The Effectiveness of the Nuclear Non-Proliferation Regime – An Institutionalist Analysis

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The Effectiveness of the Nuclear Non-Proliferation Regime – An Institutionalist Analysis

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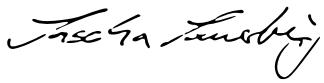
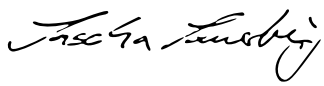
Signed: 

DECLARATION OF ANY PREVIOUS SUBMISSION OF THE WORK

The material presented here for examination for the award of a higher degree by research has not been incorporated into a submission for another degree, with the exception of comments on the term *rationality* (in Chapter 1) and reflections on the international enforcement measures against the Iranian nuclear program (in Chapter 4), which were part of my master's thesis "Tehran under Transatlantic Sanctions: A Rational Choice Perspective" submitted to the University of Bath in September 2011.

Signed: 

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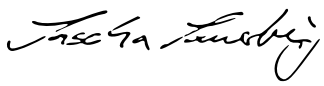
Signed: 

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Abstract

Nuclear weapons are the most destructive weapons in military history. Their threat to human kind is at the core of the nuclear non-proliferation regime. The regime is aimed at countering the spread of nuclear weapons and advancing their disarmament, while supporting the peaceful use of nuclear energy. State compliance is built upon three systems of cooperation: 1. The commitment system refers to what states commit (not) to do in order to counter nuclear weapons; 2. The verification system contains the monitoring and verification of compliance; 3. The enforcement system provides for responses to cases of non-compliance by a state.

This thesis analyzes the effectiveness of the non-proliferation regime by assessing and explaining states' commitment to and their compliance with the regime. The work comprises a qualitative study of the regime's three systems (commitment, verification, and enforcement) including an evaluation of different institutionalist modes of explanation for state behavior (security, norms, economics, and status). By developing a three-dimensional model to assess regime effectiveness, the work offers a conceptual contribution for the study of security regimes. At the same time, applying different perspectives for (non-)cooperation allows for a better understanding of state behavior within the non-proliferation regime.

List of Abbreviations

ABACC	Brazilian-Argentine Agency for Accounting and Control
ABM Treaty	Anti-Ballistic Missile Treaty
AP	Additional Protocol
BTW	Biological and Toxin Weapons
BWC	Biological Weapons Convention
CD	Conference on Disarmament
CSA	Comprehensive Safeguards Agreement
CTBT	Comprehensive Test Ban Treaty
CTBTO	Comprehensive Test Ban Treaty Organization
DPRK	Democratic People's Republic of Korea
FM(C)T	Fissile Material (Cutoff) Treaty
HEU	Highly Enriched Uranium
HI	Historical Institutionalism
IAEA	International Atomic Energy Agency
ICAN	International Campaign to Abolish Nuclear Weapons
IMS	International Monitoring System
INF Treaty	Intermediate Range Nuclear Forces Treaty
IR	International Relations
ISA	Item-Specific Agreement
JCPOA	Joint Comprehensive Plan of Action
MIRV	Multiple Independently Targetable Reentry Vehicles
MAD	Mutually Assured Destruction
NATO	North Atlantic Treaty Organization
NPT	Non-Proliferation Treaty
NNWS	Non-Nuclear Weapon State
NTM	National Technical Means
NWFZ	Nuclear-Weapon-Free Zone
NWS	Nuclear Weapon State
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean
P5	Permanent Members of the United Nations Security Council
PAROS	Treaty Preventing an Arms Race in Outer Space
PSI	Proliferation Security Initiative
PrepCom	Preparatory Commission

RCI	Rational Choice Institutionalism
SAGSI	Standing Advisory Group on Safeguards Implementation
SALT	Strategic Arms Limitation Talks
SI	Sociological Institutionalism
SORT	Strategic Offensive Reductions Treaty
SQP	Small Quantities Protocol
START	Strategic Arms Reduction Treaty
TTBT	Threshold Test Ban Treaty
UNSC	United Nations Security Council
UNSCOM	United Nations Special Commission
UNMOVIC	United Nations Monitoring, Verification and Inspection Commission
VOA	Voluntary Offer Agreement
WMD	Weapons of Mass Destruction
WMDFZ	Weapons of Mass Destruction Free Zone

1. Assessing and Explaining Regime Effectiveness – The Concept

1.1. International Regimes and Nuclear Weapons

1.1.1. Introduction

> "I was just 13 years old when the United States dropped the first atomic bomb, on my city Hiroshima. I still vividly remember that morning. At 8:15, I saw a blinding bluish-white flash from the window. I remember having the sensation of floating in the air.
>
> As I regained consciousness in the silence and darkness, I found myself pinned by the collapsed building. I began to hear my classmates' faint cries: 'Mother, help me. God, help me.'
>
> Then, suddenly, I felt hands touching my left shoulder, and heard a man saying: 'Don't give up! Keep pushing! I am trying to free you. See the light coming through that opening? Crawl towards it as quickly as you can.' As I crawled out, the ruins were on fire. Most of my classmates in that building were burned to death alive. I saw all around me utter, unimaginable devastation."
>
> (Thurlow, 2017)

With these dramatic words, Setsuko Thurlow describes her experience of the nuclear bombing of Hiroshima in August 1945 as part of the Nobel laureate speech on behalf of the International Campaign to Abolish Nuclear Weapons. There could not have been a more suiting place for her recollections. Thurlow's account is not just a constant reminder of the destructive force of nuclear weapons. It also urges the international community to prevent a nuclear explosion from happening again.

The threat of nuclear weapons has been at the core of the nuclear non-proliferation regime. The regime is aimed at countering the spread of nuclear weapons and advancing their disarmament, while supporting the peaceful use of nuclear energy. The Non-Proliferation Treaty (NPT)[1] – the "cornerstone of the regime" – provides for the main behavioral guidelines for state parties. Nuclear Weapon States (NWS), i.e. China, France, Russia, the United Kingdom, and the United States of America, pledge to pursue disarmament and not to support other states in the acquisition of nuclear weapons. All other states under the treaty (Non-Nuclear Weapon States – NNWS) commit not to pursue nuclear weapons.

50 years after the treaty opened for signature, the number of states that have a nuclear

[1] Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968. Hereafter "Non-Proliferation Treaty (NPT)."

arsenal remains relatively small. The United States of America and Russia have significantly lowered their nuclear weapon stocks following the end of the Cold War. South Africa, Belarus, Kazakhstan, and Ukraine have given up nuclear weapon capacities altogether. Furthermore, nuclear weapon tests have become increasingly rare.

But the history of the non-proliferation regime is also marked by shortcomings. First, some Non-Nuclear Weapon States have developed nuclear weapon programs. North Korea started its program while being party to the NPT, then withdrew from the treaty and successfully established and expanded a nuclear arsenal. Second, beyond the reach of the NPT, India, Pakistan, and presumably Israel have developed nuclear weapons. Third, global disarmament is nowhere near to being a reality. There are still more than 14,000 nuclear weapons[2] and the existing fissile material suffices for tens of thousands more (e.g. Reed, 2019, pp.495–6). Rather than giving up their nuclear arsenals, Nuclear Weapon States have put modernization processes in place.

Research Question

The mixed track record of the regime raises an important question that constitutes the research question of this thesis: "What determines the effectiveness of the non-proliferation regime?" This work is by no means the first to address the issue. However, although scholars have assessed and explained the regime's effectiveness for decades,[3] the effectiveness of the regime as a whole remains surprisingly understudied.

The amount of research has made the field somewhat confusing. In addition to differing in their explanatory approaches, scholars vary in their understandings of the scope of the regime[4] as well as its effectiveness. More specifically, publications tend to demonstrate a narrow understanding of the nature of the nuclear threat, the regime task, or the degree of regime effectiveness.[5] Finding a common basis for analysis is difficult.

The lack of a convincing concept to analyze the effectiveness of the non-proliferation regime in its entirety is where the motivation for my work is rooted. Without a common

[2] This number includes retired nuclear warheads awaiting dismantlement. Throughout my analysis I will focus on nuclear weapons in military service. These "stockpiled" warheads are either deployed or in reserve.
[3] See e.g. Iklé (1961), Cirincione (2000b), Miles (2002), Mærli and Lodgaard (2007), Pilat (2007), Rublee (2008), Abe (2010), Feiveson *et al.* (2014). The analyses are often connected with the possible improvement of the regime.
[4] A particular point of contention here is to what extent disarmament and horizontal proliferation should be "linked" (see e.g. Knopf, 2014).
[5] Rare efforts to develop more comprehensive concepts of regime effectiveness include Fields and Enia (2009), Enia and Fields (2014), and Kaplow (2015).

ground, academic and political discussions about past achievements and future measures in the nuclear realm are bound to face obstacles. It would be easy to give up and say: "Too many cooks spoil the broth." Instead, it is my goal to accommodate the different facets of the regime.

Approach

This thesis is aimed at assessing and explaining the effectiveness of the non-proliferation regime in an integrating and nuanced manner. I pursue a wide-ranging analysis that refrains from blanket statements about the state of and causes for regime effectiveness. Overall, the work comprises a qualitative study of state behavior in the light of the regime's three roles: *commitment*, *verification*, and *enforcement*. The fundamental question deriving from a focus on state behavior within the regime is: "What determines whether states commit to and comply with the regime?" To respond to this narrowed research question, I must do both – *assess* and *explain* (non-)cooperation within the regime.

For an assessment of states' commitment to and compliance with the regime, I will develop a three-dimensional model that accounts for different *regime tasks*, *policy fields,* and *stages of effectiveness*. This model allows for a precise judgement on where the regime demonstrates a high or low level of effectiveness (dependent variable).

As regime tasks, referring to the major roles of the regime in countering the threat of nuclear weapons, the concept will identify the *commitment system*, the *verification system*, and the *enforcement system*. The policy fields, i.e. the thematic areas addressed by the regime, that I will analyze separately are the *acquisition*, *possession*, and *use* of nuclear weapons. The stages of effectiveness refer to states' pledges and compliance in countering the threat of nuclear weapons. Here, I will distinguish between *output*, *outcome*, and *impact* effectiveness.

Explaining effectiveness means looking into why states behave the way they do. I will take a glimpse at institutionalist approaches (rational choice institutionalism, historical institutionalism, sociological institutionalism) to mark off a wide spectrum of possible explanations. I will show that driving factors put forward in the literature as independent variables can be treated as *capacities* and *incentives*.

In seeking to offer a balanced and multifaceted analysis, I will examine four possible incentives that could illuminate states' (non-)cooperation with the regime: *security*, *norms*, *economics*, and *status* (independent variables). I will develop hypotheses for each

perspective. These hypotheses are meant to serve as first-cut propositions to narrow down my theoretically grounded empirical analysis. More accurately, I will conduct an examination of plausible intent by evaluating the four different modes of explanation for state behavior for each of the three regime tasks (*commitment*, *verification*, *enforcement*).

Argument

Given that the goal of my thesis is to offer a more nuanced analysis of the non-proliferation regime, this work is a testimony against simple answers in determining and explaining regime effectiveness. Singular observations should not be regarded as proof that the whole regime has succeeded or failed.[6] Nor is a single driving factor governing the effectiveness of the regime.

Rather than stating that the regime is effective or ineffective, I will point out where commitment and compliance is particularly high or low. The three-dimensional model to assess regime effectiveness put forward in this work is an excellent tool to do just that. Its three axes (*regime task*s, the *policy fields*, and the *levels of effectiveness*) are a good reflection of the potential spectrum of regime effectiveness. The model allows me to articulate achievements and room for improvement.

In the introductory chapter, I will speculate that the effectiveness of the non-proliferation regime could resemble a pyramid, as the three axes somewhat build upon one another: Enforcement is often based on verification and prior commitment. A state's use of nuclear weapons depends on its acquiring and possessing them first. The regime's countering of the nuclear weapons threat (impact), depends on states' pledges (output) and their compliance with these pledges (outcome). As effectiveness could face setbacks from one level to the other, all dimensions could be expected to shrink towards the top – like a pyramid.

My analysis will lead me to the conclusion that there are indeed arguments that would support the existence of such a "pyramid of regime effectiveness" but also significant observations that would refute it. For instance, some states do not comply with a previous

[6] For instance, I would support William Walker in criticizing pessimistic claims, particularly in the United States, that nuclear weapon tests in India and Pakistan "show that the non-proliferation regime has failed, that further nuclear proliferation is unavoidable, that adherence to the Test Ban Treaty and development of further arms control measures are undesirable, and that only nuclear deterrence is dependable" (in: Canada House of Commons, 1998).

pledge, while other states comply without making any pledge. The reality of regime effectiveness could not be expressed in a traditional geometric form.

Explaining effectiveness, I will demonstrate that all four perspectives (security, norms, economics, status) offer explanatory value for both – states' cooperation and non-cooperation within the regime. Still, there may be a tendency: Non-cooperation may be better explained with security and status considerations, whereas economic and normative concerns appear to provide plausible intent for states' commitment to and compliance with the regime.

Contribution

The main contribution of this thesis is conceptual, as it significantly adds to macroscopic analyses of regime effectiveness. To my knowledge, the existing research does not contain a model to evaluate the non-proliferation regime as a security arrangement by integrating not only the different tasks and thematic fields of the regime but also different levels of effectiveness.

By providing a nuanced layout of regime effectiveness, this work allows for a common basis for future analyses of the non-proliferation regime and presents a template for the study of other regimes. My contribution is mainly in the field of security regimes, but the effectiveness of virtually any regime could be analyzed by accounting for *regime tasks*, *policy fields*, and *levels of effectiveness*.

In order to make the model applicable to other regimes, only the exact *policy fields* may need modification. Regimes related to weapons of mass destruction (such as biological and chemical weapons) could be devided into *acquisition*, *possession*, and *use* – just like the nuclear non-proliferation regime. By contrast, for the human rights regime, these policy fields could be countering the *conduct* of (e.g. torture) and *platforms* for (e.g. institutions) human right violations and promoting the *prohibition* thereof (e.g. through the rule of law).

Using the model with slight amendments, future works can better describe the evolving effectiveness of a specific regime over time or compare the effectiveness of different regimes. In doing so, my concept enhances the literature on regime effectiveness in general as well as the non-proliferation regime in particular.

The thesis also contains some theoretical contributions. Developing an institutionalist approach in an eclectic manner, the work provides a multifaceted explanatory footing for state behavior in the non-proliferation regime. As will be shown, driving factors for state

behavior can be treated as *capacities* or *incentives*. This distinction makes independent variables more comparable. My analysis adds to the literature that examines incentives. By attributing state commitment and compliance to a variety of material and non-material driving factors (security, norms, economics, status) that are rooted in different research traditions, the work accounts for the contextual background of state behavior.

Although it is not the goal to generate new data, the thesis also offers an empirical contribution. The existing literature on nuclear non-proliferation includes many resources that I intend to utilize to judge on state behavior. I will draw on official documents, meeting records, speeches, media reports, published interviews, as well as the academic literature. Combining a broad variety of sources allows for a critical analysis and better understanding of states' (non-)cooperation within the non-proliferation regime.

Structure

The remainder of this chapter is devoted to outlining the concept of this thesis in order to not just develop a framework for analysis but also to link my work to the existing literature. I will first take a glimpse at the issue area of nuclear energy and non-proliferation as an international regime. This is also meant to underline the eclectic nature of the thesis.

Against this background, I will develop a model to assess state commitment and compliance (dependent variable). Broadly inspired by the "Oslo-Potsdam solution" to measuring regime effectiveness, I will introduce a *no-regime* and *collective optimum regime* as yardsticks for analysis, which in my case will refer to the hypothetical level of cooperation.

The second part of the concept is devoted to explaining effectiveness. I will draw on rational choice institutionalism, historical institutionalism, and sociological institutionalism as starting point for explaining state behavior. On that basis, I will elaborate four incentives as possible driving factor for state behavior: *security*, *norms*, *economics*, and *status* (independent variable).

The concept for assessing and explaining regime effectiveness will be applied in Chapters 2 – 4, which contain an analysis of the regime tasks of the non-proliferation regime. Chapter 2 is devoted to the *commitment system* of the regime. Chapter 3 analyzes the *verification system* and Chapter 4 evaluates the *enforcement system*. Using this separated approach allows for a multifaceted understanding of regime effectiveness.

The structure throughout these chapters is the same: First, I will offer an overview of how the regime plays out for the respective regime task. Although my analysis will concentrate on those state pledges that offer an added value, a brief outline of the international, regional, bilateral, and unilateral/autonomous level is necessary to provide for a fair account of the regime as a whole.

Second, the effectiveness of the respective regime task will be assessed. I will evaluate to what extent states have committed to (output) and complied with (outcome) the regime. On this basis, I can determine the degree to which the regime has been successful in achieving its norms to counter the acquisition, possession and use of nuclear weapons (impact).

Third, in each of the Chapters 2 – 4, I will conduct an evaluation of plausible intent for the explanatory perspectives of security, norms, economics, and status. The differentiation allows me to consider the extent to which a possible driving factor may contribute to states' (non-)cooperation.

Fourth, a summary of each chapter is aimed at connecting its findings to the larger concept of the thesis to determine and explain regime effectiveness. The summary facilitates a comparison of regime effectiveness and driving factors for state behavior according to the respective regime task.

As conclusion, Chapter 5 will take up the main observations of this work. I will provide an overview of ways to improve the regime as a security arrangement by briefly outlining scenarios for reinforcing and enhancing regime commitment and compliance. Although this thesis is primarily devoted to analyzing the regime's current status, possible additional avenues for countering the threat of nuclear weapons should be of interest to scholars and policy-makers alike.

1.1.2. The Issue Area: Nuclear Energy – Two Sides of the Same Coin

What makes cooperation in the nuclear field particularly interesting as object of inquiry is that it is not concerned with promoting *or* countering something. It is concerned with promoting *and* countering something, namely nuclear energy. The three pillars of the regime are: i) preventing the horizontal proliferation of nuclear weapons, ii) nuclear disarmament, and iii) the peaceful use of nuclear energy.

The non-proliferation regime finds itself in the difficult position to balance the good and the bad side of nuclear energy. The problem is that the same material that can be used

peacefully can also be used for military purposes.[7] I will briefly outline the peaceful and the military dimension of nuclear energy respectively, as their coexistence is a key feature of the non-proliferation regime. Subsequently, I will continue by defining the non-proliferation regime as a security arrangement.

Nuclear Energy for Peaceful Purposes

> "The United States knows that peaceful power from atomic energy is no dream of the future. The capability, already proved, is here today. Who can doubt that, if the entire body of the world's scientists and engineers had adequate amounts of fissionable material with which to test and develop their ideas, this capability would rapidly be transformed into universal, efficient and economic usage?" (Eisenhower, 1953).

With these words, taken from his "Atoms for Peace" speech in December 1953, US President Dwight D. Eisenhower envisioned the peaceful use of nuclear energy on a global scale. In many ways, his dream has come true. On an international level, the cooperation to promote nuclear energy culminated in the International Atomic Energy Agency (IAEA), which facilitates medical and scientific uses as well as energy generation.

The "good uses of nuclear energy" have been advertised, among others, in a speech by former IAEA Director General Hans Blix: In the medical sector, nuclear energy is used for diagnosis and therapy. In agriculture, nuclear methods help to enhance water supplies or contribute to increasing the yield and protein content of legumes. Radiation is also used to combat the disease-transmitting tsetse fly (by sterilizing the male flies). Among the wide range of industrial nuclear applications are gauging and product improvement (e.g. polymerization) (Blix, 1996).

Also in terms of energy generation, nuclear power has been associated with different advantages, which can be summarized under the headlines "low costs," "energy independence," and "environmental advantages."[8] As stated by James Ramey, nuclear energy "provides a competitive source of energy with costs which do not vary appreciably with location […]" and offers "freedom from overreliance on foreign energy sources" (Ramey, 1973, p.11). Furthermore, nuclear energy has been described as conserving

[7] See also Spies (2006, p.407), Louka (2011, pp.89–97), and Petritz (2012, pp.97–102). Accordingly, *dual-use* items, which may have a civilian and a military purpose, pose a particular challenge to the regime. In fact, "[d]esignating something as nuclear – whether in technoscientific, political, or medical terms – carries high stakes" (Hecht, 2012, p. 4).

[8] See also Adamantiades and Kessides (2009), Miller and Sagan (2009).

traditional fuels and reducing carbon emissions (e.g. Ramey, 1973, p.11; Knapp, Pevec, and Matijević, 2010).

Some arguments in favor of nuclear power are contested. For instance, disputing the image of "low costs," Lutz Mez (2012, p.60) claims that construction and operating costs of nuclear power plants are considerably high, especially in comparison to traditional fossil-based power plants. This is not to mention nuclear catastrophes, which result in significant economic costs.[9] Further challenges deriving from nuclear energy are nuclear waste and potential health risks (Bickerstaffe and Pearce, 1980, pp.317–8).[10]

Although the global nuclear share in energy generation has declined over the last two decades, the prospects of nuclear energy remain attractive to many states. Currently, there are 413 reactors in operation in 31 countries.[11] What the role of nuclear energy will be in the future remains unclear, particularly in the wake of nuclear catastrophes as in Fukushima in 2011.[12] As a consequence of nuclear disasters, some states have abandoned nuclear energy (e.g. Mez, 2012, p.62).

Nuclear Weapons

At the core of the non-proliferation regime as a security arrangement are nuclear weapons and the "chain reaction" connected with them. First, there is a physical nuclear chain reaction that can unleash a massive destructive force. The most powerful nuclear weapon ever tested is the Soviet "Tsar Bomb," the explosion of which in 1961 was estimated as being comparable to about 50 megatons of TNT. The destructive capability of nuclear weapons, as to be seen in the nuclear bombings of Hiroshima and Nagasaki in 1945, underlines the importance of an effective regime.

Second, one could consider the metaphorical sense of a chain reaction, i.e. the proliferation of nuclear weapons. Nuclear weapons in one state may contribute to an initiation or advancement of nuclear weapon programs in another state. Following this line of thinking nuclear weapons could lead to a "domino effect" in international relations.

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[9] For instance, the economic costs associated with nuclear disaster in Chernobyl in 1986 have been estimated at £144bn (McNeill, 2011).

[10] Summarizing the development in the fields of nuclear energy, John F. Ahearne (2011, p.579) observes that while nuclear safety and non-proliferation have been enhanced, "little progress has been made in developing a permanent solution to the problem of nuclear waste and resolving public attitude issues."

[11] On the status and development of nuclear power over time see "The World Nuclear Industry Status Report" (Schneider and Frogatt, 2018, pp.16–8, 27-9, 152–72).

[12] See e.g. Louka (2011, pp.80–9), Guidolin and Guseo (2012), Varrall (2012), and Stulberg and Fuhrmann (2013).

Proliferation of nuclear weapons has a vertical and a horizontal dimension to it. Vertical proliferation refers to the expansion of an already existing nuclear arsenal. This development had its peak during the Cold War, when the Soviet Union and the United States challenged each other in a nuclear arms race. Commitments made and actions taken to decrease existing nuclear stockpiles are referred to as nuclear disarmament measures.

Horizontal proliferation refers to the development or acquisition of nuclear weapons by states that do not already have them. A fear of an increasing number of states with nuclear weapons has been voiced since the very beginning of the nuclear age. A prominent example is US President John F. Kennedy, who stated his concern during a press conference in March 1963, referring to discussions with the Soviet Union about inspections:

> "Now, the reason why we keep moving and working on this question, taking up a good deal of energy and effort, is because personally I am haunted by the feeling that by 1970, unless we are successful, there may be 10 nuclear powers instead of 4, and by 1975,15 or 20" (Kennedy, 1963).

Against the background of the peaceful uses of nuclear energy, the goal of the nuclear non-proliferation regime is to counter the spread of nuclear weapons. Looking at the coexistence of the peaceful and military uses of nuclear energy, the question appears legitimate whether the spread of knowledge, material, and equipment contributes to a proliferation of nuclear weapons. Whether a direct connection can be made is subject to academic debate.[13]

In my thesis, I will focus on the state as the primary agent and, thus, as a starting point for the analysis. It is the state which is (made) responsible for nuclear weapon programs. Treaties and other agreements – such as the NPT, Nuclear-Weapon-Free Zones, test bans, or disarmament agreements – are all based on state commitments. The primary point of reference for the verification and enforcement of the non-proliferation regime is also the state.

Since the effectiveness of the non-proliferation regime is largely based on state compliance it is more precise to narrow down the research question to: "What determines whether states commit to and comply with the principles, norms, rules and decision-making procedures that make up the non-proliferation regime?"

There should be no doubt that individuals and groups with and without an official role within a state play an important role in the non-proliferation regime. Changes in government

[13] See e.g. Bickerstaffe and Pearce (1980, pp.313–4), Fuhrmann (2009), Gartzke and Kroenig (2009), Bluth *et al.* (2010), and Varrall (2012).

may lead to changes in the representation of the state in dealing with non-proliferation commitments.[14] Non-governmental actors, in turn, demonstrate their importance in the peaceful use of nuclear energy, illicit nuclear trade, and nuclear terrorism.[15] Following the terrorist attacks of 9/11, the regime has increasingly taken aim at the dangers of fissile material, nuclear weapons, or "dirty bombs"[16] in the hands of non-state actors.[17]

1.1.3. The Non-Proliferation Regime

International Regimes in International Relations

Before discussing the effectiveness of the non-proliferation regime, I explain what I mean by the term "international regime" and clarify its meaning in the context of nuclear weapons. I want to do so critically, since the regime approach – as every concept in International Relations – has been confronted with criticism.

Although speculations were made that "[r]egimes may be a passing fad" (Strange, 1983, pp.338–341), the last four decades have shown that regime formation, regime change, and regime effectiveness have been of a major interest to scholars world-wide. International regimes have gained increasing interest in the 1980s (Kratochwil and Ruggie, 1986, pp.759–763) and have become an essential tool in the analysis of international institutions by the 1990s (Zimmerling, 1996, p.1).

Students of international regimes have been concerned with issues like the environment (Helm and Sprinz, 2000; Young and Levy, 1999), trade (Lipson, 1983), finance (Cohen, 1983), minority rights (Galbreath and McEvoy, 2012), arctic governance (Hønneland and Stokke, 2007) or security regimes, such as the chemical weapons control regime (Kelle, 2004) and, of course, the nuclear non-proliferation regime (Miles, 2002), to name just a few.

There is no single ontology of international regimes. Already in the first decade of the

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[14] For instance, as will be examined more closely in the section on the enforcement system of the non-proliferation regime, changes in the political leadership in the United States of America have resulted in different stances in dealing with (potential) proliferation cases such as North Korea or Iran.

[15] Considering the numerous publications that focus on nuclear terrorism (e.g. Allison, 2004; Ferguson and Potter, 2005), one might argue that terrorist groups deserve particular attention when assessing the effectiveness of the non-proliferation regime. Given the complexity of producing a nuclear bomb, the acquisition of nuclear weapons by non-state actors is largely influenced by a state's ability to protect its facilities and to counter illicit trafficking.

[16] "Dirty bombs" are explosives that do not have the destructive force of nuclear weapons but the explosion of which results in the spread nuclear material.

[17] See e.g. Kelle and Schaper (2003), Allison (2004), Ferguson and Potter (2005), as well as Jenkins (2006).

development of the concept, different interpretations became apparent.[18] International regimes have attracted neoliberal institutionalists but also realists and constructivists. Hence, it would appear unfit to attribute "international regimes" to a single paradigm.

My approach to regime effectiveness in this work is eclectic in nature. I will refrain from conducting a larger discussion between IR schools, but instead, particularly when identifying independent variables, will apply findings that are rooted in different schools of thought. In doing so, my approach is in line with "analytical eclecticism," which has gained prominence in recent years.[19]

The reason to use an eclectic approach is twofold. On the one hand, I want to do justice to the fact that the literature on international regimes today rests on different paradigms. On the other hand, an eclectic approach allows my analysis a more nuanced response to my research question.

As noted by Sil and Katzenstein (2010, p.1) in their seminal work on "analytical eclecticism," choosing one paradigm over the other may limit understanding. Different schools of thought may complement rather than contradict each other (see also Sil and Katzenstein, 2010, pp. 31–4). Accordingly, I will include different explanations for state behavior in my analysis.

The decision to use an eclectic approach may underline a point of criticism made by Susan Strange on the regime literature. According to her, "'[r]egime' is yet one more wooly concept that is a fertile source of discussion simply because people mean different things when they use it" (1983, pp.342–3). Given the broad spectrum of publications on regimes mentioned above, Strange's point is well taken. In addition to ontological vagueness,[20] some scholars have criticized the epistemology[21] or the operationalization of the concept (see e.g.

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[18] Haggard and Simmons (1987) make out structural, game-theoretic, functional, and cognitive approaches to international regimes.

[19] *Analytical eclecticism* is one form of *pragmatism* in IR research. Other forms include, for instance, *abduction* and *theory synthesis* (see e.g. Friedrichs and Kratochwil, 2009, pp. 707–11). According to Katzenstein and Sil (2008, pp. 110–1), "analytical eclecticism" signifies that "features of analyses in theories initially embedded in separate research traditions can be separated from their respective foundations, translated meaningfully, and recombined as part of an original permutation of concepts, methods, analytics, and empirics." Research would qualify as "analytical eclecticism," if it meets three criteria – all of which are also met by this thesis: "an open-ended problem formulation," "a complex causal story featuring mechanisms from multiple paradigms," and "a pragmatic engagement with issues of policy and practice" (Sil and Katzenstein, 2010, p. 43).

[20] Ontological vagueness may result from different understandings of what exactly belongs to a regime (e.g. Zimmerling, 1996).

[21] There has been criticism of a positivistic outline of regime analysis. Kratochwil and Ruggie (1986, p.764) criticize the reflexivity of behavior and meaning in the regime literature, concluding that epistemology actually refutes ontology. The authors demand that rather than limiting on positivist understandings, scholars should consider the value of interpretive epistemologies (Kratochwil and Ruggie, 1986, p.765).

Zimmerling, 1996).

Taking these points of criticisms seriously, "[t]he only cure for wooliness and imprecision is, of course, to make the concept of regimes less so" (Kratochwil and Ruggie, 1986, p.763). After defining the term "international regime," I will develop a model to determine and explain regime effectiveness in the non-proliferation regime in a structured way. In doing so, this thesis champions the major advantage of a regime approach, i.e. a nuanced understanding of international cooperation in the field of nuclear weapons. The model also entails a template for other scholars, hopefully making the assessment of regime effectiveness less "wooly."

A Definition of International Regimes

The formulation "international regime"[22] was coined by John Ruggie (1975, p.569) as "sets of mutual expectations, generally agreed-to rules, regulations and plans, in accordance with which organizational energies and financial commitments are allocated." Ruggie shows that international cooperation and institutions are multifaceted by pointing out different core elements of regimes: expectations, rules, and an organizational dimension.

Over the last four decades, other definitions of the term have been put forward.[23] These shall not hide the fact that the regime literature commonly uses the very same definition of "international regimes," as offered in the 1983 volume edited by Stephen D. Krasner. The definition will also be used in this thesis.

Following Stephen D. Krasner (1983c, p.2), international regimes can be defined "as sets of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations." The definition has three advantages: it is comprehensive, yet precise; it takes subject, object, and circumstances into account; its frequent application facilitates a common starting point of past contributions and, hence, a link for the added value of this work.

A valid question is whether the elements of the definition represent a "conjunction" or a "disjunction" (Zimmerling, 1996, pp.5–6). Put differently, do all elements need to be given in order to make up a regime or is it enough that one or a few elements are given? This

[22] Since this work is aimed at contributing to the literature of International Relations, rather than comprehensive domestic analyses, the term "regime" will be used interchangeably with "international regime."
[23] These will not be outlined here. Other authors have discussed definitions of "international regimes" (e.g. Rowlands, 1992, pp.25–7; Zimmerling, 1996, pp.1–5; Haggard and Simmons, 1987, pp.493–6).

question is important, but not crucial for this thesis, since the nuclear non-proliferation regime reflects all elements mentioned above. In order to operationalize Krasner's definition, I will apply its different elements on the non-proliferation regime in the next subsection.

Recently, there has been an increasing interest in regime complexity.[24] These works focus on the nature, causes, and consequences of the coexistence of international regimes. While scholars appear to agree as to how different regimes may relate to each other,[25] there remain significant differences in the identification of complexes and the added conceptual value of the approach. A sheer organizational cluster can be analyzed through the lens of the traditional regime approach.

Conceptual value of regime complexes has been provided by a precise definition of a regime complex by Orsini, Morin, and Young,[26] which identifies the *problematic* nature of a network of regimes as a core element. As the main principles and norms of the non-proliferation regime (as defined in this work) are coherent rather than problematic, I will refrain from applying the concept of regime complexity.

This is not to say that an analysis of regime complexes in the nuclear field is not worth taking. In addition to the non-proliferation regime, I would identify a nuclear deterrence regime.[27] Arguably, individual regimes could also be drawn around the peaceful use of nuclear energy or illicit fissile material trafficking.

Applying the Definition on the Non-Proliferation Regime

How does Stephen D. Krasner's definition of "international regimes" relate to the issue area of nuclear non-proliferation? In order to apply the regime approach in this thesis, it is worth looking into what is meant by the different elements that make up a regime and then

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[24] See e.g. Alter and Meunier (2007), Orsini, Morin, and Young (2013), Galbreath and Sauerteig (2014).

[25] There may be "*parallel regimes* (where there is no formal or direct substantive overlap), […] *overlapping regimes* (where multiple institutions have authority over an issue, but agreements are not mutually exclusive or subsidiary to another) and *nested regimes* (where institutions are embedded within each other in concentric circles, like Russian dolls) (Alter and Meunier, 2009, p.15).

[26] According to whom a regime complex is "[…] a network of three or more international regimes that relate to a common subject matter; exhibit overlapping membership; and generate substantive, normative, or operative interactions recognized as potentially problematic whether or not they are managed effectively" (Orsini, Morin, and Young, 2013, p.29).

[27] A similar observation, although not taking a regime approach, was made by William Walker (2000). He argues that during the Cold War, a normative "nuclear order" was shaped which was based on a "managed system of deterrence" and a "managed system of abstinence" (Walker, 2010, pp.704–10).

to translate the elements into the international field of nuclear non-proliferation. Krasner defines the regime elements as follows:

> "Principles are beliefs of fact, causation, and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice" (Krasner, 1983c, p.2).

In the understanding of this work, the core principle of the non-proliferation regime is that the acquisition, possession, and use of nuclear weapons is dangerous.[28] There are more narrow understandings that focus on the horizontal proliferation of nuclear weapons as the main threat (e.g. Keohane, 2005, p.57). Considering that the Non-Proliferation Treaty puts an emphasis on the spread of nuclear weapons, such a narrow interpretation appears legitimate.

Yet, a limitation to the fear that new states acquire nuclear weapons constraints the scope of the regime. There is a greater principle at stake, namely that nuclear weapons in general are dangerous. Even nuclear deterrence is based on the same principle but draws different conclusions.[29]

Another principle that could be identified in the regime is that nuclear energy for civilian uses offers benefits. As this thesis focuses on the regime as a security arrangement, I will not treat this aspect as a separate principle. Consequently, I will not discuss the norms and rules that relate to assistance in the peaceful use of nuclear energy.

Norms in the regime are the "standards of behavior" derived from the core principle. They are non-proliferation (states without nuclear weapons refrain from acquiring nuclear weapons), disarmament (states that possess nuclear weapons disarm), and the non-use of nuclear weapons (refrain from using nuclear weapons).

Some scholars limit their understanding of regime norms to non-proliferation, while arguing that the Nuclear Weapon States in the NPT have been granted the right to possess nuclear weapons (e.g. Kroenig, 2014, p.11). I disagree. Downplaying the normative

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[28] Given the principle of the regime, it may be more accurate to call the regime "nuclear weapons regime." I refrain from doing so for two reasons. First, the cornerstone of the regime – though not the only element – is the Non-Proliferation Treaty. It makes sense, to use a name for the regime accordingly. Second, the formulation "non-proliferation regime" is used more commonly. Although the semantics may not be precise, I do link my research to previous works using the same term. Rather than changing the name, I seek to affect the understanding of the regime. Given the strong academic focus on the Non-Proliferation Treaty, the formulation "NPT regime" is occasionally used interchangeably with the non-proliferation regime, see e.g. Pilat (2007).

[29] For instance, the argument is made that nuclear weapons may contribute to averting war (Waltz, 1981).

responsibility of NWS fails to grasp an essential part of the dynamics within the regime and provides a biased analytical frame.

The legal framework in the Non-Proliferation Treaty categorizes groups of states to clarify their rules, rather than granting an eternal privilege to five members. The non-proliferation norm may be more explicit than the other two norms, particularly in the Non-Proliferation Treaty. Still, part of the deal on which the NPT was built was that states with nuclear weapons disarm (e.g. Shaker, 1980, p.556). The pursuit of global disarmament was explicitly stated in Article VI of the NPT. An advisory opinion of the International Court of Justice also concluded that this article stands for an obligation of result (ICJ, 1996). The non-use of nuclear weapons is, for instance, embedded in the Comprehensive Test Ban Treaty.[30]

An argument has been made that the underlying power dynamics relating to nuclear weapons in international relations differ from the stated organizational and normative layout (Ruzicka, 2018a). Arguably, there is a difference between implicit and explicit norms, rules, and decision-making procedures. Also, there is no uniform treatment of states and there are no uniform actions of states. Still, the regime approach is a good starting point for analysis. I will make repeated references to where state actions contradict stated regime norms and rules including possible explanations for it. In addition to that, I will point to an institutional privileging of Nuclear Weapon States.

Rules include the specific behavioral guidelines for states, which may be laid out in treaties and agreements. These guidelines are narrower than the norm. A regime encompasses a complex network of rules. For example, underlining the non-proliferation norm, Non-Nuclear Weapon States part of the NPT are subject to the rule to conclude a verification agreement with the IAEA. Rules may also include financial or logistical support of organizations associated with the regime.

The distinction between norms and rules is one of the great advantages of the regime approach in general and Krasner's definition of regimes in particular. Rather than reducing compliance to a simple "yes" or "no," the regime approach enhances the explanatory capacity of compliance by allowing for a more specific assessment of state behavior. As will be shown in this thesis, a state may break a rule while complying with the norm.

Decision-making procedures refer to interactions within the regime. On the one hand, decision-making procedures are the channel used for the creation and change of norms and

[30] Comprehensive Nuclear-Test-Ban Treaty (CTBT), September 10, 1996.

rules (e.g. the United Nations). On the other hand, more relevant to the focus of this work, the procedures may refer to the implementation of the regime.

While the non-proliferation regime does not entail a clear and coherent governance structure, it still includes elements of a ladder of escalation to ensure compliance of a state. I will differentiate between commitment, verification, and enforcement system, which largely build upon one another. I choose the word "system" to indicate a functional unity that resembles one part of the regime. These systems are part of the same regime. Their linking depends on inherent decision-making procedures (e.g. between the International Atomic Energy Agency and the UN Security Council).

1.2. Assessing Regime Effectiveness

1.2.1. The Need for a Concept

In the previous section, I have defined international regimes according to Stephen D. Krasner and applied the definition to the realm of nuclear weapons. The effectiveness of a regime, as understood in this work, stands for states' commitment to and compliance with the principles, norms, rules, and decision-making procedures within the regime. The larger research question of "what determines the effectiveness of the nuclear non-proliferation regime" can be narrowed down to "what determines whether states commit to and comply with the non-proliferation regime?"

The remainder of this chapter will translate the research question into a model to assess regime effectiveness and it will develop explanatory factors for state behavior. I will clarify the dependent variable (state commitment and compliance) and independent variables (security, norms, economics, and status) used in the subsequent analysis. My goal is to further those studies that go beyond an understanding of horizontal proliferation and seek a more comprehensive understanding of the regime.

Among the books that show a comprehensive understanding of the regime are volumes that include a collection of texts on various issue areas within the regime.[31] The value of such volumes is immense, not just because they sketch out a broad scope of the regime, but also because they contribute significant empirical data. Yet, by including scholars with

[31] See e.g. Cirincione (2000b), Mærli and Lodgaard (2007), Pilat and Busch (2017), Black-Branch and Fleck (2014; 2015).

different backgrounds or by stringing together isolated texts, they tend to lack conceptual coherency.

More coherence is demonstrated in volumes and monographies that are concerned with the goal and organization of the abolition of nuclear weapons.[32] This research group looks at the nuclear fuel cycle (e.g. Feiveson *et al.*, 2014) or the roles of the regime in a broader sense (e.g. Perkovich and Acton, 2008) and propose policy measures towards the goal of a nuclear-free world. Although these texts represent a comprehensive understanding of the regime, their value is often political and normative, rather than conceptually assessing regime effectiveness.

Other comprehensive efforts to grasp the non-proliferation regime stem from books that look at non-proliferation from the perspective of international law.[33] These publications have an eye for the details that make up the rules of the non-proliferation regime. However, by definition, scholars of international law apply a legalistic frame, rather than a perspective of International Relations as part of political science. Students of law ontologically emphasize the structure and blend out other causal variables that affect behavior. Consequently, by the standards of political science, a legalistic frame would not suffice to analyze state behavior.

Fortunately, there are a number of works that focus on state behavior within the regime.[34] Scholars have addressed behavioral patterns, such as why states proliferate (e.g. Sagan, 1996; Potter and Mukhatzhanova, 2010a) or have taken a closer look at the underlying logics of nuclear deterrence (e.g. Shultz and Goodby, 2015). Scholars have also paid attention to states' (lacking) willingness to strengthen a commitment within the regime. A landmark article in this area was published by Andrew Grotto (2010), who explores why states that support the idea of non-proliferation do not subscribe to further commitments that would strengthen the regime.

The relation between the regime and state behavior deserves more academic attention. As Potter and Mukhatzhanova (2010b, p.5) emphasize, "[…] relatively few studies have sought to demonstrate the influence of non-proliferation institutions on nuclear weapons restraint."[35] In the introductory chapter to "State Behavior and the Nuclear Non-Proliferation

[32] See e.g. Perkovich and Acton (2008), Krieger (2009), Daley (2010), Hinderstein (2010), Feiveson *et al.* (2014).
[33] See e.g. Edward (1984), Joyner and Roscini (2012), Beynio (2010), Petritz (2012), Black-Branch and Fleck (2014; 2015), Caracciolo, Pedrazzi, and Vassalli di Dachenhausen (2016).
[34] The most prominent and comprehensive look behind the scenes of the corner stone of the Non-Proliferation Treaty was published by Shaker (1980).
[35] In an article published in Daedalus, William Potter (2010, pp.70–4) discusses several "sources of nuclear restraint" including the influence of *alliances*, *institutions*, *non-material incentives* or *domestic politics*.

Regime," edited by Jeffrey Fields (2014b), it is claimed for the time of writing that "[w]e know of no other published book-length treatments that explore why states cooperate with or undermine global non-proliferation efforts" (Fields, 2014a, p.2).

The 2014 volume edited by Fields represents a good point of reference for analyzing the effectiveness of the non-proliferation regime. It acknowledges the role of state behavior as a defining characteristic of regime effectiveness and provides insight into different behavioral explanations. The volume will, therefore, be taken into consideration when developing independent variables (Point 1.3. of this thesis).

Enia and Fields (2009) have even put forward a behavioral model, based on findings by Haggard and Simmons (1987). Enia and Fields propose and examine five "dimensions" as indicator for "regime health": *Normative Foundations*, *Scope*, *Strength*, *Organizational Form*, *Allocation Mode* in the nuclear non-proliferation regime. In the 2014 volume edited by Fields, the authors offer a revised model (including *Normative Features*, *Institutional and Organizational Features*, *Behavioral Features*) to assess and compare the effectiveness of the biological and chemical weapons regime (Enia and Fields, 2014).[36]

The work by Enia and Fields is conceptually important to the literature on the nuclear non-proliferation regime, as it offers a more nuanced understanding of the regime. However, it also includes some shortcomings. While their framework includes an excellent overview of topics that need to be considered when considering regime effectiveness and although the authors exemplify interactions between the categories, the aspects appear rather isolated towards each other.

Another effort of applying a behavioral concept of *effectiveness* is a research project by Jeffrey Kaplow, who examines the constraining power of security institutions by undertaking a quantitative study of state compliance in the non-proliferation regime. Kaplow argues that the institutional track record may affect states' compliance. In other words, regime effectiveness is based on the perception that other states comply with institutional commitments. The quantitative model also accounts for verification and enforcement (Kaplow, 2015).

Yet, Kaplow's research has two main drawbacks – one is methodological, the other is conceptual. Using a quantitative approach for an explanatory research is confronted with the epistemological challenges. It fails to account for the complexity of state behavior and

[36] Among the *Behavioural Features* are "specific aspects" such as *verification*, *compliance*, and *enforcement*, which will also be considered in the analytical model developed in this work (Enia and Fields, 2014, p. 45).

questions the reliability of the data.[37] Furthermore, Kaplow (e.g. 2015, p.40) acknowledges that disarmament plays a role in the regime, but chooses not to integrate the aspect into his model but instead makes a rudimentary reference to it.[38]

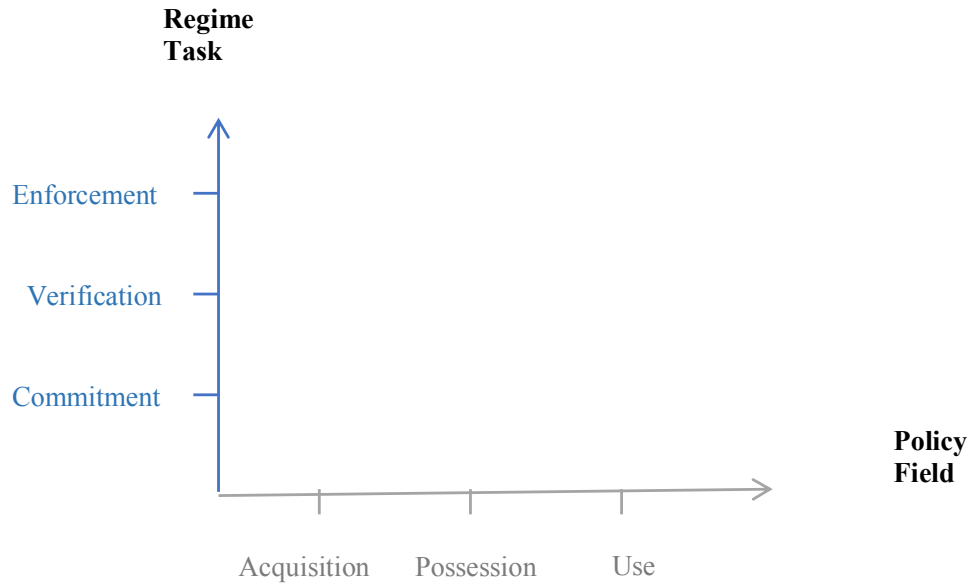
My goal is to build a more comprehensive framework. Enriching the current debate by providing a comprehensive study of the non-proliferation regime, this thesis is aimed at using an institutionalist perspective to determine and explain regime effectiveness. In doing so, it conceptually adds to two partially overlapping strands of regime effectiveness analyses of the regime: the determination (*what?*) and the explanation (*why?*) of regime effectiveness. Accordingly, the remaining chapter is divided into two main parts: I) assessing regime effectiveness (this section) and II) explaining regime effectiveness (next section).

1.2.2. Conceptualizing the Non-Proliferation Regime

As a starting point for a comprehensive model to assess regime effectiveness, I want to categorize the various thematic fields within the regime as well as the different regime tasks. The combination of both elements lay out the scope of the non-proliferation regime as a security arrangement, which can be summarized in the overview below (Figure 1). The policy field refers to the thematic areas surrounding the threat of nuclear weapons. The regime task describes the main roles of the regime in countering that threat.

[37] Kaplow (2015, pp.50–7) himself describes some "potential objections," including uncertainty and nuclear secrecy. On the challenges of quantitative studies in the field of non-proliferation see also Montgomery and Sagan (2009).
[38] See e.g. Kaplow's reference that disarmament was part of the NPT negotiation (Kaplow, 2015, pp.96–7).

Figure 1 – Regime Tasks and Policy Fields



I) Policy Fields

The three pillars of the non-proliferation regime are the horizontal proliferation of nuclear weapons, nuclear disarmament, and the peaceful use of nuclear energy. The obvious thing to do is to use these pillars as the major policy fields in the regime. Still, I refrain from following this categorization, as the three pillars are too bulky for an integrated model. I seek a more coherent abstraction in which the elements build upon one another while acknowledging the comprehensive scope of the regime. This approach makes it easier to see connections between the pillars of the regime and allows the eventual model to be applied on other regimes.

Although the Non-Proliferation Treaty is considered to be the cornerstone of the regime (see also Enia, 2014, pp.20–1), focusing exclusively on the treaty when identifying policy fields would be too narrow an understanding (see also Cirincione, 2000a, p.284; Fields, 2014a, p.12). In addition to organizations, such as the International Atomic Energy Agency (IAEA), the United Nations Security Council, or the Conference on Disarmament, various agreements can be associated with the regime:[39]

- Non-Proliferation Treaty (NPT)
- Comprehensive Test Ban Treaty (CTBT) and Partial Test Ban Treaty (PTBT)[40]

[39] Given the complexity of the nuclear non-proliferation regime, there are more organizations and agreements that could be mentioned. Since this chapter is aimed at developing a concept, a short list should suffice.
[40] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, August 5, 1963.

- Nuclear Supplier Controls
- Nuclear-Weapon-Free Zones (NWFZs)
- Bilateral Agreements (mainly between US and Soviet Union/Russia)
- International Convention for the Suppression of Acts of Nuclear Terrorism[41]
- Treaty on the Prohibition of Nuclear Weapons[42]

These agreements demonstrate that the regime tackles the threat of nuclear weapons in different ways. More accurately, it addresses varying stages in the development and use of nuclear weapons. The regime focuses on the *acquisition* (production of fissile material, trade, and assistance), *possession* (stationing of nuclear weapons, nuclear disarmament, and nuclear reversal[43]) and *use* (strategic application of nuclear weapons, negative security assurances, and nuclear weapons tests) of nuclear weapons.

The policy field of the *acquisition* of nuclear weapons primarily targets Non-Nuclear Weapon States. These states may only use fissile material, nuclear facilities, and related equipment for peaceful purposes. Using the same material for developing nuclear weapon devices is prohibited. Nuclear Weapon States have committed themselves only to trade fissile materials for peaceful purposes and not to assist other states in their pursuance of these weapons.[44]

The policy fields of *possession* and *use* of nuclear weapons first and foremost address Nuclear Weapon States as well as states outside the NPT.[45] The possession of nuclear weapons refers to discussions related to the existence of nuclear stockpiles, including bilateral disarmament agreements between the United States of America and Russia/the Soviet Union. The use of nuclear weapons contains their strategic use and nuclear tests.

Despite various commitments to the contrary, Non-Nuclear Weapon States play a subordinate role in the possession and use of nuclear weapons. If a Non-Nuclear Weapon State keeps its commitment not to pursue nuclear weapons, any commitment regarding the possession or use of nuclear weapons only provides limited added value.

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[41] International Convention for the Suppression of Acts of Nuclear Terrorism, April 13, 2005.
[42] Treaty on the Prohibition of Nuclear Weapons, July 7, 2017.
[43] *Nuclear reversal* as understood in this work describes a case in which a state that possesses nuclear weapons ends its nuclear weapons program and completely disarms. For a critical discussion of the terminology see e.g. Pelopidas (2015b).
[44] As to be seen in Article I of the NPT and the Guidelines of the Nuclear Suppliers Group.
[45] Non-Nuclear Weapon States still play a role in that they may host nuclear weapons on their territory. It has even been argued that the Non-Proliferation Treaty was intentionally formulated vaguely to accommodate *nuclear sharing* within NATO (Khalessi, 2015).

As mentioned before, there is a tendency to limit the non-proliferation regime to the horizontal spread of nuclear weapons. Including *possession* and *use* of nuclear weapons as policy fields allows for a more comprehensive and nuanced reflection of the regime. Achievements or shortcomings in one area can be considered in a more isolated manner, rather than binarily labeling the overall regime a success or failure.[46]

II) Regime Tasks

The non-proliferation regime also comprises different roles. To categorize them, it is worth considering the major tasks assigned to it. Delegating authority to an organizational structure reflects a sense of purpose from which a certain task can be deduced. According to Bradley and Kelley (2008, pp.10–7), there are eight different types of delegated authority: *legislative*, *adjudicative*, *regulatory*, *monitoring and enforcement*, *agenda setting*, *research and advice*, *policy implementation*, and *redelegation*.

Looking at the main organizations and agreements within the non-proliferation regime shows that it would certainly qualify for a variety of these categories. However, the regime's most important role is to establish cooperation and ensure compliance in accordance with the regime's norms.

Hence, considering Bradley and Kelley's types of delegated authority, this thesis will focus on the aspects of *legislative* (in the following *commitment*), *monitoring* (in the following *verification*), and *enforcement* of the regime. Taking these tasks into account, there are three functionally different systems within the non-proliferation regime that need to be considered when discussing effectiveness:

- The commitment system
- The verification system
- The enforcement system

The *commitment system* refers to what states commit (not) to do in order to counter the acquisition, possession, and use of nuclear weapons. Commitments resemble behavioral guidelines for states and reflect the principles, norms, rules and decision-making procedures

[46] The policy field is a crucial part for determining effectiveness, as it further defines the possible scope of regime effectiveness. Differentiation of policy fields helps to determine the "relative success" of the regime (formulation borrowed from: Fields, 2014a, pp.2–3).

that make up the regime. Commitments also serve as points of reference when it comes to evaluating compliance.

The main responsibility of the *verification system* is to verify that states comply with norms and rules relating to the acquisition, possession, and use of nuclear weapons. Although several institutions fall into this category (e.g. Euratom or the Comprehensive Test Ban Treaty Organization), the most important body is the International Atomic Energy Agency (IAEA).

The *enforcement system* resembles the institutionalized attempt to alter state behaviour towards compliance.[47] These means may include positive or negative incentives using political, economic, or military means. The enforcement system is mainly triggered by the verification system of the regime. Most notably, the IAEA may report a case to the UN Security Council, if non-compliance or non-cooperation of a member state is detected (Article XII.C, IAEA Statute).[48]

Many publications put an emphasis on specific regime tasks in their analyses (either commitment,[49] verification,[50] or enforcement[51]). Considering that the respective analysis has more room to examine an aspect more closely, concentrating on one aspect not only makes sense but is beneficial. Still, the respective focus comes at a conceptual sacrifice, limiting a work's ability to draw broader conclusions. Even when looking at publications that address more systems (e.g. Asculai, 2004; Ford, 2005; Hinderstein, 2010), there is a lack of comprehensive and systematic analysis of the regime tasks along the lines of all policy fields.

This thesis promotes an inclusive assessment of the regime and its effectiveness, including the different regime tasks and policy fields. Taking into account both aspects allows for a systematic assessment of the regime (see Figure 1 above). Given that the primary division of labor among the institutions in the nuclear non-proliferation regime is based on the task of the respective system rather than the various policy fields, the chapters in the analysis of the thesis are divided along the lines of the three regime tasks: the commitment system, the verification system, and the enforcement system.

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[47] Enforcement tools are "instruments of statecraft specifically geared to change the target state's behavior" (Solingen, 2012a, p.5).
[48] The Statute of the International Atomic Energy Agency, July 29, 1956, as amended up to December 28, 1989.
[49] See e.g. Beynio (2010), Grotto (2010), and Horovitz (2014).
[50] See e.g. Goldschmidt (1999), Caughley (2016) Busch and Pilat (2017), and Bowen (2018).
[51] See e.g. Müller (2000), Speier, Chow, and Starr (2001), Butler (2003), and Solingen (2012b).

1.2.3. Conceptualizing the Assessment of Regime Effectiveness

How can we translate the non-proliferation regime, including its regime tasks and policy fields, into an analytical frame for the analysis of this work? How can we assess regime effectiveness? A response to these questions requires various considerations. Similar to an approach presented in a volume by Miles *et al.* (2002), I will proceed by addressing three steps:

- What is the *object* of evaluation?
- What is the *standard* of evaluation?
- What *tools* can we use to compare the object against the standard?

(Underdal, 2002, p.5)

What is the *object* of evaluation (dependent variable)?

Students of International Relations agree that there is no single appropriate object that needs to be addressed when assessing regime effectiveness. As Alexander Kelle (2003, p.98) points out, scholars have focused on two questions: "(1) whether regimes affect state behavior in an issue area, and (2) whether regimes have an impact on the observable data in the issue area they regulate."[52]

Translating these two aspects into an example of an environmental regime, one could say that the first question addresses the extent to which a state implements measures to lower carbon emissions as agreed on the international level. The second question could then refer to whether the whole regime, by using measures such as lowering carbon emissions in member states, has been successful in countering global warming.

Also Young and Levy (1999, p.10) underline that the domain of effects are multifaceted. They put forward three possible groups of effects: (1) "effects within the behavioral complex […] and effects external to the behavioral complex;" (2) "direct and indirect effects;" and (3) "effects that help to solve a problem and effects that make it worse" (Young and Levy, 1999, p.10). While the categories presented by Young and Levy are a helpful tool to broaden the understanding of effects, they are rather difficult to operationalize.

More precise and easier to apply is a categorization put forward in the volume by Miles *et al.* (2002). Their three object categories *output*, *outcome*, and *impact* represent different stages of regime effectiveness. *Output* stands for "regime formation" (i.e. signing an agreement on the international level, ratification on the domestic level). *Outcome* focuses on

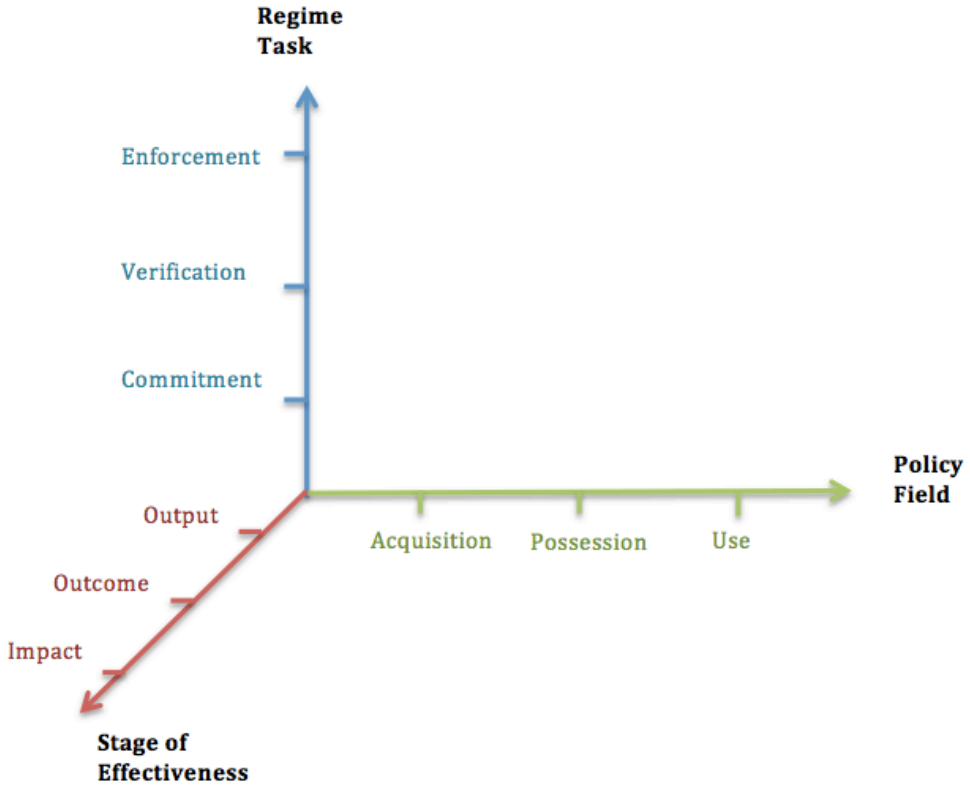
[52] A similar observation can be found in Hasenclever, Mayer, and Rittberger (1997, p.2).

the stage of "regime implementation" (target groups adapt behavior). *Impact* stands for the effect on the issue area (to what extent has a problem been resolved?) (Underdal, 2002, p.7).

The distinction between output and outcome satisfies a demand by Jeffrey Fields, who argues: "We need to be able to explain behavior beyond the point where countries make the initial yes or no decision" (Fields, 2014a, p.1). Indeed, a state may commit but fail to comply. Furthermore, while academic literature has put an emphasis on the output and the outcome level, in one form or another, it has rather neglected the impact level (see also e.g. Frantzi, 2008, p.618). Treating the latter as a separate category allows for a better awareness of the relevance of cooperation efforts in the light of the issue area at stake.

Although the categorization used in Miles *et al.* (2002) presents a nuanced understanding of effectiveness, its isolated use would be still too unsystematic as an object when analyzing the non-proliferation regime. After having sketched out the regime into its various policy fields and regime tasks, it makes sense to integrate these aspects into the *object* of regime effectiveness. Including the policy fields (*acquisition*, *possession*, and *use* of nuclear weapons) and regime tasks (*commitment*, *verification*, and *enforcement*) of the non-proliferation regime allows for a comprehensive three-dimensional model to determine regime effectiveness:

Figure 2 – Model of Regime Effectiveness



Hence, the dependent variable in this thesis consists of the output, outcome, and impact effectiveness of the regime. The output effectiveness primarily refers to states' (in)ability to agree upon rules for individual behavior to counter the *acquisition*, *possession*, and *use* of nuclear weapons. The impulses for behavior, as to be found in treaties or other agreements (e.g. NPT, NWFZs, safeguards agreements, test bans), can be subdivided onto the commitment level, verification level, and enforcement level.

Outcome effectiveness in the regime refers to the behavior of states according to non-proliferation rules. Are states in compliance with agreements made? Are they contradicting a rule, while still respecting the norm? Regimes also have an implicit dimension. States may adapt their behavior in accordance to non-proliferation agreements without officially committing to them.[53]

Impact effectiveness describes to what extent the threat of nuclear weapons could be countered. Put differently, to what extent could the overall regime norms on the *acquisition*, *possession*, and *use* of nuclear weapons be achieved? This includes a material and a political dimension. A state may have a strategic use for nuclear bombs, while lacking the capacities

[53] For instance, Pakistan and India have refrained from nuclear tests for two decades without signing and ratifying the Comprehensive Test Ban Treaty.

to develop them. Contrary, states may find themselves with adequate capacities without strategic use for nuclear weapons.

What distinguishes the nuclear non-proliferation regime from some other regimes is that outcome (state behavior) and regime impact (threat of nuclear weapons) are closely related to each other. If all states with nuclear weapons agreed to disarm, Non-Nuclear Weapon States promised not to proliferate, and all states fully implemented their commitment on a domestic level, there are eventually no nuclear weapons.

Against this background, the framework developed above, which focuses on state behavior, allows for a fair account of the overall effectiveness of non-proliferation regime as a security arrangement. Another advantage of the three-dimensional model is that it can easily be applied to other security regimes. For instance, in order to analyze regimes relating to conventional, biological, or chemical weapons, the only amendments that would need to be made are the policy fields, which in my model refer to nuclear weapons.

However, the model may suggest that all policy fields are equally accountable for the different regime tasks. This possible point of criticism is important. A certain regime output may for pragmatic reasons be difficult or impossible to verify or enforce (e.g. nuclear threats). Challenges in verifying and enforcing commitment will be noted accordingly in the respective chapters.

What is the *standard* of evaluation?

In developing a standard of evaluation for assessing effectiveness, Arild Underdal (2002, p.7) suggests to define a *point of reference* for a comparison and to develop a *metric of measurement*. Aiming to find a point of reference, scholars have developed different approaches. James Fearon (1991) describes two empirical options:

> "Suppose it is hypothesized that C was a cause of event E. I would argue that when experimental control and replication are not possible, analysts have available a choice between two and only two strategies for 'empirically' assessing this hypothesis. Either they can imagine that C had been absent and ask whether E would have (or might have) occurred in that counterfactual case; or they can search for other actual cases that resemble the case in question in significant respects, except that in some of these cases C is absent (or had a different value)" (Fearon, 1991, p.171).

Similarly, Levy and Young (1999, pp.16–9) propose two types of techniques: *natural or quasi-experiments* and *thought experiments*. The approach of *natural or quasi-experiments* "involves examining situations that are broadly comparable except for the

presence or absence of a regime or, alternatively, situations that remain largely unchanged over time except for alterations in the character of the prevailing regime" (Young and Levy, 1999, pp.17–8). In order to come to more reliable findings, the authors suggest to complement *natural or quasi-experiments* with *thought experiments*, more specifically the *method of counterfactuals* (Young and Levy, 1999, pp.18–9).

The *method of counterfactuals* "involves a rigorous effort to reconstruct the flow of events as it would have unfolded in the absence of some key factor (for example, a particular international code of conduct or regime)" (Young and Levy, 1999, p.18). A more comprehensive effort has become known as the "Oslo-Potsdam solution" to measuring the effectiveness of regimes (see e.g. Hovi, Sprinz, and Underdal, 2003a; 2003b; Miles *et al.*, 2002). [54] Hovi, Sprinz, and Underdal (2003b) describe the essence of this approach as follows:

> "The Oslo-Potsdam solution is an umbrella term that refers to two closely related options in empirical research […]. [These] use different scaling techniques to quantify a no-regime counterfactual (NR), a measure of actual performance (AP) of the international regime, and the determination of a collective optimum (CO)" (Hovi, Sprinz, and Underdal, 2003b, p.75).

This approach provides for two points of references, instead of one, namely the *no-regime* and the *collective optimum regime*. In accordance with a thought experiment, both yardsticks refer to circumstances that do not exist in the real world. The no-regime assumes a scenario defined by the absence of a given regime. The collective optimum regime stands for the "hypothetical state of affairs that would have come about with a perfect regime" (Helm and Sprinz, 2000, p.635).

The use of a *no-regime* and *collective optimum regime* as counterfactuals marks off the full spectrum of effectiveness. Comparing the regime against these scenarios allows for showing achievements as well as room for improvement. Hence, the two counterfactuals also provide a good reference for the analytical frame of this thesis. However, two main obstacles are embedded in the "Oslo-Potsdam solution:" 1) its original application on environmental regimes and 2) its quantitative layout.

Fortunately, using the *no-regime* and the *collective optimum regime* as two distinct yardsticks for analysis is not only limited to the environmental field, where it was applied first, but has also been used in the area of security studies. Alexander Kelle (2003) uses the two counterfactuals in his analysis of the BTW control regime. He offers a qualitative

[54] For other implementations of the approach see also Dombrowsky (2008), Sander (2013).

assessment of regime effectiveness. As *no-regime* he uses a historical counterfactual, as *collective optimum regime* he describes a scenario of "wishful thinking" (Kelle, 2003).

My approach in applying the two counterfactuals is more abstract, as I return to a core element of a regime: cooperation. Broadly speaking, a no-regime is the absence of cooperation (no commitment, no compliance) in all policy fields and regime tasks. The collective optimum regime stands for full cooperation and compliance by all actors in all policy fields and all regime tasks. Against this background, I can measure regime effectiveness against its own standard. Cooperation is relatively easy to spot, especially when it comes to formal commitments.

At the same time, my approach leaves room for critically assessing the contribution of the regime. Susan Strange (1983, p.345) argues that the term "regime" is "value-loaded in that it takes for granted that what everyone wants is more and better regimes, that greater order and managed interdependence should be the collective goal." This point of criticism is important. My model of regime effectiveness is aimed at giving a more nuanced assessment of the regime, in that it allows to acknowledge that even without cases of "managed interdependence," regime norms may be met. Accordingly, my four independent variables will include an explanation for a *no-regime* and *collective optimum regime*.

The *metric of evaluation* is another aspect to be considered according to Arild Underdal (2002, p.7) and refers to the goal of defining a certain (quantifiable) value in relation to the *point of reference*. Considering that this work is largely undertaking a qualitative study, it is appropriate and sufficient to construct an ordinal metric, rather than a cardinal one (the same approach and a similar argument was originally made by Underdal, 2002, p.10).

As a frame of evaluation, I will analyze states' behavior against the background of the three-dimensional model developed above. This means that I will consider for every regime task (commitment, verification, enforcement) the different policy fields (acquisition, possession, use) as well as level of effectiveness (output, outcome, and impact). Commitment to and compliance with the regime is determined by the examination of some indicators for cooperation:

- Content (To what extent does the commitment to and compliance with rules cover the three regime norms?)
- Degree of commitment (What loopholes are included in the rules? Have rules been ratified?)
- Durability (Is the cooperation limited in time?)

- Membership (What is the scope of states' cooperation?)

What form would effectiveness take in the three-dimensional model? The most cooperative regime would address all policy fields, regime tasks, and stages of effectiveness. A collective optimum regime would, thus, take the shape of a cube in the model. A no-regime would take no form whatsoever, since it would not meet any of the dimensions.

As a preliminary orientation, the actual effectiveness of the non-proliferation regime can be expected to resemble a pyramid. This is simply because the systems are largely built upon one another. In order to use nuclear weapons, a state first needs to acquire and possess them. The regime verifies rules to which states have committed and it enforces what has been verified. In order to achieve regime norms (impact), states need to commit to (output) and comply with (outcome) rules that achieve that goal. As every system is likely to demonstrate at least some elements of ineffectiveness, the range of effectiveness can be expected to get smaller and smaller towards the top, just like a pyramid.

What *tools* can we use to compare the object against the standard?

The thesis presents a qualitative study (with some quantitative references) of the effectiveness of the commitment system, the verification system, and the enforcement system of the nuclear non-proliferation regime. Chapters 2, 3, and 4 include individual analyses of each system in relation with the different policy fields and stages of effectiveness. I am drawing data from official documents, speeches, media reports, academic literature, published interviews, and expert accounts. On this basis, I give an account of states' commitment to and compliance with the regime (dependent variable).

The methodological structure of the assessment of the effectiveness of the regime is largely defined by the three-dimensional frame developed above and visualized in Figure 2. The model is aimed at integrating the (non-)cooperation of all states: Nuclear Weapon States, Non-Nuclear Weapon States, and states outside the Non-Proliferation Treaty. The distinction between output, outcome, and impact will help to differentiate between legal considerations as well as the actual compliance.

Measuring the different levels of effectiveness confront the thesis with some difficulties. The determination of regime output is straightforward, as it is based on treaties, other agreements, and policies that lay the foundation for expected behavior. Documents are well publicized, allowing an evaluation of output effectiveness.

Outcome effectiveness stands for opportunities as well as challenges. On a positive note, there are numerous reports, analyses, and other evaluations of state compliance regarding the rules laid out in the regime. Owing to the lack of complete information, the interpretation of degrees of compliance is difficult when looking at some specific cases, as to be seen in the interpretation of whether Iran is seeking nuclear weapons (Sanger, 2015). In order to decrease unnecessary speculation, I will outline points of contention where necessary.

The most challenging task is to evaluate the impact of the regime. I will consider how states' cooperation in one system correlates with its overall compliance with regime norms. I will draw preliminary conclusions on the material and political aspect of norm compliance. At the same time, it is important to note that a desired outcome may only be partially due to a regime.[55]

1.3. Explaining Regime Effectiveness

1.3.1. Institutionalism as Explanation for State Behavior

In order to develop independent variables for state behavior, I want to start out by taking a glance at institutionalism, which by some has been described as "the fundamental method of political science" (Wu, 2009, p.106). Beyond its frequent usage, institutionalism offers closer insight into how states interact with organizational structures. A categorization of institutionalist approaches provides a good starting point to mark off an explanatory frame.

On this basis, I will demonstrate that driving factors as put forward in the literature as independent variables can be treated as *capacities* and *incentives*. Focusing on the latter, I will subsequently outline hypotheses reflecting four perspectives for (non-)cooperation with the regime: *security*, *norms*, *economics*, and *status*. Finally, a conclusion will take up the main findings of this chapter.

Given that institutionalism has seen countless adoptions over time, the term has become very broad, summarized by the slogan "institutions matter." A broad distinction can be made between traditional institutionalist approaches that began to gain prominence in the late 19th century and those approaches that developed in the second half of the 20th century.[56]

[55] The same is true for a nuclear stand-off. Analyzing France in the context of the Cuban Missile Crisis, Benoît Pelopidas (2017) warns to overestimate human influence in handling nuclear crises and, instead, to account for *luck* in research.
[56] For an account of the development of institutionalism from the late 19th century onwards see e.g. Robertson (1993).

Today's institutionalists are particularly concerned with the extent to which an institution matters (March and Olsen, 2006).

Focusing on the departure from a fixed traditional understanding of institutionalism in IR, March and Olsen (1984) coined the term "new institutionalism." The authors describe the combination of traditional institutionalist approaches with contemporary developments in political science.[57] Although scholars agree that there are different types of new institutionalism that vary among and even within each other, there are different definitions of the specific strands (e.g. Hall and Taylor, 1996; Peters, 2005).

A prominent categorization has been provided by Hall and Taylor (1996). They propose three types of the new institutionalism that have developed separately but somewhat simultaneously: *historical institutionalism*, *rational choice institutionalism*, and *sociological institutionalism* (Hall and Taylor, 1996). Each strand will be briefly presented in the following to outline the explanatory capacity of institutionalism.

Rational Choice Institutionalism (RCI)

Given that the different strands of the "new institutionalism" reflect major theoretical approaches of the second half of the 20th century, it is not surprising that also rational choice assumptions have been related to institutionalist findings. Just as the other forms of institutionalism presented here, rational choice institutionalism is not a specific theory but rather a collective term for approaches emphasizing the rational behavior[58] of actors. B. Guy Peters (2005) summarizes the core assumption of rational choice institutionalism as follows:

> "The fundamental argument of the rational choice approaches is that utility maximization can and will remain the primary motivation of individuals, but those individuals may realize that their goals can be achieved most effectively through institutional action" (Peters, 2005, p.48).

[57] Theoretical approaches to "new institutionalism" that have come to light since March and Olsen's publication have addressed different guiding questions. 1. What is new institutionalism (e.g. March and Olsen, 1984; Hall and Taylor, 1996)? 2. What are the similarities and differences between the old and new institutionalism (e.g. Robertson, 1993)? 3. How can a common ground be built between old and new institutionalism (e.g. Rutherford, 1995; Selznick, 1996; Greenwood and Hinings, 1996; Wu, 2009)? The latter group has contributed to the difficulty in differentiating between the two generations of institutionalism (e.g. Greenwood and Hinings, 1996). It seems that the main difference between the two is not related to the content of a work but rather the time of its publication. Legitimately, the question has been raised whether a strict distinction between the old and new generation needs to be made (Selznick, 1996; Rutherford, 1995). Instead, the new institutionalism can be considered to be the result of an "integration of old institutionalism with other methodologies" (Wu, 2009, p.108).

[58] Broadly speaking, as explained by Herbert A. Simon (1972, p.161), the term "rationality" refers to "a style of behavior that is appropriate to the achievement of given goals, within the limits imposed by given conditions and constraints." The aspect of *rationality* was also briefly elaborated in my master's thesis (Sauerteig, 2011).

In an attempt to define different characteristics of the rational choice approach, Hall and Taylor (1996, pp.944–5) elaborate four distinguishing features of rational choice institutionalism:

1. Actors have clearly defined and fixed preferences. They behave instrumentally to achieve these preferences.
2. Institutional arrangements reduce or prevent collective action dilemmas.
3. The behavior of actors is determined by their strategic calculations. These calculations reflect expectations regarding the behavior of other actors against the background of a given institutional structure.
4. The creation of an institution is based on voluntary arrangements among actors. The continuing existence of institutions as well as their use demonstrates that it promises more gains to actors than other arrangements.

Hence, following RCI, institutions are created because of the respective interests of actors. Emphasis is put on the expectation that an institution lowers transaction costs (e.g. Hall and Taylor, 1996, p.943). Once in existence, actors will use the means in place to maximize their utility. The existence of the institution would seize if it repeatedly fails to satisfy the expected gains of the actors.

The specific understanding of rational choice institutionalism may differ, depending on whether to emphasize the aspect of "rational choice" or "institutionalism." The focus on rational choice assumes that actors use all means at hand to reach their goal, while ignoring the interests of other actors. Depending on the given situation, institutional processes may take the form of a zero-sum game.

The interest-guided behavior of the actor may even be more important than securing power. For instance, US President Barack Obama requested the Environmental Protection Agency (EPA) to reconsider its 2007 denial of a waiver that would have allowed the State of California to set stricter emission standards on state level than those in existence on national level (Obama, 2009). While at first sight it might be puzzling that the federal government would support the grant of authority to a state government, it represents rational behavior, because it reflects the goal of the Obama administration to further emission standards.

The emphasis on the aspect of institutionalism, in turn, accounts for institutional stability despite diverse interests of actors. Following traditional rational choice, instead of reaching stable majorities in US Congress, a constant overturn of bills could be expected

(Hall and Taylor, 1996, pp.942–3). The effectiveness of the institution can be explained with more game theoretic considerations by actors. They may accept a loss in one instance in exchange for a win in another case and, thereby, reinforce the institution.

Sociological Institutionalism (SI)

Sociological institutionalism differs from RCI in its understanding of institutions as well as the driving factors that shape them. At its core is a social and non-material interpretation of the world that shapes and is subject to practices. By and large, three features of SI can be derived from Hall and Taylor (1996, pp.947–50).

First, sociological institutionalists have a wide-ranging understanding of institutions, far beyond simple organizational structures. Following a definition by William Richard Scott, "[i]nstitutions consist of cognitive, normative and regulative structures and activities that provide stability and meaning to social behavior" (in: Peters, 2005, p.116). The term *culture* itself receives an institutional connotation in that "even the most seemingly bureaucratic of practices have to be explained in cultural terms" (Hall and Taylor, 1996, pp.946–8).

Second, actors and institutions relate very interactively to one another. Behavior reflects the norms and cultural practices symbolized by the institution. Hence, sociological instititonalism emphasizes the "symbolic and valuative dimensions of organizations" (Peters, 2005, p.112). The expectations from other actors are seen to play a particular important role: "Institutions as systems of meaning do convey a sense of how their members should behave […]" (Peters, 2005, p.118). A guiding element for behavior is a "logic of appropriateness."[59] The internalization of norms can be twofold – consciously following socially expected behavior on the one hand and internalized behavior as a result of routine, on the other hand (Checkel, 2005, pp.804–5).[60]

Third, according to Hall and Taylor (1996, p.947), practices are based on social legitimacy. Consequently, SI rejects classic cost-benefit estimations. Identities as well as the respective interests are formed first and foremost endogenously.[61] Contrary to rational choice institutionalism, which primarily assumes the exogenous origin of interests, SI considers the reason for a specific behavior coming from within the institution.

[59] The formulation is frequently used in the literature. See e.g. March and Olsen (1998, pp.951–2), Checkel (2005), as well as Niemann and Mak (2010).
[60] See also Niemann and Mak (2010, pp.732–3).
[61] See Ben Rosamond (in: From, 2002, p.225).

Historical Institutionalism (HI)

As the name suggests, an important starting point for historical institutionalists is a recognition of the impact of history on today's institutions guiding international relations. Rather than analyzing institutions as a present-day snapshot, their existence, structure, and performance need to be contextualized against its historical background. Institutions represent "the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or political economy" (Hall and Taylor 1996, 938).

HI regards cooperation within organizational structures as a reproduction of certain paths, i.e. "path dependency" (see e.g. Fioretis 2011, 370-5). These paths are only taken off track at critical junctures, which in turn create new paths (e.g. Capoccia and Kelemen, 2007). This may occur when a major external event, such as the terrorist attacks of 9/11, cause a reconfiguration of a given institution or lead to the creation of new institution.

The causes and the nature of path dependency are explained differently among historical institutionalists. Two different approaches can be distinguished that are either related to rational choice institutionalism, referring to the instrumental and strategic calculation of actors ("calculus approach"), or sociological institutionalism, addressing the influence of a respective worldview and institutionalized patterns of behavior ("cultural approach") (Hall and Taylor, 1996, p.939).

Whereas the cultural approach to historical institutionalism emphasizes the importance of norms and principles, the calculus approach examines the role of interests. Rather than contradicting RCI or SI, historical institutionalism may encompass both approaches. In other words, while focusing on the importance of history, it still leaves room for different explanations for how actors and institutions interact.

The recognition of path dependency on behalf of historical institutionalists has important implications, particularly in the calculus approach. Within this organizational structure, the behavior of actors is influenced by their individual considerations of past gains and investments as well as future opportunities. Hence, institutions "affect individual action by altering the expectations an actor has about the actions that others are likely to take in response to or simultaneously with his own action" (Hall and Taylor, 1996, p.939).

Given that structures do not move easily, the founding moment of an institution becomes important for future developments. John Ikenberry (2001) even observes that great powers intentionally use institutions to lock in momentary power. Since structures are not able to

adjust easily to immediate requirements, historical institutionalism considers institutions as often being inefficient or ineffective.[62]

1.3.2. Independent Variables in the Academic Literature

What can we learn from the three institutionalist strands for state behavior within regimes? One the one hand, they demonstrate that there are very different ideas in the literature about the "nuts and bolts" of institutions. On the other hand, they allow a closer expectation of what role causal variables play in the context of institutional cooperation.

Rational choice institutionalism underlines the pragmatic nature of structures to satisfy self-interest as well as the material connotation of causal variables that need to be maximized. Sociological institutionalism shows the importance of non-material and idealistic causal factors. Here, an institution is not about an organized self-interest but a reflection of a higher purpose or an extension of a cultural practice. Historical institutionalism emphasizes path dependency and its founding moment. Change is possible but requires a certain momentum (critical juncture). HI's ability to account for stasis as well as drastic change is a good image of international regimes.

The broad spectrum of material and non-material or idealistic aspects is to be seen in the driving factors for state behavior present in the regime literature. Following Stephen D. Krasner, who is reflecting on the 1983 book "International Regimes," "[t]he most prominent [variables] put forward in this volume are egoistic self-interest, political power, norms and principles, habit and custom, and knowledge" (Krasner, 1983c, p.11). A volume edited by Jeffrey Fields describes a variety of motivators for *cooperation* and *resistance*: *threat perception*; *free-riding*; *hegemony, legitimacy, discrimination*; *disarmament*; *security guarantees*; *resource constraints and economic interests*; and *self-interest* (Fields, 2014a, pp.6–11).

A more abstract categorization claims that students of international regimes have first and foremost analyzed regimes from the perspectives of interest, power, and knowledge (see e.g. Hasenclever, Mayer, and Rittberger 1997, pp.1–2). The variables are often based on

[62] There are numerous examples of scholars relating path dependency to ineffectiveness in basically every aspect of public life. Anita I. Anand and Peter Klein argue that there are significant inefficiencies in the Canadian capital markets. They observe that the securities regulatory system demonstrates path-dependency and demand an awareness of these paths in reform proposals (Anand and Klein, 2005). Barbara M. Kehm, Svein Michelsen, and Agnete Vabø (2010) argue that the implementation of the Bologna process in the education systems in Germany and Norway are confronted with the continuing existence of the Humboldtian legacy.

arguments made in connection with the foundation of an international regime but also with regime effectiveness (see e.g. Skjærseth and Wettestad, 2002, p.109).

The categorization into interest, power, and knowledge entails some problems, particularly when explaining regime effectiveness. As Galbreath and McEvoy (2012, p.27) point out, "while [these categories] have the potential in explaining why the regime came into existence, they have limited utility in explaining the operation of the regime under investigation." Furthermore, the role of norms, an aspect largely discussed in the international regime literature (e.g. Skjærseth, Stokke, and Wettestad, 2006), is ignored.

Without further elaboration, it is also unclear whether the driving factors describe *capacities* or *incentives*.[63] For instance, *power* can be both.[64] A state may seek more influence and authority. Here, power would be an incentive. Yet, the existing authority may enable or limit actions in the first place. In this instance, power is a capacity. Similarly, a state may aim to raise the level of education of its citizens, making *knowledge* an incentive. When a state is able to act the way it does because its citizens have a high level of education, knowledge is a capacity.

Any analysis would rest on unsound footing, if it fails to acknowledge the different nature of capacities and incentives in affecting state behavior. My work addresses this challenge by comparing different incentives as driving factors, rather than a mix of incentives and capacities. This choice has the advantage of facilitating a comparison, because the factors rest on a similar basis. Furthermore, I am particularly interested in the rationale of decisions. Here, incentives are a better starting point than capacities.

This does not mean that I will fully ignore the role of capacities. In my analysis of plausible intent of four incentives (*security*, *norms*, *economics*, and *status*), I will

[63] Similar formulations are to be found in the larger IR literature, including *capacity* and *willingness* (Haggard and Simmons, 1987, p.501) or *desirability* and *feasibility* (Gilboa, 2010, p.4).

[64] In the nuclear field, the aspect of *power* has been associated with a global nuclear order, which in a larger understanding refers to the relationship between nuclear weapons and the respective policies towards the world order (e.g. Kutchesfahani, 2018, p. 1). For instance, Shampa Biswas (2014, pp. 15–6) claims that "the connections between global power, international hierarchies, and neocolonialism that postcolonial scholars raise are in fact quite central to thinking about the problems posed by nuclear weapons, and understanding them will be critical to solving those problems." Nick Ritchie defines a hegemonic "nuclear control order" as structuring the international approach to dealing with nuclear weapons. The Treaty on the Prohibition of Nuclear Weapons could be seen to question the legitimacy of that order, although it is unlikely to bear fruit (Ritchie, 2019). Sara Kutchesfahani (2018) notes that different perspectives shape the nuclear order/disorder paradigm. According to her, nuclear weapons are either seen as enhancing stability or instability. Nuclear Weapon States tend to recognize the orderly fashion of nuclear weapons, while Non-Nuclear Weapon States share a more disorderly interpretation of nuclear weapons (Kutchesfahani, 2018).

occasionally refer to capacities.[65] After all, the realization of an incentive may become particularly (un)attractive because it is (un)feasible.

1.3.3. Four Incentives: Security, Norms, Economics, and Status

What incentives may influence state behavior towards the non-proliferation regime? The broad IR literature as well as the multifaceted nature of the non-proliferation regime leave many starting points for analysis.[66] Following the consideration of the "three new institutionalisms," the factors should include material as well as non-material or ideational considerations.

Commenting on the existing literature, Andrew Grotto identifies three broad explanatory perspectives for state behavior relating to proliferation:

> "[…] normative factors relating to nuclear weapons as symbols of modern statehood, political identity, and prevailing patterns of hegemony; security interests concerning the balance of military power; and the comparative economic implications of nuclear weapons development versus restraint" (Grotto, 2010, pp.5–6).

Jason Enia's account of factors that may affect states' nuclear decision-making shows several similarities with the observation by Andrew Grotto. Among other aspects, Enia points to the possible importance of a state's security environment, the perception of discrimination, economic considerations, compliance by other states, as well as the symbolic connotation of nuclear weapons and the non-proliferation regime (Enia, 2014, pp.19–20).[67]

During my analysis, I will focus on four incentives that cover many of those aspects put forward in academic literature, including those listed by Grotto and Enia. These incentives are: *security*, *norms*, *economics*, and *status*.[68] To what extent do these aspects contribute or hamper states' cooperation within the regime? Here, cooperation refers to commitment to and compliance with norms and rules within the regime.

Against the two yardsticks of cooperation (collective optimum regime) and non-cooperation (no-regime) of states, I will develop hypotheses for each incentive below. The

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[65] For instance, Libya's decision to give up its nuclear weapons program appears to have been at least partially influenced by the lacking capacity to implement a successful program (see Chapter 4).
[66] See e.g. Potter and Mukhatzhanova (2010a) and Fields (2014b).
[67] Jason Enia's list of factors that may influence decision-making includes *capacities* as well as *incentives*. For my analysis, the incentives are particularly important.
[68] In fact, considerations of security, morality, and economics in shaping political outcome have even been associated with Thucydides and his account of the Peloponnesian War (see also Johnson Bagby, 1994).

goal is not to outline a comprehensive literature review for each aspect, but to provide different rationales for state behavior regarding commitment, verification, and enforcement.

In political life, the different aspects cannot always be clearly separated, also because different factors are at stake in a decision. The hypotheses that will be elaborated in the remaining space of this chapter will serve as a basis for an examination of plausible intent in the subsequent chapters, which focus on the commitment system, verification system, and enforcement system of the non-proliferation regime.

As part of that examination, for the purpose of this research, I will treat official justifications (e.g. in statements and agreements) as indicator for motivation. It has been legitimately argued that there is a difference between *sincere* and *cheap* talk (e.g. Doyle, 2015, pp.12–5). I will, thus, point out instances in which there may be a difference between the two. Owing to the macroscopic approach of this work, however, I refrain from a comprehensive analysis of an individual speech act.

Security

Nuclear decision-making may be based on national security. Summarizing and simplifying this line of thinking, "states will seek to develop nuclear weapons when they face a significant military threat to their security that cannot be met through alternative means; if they do not face such threats, they will willingly remain non-nuclear states" (Sagan, 1996, p.54).[69]

The origin of a threat, which may put the integrity and survival of a state into question, stems primarily from other states. Nuclear weapon development could depend on whether a state is in a conflictual security environment (Paul, 2000). The awareness of potential military capacities in another state would pose a danger and result in a domestic response (e.g. James, 2000).

The incentive for state behavior is the goal to reduce a given threat. On these grounds, security considerations may hamper or enhance international cooperation within the non-proliferation regime. A collective optimum regime and the no-regime offer different rationales as to how to handle threat environments.

[69] Sagan (1996, pp.54–5) also presents an overview of publications that would underline this statement.

Collective Optimum Regime

One way to reduce a given threat may be through cooperation. Commitment to and compliance with agreements are an investment that enhances security in the long run. Ideally, an agreement is made with a potential source of a threat. Here, a bilateral agreement may suffice. The underlying logic is that the more states reliably cooperate within the regime, the lower is the global threat (e.g. Smetana and Ditrych, 2015).

In an effort to overcome a dilemma and to contain proliferation, cooperation becomes a means to achieve a shared good (Enia, 2014). Similarly, following the calculus approach of historical institutionalism, Hall and Taylor emphasize that

> "[…] institutions persist because they embody something like a Nash equilibrium. That is to say, individuals adhere to these patterns of behaviour because deviation will make the individual worse off than will adherence. It follows that the more an institution contributes to the resolution of collective action dilemmas or the more gains from exchange it makes possible, the more robust it will be" (Hall and Taylor, 1996, pp.939–40).

Other instruments shall ensure that all states keep their end of the bargain. Verification has a binary purpose from a security perspective. On the one hand, it is meant to timely detect non-compliance of a state – as this may pose a threat to the remaining states. On the other hand, a state's knowledge of inspection measures is aimed at deterring non-compliance in the first place (e.g. IAEA, 2019a). The ability of a verification body to provide transparency and build confidence requires concessions by states (e.g. Blix, 2004, pp.15–24).

Regime enforcement offers tools to ensure a state's compliance. Following Fred Charles Iklé (1961), the nature of the enforcement response significantly affects a target state's behavior. According to him, (potential) sanctions must hurt the target in order to succeed. A simple recognition of non-compliance does not suffice (Iklé, 1961).[70] Yet, enforcement is not limited to a "crowbar strategy." Hence, in a collective optimum regime, the sender has a variety of positive and negative tools at hand to be imposed on a target state.[71]

The enforcement measures need to affect the considerations of a target state. As a negative incentive, they can convey the message that continued non-compliance poses a new threat (military threats or even attacks against a target state).[72] As a positive incentive,

[70] See also David Santoro (2012).
[71] On the variety of enforcement measures in the non-proliferation context see e.g. Solingen (2012b).
[72] On military threats and attacks as tools of enforcement see e.g. Kreps and Fuhrmann (2011) or Kreps and Pasha (2012).

security assurances to promote regime cooperation may ease the security concerns that provide incentive for the target state not to comply in the first place.

The underlying logic of the collective optimum regime from a security perspective can be formulated in the following hypothesis:

If cooperation satisfies its security needs, then the state will commit to and comply with regime norms and rules (A1).

No-Regime

Security considerations could also trigger an incentive not to cooperate. There are several reasons to reject an agreement in the first place. Security could be compromised by free-riding. A state may be worse off having refrained from nuclear weapons, if the rival increases its own capacities at the same time. Lacking trust in cooperation, a state would choose to refrain from committing.[73]

States may also reject cooperation, because they "want to" or "have to" develop nuclear weapons (Potter and Mukhatzhanova, 2010a, pp.2–5).[74] Nuclear deterrence remains an important strategy in the 21st century for several states.[75] Focusing on international relations, a provocative argument was put forward by Kenneth Waltz (1981), who suggests that the spread of nuclear weapons to a larger number of states may be beneficial to contain conflict.[76]

Verification, in turn, may be considered to compromise security rather than enhancing it. Extensive verification "force governments to open up their most diverse and sensitive sites to inspectors and it might give false alarms" (Blix, 2004, p.18). Transparency may not just expose the own capacities, thus, providing potential adversaries with insight information. Nuclear ambiguity itself may be a tool for deterrence (Hymans, 2006, pp.456–

[73] For instance, Ruzicka and Wheeler (2010) argue that the functioning of the NPT depends on three relationships of trust: between Nuclear Weapon States and Non-Nuclear Weapon States, among NWS, and between NPT signatory states and those outside of the treaty.

[74] A nuclear weapons program may be aimed at countering a regional threat, see e.g. Sagan (1996, pp.57–63) and Singh and Way (2004, pp.863–4). In a broader understanding, academic literature has discussed the effect of nuclear weapons on state behavior under the term "deterrence theory" (e.g. Potter and Mukhatzhanova, 2010b).

[75] See e.g. the analyses in Lewis *et al.* (2014) and Shultz and Goodby (2015).

[76] Nuclear deterrence has been criticized as guiding star for political scientists and political decision makers. The reality is less stable than deterrence would suggest, see e.g. Lewis *et al.* (2014) and Pelopidas (2015a). Focusing on Kenneth Waltz, Anne Harrington (2016, p.192) criticizes that the underlying assumptions lead him "to transform the violence of nuclear weapons from a threat to humanity into a source of security, and therefore a normative good." Although Kenneth Waltz is a common point of reference in the academic literature, it is necessary to point out that he does not represent a consensus understanding of security, even the realist literature is more diverse (Bajema, 2010, p.61).

8). Furthermore, sensitive knowledge could be stolen and used for proliferation. This could create a new threat for a state.

Regime enforcement, in turn, may fail to address a target state's security concerns. In fact, it can even underline them. Military threats or attacks may demonstrate a state's vulnerability and strengthen its willingness to develop a nuclear weapons program. As consequence, a state would continue to counter regime norms, despite enforcement.

Summing up the no-regime, the following hypothesis can be made:

If non-cooperation satisfies its security needs, then the state will refrain from committing to and complying with regime norms and rules (A2).

Norms

Explaining the effectiveness of the non-proliferation regime simply with security does not suffice. A further aspect worth exploring are normative considerations. Norms are – by definition – part of any regime and can themselves become a driving force. They may refer to the pursuance of morality of an actor or the fulfillment of an expected behavior.

As described by Carmen Wunderlich, scholars have understood norms as following a "logic of consequences" or a "logic of appropriateness." In the former understanding, norm compliance is the result of a cost-benefit calculation, whereas the "logic of appropriateness" reflects a more *constitutive* character (Wunderlich, pp. 21–2). My understanding of norms will be guided by this latter category, in order to better distinguish normative considerations from other perspectives applied in this thesis and to put a stronger emphasis on idealistic aspects.

Focusing on norms as an incentive, I want to concentrate on two aspects during my analysis: humanitarian considerations (as embedded in international law)[77] and fairness. Humanitarian considerations stand for disinterested goals in that the state does not profit from a decision in terms of security, economics, or status. The state champions an idea, because it is the right thing to do. Fairness includes a judgement about responsibilities and the extent to which all states fulfill their role. Normative aspects may advance or lower the incentive to cooperate. As noted by Grotto (2010, p.46), who examines different

[77] For Jan Ruzicka (2018b, pp.5–6), combining humanitarian considerations with international law is a defining feature of the humanitarian initiative regarding nuclear weapons.

perspectives, "[n]ormative factors may push some countries to resist NPT- plus measures and others to endorse them."

Collective Optimum Regime

In a collective optimum regime, states commit to and comply with the regime, because the latter is fair and satisfies international law. Cooperation follows the larger principle that nuclear weapons are bad (e.g. Ruzicka, 2018b, p.2). States come together to subscribe to a shared set of norms derived from that principle. Cooperation is not a zero-sum game or about enhancing profit. It is about doing the "right thing." The participation is shared by all states.

The role of verification and enforcement depends on the respective normative stance. Institutions may not need to enforce "rightful behavior," since actors absorb and translate norms also without force.[78] In this view, verification and enforcement measures may be meant to underline the original humanitarian norm.

The notion of fairness, however, may also entail that misbehavior against a norm is met with punishment. The focus here is justice in the light of a global responsibility. After all, "[v]iolating the NPT means not only violating a public commitment but also reversing decades of compliance and support to a widely held international norm" (Rublee, 2014, p.98). Verification and enforcement are meant to signal to the target state its wrongful behavior. The state becomes aware of its breach of a norm and, ideally, refrains from further non-compliance.

There is no single way to describe normative conditions for a successful regime.[79] Rublee (2009) presents an extensive list of hypotheses against the background of the international social environment. In that continuum, norms are processed through *linking*, *activation*, and *consistency* (Rublee, 2009). Galbreath and McEvoy (2012) develop norm-driven considerations in the context of the minority rights regime. They come to the hypothesis that a regime is likely to be effective when state actors find the norms of the regime suitable for the domestic environment (Galbreath and McEvoy, 2012, p.46). As indicated before, my hypothesis for cooperation accounts for fairness and humanitarian considerations:

[78] For example, on the internalization of behavior following social expectance or routine see Checkel (2005, pp.804–5).
[79] Different approaches are put forward in e.g. Galbreath and McEvoy (2012), Müller and Wunderlich (2013), and Rublee (2009).

If cooperation satisfies international law or fairness, then the state will commit to and comply with regime norms and rules (B1).

No-Regime

From a normative perspective, cooperation may fail due to different normative preferences that fall into the categories of fairness and humanitarian considerations. A starting point are the three pillars of the NPT (non-proliferation, disarmament, and peaceful use of nuclear energy), which may entail an unequal treatment of states. Normative breaches by other states may frustrate a state's own commitment to the non-proliferation regime (e.g. Rublee, 2009, pp.212–5). Nina Tannenwald describes a few prominent disputes that hamper cooperation:[80]

- *Denial vs. nuclear sharing*
    - The right for peaceful uses of nuclear energy may contrast fears about the spread of nuclear weapons.
- *Non-possession norm vs. norm of sovereign equality*
    - Does the prohibition of nuclear weapons for some states contradict their right for a sovereign pursuance of security?
- *Inspection norm* vs. *sovereignty*
    - Inspections put a particularly heavy burden on Non-Nuclear Weapon States.
- *Universality vs. particularism*
    - Should the international community push for a universal NPT, or should a special treatment for outsiders be allowed

(Tannenwald, 2013, pp.302–305)[81]

Rejections of cooperation in the field of verification and enforcement can be derived from these disputes. From a fairness perspective, the main obstacle to cooperation is not that verification is intrusive. The main problem is that it is more intrusive for some states but not for others. There is no equal sharing of the burden.

Enforcement may also mean that a target state feels treated unfairly. Rather than accepting the demand, the state will question the legitimacy of the measures and refer to

[80] Tannenwald also considers the role of the status of great powers that also possess nuclear weapons. This falls into the category of status (see below).
[81] There is some overlap with Müller, Becker-Jakob, and Seidler-Diekmann (e.g. 2013, pp.55–9).

other states that are not subject to enforcement, although they would "deserve" it. In an extreme case a state may reject enforcement measures for humanitarian reasons in that sanctions may put the well-being of the people at risk. To sum up, the following hypothesis can be made for non-cooperation from a normative stance:

If non-cooperation satisfies international law or fairness, then the state will refrain from committing to and complying with regime norms and rules (B2).

Economics

Among other factors, Jason Enia (2014, p.20) states that nuclear decisions may depend on "perceptions about the domestic costs and benefits associated with a particular decision." In contrast to the normative approach, the perspective of economics has a material connotation that provides an incentive for self-interested state behavior. Regime commitment and compliance relate to a state's calculations[82] as to whether investments into cooperation pay off.

The aspect of economics includes a variety of sectors. I will distinguish between two main categories: Costs and benefits that relate to the field of nuclear energy and economic considerations that lie beyond the nuclear realm. Nuclear-related considerations include costs and benefits[83] from nuclear power as a potential source of energy, research, medical uses, as well as trade of fissile material and nuclear assistance. Economic aspects beyond the immediate nuclear field relate to a state's larger interests in terms of budget, finance, industry, trade, and infrastructure.

Collective Optimum Regime

A collective optimum regime satisfies the economic interests of state actors. It does not resemble a zero-sum game but a platform of shared interests for everyone. As put by Andrew Grotto (2010, p.8), referring to several driving factors including economic ones, "[…] the success of efforts to mobilize greater international support for NPT-fuel cycle reform, robust

[82] Arguably, there is a notion of uncertainty to these calculations. As described by Maria Rublee, "[t]he greater the perception of uncertainty regarding potential costs and benefits of nuclear weapons, the more likely policymakers are to be open to considering a change in their nuclear stance" (Rublee, 2009, p.51).
[83] Analyses of costs and benefits of nuclear power as energy supply and nuclear cooperation can be found in e.g. Tybout (1957), Adamantiades and Kessides (2009), Ahearne (2011), and von Hippel *et al.* (2011).

export controls, an enhanced inspections regime, and other important nonproliferation priorities hinges on aligning incentives across states' interests."

From an economic perspective, the peaceful use of nuclear energy, exchanges on technology, fissile material, and nuclear assistance may be attractive for states. Cooperation may lower the costs and increase profits of nuclear energy or offer advantages from nuclear research (Rublee, 2009, p.10). Against this background, states may be tempted to commit to and comply with the regime.[84]

Cooperation in the field of verification depends on two conditions: I) a state must be able to connect the cooperation investment with benefits and II) verification needs to be efficient in that it does not outweigh potential benefits. Security gains or normative considerations are only of secondary importance.

The success of enforcement depends on the regime's ability to serve as a "soft power." It needs to be able to convince a state by implementing a variety of economic tools that cooperation is better than non-cooperation. There is a strong emphasis on sanctions[85] in the literature on the non-proliferation regime.[86] A prominent analysis that underlines the overall virtues of economic sanctions[87] was made by Hufbauer, Schott, and Elliott (1990) in their analysis of dozens of case studies.

A further option to promote regime compliance are positive inducements, that is "the benefits or rewards extended to leaders, ruling coalitions, or broader constituencies in target states, with the expectation that they will persuade recipients to eschew nuclear weapons" (Solingen, 2012a, p.6).[88] These tools may include technical assistance as well as financial or economic support toward the target state.

For commitment, verification, and enforcement the following hypothesis can be made:

If cooperation enhances economic benefits, then the state will commit to and comply with regime norms and rules (C1).

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[84] According to Maria Rublee (2009, p.11), domestic policy makers may even push for nuclear weapon forbearance due to economic interests.

[85] Sanctions are "international instruments of statecraft that punish or deny benefits to leaders, ruling coalitions, or broader constituencies in a given state, in an effort to dissuade those targets from pursuing or supporting the acquisition of nuclear weapons" (Solingen, 2012a, p.5).

[86] There are exceptions to this tendency, including Cortright (1997), Reardon (2010), and Solingen (2012b).

[87] In this thesis, economic sanctions will be understood as an umbrella term for measures referring to trade and financial transactions as well as to strategic export controls (see Lindsay, 1986, pp.154–5).

[88] The volume edited by Etel Solingen concentrates on enforcement in cases of potential horizontal proliferation of nuclear weapons. The approach of this thesis is more comprehensive, in that it also acknowledges nuclear disarmament and nuclear weapon tests.

No-Regime

Economic considerations may also lead states to refrain from commitment to and compliance with the non-proliferation regime. First, a state may come in its calculation of costs and benefits of nuclear energy to the conclusion that costs outweigh benefits. In this case, the state would have less interest in nuclear cooperation in the first place. For instance, nuclear catastrophes as in Chernobyl or Fukushima may lead to a reevaluation of an existing civilian nuclear program.[89]

Those states that decide in favor of a nuclear program would have to consider whether they should accept the rules embedded in the regime. These rules reflect a behavioral prescription and may be seen to impede the nuclear freedom. In this scenario, the international regime does not stand for a platform for enhancing nuclear energy but becomes a burden for nuclear development.

Verification may underline these economic disadvantages for a state. On the one hand, the measures could be too expensive in terms of budget, personnel, or technical and logistical support. On the other hand, verification may be seen to put the existing economic infrastructure at risk, e.g. if on-site inspections are used for industrial espionage.

Regarding enforcement, it may well be the case that the regime fails to implement positive or negative incentives for a target state. This would leave the original decision for non-compliance with the regime unaffected. As a response to Hufbauer, Schott, and Elliott (1990), Robert A. Pape (1997, p.93) argues "that economic sanctions have little independent usefulness for pursuit of noneconomic goals." At the same time, verification may backfire. For instance, in a state that pursues nuclear energy for reasons of energy independence, heavy economic sanctions may provide further incentive for autarchy. To sum up:

If non-cooperation enhances economic benefits, then the state will refrain from committing to and complying with regime norms and rules (C2).

Status

Finally, during my analysis, I also want to consider status-related aspects. As an independent variable to describe state behavior, the term is not self-explanatory. Owing to

[89] An overview of immediate international reactions following the Fukushima incident in 2011 can be found in Schneider, Froggatt, and Thomas (2012, pp.41–50).

its broad scope, *status* may refer to standing, condition, or configuration. Consequently, there may be overlap with other possible driving factors.

For instance, elaborating a "norms model," Scott Sagan (1996, p.73) focuses on nuclear weapons' "symbolic functions – both shaping and reflecting a state's identity."[90] He mixes normative elements, such as ethics, with status considerations, including the standing of a state with nuclear weapons (Sagan, 1996, pp.73–85). The terminological overlap becomes even more apparent when considering that, if combined, *status* and *security* can be seen to make up the potential driving factor of *power*.

In order to distinguish status-considerations from other factors examined in this thesis, I will concentrate on the standing of the state and political leadership as a driving factor for nuclear decision-making as well as the compatibility and symbolic nature of the nuclear partnership. Compatibility describes to what extent a commitment is considered appropriate by a party. The symbolic nature of a partnership refers to the relationship between partners of an agreement. Status-considerations may advance or hamper cooperation in the non-proliferation regime.

Collective Optimum Regime

From a status perspective, cooperation is a platform for enhancing a state's standing rather than about the actual content. A state may commit to or comply with the regime to be(come) an accepted member of the international community and a recognized supporter of the non-proliferation cause. Ideally, the non-proliferation regime increases the status of all participants and resembles a trustful environment.

Arguably, the willingness to cooperate may be greater in a friendly atmosphere than in a conflictual one. In this sense, commitment and compliance is an extension of an already trustful relationship. Daniel D. Drezner (1999) even comes to the conclusion that sanctions are more likely to lead to concessions if the relationship between the sender and receiver of sanctions is benevolent, as future conflictual situations are less likely than among adversaries.

Verification commitment and compliance is not meant to enhance security but instead to label a state as being a compliant actor within the regime. Non-compliance in verification

[90] In more general terms, Steven Ward (2017, p. 3) argues that "rising powers" may contest an existing order not because of material interests but because "obstructed *status* ambitions unleash psychological and domestic political forces within rising states that push them to reject and challenge the status quo in order."

will lead to the condemnation of a state, degrading its role in the international community. Verification, thus, becomes a tool of categorization.

Enforcement measures are signals, similar to the normative perspective.[91] The difference with norms is that status signals target the standing of a state or its political leadership. In doing so, they affect a state's calculation by possibly enhancing or degrading its standing among other states. Sanctions may be seen as "naming and shaming" and positive incentives may become good practice rewards. In this sense, diplomatic tools of positive inducements (high level meetings, enhancing political relationship) and sanctions (travel bans or limitations on the diplomatic relationship) may significantly affect behavior.

If cooperation enhances its status, then the state will commit to and comply with regime norms and rules (D1).

No-Regime

A state may also be deterred from cooperation owing to status-related considerations. Commitment to and compliance with agreements may undermine a state's standing rather than enhancing it, e.g. due to the conflictual relationship with one or more partners in an agreement. In an extreme form, nuclear weapons themselves may appear very attractive for a state. It may seek to enhance prestige by joining the "nuclear club" (e.g. Perkovich, 1998; Tannenwald, 2013, p.305).[92]

The value attributed to nuclear weapons in the larger non-proliferation and disarmament discourse is critically analyzed by Nick Ritchie. Devaluing nuclear weapons is a complex and challenging undertaking (Ritchie, 2013, pp.166–8). In this sense, non-cooperation with the three regime norms are likely to persist as long as the value of nuclear weapons continues to exist.

The decision not to cooperate is close to the normative line of thinking described above. The difference is that the goal of *fairness* as a norm represents a higher purpose whereas status is more self-interested. Aiming for fairness, a state would seek an equal treatment of

[91] On the role of signaling in enforcement see e.g. James M. Lindsay (1986, pp.155–6) and Drezner (1999, pp.9–18).
[92] Barry O'Neill (2006) emphasizes the strategic component and social context of a desirable quality. Here, *prestige* resembles the meta-level of a quality. In other words, it is not just important what individuals think about a quality of another party (reputation) but also what individuals think about others' beliefs about the presence of that quality (O'Neill, 2006).

all, whereas aiming for status means enhancing the own standing – even if it is already better than the standing of others.

Similarly, a state may refrain from accepting verification commitments, because it decreases its own role within the international community. For instance, a state may object an underlying and allegedly unjustified general suspicion targeted against it or may question verification as unreliable, as an adversary may affect results.

Enforcement tools may fail to change a state's status considerations in favor of regime compliance. To the contrary, enforcement measures, whether positive incentives or sanctions, may be used domestically as tool of scapegoating, thus fostering the standing of the political leadership in a state rather than diminishing it. As noted by Maria Rublee, "[p]erceived U.S. bullying is a greater impetus for nonproliferation than any current loopholes in the nonproliferation regime" (2009, pp.86–7).

Against the background of status considerations regarding regime commitment, verification, and enforcement, it can be attested that:

If non-cooperation enhances its status, then the state will refrain from committing to and complying with regime norms and rules (D2).

1.4. Summary

The primary research question of this work is "What determines the effectiveness of the nuclear non-proliferation regime?" Given the nature of the regime, I have identified state behavior as the pivotal point of inquiry in assessing regime effectiveness. Accordingly, the research question has been narrowed down to "What determines whether states commit to and comply with the non-proliferation regime?"

In order to respond to this question, the thesis is undertaking a comprehensive qualitative study. It makes use of a three-dimensional model to assess regime effectiveness, accounting for the different roles of the regime (*commitment*, *verification*, *enforcement*), policy fields (*acquisition*, *position*, and *use* of nuclear weapons), as well as the level of effectiveness (*output*, *outcome*, *impact*).

Against the background of the concept put forward here, compliance in the nuclear non-proliferation regime can preliminarily be expected to represent a "pyramid of effectiveness." Since the elements of each dimension are built upon one another and may demonstrate at least some shortcomings from one level to another, effectiveness is likely to decrease towards the top in every dimension.

The three main systems (stemming from the roles of the regime) demonstrate varying institutional contexts that present state actors with varying norms, rules, and levels of influence. Accordingly, the following chapters will consider each system individually.

After having evaluated output, outcome, and impact effectiveness, I will seek to analyze possible explanations for state behavior that lead to the regime's (in)effectiveness, undertaking an evaluation of modes of pledges and justification for state behavior from four perspectives: *security*, *norms*, *economics*, and *status*. The following hypothesis will be used as first-cut propositions to narrow down the theoretically grounded empirical analysis:

Table 1 – Hypotheses

	1 - Cooperation	**2 - Non-Cooperation**
A - Security	If **cooperation satisfies** its **security needs**, then the **state will commit to and comply with** regime norms and rules.	If **non-cooperation satisfies** its **security needs**, then the state will refrain from **committing to and complying with** regime norms and rules.
B – Norms	If **cooperation satisfies international law and fairness**, then the **state will commit to and comply with** regime norms and rules.	If **non-cooperation satisfies international law and fairness**, then the **state will refrain from committing to and complying with** regime norms and rules.
C - Economics	If **cooperation enhances economic benefits**, then the **state will commit to and comply with** regime norms and rules.	If **non-cooperation enhances economic benefits**, then the **state will refrain from committing to and complying with** regime norms and rules.
D - Status	If **cooperation enhances** its **status**, then the **state will commit to and comply with** regime norms and rules.	If **non-cooperation enhances** its **status**, then the **state will refrain from committing to and complying with** regime norms and rules.

2. Commitment in the Non-Proliferation Regime

2.1. Platforms of Commitment

The commitment system is the corner stone of regime compliance. It comprises states' pledges to norms and rules that counter the *acquisition*, *possession*, and *use* of nuclear weapons. States signal their standpoint and subscribe to a specific behavior. This behavior, in turn, can be subject to verification and enforcement measures.

The types of commitment differ significantly, depending on the state and the nature of its nuclear program. Some states possess nuclear weapons, while others do not. Some states have an advanced civilian nuclear program, while other states massively depend on external nuclear support or renounce nuclear energy altogether.

At the same time, the nature of commitment may vary. A state may be in compliance with norms and rules before or even without committing. For other states, the very same norms and rules demand a behavioral change. In a *collective optimum regime*, all states would commit to and – more importantly – comply with *rules*, the entirety of which cover the three regime *norms*:

- *Acquisition*: states without nuclear weapons refrain from acquiring them
- *Possession*: states that possess nuclear weapons disarm
- *Use*: states refrain from using nuclear weapons

What conditions determine whether a state commits to and complies with the regime in the areas of *acquisition*, *possession*, and *use* of nuclear weapons? In an effort to respond to this question, I will first lay out the spectrum of commitment. While the subsequent analysis is forced to focus on the most important platforms for commitment, it is first necessary to get a grasp of the complexity of the commitment network, including the international, regional, bilateral, and unilateral level.

Next, I will assess states' commitment to (*output effectiveness*) and compliance with (*outcome effectiveness*) regime rules regarding the *acquisition*, *possession*, and *use* of nuclear weapons. On that basis, I will draw overall conclusions on compliance with regime norms (*impact effectiveness*) in the respective thematic field. This analysis allows an assessment of the extent to which states fulfill the regime norms.

After having assessed regime effectiveness in the commitment system, I will turn to possible explanations for (non-)cooperation. More specifically, I will undertake an

examination of plausible intent by critically analyzing modes of pledges and justifications for state behavior from four perspectives: *security*, *norms*, *economics*, and *status*.

Finally, a conclusion will take up the main findings of this chapter. The greatest regime impact is to be found in the *acquisition* and *use* of nuclear weapons. Following the introduction of the Non-Proliferation Treaty and the Comprehensive Test Ban Treaty, breaches to the regime norm in these fields have so far been an exception. Regarding the possession of nuclear weapons, there are mixed signals of effectiveness. Although the overall number of nuclear weapons has significantly gone down, the number of states possessing nuclear weapons remains stable.

All four factors – security, norms, economics, and status – have some virtue in explaining regime (non-)compliance. However, there appears to be a hierarchy among them. While normative considerations foster regime cooperation, status- and security-related aspects offer a strong incentive to counter regime norms.

2.1.1. International Commitment

Given the global reach of nuclear weapons, it is not surprising that a number of agreements have been concluded on an international level. The legal corner stone of the non-proliferation regime is the **Non-Proliferation Treaty (NPT)**, which maintains the three pillars of the regime: preventing the horizontal spread of nuclear weapons, nuclear disarmament, and the peaceful use of nuclear weapons. Despite its name, the treaty is not limited to countering the *acquisition* of nuclear weapons. The NPT also provides a basis for commitments on the *possession* and *use* of nuclear weapons.

The **International Atomic Energy Agency (IAEA)** is even older than the Non-Proliferation Treaty. The agency is a champion for the civilian use of nuclear energy as well as nuclear safeguards. Following the introduction of the NPT, the IAEA has become the paramount institution for nuclear verification (see following chapter). It is first and foremost focused on the non-acquisition of nuclear weapons.

Closely connected with the IAEA are provisions for **nuclear exports controls**, as outlined by two international groups of nuclear suppliers – the Zangger Committee and the Nuclear Suppliers Group (NSG). Although the export guidelines established by both groups are voluntary, they are an important point of reference in nuclear trade. The goal is to prevent the use of material and technology for nuclear weapon programs in other states.

Taking the role of non-state actors into account, the **International Convention for the Suppression of Acts of Nuclear Terrorism** was opened for signature in 2005. After all, the potential acquisition, possession, and use of nuclear weapons by individuals or terrorist groups pose a threat. The convention seeks better protection of dual-use items on a domestic level and coins the illicit use of missile material as a criminal offence.

Two further agreements restrict the *use* of nuclear devices on an international stage: The **Partial Test Ban Treaty (PTBT)** and the **Comprehensive Test Ban Treaty (CTBT)**. The former treaty bans nuclear tests "in the atmosphere, in outer space, and under water." The CTBT bans any nuclear explosion but has not yet entered into force.

The most recent international agreement in the non-proliferation regime is the **Treaty on the Prohibition of Nuclear Weapons**. The treaty offers a more comprehensive rejection of nuclear weapons. It seeks the "total elimination of nuclear weapons" (Article 4) and is, thereby, relevant for the policy fields of *acquisition*, *possession*, and *use* of nuclear weapons.

2.1.2. Regional Commitment

Over the last decades, numerous regional platforms have been established to reinforce regime norms, including the peaceful use of nuclear energy.[93] A prominent example is **EURATOM**,[94] the European Atomic Energy Community. EURATOM is aimed at promoting the peaceful use of nuclear energy, while countering the *acquisition* of nuclear weapons. It provides a market for fissionable material, a platform for joint projects, and cooperation in research and technology. It also plays an important role in the verification of nuclear programs in the European Union[95] – coordinated with the IAEA.

The most ambitious regional reinforcement of regime norms are **Nuclear-Weapon-Free Zones (NWFZs)**, which attempt to outlaw nuclear weapons in a defined area. The term may refer to *inhabited* areas (territories that allow and demonstrate human settlements) or *uninhabited* areas (i.e. areas that do not allow human settlements, e.g. outer space, seabed, Antarctic) (Pande, 1998). In this thesis, I will use the term for inhabited areas.

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[93] Wilfred Wan (2018, p.3) recently made "the case for a more specialized, decentralized, and localized nuclear non-proliferation regime." More than that, he also offers a sophisticated effort to outline and compare different regional approaches to non-proliferation.

[94] Treaty establishing the European Atomic Energy Community (EURATOM), March 25,1957.

[95] Arguably, the European Union, which is distinct from EURATOM but shares the same state membership and institutions, plays an increasing role in shaping international nuclear development (see e.g. Kienzle, 2013). Yet, following Benjamin Kienzle (2013, 1150), despite the successful "WMD Strategy" of 2003, there is a "nexus between the EU's external non-proliferation policies and the corresponding policy coordination within the EU."

NWFZs are embedded in Article VII of the NPT, which states that "[n]othing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories." Accordingly, NWFZs address the *acquisition*, *possession*, and *use* of nuclear weapons. So far, six agreements have been finalized: The Treaty of Tlatelolco (Latin America)[96], the Treaty of Rarotonga (South Pacific)[97], the Treaty of Bangkok (Southeast Asia)[98], the Treaty of Pelinda (Africa)[99], and the Treaty of Semipalatinsk (Central Asia).[100] Furthermore, Mongolia has created an internationally recognized nuclear-weapon-free status.[101]

2.1.3. Bilateral Commitment

Bilateral commitments add to international and regional agreements in the non-proliferation regime by bringing together conflictual parties. Most prominently, the nuclear superpowers – **the United States of America and the Soviet Union/Russia** – have concluded a number of bilateral agreements that target their *possession* and *use* of nuclear weapons. These include the ABM Treaty[102], START I[103], START II[104], SORT[105], New START[106], the INF Treaty[107], the Threshold Test Ban Treaty (TTBT)[108], and the Peaceful Nuclear Explosions (PNE) Treaty[109].

Pakistan and India have finalized two agreements related to nuclear weapons: The India-Pakistan Non-Attack Agreement[110] and the Lahore Declaration[111]. Although both

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[96] Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, February 14, 1967.
[97] South Pacific Nuclear Free Zone Treaty, August 6, 1985.
[98] Treaty on the Southeast Asia Nuclear Weapon-Free Zone, December 15, 1995.
[99] African Nuclear Weapon Free Zone Treaty, April 11, 1996.
[100] Treaty on a Nuclear-Weapon-Free Zone in Central Asia, September 8, 2006.
[101] Law of Mongolia on its Nuclear-Weapon-Free-Status, September 25, 1992.
[102] Treaty Between the United States of America and The Union of Soviet Socialist Republics on The Limitation of Anti-Ballistic Missile Systems, May 26, 1972.
[103] Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, July 31, 1991.
[104] Treaty Between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms, January 3, 1993. The treaty never entered into force.
[105] Treaty between the United States of America and the Russian Federation on Strategic Offensive Reductions, May 24, 2002.
[106] Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, April 8, 2010.
[107] Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles, December 8, 1987.
[108] Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, July 3, 1974.
[109] Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, May 28, 1976.
[110] Agreement between India and Pakistan on the Prohibition of Attack against Nuclear Installations and Facilities, December 31, 1988.
[111] The Lahore Declaration, February 21, 1999.

agreements play a role in the overall bilateral relations between the states, their immediate issue area is the *use* of nuclear weapons. The Non-Attack Agreement commits both states not to damage the other state's nuclear facilities. The Lahore Declaration of 1999 calls for "steps for reducing the risk of accidental or unauthorised use of nuclear weapons."

Brazil and Argentina have built a nuclear cooperation in the form of the Brazilian-Argentine Agency for Accounting and Control (ABACC).[112] The ABACC is the only bilateral authority to confirm the peaceful nature of nuclear programs. As such, the agency is integrated in the larger IAEA verification context (see following chapter) and contributes to countering the *acquisition* of nuclear weapons.

Furthermore, the Democratic People's Republic of Korea (DPRK) and the Republic of Korea (ROK) signed a declaration on the **Denuclearization of the Korean Peninsula**[113] in 1992. Among other things, both states declared that they "shall use nuclear energy solely for peaceful purposes." Although this commitment overlaps with the states' NPT pledges not to acquire nuclear weapons, the declaration emphasized the importance of the norm for the development of peace and stability on the peninsula. It was never fully implemented.

2.1.4. Unilateral Commitment

Unilateral commitments are often verbalized by **states that possess nuclear weapons**. In this context, several states have placed conditionalities on the *use* of their nuclear weapons (e.g. to refrain from use against a Non-Nuclear Weapon State or to renounce a first-use). Furthermore, while Russia and the United States of America have bilateral agreements in place, the United Kingdom[114] has unilaterally formulated a cap on its nuclear weapon stocks and France advocates a nuclear doctrine of "strict sufficiency" (limiting its size to the lowest strategic necessity). France also unilaterally decided to dismantle its nuclear testing site as well as its facilities to produce fissile material (Tertrais, 2007, p. 254).

Some states also take domestic measures to further **restrict the development of nuclear weapons on their territory**. New Zealand, the Philippines, and Brazil have constitutionally "banned the non-peaceful use of nuclear energy" (Goldemberg, Feu Alvim, and Mafra, 2018,

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[112] Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy, July 18, 1991.
[113] Joint Declaration of South and North Korea on the Denuclearization of the Korean Peninsula, January 20, 1992.
[114] The UK set out the scope of its nuclear armed forces as part of its Strategic Defense and Security Review. The latest review states: "We will retain no more than 120 operationally available warheads and, by the mid-2020s, we will reduce the overall nuclear weapon stockpile to no more than 180 warheads […]" (HM Government, 2015).

p.387). Mongolia, as stated before, went a step further by introducing the only single-state Nuclear-Weapon-Free Zone recognized by the United Nations.

2.2. Assessing Effectiveness

2.2.1. Acquisition

The regime norm not to acquire nuclear weapons primarily focusses on those states that do not already possess them. These states may have an advanced civilian nuclear program or may even have had a nuclear weapons program in the past. Countering the *acquisition* of nuclear weapons entails two major approaches, i.e. to curb the *demand* and the *supply* side of nuclear bombs. States shall refrain from nuclear weapons in the first place. For those states that pursue a weapons program, nonetheless, assistance from the outside – in the form of technology, equipment, knowledge, and nuclear material – shall be contained.

Non-Proliferation Treaty

Output

A good starting point to get a grasp of state commitment in the field of the *acquisition* of nuclear weapons is the Non-Proliferation Treaty. With 191 states party to it (UNODA, 2019b), the NPT is one of the largest international agreements in terms of membership. Only a few states have not joined the treaty: India, Israel, Pakistan, and South Sudan. North Korea joined the NPT in 1985 but announced its withdrawal in 2003. Considering that the treaty is subject to all states that do not possess nuclear weapons, with the exception of South Sudan, the legal scope represents a high output effectiveness.[115]

Output effectiveness is enhanced by the strength of the commitment. In Article II of the Non-Proliferation Treaty, Non-Nuclear Weapon States "[undertake] not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices […]." Rather than formulating a rule that contributes to the regime, the commitment embedded in Article II reflects the very regime norm not to seek nuclear weapons.

In addition to restricting the *demand* side in the acquisition of nuclear weapons, the treaty also hampers the *supply* side. Nuclear Weapon States commit not to assist in any way Non-Nuclear Weapon States in their pursuance of nuclear weapons (Article I, NPT). NPT

[115] In addition to legal obligation, NNWS arguably also have a moral duty not to acquire nuclear weapons, which may even be respected by them in the light of a possible NPT corrosion (e.g. Doyle, 2009).

member states also commit to ensure that safeguards are in place in a receiving NNWS (Article III.2, NPT). On the outset, these restrictions make it difficult for Non-Nuclear Weapon States to get hold of a nuclear weapon.

A further aspect strengthening output effectiveness is that since 1995, the Non-Proliferation Treaty is no longer timely restricted. The treaty text states in Article X that "[t]wenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods." In 1995, the NPT Review Conference decided that "the Treaty shall continue in force indefinitely."[116]

Despite its significant legal footing, the Non-Proliferation Treaty also contains setbacks in output effectiveness. One obvious aspect is that states outside the treaty (India, Israel, Pakistan, and South Sudan) are not subject to the same commitments as Non-Nuclear Weapon States. They can, nonetheless, be subject to restrictions in nuclear trade and assistance. Furthermore, the NPT does not prohibit Nuclear Weapon States[117] (China, France, Russia, the United Kingdom, and the United States of America) in their production of nuclear weapons.

Some Non-Nuclear Weapon States also host nuclear weapons on their territory in the context of *nuclear sharing* arrangements within NATO, despite a non-proliferation commitment. Following Daniel Khalessi (2015), the administration of US President Lyndon B. Johnson even pursued a vague legal formulation on that question in the NPT to accommodate NATO interests.

Current NPT members may also withdraw from the treaty, if a state's "supreme interests" are threatened.[118] On this basis, North Korea announced on January 10, 2003 that it would leave the treaty. Yet, as the discussions surrounding North Korea show (see Chapter 4 on regime enforcement), a state may still be held accountable to NPT norms and rules even after announcing the intention to leave the treaty.

[116] See Decision 3 in: NPT Review Conference (1995).
[117] i.e. states that have used or tested a nuclear explosive before 1967.
[118] The possible withdrawal from the NPT is formulated in Article X of the treaty. It requires a three months' notice to the other parties and the UN Security Council as well as a "statement of the extraordinary events it regards as having jeopardized its supreme interests […]."

Outcome

Looking at the implementation of the Non-Proliferation Treaty, we need to distinguish between larger and smaller issues of state compliance. Regarding the norm of the non-acquisition of nuclear weapons, we can attest a positive outcome effectiveness. For Non-Nuclear Weapon States, the abstinence from nuclear weapon programs appears to be the general rule.[119]

Unfortunately, there have also been major cases of non-compliance. The IAEA Board of Governors can report a case to the UN Security Council, if non-compliance or non-cooperation of a member state with safeguards is detected (Article XII.C, IAEA Statute). These cases stand for potential violations of regime norms. So far, Iran, Israel, Iraq, Romania, North Korea, Libya, and Syria have been reported to the Security Council.[120]

North Korea initiated a nuclear weapons program while being a member of the NPT and fully developed nuclear weapons after declaring its withdrawal from the NPT. Libya and Iraq also had a nuclear weapons program while being parties to the NPT. The nuclear weapon aspirations in socialist Romania, also an NPT member, were revealed after the downfall of the administration of Nicolae Ceaușescu. The existence and extent of an Iranian and Syrian nuclear weapons program in the past remain unknown (see Chapter 4).

The common interaction with the Non-Proliferation Treaty, however, goes beyond a sheer (non-)existence of nuclear weapon programs. Every five years, NPT member states, observers, and non-governmental organizations participate in a Review Conference that discusses the overall status and potential means of strengthening the non-proliferation regime. [121] As such, the NPT is also a platform for Nuclear-Weapon-Free Zones, test bans, as well as issues of nuclear disarmament.

Member state participation in these conferences is positive. 161 out of 191 parties took part in the 2015 NPT Review Conference. The funding for the conference and its preparation is also largely positive. The financial report notes that "[w]hile most States parties are meeting their financial obligations, in some cases amounts outstanding since 1995 remain to be paid" (NPT Review Conference, 2015a; 2015b)

[119] See e.g. overview of nuclear weapon aspirations according to Levite (2003, p.62).
[120] Israel is not party to the NPT. The reporting occurred in connection with the Israeli attack on the Tamuz nuclear reactor in 1981.
[121] Hence, the latest meeting, the 2015 NPT Review Conference will be used as a point of reference in this chapter's explanation of regime effectiveness.

Despite vigorous preparation, the decision-making of the Review Conference does not always bear fruit. In other words, the NPT as a policy platform leaves room for improvement. An important indicator for the success of a Review Conference is its ability to conclude a final document that includes an acknowledgement of progress and actions to be taken (see e.g. Wan, 2015). Consensus on a final declaration failed in 1980, 1990, 1995, 2005, and 2015.

Fissile Material (Cutoff) Treaty (FM(C)T)

The Non-Proliferation Treaty offers a major disadvantage: Nuclear Weapon States and states outside the NPT continue to produce fissile material for nuclear weapons or have sufficient material to build a vast amount of nuclear weapons. In order to close this commitment gap, several suggestions for a Fissile Material (Cutoff) Treaty have been put forward. Although the first proposals regarding an FM(C)T date back to the early days of the nuclear age, the most important point of reference for the current understanding of such a treaty is the "Shannon Mandate."

The "Shannon Mandate" refers to a 1995 report by Ambassador Gerald E. Shannon of Canada, which was aimed at laying the groundwork for negotiations on an FM(C)T in the Conference on Disarmament. The report called for an "Ad Hoc Committee to negotiate a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices" (Conference on Disarmament, 1995).

More than two decades after the Shannon Mandate, negotiations on an FM(C)T have not even started. Member states of the Conference on Disarmament (CD) demonstrate very different ideas about what the treaty should look like (see e.g. BASIC, 2013). One controversial issue is whether or not the scope should cover only future productions or also existing fissile material.[122]

Nuclear-Weapon-Free Zones (NWFZs)

Output

The scope of Nuclear-Weapon-Free Zones is ambitious. Their "arrangements must ensure that the zone would be, and would remain, effectively free of all nuclear weapons"

[122] On the role of fissile material in ridding the world from nuclear weapons see Feiveson *et al*. (2014).

(UN General Assembly, 1975). In more practical terms, a NWFZ is "a specified territorial entity, normally a recognized geographical region, in which manufacture, receipt, storage and installation of nuclear weapons is forbidden" (Pande, 1998, p.35). Hence, their added value is a geographical approach to restricting the demand and supply side in the acquisition of nuclear weapons.

Given the singular backgrounds of the NWFZ treaties, there are differences in their content, e.g. regarding physical protection, environmental considerations like radioactive pollution, the role of peaceful nuclear energy, or territorial definitions (e.g. whether or not continental shelves should be included).[123] Still, the treaties share common features.

All NWFZs are unlimited in duration but include possibilities for withdrawal. The Treaties of Pelindaba, Tlatelolco, and the CANWFZ allow for individual withdrawals in cases of "extraordinary events" or "circumstances" that relate to the content of the treaty. The Treaties of Rarotonga and Bangkok only allow an individual withdrawal if other member states breach the respective treaty.

States within the zone undertake "a pledge by states not to develop, deploy, station, test, or use nuclear weapons within the zone" (Diehl and Moltz, 2002, p.207). This is a significant achievement given the number of states signing these NWFZs. In sum, more than 100 states have ratified or acceded a NWFZ – effectively covering the southern hemisphere (Hamel-Green, 2009, p.359).

Following the UN guidelines, commitments not only refer to states within the zone, but also Nuclear Weapon States and states outside zone (that are not NWS).[124] NWS would make a commitment not to assist states within the zone in acquiring nuclear weapons. In practice, they pledge not to contribute to "violations" of the respective treaty. This would contribute to curbing the supply side in the *acquisition* of nuclear weapons.

Despite their impressive conceptual layout, output effectiveness of Nuclear-Weapon-Free Zones is diminished by three aspects. First of all, Nuclear Weapon States vary in their acceptance of the NWFZ protocols (see Appendix 1). This lack of commitment has negative consequences for the *possession* and *use* of nuclear weapons in these zones. Regarding the *acquisition* of nuclear weapons, the commitment offers only limited added value, as the Non-

[123] See e.g. Parrish and Du Preez (2004) or James Martin Center for Nonproliferation Studies (2019).
[124] For a further description of these three categories of commitments by state see also UN General Assembly (1975).

Proliferation Treaty already commits Non-Nuclear Weapon States not to acquire nuclear weapons.

Second, NWFZs heavily focus on the notion of Nuclear Weapon States. Apart from signatory states and Nuclear Weapon States, other states are only addressed if they have a territorial affiliation within the zone.[125] States that possess nuclear weapons but are not part of the Non-Proliferation Treaty do not find particular recognition.

Finally, while in the last decades a number of NWFZ have materialized, others have not. Prominent zones that have not been established despite considerable efforts include a Weapons of Mass Destruction Free Zone in the Middle East and ideas for a Nuclear-Weapon-Free Zone on the Korean Peninsula or in Europe. One difference in these regions is the presence of states that (presumably) possess nuclear weapons – France, the UK, North Korea, and Israel.

Outcome

Nuclear-Weapon-Free Zones are aimed at preventing the production of nuclear weapons and assistance of other states' pursuance thereof. At first sight, the implementation of these commitments offers a very positive outcome effectiveness for the field of the *acquisition* of nuclear weapons. There is no known case in which a state has pursued nuclear weapons while having a NWFZ treaty in force.

This is all the more important considering some of the zones' state parties. After abandoning nuclear weapons, Kazakhstan and South Africa joined a NWFZ respectively (the CANWZs and the Treaty of Pelindaba), legally forsaking the renewed acquisition of nuclear weapons. Both states have not rebuilt a nuclear weapon capability. In its Safeguards Statement for 2018, the International Atomic Energy Agency finds that in South Africa and Kazakhstan "all nuclear material remained in peaceful activities" (IAEA, 2019c).

Also, Argentina and Brazil ended their suspected explorations of nuclear weapons before fully implementing the Treaty of Tlatelolco. Both states put the treaty effectively into force in 1994 (OPANAL, 2018). The NWFZ is of particular importance in the states' non-

[125] Hence, some NWFZs include territory-related commitments by outside states. Here, no difference is being made between NWS and other states. Protocol 3 of the Treaty of Pelindaba is aimed at committing France and Spain to apply NWFZ rules for territories for which they are responsible within the zone. While France has signed and ratified the protocol, Spain has not. Similarly, Protocol 1 of the Treaty of Rarotonga was ratified by France and the UK and signed by the US. The Treaty of Tlatelolco was ratified by relevant states with territorial responsibilities within the zone, i.e. the US, the UK, France, and the Netherlands.

proliferation commitment. Brazil and Argentina joined the Treaty of Tlatelolco before joining the Non-Proliferation Treaty (UNODA, 2019b).

If taking into account the signing of a NWFZ, outcome effectiveness offers some setbacks. Libya pursued nuclear weapons despite signing the Treaty of Pelindaba (Parrish and Du Preez, 2004, p.3). Brazil and Argentina were suspected of having pursued nuclear weapons after signing the Treaty of Tlatelolco in 1967 (Kutchesfahani, 2014, pp. 24–52).[126] Furthermore, Syria allegedly undertook illicit nuclear activities, despite being a vocal proponent of a WMDFZ in the Middle East and North Korea established a nuclear weapons program while advocating a denuclearization of the Korean Peninsula (see Chapter 4). This shows that a signature or vocal support of an NWFZ is no guarantee for compliance.

Export Controls

Output

Nuclear export controls further limit the supply side of nuclear weapons by specifying rules for nuclear trade. The Zangger Committee developed a "trigger list" of material and equipment that shall not be diverted to nuclear explosive devices and, thus, require IAEA safeguards. The guidelines of the Nuclear Suppliers Group are more comprehensive, among other things, because they include an expanded list of dual-use items and technology and require recipients to pledge not to use or retransfer trade items for nuclear explosives and to accept IAEA safeguards on all of their peaceful activities (Cirincione, 2000a, p.287).

Export controls not only define and condition the export of nuclear material and related items to Non-Nuclear Weapon States. They also restrict nuclear programs outside of the NPT. Trade restrictions would force states outside the NPT to produce nuclear weapons independently or by trade among each other. This aspect considerably strengthens the output effectiveness of the regime. On a further positive note, states may adhere to NSG guidelines even without being members to the group.

Apart from the fact that technical developments in the field of nuclear energy and related items demand a continuous reconsideration of the items lists, there are some challenges regarding output effectiveness. Shortcomings exist in the legal implementation of export controls among nuclear suppliers, as noted by Spector and Murauskaite (2014, p.x):

[126] The international suspicion of military nuclear intentions in Argentina and Brazil was underlined by a number of factors, including the rivalry between both states and their military leadership, unsafeguarded and advanced nuclear capacities, and their rejection of international agreements (Kutchesfahani, 2014, pp. 25).

> "As of early 2011, only 60 percent of the UN's 193 member states had enacted domestic laws restricting exports of nuclear-specific and dual-use nuclear goods, only 50 percent used commodity control lists, and only 50 percent had export licensing systems. Some states lacking basic laws in this domain are in regions of proliferation concern, in particular, the Middle East. In some other cases, the implementation of such laws is poor."

After all, a major weakness of the Zangger Committee as well as the Nuclear Suppliers Group is that they are voluntary (Cirincione, 2000b, p.286). NSG members are neither obliged nor enforced to follow the export guidelines.

Outcome

Outcome effectiveness in export controls has many facets. For instance, although in accordance with NSG guidelines, the nature and efficiency of the application process for licensing of material to be exported varies significantly (Glasgow, Teplinsky, and Markus, 2012). This has led to reform suggestions to enhance bureaucratic efficiency of the process (e.g. World Nuclear Association, 2015). Regarding potential nuclear proliferation, outcome effectiveness contains two aspects. First, do supplier states limit their licensing in conformity with conventions? Second, are potential proliferators still able to trade?

As to the first question, export controls have an effect on the licensing of WMD material and dual-use material. Project Alpha of King's College London (2015) has visualized export denials by the US and the UK. The analysis demonstrates the complex network of international and unilateral export controls for WMD and conventional weapons. Overall, Project Alpha finds that the US and the UK denied 3307 licenses between 2006 and 2014, with a large share of denials are based on country specific measures. Owing to transatlantic sanctions against Iran and Russia, denials peaked following 2012 (Project Alpha, 2015).

Yet, there is a lacking coherence of the actions of Nuclear Suppliers Group and Zangger Committee members (see e.g. Anthony, Ahlström, and Fedchenko, 2007). For instance, although almost all NSG members argued that the transfer would contradict guidelines, Russia exported nuclear fuel to India in 2001 (Kimball and Davenport, 2017). Similarly, China has been pushing for nuclear cooperation with Pakistan (Hibbs, 2011, pp.13–15).

The second part of outcome effectiveness relates to potential proliferators. Some commentators refer to problems in containing illicit trade. As pointed out by Spector and Murauskaite (2014, p.74), states with (previously) incomplete export controls have served as a hub for the A.Q. Khan network's illicit trade and nuclear assistance, which in turn assisted the Libyan nuclear weapons program, as well as Iran and North Korea.

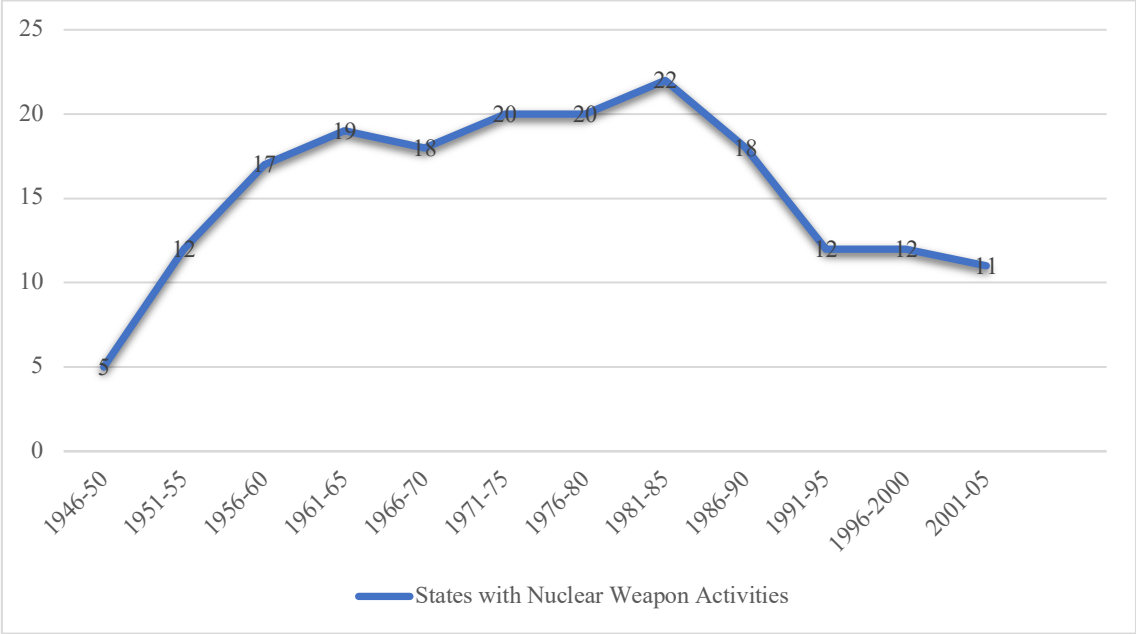
Also in states with more comprehensive export controls, proliferators have been able to defeat controls through "falsifying end-users, end uses, and destinations on licensing applications; employing middlemen, front companies, and brokers to obscure the true purposes of proposed exports; and by-passing export licensing altogether by the use of diplomatic pouches to move goods" (Spector and Murauskaite, 2014, p.74). An import factor in the increasing number of nuclear transfers and retransfers are online communication and exchange of data (e.g. Stewart, 2015).

Impact (*Acquisition* of Nuclear Weapons)

In order to shed light on regime impact, it is worth examining states' overall compliance with the regime norm not to acquire nuclear weapons against the background of regime commitment. Indeed, there is indication that the regime has at least partially achieved its goal in the field of *acquisition* of nuclear weapons. We do not have a massive increase of states that possess nuclear weapons, as feared, among others, by John F. Kennedy (1963).

Yet, this is only one part of the story. Over the last decades, several states have undertaken nuclear weapons activities. The introduction of the NPT in 1970 did neither fully stop nor reverse these number. Following an analysis by Harald Müller and Andreas Schmidt, the numbers actually peaked in the period between 1981-85, decreasing significantly in the wake of the end of the Cold War. This suggest a limited impact of the NPT on norm compliance.

Figure 3 – States with Nuclear Weapon Activities[127]



A closer look at the respective cases, however, demonstrates that several nuclear weapons activities of states like Argentina, Brazil, Germany, Japan, Switzerland, Sweden, and Italy were ended before the respective ratification of the Non-Proliferation Treaty. Moreover, these states are not known to have taken up nuclear weapon aspirations after joining the treaty. This observation suggests that the NPT locks in regime compliance, once states decide to commit.

The counter-example for the relevance of non-proliferation commitment also holds true. With the exception of South Sudan, all states that remain outside the Non-Proliferation Treaty today have developed nuclear weapons, i.e. Pakistan, India, South Africa, and presumably Israel. This indicates that non-commitment in the regime and non-compliance with the regime norm are closely connected. The fact that states outside the NPT could develop nuclear weapons also indicates a limited impact of export controls on non-proliferation.

There is even reason to believe that nuclear exchange, as promoted by the regime, i.e. trade and assistance, contribute to a negative regime impact. Applying a data set on civilian nuclear cooperation, Matthew Fuhrmann (2009) comes to the finding that peaceful nuclear cooperation and the spread of nuclear weapons or weapons programs is directly linked. He

[127] Data taken from Müller and Schmidt (2010, pp.157–8). The authors base their categorization of nuclear weapons activities on ambiguous activities, serious consideration of weapons program, nuclear weapons status, and inheritance.

argues that, due to the similarity of civilian and military programs, an existing civilian path lowers costs and technological challenges (Fuhrmann, 2009, p.39).

Fuhrmann's quantitative analysis has some virtue. As the cases of North Korea, Iraq, or Libya demonstrate (see Chapter 4), states may develop nuclear weapon programs while being members to the Non-Proliferation Treaty. Considering that several Non-Nuclear Weapon States like Japan, the Netherlands, Australia, or Germany have used the platform for the peaceful use of nuclear energy to expand and share their fairly advanced nuclear programs may give additional proliferation concern. Yet, this fear may be exaggerated, as North Korea is the only state that has successfully developed nuclear weapons following an NPT membership. Furthermore, nuclear cooperation has also been used as a tool to contain proliferation (Krige, 2016; Krige and Sarkar, 2018).

2.2.2. Possession

Commitments regarding the *possession* of nuclear weapons particularly concern Nuclear Weapon States and states outside the Non-Proliferation Treaty, in other words those states that have nuclear weapons. By and large, commitments may refer to the placing and disarmament of nuclear weapons as well as the reversal of a weapons program. *Placing* describes the stationing and transfer of nuclear weapons in a defined place or area. *Disarmament* summarizes endeavors aimed at reducing nuclear weapon stocks. The term *nuclear reversal* describes cases in which states reverse a nuclear weapons program (Levite, 2003, p.61). I will use the term for cases in which states had a successful nuclear weapons program but gave up nuclear weapons altogether. As such, a nuclear reversal embodies the regime norm of complete disarmament.

Non-Proliferation Treaty and US-Russian Disarmament

Output

In addition to limiting the *acquisition*, the Non-Proliferation Treaty also addresses the *possession* of nuclear weapons. Although these commitments formally concern all of the states party to the Non-Proliferation Treaty,[128] they are primarily relevant for the five Nuclear Weapon States: China, France, Russia, the United Kingdom, and the United States of America. The most important point of reference is Article VI of the treaty:

[128] See the interpretation of Article VI by the International Court of Justice (ICJ, 1996).

> "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

The article formulates different objectives relating to nuclear weapons, giving the impression of an evolutionary process: ending the further increase of nuclear weapons (i.e. "nuclear arms race"), reducing nuclear weapon stocks (i.e. "nuclear disarmament"), and pursuing a global nuclear reversal ("general and complete disarmament") under "international control." Hence, the Non-Proliferation Treaty embodies the goal of a world free of nuclear weapons.

The phrasing of the disarmament provisions is rather vague, especially when compared to the NNWS' commitment not to pursue nuclear weapons. Article VI demands an intent to negotiate an agreement ("undertakes to pursue negotiations"), which decreases output effectiveness. It does neither oblige the states for an immediate nuclear reversal nor specify a time-frame for the reduction of nuclear weapon stocks. However, the International Court of Justice opined in 1996 that the *result* of negotiations is obligatory, namely "nuclear disarmament in all its aspects."

Recent years have seen a push for a more comprehensive ban of nuclear weapons altogether. Numerous debates led to the Treaty on the Prohibition of Nuclear Weapons, which opened for signature in 2017. However, no Nuclear Weapon State has signed the treaty. They have taken different approaches to disarmament.[129]

While France advocates a nuclear arsenal of "strict sufficiency" and the United Kingdom has announced a cap on their nuclear weapon stocks, the nuclear superpowers – the United States of America and the Soviet Union/Russia – have concluded various bilateral agreements in the past, including: the Strategic Arms Reduction Treaty (START) I + II,[130] the Strategic Offensive Reductions Treaty (SORT), and New START.

The bilateral treaties enhance output effectiveness by incorporating decisive rules for both parties. Still, three obstacles lower the degree of commitment. 1. Withdrawal from

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[129] The fact that those states that possess nuclear weapons remain outside of the treaty lowers its output and outcome effectiveness. The role of the humanitarian initiative has become subject to academic discourse. Jan Ruzicka (2018b, pp.9–12) criticizes that the humanitarian initiative takes a universal legalistic approach rather than accounting for power considerations. Cesar Jaramillo (2017), in turn, argues that "the primary arguments used to oppose the ban cannot withstand close scrutiny. They are either misleading, based on a dead-end logic, or outright wrong." Ritchie and Egeland (2018, pp.18–9) describe the humanitarian initiative as a "multi-layered social resistance movement," which "demonstrates how a network of the relatively disempowered can affect global politics through practices of resistance."

[130] START I is categorized in this work as a bilateral agreement. Owing to the breakup of the Soviet Union, the agreement not just affects the US and Russia, but also Ukraine, Belarus, and Kazakhstan.

commitments is possible. 2. There is no inherent continuation of disarmament. START I + II, SORT, and New START all demonstrate a limited duration. Further measures depend on new negotiations. 3. The agreements do not include a complete disarmament (nuclear reversal).

The commitments in START I + II, SORT, and New START have put limits on the existing nuclear stocks of the Soviet Union/Russia and the United States. START I restricted the number of Intercontinental Ballistic Missiles, Submarine-Launched Ballistic Missiles, and delivery vehicles. The treaty has also elements of reversal to it, as Ukraine, Kazakhstan, and Belarus forsake nuclear weapons on their territory. START II attempted to put further restrictions on warheads but became superfluous when Russia withdrew in 2002. SORT reduced the number of strategic nuclear warheads to 1,700 - 2,200 by 2012.

New START replaced SORT and limits the deployed strategic nuclear warheads to 1,550 each. Despite significant reductions, the limits placed on the US and Russia still go beyond the combined arsenals of other states possessing nuclear weapons. This demonstrates a modest scope of New START (see also Tannenwald, 2013, pp.308–9).

Outcome

Interpretations of how Nuclear Weapons States should implement their NPT disarmament obligations and whether they have succeeded in doing so vary significantly. The different understandings of outcome effectiveness become plainly obvious when looking at statements made during the last NPT Review Conference. For instance, the Non-Aligned Movement promotes “a phased program and a specified time frame for the complete elimination of nuclear weapons” and criticizes a lacking progress in disarmament (Zarif, 2015).

The Nuclear Weapon States, in turn, claim that an “incremental, step-by-step approach is the only practical option for making progress towards nuclear disarmament, while upholding global strategic security and stability” (Rowland, 2015). Their statement leaves the impression that disarmament has seen major achievements in the past decades. As proof for compliance with Article VI of the Non-Proliferation Regime, NWS praise:

- An end to the Cold War arms race
- A decrease in global weapon stocks
- Lower levels of deployed nuclear weapons

- Enhanced communication among Nuclear Weapon States (since 2009 regular conferences)

(Rowland, 2015)

While the global dimension of nuclear weapon stocks will be discussed in the subsection on impact effectiveness, it is worth taking a brief look at compliance with more specific bilateral agreements and unilateral pledges. Owing to its long-term implications, a great disarmament commitment was the nuclear reversal of Belarus, Kazakhstan, and Ukraine, as embedded in START I.

The three states are in compliance with the demands to forsake nuclear weapons on their territory. They have joined the NPT as Non-Nuclear Weapon States and are not known to have taken up nuclear weapon aspirations ever since. In its latest report, the IAEA found in the case of Belarus that "declared nuclear material remained in peaceful activities." For Kazakhstan and Ukraine, the agency concluded that "all nuclear material remained in peaceful activities" (IAEA, 2019c). This is a substantial achievement, especially considering that Kazakhstan used to have the world's fourth largest arsenal of nuclear weapons on its territory (Ashikbayev, 2015).

Furthermore, the United Kingdom and France seem to be on track to fulfill their unilateral declarations. SIPRI estimates that the United Kingdom has now 95 stored and 120 deployed nuclear warheads. Although the current numbers are above the target of 180 warheads or less by the mid 2020s, the UK's goal remains achievable. France has in recent years maintained a relatively stable inventory of about 300 warheads (see e.g. SIPRI, 2018, p.236).

The United States and Russia also appear to be in compliance with their latest major bilateral nuclear agreement – New START. As noted by Hans M. Kristensen, upon the treaty's entering into effect in February 2018, both states are considered to stay below the respective limit for deployed nuclear warheads and deployed strategic launchers. Yet, this is only one third of their overall nuclear arsenal (Kristensen, 2018).

Nuclear-Weapon-Free Zones

Output

Nuclear-Weapon-Free Zones strengthen the non-proliferation regime by banning the *placing* of nuclear weapons in defined areas. The protocols of the treaties demand that

territories owned by Nuclear Weapon States within the zones shall apply the same rules as the rest of the respective zone and, therefore, should not station nuclear weapons. Furthermore, NWFZ close an NPT-loophole, which would allow Nuclear Weapon States to deploy nuclear bombs in other states (Parrish and Du Preez, 2004, p.2).[131]

These commitments seem very promising on the outset. If a *world* free of nuclear weapons is not possible, *regions* free of nuclear weapons are at least an important step forward. More than that, "[t]hrough their prohibition of nuclear weapon stationing, NWFZs have also reduced the potential fields of use or threat of use of nuclear weapons by states already possessing nuclear weapons" (Hamel-Green, 2009, p.360).

Still, output effectiveness faces some setbacks. One hurdle refers to the support by Nuclear Weapon States. As to be seen in the overview in Appendix 1, the United States has refrained from ratifying protocols of the treaties creating NWFZ, with the exception of the Treaty of Tlatelolco. In addition to that, none of the Nuclear Weapon States has signed the Treaty of Bangkok.

The second hurdle rests with the content. Nuclear-Weapon-Free Zones can still serve as transit for nuclear weapons. The Treaty of Bangkok takes a relatively comprehensive take on the transfer of nuclear weapons – owing to a wider territorial definition – but has failed to gather NWS support. According to Kelsey Davenport, NWS rejected to sign the treaty's protocol, "because of concerns that it conflicts with the right of their ships and aircraft to have freedom of movement in international waters and airspace" (Davenport, 2017).

As noted by Josef Goldblat, the issue of nuclear weapon transfer in specific states is ambivalent. Nuclear Weapon States refrain from informing a transit country about nuclear weapons on their ships. Although several countries around the globe have demanded or even legally prohibited the transfer of nuclear weapons on ships or airplanes in their territory, they pretend "not to be aware of the presence of nuclear weapons on board the visiting foreign craft" (Goldblat, 1997, p.30). Hence, there appears to be a nuclear "don't ask, don't tell" policy.

[131] The Non-Proliferation Treaty does not, however, allow Non-Nuclear Weapon States access to nuclear devices. In connection with this, Russia has repeatedly criticized the involvement of NNWS in the form of *nuclear sharing* as part of the NATO deterrence strategy (see e.g. Uliyanov, 2015).

Outcome

Regarding Nuclear-Weapon-Free Zones, outcome effectiveness on the *possession* of nuclear weapons refers to two things: stationing and transfer. An assessment of the extent to which Nuclear Weapon States transfer nuclear weapons through Nuclear-Weapon-Free Zones is difficult, as it is the "general practice of nuclear-weapon states […] not to declare whether nuclear weapons are aboard their vessels" (Davenport, 2017). As the Treaty of Bangkok suggests, Nuclear Weapon States are reluctant to officially limit the transfer of nuclear weapons.

A clearer picture exists regarding the stationing of nuclear weapons. Following an overview by Kristensen and Norris (2017), the deployments of nuclear weapons do not include the territory of the five Nuclear-Weapon-Free Zones or Mongolia, which also achieved an internationally recognized nuclear-weapon-free status. This suggests a compliant behavior of Nuclear Weapon States.

Particularly in the case of Mongolia, this is a positive assessment, considering that until 1992 Soviet troops stationed nuclear weapons on Mongolian territory (Enkhsaikhan, 2006, p.16). Since the Soviet troops left Mongolia, no nuclear weapons have been stationed in the state – although Russia keeps nuclear weapons related facilities close to the border, e.g. in the regions of Irkutsk, Zabaykalsky, or Altai Krai (see Kristensen and Norris, 2017, pp. 291–2).

South Africa

A unique state case regarding the *possession* of nuclear weapons is South Africa, the only state to have built nuclear weapons[132] and subsequently to have undertaken a full nuclear reversal. The state developed a successful nuclear weapons program throughout the 1970s and 1980s. Following a halt to the program in 1989, President de Klerk ordered the dismantlement of the existing nuclear explosives in February 1990 (von Baeckmann, Dillon, and Perricos, 1995, p.45). Post-apartheid South Africa implemented disarmament and non-proliferation measures as part of the Non-Proliferation of Weapons of Mass Destruction Act of 1993 (James Martin Center for Nonproliferation Studies, 2015).

South Africa entered the Non-Proliferation Treaty as a Non-Nuclear Weapon State in 1991 and joined the Treaty of Pelindaba in 1996 (von Baeckmann, Dillon, and Perricos,

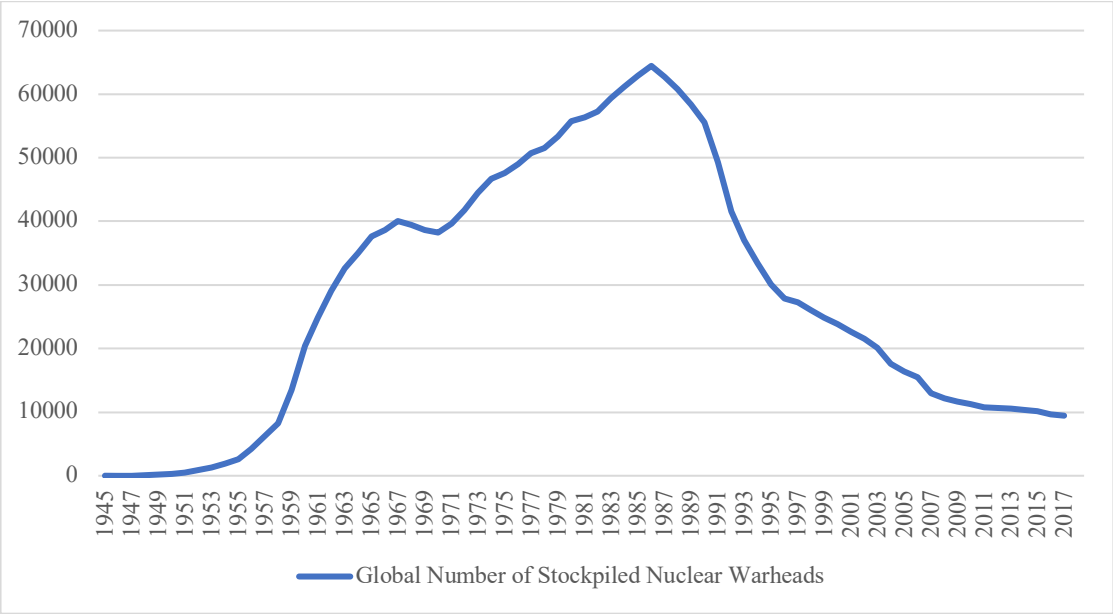
[132] In this thesis, I treat Belarus, Kazakhstan, and Ukraine as cases of *reversal* in a larger sense. These states have "inherited" nuclear weapons in the wake of the end of the Cold War.

1995, p.45). Accordingly, the state committed itself not to take up its nuclear weapons program again and appears to comply with the rules deriving from its new role. The IAEA concluded in its latest safeguard statement for South Africa that "all nuclear material remained in peaceful activities" (IAEA, 2019c).

Impact (*Possession* of Nuclear Weapons)

To what extent has the regime fulfilled the norm on the *possession* of nuclear weapons ("states that possess nuclear weapons disarm")? Three indicators can shed light on regime impact: the overall nuclear weapon stocks, the number of states with nuclear weapons, and the size of the nuclear arsenal by state. While the global stockpiles of nuclear warheads has gone down, the number of states possessing nuclear weapons has actually increased in the last 25 years, with nuclear stockpiles still being expanded in some countries.

Figure 4 – Global Stockpiles of Nuclear Weapons[133]



On a positive note, the global nuclear weapon stockpiles have significantly shrunk – from an estimated 37,863 nuclear weapons in 1970 to less than 9,500 in 2019 (Kristensen

[133] Data on nuclear weapon stockpiles is taken from the Bulletin of Atomic Scientist's illustration of the Nuclear Notebook, based on an analysis by Hans M. Kristensen and Robert S. Norris (in: Bulletin of Atomic Scientists, 2019). For reasons of data consistency, the graph in Figure 4 reflects the estimated cumulative number of warheads owned by the United States of America, Russia, the United Kingdom, France, China, Israel, India, and Pakistan (Appendix 2 and 3), rather than the global estimate by the Nuclear Notebook. The graph does not account for the vague numbers for North Korea, which may have produced between 10-20 nuclear weapons (Kristensen and Korda, 2019).

and Korda, 2019).[134] The United States, Russia, and the United Kingdom are now below the stockpile levels of 1970 – when the NPT entered into force (See Appendix 2 and 3). These observations suggest a positive regime impact.

Yet, the Non-Proliferation Treaty has had only a limited contribution to this. After the NPT entered into force, the global stockpiles went significantly up, rather than down. The development had its peak in 1986, with stockpiled warheads amounting to more than 64,000.[135] The primary reason for this trend was the massive increase of nuclear weapons in the Soviet Union. Their stockpiles increased from 11,736 warheads in 1970 to 40,159 in 1986. Concluding that this armament is in non-compliance with Article VI of the NPT is an understatement.

Following the end of the Cold War, the global numbers of warheads have been going down. It was not until 1993 that their level was lower than in 1970. Apart from North Korea (see enforcement chapter), China, Pakistan, and India continue to expand their stockpiles. Israel's suspected arsenal increased up until 2004 but seems to have remained stable since then (see Appendix 3).

Although four states have forsaken nuclear weapons, i.e. Belarus, Kazakhstan, Ukraine, and South Africa, *reversals* are an exception in international affairs. Only South Africa has reversed an independent and fully developed nuclear weapons program. At the same time, since the end of the Cold War, India, Pakistan, and North Korea have established nuclear weapon arsenals. This development contributes to the fact that even 50 years after the NPT opened for signature, complete disarmament is nowhere near to becoming the reality.

2.2.3. Use

The last policy field refers to the *use* of nuclear weapons. The field is of particular importance, as it poses the most immediate danger to human life. Commitments can target a variety of issues, including nuclear weapon tests, peaceful nuclear explosions, negative security assurances, or the strategic application of nuclear weapons.

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[134] Including warheads awaiting dismantlement, there is a global inventory of around 13,890 nuclear weapons (Kristensen and Korda, 2019).

[135] An important aspect when considering the number of nuclear weapons are also delivery vehicles. Multiple Independently Targetable Reentry Vehicles (MIRVs) have changed the ratio between weapons and missiles, as more warheads could be placed on a single missile. At the same time, several experts regard MIRVs to have significantly changed the relationship between a nuclear strike and the defense against it. On strategic considerations relating to MIRV see e.g. Potter (1978).

Nuclear weapon tests represent an important stage in establishing a nuclear weapon capability, i.e. to test the design of devices. Depending on the state, they may also serve as a demonstration of power. While North Korea has ensured media attention on its tests, South Africa and (possibly) Israel have refrained from doing so.

Negative security assurances are conditions on the actual usage of nuclear devices as a weapon. These depend on the larger nuclear strategy of a state. Commitments may relate to cases in which both parties have nuclear weapons or instances in which one state has nuclear weapons, while the other has not.

Peaceful nuclear explosions make use of the destructive force of a nuclear device for civilian proposes and are highly contentious. Potential uses include "natural resource exploitation, storage or waste disposal, transportation and scientific research" (Shaker, 1980, pp.394–5). While proponents have argued that the released power of nuclear explosions offers economic advantages, opponents have questioned the usefulness and manageability of such explosions.

Finally, commitments on the *application* of nuclear weapons put limits on the larger infrastructure. Rather than limiting nuclear weapon stocks, an agreement may limit related items, such as carriers, ballistic missiles, defense mechanisms, or launchers. The infrastructure makes up an important pillar of the nuclear strategy of a state.

Non-Proliferation Treaty

Output

Although the Non-Proliferation Treaty plays a more pivotal role regarding the *acquisition* and *possession* of nuclear weapons, it also addresses two issues in the *use* of nuclear weapons, i.e. peaceful nuclear explosions and negative security assurances. As part of the larger promotion of the peaceful use of nuclear energy, Article V of the NPT emphasizes the right of Non-Nuclear Weapon States to access peaceful nuclear explosions:[136]

> "Each Party to the Treaty undertakes to take appropriate measures to ensure that […] potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis […]."

[136] For a close examination of peaceful nuclear explosions in the context of the Non-Proliferation Treaty see Mohamed Ibrahim Shaker (1980, pp.379–480).

One problem of these explosions is that they can easily be reassigned to a military purpose. Any pursuance or access to nuclear devices for civilian explosions are, therefore, bearing the risk of facilitating the horizontal spread of nuclear weapons. Article V contains that risk by formulating conditions for peaceful nuclear explosions. Rather than simply handing over explosives to Non-Nuclear Weapon States, assistance regarding peaceful nuclear explosions shall be subject to a bilateral or international legal framework as well as observation.

The military use of nuclear explosives remains until today a point of contention.[137] In its 1996 opinion, the International Court of Justice concluded that international law does neither authorize nor universally prohibit the use and threat of the use of nuclear weapons. In practice, Nuclear Weapon States have formulated different positions on the use of nuclear bombs. One strategic decision refers to whether or not they would first introduce nuclear weapons in a conflict against another state possessing nuclear weapons (*first use*).

Table 2 – Stated Uses of Nuclear Weapons[138]

	United States	**Russia**	**United Kingdom**	**France**	**China**
First use	Yes	Yes	Ambiguous	Yes	No
General defense	Yes	Yes	Ambiguous	Yes	No
Defense against nuclear attack	Yes	Yes	Yes	Yes	Yes
Use against compliant NNWS	No, except in defense when allied with NWS or defense against WMD	No, except in defense when allied with NWS	No, except in defense when allied with NWS	No, except in defense when allied with NWS	No

Discussions surrounding the Non-Proliferation Treaty have mainly called for a guarantee from Nuclear Weapon States not to use nuclear weapons against Non-Nuclear Weapon States (*negative security assurance*). Prior to the 1995 NPT Review Conference, NWS published non-binding assurances. Apart from China, which has formulated

[137] A decisive legal stance against the use or threat of use of nuclear weapons is embedded in the Treaty on the Prohibition of Nuclear Weapons, which was not signed by any of the states possessing nuclear weapons.
[138] For an overview of the different postures of states possessing nuclear weapons see Panda (2018) or Reaching Critical Will (2019).

unconditional negative security assurances,[139] the NWS require from the NNWS in question certain conditions to be met (see e.g. Reaching Critical Will, 2019). While the specific conditions vary, negative security assurances tend not to be granted if the Non-Nuclear Weapon State:

- Is in a conflict in a conjunction with a Nuclear Weapons State
- Is in non-compliance with the NPT
- Makes use of Weapons of Mass Destruction

Apart from the fact that the Nuclear Weapon States have failed to conclude a binding commitment, output effectiveness is lowered by the nature, diversity, and vagueness of the conditions. For instance, what constitutes non-compliance with Non-Proliferation Treaty? How exactly is conjunction with a Nuclear Weapon State to be determined? A broad interpretation of the conditions would leave a large part of Non-Nuclear Weapon States subject to nuclear attacks.[140]

Outcome

Despite the inclusion of Article V, the Non-Proliferation Treaty has not become a notable platform for peaceful nuclear explosions. This development is due to the general departure from the idea that their use would justify environmental and economic costs. Still, there were efforts to explore and use explosions for peaceful purposes on the territory of the Soviet Union and the United States. Between 1945 and 1996, over 150 out of around 2,050 nuclear explosions had a peaceful purpose (CTBTO, 2012g).

Regarding the negative security assurances, it would be too trivial to conclude that Nuclear Weapon States comply, because they have not attacked a Non-Nuclear Weapon State with nuclear bombs. Implicit and explicit nuclear weapon threats continue to exist until today. For instance, Russian President Putin declared that he "was ready for nuclear alert" in the Ukraine conflict regarding Crimea (BBC, 2015). This statement is remarkable, as Putin made it afterwards. It could be seen as a vague nuclear threat by Russia referring to similar circumstances in the future.

[139] China takes great pride in the uncompromising stance as distinguishing feature among Nuclear Weapon States (see e.g. Li, 2015).
[140] In order to strengthen the negative security assurances and formulate clearer conditions, some suggestions have been made, including the conclusions of a binding resolution by the UN Security Council (see e.g. Evans and Kawaguchi, 2009, pp.174–8).

This interpretation of Putin's words as a pre-emptive nuclear threat is in line with another threat made by Russia in the context of the Crimea crisis. Russia verbally targeted Non-Nuclear Weapon States and their cooperation with NATO. Mikhail Vanin, the Russian Ambassador to Denmark, argued in a Danish newspaper:

> "I don't think the Danes fully understand the consequences of what will happen if Denmark joins the American-controlled missile defence […] If it happens, Danish war ships will become targets for Russian atomic missiles… It is of course your decision" (in: Frühling, 2018, p.78).

This threat shows that the formulated conditions for negative security assurances are not simply a protective tool for Nuclear Weapon States. Instead, the assurances themselves may become an offensive tool in a conflict to contain the military power of an opponent. The fact that the targeted state is a Non-Nuclear Weapon State becomes irrelevant.

Partial Test Ban Treaty and Comprehensive Test Ban Treaty

Output

In terms of commitment concerning the *use* of nuclear weapons, most progress has been made on nuclear weapon tests. The international legal foundation for this comprises the Partial Test Ban Treaty (PTBT) and the Comprehensive Test Ban Treaty (CTBT). The PTBT prohibits nuclear weapon tests in the atmosphere, outer space, or under water – leaving the possibility of underground nuclear weapon tests open. 126 states are party to the treaty, including Israel, India, and Pakistan. France, the People's Republic of China, and North Korea have not joined the treaty (UNODA, 2019a).

The Comprehensive Test Ban Treaty opened for signature in 1996. As the name suggests, it takes a more inclusive understanding of nuclear tests. The core commitment of states is embedded in Article 1 of the treaty:

> "Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control" (Article I.1., CTBT).

The scope of this pledge suggests a high output effectiveness. By prohibiting any nuclear explosion, the Comprehensive Test Ban Treaty not just covers the commitments made in the Partial Test Ban Treaty. It also includes underground testing (the vast majority of tests during the Cold War) and all peaceful nuclear explosions. The treaty is also more inclusive in terms of states party to it. So far, the CTBT has been signed by 184 states and ratified by 167 states (CTBTO, 2019). Just like the PTBT, the CTBT is unlimited in duration

but includes an option to withdraw from the treaty if a state's "supreme interests" are being jeopardized (Article IX).

Yet, the Comprehensive Test Ban Treaty has not come into force, since China, Egypt, Iran, Israel, and the United States have not yet ratified the Treaty (as demanded in Article XIV and outlined in Annex 2). Furthermore, India, North Korea, and Pakistan still have to sign and ratify the treaty, in order for it to come into effect. Owing to the large number of states that need to ratify the treaty, the CTBT finds itself in deadlock since it opened for signature more than 20 years ago.

Outcome

Overall, there is a positive compliance with the treaties on nuclear testing.[141] After the Partial Test Ban Treaty entered into force, only two states have conducted atmospheric nuclear tests – France (until 1974) and China (until 1980). Both states are not members to the treaty. All PTBT signatory states have complied with their commitment.

Ever since the Comprehensive Test Ban Treaty opened for signature in September 1996, three states have conducted underground nuclear weapon tests: Pakistan and India (1998) as well as North Korea (2006, 2009, 2013, 2016, 2017) (Kimball, 2019). Although the three states are required to ratify the CTBT in order for it to enter into force, they have not signed it. All other states have been in compliance with the CTBT. Considering that the treaty has not entered into force, it can be concluded that outcome effectiveness actually exceeds output effectiveness.

Nuclear-Weapon-Free Zones

Output

Negative security assurances and test bans are the "crown jewels" of Nuclear-Weapon-Free Zones for state parties (Rosen, 1997, p.56).[142] Both issues may appear redundant at first sight, owing to the CTBT and PTBT as well as the general assurances by Nuclear Weapon States towards Non-Nuclear Weapon States. For instance, although France and the United

[141] For an overview and analysis of states' nuclear tests see e.g. Bergkvist and Ferm (2000) and SIPRI (2018, pp.300–1).
[142] Originally, the Treaty of Tlatelolco also provided for peaceful nuclear explosions (Article 18). Yet, this provision does not play a role in present day, as to be seen by the fact that almost all states party to the treaty have signed and ratified the Comprehensive Test Ban Treaty.

Kingdom have signed and ratified the protocols to the Treaty of Rarotonga and Pelindaba, the commitment on nuclear tests provides little added value, since they have also ratified the CTBT.

Still, Nuclear-Weapon-Free Zones represent an additional layer for commitment on the *use* of nuclear weapons. First of all, negative security assurances in NWFZs are binding, whereas the declarations made by Nuclear Weapon States prior to the 1995 NPT Review Conference are not. NWFZs also take a more uniform approach, because all NWS are meant to sign and ratify the same protocol. In reality, however, Nuclear Weapon States also formulate reservations when signing a protocol.[143]

Banning nuclear weapon tests is of particular importance, given that some Nuclear-Weapon-Free Zones have experienced nuclear weapon tests in the past.[144] Although NWFZ may seem to duplicate the Comprehensive Test Ban Treaty, it is important to bear in mind that the CTBT is not in force. This is also due to a missing ratification in China and the United States. China, France, Russia, and the UK have ratified all Nuclear-Weapon-Free Zones, with the exception of the Treaty of Bangkok. The US has only ratified the Treaty of Tlatelolco (see Appendix 1).

Outcome

Have states complied with their NWFZ commitments regarding nuclear weapons testing and negative security assurances? On a positive note, no member state of a Nuclear-Weapon-Free Zone has conducted nuclear weapon tests. The zones have also not experienced tests by Nuclear Weapon States after the ratification of the protocols. A major controversy, however, were the French nuclear weapon tests in the South Pacific. In fact, the tests were an incentive for the Treaty of Rarotonga in the first place (Mogami, 1988, p.416). After finishing the final round of testing in January 1996, France closed the site and signed and ratified the protocols of the Treaty of Rarotonga.

Although Nuclear Weapon States have not fired nuclear weapons on members of Nuclear-Weapon-Free Zones, a closer assessment of their compliance with negative security assurances proves difficult. As analyzed by Sechser and Fuhrmann, NWS use threats to

[143] For instance, in the Treaty of Rarotonga, France stated that it would interpret the negative security assurance as in its 1995 NPT declaration – with the same conditions (James Martin Center for Nonproliferation Studies, 2018).
[144] See overview of test sites developed by AJ Software and Multimedia (2015).

demand behavioral changes from other states. They also target members of NWFZs. For instance, the United States demanded from Haiti in 1994 to restore Jean-Bertrand Aristide as President or called for Manuel Noriega's removal from power in Panama in 1989 (Sechser and Fuhrmann, 2013). Yet, these cases represent implicit nuclear threats, at best, as they mainly rest on the target's general awareness that the demanding state is a nuclear weapon state.

United States and the Soviet Union/Russia

Output

Bilateral agreements between the United States and the Soviet Union/Russia address nuclear weapon tests, peaceful nuclear explosions, and the application of nuclear weapons. The Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions (PNE) Treaty limit underground nuclear explosions to an equivalent of 150,000 kt TNT. Hence, they take up a shortcoming of the Partial Test Ban Treaty, which allows underground explosions. The treaties do not prohibit nuclear explosions altogether as the Comprehensive Test Ban Treaty. Since the latter is not yet in force, the TTBT and the PNE Treaty remain at least partial placeholders.[145]

Other bilateral agreements refer to the application of nuclear weapon uses, i.e. limiting the number of delivery vehicles, launchers, and deployment (START I, START II, New START). These rules, although not discussed in detail here, are important, as they restrict the possible use of nuclear weapons. The INF Treaty went even further, as it banned missiles with a range from 500 – 5,500 km. In doing so, the treaty eliminated two entire applications of nuclear warheads: intermediate-range and shorter-range missiles.

The Soviet Union/Russia and the United States have never established negative security assurance towards each other. Quite the contrary, the ABM Treaty of 1972 even limited defensive mechanisms in accordance with the idea of Mutually Assured Destruction. Following this logic, a state is less likely to start a nuclear war, knowing it could not sufficiently defend itself from the other party's missiles. The ABM Treaty ended with the United States' withdrawal in 2002.

[145] Both treaties are also legally interlinked with each other, in that the PNE Treaty does not allow withdrawal, as long as TTBT is in force.

Outcome

On a positive note, there have been no nuclear weapon tests and peaceful nuclear explosions by the Soviet Union/Russia since 1990 and by the United States since 1992 (SIPRI, 2018, pp.300–1). Shortcomings in outcome effectiveness are to be found regarding the *application* of nuclear weapons. Most notably, the INF Treaty became a great source for debate. While the United States has argued that the development and testing of new Russian ground-launched missiles as well as their launchers violated the INF Treaty, Moscow has claimed that three US military programs are in breach of the treaty.[146]

In February 2019, the US announced its plan to withdraw from the treaty six months later, if Russia did not eliminate the missiles in question as well as their launchers and related equipment (Pompeo, 2019).[147] Immediately following the US announcement, Russia declared its own withdrawal and its intention to develop a new missile system that would have been prohibited under the INF Treaty (e.g. Kramer, 2019). In August 2019, the INF Treaty officially came to its end. These developments suggest that the nuclear superpowers are about to revive their installation of nuclear weapons on intermediate-range and shorter-range missiles. This would be a setback for the non-proliferation regime, as it abandons past achievements on limiting the *use* of nuclear weapons.

India and Pakistan

Output and Outcome

India and Pakistan have made two bilateral commitments relating to the *use* of nuclear weapons: the Lahore Declaration and the India-Pakistan Non-Attack Agreement. In addition to confidence building measures and resolving the issue of Jammu and Kashmir, the Lahore Declaration was signed to reduce the risks of unauthorized uses of nuclear weapons. It also reaffirms unilateral moratoriums on nuclear weapon tests (see "Memorandum of Understanding").

Output effectiveness of the Lahore declaration is decreased by the fact that it formulates vague intentions rather than specific rules. Owing to the tense relationship between the two

[146] These US programs in question "include (1) the use of intermediate-range missiles as targets during tests of US missile defense systems; (2) the use of drones as weapons delivery vehicles; and (3) the planned deployment of missile defense interceptors on land in the Navy's MK-41 missile launchers" (Woolf, 2018, p.25).
[147] According to some scholars, apart from accusations against Russia, the 2018 US Nuclear Posture Review includes ideas for military research and development programs the implementation of which would have endangered the INF (e.g. Erästö and Topychkanov, 2018).

states, the declaration still represents a diplomatic milestone. Yet, it was not until 2004 that the Lahore Declaration led to an increasing cooperation between both states, particularly in fighting terrorism.[148]

Although the name "India-Pakistan Non-Attack Agreement" indicates a negative security assurance, the agreement is much narrower, in that it only refers to the nuclear infrastructure of India and Pakistan. The most important commitment is that

> "[e]ach party shall refrain from undertaking, encouraging or participating in, directly or indirectly, any action aimed at causing the destruction of, or damage to, any nuclear installation or facility in the other country."

The Non-Attack Agreement clarifies rules on what is expected from the parties, including a terminological definition of "nuclear installation or facility" in point 1. Both sides have exchanged lists with the location of nuclear facilities (Point 2 of the agreement). There have been no known attacks on the nuclear facilities on one another, which suggests compliance with the agreement.

Impact (*Use* of Nuclear Weapons)

Has the regime been successful at curbing the *use* of nuclear weapons? The first benchmark for a response is their use in war. The United States dropped two nuclear bombs on Hiroshima and Nagasaki in August 1945. These two cases remain until today the only nuclear attacks. Considering that global nuclear stockpiles amount to thousands of nuclear weapons (during the Cold War even dozens of thousands), their non-use in conflict is a positive development.

Still, one should be careful to regard the absence of nuclear weapon detonations in military conflict in recent decades as clear proof of a positive regime impact or the virtue of deterrence. As Benoît Pelopidas (2017) has demonstrated in studying the "Cuban Missile Crisis" of 1962, the non-use of nuclear weapons may very well be the result of *luck*, rather than the result of rational and informed leadership.

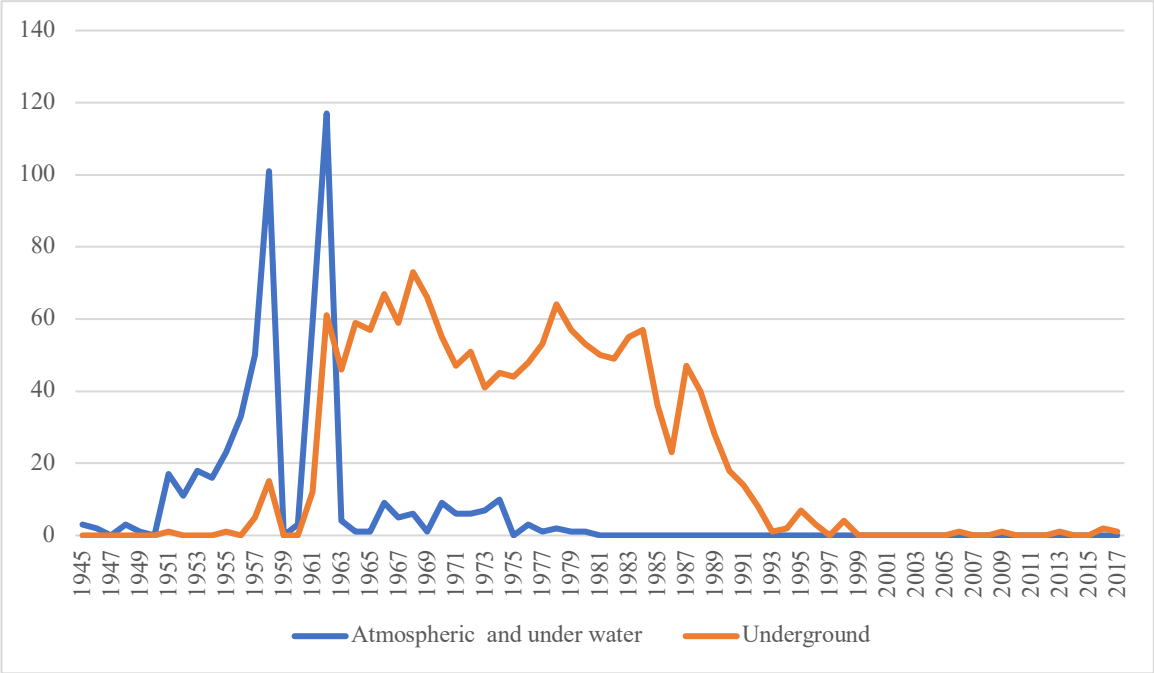
Furthermore, a broader understanding of *use* must also take nuclear threats into account. Nuclear threats still exist, either by movement of nuclear weapon carriers (such as Vanguard-submarines of the Royal Navy) or verbal threats. A prominent recent example for the latter – in addition to the aforementioned Crimean crisis – are mutual nuclear threats between the

[148] For an overview on the bilateral relationship leading up to the Lahore declaration and its aftermath see James Martin Center for Nonproliferation Studies (2011b).

United States of America and North Korea (see enforcement chapter). It remains to be seen to what extent the end of the INF Treaty broadens the strategic use of nuclear weapons in the future.

Regarding nuclear testing and the peaceful use of nuclear explosions, it is striking that outcome effectiveness is greater than output effectiveness. With the exception of North Korea, states comply with the Comprehensive Test Ban Treaty, although it is not in force. This has consequences for regime impact.

Figure 5 – Nuclear Explosions Worldwide[149]



As to be seen in Figure 5, nuclear explosions have massively gone down over the last decades. As a result, for almost 40 years, the world has not seen an atmospheric nuclear explosion. Underground tests have become an exception. This suggests that the CTBT and the PTBT had a positive impact, at least for the moment.

Yet, a closer look at the Comprehensive Test Ban Treaty appears to limit its relevance. The US (1992), the Soviet Union/Russia (1990), and the UK (1991) had conducted their last nuclear tests before the CTBT took shape and subsequently implemented moratoria. Hence, the treaty appears to lock in compliance rather than changing behavior for the better.

[149] Data based on a report by SIPRI (2018, pp.300–1). The estimations are the sum of known activities by the United States, the Soviet Union/Russia, the United Kingdom, France, China, India, Pakistan, and North Korea. Multiple tests by India and Pakistan on one date are counted as one test.

The Comprehensive Test Ban Treaty may even have led to a negative regime impact. Months prior to the conclusion of the treaty, France and China conducted their last rounds of nuclear tests. France actually had a four-year-moratorium in place just prior to the tests – between July 1991 and September 1995 (Bergkvist and Ferm, 2000, p.12). Ending the moratorium to conduct tests and then to sign and ratify the CTBT leaves the impression that the state used a last-minute opportunity for nuclear testing. In this sense, the CTBT would have been a contributing factor to why France conducted the tests at that specific time.

2.3. Explaining Effectiveness

2.3.1. Security

The remaining space of this chapter will be devoted to conduct an examination of plausible intent from four different perspective: security, norms, economics, and status. In order to explore possible explanations for (non-)cooperation within the commitment system of the non-proliferation regime, I will use the hypotheses developed in the introductory chapter as a point of orientation.

One possible explanation for state behavior are security considerations. We can expect a state to commit to and comply with the regime if cooperation satisfies its security needs. In turn, if non-cooperation increases its security needs, then a state will refrain from committing to and complying with the regime.

Cooperation

Semantically speaking, a "non-proliferation regime" has a security-related notion of containing a threat. Likewise, pivotal commitments within the regime that are aimed at countering the *acquisition* of nuclear weapons express a strong sentiment that security is significantly enhanced through states' cooperation. In its introduction, the **Non-Proliferation Treaty** is described as a tool to prevent the spread of nuclear weapons. Proliferation would enhance the chances of nuclear war, which poses a global threat:

> "[…] Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,
>
> Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

> In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons […]."

The understanding that the spread of nuclear weapons is likely to happen without an agreement is even more explicit in the first **Nuclear-Weapon-Free Zone**, which was established by the Treaty of Tlatelolco. The treaty also suggests that a disarmament agreement would be much more difficult to achieve, once weapons have spread. More specifically, in the introduction the states party to the treaty expressed their conviction

> "[t] hat the proliferation of nuclear weapons, which seems inevitable unless States, in the exercise of their sovereign rights, impose restrictions on themselves in order to prevent it, would make any agreement on disarmament enormously difficult and would increase the danger of the outbreak of a nuclear conflagration […]."

While the NPT and the Treaty of Tlatelolco describe an abstract proliferation threat, looking at **individual commitments by states** suggests concrete security concerns towards other states. These worries are often found in a regional context. For example, Michael Hamel-Green (2005, pp.241–2) considers the Treaty of Rarotonga to reduce the proliferation risk between Indonesia and Australia.

There is a legitimate rationale to this assessment. Australia's non-proliferation commitment to the NPT and the Treaty of Rarotonga goes in line with security considerations. As noted by Stephan Frühling, although the state had explored a nuclear weapons option to respond to security threats, non-proliferation in the region favored Australia's advantages in conventional weapons and its vulnerability to nuclear weapons stemming from its urbanized society.

An Indonesian nuclear weapon could spark a proliferation in Australia, because Canberra could neither count on its conventional weapons nor on an extended US deterrence as protection (Frühling, 2018, pp.75–80). As nuclear weapons in Australia may put Indonesia's regional aspirations into question, "[b]oth countries' current adherence to the NPT is a sign, rather than the cause, of this interdependence, which would endure even if the global non-proliferation regime broke down […]" (Frühling, 2018, p.80).

Switzerland and Poland, in turn, are seen to have initially supported the Non-Proliferation Treaty as a tool to contain German military power (Horovitz, 2014, p.9). Particularly the Swiss case suggests a strategic approach of conditionality. Reflecting on the domestic debate in Switzerland prior to joining the NPT, Reto Wollenmann notes that the state made the unusual decision to treat the signing and ratification of the treaty as separate

political steps.[150] This way, the state could signal its independent support for the NPT, while taking for its ratification and implementation Germany's treaty participation into account (Wollenmann, 2004, pp.149–52).

Also bilateral agreements between the **Soviet Union/Russia and the United States** are associated with security considerations. A particularly interesting case is the ABM Treaty, the conclusion and termination of which appears to have been based on security motivation. The original commitment to reduce defense capacities was in line with the logic of Mutually Assured Destruction (MAD), i.e. "I won't hit you, because if I do, our offensive weapons will destroy us both."

When the US announced its withdrawal from the ABM Treaty in December 2001, it acknowledged the original virtue of MAD. Yet, Ari Fleischer, White House Press Secretary, argued that the security environment had profoundly changed. The US stated that it had realigned its commitment and abandoned the ABM Treaty, which had become an obstacle to security interests:

> "During [the Cold War], now fortunately in the past, the United States and the Soviet Union were locked in an implacably hostile relationship. […] Our ultimate security rested largely on the grim premise that neither side would launch a nuclear attack because doing so would result in a counter-attack ensuring the total destruction of both nations. […]
>
> Today, the United States and Russia face new threats to their security. Principal among these threats are weapons of mass destruction and their delivery means wielded by terrorists and rogue states. […] We must develop and deploy the means to deter and protect against them, including through limited missile defense of our territory. Under the terms of the ABM Treaty, the United States is prohibited from defending its homeland against ballistic missile attack" (Fleischer, 2001).

The expressed focus on "terrorists and rogue states" is in line with the United States' promotion of new international commitments against the spread and use of weapons of mass destruction. These include the United Nations Security Council Resolution 1540 of 2004 and the International Convention for the Suppression of Acts of Nuclear Terrorism of 2005. Both commitments followed a perceived change of the security environment in the wake of the 9/11 terrorist attacks.

If security considerations are pivotal for regime commitment and compliance, we would expect **nuclear reversals** to be based at least partially on a changing security environment.

[150] Following traditional Swiss diplomacy, the state would only sign a treaty that is ratified without delay by the parliament (Wollenmann, 2004, p.150).

There is some virtue in this assumption. Both types of reversals seem to be compatible with the respective security environment.

The first type of nuclear reversal summarizes states that have "inherited" nuclear weapons: Belarus, Kazakhstan, and Ukraine. Here, the end of the Cold War opened an avenue for forsaking nuclear weapons. The Commonwealth of Independent States decided to have the Soviet nuclear weapons maintained by a "single unified authority," rather than multiple states. In accordance with that, Article V of the START I Protocol called on Belarus, Kazakhstan, Ukraine to join the NPT as Non-Nuclear Weapon States.

All three states confirmed the destruction of weapons on their territory in letters to US President George H.W. Bush. Here, Belarus and Ukraine make explicit references to acting in accordance with national security interests.[151] The United States, in turn, provided economic support for the three states (e.g. by buying highly enriched uranium) and Russia (Levite, 2003, p.78).

It is important to note that the former Soviet nuclear weapons were deployed on the territory of Belarus, Kazakhstan, and Ukraine but not under command of the respective government (Levite, 2003, p.62).[152] Hence, in order to acquire the nuclear weapons, the three states would have had to seize them from Russian forces (Gartzke and Kroenig, 2009, p.154). In this sense, the limited possession may have facilitated the reversal.

This is different from South Africa, the second type of nuclear reversal, since the state developed nuclear weapons by itself rather than inheriting them. The end of the South African nuclear weapons program appears to have been due to domestic and international momentum. According to Waldo Stumpf (1995, p.6), former Chief Executive Officer of South Africa's Atomic Energy Corporation, the factors that paved the way for the end of the South African nuclear weapons program involved:

- a recognition in September 1985 that the state's nuclear weapons program was facing significant constraints, i.e. it would only allow seven fission devices
- an improvement of the security situation (Fall of Berlin Wall, cease fire in and independence of Namibia)
- the election of Frederik Willem de Klerk as President, who furthered the democratization process

[151] Protocol to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, May 23, 1992.
[152] Ukraine may have had physical possession, but apparently without launch codes (Levite, 2003, p.62).

- a recognition of "distinct advantages" for South Africa in the case of an accession to the NPT

While the South African reversal cannot be pinned down to one single factor, security-considerations provide plausible rationale for the decision. On the one hand, the security environment improved. On the other hand, the very usefulness of nuclear weapons was constrained by capacity limitations within the nuclear program.

Non-Cooperation

Security considerations are not just enhancing cooperation. They also seem to be crucial in states' reluctance to support the NPT, the FM(C)T, the CTBT, nuclear disarmament, or negative security assurances. The very strategic importance of nuclear weapons may advance the *acquisition*, *possession*, and *use* of nuclear weapons – contrary to the regime norms.

The development of nuclear weapon programs in **India and Pakistan** is a good example for a regional power rivalry (e.g. Khan, 2005). The importance of the respective program can also explain why both states refrain from a larger regime commitment. With the exception of the Partial Test Ban Treaty, both states have failed to support key agreements within the non-proliferation regime.

India conducted its first nuclear test explosion in May 1974. Despite international concern, the test was officially aimed at advancing India's peaceful nuclear program (Shaker, 1980, p.813). As the next series of nuclear tests in May 1998 and the accompanying statement demonstrate, nuclear weapon aspirations had materialized and security concerns were given as justification:

> "These tests have established that India has a proven capability for a weaponised nuclear programme. They also provide a valuable database which is useful in the design of nuclear weapons of different yields for different applications and for different delivery systems. […]
>
> The Government is deeply concerned, as were previous Governments, about the nuclear environment in India's neighbourhood. These tests provide reassurance to the people of India that their national security interests are paramount and will be promoted and protected" (Mishra, 1998).

Pakistan started its nuclear program as a result of the 1971 war with India and developed nuclear weapons, following different sources, "to counter the threat posed by its principal rival, India, which has superior conventional forces and nuclear weapons" (Strategic

Security Project, 2002). This assessment is in line with Pakistan's nuclear tests in May 1998 which followed India's tests within less than three weeks. In addition to the chronology of events, Pakistan emphasized that it considered itself forced to draw level for security reasons.

> "Pakistan has been obliged to exercise the nuclear option due to weaponisation of India's nuclear programme. This had led to the collapse of the 'existential deterrence' and had radically altered the strategic balance in our region. […] After due deliberation and a careful review of all options we took the decision to restore the strategic balance" (Sharif, 1998).

The nuclear rivalry also extends to the deadlock in discussions on a Fissile Material (Cutoff) Treaty. While Pakistan insists on the inclusion of existing fissile material, other states with nuclear weapons, including India, tend to limit the scope of a potential treaty to future productions. Pakistan's more comprehensive stance has been justified with a perceived asymmetry in existing fissile material compared to India (Mian and Nayyar, 2008). Ending only future productions would lock-in a disadvantage of its nuclear program.[153]

The strategic coexistence of India's and Pakistan's nuclear arsenals is also reflected in the numbers of weapons. The stockpiles in both states have increased in the last 20 years almost synchronically. Nuclear warheads are amounting to approximately 140-150 in Pakistan and 130-140 in India (Kristensen and Korda, 2019).

Overall, security considerations offer explanatory capacity for why **nuclear disarmament** has not progressed further. As the Nuclear Weapon States argue in their statement at the 2015 NPT Review Conference, all states can advance nuclear disarmament "by creating the necessary security environment" (Rowland, 2015). This would suggest that even after the end of the Cold War, nuclear weapons are treated as a tool to respond to global security demands.

Likewise, looking at US Nuclear Posture Reviews, Daalder and Lodal conclude that US foreign policy still resembles Cold War thinking: The Clinton administration insisted on keeping large weapon stocks as a safety deposit against possible political and strategic changes in Moscow. The administration of George W. Bush reconceptionalized the relationship between conventional and nuclear weapons, underlining the role of nuclear weapons in the US strategy and urged to develop new types of nuclear weapons (Daalder and Lodal, 2008). The nuclear arsenal has been set for an immense modernization under

[153] India's and Pakistan's stances on a Fissile Material (Cutoff) Treaty can be found in: UN General Assembly (2013).

President Obama, an approach that has been continued under President Trump (Arms Control Association, 2017b).

Nuclear weapons also remain of crucial strategic importance in Russia in both – word and action. As noted by RAND's Austin Long (2018), expert evaluations of Russia's nuclear weapons fall somewhere between a tool of coercion and a tool of protection. Moscow has pushed for a flexible nuclear arsenal that allows a wide range of use, "partly to compensate for its increasing inferiority in conventional armaments" (Granholm and Rydqvist, 2018, p.11). The importance of security considerations is also to be seen in Russia's statement at the 2015 Review Conference, in which the delegation makes repeated reference to terms like *global*, *strategic*, *security*, and *stability*. Most notably, the state criticizes the United States for undermining the security environment necessary for further disarmament (Uliyanov, 2015).

Security considerations may also contribute to **stalemates in commitment**. For instance, they could explain Nuclear Weapon State's reluctant support for Nuclear-Weapon-Free Zones. The latter may entail negative effects for a nuclear deterrent. Security concerns, such as possible conflicts between NWFZs and security alliances, have already been acknowledged by a UN experts group in 1975 (UN General Assembly, 1975). Security concerns not only appear to have led to a NWS rejection of the Treaty of Bangkok but also made the negotiations of the CANWFZ difficult (Parrish, 2001, p.5).

The current deadlock in bringing the Comprehensive Test Ban Treaty into force is often described as a strategic web of non-action. As pointed out by Lassina Zerbo (2013), Executive Secretary of the CTBTO Preparatory Commission, "[t]o a certain extent, this is a classic case of lack of political leadership: country A is looking to country B to go first, and vice-versa." The treaty requires the signature and ratification of 44 specific states in order to enter into force. This requirement was the result of extensive discussions that indented to accommodate different interests by acknowledging the nuclear status of states (CTBTO, 2012a). At the same time, the condition makes the full implementation of the CTBT unlikely.

2.3.2. Norms

Although security considerations seem to provide a strong rationale for cooperation and non-cooperation within the regime, it is worth taking a look at other factors, as well. To what extent have normative considerations played into states' (non-)cooperation within the commitment system? Following the hypotheses developed in Chapter 1, we would expect a

state to commit to and comply with regime norms and rules, if cooperation is fair and satisfies international law. Vice versa, if non-cooperation satisfies fairness and international law, then the state is likely to refrain from commitment to and compliance with regime norms and rules.

Cooperation

Humanitarian and fairness considerations appear to have played into shaping and maintaining the non-proliferation regime. Early initiatives to develop international agreements were influenced by the experience of the nuclear bombings of Hiroshima and Nagasaki, as to be seen in the development of the **Baruch Plan** (Müller, Becker-Jakob, and Seidler-Diekmann, 2013, p.52). Bernhard Baruch, US representative to the United Nations Atomic Energy Commission, proposed in June 1946 an International Atomic Development Authority that would have "[m]anagerial control or ownership of all atomic energy." The plan also held out the prospect of a stop of nuclear weapons production and a disarmament of existing stocks (Baruch, 1946).

Taking a comprehensive approach to countering the *acquisition*, *possession*, and *use* of nuclear weapons, Baruch made strong humanitarian appeals. He addressed the global community (e.g. "Fellow Citizens of the World"), pointed out the humanitarian threat at stake ("We are here to make a choice between the quick and the dead," "We must elect World Peace or World Destruction"), and promoted individual sacrifice for a greater good (Baruch, 1946).[154]

Despite the strong normative appeal, the Baruch Plan never materialized. In fact, the years and the decades that followed the unsuccessful Baruch Plan showed the limits of humanitarian ideals, which appear to have given way to security concerns. As pointed out by Manpreed Sethi (1998), the administration of President Eisenhower pursued a fissile material cutoff agreement as a means to control the nuclear arsenals of the US and the Soviet Union in 1956. Initially, the Soviet Union rejected the idea. Once the strategic nuclear forces of the Soviet Union were larger than the forces of the United States, the attitude towards a cutoff agreement changed on both sides: While the Soviet Union increasingly warmed up to an agreement, the US began to oppose it (Sethi, 1998, pp.1382–3).

[154] More specifically, Baruch claimed: "The search of science for the absolute weapon has reached fruition in [the United States]. But she stands ready to proscribe and destroy this instrument - to lift its use from death to life - if the world will join in a pact to that end" (Baruch, 1946).

Despite this anecdote of humanitarian considerations appearing to be a secondary concern to the role of the own nuclear weapons status, there are also examples of more selfless efforts. Ireland, which presented the **first proposal for an agreement on the non-proliferation of nuclear weapons** in the United Nations in 1958 was guided by norms. Neither immediate security concerns, nor economic profits, nor an enhanced status appear to have driven the state. As analyzed by Mohamed Shaker (1980, p.3), the "high ideals" of its Minister for External Affairs, Frank Aiken, seem to be the primary driving factor for Ireland's push.

Discussions following the Irish proposal shared the notion of the destructive power of nuclear weapons and the threat of their proliferation (Shaker, 1980, pp.28–9). In contrast to the Baruch Plan, the normative scope was much more narrowly focused on the *acquisition* of nuclear weapons. The Irish proposal as well as the eventual Non-Proliferation Treaty was a consideration of the positions of key players in the Cold War. Former Irish diplomat Noel Dorr (2010) outlines the proceedings of the Irish delegation and argues that its steps were influenced by careful consideration of what was possible and what not. While normative considerations were a driving factor, they were compromised by other states' security considerations.

Vice versa, normative sensitivities may outweigh security considerations and eventually further regime commitment. This is all the more important in **countries with advanced nuclear programs** that could develop capacities for nuclear weapons. Maria Rublee comes to the finding that in Japan, Sweden, and Germany

> "significant elements of the political elite wanted an independent nuclear deterrent. However, in each case, portions of the domestic population lobbied heavily against an indigenous nuclear weapon program, activating the emerging international norm against nuclear weapons to strengthen and add credibility to their arguments. Thus the domestic political costs for going nuclear rose sharply" (Rublee, 2009, p.202).[155]

Following Rublee's analysis, an international social environment shaped regime commitment. The Non-Proliferation Treaty introduced an expected behavior that did not exist before (Rublee, 2009, pp.38–42). States had to decide whether or not to join the treaty. The decision, once made, is rarely reversed. Hence, the Non-Proliferation Treaty, just like

[155] Rublee (2009, p.203) argues that Egypt and Libya gave in to international pressure - an issue that will be considered in the section on the enforcement system of the NNPR.

Nuclear-Weapon-Free Zones "delegitimize" nuclear weapons; legitimizing them again is difficult.[156]

The importance of humanitarian considerations is also to be seen in the most recent **push for outlawing nuclear weapons** altogether. The Treaty on the Prohibition of Nuclear Weapons returns to a broader understanding of the regime norm as laid out in the Baruch Plan. The treaty was preceded by a series of conferences on the "Humanitarian Impact of Nuclear Weapons." The eventual treaty text also resembles a strong humanitarian connotation in its introduction:

> "[…] Deeply concerned about the catastrophic humanitarian consequences that would result from any use of nuclear weapons, and recognizing the consequent need to completely eliminate such weapons, which remains the only way to guarantee that nuclear weapons are never used again under any circumstances […]."

So far, 70 states have signed and only 25 are actually party to the Treaty on the Prohibition of Nuclear Weapons (UNODA, 2019c). Considering that the treaty is by and large a summary of norms that have existed since the very beginning of the non-proliferation regime, support is surprisingly low. There is a strong tendency that supporters are also members of NWFZs, in other words, states that have already taken a strong stance against nuclear weapons.

It could also be argued that the humanitarian initiative is only supported by states that have no strategic need for nuclear weapons. The Treaty on the Prohibition of Nuclear Weapons is not supported by states with a nuclear weapons affiliation. It is striking that NATO members all rejected the ban, although generally backing the goal of a global disarmament (see also Rauf, 2017). The United States even urged NATO allies to reject the treaty.[157] This again suggests that normative considerations give way to security factors, if present.

This is not to say that Nuclear Weapon States have not been convinced by normative considerations in the past. As noted by George Bunn, in order to strengthen the regime in the 1995 NPT Review and Extension Conference, they made a deal with Non-Nuclear Weapon States that recognized the latter's demand for NWS concessions on **negative security assurances**. This becomes apparent in an April 1995 press release by the US Arms Control and Disarmament Agency, which stated:

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[156] See also Davis (1996, p.15) and Horovitz (2014, p.23).
[157] The US letter to NATO allies dating from October 17, 2016 was published by the International Campaign to Abolish Nuclear Weapons (2016).

> "It is the Administration's view that the national statements being issued by all five NPT nuclear-weapon states, their co-sponsorship of a Security Council resolution on security assurances which is under consideration in New York, and the common negative security assurance achieved by the five – together comprise a substantial response to the desire of many NPT non-nuclear-weapon states for strengthened security assurances" (in: Bunn, 1997, pp.15–6).

This shows that the notion of fairness appears to have led to a commitment by Nuclear Weapon States on the *use* of nuclear weapons. At the same time, the concession shall not be overrated, as the NWS declarations are non-binding and, with the exception of China, conditional.

Non-Cooperation

While the notion of fairness has advanced commitments from Nuclear Weapon States in the context of negative security assurances, it also appears to have led to states' reluctance to commit to and comply with the regime. There are two major normative patterns for non-cooperation. One is connected with the larger criticism against an alleged nuclear *colonialism*. The other refers to linkage diplomacy or, put differently, *quid pro quo* obstacles.

Nuclear "colonialism" stems from a legal division – most prominently in the Non-Proliferation Treaty – that divides states into "haves" and "have nots" (Goldemberg, Feu Alvim, and Mafra, 2018, pp.385–6). The division manifests a perceived hierarchy among states that privilege certain states, while discriminating others. Unequal rights and obligations in the NPT have been criticized, among others by France, Brazil, Argentina, and India in the past.

As described by Mohamed Shaker, the categorization of states that "have" and "have not" nuclear weapons has led to skepticism in the debate on a Non-Proliferation Treaty from an early stage onwards. The fact that other states would be banned from nuclear weapons while Nuclear Weapon States, at an early point of the discussion, mainly committed not to assist others in their pursuance of nuclear bombs was criticized by the Argentinian representative in October 1958, as this

> "would mean giving legal sanction to the unequal situation resulting from the fact that only a few Powers possessed nuclear weapons. The effect would be to create a gulf between the small Powers and the great Powers" (in: Shaker, 1980, p.7).

The long-term rejection of China and France to join the Non-Proliferation Treaty is particularly interesting, as the treaty grants both states a privileged position as Nuclear Weapon States. The apparent opposition to self-interest points to higher normative ideals as driving factor for the respective stance. France's criticism in the negotiation process leading to the NPT remarked a misguided purpose of the agreement. As elaborated by Mohamed Shaker (1980, pp.794–6), French representatives put a great emphasis on nuclear disarmament before and after detonating nuclear weapons.

In 1967, the French Foreign Minister stated that "[p]roliferation is assuredly a problem […] But there is something much more important, which is that those who possess nuclear weapons should make no more and destroy those that they have" (in: Shaker, 1980, p.795). Also in explaining France's abstention from the vote on the NPT, the representative stated: "The real question is […] the complete disappearance of nuclear weapons" (in: Shaker, 1980, p.796). Accordingly, NPT commitments privilege those states that actually pose the major problem, i.e. Nuclear Weapon States.

France's decision to eventually accede to the Non-Proliferation Treaty in 1992 is also consistent with a normative interpretation of decision-making. Arguably, joining the treaty would contradict its original stance. Instead, France embedded its 1992 accession in a larger global push against weapons of mass destruction (Riding, 1991), thus shifting the normative focus from fairness considerations to a humanitarian approach.

While the French reluctance and even the eventual decision to join the Non-Proliferation Treaty is plausible from a normative perspective, it should not be overestimated. Joining the NPT could also be understood as an effort to enhance its status and to reposition itself in the world (Riding, 1991). Furthermore, although France advertises the goal of a complete global disarmament, the state has repeatedly emphasized the importance of maintaining nuclear weapons to satisfy its security needs (see e.g. Tertrais, 2007).

Non-Nuclear Weapon States continue to call for a **"fair" implementation of the Non-Proliferation Treaty**, as to be seen in the statements made during the 2015 NPT Review Conference. Tannenwald (2013, pp.306–9) sees an institutional imbalance that affects the original *bargain* (i.e. non-proliferation in exchange for disarmament) and favors NWS norms. As observed by Müller, Becker-Jakob, and Seidler-Diekmann (2013, p.55) "[d]isagreements over disarmament prevented the adoption of a consensual final document at three out of eight review conferences: 1980, 1990, 2005." The 1995 NPT Review Conference for the first time states that an essential objective of the NPT was to "eliminate

all nuclear weapons" leading to further normative conflicts between NWS and NNWS ever since (Tannenwald, 2013, pp.302–3).

At the same time, Non-Nuclear Weapon States demand a recognition of their rights included in the NPT. An important point of reference is Article IV of the Non-Proliferation Treaty that grants state parties an "inalienable right" of peaceful uses of nuclear energy "without discrimination." Apart from the actual economic gains from the peaceful use of nuclear energy, the very entitlement to it has become a political issue.

States have different understandings of what signifies "inalienable right." Especially the question of whether Iran is entitled to enrich uranium has been subject to debate (e.g. Landau, 2012; Beeman, 2013). In this sense, the very different understanding in what "inalienable right" entails may just mean the difference in whether a state complies with the regime or not.

Non-cooperation as "quid pro quo" is often to be found in the enforcement of the non-proliferation regime (see Chapter 4). States may choose not to commit or comply as a response to a development in another sector. As such, behavior in the nuclear sector may be conditioned on positive incentives or the retrieval of sanctions. A similar conditionality appears to have hampered the establishment of commitments in the first place.

As noted by Amy F. Woolf, the Duma pushed for a Russian disregard of START II as a response to the US withdrawal from the ABM Treaty. In June 2002, the Russian Foreign Ministry announced that it would no longer abide by the treaty – a symbolic step considering that the US and Russia had already started exploring new avenues for limiting strategic nuclear weapons (Woolf, 2002, p.22).

Furthermore, China has demonstrated reluctance to support a Fissile Material (Cutoff) Treaty, considering the United States' resistance to PAROS – a treaty preventing an arms race in outer space (Bin, 2008). US President Donald Trump's strengthened interest in outer space, as to be seen in his proposal for a US Space Force as an additional branch of the armed forces, can be seen to make an accord less likely. The examples of PAROS and the FM(C)T, on the one hand, and START II and the ABM Treaty, on the other hand, demonstrate that the very web of agreements may actually hamper commitment.

2.3.3. Economics

Considering that the peaceful use of nuclear energy is one of the three pillars of the non-proliferation regime, it is worth examining its role in explaining state's (non-)cooperation

within the regime. We can expect a state to commit to and comply with regime norms and rules, if cooperation offers economic benefits. However, if non-cooperation provides economic benefits, then the state is likely to refrain from committing to and complying with the regime.

Cooperation

As outlined in the introductory chapter, nuclear energy is associated with a number of advantages. As energy supply, proponents have pointed out low costs, energy independence, and environmental advantages. In addition to that, nuclear energy has been used for research and medical uses. Especially given the sophisticated nature of putting fissile material to use, states and enterprises depend on expertise, facilities and equipment, as well as material. Hence, it appears plausible that states subscribe to non-proliferation commitments as part of a **larger deal** to enter the community for the peaceful use of nuclear energy.

Looking at the negotiations leading up to the Non-Proliferation Treaty, Mohamed Shaker identifies economic concerns as having played an influential role.[158] The right for the peaceful use of nuclear energy was underrepresented in the original drafts by the United States and the Soviet Union. The introduction of Article IV as well as the amendments made to it were due to the initiative and demands made by states without nuclear weapons (Shaker, 1980, p.275).

Furthermore, states' decisions to join the treaty were subject to economic considerations, as to be seen in the case of Switzerland. As noted by Reto Wollenmann, who examines the political discourse leading up to the NPT decision, criticizers of the NPT originally argued that signing the treaty would constrain the Swiss ability to compete on the nuclear market or doubted that a civilian program would be sustainable without a military track. Eventually, the perception maintained that the Swiss economy would rather be harmed by sanctions if Switzerland stayed outside the treaty (Wollenmann, 2004, pp.167–8).

The same sentiment that appears to have contributed to shaping the Non-Proliferation Treaty and states' acceptance thereof continues to exist in the latest **NPT Review Conference.** Upon opening the conference, a large number of states emphasized the importance of the coexistence of the three pillars: non-proliferation, disarmament, and the peaceful use of nuclear energy. Although the latter appears to be subordinate in the

[158] For a background on the peaceful use of nuclear energy and explosions in the negotiation of the Non-Proliferation Treaty see Shaker (1980, pp.273–470).

statements, several countries make references to developments in the peaceful use and formulate demands for the future.

Saudi Arabia announces a comprehensive peaceful nuclear energy program (Al-Mouallimi, 2015). The Caribbean Community commends the cooperation with the IAEA as having advanced the domestic "nuclear science, medical physics and water resources" and notes that exchanges have also been aimed at improving food security and ecological issues (Rattray, 2015). South Korea emphasizes its role as a large nuclear energy producer and describes the IAEA Technical Cooperation as proof of the benefits of an international nuclear community (Shin, 2015). A statement by the United Arab Emirates demonstrated the benefits of international cooperation and indicates room for improvement:

> "UAE began construction of its first nuclear reactor in 2012. This event marked the first construction in a new [program] in more than 27 years. Today, we consider this peaceful program a role model on how non-nuclear countries can utilize the international framework of cooperation, as provided for by the Treaty. Consequently, this leads us to re-emphasize the importance of strengthening international cooperation framework to facilitate the transfer of nuclear technology for peaceful uses, and to assist countries wishing to embark on peaceful nuclear energy programs in a responsible and safe manner" (Al Jaber, 2015).

States also use the IAEA and NPT platform to share and solve problems in the peaceful use of nuclear energy. For instance, Indonesia is "still concerned with the lack of access to information on the technology necessary for research and development." One of the greatest concerns, however, is nuclear safety, especially considering the experience from the nuclear accident in Fukushima. Based on an accident report, the IAEA put forward larger conclusions in an Action Plan in 2011 (IAEA Board of Governors, 2011c). This shows that not just the effects of but also the solutions for nuclear catastrophes are subject to international cooperation.

The exchanges in the NPT Review Conference, therefore, would lead to the assumption that economic considerations in a larger sense play an important role in attracting nuclear cooperation. Apart from these vocal exchanges, another factor that highlights the significance of economic considerations in the commitment system of the non-proliferation regime is the **continuing importance of nuclear energy**.

The Annual Report of the International Atomic Energy Agency allows insight into a broad range of issues in which the international nuclear community, and the IAEA in particular, has provided benefits for member states. Following the IAEA, its technical

cooperation is being used by 144 states and territories. Overall, there were "807 active technical cooperation projects at the end of 2017" (IAEA, 2018).

To be sure, according to the World Nuclear Report, there is a global decrease in the role nuclear energy as power source. For instance, in 2017, nuclear energy made up 10.7 % of the global energy mix, decreasing from 17.5 % in 1996. Still, there are 413 reactors in operation in 31 countries and a number of "potential newcomer countries" consider to advance a nuclear program (Schneider and Frogatt, 2018, pp.16–8, 152–72). In this sense, international cooperation regarding the peaceful use of the atom remains attractive.

A great push in the field of nuclear energy is being undertaken by China, which appears to pursue domestic and international economic interests. Following the World Nuclear Report, the state has had the largest number of reactor startups in recent years and has currently 16 reactors under construction (most of which are delayed). In 2017, China was the third largest country in terms of generating nuclear energy (following the United States of America and France).

In addition to developing nuclear energy domestically, another advantage of the infrastructure of the non-proliferation is the export of nuclear technology. Analyzing China's 2004 joining of the Nuclear Suppliers Group, Sean Lucas (2004) notes: "As part of its export control policy, China aims to strike a balance between its nonproliferation objectives and its efforts to provide the developing world with access to emergent nuclear technologies for peaceful purposes." While Beijing has put its eyes on a number of perspective deals, so far, not much has materialized. Agreements on nuclear cooperation with Cambodia, Brazil, and Uganda are still waiting to bear fruit .[159]

Non-Cooperation

To what extent have economic considerations contributed to states' non-cooperation within the commitment system of the non-proliferation regime? By and large, there are two strings of argumentation. The first one refers to the existence of nuclear deals outside the framework of the Non-Proliferation Treaty. The second one accounts for the potential economic hampering of regime commitments.

Making nuclear **deals outside of the NPT framework** counters a core principle laid out in the treaty and subsequent guidelines for export controls: i.e. non-proliferation

[159] See Schneider and Frogatt (2018, pp.51–2) and World Nuclear Association (2019a).

commitment in exchange for nuclear cooperation. The peaceful use of nuclear energy is supposed to be a selling point of regime commitment and compliance. As criticized in its statement at the NPT Review 2015,

> "[…] Malaysia remains perplexed why States outside of the NPT have enjoyed [Article IV] rights. The international community, particularly States Parties to the Treaty, should live up to its obligations in upholding principles of transparency and non-discrimination in the implementation of the Treaty. Selectivity and discrimination would only serve to undermine the Treaty" (Ibrahim, 2015).

This observation by Malaysia indicates different scenarios for non-compliance with the regime. 1. States may refrain from committing to larger regime norms and rules, because economic benefits are also available outside of the NPT framework. 2. Advanced nuclear states do not comply, as they offer benefits to states outside the NPT.

There is some virtue in Malaysia's points of criticism. With the exception of South Sudan, all states outside the Non-Proliferation Treaty have developed nuclear research reactors (World Nuclear Association, 2018) and are considered to have established nuclear weapon capabilities. The current role of nuclear energy as power resource differs. In Pakistan (6.2 %) and India (3.2 %), the nuclear share is a fraction of the overall nuclear energy production. Israel and North Korea currently have no nuclear power plants but are planning to build power reactors in the near future (World Nuclear Association, 2019b). Not being members to the Non-Proliferation Treaty has not prevented domestic nuclear capacities.

Quite to the contrary, foreign assistance has contributed to the development of the respective nuclear program. For instance, India (from UK and France), Israel (from USA), Pakistan (from China), and North Korea (from Russia) have all received fuel for their HEU reactors from other countries (World Nuclear Association, 2018). Accordingly, the question can be raised whether nuclear suppliers are giving up regime norms on non-proliferation in exchange for economic benefits.

There is indeed reason to believe that economic interests may compromise non-proliferation norms. The 123 agreement between the United States and India established a larger nuclear cooperation between both states that forced India to put its civilian program under IAEA safeguards, while acknowledging the existence of a military program in India (Müller and Rauch, 2007).

Similarly, China cooperated with Pakistan before joining the Nuclear Suppliers Group. Now, being a member in the NSG, Beijing is pushing for cooperation with Pakistan (Hibbs,

2011, pp.13–15), which remains the only partner for China with which exports have actually materialized (Schneider and Frogatt, 2018, pp.51–2). Pakistani plants have received major investments from China (World Nuclear Association, 2019a).

The other drawback for regime commitment and compliance is that states may feel that non-proliferation commitments **constrain the peaceful use of nuclear energy**, rather than advancing it. Criticism about such constraints are mirrored in the 2015 NPT Review Conference. For instance, the Non-Aligned Movement demanded that a state's nuclear policies – including the decision for a full national full cycle – should be recognized and that any limitations on the peaceful use of nuclear energy shall be removed.

The concern that regime commitment could lead to economic disadvantages is as old as the Non-Proliferation Treaty. As noted by Mohamed Shaker in his analysis of the negotiation period and the issue of controls:

> "Fears were expressed by the [Non-Nuclear Weapon States] that the NPT, by instituting such a control on their peaceful nuclear activities in order to prevent the proliferation of nuclear weapons, would hamper their full access to the knowledge and technology of the peaceful atom most needed for their future progress and prosperity; that international inspection might turn into industrial espionage; and that the Treaty would place them at the mercy of the nuclear-weapon States which would continue to enjoy their privileged position as the major suppliers of nuclear fuel and necessary equipment" (Shaker, 1980, p.274).

Some of the more vocal critics refrained from joining the Non-Proliferation Treaty when it opened for signature. Brazil and India demonstrated skepticism about NPT constraints on the peaceful use of nuclear energy. Both states were proponents of independent peaceful nuclear explosions (Shaker, 1980, p.380).

As noted in the section on security, India advanced the peaceful use of nuclear energy, even after detonating a nuclear device. Following an official statement, "India had no intention of producing nuclear weapons, and reiterated its strong opposition to military uses of nuclear explosions" (in: Shaker, 1980, p.813). Eventually India proclaimed its nuclear weapon status in 1998.

Brazil considered peaceful nuclear explosions to enhance infrastructure and to facilitate access to natural resources. As described by Rosenbaum and Cooper (1970, p.78) at the time: "Nuclear excavation of Brazil's vast interior to improve river navigation and to provide water for increased acreage, as well as a scheme designed to spur the release of oil from crushed shale, are among the projects being seriously discussed."

Following José Goldemberg, Brazil also justified its nuclear program as a response to the 1973 oil crisis and, against this background, concluded a nuclear agreement with Germany. Analyzing the legitimacy of the economic argument, Goldemberg finds that Brazil's claims were unjustified. In reality, the military dictatorship also pursued nuclear weapons (Goldemberg, 2006). As India, Brazil, and cases subject to regime enforcement (see Chapter 4) demonstrate, the economic arguments may be put forward even when a state pursues a nuclear weapons program.

2.3.4. Status

Rather than enhancing security, norms, or economic benefits, states could be guided by status-related considerations in their nuclear decision-making. In this work, *status* refers to the standing of the state and political leadership as well as the compatibility and symbolic nature of a nuclear partnership. Against this background, the very nature of commitment platforms becomes important. We can expect a state to commit to and comply with the regime if cooperation satisfies its status. The state will refrain from commitment, if non-cooperation better suits its status.

Cooperation

Agreements in the non-proliferation regime can fulfill a number of status-related desires. The label of being compliant may increase a state's standing. Furthermore, the very platform of exchange associated with agreements allows for self-representation and influence.

The Non-Proliferation Treaty divides states into Nuclear Weapon States and Non-Nuclear Weapon States. This binary categorization may disguise the fact that the latter group are very diverse in terms of nuclear status. In fact, NNWS may include states with an advanced civilian nuclear program, commonly referred to as **nuclear latency**. If the nuclear component is accompanied with a strong military infrastructure, the term **nuclear hedging** may be used.[160]

[160] In this thesis, "nuclear latency" refers to the nuclear infrastructure for a weapons program rather than the actual intention to build nuclear weapons. A similar term is "nuclear hedging," which includes a stronger focus on building capabilities also in other sectors, including weaponization (see also Pilat, 2014). The latter would allow a state to develop nuclear weapons in a short amount of time, if deemed necessary.

Latency and *hedging* rest on a state's official compliance with the norms and rules of the regime. States expand a nuclear program while respecting the given legal framework. This very status offers various advantages. States can make use of benefits as Non-Nuclear Weapon States (e.g. by providing and receiving nuclear cooperation) and exclude possible repressions connected with non-compliance with the regime. In addition to that, willingly or unwillingly, the status keeps the nuclear weapons option at short distance.

There is some virtue in the attractiveness of being an advanced Non-Nuclear Weapon State. After all, North Korea advanced its nuclear infrastructure as a NNWS, eventually left the NPT and developed nuclear weapons. In recent years, countries associated with nuclear hedging include Japan, Egypt, Taiwan, South Korea, and Iran.

Ariel E. Levite describes Japan as a prominent example for nuclear hedging. The state has an advanced nuclear fuel-cycle as well as components and expertise for bomb-making. Some state officials have also indicated that a nuclear weapons program may be taken up, if necessary. At the same time, Japan has portrayed itself as a champion for the regime norms of non-proliferation and disarmament (Levite, 2003, p.71).

Another state, possibly pursuing a nuclear hedging status is South Korea. The state has a fairly advanced peaceful nuclear program, owing to its nuclear energy generation and foreign nuclear programs. Although portraying itself as a supporter of the non-proliferation regime (e.g. Shin, 2015), there could be incentive to develop nuclear weapons. As described by Lami Kim (2018, pp.126–7): "The combination of enrichment capability, lack of international inspections [regarding naval nuclear propulsion], a nuclear enemy, and a leaky nuclear umbrella is a recipe for nuclear proliferation." At the moment, however, the intention of South Korea and Japan to build nuclear weapons remains doubtful.

In addition to nuclear latency and hedging, the very **cooperation** resembled in an agreement may play an important role in facilitating commitment and compliance, as to be seen in the relationship between Argentina and Brazil. The ABACC and the Treaty of Tlatelolco in a larger context bridge a rivalry between both states. As noted by Goldemberg, Feu Alvim, and Mafra (2018, p.387) "[t]he ABACC Agreement not only creates barriers to proliferation by using the safeguards procedures but also drastically reduces the motivation for having nuclear weapons by building trust among the regional countries."

Argentina's and Brazil's enhanced regime commitment, including the Non-Proliferation Treaty, was based on better domestic and bilateral relations (Parrish and Du Preez, 2004, pp.2–3). More specifically, the increasing bilateral cooperation in peaceful uses of nuclear energy and the democratization in both states eventually led to a regional cooperation

(Treaty of Tlatelolco) and an international commitment (NPT) (Hamel-Green, 2009, p.359). In this sense, the new agreement was an extension of a changing domestic and bilateral status and made cooperation more compatible with the states' nuclear policies.

The non-proliferation regime also offers a **stage for representation and influence**. The most comprehensive platform for exchange is the NPT Review Conference. States make use of the possibility to give their view on the status and future course of non-proliferation, disarmament, and the peaceful use of nuclear energy. The more than 100 statements made on the prelude of the conference between April 27 – 30, 2015, have a very similar structure:

- Condolences for the April 2015 earthquake victims in Nepal
- Congratulations on the election of the President of the Conference
- Identification with other statements (made by a group of states)
- Criticism and demands in the context of regime norms and rules
- Domestic contributions on how the state complies with regime norms and rules

Individual statements often lack added value, which leaves the impression that they are simply considered an important tool for states to be heard. Some variation can be found concerning the *individual contributions* and *specific demands* of states. Regarding the former, Mongolia emphasizes its vision of establishing a Nuclear-Weapon-Free Zone on its territory (Od, 2015). Italy underlines its implementation of nuclear safety and nuclear research (Della Vedova, 2015). Canada and Belgium describe the respective contributions to nuclear security (Frankinet, 2015; Yelich, 2015). Argentina declares that it has shared its experience in the peaceful use of nuclear energy for prosperity with other states (Perceval, 2015).

Statements like these can keep other states up-to date about domestic developments. Yet, they are also self-advertisement, especially when issues are being discussed about which other participants can be expected to have good knowledge (such as the existence of NWFZs) or which are irrelevant for the nuclear issues at stake (such as the EU's humanitarian help to Nepal). In this sense, the NPT Review Conference appears to be an attractive platform for self-advertisement.

In addition to self-representation, states also formulate demands – either on their own or collectively. The 2015 NPT Review Conference included a number of groups of states that emphasized different issues from the wide range of norms and rules in the non-

proliferation regime.[161] These groups allow like-minded parties to have an influence on the course of the non-proliferation regime.

In the aftermath of the 2010 NPT Review Conference, a humanitarian focus appears to have had a particular effect on the regime.[162] In 2013 and 2014, states and non-governmental organizations explored the "Humanitarian Impact of Nuclear Weapons" in conferences in Oslo, Nayarit, and Vienna. The political push culminated in the Treaty on the Prohibition of Nuclear Weapons.

Non-Cooperation

Status-related considerations also appear to have provided incentive for non-cooperation in the commitment system of the non-proliferation regime. They contribute to the deadlock in achieving a world free of nuclear weapons. The prestige of nuclear weapons, a perceived degrading nature of agreements, and the nature of the relationship reflected in an agreement have hampered regime commitment and compliance.

States may find nuclear weapons **prestigious**, as they have a destructive force, sophisticated design, and the number of states that possess them is scarce. In several publications, political scientists and decision-makers describe the limited group of states that got hold of these weapons as a "nuclear club."[163] This formulation is misleading, as a state may have an advanced *nuclear* infrastructure without having *nuclear weapons*. Yet, the notion of a "nuclear club" very well describes the exclusiveness of the nuclear weapons status.

Looking at the cases in which states have acquired nuclear weapons, Perkovich (1998, pp.16–7) comes to the finding that the majority of states were either seeking nuclear weapons to protect their respective form of government or to enhance a state's prestige. Accordingly, limiting the incentive to advance a nuclear weapons program to security threats is too narrow an understanding. I will exemplify the virtue of this status-related assessment by briefly looking at the cases of Russia and Pakistan.

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[161] For instance, the African Group, Arab Group, CELAC, CARICOM, European Union, Humanitarian Consequences Group, League of Arab States, New Agenda Coalition, Non-Aligned Movement, Non-Proliferation and Disarmament Initiative, Nuclear-Weapon-Free Zones, Nuclear Weapon States, P-5, and Vienna Group of 10.

[162] On the humanitarian approach see also Jan Ruzicka (2018b, pp.2–9).

[163] A few examples of publications by political scientists and former decision-makers in which readers come across the formulation "nuclear club": Aikin (1961), Waltz (1981), Perkovich (1998), Levite (2003), Gorbachev (2007).

As mentioned before, **Russia** – like other Nuclear Weapon States – adjusts its nuclear weapons policy in accordance with security considerations. But this picture of security appears incomplete when looking at Russia's rejection to further pursue disarmament beyond New START. The state appears to maintain its edge as a nuclear superpower. When US President Barack Obama brought into play an additional cut of deployed nuclear weapons by one third (in relation to New START), Russian Foreign Secretary Lavrov emphasized that such a cut would bring the nuclear superpowers close to the nuclear weapon stocks of other nuclear powers. He demands a multilateral discussion regarding further reductions as well as a recognition of Russian concerns regarding the US missile defense (Morley and Kimball, 2013). The key in this argument is the relational dimension of nuclear weapon stocks.

It is fair to say that approximately 1,000 – 1,100 deployed nuclear weapons in the US and Russia would bring the numbers closer to other states possessing nuclear weapons. Still, the nuclear superpowers would not draw level but instead keep a considerable margin. By insisting on its own advantage, Russia's status as nuclear weapons *superpower* becomes a bargaining chip for the reductions in other states. This claim of a special status goes beyond the Non-Proliferation Treaty which makes no difference among Nuclear Weapon States and does not coin a *superpower*. The insistence to include all parties that possess nuclear weapons in further reductions, in turn, effectively leads to a stalemate.

Status considerations appear to have played also a considerable role in **Pakistan's decision** to conduct a series of nuclear weapon tests on May 1998. In the wake of the tests, Islamabad emphasized security considerations to restore the balance in the region as driving factor for the tests (Sharif, 1998). Yet, Perkovich (1998) refutes a narrow security perspective as driving force for the Indian and Pakistani nuclear weapons test. According to him, the idea of security pressure from India is exaggerated. Rather, internal political pressure within the Pakistani government led to the tests (Perkovich, 1998, p.16). The nuclear weapons program was enhanced by nationalism (e.g. Nizamani, 2000; Khan, 2005).

Indeed, security considerations are unlikely to have been the sole factor for the tests. For one thing, Pakistani Prime Minister Muhammad Nawaz Sharif makes repeated status-related references in his statement following the tests. He points to degrading comments by India about Pakistan, the latter's pride, and he praises the nuclear weapon test as national achievement:

> "Immediately after its nuclear tests, India had brazenly raised the demand that 'Islamabad should realize the change in the geo-strategic situation in the region' and threatened that 'India will deal firmly and strongly with Pakistan'. […]
>
> As a self-respecting nation we had no choice left to us. […]
>
> I would like to congratulate the nation on the achievements of our scientists and engineers. They have made it possible for the people of Pakistan to enter the next century, with confidence in themselves and faith in their destiny" (Sharif, 1998).

A further aspect that limits the notion of security is the timing of the tests or as Perkovich (1998, p.16) put it: "Why now?" The fact that Pakistan was able to conduct nuclear weapon tests only weeks after India shows that the state already had the military capacities necessary for nuclear weapons. Even Sharif's statement points to a political nature of the decision to conduct the tests by noting: "After due deliberation and a careful review of all options we took the decision to restore the strategic balance." Hence, the tests were more about a *demonstration* of capacity, rather than the building or exploration of capacity. In doing so, Pakistan crossed the status line from a latent power to an actual nuclear weapon power.

Commitment to and compliance with the non-proliferation regime has also been restricted by **degrading states in the NPT framework**. In addition to the rules (see subsection on norms in this chapter), the very status appears to privilege Nuclear Weapon States. In 1958, before France became a nuclear weapon power, the French representative Jules Moch stated:

> "France would not accept being excluded from the number of 'nuclear Powers' so long as other Powers continued to increase their stockpiles of nuclear weapons and consequently, the risks of war" (in: Shaker, 1980, p.6).

After France had detonated its first nuclear device, showing the successful military dimension of its nuclear program, the state pushed for a discussion among Nuclear Weapon States. In February 1962, Charles de Gaulle stressed in a letter to Nikita Khrushchev

> "that France would only participate in talks that would be between the nuclear Powers and that would have as their immediate goal, the destruction, the ban and control of all means of delivery of nuclear weapons" (in: Shaker, 1980, p.72).

In this sense, being part of a diplomatic dialog appears to be an aspect of status, to which France made an appeal before and after having detonated nuclear weapons. Beforehand, the state seems to have criticized the exclusivity of the club. After becoming a Nuclear Weapon State itself, it insisted on the integrity of the group.

2.4. Summary

The commitment system of the Non-Proliferation regime consists of a wide range of international, regional, and bilateral agreements as well as unilateral pledges. While they address all three norms, i.e. countering the *acquisition*, *possession*, and *use* of nuclear weapons, the greatest output effectiveness is to be found in the field of acquisition. This is mainly due to the large number of states party to the Non-Proliferation Treaty and the Nuclear-Weapon-Free Zones.

Looking at the outcome effectiveness leaves room for optimism. Most states that commit to a certain behavior also comply. Unfortunately, there are also some exceptions to this tendency, including enforcement cases (such as Libya, Iraq, and North Korea) that will be discussed in Chapter 4. There is also compliance without commitment. Although the Comprehensive Test Ban Treaty is not in force, almost all states on this planet comply with its major rules. Furthermore, Nuclear Weapon States have been reluctant to give binding negative security assurances but still seem to respect their content. This observation appears to confirm Susan Strange's regime criticism to give too much credit to managerial structures in international relations.

The output and outcome effectiveness appear particularly high in commitments that reflect a behavioral manifestation, in other words cases in which states had already been complying before making a commitment (most notably Non-Nuclear Weapon States in the NPT and the NWFZs). Agreements that demand a behavioral change do often not materialize (e.g. FM(C)T or NWFZs in the Middle East or on the Korean Peninsula) or tend to have a limited scope (e.g. disarmament agreements). The exception to this observation is the unilateral nuclear reversal of South Africa.

Overall, the impact suggests that the regime has been successful on two fronts: 1. The *acquisition* has been largely contained. Only few states have successfully acquired nuclear weapons, while a larger number have given up nuclear weapon programs. 2. There are positive developments regarding the *use* of nuclear weapons. Nuclear explosions have massively gone down in the last three decades. Also, the world has not seen a detonation of nuclear weapons in a military conflict since the end of World War II, although this may also be due to a fortunate turn of events, especially during the "Cuban Missile Crisis" (Pelopidas, 2017).

Regarding the *possession* of nuclear weapons, the picture is more diverse. The number of nuclear weapons has significantly gone down but the number of states possessing nuclear

weapons has not. Also 50 years after the NPT entered into force, a world free of nuclear weapons is nowhere near to being a reality.

A look at possible driving factors for (non-)cooperation demonstrates the complexity of state decisions within the regime. As concluded by Way and Sasikumar in a cross-state study,

> "[s]tates with acute security concerns are less [likely] to join the NPT, states with high energy needs are more likely to join it, and states for whom developing nuclear weapons would be a simple and inexpensive task are reluctant to join" (Way and Sasikumar, 2004, p.4).

An analysis of the commitment system supports the virtue of historical institutionalism, sociological institutionalism, and rational choice institutionalism alike. Material (RCI) and non-material considerations (SI) appear to shape nuclear decision-making. At the same time, (non-)cooperation demonstrates path-dependent features (HI).

Economic considerations have been pivotal in shaping the non-proliferation regime as we know it. The regime offers a platform for giving and receiving nuclear cooperation in advancing peaceful uses of nuclear energy and finding solutions for problems like nuclear safety – very much as envisioned in Eisenhower's (1953) "Atoms for Peace" speech. This is in line with a more material understanding of driving factors. Economic arguments have also been made by states that initially refrained from signing the Non-Proliferation Treaty. However, as the cases of India or Brazil have shown, these states may also explore nuclear weapon options.

Normative factors are non-material and appear to have contributed to a positive regime impact by delegitimizing nuclear weapons (see also Rublee, 2009). The Non-Proliferation Treaty triggered and, for the most part, ended domestic discussions across the world as to whether a state should acquire nuclear weapons. These decisions not only remain largely uncontested. In some cases, they were also strengthened by additional commitments, such as Nuclear-Weapon-Free Zones. Norms appear to have "locked-in" positive behavior, which would suggest a path-dependent effect.

Security considerations, if present, have a tendency to trump normative aspects. France's nuclear weapon tests up until 1996, the stalemate in the Fissile Material (Cutoff) Treaty, or the lack of a full global disarmament all go in line with security motivations. This strongly points to the persistence of nuclear deterrence and shifts the regime more towards a *no-regime* from a security perspective. Yet, security considerations have also facilitated the establishment of the Non-Proliferation Treaty.

Status may attract states' cooperation. For instance, the NPT Review Conference resembles a platform for self-advertisement in regime compliance as well as a tool to push ideas forward. Yet, the very prestige of nuclear weapons and the exclusiveness of the nuclear club also provide a plausible explanation for non-cooperation (e.g. Perkovich, 1998). Despite global reductions in nuclear weapon stocks, no Nuclear Weapon State is close to giving up nuclear bombs altogether. Instead, NWS stay on the nuclear weapons track, which would support the virtue of historical institutionalism. This observation confirms the need to find further ways to devaluate nuclear weapons, the challenges of which have been described by Nick Ritchie (2013).

3. Verification in the Non-Proliferation Regime

3.1. Platforms of Verification

The verification system is aimed at shedding light on a state's compliance with the non-proliferation regime. It allows a state to assure others of its adherence to commitments made. At the same time, verification makes it more difficult to pursue nuclear weapons undetected, deterring non-compliance with the regime in the first place (see also Ifft, 2010, p.5) or paving the way for regime enforcement (see Chapter 4).

The network of verification is quite complex. For the most part, a verifying body does not evaluate a state's compliance with regime norms[164] but with specific verification rules.[165] Effective verification, therefore, rests on the triangle between the verifying body, the state, and the verification commitment. Conclusions are particularly difficult for states that offer few analytical tools.

What conditions determine whether states commit to and comply with regime verification in the *acquisition*, *possession*, and *use* of nuclear weapons? In order to address this question, I will start by giving a brief overview on international, regional, bilateral, and autonomous verification. Although the following analysis in this chapter needs to focus on the most principal platforms, the overview is meant to account for the wide spectrum of the verification system.

Subsequently, I will examine to what extent states have ratified (*output*) and complied with verification commitments (*outcome*). Based on this, I will consider how cooperation in verification correlates with a state's compliance with regime norms (*impact*) in the respective thematic field. The latter allows for insight into states' larger nuclear behavior. Following this assessment of the three stages of regime effectiveness, I will seek to explain (non-)cooperation in the verification system by an examination of plausible intent of the factors of *security*, *norms*, *economics*, and *status*.

A conclusion will take up the most important findings of the chapter. Output and outcome effectiveness are strongest in the fields of the *acquisition* and *use* of nuclear weapons. Verification plays a subordinate role in decreasing nuclear weapon stocks. This is consistent with the commitment system of the non-proliferation regime, which resembles relatively few commitments in nuclear disarmament.

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[164] The major regime norms are to counter the *acquisition*, *possession*, and *use* of nuclear weapons.
[165] This is particularly the case for the verification in the context of the Non-Proliferation Treaty and Nuclear-Weapon-Free Zones.

Verification allows for limited additional value to the non-proliferation regime, in that it appears to reinforce states' compliance rather than preventing non-compliance. States with nuclear weapon programs refrain from making strong verification commitments. On a positive note, states that implement strong verification tools are facing further hurdles to develop nuclear weapons at a later stage.

3.1.1. International Verification

Over the years, the **International Atomic Energy Agency (IAEA)** has established itself as the cornerstone of verification in the non-proliferation regime. This is due to the agency's pioneering role as an international institution in the nuclear age and the reference to it by subsequent agreements. Article III of the Non-Proliferation Treaty made IAEA safeguards agreements mandatory for Non-Nuclear Weapon States. Similarly, Nuclear-Weapon-Free Zones demand IAEA cooperation (see Appendix 4).

Despite its prominent role within the regime, the verification spectrum of the agency is narrow. It is more concerned with the *acquisition* of nuclear weapons than it is with the *possession* or *use* of these weapons. The broad objective of the IAEA to promote the civilian use and to counter the military use of nuclear energy[166] would allow for the verification of nuclear disarmament. Still, the agency has played a subordinate role in this regard (see also Drobysz and Persbo, 2016, pp.135–7). Nuclear Weapon States are not required by the Non-Proliferation Treaty to conclude safeguards agreements.

The IAEA's verification work, particularly the inspection rights and the access to information, depend on its agreement with a state. Ideally, the agency can make a judgement about the correctness and completeness of state reports on their respective nuclear program.[167] Acknowledging different paths in the acquisition of nuclear weapons, the IAEA looks for the diversion of declared material or the non-declaration of activities, facilities, or material (Rauf, 2015, p.16).

Although its Charter[168] neither mentions *verification* nor *monitoring*, the **United Nations (UN)** is a potential verification platform in the non-proliferation regime. The UN Security Council may create *subordinary organs* to facilitate its functions (Article 29, UN Charter). While these bodies – in the form of Sanctions Committees or the Non-Proliferation

[166] See Article II of the IAEA Statute.
[167] This is to be seen in a 1992 IAEA Board of Governors judgement about Comprehensive Safeguards Agreements (e.g. Rauf, 2015, p.15).
[168] Charter of the United Nations, June 26, 1945.

Committee – may be established to check on the implementation of UN resolutions, they may also be used for verification purposes.

More importantly, Chapter VII of the UN Charter allows for *action* in cases of "threats to" or "breaches of" peace as well as "acts of aggression." This may include enforcement (see Chapter 4) but also verification. In addition to mandating the IAEA with verification tasks, the Security Council may create a new verification body.[169] It did so by establishing UNSCOM and UNMOVIC as a response to Iraq's programs of weapons of mass destruction.

Since the evaluation of and response to a threat rests on the UN Security Council, Nuclear Weapon States are unlikely to become subject to these measures. As Permanent Members, they have a de-facto veto right. Consequently, verification in the UN context is more likely to be used in cases relating to the *acquisition* of nuclear weapons.

The two international treaties on **nuclear weapon tests** have taken different approaches in verification. The scope of the Partial Test Ban Treaty and the ability to verify its implementation were a crucial part of the negotiation phase (US Department of State, 2017). The eventual treaty did not include international verification in its text. This choice reflected the understanding that states verify the commitment of other states through national means.

The Comprehensive Test Ban Treaty, in turn, lays out sophisticated provisions to verify that states do not undertake nuclear explosions underground, underwater, or in the atmosphere. Verification in the CTBT, therefore, focuses on the *use* of nuclear weapons. The major tools of verification are a global monitoring system and, in the event of suspicion, on-site inspections.

3.1.2. Regional Verification

Verification is an important pillar of **Nuclear-Weapon-Free Zones (NWFZs)**. They tend to mix three elements: IAEA verification, an executive body, and special inspections (see Appendix 4). By implementing and complementing the International Atomic Energy Agency, NWFZs strengthen the verification system in countering the *acquisition* of nuclear weapons.

According to the 1975 UN expert panel on NWFZs, the verification tasks of Nuclear-Weapon-Free Zones fall into two *categories*: Checking that *zonal states* do not acquire

[169] There is a tendency to leave nuclear issues with IAEA. A rivalry may develop between verification bodies. In the case of Iraq, occasional conflicts occurred between the IAEA and UNSCOM (Harrer, 2014, pp.28–31).

nuclear weapons and ensuring that *outside sources* effectively leave the zone free from them (UN General Assembly, 1975). In reality, there is a strong emphasis on the former category. State parties rather than the signatories of the protocols are subject to reporting and inspections.

Within the European Union (EU), verification is based on an accord between the IAEA and **EURATOM** safeguards. The EURATOM verification work is carried out by the European Commission (Chapter 7, EURATOM Treaty[170]), which evaluates documentation, sends inspectors, and circulates an annual report on nuclear safeguard activities.

EURATOM's autonomy makes it unique as a regional body. The right to "self-inspection" has created tension with the IAEA in the past, as detailed by John Krige. Former IAEA Director Sterling Cole's feared that granting too much independence to a regional body would set a dangerous precedent (Krige, 2015). EURATOM prevailed and coined its role as an important pillar of European integration.

The EURATOM safeguards system has also allowed inspections of civilian parts of the nuclear fuel cycle in France and the United Kingdom. In this sense, it has offered an added value in relation to the original IAEA outset. In the course of the United Kingdom's withdrawal from the European Union (*Brexit*), the state is also planning to leave EURATOM (HM Government, 2017).

3.1.3. Bilateral Verification

Bilateral safeguards agreements have a long history in the non-proliferation regime that even precedes the IAEA.[171] As noted by John Carlson, they resemble a prerequisite for **nuclear supplies** of fissile material and equipment rather than verification procedures *per se*. Their purpose is to ensure that material, facilities, and equipment from advanced nuclear states are only used for peaceful purposes in other states. This makes the retransfer of these items or their military use in the receiving state more difficult, even if an acknowledged Nuclear Weapon State is at the receiving end of the nuclear trade (Carlson, 2005).

This institutional layout puts nuclear suppliers into an influential position. They can translate their market position into demands for safeguards. Less advanced nuclear states

[170] Treaty Establishing the European Atomic Energy Community, March 25, 1957. Consolidated Version as of October 26, 2012.
[171] The United States had 20 agreements in place by 1957, when IAEA was founded (Carlson, 2005).

depend on them to develop their own nuclear program. Therefore, nuclear suppliers can be seen to be bilateral agenda-setters in the context of verification.

Furthermore, verification may be part of a larger bilateral agreement. The arrangements between the **United States and the Soviet Union/Russia** have made different uses of verification (see e.g. Woolf, 2011). Agreements either exclude specific tools of verification (SORT), provide for national means (ABM Treaty), or take a more comprehensive approach including exchange of information and on-site inspections (START I, START II, New START, INF).

Countering the *acquisition* of nuclear weapons, the verification work of the IAEA in **Argentina and Brazil** is complemented by the Argentine-Brazilian Agency for Accounting and Control of Nuclear Materials (ABACC).[172] The peaceful use of nuclear material is verified through the Common System of Accounting and Control of Nuclear Materials. The verification mechanism checks the correctness of state reports and non-diversion of fissile material.

3.1.4. Unilateral Verification

Unilateral (or autonomous) verification in this work refers to assessments of nuclear programs in other states based on intelligence. National intelligence not only contributes to domestic political decision-making. It is also an integral component of verification bodies within the regime (e.g. the IAEA, NWFZs, or the CTBTO). Intelligence agencies may even be better suited to produce analyses. The IAEA's regular budget of around €372 million[173] and its staff of around 2560 (IAEA, 2019b) are only a fraction of that of some intelligence agencies.[174]

Yet, national intelligence has two potential drawbacks, one referring to legitimacy, the other to accuracy. Discussions surrounding the legitimacy take two different perspectives, as noted by Pierluigi Salvati. The missing consent by a targeted state may reflect "a violation of international law." At the same time, "the lack of an *ad hoc* prohibitive rule and a

[172] The exact relationship between both states and the verification bodies is laid down in the "Quadripartite Agreement": Agreement between the Republic of Argentina, the Federative Republic of Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the International Atomic Energy Agency for the Application of Safeguards, December 13, 1991.
[173] As appropriated for 2019, see: IAEA General Conference (2018).
[174] Data regarding national intelligence agency's is often a matter of secrecy. In 1998, the US intelligence budget accumulated to $26.7 bn (CIA, 2008). In 2018, the US National Intelligence Program was appropriated to $59,4 bn (ODNI, 2018).

substantial 'tolerance' of such activity by states" could be seen to legitimize intelligence (Salvati, 2016, p.40).

Furthermore, conclusions from intelligence may intentionally or unintentionally lack *accuracy*. For one thing, intelligence conclusions may be subject to political motivation (see e.g. Porter, 2014; Bollfrass, 2017a). In addition, there are procedural challenges. As noted by Keith Hansen looking at the US example, a reliable collection of data may be obstructed by limited access to human sources and the reliance on unvetted data from intelligence services of partner states (Hansen, 2011, 10).

3.2. Assessing Effectiveness

3.2.1. Acquisition

Owing to its paramount role in verifying non-proliferation, the best angle to get a grasp of states' verification commitments countering the *acquisition* of nuclear weapons is the International Atomic Energy Agency. To what extent have states committed to (*output*) and complied with (*outcome*) IAEA safeguards? How does verification behavior of a state relate to the larger regime compliance (*impact*)?

Verification commitments with the IAEA can be categorized into Comprehensive Safeguards Agreement with an Additional Protocol, a Comprehensive Safeguards Agreement without an Additional Protocol, a Small Quantities Protocol, an Item-Specific Safeguards Agreement, and a Voluntary Offer Agreement.

Comprehensive Safeguards Agreements (CSAs) are the main pillar of verification agreements, as required in the Non-Proliferation Treaty and by Nuclear-Weapon-Free Zones.[175] Under a CSA, a state must inform the IAEA about nuclear material and facilities subject to safeguards.[176] States must also "ensure that Agency inspectors can effectively discharge their functions [...]."[177] The IAEA is responsible for checking these reports with their own means. Its tools include the use of material accountancy, inspections[178], and intelligence[179] (open source and national intelligence). Their aim is the timely detection of diversion of nuclear material. CSAs provide a good basis for the verification of the

[175] CSAs are based on the frame document INFCIRC/153 (corrected). In the negotiation between a state and the IAEA, the CSA is complemented with a Subsidiarity Agreement, a supplementary set of provisions (Petritz, 2012, pp.120–1).
[176] See Article 7 and 8, INFCIRC/153 (corrected) (IAEA, 1972).
[177] See Article 9, INFCIRC/153 (corrected) (IAEA, 1972).
[178] Inspections include ad hoc, routine, and special inspections (Rauf, 2015, pp.16–8).
[179] On the role of intelligence in the verification work of the IAEA see Pierluigi Salvati (2016).

correctness of states' verification reports. States with no or minimal nuclear activities have the option to conclude a **Small Quantities Protocol (SQP)**, which simply aims at facilitating the implementation of safeguards.

Yet, what happens if the items listed in the reports are correct but only one part of the nuclear program? To enhance the IAEA's tools to check the *completeness* of states' reports, the agency introduced the **Additional Protocol** in May 1997. The protocol provides the agency with more information as well as access rights to facilities and persons.[180] Due to its comprehensive scope, it was praised as a "milestone" for the non-proliferation regime (Goldschmidt, 1999, p.2). A CSA in combination with an Additional Protocol is the strongest verification commitment regarding the *acquisition* of nuclear weapons.[181]

In contrast to the Non-Nuclear Weapon States, Nuclear Weapon States have by definition developed nuclear weapon capacities. In these states, the IAEA only verifies nuclear facilities and material for peaceful purposes, based on **Voluntary Offer Agreements (VOAs)**. Although limited, VOAs are a way to include NWS in the verification system. The verification work also allows the IAEA "to obtain and verify information that could enhance the safeguards conclusions in States with comprehensive safeguards agreements in force" (IAEA, 2019c).

The use of **Item-Specific Agreements (ISAs)**[182] even precedes the Non-Proliferation Treaty. They are still used for peaceful nuclear activities in India, Pakistan, and Israel. Since it is prohibited for NPT member states to export fissile material and related equipment without IAEA safeguards, "[i]tem-specific safeguards agreements are […] a basic condition of nuclear trade between NPT and non-NPT states" (DeFrancia, 2012, p.38). Similar to Voluntary Offer Agreements, they leave room from a separate nuclear weapons track for fissile material which is not subject to safeguards, but they enhance the inclusion of states with nuclear weapons in the verification system.

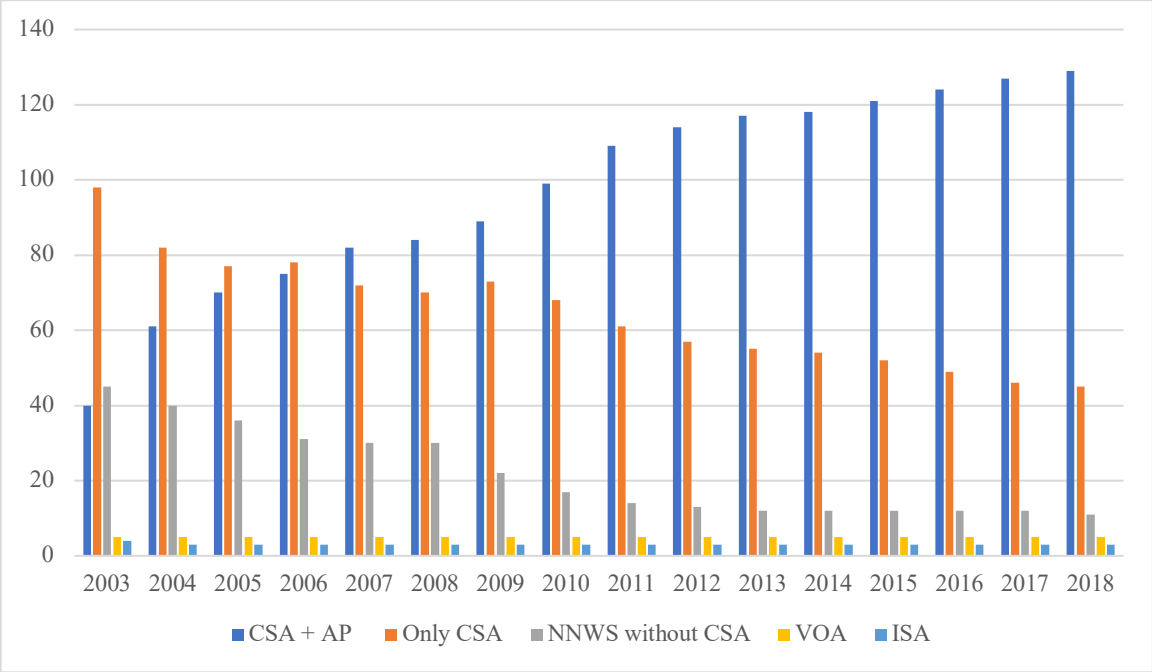
Output

In order for the IAEA to make a sound judgement that nuclear material is only used for civilian purposes, the respective state needs to put into force a Comprehensive Safeguards Agreement as well as the Additional Protocol. Here, the last 15 years have demonstrated a

[180] An overview of state's obligations under the Additional Protocol can be found in Kerr and Nikitin (2017).
[181] For the categorization of verification commitments by state see Appendix 5.
[182] The legal basis is INFCIRC/66/Rev.2 (IAEA, 1968) and related documents.

very positive trend. As illustrated in Figure 6 below, the number of Non-Nuclear Weapon States without a CSA has significantly gone down, from 45 in 2003 to 11 in 2018. Furthermore, the number of states that have a CSA as well as the AP in force increased from 40 in 2003 to 129 in 2018. Iran is provisionally implementing the Additional Protocol as part of the Joint Comprehensive Plan of Action (JCPOA). This means that the IAEA has the legal tools to make a fair judgement regarding 71% (129 out of 182) of the states in which safeguards are applied.

Figure 6 – Safeguards Agreements in Force[183]



Despite the increasing strength of the verification system on the possible *acquisition* of nuclear weapons, several shortcomings deserve attention. While verification agreements with the Nuclear Weapons States (China, France, Russia, the United Kingdom, and the United States of America) as well as three states outside of the NPT (India, Israel, and Pakistan) have been largely stable over the last 15 years, they leave the IAEA with a blind eye on their production of nuclear weapons.

Three other concerns relate to Non-Nuclear Weapon States. First, in 2018, 45 states had a Comprehensive Safeguards Agreement in force without an Additional Protocol. In 2003, 98 states belonged to this group. For these states, the IAEA can only judge on the correctness

[183] Without Taiwan, China. Data derived from annual Safeguard Implementation Reports, typically issued in June of the following year by IAEA (2019c).

but not on the completeness of reports. The number includes states with fairly advanced nuclear programs, such as Argentina, Brazil, and Egypt.[184]

Second, 11 Non-Nuclear Weapon States do not even have a CSA in place. This is a breach of their Non-Proliferation Treaty commitment. As a consequence, the International Atomic Energy is unable to make judgements about the respective nuclear program. Fortunately, the states in question do not pose serious proliferation concerns.[185]

Finally, in 2018, 37 states still have failed to amend their Small Quantities Protocols (IAEA, 2019c). The older version of the SQPs represented a weakness that was accounted for in a revised version (see also IAEA Board of Governors, 2006b). For instance, under the original text, the IAEA could neither verify that the state actually meets the criteria for the simplified implementation of safeguards, nor was the state obligated to initially report all its nuclear material to be put under safeguards (JAEA, 2016, pp.27–8). Hence, Small Quantities Protocols without amendments represent a loophole in the verification system.

Outcome

For the IAEA to claim that "all nuclear material remained in peaceful activities," a state not only has to ratify a Comprehensive Safeguards Agreement and the Additional Protocol. The agency also needs to complete its evaluations in time. The IAEA has been able to make more and more judgements that all nuclear material of a state is used peacefully. At the time of publication of the 2018 Safeguard Statement in June 2019, the IAEA made such a conclusion for 70 out of 182 member states. This number has increased from 40 in 2003.[186]

In 2018, the IAEA concluded for 54 % of the states that have a Comprehensive Safeguards Agreement and an Additional Protocol in force that *all* of their nuclear material was used for peaceful activities. The proportion of conclusions that all nuclear material has remained peaceful against the legal background of states with a CSA and an AP in force has been largely stable over the last ten years. While there is still room for improvement, considering that the agency has to digest an increasing amount of verification commitments, this observation can be seen as a success. For the other states, the IAEA determined that *reported* material was used peacefully.

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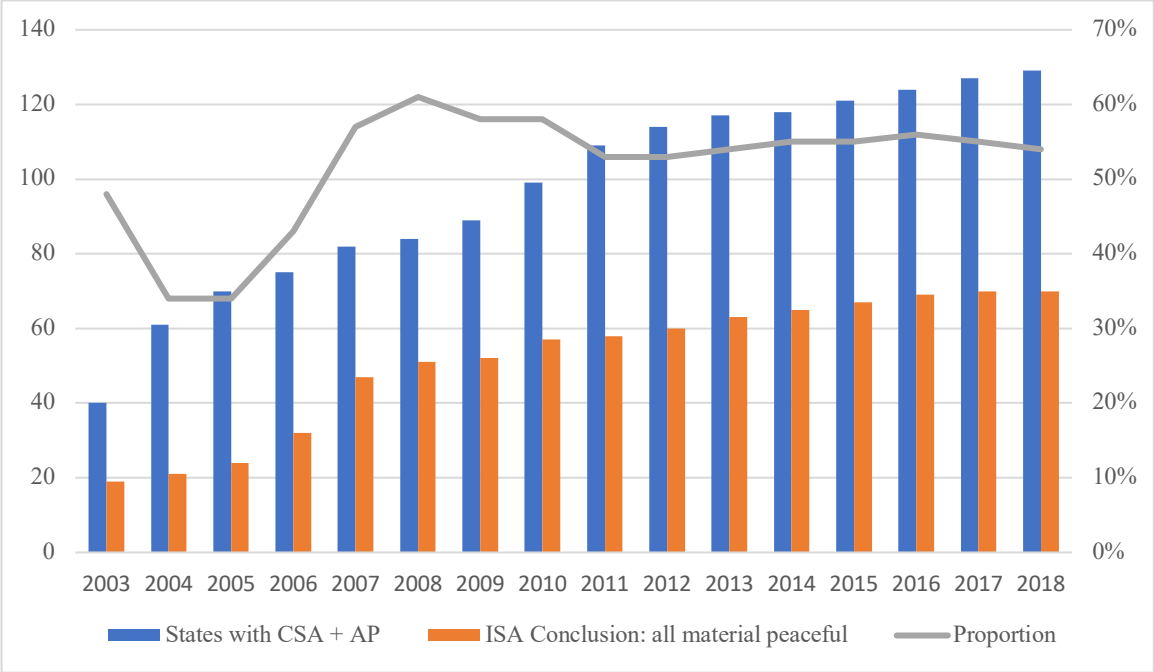
[184] The non-ratification of the Additional Protocol in Brazil and Argentina is partially compensated by the aforementioned "Quadripartite Agreement."
[185] These are Benin, Cabo Verde, Equatorial Guinea, Eritrea, Guinea, Guinea-Bissau, Micronesia, Palestine, São Tomé and Príncipe, Somalia, Timor-Leste (IAEA, 2019c).
[186] The data is based on the IAEA's annual Safeguards Statements (IAEA, 2019c).

Figure 7 – Full Safeguards Implementation[187]



Compliance with verification agreements cannot be reduced to a simple *yes* or *no*. At a minimum, analysts should distinguish between smaller and larger cases of compliance.[188] The implementation of IAEA verification commitments in larger terms is rather positive. Considering the 174 states that have a Comprehensive Safeguards Agreement in force, major breaches of verification commitments – which may put the overall norm compliance of a state into question – are the exception.

In the past, non-compliance with IAEA safeguards has been associated with Egypt, Iran, Iraq, Libya, North Korea, Romania, South Korea, and Syria. Out of these states, Iran, Libya, North Korea, Romania, and Syria were reported to the Security Council (Findlay, 2015, p.97).[189] Iran, Iraq, and North Korea were sanctioned for their programs (see following chapter). The greatest verification challenges that remain in the 2018 IAEA Safeguards Statement are Syria (which has provided an unsatisfactory clarification on the nature of a compound at Dair Alzour) and North Korea, where the IAEA has not been able to implement verification measures since 2009 (IAEA, 2019c).

[187] Without Taiwan, China. Data derived from annual Safeguards Statement, typically issued in June of the following year (IAEA, 2019c).
[188] Accordingly, although not standardized, the IAEA uses different terminology for non-compliance (see Findlay, 2015, pp.91–108).
[189] The Iraqi WMD programs had already been on the agenda of the Security Council. Libya and Romania were reported for information purposes only (Findlay, 2015, p.97).

Although not questioning the overall norm compliance with the regime, minor shortcomings in states' cooperation with the IAEA can still negatively affect the agency's ability to draw safeguard conclusions. One aspect is the IAEA budget.[190] The Regular Budget (revalued final budget)[191] of the IAEA in 2018 consisted of around €358 million. €139 million went to the nuclear verification program, only a fraction of a national nuclear weapons program (IAEA, 2019e). Fulfilling increasing verification demands, in the face of budget constraints is a continuing challenge for the agency (Findlay, 2016).

In addition to the limited budgetary horizon, several states have failed to pay their share. By the end of 2018, the IAEA budget had outstanding contributions in the amount of around €62.4 Million from states, a large share of which was to be paid by Brazil (€11.8 million) and Venezuela (€10.3 million). Nonetheless, Director General Amano stated that the Agency has a "strong overall financial health" (IAEA, 2019e).

The IAEA also faces logistical hurdles to perform its verification work. In its 2018 Safeguards Statement, the agency criticizes that some states lack a domestic infrastructure for reliable verification.[192] The agency also experienced "access restrictions to locations, material, facility records and other relevant documentation." Furthermore, there are deficiencies in state and regional systems of accounting for and control of nuclear material, which are necessary for efficient safeguards implementation. Although required in Comprehensive Safeguards Agreements, some states have failed to implement such systems (IAEA, 2019c).

While efficient verification depends on the IAEA member states, it shall be noted that the agency itself may be the cause for deficiencies in the implementation of safeguards. As pointed out by Trevor Findlay, in one instance, the safeguard goals for Canada were not met, because the IAEA failed to conduct the necessary inspections due to "personnel shortages." Australia, in turn, was temporarily believed to have misstated its nuclear material, although it had acted upon prior advice from IAEA inspectors (Findlay, 2015, p.120).

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[190] Details on the budget can be found in the Agency's Annual Financial Statements. For 2018 see IAEA (2019e).

[191] In addition to the Regular Budget, technical cooperation funding, as well as voluntary contributions are part of the IAEA funding (e.g. IAEA, 2019e).

[192] More specifically, various states lack "legal authority, resources, technical capabilities or independence from nuclear facility or [locations outside facilities (LOFs)] operators to implement the requirements of safeguard agreements and additional protocols" and do not "provide sufficient oversight of nuclear material accounting and control systems at nuclear facilities and LOFs to ensure the required accuracy and precision of the data transmitted to the Agency" (IAEA, 2019c).

Impact (*Acquisition* of Nuclear Weapons)

By enhancing transparency and deterrence, verification is supposed to strengthen the non-proliferation regime regarding the *acquisition* of nuclear weapons. A brief look into how verification relates to regime compliance gives an indication of verification impact. To what extent is there a link between compliance with verification rules and a state's overall compliance with regime norms?

At first sight, the verification developments of the last 25 years give reason for hope. The increasing output and outcome effectiveness allow for more transparency. As pointed out by Petritz (2012, p.135), already a Comprehensive Safeguards Agreement increases the difficulty of keeping a clandestine nuclear program secret, as a state would need to develop and establish two completely separated fuel cycles. The Additional Protocol allows for an even better picture of the nature of a nuclear program. These aspects would suggest that verification reforms have enhanced transparency and deterrence.

Still, although the combination of CSA and AP is the best legal outset to verify, it is not perfect. IAEA Director General Hans Blix noted during the Board of Governors meeting on the passing of the Additional Protocol that the new tools would not secure a 100% detection capability but would significantly enhance detection and deterrence (IAEA General Conference, 1997). Mistakes in verification may also occur in the future.

There is a positive correlation between verification commitment, on the one hand, and overall norm compliance, on the other hand. Out of the increasing number of Non-Nuclear Weapon States that have a CSA and an Additional Protocol in force, no norm violations can be noted.[193] This observation would be in line with the argument of a deterrent effect of verification. Considering, however, that Libya only joined the Additional Protocol after having given up its nuclear weapons aspirations leads to the assumption that a verification commitment may simply be an extension of the overall commitment to the regime rather than a deterrent.

The inversion of the deterrence argument can also be maintained. In other words, anticipating a higher detection risk, states with clandestine programs would be reluctant to make strong verification commitments. Indeed, states that have pursued nuclear weapons in

[193] This observation is based on a confrontation of state cases that have tried to develop or in other ways acquire nuclear weapons in the past, as listed by Levite (2003, p.62), the time period of the respective nuclear program (Müller and Schmidt, 2010, p.157) and the entry into force of the Additional Protocol. A notable exception may be South Korea, which gave the IAEA headaches in 2004 (see summary of events in: Findlay, 2015, pp.72–5). Here, non-compliance may have occurred without the knowledge of the government (Kang *et al.*, 2005, pp.47–8).

the aftermath of the Cold War, or have been suspected thereof, have refrained from committing to more transparency than necessary (see Table 3 below). Iran, Libya, and Syria had no Additional Protocol in force when IAEA concerns arose.

Iraq, Romania, and North Korea could not have had an AP in place when their programs became an issue. Yet, Iraq demonstrated ambiguous verification cooperation throughout the 1990s (see Chapter 4) and North Korea only reluctantly concluded its safeguards agreement with the IAEA (Findlay, 2015, pp.39–40). These considerations would suggest that a nuclear weapons program deters the conclusion of intrusive safeguards agreements, rather than the other way around.

Table 3 – Verification and Potential Cases of Non-Compliance

	Suspicion triggered by[194]	**Verification commitment at time of suspicion**[195]
Iraq	Operation Desert Storm, 1991	INFCRIC/172 (1972), no AP
Romania	Post-Ceaușescu government informed IAEA, 1992	INFCIRC/180 (1972), no AP
North Korea	Suspicion due to long CSA conclusion, IAEA verification, 1992	INFCIRC/403 (1992), no AP
Iran[a]	Reports by National Council of Resistance in Iran about illicit nuclear activities, 2002	INFCIRC/214 (1974), no AP
Libya	Revelation about WMD programs by Libyan government, prior involvement of UK and US, 2003	INFCIRC/282 (1980), no AP
Syria[a]	Israeli bombing of Dair Alzour compound, 2007	INFCIRC/407 (1992), no AP

[a] While the other states in this table were non-compliant with the regime norm, in that they had secret nuclear weapons programs, the past and current nuclear weapons aspirations of Iran and Syria remain subject to debate.

Arguably, verification procedures have helped to shed light upon cases of non-compliance.[196] Put differently, they may have offered transparency without enhancing deterrence. Werner Petritz (2012, p.138) considers it unlikely that after the strengthening of the verification system more states will follow non-proliferation commitments, breaches are just better documented. Similarly, Kang *et al.* (2005) speculate that the Additional Protocol may cover up past non-compliance of states, as it did in South Korea.

[194] See e.g. Findlay (2015).
[195] See IAEA (2016a).
[196] See e.g. Findlay (2007, p.49) as well as Rockwood and Johnson (2015, p.88).

The IAEA's track record of actually detecting non-compliance by itself is rather grim. Looking at the cases listed in Table 3, it is noticeable that more often than not, verification is not triggered from the IAEA but other actors. In fact, non-compliance reporting has only taken a strong turn since the 1990s. In the 25 years prior to the discovery of the WMD programs in Iraq no diversion was detected (Hooper, 1999, p.9). As noted and illustrated by Findlay (2011, p.88) "the overall trend over time has been an increase in the number and complexity of non-compliance reports by the Secretariat." Yet, the IAEA's tools of detection are still not at their full potential, since even twenty years after the Additional Protocol opened for signature, it is not in force in all Non-Nuclear Weapon States.

3.2.2. Possession

There are several demands for verification in academic literature that fall into in the field of the *possession* of nuclear weapons. Some texts refer to specific agreements, while others comment on the overall structure of the verification system.[197] Often, the ideas are presented as part of a larger take on global disarmament. In other words, if we want to achieve a world free of nuclear weapons, reliable verification is inevitable.[198]

Accordingly, various efforts have explored the challenges of disarmament verification. Debates include experts with governmental affiliation, NGOs, academia, and other stakeholders. The number and scope of projects already hint to the complexity and difficulty in achieving reliable verification.[199] Some of the more recent international efforts have been summarized by Tim Caughley:

- *United Kingdom-Norway Initiative (UK-NI)*
- *The International Partnership for Nuclear Disarmament Verification (IPNDV)*
- *Nuclear Threat Initiative's Verification Pilot Project (NTI Project)*
- *Trilateral Initiative/Plutonium Management and Disposition Agreement*
- *Fissile Material (Cutoff) Treaty*

(Caughley, 2016, pp.11–7)

Looking at the proposals, it becomes apparent that effective verification requires solutions for a variety of issues, most notably technical, logistical, as well as political

[197] See e.g. Kile and Kelley (2012) or Smetana and Ditrych (2015).
[198] See e.g. Hinderstein (2010), Feiveson *et al.* (2014), VERTIC (2015), Busch and Pilat (2017).
[199] As the explanation section will show, some experts and politicians opine that there are instances where reliable verification is simply impossible.

challenges. Similar to the actual process of disarmament, verification contains different tasks, which can be broadly categorized. A primer by the "Verification Research, Training and Information Centre" identifies five steps of disarmament verification:

- *Verifying Nuclear Weapon Dismantlement*
- *Verifying the Disposition of Fissile Material Recovered from Dismantled Weapons*
- *Verifying the Elimination or Reversal of Nuclear Weaponization Activities*
- *Verifying the Decommissioning of Fissile Material Production Facilities*
- *Verifying the Ongoing Peaceful Nuclear Activities of a Disarmed State*

(VERTIC, 2015)

Any state that has had nuclear weapon ambitions at one point would be subject to a combination of verification elements mentioned above even without fully developing nuclear weapons – such as Libya or Iraq. Since this section is devoted to the possession of nuclear weapons, I will focus on states that have reduced parts or all of their nuclear weapon stocks.

Output and Outcome

Verification in disarmament has played a subordinate role compared with verifying the (non-)acquisition of nuclear weapons. Nuclear Weapon States do not verify the disarmament of their weapon stocks on an international level. The Non-Proliferation Treaty makes no mention of the verification of disarmament. Nuclear-Weapon-Free Zones do not verify adherence to their protocols (which would be relevant for Nuclear Weapon States).[200] Even the Treaty on the Prohibition of Nuclear Weapons lacks a clear notion of disarmament verification (Onderco, 2017, p.394). Rather than accompanying the disarmament process, the treaty aims at preventing a nuclear weapons relapse (Articles 3 and 4 of the treaty).[201]

Verification in the field of the *possession* of nuclear weapons, therefore, demonstrates a low output effectiveness. Overall, only few verification commitments are being concluded

[200] According to the Treaty of Pelindaba, the IAEA would be tasked with disarmament verification "should nuclear weapons ever re-emerge on that continent" (Drobysz and Persbo, 2016, p.137).
[201] The negotiations of the Treaty on the Prohibition of Nuclear Weapons accounted for two different approaches: "destruction before accession" and "accession before destruction" (Caughley and Mukhatzhanova, 2017, pp.30–3). Verification, as laid in Article 3 and 4 of the eventual treaty, focuses on ensuring the irreversibility of disarmament. It is less explicit about verifying the actual disarmament process.

in disarmament. This becomes evident when looking at an overview of commitments by state (see Table 4).

Table 4 - Verification Commitments by State (Possession of Nuclear Weapons)

	International	Regional	Bilateral
Belarus	IAEA*	-	-
China	-	-	-
France	-	-	-
India	-	-	-
Israel	-	-	-
Kazakhstan	IAEA*	-	-
North Korea	(IAEA)	-	-
Pakistan	-	-	-
Russia	(Plutonium Management and Disposition Agreement)	-	START I, New START, National Technical Means: SALT I + II, INF
South Africa	IAEA*		-
Ukraine	IAEA*	-	-
United States of America	(Plutonium Management and Disposition Agreement)	-	START I, New START, National Technical Means: SALT I + II, INF
United Kingdom	-	-	-

In bold: States that reportedly still possess nuclear weapons.
In parantheses: Not implemented
* IAEA verification to certify compliance as NNWS

The **International Atomic Energy Agency** only has rudimentary roles in disarmament verification.[202] Contrary to the Plutonium Management and Disposition Agreement, in which Russia and the United States undertake to dispose of 34 metric tons of nuclear weapons (or other military) plutonium, neither state has finalized verification measures with the IAEA (VERTIC, 2015, p.41).[203]

More important is the agency's task to certify that a state that previously owned nuclear weapons fulfills the requirements as Non-Nuclear Weapon State. Here, the IAEA played a prominent role in the disarmament verification of **South Africa**. Although the development and dismantlement of nuclear weapons took place on a domestic level, the IAEA verified the correctness and completeness of the South African inventory and could find no indication

[202] On the IAEA and its disarmament role see e.g. Drobysz and Persbo (2016).
[203] Russia suspended the agreement in 2016 but is reportedly ready to resume to the agreement once the relations between the two countries "normalize" (TASS, 2018).

that would question the successful disarmament (von Baeckmann, Dillon, and Perricos, 1995).

It is important to note that the dismantlement of the nuclear weapons program preceded IAEA verification, rather than accompanying it. This lowers the output effectiveness of South Africa's verification commitment in disarmament. The chronology of events affects the accuracy of verification, as pointed out by Busch and Pilat:

> "Because South Africa dismantled its nuclear weapons and nuclear weapons infrastructure prior to the verification by the IAEA, it is not possible to know for certain if all materials and equipment were destroyed. However, the IAEA's inspections and analyses have been able to reduce the uncertainty significantly" (Busch and Pilat, 2017, p.241).

Arguably, the state did more than it was legally required. Since the NPT focuses on a state's commitments upon joining the treaty, South Africa was not legally required to give the IAEA insight into its past nuclear weapons activities – but did so, nonetheless (Purkitt and Burgess, 2005, p.127).

Today, the state has a Comprehensive Safeguards Agreement and the Additional Protocol in force. For 2018, the IAEA concluded that "all of nuclear material remained in peaceful activities" (IAEA, 2019c). In this sense, IAEA verification is crucial to certify South Africa's nuclear reversal and to attest the continuing compliance of the state.

As Table 4 shows, disarmament verification is almost exclusively based on bilateral agreements between the two nuclear superpowers, Russia/Soviet Union and the Unites States of America. The specific provisions differ significantly.[204] **START I** included a fairly extensive combination of verification means, including National Technical Means (NTM)[205], exchanges of data sets, and On-Site Inspections (James Martin Center for Nonproliferation Studies, 2011c). Edward Ifft summarizes the output and outcome effectiveness of START I as follows:

> "Through the 2009 expiration of the treaty, the United States conducted 659 START inspections and Russia 481. […] The treaty provided for special access visits […], but this was never used, since suspicions of undeclared illegal facilities never arose. A massive data exchange of over 100 pages was updated every six months with data on the numbers locations, and technical characteristics of specified systems. Between these updates, an extensive system of notifications, using the Nuclear Risk Reduction Centers of the sides, maintained an up-to-date database of the numbers and locations of all relevant systems" (Ifft, 2010, p.8).

[204] I will focus on verification commitments relevant after the end of the Cold War.
[205] These include uses of satellites, radar, and electronic surveillance (Woolf, 2011, p.4).

Despite using a mix of verification tools in START I, their implementation demonstrated shortcomings in accuracy. As noted by Mark Donaldson (2010), there was occasionally a mismatch of information: "[…] the last data exchange under START I in July 2009 reported United States as deploying over 5,900 warheads, when Pentagon said that the number was under the 2,200 limit of the Moscow Treaty." The very approaches used to determine compliance showed weaknesses. For instance, rather than counting warheads, START I took delivery systems and their maximum capacity into account (Donaldson, 2010). Conclusions regarding the warheads were, therefore, only projections.

Belarus, Kazakhstan, and Ukraine, which inherited nuclear weapons and related facilities, were also subject to START I. The translocation of nuclear weapons as well as related material and facilities was not verified on an international level. All three states joined the IAEA as Non-Nuclear Weapon States and comply with their verification commitments. Ukraine, and Kazakhstan have a Comprehensive Safeguards Agreement and Additional Protocol in force. Belarus does not have an Additional Protocol in force, but complies with its Comprehensive Safeguards Agreement (IAEA, 2019c).

The **Moscow Treaty (SORT)** went "against the widely held view that reductions should be 'irreversible' and 'effectively verifiable'" (Ifft, 2010, p.9). Other than START I, SORT did not include inspection rights. The only platform for checking the implementation of the treaty was a Bilateral Implementation Commission (Article III). This decision suggests a low output effectiveness regarding verification.

By political decision-makers, SORT was described more as a supplement than a stand-alone treaty. During the signing procedure, Russian President Vladimir Putin noted

> "[…] I'd like to point out that we're very much satisfied with the U.S. administration approach to [verification]. Our American partners have agreed that we need to retain START I, which is provided for by the system of verification. We agreed we will continue this work on the basis of the documents signed today, as well" (in: White House, 2002).

In this sense, the lack of formal verification in SORT was justified with the coexistence of verification in START I. Yet, in the wake of the 2005 Bilateral Implementation Commission meetings, Russia reportedly proposed a verification mechanism, which was not met with US approval (Yesin, 2008, pp.134–5). SORT was eventually superseded by New START, which included more institutionalized verification.

New START builds upon START I in terms of verification. In addition to exchanges of data and notifications, the treaty allows for National Technical Means of verification and inspection activities (Articles VI, X, XI). In comparison with START I, the new provisions

streamline inspections. As noted by Mark Donaldson, they include less types of inspection while providing more information.[206] A new tagging system and the ability to count warheads enhances accuracy (Donaldson, 2010).

The Treaty also encourages each party to undertake ad-hoc transparency measures to clarify "ambiguous situations" (Article VIII). This provision is taking up the spirit of the SORT, which was more informal in verification than START I. New START can, thus, be seen as an evolutionary strengthening of output effectiveness in bilateral verification.

The implementation (i.e. the outcome effectiveness) of the New START verification provisions is considered to be an important pillar of overall compliance with the agreement (e.g. Kristensen, 2018). The seven years between the treaty entering into force and its entering into effect have shown that the comprehensive verification tools have been applied as envisaged. Overall, the transparency measures between Russia and the United States included more than 14,600 notifications, 14 data exchanges, 252 on-site inspections, 14 exhibitions, and 14 meetings of the Treaty's Bilateral Consultative (US Department of State, 2018).

Impact (*Possession* of Nuclear Weapons)

Verification can have two effects on compliance. On the one hand, the tools can offer transparency on state behavior and, on the other hand, they may deter non-compliance. How does verification on the *possession* of nuclear weapons relate to the larger regime compliance?

Apart from intelligence analyses, **transparency** on nuclear weapon stocks and their stationing depend on verification commitments. Since only few disarmament agreements exist, it is not surprising to find even fewer verification concessions. Hence, particularly compared with the *acquisition* of nuclear weapons, the regime offers little tools for transparency of state behavior.

One might argue that formal verification tools are not necessary to get an understanding of state behavior. Even worse, transparency on nuclear weapon capabilities may bear a proliferation risk, if inspectors forward observations to states pursuing nuclear weapons. In this case, the regime could have a negative impact.

[206] Furthermore, while New Start provides for 18 on-site inspections per year, in contrast to 28 inspections under START, only 35 Russian facilities come into question (in contrast to 70 facilities under START).

Questioning the relevance of verification in disarmament is legitimate. A number of NGO publications draw conclusions on existing nuclear weapon capabilities, irrespective of whether a state is part of a verification mechanism. There is reason to believe that these estimations have some value. For instance, following an announcement by former US Secretary of State, John Kerry, it was noted that both the number of active US warheads and of those to be dismantled were close to estimates in the FAS Nuclear Notebook (Kristensen, 2015).

Yet, this finding shall not ignore the fact that the availability of data varies when looking at different states. The US American nuclear capacities are better explored than others. For instance, the estimations of the Nuclear Notebook are based, among other sources, on the State Department's published data on START I and New START.[207] In other words, even "autonomous" sources use verification related data to enhance accuracy.

Verification commitments, even though scarce, offer more tools for transparency. The added value of verification mechanisms becomes apparent when looking at bilateral agreements between the US and Russia. In comparison with START I, New START provides for more accurate tools to count the number of nuclear warheads and, thus, draw conclusions on compliance with the respective agreement. More than that, verification enhances predictability:

> "Like SALT I and most arms-control deals since, New START contained detailed verification and monitoring arrangements. These not only ensured that the two parties were doing what they had said. They also provided insights into how they ran their nuclear forces which improved confidence on both sides" (Economist, 2018).

Another possible impact relates to verification as a **deterrent**. According to this line of thinking, we would expect a larger rule and norm compliance in states that are subject to verification. Yet, looking at shifts in nuclear weapon capabilities, there appears to be no immediate influence on norm compliance.

The fact that agreements between the Soviet Union/Russia and the United States of America have different verification provisions does not appear to have changed compliance for the worse. Both states have adhered to START I, SORT, and New START, irrespective of the scope of verification.

[207] See footnote 1 in: Kristensen and Norris (2017, p.295).

China, France, India, Israel, North Korea, Pakistan, and the United Kingdom have refrained from structured disarmament verification.[208] Their compliance with the regime differs significantly. China, India, Israel, North Korea, and Pakistan have, to a greater or lesser degree, increased their stockpiles (Appendix 3). In terms of deterrence, their nuclear programs are neither contained by commitment nor by verification.

France and the United Kingdom have unilaterally decreased their nuclear weapon stocks in the last 20 years (Appendix 3). The cases show that refraining from making verification commitments[209] does not mean non-compliance with the regime. Again, this would suggest that the effect of verification on compliance is limited.

3.2.3. Use

States' commitments in the *use* of nuclear weapons can take different forms. They may refer to *negative security assurances*, *nuclear weapon tests*, *peaceful nuclear explosions*, or the *application* of nuclear weapons. As the previous chapter has shown, states with nuclear weapons have only made limited commitments. Nuclear Weapon States have given non-binding and, except for China, conditional negative security assurances. The Soviet Union/Russia and the United States have signed bilateral agreements on peaceful nuclear explosions and the application of nuclear weapons. On an international level, most progress has been made regarding nuclear weapon tests.

Given the low level of commitments in the first place, the regime offers even fewer avenues for verifying the *possession* of nuclear weapons. There are only two notable platforms for verification – the Comprehensive Test Ban Treaty and the bilateral agreements between the two nuclear superpowers.[210] Commitments in the field of negative security assurances are not subject to verification and are unlikely to be in the future. This is due to a lack of feasibility and usefulness of verifying state behavior. While the actual use of nuclear weapons in a conflict is an easy thing to spot, nuclear threats are not.

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[208] On individual instances of disarmament, verification has been included. For instance, France used IAEA verification for the dismantlement of its nuclear test site. North Korea provisionally accepted verification in the context of the Six-Party-Talks.

[209] The United Kingdom also takes a leading role in research connected with disarmament verification (United Kingdom-Norway Initiative).

[210] In addition to IAEA verification, Nuclear-Weapon-Free Zones also provide for reporting schemes for non-compliance of state parties (see Appendix 4). Of course, nuclear weapon tests would fall into this category. However, in terms of verifying nuclear weapon tests, NWFZs do not offer significant added value in comparison with the Comprehensive Test Ban Treaty.

Comprehensive Test Ban Treaty

Output

International verification on a possible detonation of a nuclear device rests on the **Comprehensive Test Ban Treaty** (Article IV) and associated decisions. Despite the name, verification of the CTBT not only focuses on tests, but "any nuclear explosion," as outlined in the subject matter of the agreement (Art. I., Paragraph 1, CTBT). Since the nature and scope of a nuclear explosion cannot be determined right away, the treaty provides for different stages of verification:

- International Monitoring System
- Consultation and clarification
- On-site inspections
- Confidence-building measures

(Article IV, Paragraph 1, CTBT)

The combination of these verification elements is promising in spotting possible nuclear explosions in a state.[211] One advantage is the variety of modern instruments that allows for transparency. A paramount feature that has largely been installed is the International Monitoring System (IMS). The IMS contains sophisticated, state-of-the-art monitoring to detect a suspicious event, including:

- seismological monitoring
- radionuclide monitoring including certified laboratories
- hydroacoustic monitoring
- infrastructure monitoring
- means of communication
- an international data center

(Article IV, Paragraph 16, CTBT)

In addition to technical sophistication, the verification is unbiased towards members in providing information (Article IV, Paragraph 4, CTBT). The IMS mechanism works broadly as follows: The monitoring stations and laboratories across the globe detect the location, time, and magnitude of nuclear tests. The data is subsequently submitted using satellite

[211] To what extent the system is able to detect minor tests remains subject to discussion, see e.g. Hansen (2006).

systems to the international data center in Vienna and data bulletins including data and analysis are forwarded to member states.[212]

Also, when it comes to a possible case of non-compliance, the IMS system is meant to be objective and non-discriminatory. While the International Atomic Energy Agency's approach is to judge on the correctness and completeness of state's reports, spotting a suspicious activity under the Comprehensive Test Ban Treaty is more independent from a state in question. A state does not even have to be a member of the CTBT to set off its verification. This is illustrated best in data published in the context of North Korea's nuclear weapon tests, which the CTBTO Preparatory Commission (PrepCom) has made available on its website.[213]

The IMS system is also independent from the ratification status of the Comprehensive Test Ban Treaty. In other words, the CTBT does not need to be in force for the mechanisms to work. As a result, the verification system can already now spot suspicious events. In this regard, the output effectiveness of CTBT verification is actually higher than that of CTBT commitment.

Despite these advantages of the IMS system, other elements of CTBT verification are currently ineffective. Since the elements of "consultation and clarification" as well as "on-site inspections" depend on the treaty entering into force (CTBTO, 2012f), they are not yet in place. If an explosion were to take place in a CTBT signatory state, the nature of such could not be determined, because the tools that require physical presence in the area of concern are not available. Consequently, the verification system is able to detect a suspicious event and narrow down its location. Yet, the system is unable to fully judge on the nature of the event, which decreases output effectiveness.

Outcome

The success of the verification of the Comprehensive Test Ban Treaty depends on the political, financial, and logistical support of its member states (e.g. CTBTO, 2012h). Article IV, Paragraph 3, of the treaty lays out the verification commitments. By and large, member states shall cooperate in the clarification of outstanding issues (e.g. in consultation and on-site inspections)[214] and establish the infrastructure and communication means for the

[212] On the verification and communication procedures see CTBTO (2014b).
[213] See overview on nuclear weapon tests (CTBTO, 2016a).
[214] As this aspect depends on treaty ratification, it will not be discussed in this subsection.

monitoring system. In addition to that, states support verification through their budget contributions. How have states complied with the verification requirements?

States' contribution in implementing CTBT verification has been largely satisfactory. The CTBTO PrepCom has been tasked to lay the groundwork for verification to facilitate the entry into effect of the treaty. The PrepCom not only commends a quick implementation phase, but also states' cooperation:

> "It is interesting to note that, even though the Treaty negotiations themselves were long, complex and hard fought, the period between the Treaty's opening for signature, the establishment of the Commission, and the commencement of [Provisional Technical Secretariat] operations comprised a bare six months. This swift pace showed the urgency with which States Signatories were getting on with the establishment of an efficient and effective CTBTO" (CTBTO, 2016b).

The International Monitoring System currently consists of 337 stations, of which 296 are already certified, 10 installed, 6 under construction, and 25 planned (CTBTO, 2018b). Parts of the network of international monitoring stations could be integrated smoothly, since some national detection facilities had been in place before the CTBT opened for signature.[215] The functioning of the network has also been enhanced by technological developments: "Since 1996, the analysis procedures and technologies have improved so much that the IMS is already now capable to fulfill the verification requirements of the Treaty" (Bönnemann, 2017, p.24).

Some monitoring stations have not been implemented, also for political reasons.[216] This observation shall not diminish the positive trend of verification implementation. For instance, the United States and China have not ratified the CTBT, but still contribute to the budget and provide data for IMS analysis (CTBTO, 2018b). They comply, without fully committing to the treaty.

Another indicator that outcome effectiveness is higher than output effectiveness relates to the capacity building for on-site inspections. While such inspections can only be used once the treaty comes into force, the CTBTO PrepCom has made great progress in facilitating their implementation. Two major "Integrated Field Exercises" took place in 2008 and 2014. The inspection tools have been enhanced and are now mostly tested. This underscores the accuracy of on-site inspections. If implemented, "[t]here is a high

[215] The United States, for instance, began in the late 1940s (Hansen, 2006, p.57).
[216] Other hurdles included environmental, technical challenges, logistical and administrative challenges (CTBTO, 2012h).

probability of detecting evidence of a nuclear explosion during a CTBTO on-site inspection" (Gestermann, Müller, and Groneschild, 2017, p.259).

A further positive sign for outcome effectiveness is budget compliance. Although the treaty is not in force, the PrepCom needs to be financed. The budget for verification of the CTBT consists of assessed and voluntary contributions from member states (similar to the UN), following the "ability to pay," based on national income (CTBTO, 2012c).[217] Budget compliance is high. In 2018, the collection rate was above 90% (CTBTO, 2018a).

Room for improvement is to be found in the establishment of a domestic communication system. Signatory states of the Comprehensive Test Ban Treaty are called upon to install National Data Centers, which are voluntary but highly recommended by the PrepCom to facilitate the communication with the International Data Centre and the evaluation of data. 100 States have installed such a center (CTBTO, 2012d). The remaining states have limited access to information, in case of the detection of a suspicious event.

Bilateral Agreements between the United States and the Soviet Union/Russia

Output and Outcome

The United States of America and the Soviet Union/Russia have made various commitments on a bilateral level that address the *use* of nuclear weapons. These refer to nuclear weapon tests, peaceful nuclear explosions, and the application of nuclear weapons and are embedded in a network of agreements:

- Strategic Arms Reductions Treaty (START) I
- New Strategic Arms Reductions Treaty
- Threshold Test Ban Treaty (TTBT)
- Peaceful Nuclear Explosions (PNE) Treaty
- Anti-Ballistic Missile (ABM) Treaty
- Intermediate-Range Nuclear Forces (INF) Treaty

All of these treaties provide for means to observe compliance, although the exact tools differ. While verification in START I and New START has already been considered in the subsection on the *possession* of nuclear weapons, it is worth taking a brief look at other

[217] An overview of payments can be found in CTBTO (2017).

agreements. As the following overview demonstrates, the bilateral commitments take up three elements of verification, i.e. National Technical Means, consultations, and inspections:

Table 5 – Verification: US and Russia/Soviet Union (Use of Nuclear Weapons)

	National Technical Means	**Consultation**	**Inspections**
ABM Treaty[218]	Make use of own NTM, do not interfere with other party's NTM (Art. XII)	Standing Consultative Commission (Art. XIII)	No
INF Treaty	Make use of own NTM, do not interfere with other party's NTM (Art. XII)	Special Verification Commission (Art. XIII)	Yes (Article XI + Protocol)[219]
TTBT	Make use of own NTM, do not interfere with other party's NTM (Art. II)	Consultation as necessary (Art. II), Bilateral Consultative Commission (Sect. XI in Protocol)	Yes (Sect. III + VII in Protocol)
PNE Treaty	Make use of own NTM, do not interfere with other party's NTM (Art. IV)	Joint Consultative Commission (Art. V)	Yes (Sect. III + VII in Protocol)

Providing for National Technical Means in all of the agreements shows the importance of and confidence in both states' domestic technical infrastructure to gather information. The treaties entitle the states to make use of their means and demand not to obstruct the respectively other party in their application of NTM. Consultations have different purposes, including sharing information and updating technical details. They are also meant as a platform for clarifying issues of possible non-compliance.

In terms of outcome effectiveness, the latter has become particularly important in the context of the INF Treaty. Russia and the United States have used consultations to bring forward their observations of possible treaty violations by the respectively other party. Instead of resolving the allegations or offering more transparency, divisions appear to have entrenched during consultations. "Proof" of treaty violations as well as assurances of compliances have been refuted on both sides (see e.g. Woolf, 2018). In 2019, the United States and Russia announced their withdrawal from the treaty.

Verification also played a crucial role in the Threshold Test Ban Treaty and its sister treaty, the Peaceful Nuclear Explosions Treaty. Edward Ifft (2009), who was as a member

[218] Although providing for verification, the ABM Treaty plays a subordinate role in its use, compared with other treaties listed here. It will, therefore, not be discussed in further detail.
[219] On-site inspections in the context of the INF Treaty ended in 2001 with the completion of the elimination of the relevant items (Woolf, 2018, p.13).

of the US delegation part of the negotiations in 1974, provides a good account of the evolving development and implementation of verification tools. He emphasizes technical and political challenges in the wake of concluding and implementing verification. Technically, predicting and determining the exact yield of a nuclear explosion was considered difficult (Ifft, 2009).

Politically, the implementation of verification tools necessary to reduce uncertainties evolved over time, as Ifft continues to describe. Many provisions (including the exchange of data, notification of explosions, and on-site inspections) did not take form until Mikhail Gorbachev became General Secretary. After the full verification instruments came to be available in 1990, the Soviet Union could monitor two tests by the United States, until nuclear tests were stopped. The Soviets had already put a moratorium in place before, depriving the US from tests to be monitored (Ifft, 2009).

Impact (*Use* of Nuclear Weapons)

What effect does verification on the *use* of nuclear weapons offer for transparency and norm compliance? Looking at the bilateral agreements between the nuclear superpowers may leave skepticism regarding the usefulness of verification in ensuring compliance. On the one hand, shortcomings in transparency may be accepted without a negative effect on compliance. On the other hand, observations may become a political tool that makes cooperation more difficult.

The Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty demonstrate technical challenges in verification. We cannot say today to what extent the parties may have violated the treaty unintentionally in the past (Ifft, 2009). Despite this uncertainty, both treaties remain in force. The US and Russia have not detonated nuclear devices in more than 25 years, leaving little room for heated debates about the agreements.

In the case of the INF treaty, information may have contributed to tension. The existing verification provisions have turned into platforms for political debate on treaty compliance. Rather than clarifying issues, “evidence” of the respectively other side has been rebuffed as being insufficient or misinterpreted. This shows that even when verification provisions are being implemented, they may fail to ensure treaty compliance. To the contrary, they become tools for political exchanges.

The Comprehensive Test Ban Treaty offers more room for optimism. A large share of its verification tools was meant to be ready before the treaty’s entering into force. This chronology has a major advantage. Although crucial states still have failed to ratify the

CTBT, larger nuclear weapon tests are unlikely to remain undetected. The precision of technology was praised by Hans Blix (in: CTBTO, 2016c), former Director General of the IAEA, who acknowledged that "[t]here is hardly any area in which the verification system is more reliable than in the area of nuclear testing."

Transparency even exceeds nuclear weapon tests. Verification also covers peaceful nuclear explosions (Bönnemann, 2017, p.21) and has possible applications in the field of natural catastrophes, such as tsunamis (Bauer and O'Reilly, 2015, p.146). This suggests a positive regime impact, also because it has triggered interest from states outside of the current CTBT realm. For instance, former CTBTO Executive Secretary Wolfgang Hoffmann recalled after a trip to Pakistan that the state was interested in the civilian use of CTBT verification tools and that officials had not been aware of the broad range of its technical applications "from tsunami to ash cloud warning to the study of climate change and pollution" (CTBTO, 2014a).

The biggest problem of transparency in the context of the Comprehensive Test Ban Treaty rests with the ability to make decisive conclusions regarding suspicious events. Despite the CTBTO Preparatory Commission's ability to circulate data on nuclear weapon tests in North Korea, conclusions did not include on-site inspections. Instead, it evaluated official comments made in North Korean media. Its analysis was, therefore, not fully independent from the state.

In addition to transparency, another crucial factor of verification impact must take into account norm compliance. There appears to be a correlation between verification compliance and norm compliance. North Korea, India, and Pakistan, which have tested nuclear weapons, have no active role in CTBT verification. They do neither contribute to the CTBT budget nor host monitoring stations.[220]

The opposite holds true as well. All states that have ratified the CTBT and/or support its verification system largely comply with the regime norm not to test nuclear weapons. As noted by Bauer and O`Reilly, verification and norms appear to go hand in hand:

> "In that light, even before entry into force, there is not only a globally emerging norm against nuclear testing, but also a verification architecture in place that already surpasses those of many legally binding instruments in international arms control" (Bauer and O'Reilly, 2015, p.138).

[220] In Pakistan, the integration of an infrasound and a seismic facility into the IMS is planned (CTBTO, 2018b).

Accordingly, verification in the context of the Comprehensive Test Ban Treaty can be considered a great success of the non-proliferation regime. This is somewhat ironic considering that the treaty it is supposed to verify has not even entered into force.

3.3. Explaining Effectiveness

3.3.1. Security

The remaining part of this chapter will examine possible driving factors for state behavior that may strengthen or weaken the verification system of the non-proliferation regime. One explanatory factor for cooperation and non-cooperation regarding regime verification are security considerations. Following the hypotheses developed in Chapter 1, a state will commit to and comply with verification, if it satisfies its security needs. Vice-versa, a state may consider its security compromised under verification commitment and compliance. If non-cooperation satisfies its security needs, then a state will refrain from verification.

Cooperation

Since the end of the Cold War, the greatest development in verifying the non-acquisition of nuclear weapons have been the strengthened safeguards of the **IAEA**, including Comprehensive Safeguards Agreements with an Additional Protocol. The predominant argument in academic literature for why states accepted enhanced verification measures relates to the painful experiences from the cases of Iraq and North Korea.

North Korea demonstrated a judicial quagmire. The state failed to fulfill its NPT requirements for a long time, in that negotiations about a CSA did not materialize (Petritz, 2012, p.107). Instead of rejecting safeguards right away, Pyongyang continued a half-hearted pursuance of safeguards, thereby, hampering effective verification of its non-proliferation commitments.

Iraq questioned the very usefulness of existing safeguards.[221] Somewhat coincidently troops taking part in the operation "Desert Storm" found signs for a clandestine program (Petritz, 2012, p.107). The case made short-term verification actions and a long-term solution necessary. On the one hand, the IAEA should better implement the tools it already

[221] The graveness of Iraqi non-compliance is reflected in IAEA debates and documentation (See e.g. IAEA Board of Governors, 1991).

had at hand. On the other hand, further reporting, inspection rights, and other investigative tools became necessary (Findlay, 2007, p.48).

Particularly the experience from Iraq cast a dark shadow on the debate within the IAEA on strengthening measures. During a Board of Governors meeting in 1996, Nelson F. Sievering, then US representative to the IAEA, pointed to a mismatch between overall regime compliance and verification tools. After all, Iraq was able to develop a significant nuclear weapons track without raising a flag at the IAEA. Originally, there was no proof that the state broke verification commitments (IAEA Board of Governors, 1996b, Paragraphs 30–45).

The debates within the Board of Governors showed that some states followed an understanding of reciprocity: "In other words, states comply with international law because they see (or expect) others to comply" (Onderco, 2017, p.398). Representatives from South Korea and Morocco explicitly noted that they were willing to accept a greater burden for the sake of a strengthened international security (IAEA Board of Governors, 1996b, Paragraph 104; 1996c, Paragraph 74). This argumentation would explain why the vast majority of states was willing to commit, without ever having caused suspicion themselves. According to IAEA Director General Hans Blix, in addition to facilitating peaceful nuclear activities, transparency provisions were aimed at strengthening the confidence among states (IAEA Board of Governors, 1996a).

The debates also reflect an awareness of a window of opportunity, especially triggered by the Iraqi non-compliance.[222] During the talks at the Board of Governors on strengthening safeguards, the IAEA Director General commended the continuous momentum of talks and argued that it shall not be lost. To facilitate the conclusion of the talks, he advertised a committee to formulate verification provisions (IAEA Board of Governors, 1996a). This suggests that the timing itself was used as an instrument and gave momentum for strengthening the regime. A historical institutionalist would call it a critical juncture.

Security considerations are also an explanation for the apparent paradox surrounding the **Comprehensive Test Ban Treaty**, where some states support verification although failing to ratify the treaty. In fact, verification may be considered a premise for overall regime commitment. Following Gideon Frank, Director General of the Israel Atomic Energy Commission, Israeli decision-making in the CTBT context depends on "the level of

[222] A similar reference to a window of opportunity is also made by Trevor Findlay (2007, p.48).

development and readiness of the verification regime achieved by the Prep-Com, its effectiveness and immunity to abuse" (Frank, 1999).

Similarly, as argued by the Permanent Representation of China in Vienna, Chinese cooperation in the field of verification is seen as a way to facilitate an entry into force of the treaty (FMPRC, 2004). The verification system, in turn, also depends on states like China that have not ratified the treaty in order to function. During a 2018 opening ceremony of 4 IMS stations in China, Lassina Zerbo, Executive Secretary of the CTBTO PrepCom, stated:

> "The international monitoring system and comprehensive test responsibilities [are] relying on the experts in China, with their skills and technical capabilities to build us a verification regime to support a world free from nuclear test" (Zerbo in: Ge, 2018).

Global support is a precondition for reliable test ban verification. Reliable verification, in turn, can be seen to condition commitment to and compliance with the treaty. Unfortunately, this chronology may lead to a vicious circle, as the full capacity of verification depends on the treaty entering into force. CTBT verification has significantly advanced in the last two decades. Nonetheless, key states have failed to ratify the treaty which is why the argument of verification conditioning commitment shall not be overestimated.

Verification may still serve as a platform for a larger regime commitment, rather than the other way around. Verification was a driving force in furthering the relationship between **Brazil and Argentina**. Both states embedded nuclear verification in the ABACC. According to Argentinian nuclear expert Sonia Fernández-Moreno, who was part of the bilateral verification negotiations, the "ABACC is more than a safeguards agreement: it's a non-proliferation agreement between Argentina and Brazil" (in: Kutchesfahani, 2014, p.24). Following this understanding, the agreement offered security related gains that exceeded the immediate advantages of verification.

Transparency and confidence have also been pivotal in the nuclear relationship between the **United States and the Soviet Union/Russia**. Both states maintain a technical infrastructure that is more sophisticated than that of other states. As noted by Keith Hansen (2006, p.35), the inclusion of National Technical Means has helped bringing forward bilateral nuclear talks during the Cold War.

While the confidence in their own tools was a good point to get started on a verification infrastructure, looking at more recent bilateral disarmament, the importance of accuracy of verification has increased. This is particularly to be seen in **New START**. The element of

foresight as a security gain was emphasized by former US Secretary of State John Kerry, who praised the treaty as follows:

> "[New START] gives us the confidence and level of oversight we need – and could not otherwise have – by allowing U.S. inspectors unprecedented access to Russian nuclear facilities. […] New START furthers our goals to promote trust, transparency, predictability, and stability" (Kerry, 2016).

The direct link between transparency and security was also pointed out by former Russian President Dmitry Medvedev. During the New START signing ceremony in Prague, he noted that the mechanism "ensures the proper verification, irreversibility and transparency of the entire process of reducing strategic offensive arms" (in: White House, 2010). In this sense, verification is an important pillar of a larger security arrangement, rather than a complement.

Non-Cooperation

There are also cases to be found where security considerations appear to have hampered verification commitment. Overall, there seem to be three arguments for why states are reluctant to cooperate:

1. Verification fails to enhance transparency and security
2. Verification means are intrusive
3. Verification would contradict the larger nuclear strategy

The first security obstacle is a potential doubt of the **usefulness of enhanced verification measures**. This was noticeable in the reform of IAEA safeguards. The original Comprehensive Safeguards Agreements (on the basis of INFCIRC/153) were a compromise of what was possible and needed, but Iraq demonstrated that the absence of proof was no proof of absence.[223] Even though today the IAEA declares for states that implement a CSA and an Additional Protocol that all nuclear material was used peacefully, the agency cannot possibly verify the non-diversion from bulk-handling facilities (Findlay, 2007, p.50).

The debate on strengthening the IAEA verification tools was marked by questioning its security value, in that it leaves larger issues at stake unaddressed. The Indian representative said that enhanced verification measures fail to create a universal nuclear order, the only thing that would help to solve the "nuclear dilemma." In the same discussion, the Israeli representative emphasized the importance of the political context of an agreement. Although

[223] See also Rich Hooper (1999, p.10).

Israel supported stronger verification measures in principle, there was no verification tool that could secure a state's compliance (IAEA Board of Governors, 1996c, Paragraphs 52, 96–7).

Within the realm of the Comprehensive Test Ban Treaty, verification was even one of the arguments put forward to resist treaty ratification in the US Senate. More specifically, opponents argued "that the Treaty is unverifiable because it is not possible to monitor nuclear testing activity down to the zero-yield advocated by the Clinton Administration" (Hansen, 2006, p.51). Despite expert assessments that the CTBT was by and large verifiable, several decision-makers remained skeptical.[224] Until today, the US Senate has failed to ratify the treaty.

In contrast to his predecessor, US President George W. Bush avoided verification to which the United States could be subject. On the one hand, his administration pushed for weak verification instruments in SORT. This decision is in line with a decreasing perception of a security threat following the end of the Cold War. US Secretary Donald Rumsfeld argued during a Senate Hearing that SORT merely puts into writing unilateral announcements to reduce stocks and that the US would no longer define its military infrastructure as a response to the other nuclear superpower (Woolf, 2011, p.8). According to this line of thinking, verification would only be relevant in the context of a strong security incentive.

On the other hand, the Bush administration offered a proposal for a Fissile Material (Cutoff) Treaty that excluded specific verification provisions altogether, arguing that the treaty was effectively not verifiable and that, by establishing verification mechanisms, "the appearance of effective verification could provide a false sense of security" (Ford, 2007). The verification of compliance has been an important point of contention in the context of a Fissile Material (Cutoff) Treaty. The suggestions put forward reach from a comprehensive approach to a focused approach, to no verification at all (BASIC, 2013, pp.10–2).

A further security concern of states is the **intrusiveness** of verification measures. As noted by former IAEA Director General Hans Blix, states traditionally tend to oppose intrusive inspections (in: Council on Foreign Relations, 2014). In the committee to develop stronger verification measures for the IAEA in the wake of the Iraq discoveries, the "confidentiality of information obtained by the Agency" turned out to be one of the most discussed topics (IAEA General Conference, 1996). Likewise, individual comments by state

[224] For a summary of Senate discussions surrounding CTBT verification see e.g. Hansen (2006, pp.50–3).

representatives in the Board of Governors urged for a sensible balance of verification tools.[225]

The negotiation and implementation of the Comprehensive Test Ban Treaty verification was marked by similar fears. Keith Hansen, member of the US negotiation team, describes that several states were concerned about the intrusiveness of on-site inspections. This led to difficulties in hammering out the details for the mechanism (Hansen, 2006, pp.30–6). Despite "bumps in the road" during the negotiations of the IAEA reforms and the CTBT, it needs to be pointed out that both verification platforms eventually received great support.

Finally, verification may contradict the very **nuclear policy of a state**. Just as security considerations may motivate a nuclear weapons program (e.g. Onderco, 2017, p.394), revealing details of said program may be harming. It is not surprising that states with nuclear weapons are very careful about agreeing to and complying with comprehensive verification. Libya, North Korea, and Iraq – which will be discussed in greater detail in the next chapter – all made their verification commitment dependent on the nature of their program.

Furthermore, the very use of nuclear ambiguity may be a tool for deterrence (Hymans, 2006, pp.456–8). This is particularly true for Israel's strategy of *nuclear opacity*. Although sharing the idea of deterrence with Nuclear Weapon States, the ladder in establishing a nuclear weapons program is quite different in Israel's case (Cochran, 1996, pp.322–3). Any action that may confirm an actual nuclear weapon status, such as a public nuclear weapon test, would contradict the strategy.

Accordingly, the state has refuted intrusive verification of its own program (Datan, 2010, p.39). This is unlikely to change in the near future. First, nuclear opacity is considered by many as "one of the Jewish state's greatest strategic and diplomatic success stories" (Cohen and Miller, 2010, p.31). Transparency would threaten that success. Second, the larger security context would have to improve (e.g. recognition of Israel by other states, establishment of a WMDFZ). Third, openness may significantly put a security risk to the state, since Arab states threatened that they would leave the Non-Proliferation Treaty, if Israel were to announce its program (Cohen and Miller, 2010, p.31).

[225] For instance, concerns about intrusiveness and calls for an efficient approach were mentioned on the Board of Governors by South Korea, India, and Germany (IAEA Board of Governors, 1996b, Paragraphs 106–8; 1997a, Paragraphs 55, 82).

3.3.2. Norms

States may also be influenced by normative considerations in their nuclear policy. Chapter 2 has shown that there are particularly two normative aspects that influence regime commitment and compliance. One refers to the firm belief that nuclear weapons are a threat to humanity. The other consideration relates to the premise of fairness. Both aspects may also play into states' decision-making in verification. Taking a normative stance, we can expect a state to commit and comply with regime verification if cooperation is fair and satisfies international law. If, however, non-cooperation represents fairness and international law, then the state will refrain from committing to and complying with regime verification.

Cooperation

Humanitarian considerations have played an important role in shaping the commitment system of the non-proliferation regime (see previous chapter). Looking at verification, humanitarian concerns appear to be subordinate, particularly in comparison with the demand for fairness. Nonetheless, verification debates make occasional references to humanitarian aspects.

One of the platforms used to put forth humanitarian concerns were the IAEA Board of Governors debates in the 1990s devoted to strengthening the agency's means of verification. Here, Kuwait noted that stronger tools for the IAEA were a contribution to the global effort of the elimination of weapons of mass destruction. Iran, Malaysia, and Mexico used their remarks on the proposal to point to the goal of a world free of nuclear weapons and the overall necessity to disarm that goes along with it (IAEA Board of Governors, 1997a, Paragraph 68; 1997b, Paragraphs 1–2, 10, 13, 56).

Despite a humanitarian reference, none of these states explicitly connected their own verification commitment with the global norm. To the contrary, Malaysia still has no Additional Protocol in force and Iran is only provisionally implementing the protocol as part of the Joint Comprehensive Plan of Action. This suggests that the humanitarian reference was not meant for themselves but rather for other states, including those that possess nuclear weapons.

Verification compliance is frequently described as an extension of a general commitment to the non-proliferation regime. This is to be seen in the context of the Comprehensive Test Ban Treaty. For instance, Wolfgang Hoffmann (2000), Executive Secretary of the CTBTO PrepCom at the time, argued in 2000 in the UN General Assembly

that the high budget collection rate demonstrated a willingness to support the overall purpose of the treaty. There appears to be a notion of obligation also among states that have not ratified the CTBT.

Similarly, the domestic implementation of the verification infrastructure is connected with an overall commitment. Hoffmann's successor Lassina Zerbo commended the commissioning of four monitoring stations in China, describing the responsibility of an individual state as part of a global goal:

> "The CTBT provides China with an opportunity to demonstrate its leadership, dedication and independence on an issue on which nearly the entire international community is united. […] China has also set a positive example for other Member States by robustly increasing its engagement on technical issues related to the Treaty's verification regime" (CTBTO, 2018c).

The idea of keeping up with a commitment was echoed in China. Ambassador Shi Zhongjun of the Chinese Permanent Mission to the United Nations in Vienna proclaimed that "China was one of the first countries to sign the Comprehensive Nuclear-Test-Ban Treaty. The certification of these four stations fully exhibits China's responsible attitude in realizing its commitment" (in: Ge, 2018).

A greater normative driving factor for cooperation than humanitarian considerations seems to be the aspect of **fairness**. Although the primary aim of the enhanced verification tools for the IAEA were to better prevent a horizontal proliferation of nuclear weapons, also Nuclear Weapon States made voluntary commitments to implement at least parts of the protocol.

While other NWS selectively agreed to apply verification measures, the United States announced that it would implement all provisions of the Additional Protocol, as long as they would not affect national security concerns. The US repeatedly mentioned on the IAEA Board of Governors that it followed an understanding of fairness. The state referred to a 1967 announcement by President Johnson that it would not demand from other states to implement safeguards that it would deem unacceptable for itself (IAEA Board of Governors, 1997a, Paragraph 47).

A similar notion was reflected in a statement by US President Bill Clinton who emphasized that "[…] the United States stands ready to accept the new safeguards as fully as possible in our country consistent with our obligations under the NPT" (IAEA Board of Governors, 1997b, Paragraph 30). In this light, fairness played into the decision of the United States to accept verification commitments.

The commitment was also a concession to states with Comprehensive Safeguards Agreements to ease their acceptance of the Additional Protocol. Following Hans Blix, states like Germany and Belgium were skeptical "having inspectors milling around, especially as the nuclear weapons states did not have to do it" (in: Council on Foreign Relations, 2014). As described by Werner Petritz (2012, pp.111–2), reluctance on behalf of some Western Non-Nuclear Weapon States could only be eased after the United States declared that it would also put some of its civilian nuclear facilities under the Additional Protocol.

As the Board of Governors (1997a; 1997b) records show, the United States' decision was applauded by several NNWS. The importance devoted to its voluntary verification commitment cannot be explained with significant security gains or a status change, as the United States remains a Nuclear Weapon State with an active nuclear weapons program. Neither can economic considerations explain the commitment, because further verification also enhances the costs of the whole mechanism. The decision can primarily be seen as a signal to share the burden of verification.

Fairness has also played a role in shaping the very capacity for verification. This is a particular challenge considering that states have different means to collect and analyze data. Ideally, verification in an international agreement compensates for these dissimilarities to allow for a non-discriminatory and reliable system for its members. A fair provision of data is also crucial to provide for regime enforcement.

Accordingly, in the negotiations of the Comprehensive Test Ban Treaty, states like China, India, and Pakistan feared "that the superpowers would use their superior national monitoring capabilities (read intelligence) to the disadvantage of less capable countries" (Hansen, 2011, p.16). The eventual verification tools of the CTBT are aimed at providing benefits to all participating states. While the communication system itself requires support from the member states, they have an equal right to access monitoring data and bulletins from the organization (CTBTO, 2012d).

Non-Cooperation

Verification in the non-proliferation regime may appear to resemble a puzzle. Why are states that are not seeking nuclear weapons and "have nothing to hide" reluctant to implement mechanisms like the Additional Protocol?[226] While a number of reasons have

[226] The question relates to a larger puzzle: "Why do states that are members of the NPT refrain from undertaking further commitments that would strengthen the regime?" (See e.g. Grotto, 2010; Enia, 2014).

been put forward for this observation,[227] the premise of fairness appears to have significantly contributed to states' reservations against verification commitments. Fairness offers two shades of restraints: one referring to measures as being "unjust" and another one perceiving them as "one-sided."

Although not leading to an outright rejection of verification measures, the fear of being treated **unjustly** has contributed to shaping the verification of Comprehensive Test Ban Treaty. As noted by Hansen (2006, p.31), some states initially argued that Nuclear Weapon States should finance verification. Put differently, why should states that have no intention of testing and have no record of doing so in the past be subject to the costs?

Furthermore, instead of offering insight on a state's regime compliance the tool of transparency could be exploited by other states. A major concern during the CTBT negotiations was that on-site inspections could give opportunity to ill-minded states for intelligence gathering (Hansen, 2006, pp.30–6).[228] In order to allow for a more objective assessment of compliance, "[n]o national of the requesting State Party or the inspected State Party shall be a member of the inspection team" (CTBT, Part II, A.9).

A similar line of thinking is to be found in the rejection of the International Atomic Energy Agency as a potential CTBT verification body. States that have only limited agreements with the IAEA, notably Israel, India, and Pakistan, were worried that data within the same institution could easily be transferred and be used for other verification purposes (Hansen, 2006, p.30). Although making the CTBT more attractive for these states by leaving the IAEA aside, none of them has ratified the treaty.

Fairness may also mean that measures are **one-sided**, a criticism which is often connected with the demand for a universality of verification measures. Regarding the Additional Protocol, universality may refer to different things. Traditionally, it relates to the goal that all Non-Nuclear Weapon States implement a Comprehensive Safeguards Agreement with an Additional Protocol.[229] In addition to that, mostly for NNWS, the notion of universality applies to all states, including those with nuclear weapons. Here, verification

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[227] A summary of arguments broadly related to power, interests, and norms can be found in Enia (2014).
[228] Such a concern is not far-fetched, considering that, as noted by Hans Blix, there is reason to believe that US participation in the UNSCOM inspections was used or at least perceived to be used for intelligence gathering (e.g. to make out possible targets) (in: Hansen, 2006, p.18).
[229] See e.g. Action 29 of the Action Plan concluded in the 2010 NPT Review Conference, which promotes the implementation of Comprehensive Safeguards Agreements and the Additional Protocol in NPT state parties. Although this also includes Nuclear Weapon States, the action is listed in the subsection on "nuclear non-proliferation" (NPT Review Conference, 2010).

commitments are part of the original bargain of non-proliferation in exchange for nuclear disarmament (see e.g. Grotto, 2010, pp.1–2; Tannenwald, 2013, pp.304–5).

A prominent example of the latter position is the Islamic Republic of Iran, which over the last years has been under suspicion of seeking nuclear weapons, while declaring the contrary. During the 2010 NPT Review Conference, President Ahmadinejad criticized Nuclear Weapon States by declaring: "The IAEA has been putting the most possible pressures on non-nuclear weapon states under the pretext of proliferation risks, whilst those having nuclear bombs continue to enjoy full immunity and exclusive rights" (Ahmadinejad, 2010). During the last NPT Review Conference, Iran – this time on behalf of the NAM[230] – again criticized that NWS were not doing enough to keep their end of the bargain (Zarif, 2015).

Already during the IAEA Board of Governors talks on strengthening the verification tools, some states criticized the limited involvement of Nuclear Weapon States in the verification process. Except for the United States, NWS were called upon to implement further measures from the Additional Protocol. A very critical voice was offered by Spain, which appeared staggered about the selectiveness of verification measures (IAEA Board of Governors, 1997b, Paragraph 55). Yet, Non-Nuclear Weapon States rarely depended their cooperation on NWS cooperation. A notable exception is Switzerland, which announced on the Board of Governors that its parliament would await the Nuclear Weapon States' implementation of verification before deciding on the Additional Protocol (IAEA Board of Governors, 1997a, Paragraph 110).

In addition to the Nuclear Weapon States, states outside of the Non-Proliferation Treaty became a target for NNWS. Here, the sentiment of unfairness also materialized as an extension of a regional conflict. As result of this, Egypt has rejected to implement the Additional Protocol, since Israel is not party to the Non-Proliferation Treaty (Schulte, 2010, p.89).

3.3.3. Economics

Economic benefits from nuclear energy have been part of the non-proliferation regime since its very foundation. In order to achieve them, states may be willing to accept verification. At the same time, the implementation of safeguards and the maintenance of

[230] In general, the Non-Aligned Movement is a strong supporter of nuclear disarmament. See also Grotto (2010, pp.14–21) and Petritz (2012, p.137).

verification bodies demand a financial and logistical effort, the anticipation of which may cause reluctance to comply.

Hence, it is worth considering whether economic considerations have affected states' cooperation in the verification system. We can expect a state to commit to and comply with regime verification if cooperation enhances economic benefits. If, however, non-cooperation enhances economic benefits, then the state will refrain from committing to and complying with regime verification.

Cooperation

Economic incentives have played an important role in the conclusion of verification commitments. As demonstrated in the last chapter, states associate benefits with joining the Non-Proliferation Treaty in the first place. Concluding a Comprehensive Safeguards Agreement with the IAEA is an extension of a larger NPT commitment, in which Non-Nuclear Weapon States renounce nuclear weapons to enjoy the benefits of peaceful nuclear energy. The link between NPT commitment and verification is strong. Only 11 Non-Nuclear Weapon States do not have a Comprehensive Safeguards Agreement in force (see Appendix 5).

The importance of verification is also resembled in **nuclear trade**. The Zangger Group and the Nuclear Suppliers Group give verification guidelines for trade. Hence, nuclear suppliers, whether providing nuclear material or equipment, have enhanced the scope of bilateral verification agreements. As noted by John Carlson in 2005, the greatest network of bilateral verification agreements includes either Australia, Canada, or the United States of America. While Australia and Canada make up 65 % of the world's uranium production, the United States is a major player in enriching material. Overall, "80 per cent of uranium in the global civil nuclear industry is estimated to have [US] consent rights attached" (Carlson, 2005, p.1).

Looking at specific agreements, states have accepted significant verification demands in exchange for economic benefits. Two prominent cases are India and Iran. Iran accepted, among limits on its nuclear weapons program, enhanced verification measures in exchange for a sanctions relieve in the Joint Comprehensive Plan of Action (see following chapter). Since the conclusion of the agreement, the Islamic Republic has provisionally implemented and complied with the Additional Protocol.

India considerably enhanced its international verification commitment on the basis of a bilateral nuclear deal with the United States. The 123 Agreement offered New Delhi nuclear trade and assistance as well as support for its satellite program. The composition of the agreement was expected to allow India to expand its nuclear program, while attracting popular support domestically. For instance, the formulation of the treaty was chosen to emphasize advantages for the rural areas in India (Baru, 2015).

Although the bilateral agreement was controversial, as it recognized the nuclear weapon status of India (see e.g. Kimball, 2005), the economic incentive led to a direct impact on the Indian nuclear program. The state agreed to separate its civilian and military program and accepted IAEA verification on its civilian nuclear track. On this basis, the agreement further included a non-party to the NPT into the non-proliferation regime.

Moreover, the very nature of a commitment may decrease the financial and logistical burden on a state, thereby, making verification more attractive. The **Small Quantities Protocol** allows Non-Nuclear Weapon States with small nuclear activities to comply with the Non-Proliferation Treaty without facing a bulk of verification demands. Unsurprisingly, SQPs enjoy great popularity (see Appendix 5).

In a general effort to strengthen safeguards, the IAEA Board of Governors concluded in 2005 that SQP are a weakness to the existing safeguards. In order to close loopholes, the original text was amended. Despite the recognition of security concerns based on the original Small Quantities Protocol, various states urged that amendments should be kept to what is necessary. The Argentinian representative demanded that verification activities need to be proportionate to dimension of nuclear program. South Africa acknowledged that the old SQP provisions were problematic. Nonetheless, further financial burden should be minimized (IAEA Board of Governors, 2006b, Paragraphs 105, 110).

The exchanges on the Board of Governors also demonstrated how important assistance in the safeguard implementation is for SQP state parties. Repeatedly, state representatives commended the assistance of the International Atomic Energy Agency in providing support for the smaller states in fulfilling their verification duties, including training and guidelines on the implementation of the Small Quantities Protocol (IAEA Board of Governors, 2006b).

Non-Cooperation

There are two predominant economic considerations that have caused skepticism on behalf of states in accepting verification: One refers to objections against the costs, the other

to the economic intrusiveness of the measures. While serving as argument to reject verification in some cases, the concerns were mostly integrated into shaping the verification measures.

Every debate surrounding verification appears to a smaller or larger extent to be subject to **cost objections**, including bilateral agreements between US and Russia, the Fissile Material (Cutoff) Treaty (BASIC, 2013), or the Comprehensive Test Ban Treaty (CTBTO, 2012e). In the larger discussions surrounding the Additional Protocol, virtually every IAEA institution (Secretariat, the Director General, the Board of Governors, General Conference) pushed for keeping costs of the measures to a minimum (see e.g. IAEA General Conference, 1993). Paving the way for an agreement, a Standing Advisory Group on Safeguards Implementation (SAGSI)

> "addressed improvements in cost-effectiveness through the use of new techniques, the use of procedures to detect undeclared facilities, the use of increased co-operation with State Systems of Accounting and Control (SSACs) and the use of alternative safeguards approaches" (IAEA General Conference, 1993).

Building upon the SAGSI's work, a "Program 93+2" by the Secretariat was tasked to develop ideas for a "strengthened and more cost-effective safeguards system." The program undertook seven tasks, four of which made reference to *cost analysis*, *cost saving*, or *efficiency* and build the groundwork for the later IAEA verification reforms see e.g. IAEA General Conference, 1994). In this sense, cost considerations significantly contributed to verification as we find it today.

Several states raised economic concerns in the discussions on the IAEA Board of Governors at the time. Russia repeatedly portrayed itself as a strong proponent of "zero real budgetary growth." According to its representative Yury Sokolov, new measures could be compensated with cutting some measures under the Comprehensive Safeguards Agreements. In addition to that, rather than implementing a comprehensive routine use of the IAEA under the new provisions, the IAEA should focus on key facilities that may give reason for concern (IAEA Board of Governors, 1996c, Paragraph 44).

The Tunisian representative, Mohamed El Fadhel Khalil, argued that a successful implementation depended, among other things, on the burden on smaller nuclear states. Countries that had neither nuclear facilities nor nuclear weapons should not be confronted with increased costs. Furthermore, these states should not face a reduction in technical support (IAEA Board of Governors, 1997a, Paragraph 101).

Although the International Atomic Energy Agency has found ways to operate under budget restrictions, the constant premise of keeping costs to a minimum appear to have left their mark. As described by Trevor Findlay, the IAEA has been frustrated with limited resources and argued that it could not work properly without adjusting its budget:

> "In June 2007, [IAEA Director General] ElBaradei decried the board's refusal to approve a requested increase of 4.6 percent in the IAEA annual budget of around $275.5 million, revealing that the agency's safeguards function was being 'eroded over time' He noted that the organization was forced to use an unreliable 28-year-old instrument for environmental sampling and rely on external laboratories for analysis, 'which puts into question the whole independence of the agency's verification system.' Moreover, there has been no general implementation of wide-area environmental sampling due to the projected costs" (Findlay, 2007, p.50).

The financial evaluation of verification tools was also subject to debate in the context of the Comprehensive Test Ban Treaty. The broad scope of the treaty came along with ambitious demands for monitoring compliance and detecting non-compliance. Similar to the IAEA reform, shaping the infrastructure of the International Monitoring System was heavily subject to economic considerations:

> "China and Pakistan insisted that the IMS include satellites as well as monitoring for electromagnetic pulses (EMP). The French also initially supported a satellite system, but acknowledged that the cost might be prohibitive. Russia supported space-based sensors and the maintenance of aircraft to monitor for radionuclide particulates emitted from nuclear explosions. At US$3000 million, many delegates were discouraged by the estimated cost of such a system" (CTBTO, 2012b).

This extract shows that, while there was large consensus that verification was important, a pivotal question in the CTBT negotiations was whether specific measures are worth implementing. Tools that were considered too expensive were ruled out. Again, economic considerations appear to have significantly shaped today's verification.

Using costs as a guiding star in negotiations may fail the original purpose. Being asked about the premise of cost-effectiveness in drafting a monitoring system, Ola Dahlman, Head of the CTBTO verification working group, argued that the financial aspect should not be exaggerated:

> "I don't find it wise to overemphasize cost. After all, if one considers the costs of military spending, the comparative costs of arms control and disarmament are not even 'peanuts'. Conversely, we should invest more, not less, in arms control. And we should do it both efficiently and effectively" (in: CTBTO, 2012e).

A further concern leading to reluctance in accepting verification is economic **intrusiveness**. In contrast to the security dimension of intrusiveness, the economic perspective refers to the very protection of the civilian use of nuclear energy. Preventing economic disadvantages for a state subject to verification is an important guideline for the International Atomic Energy Agency (Drobysz and Persbo, 2016, p.134).

Despite finding accommodation in the provisions of the Additional Protocol, intrusiveness has also led to outright rejection. Until this day, Brazil has refrained from ratifying the Additional Protocol arguing it would endanger its nuclear industry. As stated by former foreign minister of Brazil, Celso Amorim, Brazil's rejection of the Additional Protocol reinforced the right for industrial secrecy (Patti, 2010, p.186).

The larger consequences of Brazil's rejection of the Additional Protocol also demonstrates that economic interest in nuclear trade may prevail verification interests. With the introduction of enhanced verification tools for the IAEA, nuclear suppliers have raised their verification demands for trade. For instance, former US President George W. Bush defined the universalization of the Additional Protocol as a crucial pillar of non-proliferation and claimed in February 2004: "I propose that by next year, only states that have signed the Additional Protocol be allowed to import equipment for their civil nuclear programs" (in: Hirsch, 2004, p.140).

Despite the support of several states, the conclusion of the Additional Protocol is still not the gold standard for nuclear trade. A reform of the guidelines of the Nuclear Suppliers Group watered down the notion of an AP requirement, in that Argentina and Brazil could still take part in nuclear trade, even without having the protocol in force (Hibbs, 2010; Viski, 2012). This suggests that economic interests may compromise non-proliferation verification.

3.3.4. Status

To what extent have status-related considerations affected verification within the non-proliferation regime? The notion of *status* takes different forms when it comes to monitoring regime compliance. Verification commitments may play into a state's domestic or international standing. Here, cooperation depends on whether or not an obligation enhances a state's self-image. Furthermore, the very platform of cooperation may facilitate or hamper cooperation. Following the hypotheses developed in Chapter 1, we would expect a state to commit to and comply with verification if cooperation enhances its status. If, however, non-

cooperation enhances its status, then a state will refrain from committing to and complying with verification.

Cooperation

The establishment of verification provisions can be seen to be at least partially due to status-related factors. The development of monitoring provisions has attracted states as a platform to signal a stance and to provide room for expertise. Rather than being the main driving factor, these aspects may facilitate commitment and compliance in the verification system.

First of all, nuclear verification appears to be an important platform for a state to **reinforce its non-proliferation stance**. In addition to discussing the virtues of certain measures, debates among representatives are also used to highlight contributions of their respective state. These statements keep other countries informed about domestic developments. Furthermore, the comments convey the message of a state being a champion of the global effort to counter nuclear weapons.

One example for this observation is the IAEA Board of Governors. Upon finalizing the talks on the *93+2 program*, Nuclear Weapon States expressed their regime compliance as well as their support of the IAEA and effective new verification measures.[231] Their expressions are particularly noteworthy considering that other states used the same talks to criticize the lacking regime compliance of NWS. Overall, the exchanges between states leave the impression of switching from accusation to defense and vice-versa.

In addition to that, the discussions on the reform of the Small Quantities Protocol were used by states to emphasize their contribution. States expressed their support of closing legal loopholes and described their achievements in the ratification and implementation process, for instance, by preparing legal requirements or by hosting regional seminars.[232]

Such statements on verification reforms are not necessarily a matter of vanity, but they also suggest the symbolic meaning of partnership. For some states, the importance of signaling a shared vision may even be a stronger driving factor than a security driven

[231] See Annex 4 in: IAEA General Conference (1997).
[232] See e.g. comments by the chairman of the Board of Governors, as well as by the representatives from New Zealand and Ecuador on the implementation of the reform of the Small Quantities Protocol (IAEA Board of Governors, 2006b, Paragraphs 99–101, 117, 119).

understanding of compliance. Commenting on the Additional Protocol, former Director General of the IAEA Hans Blix notes:

> "[T]he first point, I think, is that the world is not milling of would-be proliferators. There is a sort of attitude in the West that everyone is keen to do it, as if they can get away with it. That is not so. I mean, even if the NPT were to collapse, I think most of the countries that are parties would say that we have decided to join this treaty because we think it's in our interest not to have nuclear weapons. We are not going to have it, and we want to signal that by joining the [Additional Protocol]" (in: Council on Foreign Relations, 2014).

The notion of a community of states was also reflected in the negotiation process of the 93+2 program. Some states on the Board of Governors not just commended their own role but also the "spirit of cooperation."[233] Similarly, the chairman acknowledged talks outside of meetings as having contributed to the progress (IAEA Board of Governors, 1997b, Paragraph 73).

This leads to the conclusion that international cooperation itself seems to be an important symbolic driving factor. Nonetheless, one should be careful when reading these statements. For instance, Libya demanded that the safeguards system should be built upon "trust and co-operation" (IAEA Board of Governors, 1996c, Paragraph 80), while at the same time breaking the non-proliferation norm by pursuing nuclear weapons (see Chapter 4).

The history of the non-proliferation regime also demonstrates that verification offers a **platform for expertise** that may pave the way for cooperation. Given its technical nature, verification offers a good basis for the creation of epistemic communities, i.e. expert groups that share similar ideas and push for their realization. These platforms of exchange even bridge distrust and rivalry between states. In doing so, they have an important influence on the successful negotiation of verification agreements.

A good example for this is the Comprehensive Test Ban Treaty, which was heavily influenced by a Group of Scientific Experts (GSE). According to Ola Dahlman, former Chairman of the CTBTO Working Group on verification, the GSE not only offered a significant technical input for the eventual agreement but also enhanced cross-border confidence building and a training platform in matters of verification. He also describes the

[233] See e.g. the comments by Italy (on behalf of the EU) and China (IAEA Board of Governors, 1996b, Paragraph 79; 1996d, Paragraph 101).

GSE as an important tool to "keep the process going" in the Cold War era when political progress was difficult (Dahlman in: CTBTO, 2012e).

Cooperation of experts also led to regional verification in the form of the Argentine-Brazil Agency for Accounting and Control of Nuclear Materials. As elaborated by Sara Kutchesfahani, Argentinian and Brazilian diplomats, scientists, and military officials developed a network of expertise. The opportunity to express and exchange ideas led to an increasing rapprochement in the area of peaceful uses of nuclear energy which eventually allowed the creation of the ABACC. One of the shared virtues was the criticism of the Non-Proliferation Treaty as being discriminatory (Kutchesfahani, 2014, pp.42–52).

There is a somewhat ironic connotation to the success of this bilateral cooperation, as it was originally based on conflict. Similar to the CTBT, expertise helped to ease political stalemate. Technical cooperation led to political progress:

> "The creation of ABACC was a remarkable accomplishment given that the two nations had hitherto been embroiled in a century-long rivalry. It is therefore quite significant that the one sensitive area in which they were competing, mistrusting, and suspicious, in fact, brought them closer together" (Kutchesfahani, 2014, p.26).

Although the technical nature of verification may facilitate states' support, e.g. by allowing for epistemic communities, expert groups are no guarantee for finding solutions to a conflict. To the contrary, technical discussions may also be used to reinforce political discussions. In order to reduce the chances of a political clash, members of expert groups are often meant to distinguish themselves through a strong technical knowledge of the issue at state rather than a close governmental affiliation.

The latter understanding was also the case in the discussions surrounding a potential Fissile Material (Cutoff) Treaty. Facing a political deadlock even before negotiations have started, the Conference on Disarmament introduced a Group of Governmental Experts (GGE) "to make recommendations on possible aspects that could contribute to but not negotiate a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices" (UN General Assembly, 2012).

This purpose of the GGE already summarized the hopes and limits associated with it. So far, the meetings appear to have failed to spur negotiations. The group published a report in 2015 and was followed by a "High-Level Fissile Material Cutoff Treaty Preparatory Expert Group" to make recommendations on possible elements of a treaty. While the discussions may have helped to keep the FM(C)T on the agenda, actual negotiations have still not taken place.

Non-Cooperation

Status-related factors may also hamper the development or implementation of verification commitments. These aspects include logistical incompatibility, the nature of a nuclear program, and the verification environment. As a result, verification cooperation may be compromised or even rejected.

To begin, it is worth keeping in mind that there is no one-size-fits-all verification commitment. This is simply due to the uniqueness of every nuclear program and the purpose of verification. Even though there are templates for agreements, getting the specific content into writing and implementation may be complicated by an **incompatibility with verification provisions**, even if state parties intend to comply.

As noted by Werner Petritz (2012, pp.119–24), given their individual and complex nature, Comprehensive Safeguards Agreements were often not concluded within the deadline, thereby reducing output effectiveness of verification. Moreover, in the implementation phase (outcome effectiveness), domestic capacities have hindered effective IAEA verification. On the very outset, authorities may lack capacities to fulfill safeguards agreements (IAEA, 2019c; Drobysz and Persbo, 2016, p.133).

For instance, South African officials faced legal difficulties in the state's nuclear reversal and its verification. The very fact that the state had had a nuclear weapons program made the conclusion and implementation of a verification commitment with the IAEA difficult.[234] This shows that the **nature of the nuclear program** may affect verification commitment and compliance.

Another prominent example for the latter relates to the 1990s discussions on strengthening the tools of the IAEA. Although the enhanced measures were primarily introduced for Non-Nuclear Weapon States, other states were urged to implement the provisions, as well. Yet, Nuclear Weapon States as well as States outside the Non-Proliferation Treaty were reluctant to do so.

As the records of Board of Governors meetings demonstrate, China and France noted that they could, by definition, not introduce the Additional Protocol because of the status of their nuclear program. States outside the NPT – namely Israel, India, and Pakistan – rejected

[234] In an interview, Waldo Stumpf, former Chief Executive Officer of South Africa's Atomic Energy Corporation (AEC), "noted that the AEC was unable to use existing INFCIRC-153-type Safeguard Agreements in its efforts to join the Nuclear Non-Proliferation Treaty. South African officials felt hampered by the fact that there was no legal way to join the treaty until all nuclear weapons had been dismantled and safeguards had been applied to all nuclear activities" (Purkitt and Burgess, 2005, pp.273–4).

the idea that they were subject to the provisions on similar grounds. In this context, on a rare occasion, Pakistan even explicitly identified itself with the position of its rival India (IAEA Board of Governors, 1997a, Paragraphs 12, 31, 57, 67; 1997b, Paragraph 60).

Finally, verification may be rejected because of the **status of a relationship**. While distrust and rivalry may enhance verification, a good relationship may lower commitments. For instance, the Moscow Treaty (SORT) included minor provisions for verification. Following Edward Ifft (2010, p.9), "[t]his treaty is the product of the view of the Bush administration (reluctantly accepted by the Russians) that the new era of cooperation and openness between the United States and Russia makes traditional monitoring and verification unnecessary."

Despite leaving out strong verification measures, both states complied with the overall commitments made. This shows that weak verification provisions do not equal non-compliance. To the contrary, accounting for rather informal platforms of exchange to ensure compliance can make an agreement more attractive. Taking up the experience from SORT and START I appears to have facilitated the establishment of verification provisions in New START. According to former US Assistant Secretary Rose Gottemoeller (2010), the fast negotiation of the measures goes back to mutual experience and efficient communication.

3.4. Summary

Verification in the non-proliferation regime is legally and structurally fragmented. Requirements to conclude verification agreements differ from one state to another, depending on the nature of the respective nuclear program and the purpose of verification. There are different levels of verification: international, regional, bilateral, or national. Hence, there is no single verification body.

More than 40 years after the Non-Proliferation Treaty came into force, the primary task of the verification system is still to shed light on the (non)-*acquisition* of nuclear weapons. While the verification commitments and compliance of Non-Nuclear Weapon States demonstrate a positive trend, Nuclear Weapon States and states outside the NPT have a privileged position. Their "Voluntary Offer Agreements" and "item-specific" verification only focus on selective parts of their nuclear fuel cycle. In this sense, verification manifests a discrimination among states that is already to be found in the commitment system.

Verification has, so far, played a subordinate role regarding the *possession* of nuclear weapons. The major exception in verification are bilateral agreements between

Russia/Soviet Union and the United States of America. Numerous research projects have been put forward to pave the way for future disarmament verification but are still awaiting implementation – just like disarmament commitments themselves.

Regarding the *use* of nuclear weapons, verification has seen significant advances on an international level in the last 20 years – technologically, as well as politically. Most progress has been made in the context of the Comprehensive Test Ban Treaty. Although the treaty is not in force, its verification is fairly advanced and receives wide support by states.

In terms of verification *impact*, there is a strong notion that verification compliance is an extension of overall regime compliance. Put differently, verification tends to follow a prior intention to comply. Here, transparency can make it more difficult to break regime rules undetected and deter non-compliance (e.g. Ifft, 2010, p.5). In this regard, verification offers a lock-in effect on compliance, in accordance with historical institutionalism. At the same time, states that intend to break regime norms appear to refrain from undertaking verification commitments in the first place.

Yet, just because a state fails to conclude or comply with verification does not mean that it has the intent to build up a clandestine nuclear program. This observation would again confirm Susan Strange's skepticism regarding the virtue of managerial structures in international relations. Looking at different explanatory factors shows that states' decisions to commit to and comply with specific verification measures appear to be subject to different influences.

Security considerations appear to be a pivotal driving factor. The discussion surrounding the strengthening of the IAEA, including the Additional Protocol, is the best proof of that. In the wake of the illicit nuclear activities in Iraq (resembling a *critical juncture*), states seem to have made their own commitment to strengthen the regime as a whole. This is comparable with bilateral verification between the US and Russia. Reciprocal disarmament requires knowledge about whether the other party is keeping its end of the bargain. Still, there is a constant fear that measures may be too intrusive, thereby, countering national interest.

Normative aspects also seem to have played a contributing factor. Overall, commitments in the non-proliferation regime go along with an understanding of "it is the right thing to do." This is also true for verification. Yet, more important in terms of the focus of this chapter is the aspect of fairness. Although Nuclear Weapon States kept emphasizing that the Additional Protocol was targeted at Non-Nuclear Weapon States, they also decided to apply stronger verification on their own fuel cycle. The symbolic nature of the NWS

commitments indicates the virtues of sociological institutionalism. Arguing that verification leads to discrimination among states, some countries (such as Egypt) have refrained from further commitments.

Economic considerations proved to be a driving factor as well as an obstacle to verification. The conditionality of safeguards in nuclear trade is a helpful element to promote the verification regime. Yet, every verification measure, irrespective of its area of use, has been subject to a close cost-benefit analysis – in accordance with rational choice institutionalism. Efficiency has become the subtitle of verification. If measures are too expensive or economically too intrusive, they are ruled out.

Status has played a subordinate role in verification. Still, there are platforms for exchange and representation that make cooperation attractive. Similar with the platforms presented in the commitment system (chapter 2), states vividly engage on them and make sure that their voice is heard. At the same time, status may hamper commitment and compliance. Most notably, verification may be incompatible with nuclear status of a country.

4. Enforcement in the Non-Proliferation Regime

4.1. Platforms of Enforcement

Enforcement may be a bit of an overstatement when talking about the non-proliferation regime. The term suggests a clear and coherent prescription for countering non-compliance with the regime. This is not the case. Although there are several explicit decision-making procedures, the decisions themselves are very diverse.

Overall, enforcement tools are the sum of positive and negative incentives (political, diplomatic, economic, or military) to stimulate regime compliance of a state. They may shift the security, norm, economic, or status-related considerations of the target state. There are different nuances that may put varying degrees of pressure or inducement on the target, including *theme-specific*, *linkage-diplomatic*, and *existential* measures.[235]

What conditions determine whether states commit to and comply with the regime in the light of enforcement? Addressing this question, I will first briefly map out the spectrum of enforcement in order to get a glimpse of the complexity of approaches. The most common path of enforcement is that the IAEA reports a suspected case of non-compliance to the United Nations Security Council, which may implement further actions. While my analysis focuses on this path, it is important to bear in mind that enforcement can be embedded on an international, regional, bilateral, and even unilateral level.

Subsequently, I will assess the effectiveness of the enforcement system regarding the *acquisition* as well as the *possession* and *use* of nuclear weapons. Here, my analysis consists of three steps. I will examine

- whether the target state of enforcement incentives has made a regime commitment (*output*)
- whether the target state changed its behavior (*outcome*)
- to what extent enforcement correlates with states' compliance with the overall regime norms – non-proliferation, nuclear disarmament, and the non-use of nuclear weapons (*impact*)

[235] "Theme-specific" measures focus on the issue at hand, i.e. the nuclear program. Positive inducements may include trade or assistance in the peaceful use of nuclear energy. Damaging tools, in turn, could be a suspension of institutional privileges or restrictions on the target's access to fissile material and nuclear assistance. "Linkage diplomacy" reflects approaches of "making policy for one issue contingent on another state's behavior on a different issue" (Li, 1993, p.349). These measures go beyond the scope of the issue at hand (nuclear energy). They intend to facilitate behavioral change by including other areas, such as the trade, infrastructure, or financial markets. Measures that threaten or strengthen the political leadership in the target state can be considered "existential."

On this basis, the remaining space of this chapter will be devoted to possible explanations for target states' behavior. Examining official documents, published interviews, and expert accounts, I will conduct an exploration of plausible intent based on the hypotheses developed in the introductory chapter. The four perspectives include *security*, *norms*, *economics*, and *status*. For each aspect, I will undertake an evaluation of modes of pledges and justification with a focus on the cases of Iraq, Libya, Syria, Iran, and North Korea.

A conclusion will take up the major findings regarding the assessment and explanation of regime effectiveness. While lacking tools to stimulate the compliance of Nuclear Weapon States, the regime may place strong incentives on Non-Nuclear Weapon States. A closer look at enforcement shows that there is no one-size-fits-all solution to stimulate regime compliance. The same incentives may play out contrarily in different states. Finding the right enforcement tools requires close attention to the state's domestic context. Rather than continuously turning the screw of sanctions, positive incentives may be more effective.

4.1.1. International Enforcement

While several international agreements may serve as a basis for regime enforcement,[236] the most important platform in the non-proliferation regime is the United Nations. This is due to the institution's unique authority in conflict resolution to champion international peace.[237] The UN Security Council is responsible for assessing a threat to international peace and for initiating proper measures (Art. 24.1, UN Charter).[238] Under the umbrella of the UN, the General Assembly (Art. 11.3, UN Charter), individual members (Art. 35.1, UN Charter), or the Secretary-General (Art. 99, UN Charter) may inform the Security Council about a threat.

More importantly in the nuclear context, the IAEA Board of Governors has the right and responsibility to report the non-compliance of a member to the Security Council (Art. XII.C, IAEA Statute).[239] By doing so, the IAEA can escalate a specific case to a more

[236] A crucial treaty within the non-proliferation regime that accounts for a variety of enforcement tools is the Comprehensive Test Ban Treaty. The Treaty on the Prohibition of Nuclear Weapons and the International Convention on the Suppression of Acts of Nuclear Terrorism provide for a settlement of disputes.
[237] Article 103 of the UN Charter states: "In the event of a conflict between the obligations under any other international agreement, their obligations under the present Charter shall prevail." In this sense, the UN takes over in international agreements subject to the UN topics, such as peace and security.
[238] Following Resolution A/RES/377 ("Uniting for Peace"), the General Assembly can make recommendations, if the Security Council is unable to maintain peace. So far, this tool has not been used for non-proliferation purposes. An overview of Emergency Special Sessions can be found in Dag Hammarskjöld Library (2019a).
[239] A comprehensive study of the IAEA reporting can be found in Findlay (2015).

powerful platform.[240] The cases reported by the IAEA to the Security Council are: Israel, Iraq, Romania, North Korea, Libya, Iran, and Syria.[241] A similar option of reporting to the UN is also provided for in the Comprehensive Test Ban Treaty (Art. V, CTBT).

The Security Council has great liberty to enforce regime compliance. First, the vague formulations "threats to peace," "breaches of the peace," or "acts of aggression" (Art. 39, UN Charter) are the only reference to initiate actions. A broad interpretation of the formulations would justify enforcing all policy fields of the non-proliferation regime (*acquisition*, *possession*, and *use* of nuclear weapons) – even if the respective state has not signed the NPT.

Second, resolutions by the Security Council have a global dimension. Even though a decision is made by 15 states in the Security Council, it is subject to all other UN member states (Art. 25, UN Charter). Ideally, this rule allows for uniform measures to be taken. These should also state clear expectations from a target state (UN Security Council, 2006a).

Third, the United Nations has a variety of tools at its disposal. The UN Charter allows for a suspension of membership privileges (Art. 5) or, in a case of a persistent violation of UN principles, an expulsion from the UN (Art. 6). If "threats to peace," "breaches of the peace," or "acts of aggression" are present, the Security Council can initiate non-military (Art. 41)[242] and military (Art. 42)[243] action. There are no explicit means of positive inducements. Nonetheless, the Security Council may reward (partial) compliance of a state with sanction relief (Ban, 2007),[244] economic assistance, or the support of the civilian nuclear program.

Still, there is a major drawback in regime enforcement by the UN. The Security Council was created "[i]n order to ensure prompt and effective action by the United Nations" (Art. 24.1, UN Charter). This is ironic, as any non-procedural decision by the Security Council

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[240] The International Atomic Energy Agency has also intra-institutional enforcement measures. It may suspend a state's institutional privileges or place restrictions on a nuclear program (IAEA General Conference, 1988). Apart from taking measures owing to outstanding payments, the use of these sanctions is almost non-existent. Two notable exceptions are attempts to suspend Israel owing to its strike on an Iraqi nuclear facility in 1981 and South Africa for its Apartheid regime (see Magliveras, 1999, p.224). Following Trevor Findlay (2015, p.19), the IAEA has a preference of reporting a case to the Security Council rather than using its own sanctions, as this decision could backfire and a state withdraw from the IAEA or even the NPT.

[241] See e.g. Myjer and Herbach (2012, p.132). The reporting of Libya and Romania occurred for information purposes only. Israel was reported owing to its bombing of an Iraqi nuclear facility in 1981.

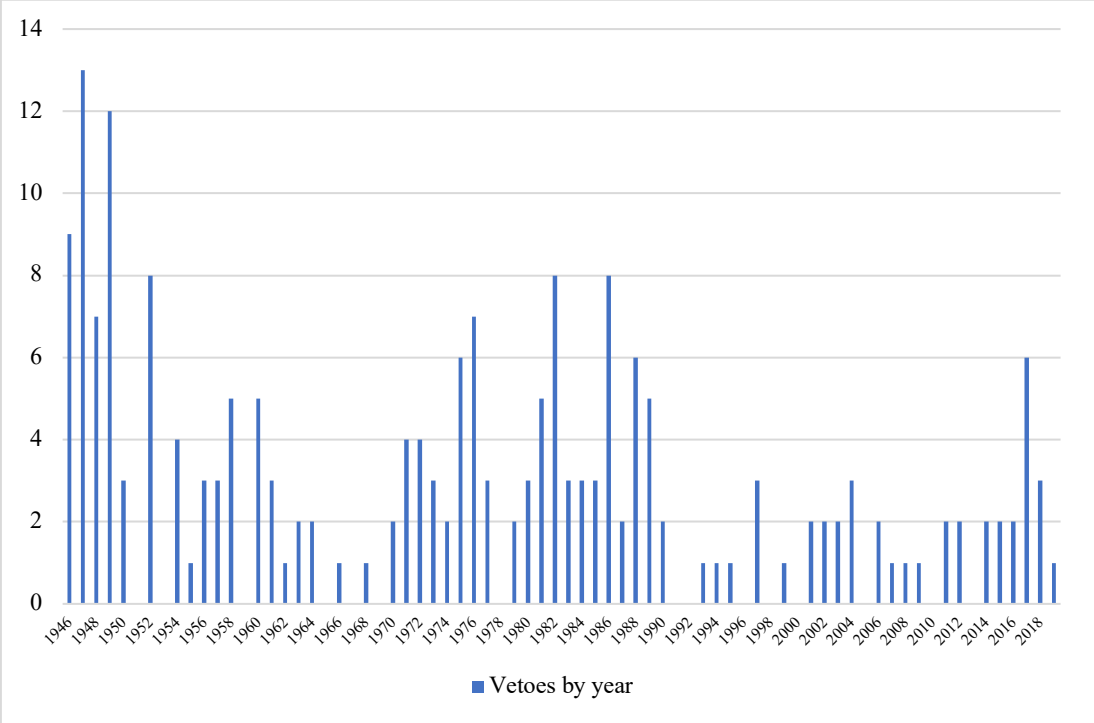
[242] Non-military measures "may include complete or partial interruption of economic relations and of rail, sea, air, postal, telegraphic, radio, and other means of communication, and the severance of diplomatic relations" (Art. 41, UN Charter).

[243] Armed forces may be applied by land, air, or sea if non-military actions would be inadequate (Art. 42, UN Charter).

[244] See also Golnoosh Hakimdavar (2014, p.5).

not only requires the support of 9 of the 15 members, but also the support or acceptance of all five Permanent Members (P5): The United States, Russia, France, the United Kingdom, and China (Art. 27, UN Charter). This outset has paralyzed decision-making from the very beginning (see also Wolf, 2016, p.7). The list of vetoes used over the last decades include around 200 cases on a variety of topics (see below).

Figure 8 – Veto Use in UN Security Council[245]



Although many of these resolutions would have been passed without veto rights, the "dark figure" of failed resolutions is higher, as proponents of action may refrain from putting a resolution on the table, knowing it would be vetoed. For the non-proliferation regime, the veto power has two consequences:

1. UN enforcement against any of the P5 is virtually impossible.
2. Enforcing the compliance of other states requires support or acceptance by all Permanent Members. Resolutions are difficult to achieve or may be "watered down."[246]

[245] Data as of March 2019 from: Dag Hammarskjöld Library (2019b).
[246] To make things even more challenging, the P5 have demonstrated different approaches and priorities in handling (potential) proliferation cases in the past (Santoro, 2012, pp.15–7).

4.1.2. Regional Enforcement

Given their regional role in strengthening the non-proliferation regime, Nuclear-Weapon-Free Zones are an ideal candidate for enforcement. Since NWFZs are not based on uniform treaties, they differ on whether dealings with non-compliance are stated, how non-compliance should be determined, and what should be done as a consequence (see Appendix 4).

One similarity is that Nuclear-Weapon-Free Zones lack tools to enforce the compliance of Nuclear Weapon States. The Treaty of Bangkok is the only zone that provides for the enforcement of its protocols, which none of the Nuclear Weapon States has signed. Nonetheless, NWFZs offer some advantages for regime enforcement:

- They complement the Non-Proliferation Treaty. The NPT does neither provide for non-compliance (Findlay, 2015, p.2) nor an executive body – other than most NWFZs.
- NWFZs reinforce the International Atomic Energy Agency and strengthen the "IAEA track" of enforcement. All treaties demand the conclusion of IAEA safeguards.
- Most NWFZs provide for the escalation of a case to the United Nations, which strengthens the warning system.
- The Treaties of Tlatelolco, Bangkok, Pelindaba, and Rarotonga establish mechanisms for special investigations. These bodies can trigger further investigations, independent from IAEA decision-making.

As another regional nuclear platform, EURATOM accounts for two types of regime enforcement: against states as well as "persons and undertakings."[247] Article 83 of the EURATOM Treaty relates to "an infringement on the part of persons or undertakings." Here, the European Commission can apply a variety of sanctions, including a warning, "the withdrawal of special benefits such as financial or technical assistance," or the retraction of material.

More important from a state perspective, Article 82 of the EURATOM Treaty is concerned with "infringements" by a member state. After inspectors report a case to the European Commission, the latter urges the state to take "all measures necessary to bring

[247] See Articles 82 and 83 as well as the corresponding Articles 141 and 142 of the EURATOM Treaty.

such infringement to an end." If non-compliance continues, the Commission or a EURATOM member state may forward the case to the European Court of Justice.

This approach is very similar to the infringement proceedings against an EU member state that breaks EU law. The European Commission seeks an adjustment by the state itself. Only if the state fails to produce satisfying results, the issue is taken to the European Court of Justice. Rather than using a "crowbar strategy" that sanctions right away, this approach gives a state room for improvement without punishment.

4.1.3. Bilateral Enforcement

As the previous chapters have shown, bilateral agreements are an important part of the commitment system and the verification system of the non-proliferation regime. Yet, they play a subordinate role when it comes to enforcement. For the most part, bilateral agreements either include no provisions to ensure regime compliance or their enforcement is integrated into the larger IAEA-UN enforcement mechanism.

The general bilateral nuclear cooperation (trade and assistance) does not independently enforce compliance. This is in line with the Zangger Committee and the Nuclear Suppliers Group, which are voluntary and do not include enforcement tools. Still, there are elements of enforcement in nuclear trade and assistance. On the one hand, bilateral nuclear cooperation includes a conditionality of safeguards. Without meeting this condition, cooperation may fail to be implemented. On the other hand, including IAEA safeguards makes the cooperation part of regime enforcement and reporting by the IAEA.

This is similar to the nuclear cooperation between Argentina and Brazil. The agreement between the two states, the ABACC, and the International Atomic Energy Agency (Quadripartite Agreement) requires both countries to implement safeguards and gives the IAEA the "right and obligation to ensure that safeguards will be applied."[248] Hence, the cooperation is subject to the IAEA reporting scheme to the UN Security Council in potential cases of non-compliance.

In addition to that, the bilateral agreement between Argentina and Brazil accounts for enforcement in different ways.[249] Disputes between the two states are meant to be settled bilaterally through diplomatic means (Art. XVIII). A serious breach of the agreement allows

[248] See Articles 1, 2, and 15 of the Quadripartite Agreement.
[249] Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful use of Nuclear Energy, July 18, 1991.

the other party to terminate the agreement and to inform the UN Secretariat and the Secretariat of the Organization of American States (Art. XIX). The agreement also provides for penalties if the "confidentiality of information" is compromised in the verification process (Art. XIV).

The provisions in the bilateral agreements between the United States and Russia are diverse, in terms of content and verification. When it comes to enforcement, they share a similarity: there is none. START I, New START, SORT, the ABM Treaty, the INF Treaty, the Threshold Test Ban Treaty, and the Peaceful Nuclear Explosions Treaty do not account for specific tools to enforce compliance. Although not including possible sanctions or positive incentives, agreements include commissions or committees to take up and clarify possible cases of non-compliance (see Chapter 3).

Finally, also India and Pakistan have refrained from establishing explicit enforcement measures in the Lahore Declaration and the India-Pakistan Non-Attack Agreement. This is not surprising considering that the content of the agreements is very limited. The Non-Attack Agreement may be implicitly covered by the larger notion of nuclear deterrence, as an attack on a nuclear facility could be followed by a counter-attack.

4.1.4. Unilateral/Autonomous Enforcement

Another scenario is the enforcement of the regime without using the institutional ladder of escalation. Autonomous measures may include unilateral action as well as selective multilateralism. Considering that the United Nations has close to 200 member states, unilateral action as well as measures by a countless combination of states have – mathematically speaking – a massive potential.

Whether states are individually entitled to apply economic sanctions remains legally contested. In practice, states react in the affirmative (Hakimdavar, 2014, p.28). Unilateral or collective military action is legitimate without UN approval in cases of self-defense (Article 51 UN Charter). Other forms of independent measures are not provided for in the UN Charter, as military and non-military action is subject to the Security Council (UN Charter, Articles 41 and 42).

The advantages of taking autonomous action appear straightforward. A potential nuclear threat may be addressed without losing valuable time by internationalizing and institutionalizing a response. Autonomous measures could also be useful in addressing gaps

of the UN system, enforcing disarmament commitments, minor cases of non-compliance with the regime, or agreements that do not explicitly state enforcement instruments.

Nonetheless, the judgement to use tools of enforcement is highly subjective and lacks international legitimacy. The target may deem autonomous action as a malicious act. This would question the virtue of the enforcement message and may escalate a conflict. Autonomous action has also a structural disadvantage in that it reinforces the power of states that have economic or military tools of enforcement.

4.2. Assessing Effectiveness

Looking at the most prominent enforcement platforms in the non-proliferation regime (see Table 6) demonstrates that there are different avenues to ensure regime compliance, such as intra-institutional means (e.g. withdrawal of privileges), military action, sanctions, or positive inducements. These provisions give reason for hope that a state's considerations of *security*, *norms*, *economics*, or *status* may be influenced in favor of regime compliance.

Table 6 – Prominent Platforms of Enforcement

	Acquisition	**Possession**	**Use**
United Nations	Intra-institutional, military and non-military measures	Intra-institutional, military and non-military measures[a]	Intra-institutional, military and non-military measures[a]
IAEA	Intra-institutional, reporting to UN[b]	Intra-institutional, reporting to UN[b]	Intra-institutional, reporting to UN[b]
NWFZs	Intra-institutional, reporting to UN	Only in Treaty of Bangkok	Only in Treaty of Bangkok
Comprehensive Test Ban Treaty			Intra-institutional, reporting to UN[c]
Autonomous Action	Positive inducements, military and non-military measures	Positive inducements, military and non-military measures	Positive inducements, military and non-military measures

[a] Enforcement against P5 virtually impossible
[b] Basis for enforcement are membership and safeguards agreements. Strong emphasis on NNWS
[c] Not yet in force
Underlined: Enforcement tracks predominantly used

Yet, there are two tendencies that reduce the effectiveness of the enforcement system on its very outset. First, there is a strong emphasis of enforcement on the *acquisition* of nuclear weapons. All the tools that could hypothetically be used against Nuclear Weapon States and, thus, the *possession* or *use* of nuclear weapons are unlikely to be used.

Second, the most common tools of enforcement available are intra-institutional measures and reporting powers. Except for withdrawing voting rights (e.g. to sanction members for outstanding payments), both tools are rarely used. In fact, only one institution stands out for addressing larger cases of regime non-compliance, namely the IAEA. The agency has reported several states to the UN Security Council. The most prominent cases of regime enforcement are Iraq, Libya, Syria, North Korea, and Iran.

4.2.1. Acquisition

By and large, the *acquisition* of nuclear weapons consists of a demand and supply side. Enforcement may target both in order to ensure regime compliance by a state. Furthermore, illicit nuclear activities may depend on individual persons and non-state entities that could be subject to sanctions.

In order to get an idea of the regime's effectiveness in countering the acquisition of nuclear weapons, I will take up state cases that have been subject to enforcement: Iraq, Libya, Syria, and Iran.[250] Although my approach concentrates on states, it shall be pointed out that a work that focuses on non-state actors would likely put a stronger emphasis on the enforcement of the International Convention on the Suppression of Acts of Nuclear Terrorism or UN Resolution 1540.

Iraq

Output and Outcome

In the history of weapons of mass destruction, Iraq is unique because it reflects the highest degree of regime enforcement imaginable. The developments leading to the 2003 invasion of the state (Operation Iraqi Freedom) are multifaceted, with nuclear weapon concerns being just one aspect. In a post-9/11 context, Iraqi leader Saddam Hussein posed a threat in the eyes of the United States and some allies for a number of reasons, owing to "his track record of invading other countries, his support for terrorists, his brutal treatment of his

[250] As North Korea has succeeded in developing nuclear weapons, the case will be considered in the following subsection on the *possession* and *use* of nuclear weapons.

own people, his attempts to shoot down US aircraft patrolling no-fly zones, *as well as* his WMD arsenal" (Duelfer, 2016, p.167).[251]

In terms of weapons of mass destructions, the threat of which became even more apparent in the wake of the Gulf War of 1990/1991, there were two demands:[252]

- The complete abandonment and dismantlement of its WMD programs
- The provision of information and cooperation with verification bodies (IAEA, UNSCOM, UNMOVIC) to ensure WMD compliance

The measures against Iraq included international and unilateral sanctions targeting the WMD sector as well as the larger economy (e.g. trade embargoes, freezes of financial assets), military attacks by Israel in 1981 and by the United States and the United Kingdom in 1998, military threats, and a multilateral invasion in 2003.

There were also positive inducements, such as the "oil-for-food program."[253] Rather than targeting regime compliance, the UN initiative was aimed at easing the humanitarian consequences of sanctions, by allowing Iraq to sell limited amounts of oil for the provision of basic supplies for the Iraqi population (Reynolds and Wan, 2012, p.69).

Although Iraq reaffirmed its commitment to the non-proliferation regime (*output effectiveness*), throughout the 1990s and particularly during the months prior to the 2003 invasion of Iraq, the international community was widely divided as to what extent the state was complying with international demands (e.g. Blix, 2004).

Looking at the *outcome effectiveness* of the regime enforcement efforts, we can acknowledge today that Iraq did end its weapons of mass destruction programs, although failing to fully cooperate with the verification bodies to assure the international community of its compliance. Put simply by Hans Blix (2004, p.259), the Head of UNMOVIC, "[t]he UN and the world had succeeded in disarming Iraq without knowing it."

When in the fall of 2002 UNMOVIC inspectors were readmitted into the country, some illicit activities in missile development as well as apparent attempts to hide documents were revealed (Duelfer, 2016, p.165). However, no indications could be found about an active

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[251] The insistence of the US and the UK that Iraq continued its programs of weapons of mass destruction (including a continuation of alleged nuclear aspirations) and, therefore, posed a serious threat was labeled by Hans Blix (2004, pp.259–60) as the "Mother of all Misjudgments."

[252] These demands are, for instance, embedded in Security Council Resolutions S/RES/687 (1991), S/RES/949 (1994), S/RES/1051 (1996), S/RES/1060 (1996), S/RES/1115 (1997), S/RES/1154 (1998), S/RES/1441 (2002).

[253] A good overview of sanctions, military action, and positive inducement was put together by Reynolds and Wan (2012).

WMD program. The illicit nuclear program found in 1991 had apparently been ended and there were no indications of efforts to resume the program (Lopez and Cortright, 2004, pp.92–3).[254] Although Iraq had some hidden activities, WMD stocks were not found, according to the Iraqi Survey Group assessment (*Duelfer Report*) (Duelfer, 2016, p.172).

Saddam Hussein's claims that Iraq had no weapons of mass destruction, while failing to fully cooperate with verification bodies divided the Security Council. The United States and the United Kingdom pushed for military action, based on false intelligence assumptions that Iraq had active WMD programs.[255] Russia, France, and Germany were against military action and prevented the explicit authorization of military force by the Security Council.

While the argument can be made that particularly Russia also had economic interests in Iraq,[256] the rejection of war was based on a differing judgement about the existing threat. In his speech at the Munich Security Conference 2003, German Foreign Secretary Joschka Fischer (2003) rejected a German support of military action against Iraq, stating "I am not convinced." The Operation Iraqi Freedom, which overthrew the political leadership in Iraq and occupied the country, was initiated without explicit UN Security Council support and can, thus, be seen as *autonomous* action.

Libya

Output and Outcome

Libya had a long history of nuclear weapon aspirations under the leadership of Muamar al-Gaddafi. After the coup d'état in 1969, the state tried before and after ratifying the NPT in 1975 to acquire nuclear weapons as well as material and assistance for a nuclear weapons program from China, Pakistan and reportedly from France, India, the Soviet Union, and the black market. Crucial support in the Libyan nuclear weapons program was provided by the international network of A.Q. Khan, starting in the second half of the 1990's. The state, however, never came close to successfully detonating a nuclear device.[257]

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[254] For instance, UNMOVIC could not confirm alleged purchases of yellowcake or other indicators of uranium enrichment (Duelfer, 2016, p.165).

[255] As to be seen in US Secretary of State Colin Powell's statement in the Security Council in February 2003: "The facts and Iraq's behaviour demonstrate that Saddam Hussain and his regime have made no effort to disarm as required by the international community. Indeed, the facts and Iraq's behaviour show that Saddam Hussain and his regime are concealing their efforts to produce more weapons of mass destruction" (In: UN Security Council, 2003).

[256] See e.g. Palkki and Smith (2012, pp.278–81) and Charles Duelfer (2016, p.176).

[257] See Palkki and Smith (2012, pp.264–6). A closer look at the different efforts to establish a successful nuclear weapons program can be found in Chapter 2 in: Wyn Q. Bowen (2006).

Although Libya faced several sanctions under Muamar al-Gaddafi, nuclear weapons played a subordinate role. One possible reason for this is that the ambitions were effectively kept secret (see also Reynolds and Wan, 2012, p.65), another reason is that other issues proved to be more pressing. The sanctions against Tripoli by the United Nations Security Council prior to 2003 took up other illicit activities, most notably Libya's support of international terrorism (as on PAN-AM Flight 103 in 1988).[258]

For the same reason, the Unites States had already extended unilateral sanctions throughout the 1980s, including (threats of) military attacks (Palkki and Smith, 2012, pp.266–9). The administration of US President George W. Bush eventually linked the lifting of the US sanctions to the dismantlement of the Libyan weapons of mass destruction programs (e.g. Leverett, 2004). The international sanctions against Libya included diplomatic, financial, and other economic sanctions, as well as arms and air embargoes (Reynolds and Wan, 2012, pp.63–5).

The major turning point that put an end to the nuclear weapons program occurred in December 2003 when Libya proclaimed that it would "eliminate ... materials, equipments and programs which lead to the production of internationally proscribed weapons" and assured the Security Council of its adherence to the NPT, its acceptance of its IAEA safeguards agreement and the additional protocol, and its welcoming of international inspectors (IAEA Board of Governors, 2004a). As this announcement reflected a full behavioral change in line with the international demands as well as the regime norms and rules, enforcement can be seen to demonstrate a high *output effectiveness*.

In March 2004, the IAEA Board of Governors decided to report the Libyan nuclear case "for information purposes only" to the Security Council, but also acknowledged the Libyan promise to adhere to non-proliferation commitments (IAEA Board of Governors, 2004b). The UN Security Council (2004) also welcomed Libya's announcement and encouraged assistance to Libya in reversing its nuclear weapons program.

In addition to the positive *output* effectiveness, also the *outcome* can be seen to be successful. Following the December 2003 announcement, Libya dismantled its nuclear weapons program. The process included turning over documentation, equipment, and Highly Enriched Uranium.[259] The IAEA applauded Libya's cooperation, including provision of

[258] An overview of UN Security Council resolutions on Libya is published by the Security Council Report (2019a).
[259] An overview of Libya's WMD disarmament was published by the Arms Control Association (Davenport, 2018).

information and access to sites and personnel, "beyond that required under its Safeguards Agreement and Additional Protocol" shedding light on its nuclear past (IAEA Board of Governors, 2008). Although Libya made great progress in realizing its non-proliferation commitments, there have been concerns about the combination of Libyan WMD past and current instability (e.g. Dahl, 2011; Terrell, Hagen, and Ryba, 2016). Nonetheless, there appears to be no immediate threat.[260]

Syria

Output and Outcome

The exact nature of the Syrian nuclear program is ambiguous. On the outset, the state appears to be committed to nuclear non-proliferation. Syria signed the Non-Proliferation Treaty on the very same day it opened for signature and has repeatedly called for a WMD free zone in the Middle East.[261] Reemphasizing this commitment, Syrian Ambassador to the UN Bashar Ja'afari (2016) describes non-proliferation as a national priority for Syria in "word and action." Still, there is concern whether "actions" match the "words."

The greatest reason for skepticism has been a facility at Dair Alzour/Al-Kibar. While Syria has insisted that the building was constructed as a non-nuclear military facility, academic and intelligence analysts see a strong resemblance of the facility to the North Korean plutonium production reactor at Yongbyon.[262] Israel bombed the compound in a secret air strike in September 2007.

Prior to the attack, Ehud Olmert, Israeli Prime Minister at the time, launched a fact-finding mission and had exchanges with the United States (Follath and Stark, 2009). US President Bush rejected Olmert's request to bomb the Syrian facility and decided in favor of

[260] In its latest evaluation, the IAEA does not raise a flag on Libya (IAEA, 2019c). In a broader consideration on the situation in Libya, the Security Council makes no mention of fissile material in its latest statement on the issue (UN Security Council, 2017c). Stocks of yellowcake were found but not deemed as a serious threat – in 2013, a UN Panel of Experts "opin[ed] that the yellowcake posed no significant security risk without extensive processing, which required national facilities" (UN Security Council, 2013).

[261] While being a member of the Security Council in 2003, Syria introduced on behalf of the Arab Group a proposal for a WMD free zone in the Middle East. Since Israel is the only state in the region considered to possess nuclear weapons, the state was a target of the draft resolution. Syria describes Israel as the greatest non-proliferation threat in the Middle East (Ja'afari, 2016).

[262] A model visualization of the Dair Alzour facility and its resemblance to the North Korean Yongbyon reactor was published by the James Martin Center for Nonproliferation Studies (2011a).

a diplomatic option combined with a military threat (Bush, 2010, pp.420–2). Israel eventually acted unilaterally.[263]

Upon receiving information following the demolition of the Dair Alzour compound that the facility had been a nuclear reactor before completion, the IAEA started an investigation including requests of detailed information and access to the site from the Syrian government. In 2011, the IAEA came to the finding that "Syria's statements […] are limited in detail, are not supported by documentation and have not allowed the Agency to confirm Syria's assertions regarding the non-nuclear nature of the destroyed building" (IAEA Board of Governors, 2011b).

The Agency concludes that the Dair Alzour facility was probably a nuclear facility that should have been (but was not) reported. Owing to the frustration with Syrian authorities in assisting the IAEA, the Agency found Syria in breach with its safeguards agreement and reported the case to the Security Council in June 2011 (IAEA Board of Governors, 2011b).

The Security Council did not act. This is due to several reasons – one being institutional. China and Russia voted against the IAEA Board of Governors resolution on Syria, which was issued nonetheless, but could have vetoed any action in the Security Council (James Martin Center for Nonproliferation Studies, 2011d).

Another factor was that the non-proliferation concern became part of the UN Security Council debate in a moment it had to deal with humanitarian and political considerations in Syria (Security Council Report, 2011). UN Security Council resolutions addressed political, humanitarian, and military challenges arising from the Syrian Civil War.[264] While weapons of mass destruction were addressed in UN Security Council Resolution 2118 (2013) on the destruction of Syrian chemical weapon stockpiles, no resolution referred to the Syrian nuclear program.

The perhaps greatest reason for why the Security Council did not act is due to the chronology of events. The unilateral attack by Israel made a UN decision against Syria irrelevant. Not only was the IAEA not informed in time. By attacking the facility, Israel also destroyed possible evidence[265] the IAEA would need to make an informed assessment. The

[263] Reflecting on the development, George W. Bush emphasizes the unilateral nature of the strike: "Finally, the bombing demonstrated Israel's willingness to act alone. Prime Minister Olmert hadn't asked for a green light, and I hadn't given one. He had done what he believed was necessary to protect Israel" (Bush, 2010, p.422).
[264] An overview of the UN Security Council Resolutions is published by the Security Council Report (2019b).
[265] Further evidence was likely destroyed by Syria after the attack (e.g. Bush, 2010, 422).

withholding of information and destruction of evidence was "regret[ted]" in a report by the IAEA Director General (IAEA Board of Governors, 2011a).

Until today, Syria has failed to "cooperate fully with the Agency in connection with unresolved issues related to the Dair Alzour site and other locations" (IAEA, 2019c). Syria has not provided the IAEA with further information or clarifications on the site and has refrained from admitting any wrongdoings. As the rejection of cooperation on the matter contradicts the IAEA demands, the enforcement effort itself demonstrates a low *output* and *outcome* effectiveness. Still, it needs to be pointed out that the IAEA concluded in its latest Safeguards Statement that Syria's "declared nuclear material remained in peaceful activities" (IAEA, 2019c).

Iran[266]

Output and Outcome

The Iranian nuclear program has been one of the greatest concerns within the non-proliferation regime. While Iranian leaders have emphasized the peaceful nature of the program, two observations give rise to worry: I) Over the last two decades, Iran has repeatedly failed to comply with verification commitments, limiting transparency on its nuclear program (Giles, 2015, pp.48–9).[267] II) The Iranian nuclear program has seen an enormous expansion since the beginning of this millennium, reducing the time needed to develop a nuclear weapon.[268]

The international community has used a variety of instruments to ensure Iran's compliance with the non-proliferation regime, including positive and negative incentives. The incentives have had two goals: motivating Iran to make and keep international commitments as well as reducing its capacities to potentially produce nuclear weapons.[269]

Following a failed diplomatic effort by France, Germany, and the United Kingdom, the Board of Governors of the International Atomic Energy Agency decided to report the Iranian

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[266] The analysis of the enforcement system of the non-proliferation regime in the case of the Iranian nuclear program includes parts of my master's thesis "Tehran under Transatlantic Sanctions: A Rational Choice Perspective" (Sauerteig, 2011).

[267] For instance, in 2003, the National Council of Resistance of Iran revealed the existence of undeclared facilities for uranium enrichment and heavy water production (Mukhatzhanova, 2010, pp.43–4).

[268] For an overview of Iran's nuclear program see e.g. Gaukhar Mukhatzhanova (2010, pp.43–6), Robert Reardon (2012, pp.10–61), Matthew Kroenig (2014, pp.7–18), and Gregory Giles (2015, pp.41–7).

[269] The aspirations to affect Iran's material capacities and motivations are reflected in a statement by former Secretary of State Hillary Clinton, who claims that CISADA was aimed at "constraining Iran's nuclear program, changing the calculus of Iran's leaders, and demonstrating that Iran's policies decrease its standing, and further isolate it in the international community" (Rodham Clinton, 2010).

case to the United Nations Security Council in 2006 (IAEA Board of Governors, 2006a). Urging Iran to comply with IAEA safeguards agreements and to suspend its enrichment and reprocessing activities, UN Security Council Resolutions 1737 (2006), 1747 (2007), 1803 (2008), and 1929 (2010) introduced sanctions against the Islamic Republic.

These measures include an embargo of proliferation-sensitive goods, an arms embargo, an asset freeze, and a travel ban on selected Iranian persons and entities. While the resolutions by the UNSC focused on limiting the development of a possibly military nuclear program in Iran, measures by the European Union and the United States have addressed the Iranian economy in more general terms.

The *carrots* offered to Tehran have primarily included a relief from existing sanctions, support in the nuclear energy sector, and larger economic incentives. The most comprehensive concessions by the international community materialized in the 2015 Joint Comprehensive Plan of Action (JCPOA) (in: UN Security Council, 2015). The E3/EU+3[270] commit to terminate UN and transatlantic sanctions related to the Iranian nuclear program and to support Iran in accessing enriched uranium fuel for the Tehran Research Reactor. The Iranian commitment in the JCPOA reflects a significant *output effectiveness*, as the state accepts limitations on its enrichment capacity, refrains from producing highly enriched uranium, and consents to intrusive verification on civilian facilities.

In terms of Iran's compliance with non-proliferation demands (*outcome effectiveness*), the last two decades can be divided into two parts: before and after the JCPOA. Under President Ahmadinejad, Iran refuted international sanctions and expanded the nuclear program. In 2007, former Iranian Deputy Secretary of State, Gholami Khoshrou, stated: "The Security Council passes more and more resolutions; Iran installs more and more centrifuges" (in: Perthes 2008, p.89).

This material observation is accurate. Iran completed its first cascade of 164 centrifuges in March 2006 (Shire and Albright, 2007). At the beginning of the talks in 2013 that led to the JCPOA, Iran had 19,000 working centrifuges and 27,000 deployed (John Kerry in: Chatham House, 2017b). Sanctions did also fail to stop the construction of the secret uranium enrichment facility in Qom (Nincic, 2012, p.137).

Tehran is, however, largely seen to have complied with the provisions of the JCPOA, which was negotiated under Iranian President Rouhani, until US withdrawal. The IAEA

[270] Including China, France, Germany, Russia, the United Kingdom, and the United States of America. The High Representative of the European Union for Foreign Affairs and Security Policy also participated in the negotiations.

confirmed that Iran undertook the necessary steps leading up to the implementation day and that Iran has continued to follow verification commitments resulting from the agreement (IAEA Board of Governors, 2017).[271]

US President Trump decided that the United States would withdraw from the agreement, claiming that the JCPOA included too many concessions from the US in exchange for too few concessions from Iran regarding its nuclear program and other activities (White House, 2018a). The other negotiating parties of the JCPOA have reaffirmed their commitment to the agreement (Deutsche Welle, 2018).

Iran has expressed frustration about renewed US sanctions and has demanded the remaining signatories of the JCPOA to compensate for the resulting economic damage. More recently, Tehran has ramped up parts of its nuclear program and has selectively broken commitments made in the JCPOA, including enrichment activities (see e.g. Wintour, 2019). This development lowers *outcome effectiveness* connected with the agreement.

Impact (*Acquisition* of Nuclear Weapons)

Exploring the regime *impact* demands a look at the correlation between enforcement measures and the regime norms. In the field of *acquisition*, the regime norm is: states without nuclear weapons refrain from acquiring them. To account for the demand and supply side of nuclear weapons, it is worth considering to what extent the regime norm has been achieved in material and political terms. The political aspect refers to the willingness to develop nuclear weapons. The material aspect refers to the capacity to do so.

Iraq and Libya indicate a strong regime impact, as both states dismantled their nuclear weapon programs. While the Libyan reversal did not take place until December 2003, Saddam Hussein is reported saying as early as early as 1991 to senior Iraqi officials: "I have given them [the Americans] everything. I mean, I have given them everything: the missiles, and the chemical, biological and nuclear weapons" (in: Palkki and Smith, 2012, p.290). Hussein reinforced the lack of WMD on multiple occasions.[272] Yet, Iraq appeared to have kept elements of its nuclear program secret which would have allowed an easier restart of the program after the withdrawal of sanctions (Duelfer, 2004).

[271] According to US President Donald Trump (2017a), "Iran is not living up to the spirit of the deal." Trump also criticizes the Iranian treatment of inspectors and points out that Iran "exceeded the limit of 130 metric tons of heavy water. Until recently, the Iranian regime has also failed to meet our expectations in its operation of advanced centrifuges" (Trump, 2017a).
[272] See e.g. Palkki and Smith (2012, pp.289–91).

Libya's reversal was more decisive, but its nuclear program was also less promising. Some estimates speculate that, had Iraq decided to develop a nuclear device at the peak of its program, it would have taken another 6 - 24 months (FAS, 2012). In Libya the story is different. Although the state had acquired and successfully installed centrifuges, an intelligence expectation that Tripoli would have a nuclear bomb by 2007 was overrated (Braun and Chyba in: Jentleson and Whytock, 2006, p.68).

Libya's history of efforts to gain access and material for a nuclear weapon were frustrated by rejections from other states, a limited reliability of the Khan network, and lacking expertise of the Libyan engineers (see e.g. Palkki and Smith, 2012, pp.264–6). In his March 2004 report on the Libyan case to the Board of Governors, the IAEA Director General noted that although the state had received documentation on the design of nuclear weapon components around 2001/02, "Libya stated that it had no national personnel to evaluate the data and would have asked the supplier for help in the event it had opted to take further steps to develop a nuclear weapon" (IAEA Board of Governors, 2004a).

In **Iran and Syria,** it remains unclear whether there has been political willingness to develop nuclear weapons. In both states, leaders have repeatedly emphasized the peacefulness of the respective nuclear program. Still, there remains skepticism. In Syria, the unilateral attack by Israel in 2007 may have had a positive impact on a possible nuclear threat, as it destroyed the facility in question. Kreps and Fuhrmann (2011, p.173) conclude that "[b]y destroying the physical plant […] Israel negated about six years of progress toward nuclear development, the average time states have taken to build a gas-cooled graphite-moderated reactor."

But Israel's attack also diminished clarification on Syria's political stance on nuclear weapons. Referring to the Dair Alzour facility, Russian Deputy Ambassador to the UN Alexander Pankin pointed out: "In a crime investigation, if you don't have a corpse you don't have a case. […] There is nothing there. We are not an investigation team, we are the Security Council. We deal with imminent or coming threats" (in: James Martin Center for Nonproliferation Studies, 2011d).

His Chinese counterpart Wang Min stated: "We should not talk about something that does not exist. There are a lot of things that happened in the past -- should we discuss all of them" (in: Worsnip and Davies, 2011). Both comments suggest the Security Council's lacking capacity or willingness to enforce a "mere" non-compliance with IAEA safeguards agreements following autonomous action.

In the Iranian case, the interpretation of regime impact depends on the value of the Joint Comprehensive Plan of Action. Among others, Israeli Prime Minister Benjamin Netanyahu criticizes that the ballistic dimension is not included in the deal and that inspections do not include military facilities. The JCPOA also entails a "sunset clause," putting an end date to several commitments (Netanyahu in: Chatham House, 2017a).

Accordingly, Iran could develop some elements outside the scope of the JCPOA and its termination would leave the Islamic Republic with great liberty in enriching uranium. Hence, the agreement does not put an end to a possible future decision of Iran to pursue nuclear weapons. Furthermore, granting domestic enrichment may also set a negative precedent for other states, such as Saudi Arabia (see also Kroenig, 2016).

Despite these shortcomings, the JCPOA comprises major advantages in ensuring Tehran's compliance with the non-proliferation regime. It puts strong limitations on the Iranian nuclear program. John Kerry estimates that the nuclear weapon breakout time for Iran now is about one year, as opposed to 2-3 months before the agreement (in: Chatham House, 2017b). Materially speaking, the JCPOA may have saved – for now – a state from proliferating.

The additional value of the JCPOA is that Iran's nuclear program is much more transparent, as it applies a Comprehensive Safeguards Agreement with the IAEA as well as provisionally the Additional Protocol and further measures. Combining limitations and transparency, the four most important nuclear sites – the enrichment facilities at Natanz and Qom, the uranium conversion plant at Isfahan, and the nuclear reactor at Arak[273] – have little room of maneuvering in establishing a secret nuclear weapons program.

4.2.2. Possession and Use

Several thematic subfields fall into the policy fields of *possession* and *use* of nuclear weapons and could serve as a starting point for regime enforcement.[274] The fact that states have failed to comply with the regime norms in different ways (see Chapter 2) would even provide incentive to do so. Yet, when it comes to ensuring regime compliance regarding the

[273] As pointed out by Matthew Kroenig (2014, p.22), these facilities would be essential for Tehran to build nuclear weapons.
[274] The subfields include the stationing of nuclear weapons, disarmament, nuclear reversal, nuclear weapon tests, negative security assurances, as well as the application of nuclear weapons.

possession and *use* of nuclear weapons, only two issues appear to be taken up, i.e. calls for the nuclear reversal of a specific state und demands to stop nuclear weapon tests.

As for nuclear weapons testing, a common point of reference is the Comprehensive Test Ban Treaty, which provides for a variety of enforcement tools. The treaty entails that a state may lose institutional privileges, be subject to collective measures, or be reported to the United Nations (Article V). The Preparatory Commission of the Comprehensive Test Ban Treaty Organization is also involved in Security Council decision-making.[275]

International demands for nuclear reversals tend to be accompanied with a reference to the Non-Proliferation Treaty. This may seem unusual, as the NPT itself does not include enforcement measures. Instead, the target state is called upon to give up its nuclear weapons and join the NPT as a Non-Nuclear Weapon State.

One of the most prominent cases of enforcement in the non-proliferation regime is North Korea. The state has been facing different waves of sanctions that target its nuclear weapons program, more recently following nuclear weapon tests. Yet, just looking at North Korea would give a wrong impression of the effectiveness of the enforcement system. I will, therefore, also briefly turn to the cases of France and China as well as India and Pakistan.

France and China

Output and Outcome

In the months leading up to finalizing the text of the Comprehensive Test Ban Treaty, France and China conducted their last rounds of underground nuclear weapon tests. France undertook six tests in 1995 and 1996, with the last one taking place on January 27, 1996. China conducted four nuclear weapon tests in both years up until July 29, 1996 (Kimball, 2019). Both states subsequently signed the CTBT and have not taken up nuclear testing since.

Considering that nuclear history has seen more than 2000 nuclear explosions, the tests may seem as a minor breach of the regime norm not to *use* nuclear weapons. Still, they were highly contentious, not because of the actual number of tests but because of the timing. All other Nuclear Weapon States had ceased their nuclear weapon tests by 1992. In fact, even France had a moratorium in place before taking up its final round of tests. Consequently, there had already been a trend against nuclear explosions that preceded the CTBT.

[275] See e.g. Jeffrey Feltman (2017).

Still, the institutional landscape made regime enforcement difficult. The Comprehensive Test Ban Treaty had not yet been negotiated, so the states could not have been parties to it. The treaty's provisions for compliance were also not in place, making enforcement on the basis of the CTBT impossible. Furthermore, although France detonated its weapons in the Pacific, it was not subject to the enforcement of the Treaty of Rarotonga. The state had not signed the protocols of the treaty. Even if France had signed them, the Nuclear-Weapon-Free Zone does not state the enforcement of protocols.

In addition to that, China and France have as Permanent Members a veto right in the UN Security Council, allowing them to block action that would target their tests. An alternative would be a resolution in the UN General Assembly, which is non-binding.[276] The most flexible incentive would have been autonomous action, which is difficult to implement, as both states are economically and militarily strong targets.

Although the Security Council was concerned with other WMD issues (i.e. WMD destruction) in the years of 1995 and 1996, it did not address nuclear testing by China and France. The UN General Assembly was more active in this regard. Its resolutions repeatedly spoke in favor of "utmost restraint" regarding nuclear testing and urged for the negotiation of a test ban treaty (UN General Assembly, 1994; 1995a).

In December 1995, the General Assembly became more vocal on the status of testing at the time by commending cessation of nuclear testing and criticizing its continuation. Here, it is striking that criticism of nuclear testing was not explicitly targeted against China and France. Instead, the General Assembly used a more abstract formulation:

> "Sharing alarm expressed internationally, regionally and nationally at recent nuclear tests,
> 1. Commends those nuclear-weapon States observing nuclear testing moratoria, and urges them to continue those moratoria pending the entry into force of a comprehensive nuclear-test-ban treaty;
> 2. Strongly deplores all current nuclear testing;
> 3. Strongly urges the immediate cessation of all nuclear testing."
>
> (UN General Assembly, 1996)

This does not mean that China and France did not become subject to explicit criticism. Discussion in the First Committee of the UN General Assembly singled out and condemned both states for their nuclear tests. Concerns brought forward by members of the First Committee were related to the consequences for environment and health, alleged breaches

[276] The General Assembly may still "carry political and moral weight" (Goldblat, 1986, p.131).

of existing commitments, and a poisoning of the atmosphere of the CTBT negotiation (UN General Assembly, 1995b; 1995c; 1995d).

Even though the Comprehensive Test Ban Treaty had not been negotiated, there was an implicit rule not to test for which both states were held accountable. Rather than sanctioning the states, the discussions resembled a "naming and shaming." Particularly Pacific states made their outrage as a result of the tests heard. For instance, Epsen Ronneberg, Representative of the Marshall Islands, made an emotional statement pointing out that France was not living up to its role as an advanced state: "It is simply incomprehensible to us that this great nation of culture, science and fine arts, that this nation could visit this abomination upon us in the Pacific" (UN General Assembly, 1995c).

Adding to the discussions in the First Committee, there was also a major public resistance to the actions of Nuclear Weapon States. France especially had to face a public outcry, including domestic and international protests as well as boycotts of French products (Pullar-Strecker, 1996; BBC, 2008). This indicates that regime enforcement may also be strengthened by non-state actors.

Following their last rounds of testing, there has been a rather positive development in terms of *output* and *outcome effectiveness*. China and France have put in place moratoria and have signed the Comprehensive Test Ban Treaty. While France has also ratified the treaty, China's ratification is still pending.

India and Pakistan

Output and Outcome

The 1998 nuclear weapon tests by India and Pakistan are commonly mentioned together, also in regime enforcement. This is due to their regional and political connection (see Chapter 2) but also owing to the timing of the detonations. Both tests were conducted in May 1998 and represented the first nuclear explosions after the Comprehensive Test Ban Treaty opened for signature.

In an apparent anticipation of an international condemnation of the tests, Pakistani Prime Minister Muhammad Nawaz Sharif (1998) claimed in his public statement on May 29 that "[…] Pakistan will oppose all unjust embargoes aimed at preventing it from exercising its right to develop various technologies for self-defence or peaceful purposes." As it turned out, Sharif's apparent anticipation of international opposition became reality.

In contrast to the nuclear weapon tests by China and France, which were conducted only a few years earlier, the UN Security Council condemned India and Pakistan for their actions (UN Security Council, 1998). The UNSC demonstrated concern that the tests, on the one hand, would significantly raise the regional tension. On the other hand, the tests were described as countering non-proliferation efforts:

> "Gravely concerned at the challenge that the nuclear tests conducted by India and then by Pakistan constitute to international efforts aimed at strengthening the global regime of non-proliferation of nuclear weapons, and also gravely concerned at the danger to peace and stability in the region" (UN Security Council, 1998).

In addition to acknowledging that the tests posed a threat to the international security environment, the resolution of the Security Council formulated a number of demands[277] towards India and Pakistan. The states were urged and called upon to

- Not conduct further nuclear weapon tests
- Not export knowledge, equipment, or material that could proliferate WMD
- Not further escalate the bilateral conflict
- End their nuclear weapon programs, including a related development of ballistic missiles and the production of fissile material for weapon devices
- Take up the bilateral dialogue
- Join the Comprehensive Test Ban Treaty and Non-Proliferation Treaty

The demands refer to the Comprehensive Test Ban Treaty and the Non-Proliferation Treaty, which shows that regime enforcement is not just used as a tool to counter non-compliance with norms. It is also used as a platform to further integrate states into the regime. To underline the demands, the resolution by the UNSC introduces the notion of sanctions that target the nuclear programs by India and Pakistan:

> "8. Encourages all States to prevent the export of equipment, materials or technology that could in any way assist programmes in India or Pakistan for nuclear weapons or for ballistic missiles capable of delivering such weapons, and welcomes national policies adopted and declared in this respect" (UN Security Council, 1998).

Although the international community massively criticized the nuclear tests by India and Pakistan, the actual international response varied significantly. As noted in Oliver Meier's (1999) analysis of international reactions, the idea of implementing sanctions was

[277] In the resolution it was formulated that the Security Council "demands," "urges," or "calls upon."

only supported by some and even those who did appeared to doubt that they would have a positive effect in changing both states' behavior.

In June 1998, the United States implemented sanctions that prohibited economic and military assistance with India and Pakistan. In the case of the latter, a number of sanctions had already been imposed since 1979 (Wagner, 2001). Those US measures that were introduced for the 1998 nuclear tests were ended in the fall of 2001.[278] The step became part of a larger cooperation effort in the Bush administration's fight against terrorism (Krishnadas, 2001).

India and Pakistan have unilateral moratoria in place not to conduct further nuclear weapon tests. The unilateral declarations were also reaffirmed in the Lahore Declaration of 1999. This reflects a positive but modest *output effectiveness*, as the commitments are non-binding and do not extend to other parts of the nuclear programs. The outcome effectiveness is also positive when it comes to nuclear testing as both states have, so far, refrained from new nuclear weapon tests. Other than that, the nuclear development in both states leave little room for optimism. Over the last twenty years, they have continued to advance their nuclear weapon programs and have an increasing arsenal of nuclear weapons (Appendix 3).

North Korea

Output and Outcome

There is a long history of inducements targeting the North Korean nuclear program, falling into all policy fields (*acquisition*, *possession*, and *use* of nuclear weapons).[279] The international demands include a stop of nuclear weapon tests, a dismantlement of the weapons program, and adherence to international treaties. The goal has not changed: making the DPRK a compliant Non-Nuclear Weapon State.

Connected with the demands, the UN Security Council has issued eleven resolutions on North Korea since 2006.[280] The sanctions demand inspection against North Korean cargo and include a prohibition to export weaponry and materials that could be used for WMD

[278] Some sanctions against Pakistan remained in place that sanctioned missile proliferation and the 1999 military coup (Wagner, 2001).
[279] Fittingly, a vast amount of works on the problem and possible solution of the North Korean nuclear crisis have been published (just to name a few: Hayes, 2007; Acharya, 2009; Bechtol, 2010; Haggard and Noland, 2012; Roehrig, 2012; Sun and Wit, 2015; Iverson, 2017).
[280] These resolutions are S/RES/1718 (2006), S/RES/1874 (2009), S/RES/2087 (2013), S/RES/2094 (2013), S/RES/2270 (2016), S/RES/2321 (2016), S/RES/2345(2017), S/RES/2356 (2017), S/RES/2371 (2017), S/RES/2375 (2017), S/RES/2397(2017).

purposes, an export ban of luxury goods, a limitation of the number of North Korean diplomats, a prohibition to employ or educate North Koreans (in WMD related fields), as well as financial sanctions against individuals and entities.

Lately, there have been increasing restrictions on North Korean exports, such as coal, iron, lead, and seafood.[281] There is also a military dimension to the North Korean nuclear crisis. The US is ally to South Korea and has a military presence on the Korean peninsula.[282] The state was repeatedly subject to military threats as well as nuclear engagement throughout the 1990s. This dual approach has also been embodied by US President Donald Trump (2017b), who has made several explicit threats, declaring the US would "totally destroy" North Korea if "forced to defend itself or its allies." Still, he has enganged in personal meetings with Kim Jong-un.

Positive incentives towards North Korea have included assistance in developing a peaceful nuclear energy infrastructure, delivering energy resources, food aid, providing cash payments, and offering security assurances.[283] In the US-DPRK Agreed Framework of 1994,[284] the US agreed to support the building of a light water reactor (LWR). Pyongyang consented to freeze and eventually dismantle its graphite-moderated reactors and related facilities, which were to be compensated for by the US through energy replacement. Upon the discovery of the secret North Korean uranium production, the administration of George W. Bush put a halt to the fuel oil shipments. The LWR which was originally to be completed by 2003, was not finished.

Considering that North Korea accepted limitations on its reactors, the Agreed Framework succeeded in enhancing *output effectiveness* (i.e. commitments from the DRPK). Yet, the scope was rather narrow, limiting the degree of effectiveness. This became all the more apparent when the DPRK was able to develop a uranium production in parallel. At the same time, the secret uranium production decreases *outcome effectiveness*, as the state's behavior following the commitment not only contradicted IAEA safeguards but also the Agreed Framework. North Korea did not work towards a denuclearization of the Korean

[281] For an overview of the respective sanctions and contents see e.g. Arms Control Association (2018), US Department of the Treasury (2019), Council of the European Union (2019).
[282] The Mutual Defense Treaty Between the United States and the Republic of Korea, October 1, 1953.
[283] A similar summary of positive inducements can be found in Haggard and Noland (2012, pp.245–7). A cash payment in the amount of $500 million was reportedly paid for the 2000 North-South summit (Cha, 2012, pp.2–3). The North-South summit was aimed at improving the bilateral relations in more general terms.
[284] Agreed Framework between the United States of America and the Democratic People's Republic Korea, October 21, 1994.

Peninsula and did not remain in the NPT (withdrawing in 2003), as demanded in the Agreed Framework.

The most prominent international attempt to engage with North Korea were the Six-Party Talks held between 2003 and 2009 by China, Japan, North Korea, Russia, South Korea, and the United States. The parties eventually concluded two agreements in 2007 aimed at completely dismantling North Korea's Yongbyon facility in exchange for economic incentives such as heavy fuel oil shipments (Haggard and Noland, 2012, pp.232–3) and prior unfreezing of North Korean funds (Bechtol, 2010, p.90). Again, in terms of *output*, North Korea's commitment reflects a modest achievement. Neither the uranium production (which North Korea kept secret) nor the already produced fissile material were part of the agreement.

The *outcome* demonstrates elements of success, as North Korea put temporary halts on plutonium production and publicly took down a water tower. Yet, outcome effectiveness overall was not positive, as the DPRK never fully dismantled the Yongbyon facility. Although there have been repeated attempts by different parties to revive the Six-Party Talks, no new rounds have taken place since 2009.

The DPRK reportedly approached Russian President Vladimir Putin in 2014 to signal a willingness to resume the Six-Party talks (Arms Control Association, 2017a). In the meantime, North Korea's behavior arguably became more aggressive in other areas, as noted by David Santoro (2012) referring to the 2010 sinking of a South Korean corvette and the bombardment of Yeonpyeong Island.

China, South Korea, and the United States of America have engaged with North Korea bilaterally in recent months. In June 2018, US President Donald Trump met with North Korean leader Kim Jong-un. Both leaders signed a joint declaration, which expresses the goal to improve bilateral relations and provide a basis for further negotiations. The statement notes that "President Trump committed to provide security guarantees to the DPRK, and Chairman Kim Jong Un reaffirmed his firm and unwavering commitment to complete denuclearization of the Korean Peninsula" (White House, 2018b).

In the wake of negotiations, Pyongyang has halted its nuclear weapon tests and started dismantling a nuclear weapon test site at Punggye-ri. Still, as North Korea has not taken irreversible steps to dismantle its nuclear program, the state is largely non-compliant with international demands (*outcome effectiveness*). In a most recent meeting between Trump and Kim in Hanoi in February 2019, the leaders did not come to an agreement on how to proceed.

Impact (*Possession* and *Use* of Nuclear Weapons)

How does regime enforcement correlate with the larger (non-)compliance with norms on the *possession* and *use* of nuclear weapons? States that possess nuclear bombs are expected to disarm and refrain from using nuclear weapons. Considering that enforcement mainly focuses on nuclear weapon tests and nuclear reversals lowers the prospects of regime impact. In order to get a grasp of the regime's effect, I will briefly turn to nuclear weapon tests and nuclear programs described in this subsection before specifically turning to the North Korean case.

A positive trend of regime impact can be found in the field of nuclear weapon tests. This is in line with the regime's impact as outlined in the commitment system (Chapter 2). The scope of enforcement tools that the Comprehensive Test Ban Treaty has to offer towards its members is remarkable. More important than that, it has also become a yardstick for states outside the CTBT that undertake nuclear weapon tests.

Detonations by India, Pakistan, and North Korea have been condemned by the United Nations with reference to the CTBT, although none of them is a signatory of the treaty (e.g. UN Security Council, 1998; 2017a). This also means that every nuclear weapon test after CTBT opened for signature has triggered an international response. A further positive correlation exists in the cases of India and Pakistan. Both states have refrained from conducting tests since 1998.

Although there has been a massive international outcry regarding nuclear weapons in India and Pakistan, both states have failed to comply with the demands to reverse their programs. Instead, they have significantly expanded their arsenal. This indicates that the sanctions did not change the political aspiration for nuclear bombs. If anything has changed, it is the stance of the international community. The United States, a vocal critic of the tests, reversed its sanctions in 2001, because they no longer resembled US "national security interests" (Krishnadas, 2001).

China and France did not even face an UN Security Council condemnation of their nuclear tests in 1995 and 1996. Both states are far from dismissing their nuclear weapon status. On a positive note, however, they have not taken up nuclear weapon tests again and France has even lowered its nuclear weapon stocks. This confirms again that, even without sanctions, states may increasingly comply with the regime's norms and rules.

The most ambitious enforcement case is North Korea which faced international sanctions even before detonating its first nuclear bomb. While the exact number of nuclear

weapons remains unknown, Kristensen and Norris (2018, p.41) "cautiously estimate that North Korea might have produced sufficient fissile material to build 30 to 60 nuclear weapons, and that it might possibly have assembled 10 to 20 warheads."

The DPRK has conducted six nuclear weapon tests and has been developing a variety of missiles with different ranges. Thus, Pyongyang's nuclear threat is or will soon be of intercontinental reach (Kristensen and Norris, 2018). This development is perhaps the greatest failure in the enforcement of the non-proliferation regime. Looking at norms, the regime failed in every aspect imaginable in North Korea, as it could not counter the states acquisition, possession, and use of nuclear weapons, regardless of extensive sanctions along the way.

Despite this negative impression, the impact of international efforts against the North Korean nuclear program is more nuanced. It should be noted that Pyongyang reacts to incentives. Without these reactions, we may be worse off than we are now (e.g. Barbaro, 2017). The Agreed Framework put a temporary halt on the separation of plutonium to be used for nuclear weapons. Similarly, the 2007 agreement resulting from the Six-Party Talks suspended the reprocessing facilities at Yongbyon, which were inspected by the IAEA and sealed until North Korea resumed production in 2009.

While these achievements point to a material impact on North Korea's nuclear program, the political relevance of nuclear weapons remains unchanged. Pyongyang plays a double-game: Demonstrating compliance while keeping an ace up its sleeve. When asked whether the freeze of Yonbyon negotiated in the Agreed Framework slowed North Korea's nuclear program, defector Kim Duk-hong, former assistant to ideological mastermind Hwang Jang-yop, responded:

> "Of course, I think the Clinton administration was great. […] [But the North Koreans] resumed the development of nuclear weapons as soon as they signed the Geneva Agreed Framework, even before the ink dried on the paper. In 1995, the national military industry secretariat went to Pakistan to trade skills in exchange for producing nuclear weapons. They sent engineers to Pakistan after they signed for Geneva Agreed Framework in 1994. They began to talk about nuclear weapons with Pakistan 1995" (in: Frontline, 2003).

North Korea also worked on the secret enrichment of uranium, despite signing the Agreed Framework. Thus, nuclear freezes are no proof for political will to disarm.[285]

[285] Former North Korean chief ideologist Hwang Jang-yop questioned the very usefulness of nuclear freezes, claiming that Pyongyang would just build new facilities. He argued that "[t]he more North Korea has to gain

Accordingly, skepticism regarding the declared dismantlement of a nuclear weapon test site is justified. Especially considering that there are reports about new constructions on the site (Brunnstrom and Lambert, 2019).

4.3. Explaining Effectiveness

The cases of regime enforcement described above indicate some material and/or political progress in meeting regime norms. This would suggest that enforcement has at least partially countered states' non-compliance. Instead of prematurely assuming such a causality, it is worth exploring state behavior more closely. Taking the perspectives of *security*, *norms*, *economics*, and *status*, I will use the remaining space of this chapter to examine states' (non-)cooperation with the regime in the light of enforcement. The most prominent regime enforcement efforts are listed in the following table:

from the six-party talks, the stronger the Kim Jong-il regime will become" (Hwang Yang-jop in: Kim Song A, 2007).

Table 7 – Prominent Cases of Regime Enforcement

	Iraq	**Libya**	**Syria**	**Iran**	**North Korea**
Policy Field	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition, Possession, Use
Main tools	Sanctions, military invasion (prior military threats and attacks)	Linking removal of sanctions to WMD programs, military threats	Autonomous military attack by Israel	Sanctions, military threats, cyber-attack, JCPOA	Sanctions, military threats, civilian assistance, security assurances
Demands	Dismantle nuclear weapons program, verify	Dismantle nuclear weapons program, verify	Clarification on site at Dair Alzour	Transparency, stop (later contain) uranium enrichment	Dismantle nuclear weapons program, verify, stop nuclear weapon tests
Compliance	Dismantled, but not fully verified	Dismantled and verified	Insufficient clarification	Compliance with JCPOA until US-withdrawal from agreement, Prior: expansion of enrichment capacities	Temporary halts to plutonium production. Dismantlement of water tower and test site, expansion of nuclear program
Impact	Dismantlement of program. Some facilities destroyed by 1991 Gulf War. Option for future development of WMD was kept.	Political reversal, dismantlement of program	Facility destroyed, political impact unclear	JCPOA contains break-out capacity, extensive but time-restricted verification, political impact unclear	Expansion of nuclear weapons program, no political impact (for now)

4.3.1. Security

To what extent did security considerations affect states' willingness to cooperate? We would expect a state to commit to and comply with regime norms and rules if the cooperation satisfies its security needs. A state may improve its security environment by investing in international cooperation or may feel threatened by pursuing a nuclear weapons track. Military threats in particular could affect this calculation (see e.g. Kreps and Pasha, 2012).

However, pursuing nuclear weapons may also be used to counter a regional threat (e.g. Sagan, 1996, pp.57–63; Singh and Way, 2004, pp.863–4). According to some analysts, states may also pursue nuclear ambiguity as a tool for deterrence (Hymans, 2006, pp.456–8). Regime enforcement may fail to address security concerns or may even underline them. We can assume that if non-cooperation satisfies its security needs, then a state will refrain from complying with regime norms and rules. As consequence, a state would continue to counter regime norms, despite enforcement.

Cooperation

Security considerations may contribute to ensuring compliance with the non-proliferation regime. Although the reasons for **Libya** to give up its nuclear weapons program were very multifaceted, one aspect was possibly a military threat (see e.g. Jentleson and Whytock, 2006). This is due to a combination of two factors.

On the one hand, particularly the administration of George W. Bush emphasized that Libya drew lessons from the war on Iraq.[286] Accordingly, Libya would have to fear the same destiny had it continued a WMD path. Muammar al-Gaddafi is even reported saying to former Italian Prime Minister Silvio Berlusconi "I will do whatever the Americans want, because I saw what happened in Iraq, and I was afraid" (in: Litwak, 2007, p.193).[287] On the other hand, an October 2003 interception of the vessel *BBC China*, which included centrifuge components and was bound for Libya, underlined the state's illicit activities to the international community (Jentleson and Whytock, 2006, p.74).

At first sight, the timing of Libya's decision to give up its WMD programs fits into the narrative of a perceived military threat. Libya's public dismissal took place in the same year as the discovery of its illicit nuclear activities and the Operation Iraqi Freedom. Still, there is skepticism regarding security threats as having played into Libya's calculations. For instance, Benoît Pelopidas questions the virtue of linking the 2003 invasion in Iraq with Libya giving up its WMD programs:

> "(1) The 1986 bombings intended to kill Gadhafi did not lead him to give up the WMD programs, so why should a more remote threat produce a stronger effect? (2) In the 1990s, during the secret negotiations with the United States and the United Kingdom, the Libyan regime offered to give up its weapons of mass destruction after the threat of regime change was removed, not because of it" (Pelopidas, 2015a, p.43).

Harald Müller (2007, pp.86–8), in turn, argues that the decision to give up the WMD programs had been made and communicated internally before the October 2003 interception of the BBC China. Rather than overemphasizing the security dimension, Libya's decision to dismantle may have been due to diplomatic efforts (e.g. St John, 2004), domestic economic

[286] Even years after the incident, former President George W. Bush (2010, p.267) claimed that Libya reversed its course also because of the experience from Saddam Hussein.
[287] Robert G. Joseph, who was part of the US negotiation team in the talks leading to Libya's WMD reversal, claims that Libya was likely to have been affected by a number of motivations – including a possible removal of sanctions, a strive for domestic change, and the fight against Islamic extremism. In his view, a key aspect was also the possibility of becoming a military target – just like Iraq under Saddam Hussein. This would be somewhat ironic, as military attacks on Libya were not immediately planned by the US (Joseph, 2009).

factors (e.g. Barnum and Fearey, 2016), sanctions (e.g. Park, 2017), and even status (e.g. Braut-Hegghammer, 2008) considerations which will be taken up in following subsections.

As for **Syria**, some scholars see a positive deterrent impact of Israel's 2007 military attack. For instance, Kreps and Fuhrmann (2011, p.175) speculate that Israel's destruction of the Dair Alzour facility may have scared off North Korea in providing nuclear assistance, thereby, further hampering illicit nuclear activities. Yet, there are indications that Syria continued illicit nuclear activities, including help from Iran and North Korea (e.g. Follath, 2015). This observation would question a deterrent effect on Syria and North Korea. Considering that Pyongyang is a far greater nuclear concern for the international community than Damascus, it is unlikely that North Korea would give-in to a secondary deterrence rather than the threats to which it itself is subject.

Israel's attack on the Dair Alzour facility is also described as serving as a possible deterrent for other Middle Eastern states considering a nuclear weapons program (Spector and Berman, 2010, p.127). While the argument is plausible, it is difficult to prove. The fact that Libya, Syria, and Iran have demonstrated illicit nuclear activities despite Israel's attack of an Iraqi facility in 1981 shows that deterrence following a unilateral military attack is limited.

To the contrary, being subject to military attacks may even demonstrate vulnerability, which can even increase the willingness to develop a nuclear deterrent. For Libya, this assumption is in accordance with Muammar al-Gaddafi speaking in favor of a nuclear deterrent after having been attacked by the United States in the 1980s (Bowen, 2006, pp.20–2).

Non-Cooperation

This latter consideration already indicates that security aspects may lead to non-compliance with the regime. Reading and listening to official statements by **North Korea**, one gets the impression that the state's refusal to give up its nuclear weapons program is security driven. Although certainly not the only factor, there is some virtue in this claim. Pyongyang often makes references to its nuclear program as a response to US military power.

For instance, the North Korean news agency KCNA reported that the 2013 nuclear weapons test was meant "to defend the country's security and sovereignty in the face of the ferocious hostile act of the US" and concluded that "[i]f the U.S. continues with their

hostility and complicates the situation, it would be inevitable to continuously conduct a stronger second or third measure" (in: Mullen, 2013). Pyongyang has also portrayed the alleged reach of its missiles to US mainland as a milestone of its program (e.g. Cohen *et al.*, 2017). In this sense, the vast expansion of Pyongyang's nuclear program was particularly aimed at the United States.

The security-related value of North Korea's nuclear weapons program appears to have been confirmed by experiences from other states. North Korea follows events in other states closely and draws conclusions for its own military.[288] The lack of nuclear weapons appears to be a striking feature of vulnerability. Libya as well as Iraq have been portrayed in the DPRK as negative examples for how states without nuclear weapons can end up.[289]

There is reason to believe that North Korea's threat perception is real. The United States' involvement in the Korean War, its continued military presence in the region (including military exercises), and the hostile rhetoric by political leaders[290] that also involve military threats may give the impression that Washington wants to replace the political leadership in Pyongyang. In fact, the DPRK is legally still at war.

A perceived existential threat would also explain why North Korea has always tried to keep the upper hand in agreements, never seriously endangering the long-term existence of its nuclear weapons. According to Haggard and Noland (2012, p.259), the strong opposition to comprehensive verification may be part of a greater strategy to retain deterrence. Furthermore, North Korea's halt to nuclear weapons testing or even the aforementioned destruction of a water tower have no long-term impact on the program.

Still, it is hard to say which instances are perceived as a real threat. For example, while the KNCA described the *Foal Eagle* military exercise in the past as an aggression (Reuters, 2017), Kim Jong-un expressed his understanding for the drill to a South Korean delegation (Hancocks, 2018). Furthermore, despite prior vivid exchanges of nuclear threats between

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[288] As described by John Cha (2012, p.86), "[i]n March 2003, it was reported that Kim Jong-il had not been seen in public for forty-three days. It was eventually discovered that Kim had spent time at the underground bunker Cheol Bong Li near Pyongyang, watching and analyzing television broadcasts about the American invasion of Iraq. He and his military leaders were no doubt concerned about whether or not US forces could roll across North Korea in the same way they had in Iraq."

[289] For instance, in a conversation about the nuclear weapons program, US Representative Eliot Engel was told by a high-ranking North Korean official: "Saddam Hussein didn't have nuclear weapons and look how he wound up" (in: Thae, 2017). On Libya, a North Korean spokesperson commentated: "It has been shown to the corners of the earth that Libya's giving up its nuclear arms, which the U.S. liked to chatter on about, was used as an invasion tactic to disarm the country by sugarcoating it with words like 'the guaranteeing of security' and 'the bettering of relations'" (in: Kim, 2011). On the discussion of the "message" of Muammar al-Gaddafi's toppling and Libya's decision to give up its WMD programs see also Pelopidas (2015a, pp.39–43).

[290] President George W. Bush's denouncement of North Korea as a member of the infamous "axis of evil" in his 2002 state of the Union address is a prominent example (Bush, 2002).

Kim Jong-und and Donald Trump,[291] both leaders made complimenting comments during the June 2018 Singapore summit. Hence, the image of the enemy is also subject to rhetoric.

Security considerations appear to have also restrained **Iraq's** compliance with international demands. First, weapons of mass destruction were considered to have benefited Baghdad. According to the Duelfer Report, Iraqi senior officials were convinced that WMD prevented an Iraqi loss in the war against Iran and deterred a US invasion into Baghdad in 1991. Iraqis even contemplated that the outcome of the 1991 Gulf War would have been different with nuclear devices. Against this background, complying with the demand of WMD dismantlement was a difficult decision (Duelfer, 2004).

Second, some analysts suggest that even after having given up its weapons of mass destruction, Baghdad pursued a "strategic ambiguity" to deter neighbors, particularly Iran, (Palkki and Smith, 2012, pp.285–7). This interpretation is in line with the mixed public messages by Saddam Hussein on his stance on WMD. These were misread by the US administration at the time, as noted by Charles Duelfer, former Acting Chairman of UNSCOM:

> "Saddam was asked about a speech he gave in June 2000, in which he said, 'You cannot expect Iraq to give up a rifle and live only with a sword, if its neighbors do not also give up their rifles and keep only swords.' In Washington, this sounded like 'Saddam-speak' for declaring that he had retained WMD. Saddam explained that he had Tehran in mind as his audience, not Washington. […] Ironically, Saddam assumed that the United States knew the true status of his WMD stocks – that they were basically gone" (Duelfer, 2016, p.175).

While making empty threats himself, Saddam Hussein misread real military threats that were guided against him by the United States. He reportedly had doubts that a war was imminent, much to the surprise of George W. Bush.[292] Bush (2010, p.269) suspects that Hussein may have underestimated the threat due to "mixed signals from France, Germany, and Russia." While mixed signals may have played a role in the Iraqi threat perception, the Duelfer Report suggests that Hussein mainly failed to understand US domestic politics and

[291] For instance, President Trump emphasized that his "Nuclear Button" was "bigger and more powerful" than Kim Jong-un's (Beech, 2018).

[292] In his autobiography the former US President stated: "I'm not sure what more I could have done to show Saddam I meant what I said. I named him part of an axis of evil in my State of the Union address. I spoke to a packed chamber of the United Nations and promised to disarm him by force if diplomacy failed. We presented him with a unanimous Security Council resolution. We sought and received strong bipartisan backing from U.S. Congress. We deployed 150,000 troops to his border. I gave him a final forty-eight-hours' notice that we were about to invade his country. How much clearer could I have been" (Bush, 2010, p.269)?

the international security environment in the context of 9/11, until it was too late (Duelfer, 2004).

The aspect of security is also a popular explanation for **Iran's** secretive nuclear behavior and reluctance to make nuclear concessions. Iran finds itself in confrontation with Arab states, most notably Saudi Arabia, while major opponents – the United States and Israel – have nuclear weapons. Accordingly, Tehran would seek nuclear weapons itself (e.g. Kroenig, 2014, pp.32–40) or at least nuclear ambiguity (e.g. Jones and Holmes, 2012, p.214).[293]

Nonetheless, security is unlikely the primary driving factor for Iran's nuclear program. Gaukhar Mukhatzhanova (2010, pp.47–57) examines the threat argument looking at Iran's different phases of relationship with Iraq, Saudi Arabia, Pakistan, Israel, and the United States since the 1980s and concludes that the threat perception may be exaggerated.

In the last few years, Iran has found itself countering a range of threats. US President Donald Trump is particularly hostile to the state leadership and Iran's entanglement in the wars in Syria and Yemen underline conflict with other regional forces. Still, the Islamic Republic has complied with the JCPOA and accepted constraints on and verification of its nuclear program. Hence, security considerations do not appear to have pushed Iran towards non-cooperation.

Tehran's nuclear behavior would be inconsistent when assuming a security driven perspective to non-cooperation with the regime. Materially speaking, Iran could have developed a nuclear weapon. Why would Tehran conclude the JCPOA if it seeks nuclear weapons? The extensive verification commitments of the agreement, with which Iran has complied, reduces Tehran's ability to make use of nuclear deterrence and decreases the state's possible pursuance of strategic ambiguity.

Overall, there is no general response to whether security considerations facilitate or hamper cooperation within the non-proliferation regime in the light of regime enforcement. As noted by Derek Smith looking at deterrence and "rogue states," the motivation for nuclear weapon programs is diverse and so are states calculations on possible retaliation, most notably by the United States. A harsh approach of bullying states into compliance can easily backfire, which makes enforcement a delicate act (Smith, 2006). Any form of explicit or implicit military threat may offer incentive for regime compliance (which may have been a

[293] Following Scott A. Jones and James R. Holmes (2012), strategic considerations in the regional context may even exist without the current Islamic leadership.

contributing factor in Libya) or it may push a state further down the road of proliferation, as it appears to have been the case in North Korea.[294]

4.3.2. Norms

As Chapters 2 and 3 have shown, normative considerations have strengthened commitment to and compliance with the non-proliferation regime. Against this background, it makes sense to consider the normative contribution to states' (non-)cooperation in the enforcement system. Looking at the hypotheses, we expect a state to commit to and comply with regime norms and rules, if cooperation is fair and satisfies international law. In turn, if non-cooperation represents fairness and international law, then the state will refrain from committing to and complying with regime norms and rules.

Cooperation

Deriving from its behavior, **Libya** appears to be a candidate for a normative change of heart. Not only did the state give up its WMD programs but has also made several non-proliferation commitments, including the implementation of the Comprehensive Test Ban Treaty as well as the ratification of the Treaty of Pelindaba and the Additional Protocol. Under new leadership, Libya has become a champion of the humanitarian initiative and has signed the Treaty on the Prohibition of Nuclear Weapons.

Nonetheless, normative considerations do not appear to have been a crucial motivation for Libya to end its WMD programs.[295] Rather, the state was subject to other driving factors discussed in this thesis. Saif al-Islam al-Gaddafi, a leading figure behind the reversal, emphasizes the diplomatic deal with Western powers as main condition for Libya's decision (in: Andersen and Kleber, 2009). According to this line of thinking, compliance was the tool, not an end by itself.

Following **Iran's** argumentation, several normative considerations are defining its nuclear program. One argument put forward is humanitarian. Iran portrays itself as a non-proliferation champion, because it has itself been a victim of weapons of mass destruction

[294] Proliferation may even occur at radical consequences. As noted by Maria Rublee, "[c]ases such as North Korea, Pakistan, and Iran only underscore the point: if a country has the political will, not even poverty or underdevelopment can keep it from building a nuclear weapons program" (Rublee, 2009, pp.202–3).
[295] The literature on the Libyan reversal do not account for normative factors as having played a defining role. See e.g. Wyn Q. Bowen (2006), Jentleson and Whytock (2006), Palkki and Smith (2012), William Tobey (2014), as well as Barnum and Fearey (2016).

and seen its devastating effects. Accordingly, nuclear weapons are prohibited by religious decree by the Supreme Leader (e.g. Mousavian, 2017). On these grounds, Iranian leaders have repeatedly emphasized that Iran has complied with the non-proliferation norm and will continue to do so.[296] The humanitarian argument could explain why the state has, so far, refrained from developing nuclear weapons, despite an advanced nuclear infrastructure.

In the context of its controversial uranium enrichment, Iran claims to pursue international law and fairness. The Islamic Republic refuted calls to suspend its activities (e.g. UN Security Council, 2006b) while maintaining to honor the non-proliferation norm. Iranian leaders consider enrichment as an "inalienable right" that can be derived from Article IV of the NPT.[297] In this sense, the state is cooperating with the regime, as it is following the NPT.

The notion of fairness derives from Iran's reference to other nuclear programs. Allowing some states peaceful enrichment and refusing the right to others is considered by Tehran as highly discriminatory (Mukhatzhanova, 2010, p.62). Domestic enrichment is considered vital to maintain a fair regime. Referring to uranium enrichment, former President Mahmud Ahmadinejad stated:

> "This is one of our rights in terms of international law. We don't necessarily wish to call on these rights. […] Countries which produce uranium over 20 % enrichment based on their rights must also allow us to produce at 20 % enrichment level, but so far we've not been permitted to do so" (in: FRANCE 24 English, 2012).

Still, normative considerations are unlikely an isolated driving factor for Iranian nuclear behavior. The legalistic argumentation by Ahmadinejad above does not explain why the state broke IAEA rules like failing to declare nuclear facilities. There are also less controversial ways than enrichment to show discontent with an (allegedly) unfair implementation of the NPT and to underline humanitarian concerns, which Iran does not pursue (e.g. supporting the Treaty on the Prohibition of Nuclear Weapons).[298] Nonetheless, the image of fairness plays into the driving factor of status, which will be considered in subsequent pages.

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[296] For instance, in a 2017 interview with NBC, Iranian President Hassan Rouhani pointed out that Iran will only pursue peaceful nuclear activities, even if the JCPOA were to break down (in: NBC Nightly News, 2017).
[297] More specifically, Article IV.1. of the NPT states that "Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty." Iran's "inalienable right to enrich" is also rejected by some scholars (e.g. Kroenig, 2014, pp.84–6).
[298] Accordingly, there have been calls for Iran to be a greater champion of non-proliferation on an international stage (e.g. Mousavian, 2017).

Also, **Iraq** insisted that it was cooperating with the regime while critizising a lack of fairness. The Operation Iraqi Freedom showed that the state was, from a material perspective, in compliance with the non-proliferation norm. Prior to the 2003 military invasion, Hussein publicly and internally criticized international sanctions. Apparently, he had doubts that extensive compliance with UN demands would lead to a relief of the measures. He reportedly stated to his inner circle that Iraq would have "sanctions with inspectors or sanctions without inspectors" (Palkki and Smith, 2012, p.283).

Indeed, there were structural challenges imposed by the sanctioning states. Iraq could not possibly comply with rules that assumed it had an active WMD program. As pointed out by Mohamed El Baradei (2011, p.68), the demands in a March 2003 draft Security Council resolution by the United Kingdom included six demands towards Iraq, at least three of which the state could not fulfill because it simply did not have the suspected material and inventory.

Non-Cooperation

Iraq also vocally refuted international sanctions and claimed that they were inhuman, giving a possible incentive for less cooperativeness. There is validity in the claim, as sanctions are seen to have made it more difficult for the Iraqi population to fulfill basic needs (Reynolds and Wan, 2012, p.68). According to several scholars, the sanctions may have contributed to the death of thousands of Iraqi children (e.g. Pape, 1998, p.76; Pyka, 2015, pp.35–6; Reynolds and Wan, 2012, p.68).

However, Charles Duelfer, former Acting Chairman of UNSCOM, concluded from his investigation of the Iraqi WMD programs that Saddam Hussein intentionally used humanitarian arguments to pressure the Security Council to lift sanctions. He finds that Saddam Hussein "emphasized the suffering of the innocent Iraqi civilian population and argued that the sanctions were immoral. At the same time, he gave prominent vocal Iraq supporters and willing influential UN-officials lucrative oil allocations" (Duelfer, 2004). The Iraqi leader could have eased the suffering of his people, but instead chose to consolidate power. Hence, the humanitarian aspect seems to have been not a driving force, but a tool to refute international sanctions.

A normative argumentation is also to be found in statements by **Syria**, which has failed to cooperate in clarifying the nature of its Dair Alzour facility. Criticizing the IAEA Annual Report, the Syrian Ambassador to the United Nations, Bashar Ja'afari, reemphasized the non-proliferation commitment of his country and described Israel as the "real nuclear threat"

in the region. Ja'afari (2016) denounced a "double standard" in the non-proliferation regime as well as an alleged failure by the IAEA to condemn Israel's military attack in 2007.

Criticism of the unilateral attack against the Syrian compound is legitimate. The former Director General Mohamed El Baradei described the attack as being hypocritic, since Israel – with the knowledge of the United States – attacked Syria, but refrained from providing the IAEA with information, which they were obliged to do (El Baradei, 2011).[299] In contrast to its 1981 bombing in Iraq, Israel was not sanctioned by the Security Council. Spector and Berman (2010, p.127) even come to the finding that "[t]he reluctance of the international community to criticize Israel's attack on Dair Alzour implies that the rules for using military force preemptively where emerging nuclear threats are concerned may be changing."

Still, calls for fairness fail to explain Syria's reluctance to fully comply with the IAEA's demands for cooperation in the matter of the Dair Alzour facility, which is simply another issue. If the bombing of the compound had created a normative incentive for Syria, an immediate public outcry could be expected. Instead, immediately after the attack, Syria and Israel reportedly had a silent agreement not to make the attack public (Follath and Stark, 2009). This would suggest that Syria, instead of crying out injustice, was taking other considerations than fairness into account.

In the case of **North Korea**, normative arguments are made to justify non-compliance with the non-proliferation norm. The state has repeatedly rejected UN Security Council resolutions as illegitimate (UN Security Council, 2017b, p.8). Pyongyang defends its development of nuclear weapons often as a combination of self-defense and pursuing an "inalienable right." Similarly, the North Korean ambassador to the United Kingdom Choe Il explains in an interview:

> "Our nuclear power is a result of the US hostile policy against us. The US has been threatening us with their nuclear power for 60 years. They have been threatening that they would launch a nuclear attack and destroy us. We need nuclear power to defend ourselves. Our nuclear power is our sovereign right. It is the only way to protect the peace of the Korean Peninsula and the region" (in: Sky News, 2017).

In this description, mixing considerations of norms and security, self-defense trumps the non-proliferation norm. There is also a legalistic aspect to this thinking, as the Non-Proliferation Treaty accounts for a withdrawal of a state party in the circumstances of

[299] The passage was also quoted by Syrian Ambassador Ja'afari (2016) at the United Nations General Assembly.

"extraordinary events" (Article 10). North Korea is the only state that has, so far, made use of this option.

The decision to make use of Article 10 is by itself interesting, as the state could also have chosen to further pursue nuclear weapons in secret while being party to the NPT. One possible explanation is that North Korea withdrew not only because of its "right" for self-defense but also because it acknowledged the international procedure that goes along with it. This line of thinking is doubtful, as the state had a nuclear weapons program in place while being an NPT-member, in other words the track record of the DPRK stood in contrast to the content of the treaty. At the same time, the decision could be a step targeted at the United States to come to an agreement – just as the first announcement of withdrawal in 1993 lead to the Agreed Framework.

From a normative perspective, another striking feature of North Korea's withdrawal from the NPT is that it is not equated with the pursuit of nuclear weapons. To the contrary, despite having a nuclear weapons program, Pyongyang argued in its announcement that

> "[t]he withdrawal from the NPT is a legitimate self-defensive measure taken against the US moves to stifle the DPRK and the unreasonable behaviour of the IAEA following the US. Though we pull out of the NPT, we have no intention to produce nuclear weapons and our nuclear activities at this stage will be confined only to peaceful purposes such as the production of electricity" (in: Acronym Institute, 2002).

Again, considering that North Korea had, contrary to the statement, an active nuclear weapons program in place, suggests that the normative justification given is unlikely to have motivated the state. Similarly, as mentioned in Chapter 3, Libya demanded that the IAEA safeguards system ought to be built upon "trust and co-operation" (IAEA Board of Governors, 1996c, Paragraph 80), although the state had at the same time a secret nuclear weapons program.

The North Korean and Libyan cases show that normative considerations are frequently put forward by states subject to regime enforcement – but their value in inspiring state behavior is questionable. Humanitarian arguments are often made to assure a state's regime compliance. Yet, this may be a decoy. Furthermore, fairness arguments, in which failures of other states or international organizations are emphasized, could be used to distract from one's own non-compliance with the non-proliferation regime. As Syria's (but also Iran's) criticism of Israel demonstrate, it is hard to distinguish between justification, criticism, and distraction.

4.3.3. Economics

Considering that financial sanctions and trade bans are a frequent tool of regime enforcement, it is worth exploring whether economic considerations have influenced states' (non-)cooperation with the regime. Drawing from the hypotheses developed in the introductory section, we expect a state to commit to and comply with regime norms and rules, if cooperation significantly enhances economic benefits. In turn, if non-cooperation provides economic benefits, then the state will refrain from committing to and complying with regime norms and rules.

Cooperation

Overall, economic considerations appear to have played an important role in achieving regime compliance. Sanctions and positive incentives can significantly influence a target state's economy as well as its nuclear decision-making. As such, they have the potential to serve as important tools of regime enforcement.

In the case of **North Korea**, the latest rounds of sanctions are particularly strong. S/RES/2371 (2017) was praised by the United States Mission to the United Nations by effectively "prevent[ing] North Korea from earning over a $1 billion per year of hard currency that would be redirected to its illicit programs" (Department of State, 2017).

The sanctions seem to have put the state into further economic isolation.[300] While North Korea's trade with China has increased between 2000 and 2015, the trade volume with secondary trade partners has by and large gone down (Wertz and Ruch Clegg, 2017). More recently, also Chinese trade has reportedly decreased. China has stated that it would discontinue the import of coal from North Korea (UN Security Council, 2017b) and continues to emphasize its implementation of Security Council resolutions (e.g. UN Security Council, 2019, p.29).

Economic sanctions have had a direct impact on the nuclear program. The 2005 US sanctioning of Banco Delta Asia had a significant effect on Pyongyang's budget, as suggested by Chairman Ed Royce of the US House Committee on Foreign Affairs. Royce stated that a senior defector familiar with the North Korean missile program "indicated that

[300] An overview of the implementation reports on the sanctions can be found on the website of the United Nations (United Nations, 2017). The effect of the sanctions on trade partners is ambiguous – also because of limited data (Wertz and Ruch Clegg, 2017).

because we had cut off the hard currency, they had to shut down their ICBM program" (in: US House Committee on Foreign Affairs, 2017).

Financial and economic considerations are an important incentive for North Korea – especially for small concessions. The main aim for the international community has been to establish (ideally verifiable) limitations on the production of fissile material. For North Korea, the threshold to justify positive incentives has been much lower, as noted by Haggard and Noland (2012, p.246) analyzing the Six-Party-Talks: "Inducements were periodically demanded simply to talk, in exchange for declaratory statements of intent, or to take actions that were easily reversible, most notably a 'freeze' of existing activities."

Iran appears to have been immensely affected by transatlantic sanctions, as to be seen in the EU-Iranian trade relationship. The year 2013, in which the JCPOA was concluded, represents the lowest levels of EU-Iranian trade. Exports were only 48.2% and imports only 5.4% of the values in 2006. Following the termination of sanctions in 2016, trade with the EU and the rest of the world, as well as foreign direct investment went up.[301] In the wake of the US withdrawal from the JCPOA, Iran's global trade decreased again by around €2.6 bn in 2018 (European Commission, 2019).

US-American pressure on banks from third party states has also put Tehran into isolation from the financial world in the past (e.g. Perthes, 2008, p.45; Jacobson, 2008, p.76). Major banks reduced or even ended their cooperation with Iran (Jacobson, 2008, p.76).[302] Likewise, Shell and BASF are said to have given up their plan to sell Basell, a Joint Venture, for €4.4 bn to the Iranian National Petrochemical Company (Kubbig and Fikenscher, 2007, p.16). Iranian business men are even said to have gone to Supreme Leader Khamenei to complain about the economic isolation of Iran and the fact that some Chinese banks have reduced or even cancelled their transactions with the Islamic Republic (Perthes, 2008, p.46).

Many politicians outside of Iran agree that the very fact that Tehran was willing to negotiate and eventually make an agreement on its nuclear program shows that sanctions did have an impact on getting Iranian concessions on its nuclear program.[303] Similarly, during a

[301] With imports from Iran increasing from €1.2 bn to €5.5 bn and exports increasing from €6.5 bn to €8.3 bn in the same time period (European Commission, 2017).
[302] According to Kubbig and Fikenscher (2007), Daimler Chrysler has also suspended its activities with Iran because of US persuasion.
[303] For instance, in an interview with Mic Network, former US President Barack Obama (2015) emphasized that strong sanctions were necessary to bring Iran to the negotiation table on its nuclear program. Opponents to the JCPOA argue that sanctions against Iran should have been kept as leverage to achieve a more comprehensive nuclear deal or to end other illicit Iranian activities (e.g. Rothfus, 2015). The argument was repeatedly mentioned in the US political debate (e.g. in: US House Committee on Foreign Affairs, 2017). US

debate of candidates for the Iranian presidential elections in 2013, the eventual victor of the elections, Hassan Rouhani, stated:

> "All of our problems stem from this – that we didn't make the utmost effort to prevent the [nuclear] dossier from going to the UN Security Council. It's good to have [uranium enrichment] centrifuges running, providing people's lives and sustenance are also spinning" (in: Giles, 2015, p.45).

Rouhani's election was a political momentum. He sought a lifting of international sanctions; two months after him taking office, nuclear talks with the P5+1 resumed (Giles, 2015, p.45). The JCPOA was a sanction relieve, Iran's reason to make a commitment in the first place. In a meeting with the Assembly of Experts, Supreme Leader Khamenei (2015) made clear: "We negotiated so that the sanctions framework will be eliminated and that sanctions in general will be lifted," reiterating that if sanctions stayed in place, the JCPOA was baseless. Thus, the conclusion of the JCPOA suggests that a combination of effective sanctions and prospects of sanction relieve had a positive impact on Iran making and keeping its international commitments.

International sanctions also provided momentum for **Libya** to give up its nuclear weapons program. Although the state had been under sanctions for decades, the years prior to the December 2003 announcement were pivotal. As noted by Barnum and Fearey (2016), while sanctions had only a minor effect until 1992,[304] they lowered investments and increased uncertainty throughout the 1990's. In combination with domestic failures, sanctions constrained economic development (Barnum and Fearey, 2016, pp.238–41).

A diplomatic solution could relieve these constraints. Following Jentleson and Whytock (2006), in the summer of 2002, weapons of mass destruction became part of a larger offer by the US and the UK to normalize relations with Libya. By March 2003, the communication had turned into serious negotiations (Jentleson and Whytock, 2006, pp.73–4).

According to Saif al-Islam al-Gaddafi, giving up WMD programs was, above other things, a political deal in exchange for ending Libya's isolation (in: Andersen and Kleber, 2009). At the same time, the feasibility and the prospects of a successful nuclear weapons program offered fewer gains (Palkki and Smith, 2012, p.273). To the contrary, continuing the nuclear weapons program may have caused significant retribution.

President Donald Trump estimates that the lifting of the sanctions in the context of the JCPOA prevented a collapse of the Iranian regime (Trump, 2017a).

[304] The costs of sanctions between 1980 and 1992 only amounted to an estimated $850 million (O'Sullivan in: Jentleson and Whytock, 2006, p.238).

Also in **Iraq**, economic considerations played a role in dismantling the nuclear program. Overall, the enforcement measures against Iraq are seen to have been efficiently agreed upon and implemented, while having a shattering effect on the Iraqi society in the 1990's (Pyka, 2015, pp.33–5). The Gulf War and the economic sanctions led to a massive inflation and a decreasing Gross Domestic Product (Reynolds and Wan, 2012, p.68).

According to internal documents and statements by affiliates of the Iraqi leadership, Saddam Hussein was very concerned about the falling morale of the Iraqi people, as it could pose a domestic threat to his leadership (Palkki and Smith, 2012, pp.278–9). According to the Duelfer Report, Iraq's primary goal throughout the 1990s was to get rid of international sanctions and, therefore, the state dismantled its WMD programs (Duelfer, 2004).

However, Iraq only complied as much as necessary. Following the Duelfer Report, Iraq's conflict with UNSCOM in 1998 was accompanied by increasing pessimism about gains from cooperation. Instead, Iraq strategically aimed at escalating the conflict to the Security Council, where it found support by France and Russia (Duelfer, 2004). This would suggest that the very same measures that provided for Iraq's compliance with the non-proliferation norm was also the basis for breaches of verification rules.

In sum, economic considerations have been a strong incentive to get nuclear concessions from a state. Whether the concessions resemble a long-term compliance depends on the case. In Libya, the relieve of sanctions contributed to a full reversal of the nuclear weapons program. Iraq dismantled the WMD programs but failed to comply with verification. In the Iranian case, sanctions paved the way for the JCPOA. In North Korea, nuclear concessions have only been very minor.

Non-Cooperation

Looking at the enforcement cases considered in this chapter, one argument to explain non-cooperation may be that international measures have failed to create economic momentum in the target state. There are indicators for setbacks in the firepower of sanctions. In **Iran**, there have been differences in capacity[305] and willingness among the sanctioning states to implement UN resolutions successfully.[306]

[305] In a striking illustration, Jacobson (2008, p.80) pointed to the shortcoming that Italy "has less than 15 people working in its export control office, and only eight of these are investigators."
[306] A comprehensive report regarding the implementation of sanctions against the Iranian nuclear program was produced annually by the Security Council Committee established pursuant to resolution 1737 (2006) up until 2015.

While the UN resolutions gave the US and the EU room for maneuvering to implement tough measures, the reading of the UN sanctions was much narrower by other international powers, such as Russia and China, which demanded that sanctions should neither disturb usual commercial relations nor hurt the Iranian people (see O'Sullivan 2010, p.16).

During the early years of UN sanctions, the economic relationship between Iran and Russia grew steadily (Ilias, 2010, p.23). Russian-produced goods, such as passenger airplanes, and weaponry have been sold to Iran (Trenin and Malashenko, 2010, p.21). A "flagship of Russo-Iranian economic cooperation" is the $1bn Bushear nuclear power reactor, which was officially launched in August 2010 (Trenin and Malashenko, 2010, p.21).

China's trade position has also profited from the sanctions. Iran and China have signed a $100bn-agreement, described as the "deal of the century," about the delivery of liquefied natural gas to the People's Republic over the period of 25 years (Afrasiabi and Kibaroglu, 2005, p.263). In 2018, China was Iran's most important trading partner, representing 26.4 % in Iran's total trade with the world (European Commission, 2019).

Also in **North Korea**, there are indicators for a limited influence of sanctions on the national economy. The state has been living under sanctions for many years (see also: Thae, 2017). Even though the new sanctions of 2016 and 2017 are more comprehensive, the immediate leverage of Western states is limited.

In 2015, the DPRK imported goods worth around $39,7 million from Europe and $21.5 million from North America (OEC, 2017). China has a much greater pull but has demonstrated less willingness to take a hard stance on Pyongyang, as seen in the discussions surrounding previous UN resolutions. The international community has, thus, either too little leverage or to little incentive (see also: Haggard and Noland, 2012, p.240).

According to the Panel of Experts which is monitoring the implementation of the UN sanctions against North Korea, there is also an evasion of the sanctions from North Korea, other states, and entities/individuals. Pyongyang has found various ways to circumvent the effect of sanctions. In the maritime sector, strategies of the North Korean maritime administration have included the renaming and re-registering of vessels, an illicit certification for vessels and crew, and an alteration of vessel identity and documentation. In the financial sector, front companies or foreign ownership of North Korean financial institutions have been used to access the international banking system (UN Security Council, 2017b, pp.18–25).

Pyongyang's evasion of UN sanctions is also facilitated by the poor implementation or intentional circumvention of the resolutions by some UN member states, limiting the outcome effectiveness of sanctions. For instance, after China stopped the import of coal from North Korea, Pyongyang shifted its coal exports to other states like Vietnam and Malaysia. In other cases, the trade route is disguised through trans-shipments (UN Security Council, 2019). In addition to the violation of sanctions through UN member states, the high frequency of sanctions puts challenges to a quick implementation of the measures in the UN member states,[307] leaving Pyongyang time to adjust to the new circumstances.

The vigorous attempts to circumvent sanctions show again that they can have a strong impact on a state's economy. Whether the economic effect translates into norm compliance in the nuclear field seems to depend on the target state's economic alternatives and the state's political insistence (e.g. regarding domestic enrichment in Iran). Iran and North Korea have seen many rounds of sanctions in the past. North Korea, in particular, shows that even one of the poorest countries in the world prefers not to cooperate with the regime to a great extent, even that means bringing the state close to collapse (see also Rublee, 2009, pp.202–3).

4.3.4. Status

Inducements may also shift a state's calculations on its own domestic or international standing. Did status-related considerations play into (non-)cooperation with the non-proliferation regime? Following the hypotheses developed in Chapter 1, a state would commit to and comply with regime norms and rules if cooperation enhances its status. If, in-turn, non-cooperation enhances a state's status, then it will refrain from committing to and complying with the regime.

Cooperation

For **Iran**, status-related aspects seem to play an important role in making and refraining from a nuclear commitment. Tehran refrains from great concessions on its nuclear policy due to the prestige connected with the nuclear program (e.g. Perthes, 2008, p.93; Sadjadpour,

[307] An indicator for the administrative challenges to the implementation are state reports on the respective UN resolutions: *"As of* 7 November 2017*, 7 Member States [have]* submitted reports on the implementation of resolution 2375 (2017), 20 Member State have submitted report on the implementation of resolution 2371 (2017), 87 Member States have submitted reports on the implementation of resolution 2321 (2016) and 101 Member States on the implementation of resolution 2270 (2016)" (United Nations, 2017).

2009, pp.23–4). Developing an advanced nuclear technology underlines Iran's place among the powerful countries in the world (Afrasiabi and Kibaroglu, 2005, p.257). For Supreme Leader Khamenei, the nuclear program represents the spirit of the revolution of 1979, namely the Iranian struggle for independence, the injustice of foreign countries, the Iranian need for self-sufficiency, and Islam's high respect toward science (Sadjadpour, 2009, p.22).

Sanctions have not changed the Iranian goal to establish an advanced nuclear program. Following estimations by nuclear physicists, Iran could have saved billions of dollars if it decided in favor of importing enriched uranium. Nonetheless, Khamenei emphasized the benefits of the full and independent nuclear cycle (Sadjadpour, 2009, pp.23–4).

Sanctions may have even strengthened the incentive to proceed with enrichment. As noted by Miroslav Nincic (2012, p.137), "it seems that each new wave of sanctions has been coupled with Tehran's strengthened commitment to its nuclear program, and with staunch public support for it." Following Iranian Foreign Minister, Mohammad Zarif, Iran increased its centrifuges from 200 to 20,000 from the beginning of the sanctions to the talks that would lead to the JCPOA. Describing Iran's behavior to sanctions, Zarif stated: "Iran does not respond well to threats. We respond very well to mutual respect and mutual interest" (in: CNN, 2017).

The JCPOA acknowledged Iranian domestic uranium enrichment. In exchange, for the first time in 8 years, Iran was willing to accept limits on its program (Giles, 2015, p.45). Put differently, all carrots and sticks combined did not change Iran's insistence on domestic enrichment. Only when the P5+1 negotiators yielded to that stance, was Iran willing to conclude an agreement.

Status may also have contributed to **Libya's** reversal of its WMD programs. First of all, status considerations were part of the reason why Tripoli initiated a nuclear weapons program. Following Saif al-Islam al-Gaddafi, a main actor behind Libya's reversal, Libya pursued nuclear weapons to respond to the power and presence of the United States (in: Andersen and Kleber, 2009). Muamar al-Gaddafi imagined an "Arab bomb" as deterrence.[308] By promoting the Arab cause, the Libyan leader was seeking to expand his position among Arab allies in the region (Bowen, 2006, p.22).

Libya's affiliation changed prior to the 2003 WMD reversal. Facing UN sanctions, al-Gaddafi grew frustrated with insufficient Arab support and turned increasingly from Pan-

[308] Muammar al-Gaddafi made several references to an Arab bomb, to counter the military power of the United States and Israel (Bowen, 2006, pp.20–22).

Arabism to Pan-Africanism, which made nuclear weapons as status symbol superfluous (Barnum and Fearey, 2016, pp.241–2).[309] More than that, by creating a Nuclear-Weapon-Free Zone in Africa, "Pan-Africanism" reflected a stance against nuclear weapons.

Publicly reversing the WMD programs also offered status gains for Libya. Saif al-Islam al-Gaddafi stated that his father "believed that if this problem were solved, Libya would emerge from the international isolation and become a negotiator and work with the big powers to change the Arab situation" (in: Jentleson and Whytock, 2006, p.48). This would suggest that cooperation, by itself, was perceived as a tool to improve Libya's standing in the region.

Cooperation meant that Libya had to make a behavioral U-turn, from a state sponsor of terrorism to a supporter of the fight against terrorism and from a potential WMD proliferation to a chastened member of the non-proliferation community. Libya is, therefore, an example of how a change of status perception may contribute to regime compliance. The non-proliferation regime was not the initiator of the status-related change. Rather, it seems to have served as a platform to which Libya could subscribe to lose its image as a rogue state.

While Iran as well as Libya appear to have been affected by status-considerations in their willingness to make a nuclear agreement, the outset was quite different. In Libya, the preferences regarding status changed by recognizing the very virtue of international cooperation and Pan-Africanism. Thus, status interests became compatible with international demands. In Iran, it was the international demand that changed (to suspend domestic enrichment in Iran), making cooperation from a status-perspective more attractive for the Islamic Republic.

Non-Cooperation

Iraq under Saddam Hussein never lost the image of a rogue state. This is also due to a variety of status-related considerations that added to the state's non-compliance with the regime. The Duelfer Report gives insight into the worldview and calculations of Saddam Hussein. His goal was to ensure Iraq's leadership in the region. As the state saw itself to be inherently superior to other Arab states, it had to lead in a variety of fields. Duelfer notes in his transmittal message:

[309] Similarly, Malfrid Braut-Hegghammer (2008) describes a changing calculus in Libyan leadership regarding its nuclear weapons program.

> "In [Saddam Hussein's] view, the most advanced and potent were nuclear science and technology. By all accounts, and by the evidence of the massive effort expended by the Regime, nuclear programs were seen by Saddam as both a powerful lever and symbol of prestige. He also did not want to be second to the Persians in neighboring Iran" (Duelfer, 2004).

Iraq had, therefore, status-related incentives to advance its nuclear program. The main driving factors to pursue nuclear weapons were similar to those of Libya. Saddam Hussein intended to develop a deterrence, mainly against Israel and Iran, and to position Iraq as leader among Arab states (Brands and Palkki, 2011).

Another aspect that drove Iraq to its original non-compliance was its relationship with the United States. Saddam Hussein could generate a lot of domestic support by portraying himself as a rival to the "last superpower," which made non-compliance with demands by the US intriguing (Duelfer, 2004). International sanctions were used by him to strengthen his position, by scapegoating the sanctioning parties, establishing a state-controlled rationing system, and rewarding domestic allies (Palkki and Smith, 2012, p.278). Iraq could generate financial means illegally and redistribute them. For instance, the state managed to secure $10.1 billion between 1997 and 2002 through illicit activities, such as oil smuggling (Reynolds and Wan, 2012, p.70).

For **North Korea**, compliance with the non-proliferation regime has been hampered by the value of the nuclear program. In 1993, Kim Jong-il convinced his father, Kim Il-sung, that nuclear weapons were a better option to improve the economy than the Chinese model of market opening (Cha, 2012, p.4). In choosing a nuclear weapons pursuit, the state followed a path on which it still finds itself today. Also, Kim Jong-un's *Byungjin* strategy emphasizes the close link between the success of the North Korean economy and its nuclear arsenal (Sun and Wit, 2015, p.70).

On an international stage, North Korea uses its nuclear weapons status frequently to push for concessions in other fields. For instance, during the Six-Party Talks, North Korea made the Banco Delta sanctions part of the negotiations (Bechtol, 2010, p.82). The financial freeze going along with it was not specifically aimed at nuclear weapons, but money laundering.

Furthermore, the successful development of nuclear weapons by Pakistan and India as well as the status that goes along with it, appear to be an important point of reference for Kim Jong-un (Thae, 2017). Hence, North Korean ideological mastermind and later defector Hwang Jang-yop demanded from sanctioning countries in 2006 that they should not reward North Korea's nuclear weapons status:

> "We should tell them (North Korea) 'You can't take part in six-party talks. You are not qualified to come to the six-party talks. The remaining five parties can prove that Kim Jong-Il's regime is an international criminal organisation and the enemy of democracy. There is plenty of evidence" (in: AP Archive, 2006).

Nuclear weapons also seem to be an essential instrument for the domestic survival of the Kim dynasty. According to former North Korean diplomat Thae Yong-ho, the nuclear weapon ICBM program has been streamlined to the command of Kim Jong-un. Thae also states that "[Kim Jong-un] believes that ICBM equipped with nuclear weapons can provide him a kind of legitimacy of the leadership for [the] next several decades" (Thae, 2017).

Similarly, foreign powers are used by the political leadership to foster its status at home. In a most dramatic example, the North Korean famine in the second half of the 1990s was blamed on external forces: "People in general were made to believe that South Korea and the United States were taking advantage of the absence of Great Leader Kim-Il-sung and conspiring to start a war. They also believed that South Korea and the United States were plotting to starve the people in preparation for war" (Cha, 2012, p.75). In reality, other states provided food aid, which was rotting, owing to storage and transportation problems, or was used primarily for the military (Cha, 2012, pp.79–80).[310]

To sum up, nuclear weapon programs as well as international cooperation may stand each for respect and authority. Compliance with the regime has changed when either the domestic calculations on status change, as in the case of Libya, or if the international demands adopt to the domestic standing of the nuclear program, as in Iran. In North Korea, the general importance of nuclear weapons has not changed. This would explain, why the state has refrained from giving up on nuclear weapons.

A further status-related obstacle to regime enforcement is the very structure of the non-proliferation regime, which fails to accommodate for the current nuclear landscape. The Non-Proliferation Treaty as well as other major agreements[311] are based on the 1968 definition of a "Nuclear Weapon State." As such, the existing institutional framework constraints enforcement regarding **states outside of the Non-Proliferation Treaty** that presumably possess nuclear weapons: India, Pakistan, Israel, and (after its withdrawal from the NPT) North Korea.

[310] During a hearing in the US House Committee on Foreign Affairs, former North Korean diplomat Thae Yong-ho stated that the ration system is currently only available to civil servants (Thae, 2017).
[311] Such as Nuclear-Weapon-Free Zones, the Nuclear Suppliers Group, or the IAEA.

As matters stand, states outside the Non-Proliferation Treaty could not join the NPT as Nuclear Weapon States despite possessing nuclear bombs, since they tested their weapons after 1967 (Article IX, NPT). Nuclear Weapon States, in turn, would keep their status even if they individually decided to fully disarm. This outset leads to a deadlock in terms of disarmament. It is unlikely that Pakistan and India be accepted as Nuclear Weapon States into the NPT. Yet, it is also doubtful that the states give up their nuclear weapons to join the NPT as Non-Nuclear Weapon States (see also Nielsen, 2007).

As the Non-Proliferation Treaty provides the basis for other regime commitments, it is also difficult to integrate states outside the NPT into other institutions to strengthen regime commitment. A current example is India's bid for membership in the Nuclear Suppliers Group. Although a number of NSG members would except India into their ranks, China has repeatedly rejected the idea referring to NSG guidelines according to which membership is only for members of the Non-Proliferation Treaty.[312]

4.4. Summary

Enforcement in the non-proliferation regime is almost exclusively about preventing the *acquisition* of nuclear weapons. Just as the commitment and verification system, the enforcement system privileges the Nuclear Weapon States. Cases of non-compliance with the regime are eventually channeled to the UN Security Council. As Permanent Members, NWS can veto resolutions against their interest. Thus, enforcing the compliance of these states is virtually impossible.

Regarding the *possession* and *use* of nuclear weapons, the Security Council has passed resolutions on North Korea, India, and Pakistan. The nuclear weapon tests of the latter two were largely condemned, but the international community was divided on how to proceed. North Korea has been confronted with a variety of inducements over the last 25 years, without a notable effect on norm compliance. The state has repeatedly spoken in favor of denuclearization but has only made minor concessions on its nuclear program.

Just as in the North Korean case, there is a broad range of tools available to stimulate regime compliance in the *acquisition* of nuclear weapons. Inducements have targeted nuclear programs, the economy, or even the existence of the political leadership. Negative incentives have encompassed diplomatic and economic sanctions as well as the use of military. Positive

[312] Arguably, China's position resembles a double standard, as it is more likely to endorse Pakistan's membership, which is – like India – not a member of the NPT (see also Singh, 2018).

inducements have contained the suspension or ending of sanctions, nuclear energy assistance, economic support, and security assurances.

The outcome and impact of these measures differ. Libya gave up its WMD programs. Iraq largely dismantled its WMD but failed to comply with verification demands. Saddam Hussein also retained an eye on a future nuclear weapons program. Syria has failed to fully clarify the nature of the Dair Alzour compound, the destruction of which may have set back a possible nuclear weapons program. Iran's capacities to develop nuclear weapons under the JCPOA is restrained. Yet, the agreement is limited in time and, after US withdrawal, rests on unsound footing.

Traditionally, particularly the literature on sanctions shows a strong overlap with rational choice institutionalism. Following this line of thinking, if sanctions hurt, the target state will change its behavior (e.g. Iklé, 1961). This chapter has shown that material as well as non-material considerations play a role in state's willingness to cooperate. Regime enforcement may shift the security, normative, economic, or status-related considerations of the target states very differently. Yet, it would be to short-sighted to regard state behavior as a linear result of inducements. Sometimes they are simply a contributing factor in a larger picture.

Targeting **security calculations**, as in the (threat of) use of military force, is ambiguous. The political leadership surrounding Saddam Hussein was toppled by military invasion although the state had already largely followed regime norms. According to Muammar al-Gaddafi, the Iraqi case provided a contributing factor for Libya to end its WMD programs. North Korea, in turn, reportedly sees the overthrow of both leaders as incentive to maintain a nuclear weapons program. Hence, security considerations seem to affect regime compliance for better or worse.

Normative considerations are frequently brought forward by target states. There is a tendency to renounce nuclear weapons and to champion the non-proliferation regime. This is different in North Korea, which argues that it has a right to a nuclear weapons program as means of self-defense. Sanctions, in turn, are often referred to as unjust. Saddam Hussein dismissed international sanctions as inhuman. Yet, instead of easing their effect on the Iraqi society, he did the contrary, apparently attempting to consolidate power.

Economic concerns appear to have been crucial for Libya's reversal in that the political leadership saw potential gains in bringing the state out of international isolation. Economic considerations also seem to have motivated the newly elected Iranian President Rouhani to negotiate an agreement with the P5+1, thus, shifting the course of the administration of his

predecessor Mahmoud Ahmadinejad. In North Korea, sanctions have significantly hurt the state's economy. Although Chairman Kim Jong-un is seeking a retrieval of sanctions, the development of the North Korean nuclear arsenal continues.

Finally, **status-related considerations** are important. In several states targeted by regime enforcement, nuclear energy represents an aspect of great pride. Arguably, one of the reasons for why the JCPOA could be concluded was because the P5+1 acknowledged Iran's domestic uranium enrichment. On the other hand, nuclear weapons in North Korea continue to strengthen the international and domestic standing of the political leadership, making denuclearization difficult.

Reflecting on these factors, it becomes clear that there is no recipe for effective regime enforcement. A general or binary assessment of whether or not incentives work is misleading, even if it is just used as a pretext in some works on economic sanctions (e.g. Hufbauer, Schott, and Elliott, 1990; Pape, 1998). States react very differently to the same incentives. The success of enforcement depends on the formulation of enforcement tools and the target states' domestic context.[313]

For regime enforcement, this requires a variety of enforcement tools and the ability to make a sound judgement about the intentions of the political leadership in the target state. Otherwise, incentives can easily backfire, in that a state ends up more encouraged to pursue nuclear weapons or exploits positive incentives. In some cases, such as Libya or South Africa, regime compliance could even be achieved without specifically putting sanctions on a nuclear weapons program. This would contrast Fred Iklé's (1961) assumption that political consequences by the international community must follow a detection of non-compliance.

[313] This is in line with other scholars such as Derek Smith (2006).

5. Conclusion

Despite a vast amount of efforts to determine and explain the effectiveness of the nuclear non-proliferation regime, the existing literature lacks – apart from a few exceptions[314] – concepts for a macroscopic analysis. Instead, scholars demonstrate a narrow interpretation of the nature of the nuclear threat, the regime task, or the degree of regime effectiveness. Furthermore, the research includes very different understandings of what factors determine state behavior.

Outright conclusions that the non-proliferation regime is good or bad do not do justice to the complexity of the regime and its effectiveness. Aiming for a more nuanced understanding, this thesis presents a novel approach to analyze regime effectiveness by using an eclectic approach. It offers a manual on how effectiveness can be determined and explained in a more organized manner.

Integrating the different tasks and thematic fields of the regime as well as different levels of effectiveness, the model developed here (Figure 2) has two advantages: It allows for a better insight into the non-proliferation regime and strengthens the regime concept as an analytical tool in international relations. With slight amendments, the model can also be used for other security regimes.

In addition to its conceptual contribution, there is theoretical and empirical value. It was not my goal to claim that one driving factor rules the overall state behavior but to show where certain incentives may have particularly influenced states' (non-)cooperation. Applying a broad institutionalist frame, including a wide spectrum of incentives for state behavior, and drawing on a variety of resources allows a better account of the contextual background of state behavior.

My starting point was to broaden the awareness of the scope of regime effectiveness on different fronts. Fields and Enia have done important work in this regard,[315] but my intension was to establish a more integrative model. Taking three considerations into account allows for a three-dimensional model as an analytical tool to assess regime effectiveness in a comprehensive and nuanced manner.

First, we need to be aware of the primary norms of the non-proliferation regime as a security arrangement. The underlying principle of the regime is that nuclear weapons are a

[314] Comprehensive approaches to the regime's effectiveness include Fields and Enia (2009), Enia and Fields (2014), and Kaplow (2015).
[315] See Fields and Enia (2009) as well as Enia and Fields (2014).

threat to human kind. Three norms derive from this principle: States without nuclear weapons do not acquire them, states with nuclear weapons give them up, and states do not use nuclear weapons. This leaves us with different policy fields within the regime, i.e. the *acquisition*, *possession*, and *use* of nuclear weapons.

Second, the regime stands for a variety of roles to provide for, observe, and ensure states' compliance with the different norms. States may pledge or coordinate a certain behavior, thus, bringing their actions in line with the norms (*commitment system*). Tools of monitoring and verification shed light on whether states comply (*verification system*). In possible cases of non-compliance with rules and norms, the regime includes ways of enforcing compliance (*enforcement system*). Commitment, verification, and enforcement are to be found on a unilateral, bilateral, regional, and international level.

Third, we need to sharpen our understanding of what exactly is meant by *effectiveness*. A useful way to give a more precise account of the term is the distinction between output, outcome, and impact, as applied by Miles *et al.* (2002). *Output* effectiveness is the declared behavior relating to the regime's norms and rules. *Outcome* effectiveness reflects states' compliance with regime rules. *Impact* effectiveness is the larger effect on the nature of the problem, i.e. the overall acquisition, possession, and use of nuclear weapons.

Yet, the research question of this work – "What determines the effectiveness of the non-proliferation regime?" – goes beyond a description of the regime's effectiveness. Focusing on state behavior, I have developed an analytical rationale to explain why states (fail to) commit to and comply with the regime. Inspired by different institutionalist perspectives, I have defined a variety of possible incentives frequently associated with the regime that could explain states' decisions to cooperate or not: *security*, *norms*, *economics*, and *status*. Based on these incentives, I have explored the virtue of different hypotheses throughout the analysis of the regime's three systems (commitment, verification, and enforcement).

The remaining few pages are meant to reflect on this work to draw some general conclusions. Instead of repeating the chapters' summaries, I will sketch out some general findings regarding the assessment and explanation of regime effectiveness. On that basis, I will briefly lay out three modes of regime change that can be identified from the regime's past and could serve as starting points for enhancing regime effectiveness. Finally, aware of the limits of my thesis, I am pointing to potential additional research.

5.1. Assessing Effectiveness

In the introductory chapter, I made some forecasts of what shape the effectiveness of the non-proliferation regime could take. Inspired by the Oslo-Potsdam solution to regime effectiveness (e.g. Hovi, Sprinz, and Underdal, 2003b), I included two counterfactuals as a starting point for orientation: the *no-regime* and the *collective optimum regime*. Both scenarios play out differently in the three-dimensional model that includes the levels of effectiveness (output, outcome, impact), the policy fields (acquisition, possession, use), and the regime tasks (commitment, verification, enforcement).

Following the no-regime, there is no state cooperation in regime commitment, verification, and enforcement. In the three-dimensional model that displays the strength of cooperation, an illustration of the no-regime would take no shape. In stark contrast is the collective optimum regime, which assumes full cooperation in all its dimensions. As it addresses all dimensions in the model, the form would resemble a cube.

I have speculated that the actual non-proliferation regime could take the form of a *pyramid*. This is due to the understanding that the three axes are somewhat built upon one another: To enforce, you need first some form of verification, which tends to follow state commitment. To use nuclear weapons, you need to acquire and possess them. Finally, regime impact depends on states' commitment to and compliance with rules. Following the premise that effectiveness is likely to face some loss from one level to the other, all dimensions would get smaller towards the top – like a pyramid.

Reflecting on the past chapters, it can be argued that there are elements that suggest the existence of a "pyramid of effectiveness," meaning that there are instances that demonstrate a loss of effectiveness from one level to another. Not all states comply (*outcome*) with their declared behavior (*output*). Even complying with rules does not mean that regime norms are actually satisfied (*impact*). Furthermore, regime *commitment* in the Non-Proliferation Treaty does not translate into full *verification* (Comprehensive Safeguards Agreement and Additional Protocol). Success in regime *enforcement* seems to be even more limited.

In addition to that, the United States and the Soviet Union/Russia have concluded a number of bilateral agreements. Although both states have complied with most treaties, the discussions surrounding the INF Treaty demonstrate that there has also been non-compliance – decreasing *outcome* effectiveness towards *output* effectiveness. Looking at the global stocks indicates an even more limited success on the *impact* level. Again effectiveness appears to get smaller from one level to another – like a pyramid.

Despite these indicators that suggest the validity of a "pyramid of effectiveness," this work also offers observations that would contradict the notion. In fact, the reality is messier than any traditional geometric form could express. For instance, *nuclear sharing* demonstrates that, although Non-Nuclear Weapon States have not acquired nuclear weapons (thus complying with their NPT commitment), they may still be affiliated with nuclear weapon systems.

Furthermore, the levels not always build upon each other. *Outcome* effectiveness may trump *output* effectiveness and *verification* may be stronger than *commitment*. One of the greatest achievements of the non-proliferation regime is that in the 21st Century only one state has conducted nuclear explosions: North Korea. We also have a sophisticated verification infrastructure in place to detect nuclear explosions. Both achievements exist, although the Comprehensive Test Ban Treaty is not in force. Again, this would contradict the notion of a "pyramid of regime effectiveness."

The three-dimensional model should also not divert from the fact that the necessity of *commitment*, *verification*, and *enforcement* varies. One should not overemphasize managerial structures (see Strange, 1983, p.345). Particularly in enforcement, this work confirmed the understanding that there is no one-size-fits all tool to ensure states' compliance with regime norms, as states have reacted very differently to positive and negative incentives. Enforcement may even be superfluous in cases of unintentional non-compliance. Verification, in turn, may do more harm than good, as knowledge about a nuclear weapon infrastructure could contribute to proliferation.

5.2. Explaining Effectiveness

My approach to develop independent variables to assess regime effectiveness was based on a twofold choice. On the one hand, I have focused on state actors. On the other hand, my explanatory factors resemble incentives rather than capacities. Against this background, I have conducted an analysis of plausible intent from the perspectives of security, norms, economics, and status to assess their respective virtue in states' decisions in the systems of commitment, verification, and enforcement.

All four factors offer explanatory value for regime cooperation as well as non-cooperation. This also means that material and non-material considerations appear to have affected interactions in the non-proliferation regime. Yet, when looking at the different

systems as well as the nature of cooperation, there appears to be a hierarchy among the factors.

Security and status seem to play a crucial role in the establishment and maintenance of nuclear weapons programs. Both factors can be attributed to all states presumably possessing nuclear weapons. In my framework, security and status appear to represent strong incentives for non-commitment and non-compliance with the regime, as the programs contradict the norms on the *possession* and *use* of nuclear weapons. This finding is in line with the understanding that nuclear deterrence has a persistent value for states.

It would be an intellectual game to consider to what extent states possessing nuclear bombs would build them from scratch in today's landscape, if they did not already have them. For France, the response is likely "No!" (e.g. Tertrais, 2007, p.251). Such an analysis would allow a weighing of the importance of acquiring and maintaining nuclear weapons, thereby, further clarifying the role of path-dependency and, thus, the virtue of historical institutionalism. Unfortunately, an extensive examination of individual states is beyond the scope of this work.

Norms seem to strengthen the regime by contributing to a lasting effect of regime commitment and compliance. In accordance with the historical institutionalist literature, states do not appear to constantly question their choice to join the Non-Proliferation Treaty as Non-Nuclear Weapon States. The vast majority of states that had stopped nuclear weapon programs before becoming party to the NPT have not restarted them. But effectiveness goes beyond that. Particularly in recent years, the humanitarian purpose of the non-proliferation regime has been reemphasized by a number of NNWS. In this sense, norms remain a guiding star for strengthening the regime. This observation confirms the validity of sociological institutionalism, which emphasizes non-material and idealistic driving factors.

Economic considerations, in turn, appear to play a particularly important role in the enforcement system. Sanctions and, most notably, credible offers to retrieve sanctions have led to concessions from target states to commit to and comply with rules. Whether extensive cooperation can be achieved on the basis of enforcement depends on the state. Libya gives reason for hope, as the state decided to fully stop its nuclear weapons program, among other aspects in order to get rid of international sanctions. North Korea has, so far, demonstrated limited effect in stopping a nuclear weapons program, despite multiple rounds of sanctions.

Again, these observations are valid if official justifications, as presented in statements and agreements, are accepted as indicator for motivation. Given the macroscopic approach of this work, I have decided to refrain from a comprehensive analysis of an individual speech

act. Nonetheless, I have shown some instances in which justifications are unlikely to reflect motivation – often to be found in statements that appear to disguise illicit nuclear activities.[316]

5.3. Enhancing Regime Effectiveness

Although major changes within the non-proliferation regime depend on a certain degree of momentum (e.g. strengthening the regime's verification after discovering Iraq's WMD programs or enhancing the tools against non-state actors in the aftermath of the 9/11 terrorist attacks), it is important to keep in mind that regime effectiveness is not static. The framework for analysis developed in this work would have offered different results if it were applied in 1987, simply because the political and legal landscape differed. The framework is also likely to show other observations in 20 years from now, since regime effectiveness will probably change – for better or for worse.

After having conducted an assessment and explanation of regime effectiveness in this thesis, the question is: Where do we go from here? It should be the goal of politicians and scholars of political science to continue strengthening the non-proliferation regime. The macroscopic focus of this work allows for the identification of different avenues for enhancing effectiveness that can also be used for future approaches.

Based on my observations, I will briefly identify three ways to strengthen regime cooperation: the reform approach, the layering approach, and the wildfire approach. All of these avenues offer advantages and disadvantages in terms of states' cooperation. Consequently, a combination of approaches may be a promising way to strengthen the regime.

5.3.1. Reform Approach

One way of improving the regime is to reach universality through the existing frameworks of the NPT, the IAEA, the CTBT, and the UN. This "reform" approach has, for instance, been used for a reform of the Small Quantities Protocol or the extension of the Non-Proliferation Treaty. Accordingly, states outside the NPT could be included through a

[316] For instance, Brazil's pursuit of nuclear energy allegedly owing to the oil crisis, North Korea's declared intention not to develop nuclear weapons, although withdrawing from the NPT, Saddam Hussein's rejection of sanctions on humanitarian grounds, or Libya's demand for "trust" in the course of verification reform, while secretly developing a nuclear weapons.

reform of the treaty (e.g. Kumar, 2010), Nuclear Weapon States be forced to comply with disarmament obligations (e.g DiFilippo, 2005), and withdrawal from the NPT be made impossible (e.g. Miller, 2012).

The reform approach offers several advantages. To begin, integration would prevent additional institutional overlap, thereby, enhancing efficiency and clarity. The recognized Nuclear Weapon States have favored the traditional institutional track, which facilitates their involvement in shaping the future of the regime. Including Israel, India, and Pakistan through an NPT reform may even strengthen the regime by better reflecting current world affairs.

However, ambitious reforms are unlikely to materialize. Changes that depend on all states or a vast majority to take effect are difficult to implement. Most notably, the Comprehensive Test Ban Treaty was criticized for being a "stillborn" agreement, owing to its ratification requirements. Also, proposals to change the composition or voting system within the Security Council are very difficult to achieve due to current decision-making, even if a reform could facilitate regime enforcement.

There are also two difficulties in trying to include states outside the NPT in the treaty framework. First, no matter which legal way would be used, [317] all of them would virtually allow Israel, India, and Pakistan a Nuclear Weapon State status. Put differently, states that decided to stay outside the NPT in the first place are being "rewarded" for countering the spirit of the treaty. Non-Nuclear Weapon States could even be seen to be overburdened from a security perspective, if the option to withdraw, i.e. the "safety valve" (Shaker in: Miller, 2012), would be taken away.

Second, it remains doubtful whether the states outside the NPT would be willing to join the treaty. For instance, Israel's strategy is nuclear opacity (e.g. Miller and Scheinman, 2003). Joining the NPT would force the state to provide more transparency on its actual status. Being recognized for possessing nuclear weapons could also add to regional tension.

5.3.2. Layering Approach

Another approach to strengthening the regime is filling commitment gaps through institutional layering. On a macro-level, this scenario resembles a patchwork of international commitment, as new commitments are not achieved through institutional reform but

[317] There are several ways to recognize the nuclear weapon status of Israel, India, and Pakistan under the NPT-framework, i.e. through pushing the 1968 cutoff to 1998, through adding a third category (e.g. "state with nuclear weapons"), or adding a protocol to the NPT (Kumar, 2010).

additional agreements (e.g. regional or bilateral agreements) and the according verification and enforcement commitments. On a micro-level, individual commitments are being addressed through a step-by-step approach, e.g. through open-ended working groups or consultations.

The presence of different agreements may lead to overlapping rules. States may be given the opportunity to pick favorable rules or to play institutions against each other. For instance, the FM(C)T discussions have been hampered, among other things, by the fact that China linked its support to another agreement, i.e. PAROS, which is rejected by the United States. On a micro-level, a step-by-step approach is time consuming, as more input is fed into a decision. Each expert group has a selection process, a time of evaluation, and a certain form of reporting that needs to be evaluated.

Despite these disadvantages, the institutional layering approach is a good way to improve *output* effectiveness, since agreements "of the willing" are easier to achieve. Overlapping agreements could also serve as "back-up" towards each other, reinforcing the main goals of the regime. Even if individual agreements fail, others remain in place.

On a micro-level, careful preparations by group of experts can anticipate the impact of a treaty. For instance, in the context of a possible Fissile Material (Cutoff) Treaty, the Group of Governmental Experts addressed a wide field of topics – including scope, definitions, verification, and legal/institutional arrangements (UNOG, 2014). Furthermore, they may keep the process going in times of political tension, such as international expert meetings on verifying a test ban treaty during the Cold War.

Individual agreements also have the advantage of addressing specific concerns and deals. In the case of Brazil and Argentina, bilateral cooperation led to regional and international cooperation. The JCPOA with Iran or the US-India nuclear deal allowed for additional commitments from states. As for India, the approach facilitated the further regime inclusion of a state not party to the NPT.

Yet, the question needs to be asked to what extent "patchwork deals" also have a negative impact by undermining the non-proliferation regime in other ways. In this sense, the US-India nuclear deal has also received great criticism for virtually accepting the nuclear weapon status of India (see e.g. Kimball, 2005). The JCPOA, in turn, acknowledges that Iran can domestically produce fissile material, which according to some scholars sets a dangerous precedent (e.g. Kroenig, 2016).

5.3.3. Wildfire Approach

The Geneva Nuclear Disarmament Initiative – better known as "Wildfire>_" – advertises a radical approach to improving the non-proliferation regime.[318] The organization criticizes the slow progress in complete disarmament and argues that Nuclear Weapon States will not give up their nuclear weapons because they are "addicted" to them. Accordingly, a step-by-step approach is the wrong way to achieve a world free of nuclear weapons.

The "wildfire" approach intends to shift emphasis away from the current nuclear landscape, which is supposedly defined by the power and interests of Nuclear Weapon States, by focusing on *impact* rather than *output*. The goal should be to "change the game." States without nuclear weapons should not accept "empty promises," bring forward a treaty that outlaws nuclear weapons (and Nuclear Weapon States) and that includes no withdrawal options or other loopholes. The effort contributed to the Treaty on the Prohibition of Nuclear Weapons.

Outlawing nuclear weapons would certainly reinforce the idea that they are illegitimate, turning the current ambiguous evaluation of nuclear weapons (no/yes-if) into a clear "no." Strategically speaking, the approach offers more agency to Non-Nuclear Weapon States, i.e. those states that should have a particular interest in the complete disarmament of nuclear weapons.

The question is whether Non-Nuclear Weapon States can pressure Nuclear Weapon States into disarming. This is doubtful. First, given that the interests of Non-Nuclear Weapon States and their relation towards nuclear weapons differ (i.e. in matters of *nuclear sharing*), it is doubtful that they can produce a united front against nuclear weapons. The divide in the support of the Treaty on the Prohibition of Nuclear Weapons underlines this hurdle.

Second, even if all NNWS agree to "outlaw" nuclear weapons, the impact on NWS may be weak, as the agreement would need to comprehensively address their strategic considerations. After all, the Treaty on the Prohibition of Nuclear Weapons is not supported by any Nuclear Weapon State nor their military allies. Particularly with a low membership, the treaty may become another "paper crane" – the sort of agreement that Wildfire>_ intended to throw out.

One decision by Non-Nuclear Weapon States that would strategically affect Nuclear Weapon States is nuclear blackmail: "If you do not get rid of your stocks within time x, we

[318] Details on "Wildfire>_" can be found in: Geneva Nuclear Disarmament Initiative (2019).

will leave the NPT and give up our commitment not to acquire nuclear weapons." Apart from the fact that this is a high gamble threatening past achievements, most NNWS can be expected to prefer the status quo over nuclear anarchy (e.g. Horovitz, 2014). In other words, the threat is unlikely to materialize.

5.4. Additional Research

Despite its comprehensive approach, this thesis leaves various starting points for additional research – both in better understanding regime effectiveness, in general, as well as the non-proliferation regime, in particular. Some studies can serve as a follow-up to my research. Others could cover aspects that were left aside here, owing to a narrowing of the research question.

The major contribution of this work is the concept of assessing and explaining regime effectiveness. The **three-dimensional model** developed in the introductory section can easily be applied to other regimes, most notably security regimes. The model allows a better understanding of regimes relating to weapons of mass destruction and makes them more comparable. It would be worth using the same approach for the regimes surrounding biological and chemical weapons, which could use the same categories to determine regime effectiveness, i.e. *regime task* (*commitment*, *verification*, *enforcement*), *policy field* (*acquisition*, *possession*, *use*), and *level of effectiveness* (*output*, *outcome*, *impact*).

Beyond WMD, I would argue that the effectiveness of virtually any regime could be measured against the three-dimensional model developed in this work. Two dimensions, the regime tasks and the levels of effectiveness, are universally applicable. While also the third dimension (policy field) remains valid for all regimes, its exact definition may require amendments.

The policy fields of some regimes, e.g. as to be found in the environmental field, could be categorized like the non-proliferation regime. If the regime goal were to reduce CO2 emissions, the policy fields could also be *acquisition* (e.g. making rules to build cars with low emissions), *possession* (e.g. creating incentives for consumers to trade in their old cars for environment-friendly vehicles), and *use* (e.g. prohibiting cars with high CO2 emissions in certain zones).

My conceptual choice was to consider different incentives as **driving forces** that are prominent in the existing academic literature (norms, security, economics, status). There are other incentives that could be explored but have been left out in this work. For instance, a

focus on the possible factors of health, environment, technology, or research may be worth taking against the background of the three-dimensional model. To what extent have these aspects – treated in a more isolated fashion – advanced or hampered regime cooperation?

Beyond incentives, regime effectiveness also depends on capacities. Just because an actor *wants* to do something does not mean that he or she *can* do something. Cognitive, financial, technological aspects, or natural resources may enable or hamper a certain development. To what extent do capacities affect cooperation in the regime?

As we live in an ever more institutionalized world, the recent take on **regime complexity** is legitimate and deserves further attention. As I have argued before, the added conceptual value of regime complexity should not be the sheer coexistence of different institutions, as this can easily be explained with the existing regime concept. Instead, scholars of International Relations ought to focus on regimes that are "potentially problematic" towards each other, as defined by Orsini, Morin, and Young (2013, p.29).

In the field of fissile material or nuclear weapons I would identify three regimes that are potentially problematic towards each other. They have similarities but also crucial differences in either norms, rules, principles, or decision-making procedures. Considering that it may not suffice to examine state behavior in an isolated fashion in one institution to understand regime effectiveness, further research could examine the effect of the three different regimes towards each other.

Apart from the non-proliferation regime, as described in this thesis, it could be argued that the peaceful use of nuclear energy resembles a distinct regime that shares the same membership and even organizations. The potential conflict with the non-proliferation regime lies in the order of preferences. The peaceful use regime enables the use of fissile material and cooperation (for peaceful purposes). The non-proliferation regime restrains fissile material and cooperation (for military use). The NPT and the IAEA try to strike a balance between the two. Yet, a state that is solely interested in peaceful uses may be frustrated by the burden placed upon it.

Then there is arguably also a nuclear deterrence regime. It may share the same principle as the non-proliferation regime that nuclear weapons pose a threat to human life (if they were to be used). It also shares the norm not to use nuclear weapons in an actual military conflict. Yet, the larger conclusions on norms and rules differ significantly. One underlying logic of a nuclear deterrence regime could be that the possession of nuclear weapons in the hands of

rational leaders may not only strengthen security but even enhance peace.[319] This is highly problematic when compared with the norm of the non-proliferation regime not to possess nuclear weapons but to disarm.

In addition to the larger state-centered regime approach laid out in this thesis, it is essential to devote further attention to **groups of actors** that affect the regime and *vice versa*, such as expert groups and epistemic communities (e.g. Pelopidas, 2011; Kutchesfahani, 2014), intelligence (e.g. Bollfrass, 2017b), illicit trading and assistance networks (e.g. Albright, Brannan, and Stricker, 2010; Maccalman, 2016), or cyber networks (e.g. Zetter, 2014; Rotondo, 2016). Here, small-n or single-case studies can provide closer insight into the nuts and bolts of the regime.

These avenues for further research show that there is still a lot to be done by scholars studying the non-proliferation regime. At the same time, it is up to politicians and civil society to further strengthen the regime. More than 70 years after the devastating bombings of Hiroshima and Nagasaki, nuclear weapons still pose one of the greatest challenges in international relations. Facing the regime's setbacks as pointed out in this thesis should not leave us discouraged. To the contrary, we should focus on the regime's achievements and strive to do more. This way, the non-proliferation regime can become a testimony of what is possible when international cooperation works at its best.

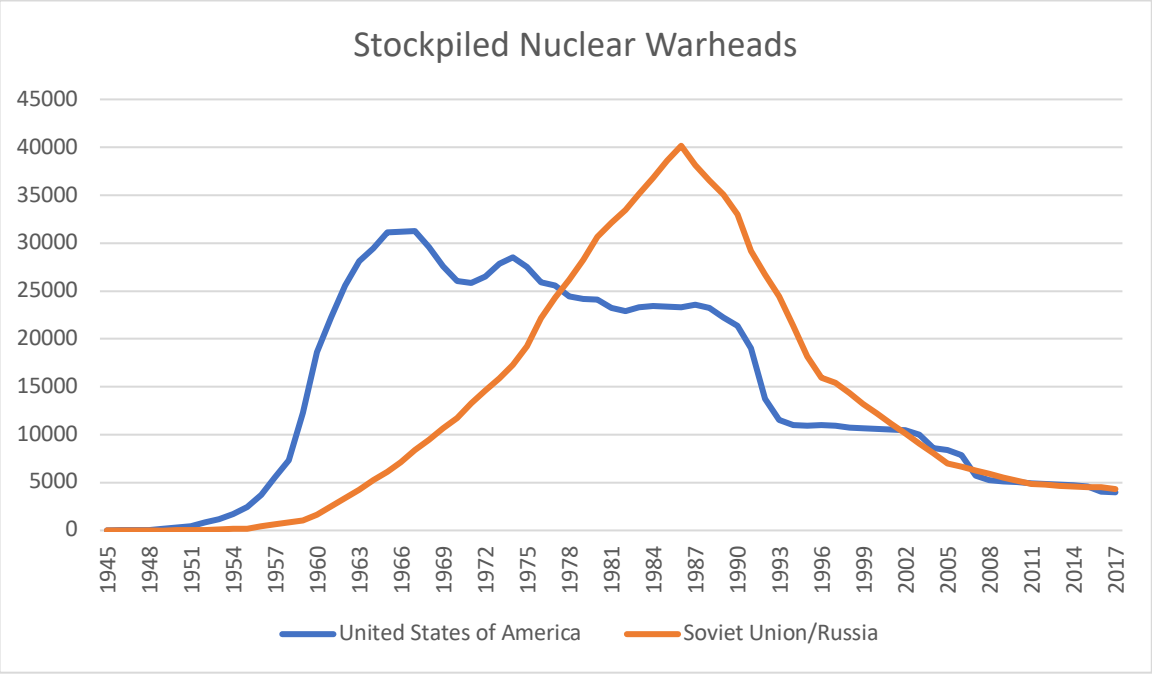
[319] On the argument that nuclear weapons in the hands of rational leaders may enhance peace see Waltz (1981).

6. Appendix

Appendix 1 – Nuclear-Weapon-Free Zones: External Support

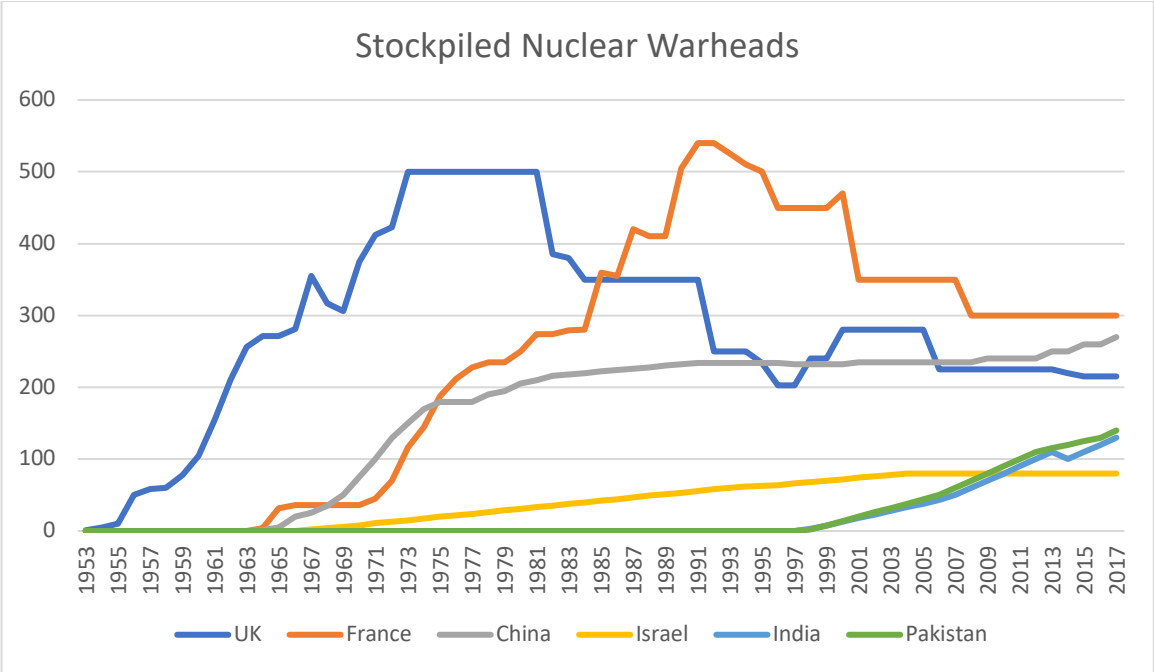
	Tlatelolco	**Pelindaba**	**Rarotonga**	**CANWFZ**	**Bangkok**
General Support/ Negative Security Assurance	Protocol II: Signed and ratified by all NWS	Protocol I+II: Signed and ratified by all NWS, except US (only signed)	Protocol II: Signed and ratified by all NWS, except US (only signed)	Protocol: Signed and ratified by all NWS, except US (only signed)	Protocol: Neither ratified nor signed by any NWS
Commitments on Territory in Zone	Protocol I: Signed and ratified by France, the Netherlands, UK and US	Protocol III: Signed and Ratified by France, not by Spain	Protocol I: Signed and ratified by France and UK. Signed, but not ratified by US	N/A	N/A
Nuclear Weapon Tests	N/A	Protocol I: Signed and ratified by all NWS, except US (only signed)	Protocol II: Signed and ratified by all NWS, except US (only signed)	N/A	N/A

Appendix 2 – Nuclear Warheads: US and the Soviet Union/Russia[320]



[320] Data from Bulletin of Atomic Scientists (2019).

Appendix 3 – Nuclear Warheads: UK, France, China, Israel, India, and Pakistan[321]



[321] Data from Bulletin of Atomic Scientists (2019).

Appendix 4 – Nuclear-Weapon-Free Zones: Verification and Enforcement

	Tlatelolco	**Rarotonga**	**Bangkok**	**Pelindaba**	**CANWFZ**
Demand for IAEA safeguards	Art. 13	Art.8.2(c), Annex 2	Art. 5, Art. 10.2.(a)	Art. 9 (b), Annex II	Art. 8
Executive Body	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL)	Executive tasks reside with Director of the South Pacific Bureau for Economic Cooperation and South Pacific Forum[322]	Commission for the Southeast Asia Nuclear Weapon-Free Zone (Art. 8), Executive Committee (Art. 9)	African Commission on Nuclear Energy (Art. 12, Annex III)	No additional body created
Non-compliance reported by	A state party (Article 16.1.(i)), IAEA (based on IAEA safeguards Article 13), General Conference (Art. 20.1.)	A party > Director of the South Pacific Bureau for Economic Cooperation, after trying to resolve issue bilaterally with party in question (Annex 4)	A party may seek clarification from other party, the former shall inform the Executive Committee	A party may seek clarification from other party (Annex 4.1.), If matter is not resolved > African Commission on Nuclear Energy (Annex 4.2.)	Not explicitly stated, compliance discussed at annual consultative meeting (Art. 10)
Non-compliance determined by	General Conference (Art. 20.1.)	Consultative Committee (Annex 4.4., Annex 4.9.)	Executive Committee (Art. 14.1.), Commission for the Southeast Asia Nuclear Weapon-Free Zone	African Commission on Nuclear Energy (Annex IV.4(e))	Not explicitly stated, compliance discussed at annual consultative meeting (Art. 10)
Special Inspections	Yes (Art. 16)	Yes (Annex 4.4. - Annex 4.8.)	Yes ("Fact-Finding Mission" – Art. 13)	Yes (inspections Annex 4.4.)	Not stated
Body responsible for initiation of Special Inspections	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean + IAEA (according to safeguards agreement) (Art. 16)	Consultative Committee (Annex 4.4.,), which "shall not duplicate safeguards procedures to be undertaken by the IAEA" (Annex 4.5)	Party > Executive Committee (Art. 13)	African Commission on Nuclear Energy (Annex 4.4.)	Not stated

[322] The South Pacific Forum was renamed to Pacific Islands Forum.

Enforcing protocols?	Not stated	Not stated	Yes (Art. 14.4.)	Not stated	Not stated
Further escalation stated?	General Conference shall report to: Security Council, UN General Assembly, Council of the Organization of the American States, IAEA (Art. 20.2.)	Only states in Annex 4.9. that "the Parties shall meet promptly at a meeting of the South Pacific Forum [Pacific Islands Forum]."	Commission for the Southeast Asia Nuclear Weapon-Free Zone), "shall decide on any measure it deems appropriate" (Art. 14.2/14.3)	Meeting of State Parties > Organization of African Unity (African Union) > UN Security Council (Annex 4.4. (g))	"Disputes […] shall be settled through negotiations or by other means as may be deemed necessary by the Parties" (Art. 11).
Compliance	No fundamental violations	No fundamental violations	Not yet fully implemented. No fundamental violations	Libya in breach of treaty before implemen-tation	No fundamental violations

Appendix 5 – Safeguards Agreements by State

Source: IAEA (2019d) Status List. Conclusion of Safeguards Agreements, Additional Protocols and Small Quantities Protocols. Status as of March, 6, 2019. *International Atomic Energy Agency* [online]. March 6, 2019, Available from: https://www.iaea.org/sites/default/files/status-sg-agreements-comprehensive.pdf [Accessed April 20, 2019].

State [a]	Small quantities protocols [b]	Safeguards agreements [c]	INFCIRC	Additional protocols
Afghanistan	Amended: 28 January 2016	In force: 20 Feb. 1978	257	In force: 19 July 2005
Albania[1]		In force: 25 March 1988	359	In force: 3 Nov. 2010
Algeria		In force: 7 Jan. 1997	531	Signed: 16 Feb. 2018
Andorra	Amended: 24 April 2013	In force: 18 Oct. 2010	808	In force: 19 Dec. 2011
Angola	In force: 28 April 2010	In force: 28 April 2010	800	In force: 28 April 2010
Antigua and Barbuda[2]	Amended: 5 March 2012	In force: 9 Sept. 1996	528	In force: 15 Nov. 2013
Argentina[3]		In force: 4 March 1994	435	
Armenia		In force: 5 May 1994	455	In force: 28 June 2004
Australia		In force: 10 July 1974	217	In force: 12 Dec. 1997
Austria[4]		Accession: 31 July 1996	193	In force: 30 April 2004
Azerbaijan		In force: 29 April 1999	580	In force: 29 Nov. 2000
Bahamas[2]	Amended: 25 July 2007	In force: 12 Sept. 1997	544	
Bahrain	In force: 10 May 2009	In force: 10 May 2009	767	In force: 20 July 2011
Bangladesh		In force: 11 June 1982	301	In force: 30 March 2001
Barbados[2]	X	In force: 14 Aug. 1996	527	
Belarus		In force: 2 Aug. 1995	495	Signed: 15 Nov. 2005
Belgium		In force: 21 Feb. 1977	193	In force: 30 April 2004
Belize[5]	X	In force: 21 Jan. 1997	532	
Benin	*Amended: 15 April 2008*	*Signed: 7 June 2005*		*Signed: 7 June 2005*
Bhutan	X	In force: 24 Oct. 1989	371	
Bolivia, Plurinational State of [2]	X	In force: 6 Feb. 1995	465	
Bosnia and Herzegovina		In force: 4 April 2013	851	In force: 3 July 2013
Botswana		In force: 24 Aug. 2006	694	In force: 24 Aug. 2006
Brazil[6]		In force: 4 March 1994	435	
Brunei Darussalam	X	In force: 4 Nov. 1987	365	
Bulgaria[7]		Accession: 1 May 2009	193	Accession: 1 May 2009
Burkina Faso	Amended: 18 Feb. 2008	In force: 17 April 2003	618	In force: 17 April 2003
Burundi	In force: 27 Sept. 2007	In force: 27 Sept. 2007	719	In force: 27 Sept. 2007
Cabo Verde	*Amended: 27 March 2006*	*Signed: 28 June 2005*		*Signed: 28 June 2005*
Cambodia	Amended: 16 July 2014	In force: 17 Dec. 1999	586	In force: 24 April 2015
Cameroon	X	In force: 17 Dec. 2004	641	In force: 29 Sept. 2016
Canada		In force: 21 Feb. 1972	164	In force: 8 Sept. 2000
Central African Republic	In force: 7 Sept. 2009	In force: 7 Sept. 2009	777	In force: 7 Sept. 2009
Chad	In force: 13 May 2010	In force: 13 May 2010	802	In force: 13 May 2010
Chile[8]		In force: 5 April 1995	476	In force: 3 Nov. 2003
China		In force: 18 Sept. 1989	369*	In force: 28 March 2002
Colombia[8]		In force: 22 Dec. 1982	306	In force: 5 March 2009
Comoros	In force: 20 Jan. 2009	In force: 20 Jan. 2009	752	In force: 20 Jan. 2009
Congo	In force: 28 Oct. 2011	In force: 28 Oct. 2011	831	In force: 28 Oct. 2011
Costa Rica[2]	Amended: 12 Jan. 2007	In force: 22 Nov. 1979	278	In force: 17 June 2011

State [a]	Small quantities protocols [b]	Safeguards agreements [c]	INFCIRC	Additional protocols
Côte d'Ivoire		In force: 8 Sept. 1983	309	In force: 5 May 2016
Croatia[9]		Accession: 1 April 2017	193	Accession: 1 April 2017
Cuba[2]		In force: 3 June 2004	633	In force: 3 June 2004
Cyprus[10]		Accession: 1 May 2008	193	Accession: 1 May 2008
Czech Republic[11]		Accession: 1 Oct. 2009	193	Accession: 1 Oct. 2009
Democratic Republic of the Congo		In force: 9 Nov. 1972	183	In force: 9 April 2003
Denmark[12]		In force: 1 March 1972	176	In force: 22 March 2013
		In force: 21 Feb. 1977	193	In force: 30 April 2004
Djibouti	In force : 26 May 2015	In force: 26 May 2015	884	In force: 26 May 2015
Dominica[5]	X	In force: 3 May 1996	513	
Dominican Republic[2]	Amended: 11 Oct. 2006	In force: 11 Oct. 1973	201	In force: 5 May 2010
Democratic People's Republic of Korea		In force: 10 April 1992	403	
Ecuador[2]	Amended: 7 April 2006	In force: 10 March 1975	231	In force: 24 Oct. 2001
Egypt		In force: 30 June 1982	302	
El Salvador[2]	Amended: 10 June 2011	In force: 22 April 1975	232	In force: 24 May 2004
Equatorial Guinea	*Approved: 13 June 1986*	*Approved: 13 June 1986*		
Eritrea				
Estonia[13]		Accession: 1 Dec. 2005	193	Accession: 1 Dec. 2005
Eswatini	Amended: 23 July 2010	In force: 28 July 1975	227	In force: 8 Sept. 2010
Ethiopia	X	In force: 2 Dec. 1977	261	
Fiji	X	In force: 22 March 1973	192	In force: 14 July 2006
Finland[14]		Accession: 1 Oct. 1995	193	In force: 30 April 2004
France		In force: 12 Sept. 1981	290*	In force: 30 April 2004
	Amended: 25 Feb. 2019	In force: 26 Oct. 2007[15]	718	
Gabon	Amended: 30 Oct. 2013	In force: 25 March 2010	792	In force: 25 March 2010
Gambia	Amended: 17 Oct. 2011	In force: 8 Aug. 1978	277	In force: 18 Oct. 2011
Georgia		In force: 3 June 2003	617	In force: 3 June 2003
Germany[16]		In force: 21 Feb. 1977	193	In force: 30 April 2004
Ghana		In force: 17 Feb. 1975	226	In force: 11 June 2004
Greece[17]		Accession: 17 Dec. 1981	193	In force: 30 April 2004
Grenada[2]	X	In force: 23 July 1996	525	
Guatemala[2]	Amended: 26 April 2011	In force: 1 Feb. 1982	299	In force: 28 May 2008
Guinea	*Signed: 13 Dec. 2011*	*Signed: 13 Dec. 2011*		*Signed: 13 Dec. 2011*
Guinea-Bissau	*Signed: 21 June 2013*	*Signed: 21 June 2013*		*Signed: 21 June 2013*
Guyana[2]	X	In force: 23 May 1997	543	
Haiti[2]	X	In force: 9 March 2006	681	In force: 9 March 2006
Holy See	Amended: 11 Sept. 2006	In force: 1 Aug. 1972	187	In force: 24 Sept. 1998
Honduras[2]	Amended: 20 Sept. 2007	In force: 18 April 1975	235	In force: 17 Nov. 2017
Hungary[18]		Accession: 1 July 2007	193	Accession: 1 July 2007
Iceland	Amended: 15 March 2010	In force: 16 Oct. 1974	215	In force: 12 Sept. 2003
		In force: 30 Sept. 1971	211	
		In force: 17 Nov. 1977	260	
India[19]		In force: 27 Sept. 1988	360	
		In force: 11 Oct. 1989	374	
		In force: 1 March 1994	433	

State [a]	Small quantities protocols [b]	Safeguards agreements [c]	INFCIRC	Additional protocols
		In force: 11 May 2009	754	In force: 25 July 2014
Indonesia		In force: 14 July 1980	283	In force: 29 Sept. 1999
Iran, Islamic Republic of[20]		In force: 15 May 1974	214	Signed: 18 Dec. 2003
Iraq		In force: 29 Feb. 1972	172	In force: 10 Oct. 2012
Ireland		In force: 21 Feb. 1977	193	In force: 30 April 2004
Israel		In force: 4 April 1975	249/Add.1	
Italy		In force: 21 Feb. 1977	193	In force: 30 April 2004
Jamaica[2]		In force: 6 Nov. 1978	265	In force: 19 March 2003
Japan		In force: 2 Dec. 1977	255	In force: 16 Dec. 1999
Jordan		In force: 21 Feb. 1978	258	In force: 28 July 1998
Kazakhstan		In force: 11 Aug. 1995	504	In force: 9 May 2007
Kenya	In force: 18 Sept. 2009	In force: 18 Sept. 2009	778	In force: 18 Sept. 2009
Kiribati	X	In force: 19 Dec. 1990	390	Signed: 9 Nov. 2004
Korea, Republic of		In force: 14 Nov. 1975	236	In force: 19 Feb. 2004
Kuwait	Amended: 26 July 2013	In force: 7 March 2002	607	In force: 2 June 2003
Kyrgyzstan	X	In force: 3 Feb. 2004	629	In force: 10 Nov. 2011
Lao People's Democratic Republic	X	In force: 5 April 2001	599	Signed: 5 Nov. 2014
Latvia[21]		Accession: 1 Oct. 2008	193	Accession: 1 Oct. 2008
Lebanon	Amended: 5 Sept. 2007	In force: 5 March 1973	191	
Lesotho	Amended: 8 Sept. 2009	In force: 12 June 1973	199	In force: 26 April 2010
Liberia	In force: 10 Dec. 2018	In force: 10 Dec. 2018	927	In force: 10 Dec. 2018
Libya		In force: 8 July 1980	282	In force: 11 Aug. 2006
Liechtenstein		In force: 4 Oct. 1979	275	In force: 25 Nov. 2015
Lithuania[22]		Accession: 1 Jan. 2008	193	Accession: 1 Jan. 2008
Luxembourg		In force: 21 Feb. 1977	193	In force: 30 April 2004
Madagascar	Amended: 29 May 2008	In force: 14 June 1973	200	In force: 18 Sept. 2003
Malawi	Amended: 29 Feb. 2008	In force: 3 Aug. 1992	409	In force: 26 July 2007
Malaysia		In force: 29 Feb. 1972	182	Signed: 22 Nov. 2005
Maldives	X	In force: 2 Oct. 1977	253	
Mali	Amended: 18 April 2006	In force: 12 Sept. 2002	615	In force: 12 Sept. 2002
Malta[23]		Accession: 1 July 2007	193	Accession: 1 July 2007
Marshall Islands		In force: 3 May 2005	653	In force: 3 May 2005
Mauritania	Amended: 20 March 2013	In force: 10 Dec. 2009	788	In force: 10 Dec. 2009
Mauritius	Amended: 26 Sept. 2008	In force: 31 Jan. 1973	190	In force: 17 Dec. 2007
Mexico[24]		In force: 14 Sept. 1973	197	In force: 4 March 2011
Micronesia, Federated States of	*Signed: 1 June 2015*	*Signed: 1 June 2015*		
Monaco	Amended: 27 Nov. 2008	In force: 13 June 1996	524	In force: 30 Sept. 1999
Mongolia	X	In force: 5 Sept. 1972	188	In force: 12 May 2003
Montenegro	In force: 4 March 2011	In force: 4 March 2011	814	In force: 4 March 2011
Morocco		In force: 18 Feb. 1975	228	In force: 21 April 2011
Mozambique	In force: 1 March 2011	In force: 1 March 2011	813	In force: 1 March 2011
Myanmar	X	In force: 20 April 1995	477	Signed: 17 Sept. 2013
Namibia	X	In force: 15 April 1998	551	In force: 20 Feb. 2012
Nauru	X	In force: 13 April 1984	317	

State [a]	Small quantities protocols [b]	Safeguards agreements [c]	INFCIRC	Additional protocols
Nepal	X	In force: 22 June 1972	186	
Netherlands	X	In force: 5 June 1975	229	
		In force: 21 Feb. 1977	193	In force: 30 April 2004
New Zealand[25]	Amended: 24 Feb. 2014	In force: 29 Feb. 1972	185	In force: 24 Sept. 1998
Nicaragua[2]	Amended: 12 June 2009	In force: 29 Dec. 1976	246	In force: 18 Feb. 2005
Niger		In force: 16 Feb. 2005	664	In force: 2 May 2007
Nigeria		In force: 29 Feb. 1988	358	In force: 4 April 2007
North Macedonia	Amended: 9 July 2009	In force: 16 April 2002	610	In force: 11 May 2007
Norway		In force: 1 March 1972	177	In force: 16 May 2000
Oman	X	In force: 5 Sept. 2006	691	
Pakistan		In force: 5 March 1962	34	
		In force: 17 June 1968	116	
		In force: 17 Oct. 1969	135	
		In force: 18 March 1976	239	
		In force: 2 March 1977	248	
		In force: 10 Sept. 1991	393	
		In force: 24 Feb. 1993	418	
		In force: 22 Feb. 2007	705	
		In force: 15 April 2011	816	
		In force: 3 May 2017	920	
Palau	Amended: 15 March 2006	In force: 13 May 2005	650	In force: 13 May 2005
Panama[8]	Amended: 4 March 2011	In force: 23 March 1984	316	In force: 11 Dec. 2001
Papua New Guinea	Amended: 6 Feb. 2019	In force: 13 Oct. 1983	312	
Paraguay[2]	Amended: 17 July 2018	In force: 20 March 1979	279	In force: 15 Sept. 2004
Peru[2]		In force: 1 Aug. 1979	273	In force: 23 July 2001
Philippines		In force: 16 Oct. 1974	216	In force: 26 Feb. 2010
Poland[26]		Accession: 1 March 2007	193	Accession: 1 March 2007
Portugal[27]		Accession: 1 July 1986	193	In force: 30 April 2004
Qatar	In force: 21 Jan. 2009	In force: 21 Jan. 2009	747	
Republic of Moldova	Amended: 1 Sept. 2011	In force: 17 May 2006	690	In force: 1 June 2012
Romania[28]		Accession: 1 May 2010	193	Accession: 1 May 2010
Russian Federation		In force: 10 June 1985	327*	In force: 16 Oct. 2007
Rwanda	In force: 17 May 2010	In force: 17 May 2010	801	In force: 17 May 2010
Saint Kitts and Nevis[5]	Amended: 19 Aug. 2016	In force: 7 May 1996	514	In force: 19 May 2014
Saint Lucia[5]	X	In force: 2 Feb. 1990	379	
St Vincent and the Grenadines[5]	X	In force: 8 Jan. 1992	400	
Samoa	X	In force: 22 Jan. 1979	268	
San Marino	Amended: 13 May 2011	In force: 21 Sept. 1998	575	
São Tomé and Príncipe				
Saudi Arabia	X	In force: 13 Jan. 2009	746	
Senegal	Amended: 6 Jan. 2010	In force: 14 Jan. 1980	276	In force: 24 Jul. 2017
Serbia[29]		In force: 28 Dec. 1973	204	In force: 17 Sept. 2018
Seychelles	Amended: 31 Oct. 2006	In force: 19 July 2004	635	In force: 13 Oct. 2004
Sierra Leone	X	In force: 4 Dec. 2009	787	
Singapore	Amended: 31 March 2008	In force: 18 Oct. 1977	259	In force: 31 March 2008

State [a]	Small quantities protocols [b]	Safeguards agreements [c]	INFCIRC	Additional protocols
Slovakia[30]		Accession: 1 Dec. 2005	193	Accession: 1 Dec. 2005
Slovenia[31]		Accession: 1 Sept. 2006	193	Accession: 1 Sept. 2006
Solomon Islands	X	In force: 17 June 1993	420	
Somalia				
South Africa		In force: 16 Sept. 1991	394	In force: 13 Sept. 2002
Spain		Accession: 5 April 1989	193	In force: 30 April 2004
Sri Lanka		In force: 6 Aug. 1984	320	Approved: 12 Sept. 2018
State of Palestine[32]	*Approved: 7 March 2018*	*Approved: 7 March 2018*		
Sudan	X	In force: 7 Jan. 1977	245	
Suriname[2]	X	In force: 2 Feb. 1979	269	
Sweden[33]		Accession: 1 June 1995	193	In force: 30 April 2004
Switzerland		In force: 6 Sept. 1978	264	In force: 1 Feb. 2005
Syrian Arab Republic		In force: 18 May 1992	407	
Tajikistan		In force: 14 Dec. 2004	639	In force: 14 Dec. 2004
Thailand		In force: 16 May 1974	241	In force: 17 Nov. 2017
Timor-Leste	*Signed: 6 Oct. 2009*	*Signed: 6 Oct. 2009*		*Signed: 6 Oct. 2009*
Togo	Amended: 8 Oct. 2015	In force: 18 July 2012	840	In force: 18 July 2012
Tonga	Amended: 3 April 2018	In force: 18 Nov. 1993	426	
Trinidad and Tobago[2]	X	In force: 4 Nov. 1992	414	
Tunisia		In force: 13 March 1990	381	Signed: 24 May 2005
Turkey		In force: 1 Sept. 1981	295	In force: 17 July 2001
Turkmenistan		In force: 3 Jan. 2006	673	In force: 3 Jan. 2006
Tuvalu	X	In force: 15 March 1991	391	
Uganda	Amended: 24 June 2009	In force: 14 Feb. 2006	674	In force: 14 Feb. 2006
Ukraine		In force: 22 Jan. 1998	550	In force: 24 Jan. 2006
United Arab Emirates		In force: 9 Oct. 2003	622	In force: 20 Dec. 2010
United Kingdom	Signed: 6 Jan 1993	In force: 14 Dec. 1972[34] In force: 14 Aug. 1978 Signed: 6 Jan. 1993[15] Signed: 7 June 2018*	175 263* 	 In force: 30 April 2004 Signed: 7 June 2018
United Republic of Tanzania	Amended: 10 June 2009	In force: 7 Feb. 2005	643	In force: 7 Feb. 2005
United States of America	Amended: 3 July 2018	In force: 9 Dec. 1980 In force: 6 April 1989[15]	288* 366	In force: 6 Jan. 2009
Uruguay[2]		In force: 17 Sept. 1976	157	In force: 30 April 2004
Uzbekistan		In force: 8 Oct. 1994	508	In force: 21 Dec. 1998
Vanuatu	In force: 21 May 2013	In force: 21 May 2013	852	In force: 21 May 2013
Venezuela, Bolivarian Republic of [2]		In force: 11 March 1982	300	
Viet Nam		In force: 23 Feb. 1990	376	In force: 17 Sept. 2012
Yemen	X	In force: 14 Aug. 2002	614	
Zambia	X	In force: 22 Sept. 1994	456	Signed: 13 May 2009
Zimbabwe	Amended: 31 Aug. 2011	In force: 26 June 1995	483	

Key

Bold	States not party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) whose safeguards agreements are of INFCIRC/66-type.
Italics	States Parties to the NPT that have not yet brought into force comprehensive safeguards agreements (CSAs) pursuant to Article III of the NPT.
*	Voluntary offer safeguards agreement with NPT nuclear-weapon States.
X	'X' in the 'small quantities protocols' column indicates that the State has an operative small quantities protocol (SQP). 'Amended' indicates that the operative SQP is based on the revised SQP standardized text.

NB: This table does not aim at listing all safeguards agreements that the Agency has concluded. Not included are agreements under which the application of safeguards has been suspended upon the entry into force of a CSA. Unless otherwise indicated, the safeguards agreements referred to are CSAs concluded pursuant to the NPT.

[a] An entry in this column does not imply the expression of any opinion whatsoever on the part of the Agency concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

[b] Provided that they meet certain eligibility criteria (including that the quantities of nuclear material do not exceed the limits set out in paragraph 37 of INFCIRC/153(Corrected)), countries have the option to conclude an SQP to their CSAs that holds in abeyance the implementation of most of the detailed provisions set out in Part II of the CSAs as long as eligibility criteria continue to apply. This column contains countries whose CSA with an SQP based on the original standard text has been approved by the Board of Governors and for which, as far as the Secretariat is aware, these eligibility criteria continue to apply. For those States that have accepted the revised standard SQP text (approved by the Board of Governors on 20 September 2005) the current status is reflected.

[c] The Agency also applies safeguards for Taiwan, China under two agreements, which entered into force on 13 October 1969 (INFCIRC/133) and 6 December 1971 (INFCIRC/158), respectively.

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[1] *Sui generis* comprehensive safeguards agreement. On 28 November 2002, upon approval by the Board of Governors, an exchange of letters entered into force confirming that the safeguards agreement satisfies the requirement of Article III of the NPT.

[2] Safeguards agreement is pursuant to both the Treaty of Tlatelolco and the NPT.

[3] Date refers to the safeguards agreement concluded between Argentina, Brazil, ABACC and the Agency. On 18 March 1997, upon approval by the Board of Governors, an exchange of letters entered into force between Argentina and the Agency confirming that the safeguards agreement satisfies the requirements of Article 13 of the Treaty of Tlatelolco and Article III of the NPT to conclude a safeguards agreement with the Agency.

[4] The application of safeguards for Austria under the NPT bilateral safeguards agreement (INFCIRC/156), in force since 23 July 1972, was suspended on 31 July 1996, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Austria had acceded, entered into force for Austria.

[5] Date refers to a safeguards agreement pursuant to Article III of the NPT. Upon approval by the Board of Governors, an exchange of letters entered into force (for Saint Lucia on 12 June 1996 and for Belize, Dominica, Saint Kitts and Nevis and Saint Vincent and the Grenadines on 18 March 1997) confirming that the safeguards agreement satisfies the requirement of Article 13 of the Treaty of Tlatelolco.

[6] Date refers to the safeguards agreement concluded between Argentina, Brazil, ABACC and the Agency. On 10 June 1997, upon approval by the Board of Governors, an exchange of letters entered into force between Brazil and the Agency confirming that the safeguards agreement satisfies the requirement of Article 13 of the Treaty of Tlatelolco. On 20 September 1999, upon approval by the Board of Governors, an exchange of letters entered into force confirming that the safeguards agreement also satisfies the requirement of Article III of the NPT.

[7] The application of safeguards for Bulgaria under the NPT bilateral safeguards agreement (INFCIRC/178), in force since 29 February 1972, was suspended on 1 May 2009, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Bulgaria had acceded, entered into force for Bulgaria.

[8] Date refers to a safeguards agreement pursuant to Article 13 of the Treaty of Tlatelolco. Upon approval by the Board of Governors, an exchange of letters entered into force (for Chile on 9 September 1996; for Colombia on 13 June 2001; for Panama on 20 November 2003) confirming that the safeguards agreement satisfies the requirement of Article III of the NPT.

[9] The application of safeguards for Croatia under the NPT bilateral safeguards agreement (INFCIRC/463), in force since 19 January 1995, was suspended on 1 April 2017, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Croatia had acceded, entered into force for Croatia.

[10] The application of safeguards for Cyprus under the NPT bilateral safeguards agreement (INFCIRC/189), in force since 26 January 1973, was suspended on 1 May 2008, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Cyprus had acceded, entered into force for Cyprus.

[11] The application of safeguards for the Czech Republic under the NPT bilateral safeguards agreement (INFCIRC/541), in force since 11 September 1997, was suspended on 1 October 2009, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which the Czech Republic had acceded, entered into force for the Czech Republic.

[12] The application of safeguards for Denmark under the NPT bilateral safeguards agreement (INFCIRC/176), in force since 1 March 1972, was suspended on 21 February 1977, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193) entered into force for Denmark. Since 21 February 1977, INFCIRC/193 also applies to the Faroe Islands. Upon Greenland's secession from Euratom as of 31 January 1985, INFCIRC/176 re-entered into force for Greenland. The Additional Protocol for Greenland entered into force on 22 March 2013 (INFCIRC/176/Add.1).

[13] The application of safeguards for Estonia under the NPT bilateral safeguards agreement (INFCIRC/547), in force since 24 November 1997, was suspended on 1 December 2005, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Estonia had acceded, entered into force for Estonia.

[14] The application of safeguards for Finland under the NPT bilateral safeguards agreement (INFCIRC/155), in force since 9 February 1972, was suspended on 1 October 1995, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Finland had acceded, entered into force for Finland.

[15] The safeguards agreement is in connection with Additional Protocol I to the Treaty of Tlatelolco.

[16] The NPT safeguards agreement of 7 March 1972 concluded with the German Democratic Republic (INFCIRC/181) is no longer in force with effect from 3 October 1990, on which date the German Democratic Republic acceded to the Federal Republic of Germany.

[17] The application of safeguards for Greece under the NPT bilateral safeguards agreement (INFCIRC/166), in force since 1 March 1972, was suspended on 17 December 1981, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Greece had acceded, entered into force for Greece.

[18] The application of safeguards for Hungary under the NPT bilateral safeguards agreement (INFCIRC/174), in force since 30 March 1972, was suspended on 1 July 2007, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Hungary had acceded, entered into force for Hungary.

[19] The application of safeguards for India under the safeguards agreement between the Agency, Canada and India (INFCIRC/211), in force since 30 September 1971, was suspended as of 20 March 2015. The application of safeguards for India under the following safeguards agreements between the Agency and India was suspended as of 30 June 2016: INFCIRC/260, in force since 17 November 1977; INFCIRC/360, in force since 27 September 1988; INFCIRC/374, in force since 11 October 1989; and INFCIRC/433, in force since 1 March 1994. Items subject to safeguards under the aforementioned safeguards agreements are subject to safeguards under the safeguards agreement between India and the Agency (INFCIRC/754), which entered into force on 11 May 2009.

[20] Pending entry into force, the Additional Protocol is being applied provisionally for the Islamic Republic of Iran as of 16 January 2016.

[21] The application of safeguards for Latvia under the NPT bilateral safeguards agreement (INFCIRC/434), in force since 21 December 1993, was suspended on 1 October 2008, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Latvia had acceded, entered into force for Latvia.

[22] The application of safeguards for Lithuania under the NPT bilateral safeguards agreement (INFCIRC/413), in force since 15 October 1992, was suspended on 1 January 2008, on which date the agreement of 5 April 1973 between the non-nuclear-

weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Lithuania had acceded, entered into force for Lithuania.

[23] The application of safeguards for Malta under the NPT bilateral safeguards agreement (INFCIRC/387), in force since 13 November 1990, was suspended on 1 July 2007, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Malta had acceded, entered into force for Malta.

[24] The safeguards agreement was concluded pursuant to both the Treaty of Tlatelolco and the NPT. The application of safeguards under an earlier safeguards agreement pursuant to the Treaty of Tlatelolco, which entered into force on 6 September 1968 (INFCIRC/118), was suspended as of 14 September 1973.

[25] Whereas the NPT safeguards agreement and SQP with New Zealand (INFCIRC/185) also apply to Cook Islands and Niue, the additional protocol thereto (INFCIRC/185/Add.1) does not apply to those territories. Amendments to the SQP entered into force only for New Zealand on 24 February 2014 (INFCIRC/185/Mod.1).

[26] The application of safeguards for Poland under the NPT bilateral safeguards agreement (INFCIRC/179), in force since 11 October 1972, was suspended on 1 March 2007, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Poland had acceded, entered into force for Poland.

[27] The application of safeguards for Portugal under the NPT bilateral safeguards agreement (INFCIRC/272), in force since 14 June 1979, was suspended on 1 July 1986, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Portugal had acceded, entered into force for Portugal.

[28] The application of safeguards for Romania under the NPT bilateral safeguards agreement (INFCIRC/180), in force since 27 October 1972, was suspended on 1 May 2010, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Romania had acceded, entered into force for Romania.

[29] The NPT safeguards agreement concluded with the Socialist Federal Republic of Yugoslavia (INFCIRC/204), which entered into force on 28 December 1973, continues to be applied for Serbia to the extent relevant to the territory of Serbia.

[30] The application of safeguards for Slovakia under the NPT bilateral safeguards agreement with the Czechoslovak Socialist Republic (INFCIRC/173), in force since 3 March 1972, was suspended on 1 December 2005, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Slovakia had acceded, entered into force for Slovakia.

[31] The application of safeguards for Slovenia under the NPT bilateral safeguards agreement (INFCIRC/538), in force since 1 August 1997, was suspended on 1 September 2006, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Slovenia had acceded, entered into force for Slovenia.

[32] The designation employed does not imply the expression of any opinion whatsoever concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

[33] The application of safeguards for Sweden under the NPT bilateral safeguards agreement (INFCIRC/234), in force since 14 April 1975, was suspended on 1 June 1995, on which date the agreement of 5 April 1973 between the non-nuclear-weapon States of Euratom, Euratom and the Agency (INFCIRC/193), to which Sweden had acceded, entered into force for Sweden.

[34] Date refers to the INFCIRC/66-type safeguards agreement, concluded between the United Kingdom and the Agency, which remains in force.

7. Bibliography

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