

Terminating Apartheid's Atomic Bomb

Applying Scott D Sagan's three level-model to South Africa's
nuclear disarmament

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Abstract

South Africa secretly produced six and a half nuclear weapons from 1978-1989 before undertaking a complete nuclear disarmament between 1989-1991; it is the only instance in history of when a state has discarded an indigenously developed nuclear arsenal and presents a unique case for studying the nuclear decision-making of states. This thesis is a theory-testing case study where I, by conducting a qualitative content analysis of previous research on South Africa's nuclear rollback, examine how well Scott D Sagan's nuclear policy model can explain the nuclear disarmament of South Africa. The model is found to have a high explanatory power despite its disregard of the beliefs of individuals which limits its explanatory power. The thesis confirms the assertions of previous studies that the emergence of a secure external milieu and the views of domestic actors likely facilitated South Africa's decision to discard its nuclear arsenal, and as well demonstrates that previously overlooked concessions given to South Africa for acceding to the NPT should also be taken into account. The thesis also illustrates that the external security milieu, the importance conferred on nuclear weapons by domestic elites and the influence of nuclear non-proliferation norms and institutions, together can influence the nuclear decision-making of states.

Keywords: South Africa, Nuclear Disarmament, Tripart Accord, Frederik de Klerk, Nuclear Non-proliferation Treaty.

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1 Introduction

1.1 Nuclear Disarmament: Partial Success and Partial Failure

In 1960 the former President of the United States John F Kennedy predicated that over 20 states would acquire nuclear weapons in the coming decades (Mehta 2020, p. 1). Kennedy was dead wrong; in year 2022 only nine states possess nuclear weapons - United States, Russia, United Kingdom, France, China, India, Pakistan, Israel, and North Korea. Since the late 1960s, there has instead been a radical shift in the international community's attitude towards nuclear weapons, both among nuclear-weapons states (NWS) and non-nuclear weapons states (NNWS). With the enactment of multilateral treaties such as the Nuclear Non-Proliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT) by an overwhelming majority of states in the world, as well as the establishment of Nuclear Weapons Free Zones (NWFZ) in much of the Global South, the non-proliferation and non-usage of nuclear weaponry have become an almost universally accepted norm (Davenport 2019, p. 2-23); no state except Iran is today considering crossing the nuclear threshold, and no longer do NWS – except North Korea – conduct nuclear tests (Fedchenko 2017, p. 300-301). Through a series of nuclear arms treaties between the two primary nuclear powers, the Soviet Union/Russia and United States (Davenport 2019, p. 3-5), the nuclear stockpile of the world has also dramatically decreased from around 60000 warheads in the late 1980s (Kristensen – Norris 2015, p. 78) to circa 13000 in 2022 (SIPRI 2022, p. 14).

Whereas the international non-proliferation regime has been successful in reducing much of the world's nuclear arsenal and managed to stave off countries from developing nuclear weapons, the nine NWS continues to disregard the provisions of article VI of the NPT, which calls for a “general and complete disarmament under strict and effective international control” (UNODA 1). The international community's objective of a complete nuclear disarmament (UNODA 2) remains an unrealized objective unlikely to be reached in foreseeable future.

1.2 South Africa: Unique Case of Nuclear Disarmament

However, this objective has previously been fulfilled by four former NWS which decided to completely discard its nuclear stockpile – Ukraine, Belarus, Kazakhstan, and South Africa.

When Ukraine, Kazakhstan, and Belarus became independent countries with the dissolution of the Soviet Union in 1991 they inherited large nuclear arsenals placed on their territories - from 50 to over 1400 warheads – that had previously been under Moscow’s auspices (Walker 1992, p. 257). The three states agreed in 1992 to accede to the NPT as NNWS and transfer their nuclear arsenal to the newly formed Russian Federation. In 1996, the transfer was completed (Davenport 2019, p. 3-7, 3-8).

Unlike the post-soviet countries, South Africa had an indigenous nuclear weapons program and had independently, from 1978-1989, developed their own nuclear arsenal before dismantling it between 1989-1991. It is the only instance since the nuclear age began in 1945 of when a state has completely dismantled an indigenously developed nuclear arsenal (Möser 2019, p. 559). In contrast to Ukraine’s, Kazakhstan’s, and Belarus’s nuclear dismantlement, South Africa’s nuclear rollback 1989-1991 was also undertaken in secret without the involvement of other states; not until after the nuclear rollback was completed did South Africa publicly acknowledge its prior development of nuclear weapons (WC, p. 1-2).

Therefore, examining the causes behind South Africa’s nuclear rollback can give unique insights into which factors influence the nuclear decision-making of states and what can potentially make states – like the current nine NWS – that have opted to develop nuclear weapons decide to eventually discard them.

1.3 Research Question

This thesis is a theory-testing case study where I use and evaluate how well Scott D Sagan’s three-level model (Sagan 1996-1997, p. 54-86) for nuclear policies can explain the decision by South Africa to discard its nuclear weapons arsenal. The purpose is to answer the following research question: *What is the explanatory power of Sagan’s three level-model when applied to South Africa’s nuclear disarmament?*

To analyze the explanatory power of Sagan’s theory, I delineate the assumptions of the theory and analyze whether these are observed or not. By doing this and comparing the result to previous studies on South Africa’s nuclear dismantlement, I showcase which factors the model includes and which factors the theory potentially disregards.

1.4 The Structure of The Thesis

In order to answer my research question, I have divided the procedure into five separate parts. First, I give a brief historical background to South Africa's acquirement and dismantlement of nuclear weapons. Secondly, I present the previous research – its methods and conclusions – on South Africa's nuclear disarmament. Thirdly, I outline different theories and models for explaining the nuclear weapons policies enacted by states and, within this context, discern and describe Scott D Sagan's model for explaining the nuclear decision-making of states. Fourthly, I analyze South Africa's denuclearization in detail by using Scott D Sagan's model. Finally, I identify how well the model explains the South Africa's decision to dismantle its nuclear weapons.

To help with the reading section 8 contains an appendix covering the recurring abbreviations used in the thesis.

2 Setting the scene: South Africa's nuclear rollback

2.1 South Africa: A Former Nuclear Weapons State

On the 24th of March 1993 the president of South Africa, Frederik de Klerk, publicly disclosed to a special joint commission of the South African Parliament that South Africa had developed, and later dismantled, "a limited nuclear deterrent" (WC, p. 3). This was the first official confirmation from the South African government that the country had developed nuclear weapons. Neither the construction of the nuclear deterrent between 1978 – 1989, or the dismantlement of the nuclear arsenal between 1989-1991 (Masiza 1993, p. 44-45), had been known to people outside the top echelons of the South African government and a select group of nuclear scientists and high-ranking military officers. The country had undertaken both a clandestine nuclearization and a clandestine denuclearization.

2.1.1 A Nuclear Deterrent In The Basement: South Africa's Covert Nuclearization

Before South Africa embarked on developing nuclear weapons, the country had for decades been a prominent partner in commercial nuclear affairs. South Africa's status as a founding member of the International Atomic Energy Agency (IAEA) in 1957, its abundant uranium resources and participation in international nuclear cooperation such as the US-led "Atoms for Peace program" (Masiza 1993 p. 36), cemented South Africa as an advanced nuclear power (Van Wyk 2010, p. 101). Enabled by the country's abundant uranium resources and nuclear knowhow, South African nuclear scientists within the Atomic Energy Bureau (AEB) began research into uranium enrichment in early 1960s (Stumpf 1995, p. 4), and in 1969, the government approved the building of a uranium enrichment plant designed to produce highly enriched uranium (HEU) – a prerequisite for developing nuclear explosives (Albright – Stickner 2016, p. 7-8). In 1971 the government approved the request of AEB to conduct preliminary research on the development of peaceful nuclear explosives (PNE) for use in the mining industry (Lieberman 2001, p. 50). Three years later, in 1974, the Prime Minister John Vorster authorized preparations for the testing of PNE:s and the building of an underground nuclear-explosive test-site in the Kalahari Desert (Stumpf 1995, p. 4). A diplomatic outcry occurred when this secret test-site was detected by Soviet intelligence in August 1977 and the site was subsequently abandoned (De Villiers et al. 1993, p. 100). After the Kalahari-incident in August 1977, Prime Minister John Vorster ordered a militarization of the PNE-program with the intent of developing nuclear weapons (Purkitt – Burgess – Lieberman 2002, p. 191-192). The first nuclear weapon was completed in early 1978 (Masiza 1993, p. 38). During P.W. Botha's tenure as prime minister and president between 1978 – 1989*, the nuclear weapons program expanded; new facilities were constructed, and the arsenal slowly increased. But in September 1985 the program was reviewed, and it was decided that the nuclear deterrent was going to be capped at seven warheads (Stumpf 1995, p. 6).

Prior to when the nuclear disarmament commenced in 1989, South Africa's nuclear deterrence consisted of six dissembled nuclear warheads, and an incomplete seventh, stored in underground vaults at the Kentron Circle facility outside Pretoria (Masiza 1993, p. 44).

* South Africa's head of government was changed from prime minister to state president in 1984.

2.1.2 A Hasty U-turn: South Africa's Covert Denuclearization

When president Botha suffered a heart attack in February 1989 he was forced to step down as head of government and was replaced by Frederik de Klerk. Shortly after de Klerk's official inauguration as president in September 1989, he assembled an ad hoc committee to evaluate the future status of the nuclear weapons program (Lieberman 2001, p. 73). Later that same autumn, in November, the ad hoc committee recommended a decommissioning of the nuclear weapons program and a complete dismantlement of the nuclear arsenal (De Villiers – Jardine – Reiss 1993, p. 103). De Klerk concurred and a timeline for the denuclearization process was drawn up. In February 1990, on the instruction of de Klerk, the dismantlement process began. Between July 1990 and September 1991, the arsenal was dismantled and the nuclear weapons facilities at Kentron Circle were shut down (Albright – Sticker 2016, p. 198-200).

On the 10th of July 1991 South Africa acceded to the NPT-treaty and, after signing a safeguards agreement with IAEA on September 16, IAEA inspections of South Africa's nuclear materials and facilities began in November 1991 (Stump 1995, p. 6-7). In September 1993, IAEA general director Hans Blix stated that IAEA inspections had verified the non-military status of the remaining nuclear facilities in South Africa (Blix 1993, p. 14-15). The country had become a de-jure and de-facto denuclearized state.

2.2 Previous Research on South Africa's Nuclear Disarmament

Since South Africa's official recognition of its previous possession of nuclear weapons a number of studies have been conducted with the aim of explaining the unique nuclear rollback of the country.

De Villiers, Jardine, and Reiss (1993) emphasizes the removal of a serious external threat to the apartheid regime in southern Africa with the Tripart Accord signed by Angola, Cuba and South Africa on 22 December 1988, which ended the long military conflict between the belligerents and guaranteed the independence of Namibia from South Africa. They also argue that the nuclear deterrent and the country's status as a non-signatory of NPT was becoming a liability to the governments ambitions of ending South Africa's international isolation and transforming it to a politically respected country (De Villiers et al. 1993, p. 102-104)

Van Wyk (2010) sees South Africa's decision to develop a nuclear stockpile as an element of Cold War logic by the anti-communist apartheid regime in South Africa. Based on this,

Van Wyk argues that the nuclear deterrent was becoming superfluous with the winding down of the Cold War and Soviet/Cuban presence in southern Africa (Van Wyk 2010, p. 114-115). Like de Villiers et. al, Van Wyk also explains the denuclearization of South Africa by stressing the betterment of the country's external security position following the Tripart Accord in 1988 and the desire of the apartheid leadership to radically reform and democratize the country. Furthermore, Van Wyk claims that in the midst of the dissolution of apartheid, denuclearization was partially undertaken because of the unwillingness of the white-minority regime to hand over nuclear weapons to a black-majority government (Van Wyk 2010, p. 116).

Liberman (2001) analyzes the causes of South Africa's nuclear rollback by employing three theories that explains denuclearization as a consequence of either: 1) modified views within the nuclear establishment, 2) the governments ideological revision from nationalism to liberalism, 3) or changing external security milieu. Liberman suggest that the decision by South Africa to discard its nuclear weapons arsenal can best be explained by theory 2 and 3; a combination of internal factors – the changing political persuasion of the apartheid government throughout de Klerk's presidency, and external factors – the elimination of a significant external threat to South Africa during the preceding years (Liberman 2001, p. 81-82).

Babbage (2004) downplays the changing external security environment and the internal ideological shift of the apartheid-regime after de Klerk's ascent to power in 1989. Babbage instead proclaims that the main cause behind the nuclear reversal was de Klerk's and his cabinet's fear of nuclear weapons in the hands of a coming black-majority and/or authoritarian regime (Babbage 2004, p. 1,15).

Park and Chung (2022) argue that South Africa's nuclear disarmament was facilitated by changing domestic politics within South Africa in the late 1980s and the concurrent changing external security milieu which collectively drove South Africa to transition into what they label a "trading state" (Park-Chung 2022, p. 496-498): a state that bases its national sovereignty and security on economic and political interdependence and participation in collective security arrangements (Park – Chung 2022, s 483-484). According to them South Africa's renouncement of nuclear weapons paved the way for the economically and politically beneficial transition to a "trading state".

From the previous research it is possible to conclude that the preceding explanatory approaches to South Africa's nuclear rollback focus to varying degrees on external and internal factors. Some studies – (Van Wyk 2010) – give precedent to external factors, some studies – Babbage (2004) – give precedent to internal factors, and others - Liberman (2001), De Villiers et. al (1993), Park (2022) - underscores both internal and external factors.

However, a nuclear policy theory which has not been sufficiently employed to South Africa's nuclear disarmament and that considers internal, external, normative as well as ideational factors, is Scott D Sagan's three-level model. Hughes (2013) is the only previous study that has applied Sagan's model to South Africa's nuclear rollback. But Hughes's very brief examination – 2 and ½ pages – and sparse referencing (Hughes 2013 p. 82-84), calls for a more comprehensive evaluation of the explanatory power of Sagan's theory when applied to the nuclear disarmament of South Africa. New research on the historical relationship between South Africa and the IAEA (Van Wyk 2015) and South Africa's accession to NPT (Möser 2019) have recently been presented. In light of this new information, it is also appropriate to reexamine why South Africa decided to undertake a complete nuclear disarmament.

3 The Enigma of Nuclear Disarmament: Theory and Method

3.1 Theories on Nuclear Decision-Making

A state inevitably adopts a nuclear policy. If the state is a NNWS it can opt to develop or not develop nuclear weapons, and if the state is a NWS it can decide to retain or not retain nuclear weapons.

Theories that attempt to explain the nuclear decision-making of states focus on five different aspects: 1) the external security milieu, 2) the interests and ideology of domestic actors within states, 3) the economic and technological means of states, 4) the psychological and ideological disposition of state leaders, and 5) the coercive power of international nuclear non-proliferation norms and the symbolic function of nuclear weapons in the international community (Khaili 2018, p. 9-12).

The first approach is closely related to a (neo)realist view of international relations where state behavior is principally governed by the structure and (in)stability of the anarchial

international system. Proponents of this approach are realists like Kenneth Waltz (Khalili 2019, p. 9) and John Mearsheimer who see the nuclear policies of states as a reaction to the presence or absence of external threats (Mearsheimer 1990, p. 37-40). To explain nuclear decision-making as result of the interest and ideology of domestic actors - the government, the military, the nuclear research establishment – is instead a “bottom-up” perspective aligned with the idealist/liberal conception of state action. Examples of this are Solingen’s (Solingen 1994, p. 136-142) and Reiss’s (White 1996, p. 48-49) theories which suggest that nuclear policies are determined by the internal characteristics of states and their ruling coalitions. States that are authoritarian and nationalist are, according to them, more likely to develop and/or retain nuclear weapons than democratic states who are governed by liberal outward-looking coalitions. The theoretical branches that analyze nuclear decision-making by examining the psychology of key decisionmakers (White 1996, p. 52) and the coercive power of nuclear non-proliferation norms (Wan – Solingen 2015, p. 3-5) combine a constructivist and neoliberal approach where state action is seen as emanating from forces both within and outside the state (Khalili 2018, s 10-12). Essentially these approaches maintain that the psychological and ideological disposition of state leaders and the influence of international non-proliferation norms and institutions, determine if states do/don’t regard the possession of nuclear weapons as legitimate, prestigious and symbolically useful (Van der Meer 2016, p. 219-221).

3.2 Sagan’s Three-Level Theory

In the article “Why do States Build nuclear weapons?”, Scott D Sagan describes three approaches – models – to explain why states do/don’t develop nuclear weapons and why states do/don’t discard nuclear weapons. Together the three models encompass most of the factors outlined by the theories outlined above; the first model focuses on the external security environment; the second model analyzes the economic and military interests of domestic actors; the third model emphasizes the influence of nuclear non-proliferation norms and the symbolic function of nuclear weapons. However, Sagan’s theory disregards the psychological and ideological disposition of state leaders.

The three models are: 1) The Security Model, 2) The Domestic Politics Model, 3) The Norms Model

Model 1 – The first model explains the nuclear weapons policies enacted by states as a reaction to external threats. Thus, if a state is exposed to a serious military threat, conventional or nuclear, it is likely to develop and/or retain nuclear weapons. Moreover, if a nearby and/or strategic adversary acquires nuclear weapons, the incentive for a state to acquire and/or retain nuclear weapons is reinforced. In contrast, a state decides to not develop or retain nuclear weapons if the state's external milieu is/becomes non-threatening. A decision to not develop or retain nuclear weapons also becomes likelier if no neighboring country or adversary can pose a critical nuclear threat to the state (Sagan 1996-1997, p. 57-62).

Model 2 – The second model explains the nuclear decision-making of states as consequence of the interests of domestic actors within the state. Specifically, three types of actors can by themselves, or in coalition, form a state's nuclear weapons policy: 1) top-government officials, 2) the nuclear energy/research establishment of the state, 3) high-ranking military personnel. If one these groups alone, or several in alignment, have interests – military or economic – in the development and/or retainment of nuclear weapons, the state is likely to acquire and/or retain them. On the other hand, if one or several of these groups don't have any interests – military or economic – in obtaining or retaining nuclear weapons, the state will likely not develop and/or retain nuclear weapons (Sagan 1996-1997, p. 63-72).

Model 3 – The third model suggests that the nuclear decision-making of states is determined by what extent prevailing nuclear non-proliferation norms influence states, and how useful the attainment of nuclear weapons and their associated symbolism is to states.

According to this model, a state acquires and/or retains nuclear weapons if international nuclear non-proliferation norms have limited influence on the nuclear policy adopted by a state. A state also acquires and/or retains nuclear weapons if they can/do have a beneficial symbolic function for the state, giving it – and its leaders and population - both real and perceived prestige and influence on the international stage. The model suggests that a state abstains from developing and/or retaining nuclear weapons, because international non-proliferation norms exert influence over the state's nuclear decision-making. Furthermore, a state refrains from developing and/or retaining nuclear weapons if nuclear weapons can't/don't have a beneficial symbolic function for its leaders and population (Sagan 1996-1997, p. 73-82).

3.3 Applying Sagan's Model

Sagan's three-level model is a broad theory which suggests that the nuclear policies adopted by states can be analyzed on three different levels. To examine the explanatory power of Sagan's whole theory, it is necessary to investigate each model. A feasible approach is to analyze the assumptions that each model purport about nuclear decision-making independently from one another. By investigating the relevance of each model one can then assess the explanatory power of Sagan's whole theory.

I delineate in section 4 the assumptions of each model and then, based on these assumptions, formulate observable implications that I examine in my analysis. To make the analysis coherent, I have included a background section before the examination of each model's observable implications.

3.4 Material and method

In order to ascertain each model's observable implications, I will conduct a qualitative content analysis. My qualitative content analysis relies mainly on secondary articles. These secondary sources are a combination of previous studies/articles written about South Africa's nuclear disarmament and studies/articles that deal with relevant adjoining events to South Africa's nuclear rollback. In addition, I have used books and anthologies about South Africa's nuclear rollback. To some extent I have also depended on primary sources like speeches and reports and international treaties.

Based on these sources, I make my own arguments as to why an observable implication is confirmed or disconfirmed in the case of South Africa's nuclear disarmament.

3.5 A Note on Using Sagan's Model

To apply Sagan's three level-model, I have summarized what I understand to be each model's core preconceptions about states' nuclear weapons policies. From these preconceptions, I formulate observable implications related to South Africa's nuclear disarmament. I have decided to limit the number of observable implications to two per model since it enables me to analyze each observable implication in detail.

I have consciously also chosen to exclude the political interests of domestic actors in model 2 because I believe the model prioritizes the economic and military interests of domestic actors (Sagan 1996-1997, p. 64-65). Nevertheless, it is possible to have an alternative approach to Sagan's model and include this as well.

4 Solving the Enigma: Analysis

4.1 Model 1

Model 1: The first model purports that nuclear disarmament can be undertaken 1) if the external security milieu is/becomes non-threatening, and 2) if there is no credible nuclear threat to the state by a nearby and/or strategic adversary. According to model 1, South Africa's nuclear disarmament was facilitated by:

- 1) A significant improvement to South Africa's external security.
- 2) There was no credible nuclear threat to South Africa by a nearby/and or strategic adversary.

4.1.1 Background: A Besieged Apartheid-Regime 1974-1988

South Africa's initial research into nuclear explosive technology between 1971-1974 and the country's succeeding development of nuclear weapons from 1977 onward, coincided with a serious deterioration of the country's security position. In South Africa's neighboring countries Angola and Mozambique, Soviet and Cuban backed marxist-leninist parties* seized power following their independence from Portugal in 1975 (Van Wyk 2010, p. 104). Furthermore, only five years later in 1980 the white minority regime in Rhodesia (now Zimbabwe), was ousted by radical liberation movements.

Particularly concerning for South Africa was the situation in Angola. With the help of extensive Soviet and Cuban military support, the MPLA defeated the armed forces of National Front for the Liberation of Angola (FNLA) and National Union for Total Independence of South Africa (UNITA) in the Angolan Civil War and gained control over

* In Angola the People's Movement for the Liberation of Angola (MPLA) and in Mozambique Liberation front of Mozambique (FRELIMO).

much of Angola (Hill 2021, p. 143-146). Because of the MPLA's anti-apartheid stance and their support for the independence of Southwest Africa/Namibia from South Africa (Gleijeses 2007, p. 287), southern Angola became a safe haven for the Namibian independence movement Southwest African people's organization (SWAPO) and the South African liberation movement ANC (African National Congress). As was Pretoria's fear, this allowed SWAPO and the MPLA – with Cuban and Soviet Support – to unite against South Africa in Angola and conduct incursion into Namibia against South African forces (Gleijeses 2007, p. 288).

The end of Portuguese rule in Angola and Mozambique and Zimbabwe's independence in 1980 (Gleijeses 2007, p. 286), was a shift of power balance in southern Africa that greatly reduced South Africa's influence in the region. This regional development coupled with the waning support of the United States for Pretoria following the Soweto Riots 1976, made South Africa, both ideologically and militarily, an internationally ostracized country that could not rely on outside assistance for its security (Van Wyk 2019, p.156-158). The possibility of a landward Soviet-directed invasion from the north, posed an existential threat to the apartheid regime in South Africa (Van Wyk 2019, p.154), which prompted the South African government to develop nuclear weapons.

4.1.2 Observable Implication 1: A Non-Threatening External Milieu

South Africa's decision to discard its nuclear deterrent was taken in the wake of beneficial changes to South Africa's external security. The increasingly non-threatening situation in southern Africa can be attributed to the cessation of military hostilities in the region and the Soviet Union's revised policy towards liberation movements in Africa. The thirteen year long military conflict in Namibia and Angola, where South Africa faced the collective forces of SWAPO, MPLA and up to 50 000 Cuban troops, had ended with a cease-fire agreement in August 1988 (Albright – Stickner 2016, p. 182-183). South Africa, Cuba and the MPLA later signed the Tripartite Accord in December 1988 which guaranteed the independence of Namibia and the withdrawal of the Cuban military from Angola (UNP 2019, p. 2). The Soviet Union had concurrently under Michael Gorbachev's leadership altered its policies in southern Africa. Already in 1986, Gorbachev had announced reductions in financial and military support to its allies in the region (Saunders – Onslow 2010, p. 238-239). Moscow had also reapproached Pretoria and expressed a willingness that the transition to majority rule in South Africa should come about through negotiations and not an armed revolutionary struggle (Legum 1991, p. 58, 63-64).

It is clear that South Africa's external security had significantly improved when the nuclear disarmament process began in February 1990. The Soviet-expansionist threat had receded, Cuban troops were withdrawing from Angola and a democratic transition in Namibia was underway in accordance with the Tripart Accord (UNP 2019, p.3). There had also been reciprocal reconciliations between the apartheid-regime and ANC; the ANC had shifted away from a revolutionary socialist agenda and the apartheid-government had released Nelson Mandela in February 1990 and lifted its ban on the ANC and South African Communist Party (SACP) (Sauders-Onslow 2010, p. 240). Emboldened by these dramatic political changes and the gradual disintegration of the East Bloc following the fall of the Berlin Wall in November 1989, de Klerk authorized the nuclear disarmament process to commence. The nuclear deterrent had, according to de Klerk, become "superfluous" (WC, p. 3)

4.1.3 Observable Implication 2: A Non-Existent Nuclear Threat to South Africa

Nothing suggests that it was likely that a foreign power would use nuclear weapons against South Africa, either before or during the country's nuclear disarmament. First of all, no state on the African continent besides South Africa possessed or has possessed nuclear weapons (Mehta 2020, p. 63). Secondly, South Africa's principal nuclear adversary, the Soviet Union, had never deployed nuclear weapons outside its own territory (Walker 1992, p. 258-260) and it was generally assumed that the Soviet Union would not extend its nuclear commitment to its allies in southern Africa (Van Wyk 2010, p. 112-113). Considering the Soviet Union's close ties with ANC and the SACP (Legum 1991 p. 56-60) and the consequences of nuclear weapons usage, a scenario where the Soviet Union would have used nuclear weapons on the territory of its allies becomes highly improbable

Finally, judging by the secret nuclear strategies enacted by South Africa, the first in 1978 and the second in 1987, it is likely that neither the government or the military perceived that the purpose of the nuclear deterrent was to defend South Africa from an imminent nuclear threat from the Soviet Union or any other foreign power (Lieberman 2001, p. 53, 56-57). The nuclear deterrent functioned instead as an insurance that would, if South Africa was collectively attacked by its neighboring countries, be covertly revealed to selected western powers in the hopes that they would lobby for de-escalation (Lieberman 2001, p. 55-57). The conclusion is that there was no credible nuclear threat to South Africa by a nearby and/or adversarial state when South Africa decided to discard its nuclear arsenal.

4.2 Model 2

Model 2: The second model purports that nuclear disarmament can be undertaken if top government officials, the nuclear energy/research establishment, and high-ranking military personnel have 1) no/limited economic interests, or 2) no/limited military interests in the retainment of nuclear weapons. According to model 2, South Africa's nuclear disarmament occurred because:

- 1) These actors, alone or together within South Africa, believed that retaining nuclear weapons would be too costly.
- 2) These actors, alone or together within South Africa, believed that the nuclear deterrent had no/limited military use.

4.2.1 Background: The Actors Involved and the Nuclear Strategies Employed

The decision to consciously pursue nuclear weapons was made in 1977 Prime Minister John Vorster in concert with Defense Minister P.W. Botha and AEB chairman AJ Roux * (Lieberman 2001, p. 63-64). Botha appointed a steering-committee to oversee the program in October 1978, just one month after he had become prime minister (Albright – Sticker 2016, p. 84). The committee – chaired by Botha and attended by minister of defense, minister of foreign affairs, minister of minerals and energy, chiefs of AEC/AEB and South African Defense Force (SADF) – decided that the nuclear weapons program was to be led by Armaments Corporation of South Africa (ARMSCOR) in cooperation with the AEC and SADF. ARMSCOR, AEC, SADF subsequently formed a management committee that reported to a special government commission which oversaw and controlled the program (Albright – Stickner 2016, p. 85-86).

Shortly afterwards, in early 1979 Botha approved a basic nuclear deterrent strategy written by SADF chief John Huyser in which Huyser outlined three phases: phase 1) the government would neither disclose nor deny its possession of nuclear weapons, phase 2) if the country was threatened militarily, the government would reveal its nuclear deterrent to selected western powers, phase 3) if phase 2 failed, the nuclear deterrent would be publicly revealed by the government through an official statement or by conducting an underground nuclear weapons-test (Goodson 2012, p. 213). This strategy was later assessed by an ARMSCOR strategy

* The Atomic Energy Bureau changed its name to Atomic Energy Agency (AEC) in 1982.

group in 1983 which essentially endorsed Huyser's strategy but added to phase 3 the possibility of conducting an above ground nuclear weapons test outside South Africa's coast (Lieberman 2001, p. 55-56).

In 1985, the nuclear weapons program was reviewed by a committee attended by Botha, several cabinet members, and the heads of SADF, ARMSCOR and AEC. The committee determined that no more than seven warheads were to be produced (Albright – Stickner 2016, p. 133). Six of these warheads was completed, when Frederik De Klerk - who had previously been minister of mines and energy and was thus informed about the existence of the country's nuclear weapons (Albright – Stickner 2016, p. 187) - assumed office as president in September 1989. A cabinet committee chaired by de Klerk and attended by various cabinet ministers, unanimously decided in November 1989 that South Africa should terminate its nuclear deterrent and accede to NPT (Lieberman 2001, p. 73-74). De Klerk entrusted a steering committee consisting of the heads of AEC, ARMSCOR and SADF to prepare the denuclearization process, which eventually commenced in February 1990 (Stumpf 1995, p. 6).

Thus, the nuclear weapons program's development and decommissioning was led by the government, and supported and implemented by the ARMSCOR, AEC and SADF (Van Wyk 2010, p. 115-116). Throughout its duration, the South African nuclear weapons program remained an undisclosed state secret, unknown to the South African populace and known to only a handful of select cabinet ministers, high-ranking chiefs within the SADF and the heads of ARMSCOR and AEC. With the exception of these select groups approximately a thousand people knew about the program's existence, mostly employees at ARMSCOR and AEC (Stumpf 1995, p. 6).

4.2.2 Observable Implication 1: An Affordable Nuclear Deterrent

There are different estimations of the exact cost of the nuclear weapons program; Lieberman claims the total costs was at minimum 680 million rand, and possibly double that amount (Lieberman 2001, p. 55); former AEC-head Waldo Stumpf states the cost for the program was 680 million rand; AEC-chairman J.W. de Villiers et al. claims it was 750 million (De Villiers et al. 1993, p. 101); Masiza claims the total cost was 800 million rand (Masiza 1993, p. 35).^{*} However, the general consensus – (Albright 1994, p. 39), (Lieberman 2001, p. 55) is that the

^{*} 800 million rand in 1990 was roughly worth 300 million US dollars (BT).

cost of the nuclear weapons program was manageable given South Africa's large military budget. Before the nuclear disarmament process began in 1989, the size and cost of the program had also been curtailed when, in 1985, it was decided that no more than seven nuclear warheads would be developed (Albright – Sticker 2016, p. 133-134).

Moreover, there is scant evidence that suggest South Africa decided to terminate its nuclear weapons arsenal because the retainment of nuclear weapons was perceived to be too costly. In fact, officials within ARMSCOR and AEC who could have opposed the nuclear disarmament for economic reasons, as it meant economic cutbacks and workforce reductions (Albright – Stickner 2016, p. 207-210), supported - and implemented – the denuclearization process. For ARMSCOR, opposition to the nuclear rollback might have been dampened because they were permitted to maintain their more extensive and costly space launch program (Albright – Stickner 2016, p. 213). Additionally, statements from government officials like President de Klerk (WC, p. 3-4) and people involved in the nuclear weapons program (Stumpf 1995, p. 5-6) (Lieberman 2001, p. 77) exclude economic concerns as a factor behind South Africa's nuclear disarmament. The fact that the government approved in 1985 the construction of a new ARMSCOR nuclear research facility to upgrade the nuclear deterrent, costing 36 million rand and completed in 1989 (Albright 1994, p. 45), further corroborates that neither the government nor the nuclear research establishment were particularly concerned with the program's costs prior the nuclear rollback. As late as 1987 the South African air force, the main weapons branch within SADF involved in the nuclear weapons program, had also called for an 800-million-rand worth expansion of the nuclear weapons arsenal (Albright – Stickner 2016, p.140-141).

The circumstances outlined above, indicates that it is highly unlikely that South Africa decided to discard its nuclear arsenal because the nuclear weapons program was considered to be too expensive by the people involved in the program.

4.2.3 Observable implication 2: An Unusable Nuclear Deterrent

Several factors support the notion that the government, the military (SADF) and the nuclear research establishment (ARMSCOR and AEC), considered the nuclear deterrent to have had limited military utility. Firstly, the three-phase nuclear weapons strategies approved by the government and written by SADF chief John Huyser and an ARMSCOR strategy group respectively, suggest that the principal objective of the nuclear weapons arsenal was political, not military. By complying with phase 1 – neither confirming nor disclosing the possession of

nuclear weapons – South Africa’s nuclear weapon’s arsenal had a political and diplomatic function, keeping the world in the dark and potentially discouraging an attack against South Africa. (Goodson 2012, p. 211-212). But even if South Africa was attacked, this latent weapon would not be employed militarily. Instead, it would be used diplomatically through covert revelation to western powers in the hopes that they would help to de-escalate the conflict (Goodson 2012, p. 209, 212). Consequently the nuclear weapons strategies foresaw no actual use of nuclear weapons on the battlefield. On the contrary, they entailed that the usage of nuclear weapons should be avoided (Stumpf 1995, p. 5).

Furthermore, the testaments from government ministers and people involved in the nuclear weapons program are concordant in claiming that they considered the nuclear deterrent to have been militarily unusable. According to President P.W. Botha, South Africa’s nuclear deterrent was “primarily a political weapons system, not a military system” (Albright – Stickner 2016, p. 130). Both Waldo Stumpf, the head of AEC when nuclear disarmament process began, (Stumpf 1995, p. 5) and AEC chairman J.W. de Villiers (De Villiers et al. 1993, p. 101), asserts that the government never envisioned actual use of nuclear weapons. André Buys, who headed the ARMSCOR strategy group in 1983, considered that the usage of nuclear weapons – even if South Africa was existentially threatened – to have been suicidal (Lieberman 2001, p. 56), potentially uniting the Soviet Union and the United States against South Africa. The head of SADF, General Johannes Geldenhuys, had not believed that the nuclear arsenal had any military use (Lieberman 2001, p. 78).

It is possible, as Goodson points out, that evidence detailing the usage of nuclear weapons in certain situations were destroyed prior to President de Klerk’s official disclosing of South Africa’s nuclear weapons in 1993 (Goodson 2012, p. 213). Apartheid leaders and people connected to the nuclear weapons program have a vested interests in portraying the program as more “peaceful” than it was. Nevertheless, the nuclear weapons strategies employed and the unanimous rejection by the people involved in the nuclear weapons program to ever use nuclear weaponry, makes it probable that the nuclear deterrent was regarded as militarily unusable.

4. 3 Model 3

Model 3: The third model purports that nuclear disarmament can be undertaken if: 1) international non-proliferation norms exert influence over a state’s nuclear decision-making,

and 2) if a state's possession of nuclear weapons doesn't have a beneficial symbolic function for the state and doesn't confer prestige and influence on the state. According to this model South Africa's nuclear disarmament was facilitated by:

- 1) South Africa receiving concessions for adherence to nuclear non-proliferation norms.
- 2) South Africa's nuclear weapons gave the country no/limited prestige in the international stage and had no/limited symbolic value for the country.

4.3.1 Background: South Africa's Nuclear Isolation

Prior to South Africa's development of nuclear weapons, the country was at the forefront in nuclear technology and a key partner in international cooperation on nuclear matters with western countries (Albright – Sticker 2016, p. 1-2). South Africa had for instance in the 1950s participated in the US-led "Atoms for peace program", received its first nuclear power plant in 1965, SAFARI 1, from the United States (Van Wyk 2010, p. 53), and was, as the most advanced nuclear country in Africa, a founding member of the IAEA in 1957. Despite South Africa's initial nuclear cooperation in the decades following WW2, the country became increasingly isolated on nuclear matters from the 1970s and onwards. This was partly due the country's political ostracization on account of its apartheid politics, and partly due to South Africa's refusal to sign the NPT in 1970 and adhere to IAEA-inspections (Van Wyk 2010, p. 54). As a result, the Ford-administration ended in 1976 the bilateral nuclear cooperation with South Africa (Stumpf 1995, p. 5) and the succeeding Carter-administration enacted in 1978 the Nuclear Nonproliferation Act which barred trade with South African uranium and nuclear technology (Van Wyk 2015, p. 54).

The isolation was further reinforced as the international community came to believe that South Africa was pursuing nuclear weapons. Two events in particular cemented these suspicions. The first one was the Kalahari-incident in 1977 when a nuclear weapons test-site in the Kalahari Desert was revealed, and the second event was the Vela-incident in 1979 when an American satellite detected what was possibly an atmospheric nuclear explosion close to the South African Prince Edward Islands in the Indian Ocean (Goodson 2012, p. 250)*.

* On the 22 September 1979, the American satellite "Vela" detected an emission of light characteristic of a nuclear explosion. The exact nature of this event has never been confirmed; it is generally thought to have been either a crashing meteorite or a nuclear test conduct by South Africa and/or Israel (Wright – De Geer 2017, p. 95- 96, 106-108).

This, in combination with South Africa's racial policies, precipitated South Africa's loss of its designated seat at IAEA Board of Governors to Egypt in 1977, the rejection of the credentials of South Africa's IAEA-delegation in 1979 (Möser 2019, p. 561), and the IAEA to pass a resolution in 1984 that called on states to end all nuclear cooperation with South Africa (Van Wyk 2015, p. 405).

From fear of being completely expelled from IAEA, President P.W. Botha announced in 1987 that South Africa was planning to accede to NPT (Van Wyk 2015, p. 406 - 407). As South Africa was designated as a NNWS according to the NPT (Albright – Stickner 2016, p. 210), its secret possession of nuclear weapons could not be accepted within the NPT-framework; joining the NPT therefore required nuclear disarmament. Thereafter in several negotiations rounds starting in 1988, South African delegations, led by foreign minister Roelf "Pik" Botha, negotiated the conditions of South Africa's accedence to the NPT with the treaty's depository powers – United Kingdom, United States, and the Soviet Union (Möser 2019, p. 566). Eventually, after South Africa had secretly dismantled its nuclear weapons arsenal, South Africa signed the NPT in July 1991 and, in accordance with the treaty, signed a safeguards-agreement with the IAEA.

4.3.2 Observable implication 1: Seeking and Receiving Benefits for NPT-accession

South Africa's road to NPT-accession ran parallel to its nuclear disarmament process. When the deliberations started in August 1988, South Africa was interested in "clarifying the costs and benefits of adherence" (Van Wyk-Van Wyk 2015, p. 42). Particularly important for South Africa was the provisions in article IV in the NPT (Möser 2019, p. 564-655), which guarantees "the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy" (UNODA 1). But the NPT-depositories signaled that South Africa's isolation on nuclear matters could not be terminated as long as its racial policies persisted (Möser 2019, p. 566). However, in talks held in 1989 and 1990, South Africa convinced the NPT-depositories to pressure states in southern Africa – Namibia, Angola, Zambia, Tanzania, Mozambique, and Zimbabwe – to simultaneously accede to the NPT (Möser 2019, p. 570-572). As a result, Mozambique signed the NPT in September 1990 and Namibia, Angola, and Zambia concurrently stated that they would accede to the NPT. Mozambique also indicated that it would sign treaty on the condition that South Africa first joined (Möser 2019, p. 572). By

convincing the NPT-depositories to lobby states in southern Africa to also sign the NPT, South Africa managed to receive diplomatic benefits by discarding its nuclear arsenal and adhering to the NPT.

By joining the NPT and making the NPT-depositories persuade regional states to sign the treaty, de Klerk and the foreign office could also realize their ultimate objective (Msjer 2019, p. 573-574) – the establishment of Nuclear Weapons Free Zone (NWFZ) in Africa (negotiations on a NWFZ in Africa began in 1996).

4.3.3 Observable Implication 2: An Internationally Disapproved Bomb

After the Kalahari-incident in 1977 and the Vela-incident in 1979, the international community surmised that South Africa had nuclear weapons or was developing a nuclear capability (Goodson 2012 p. 250). But South Africa's clandestine, yet presumed, development of nuclear weapons was not a case of what Sagan identifies as a prestigious nuclear acquisition that enhances a state's status and influence in international politics (Sagan 1996-1997, p. 75-80).

On the contrary, South Africa's presumed nuclear proliferation was a catalyst that further ignited the international community's effort to politically isolate and sanction the apartheid regime (Van Wyk 2015, p. 395-397). Although South Africa's ostracization in nuclear affairs (Lieberman 2001, p. 69), and measures such as the approval of a mandatory arms-embargo against South Africa in 1977 by the United Nation Security Council (Albright – Stickner 2016, p. 82), might have chiefly stemmed from the outside worlds' disapproval of apartheid, the assumed development of nuclear weapons reinforced South Africa's position as an international pariah. The lack of prestige accorded to South Africa's nuclear program and the international community's especially strong opposition to the possibility of the country becoming a nuclear weapons state, can be manifested by comparing South Africa's and India's development of nuclear weapons. India was like South Africa a non-signatory of the NPT and classified as NNWS according to the treaty (UNODA 1) when the country officially revealed its possession of nuclear weapons in 1974 by conducting an atmospheric nuclear test (Fair 2005, p. 23-26). Yet unlike South Africa, India was not shunned in IAEA and in nuclear affairs. Prime Minister Vorster's and Botha's choice to keep the nuclear deterrent secret also precluded the country from becoming, like India, a contested yet recognized nuclear weapons state in international affairs. The decision to keep the program secret, indicates, that the South

African leadership thought “the costs of officially joining the nuclear club overtly outweighed the benefits” (Lieberman 2001, p. 70).

Consequently, South Africa received no significant political leverage or prestige on the international stage by developing nuclear weapons. Ultimately, the fact the nuclear deterrent was unknown to the general South African population and to most of the political and military establishment (Albright 1994, p. 38) also hindered South Africa’s possession of nuclear weapons from becoming a national symbol, an instrument that groups supporting nuclear arms could rally behind. Thus, the decision to disarm was taken behind closed doors and the decisionmakers did not have to face any potential opposition from nuclear weapons-friendly groups within or outside the government (Möser 2019, p. 568- 569).

5 Assessing Sagan’s model: Discussion

5.1 A multifaceted nuclear disarmament: Results

The analysis of South Africa’s nuclear disarmament validates five out of the six formulated observable implications. Model 1 showcases that there was a significant improvement to South Africa’s security milieu prior to the nuclear rollback, and that there was simultaneously no conceivable nuclear threat to South Africa by a nearby and/or adversarial state. Model 2 corroborates that the government, military and nuclear research establishment believed that the country’s nuclear deterrent had limited military utility. Model 3 confirms that South Africa received some concessions by discarding its nuclear arsenal and adhering to nuclear non-proliferation norms. In addition, model 3 confirms that the nuclear weaponry did not give the country any prestige and influence in the international community, and that the nuclear deterrent had no significant symbolic function for the country. The only implication that is disproved is number 1 within model 2; the analysis refutes that South Africa’s nuclear rollback was undertaken because the government, the military and nuclear research establishment believed that retaining nuclear weapons was too costly.

5.2 Sagan's Theory: A Model With High Explanatory Power

Considering that nearly every preconception in Sagan's theory about conditions that can facilitate nuclear disarmament is confirmed, the explanatory power of Sagan's theory when applied to South Africa's nuclear rollback should be regarded as high.

The usage of Sagan's model corroborates previous studies with emphasis on the changing external security milieu to explain South Africa's nuclear disarmament Liberman (2001), Stump (1995), Van Wyk (2010), Park & Chung (2022). By showcasing that there was no credible nuclear threat to South Africa, this thesis further reinforces the notion that South Africa's nuclear rollback can be explained by the emergence of a non-threatening external milieu. The belief among government ministers, the military and nuclear research-establishment that the nuclear deterrent had limited military utility, confirms the assertion of some studies – Liberman (2001) Albright & Sticker (2016), – that the anti-nuclear persuasion of domestic actors likely influenced South Africa's nuclear rollback. The usage of Sagan's theory also highlights an overlooked factor in previous studies– namely the concessions given to South Africa by NPT-depositories' in the NPT-negotiations. With that, this thesis demonstrates that non-proliferation norms, and especially the NPT-framework, potentially influenced South Africa's nuclear disarmament decision. By illustrating the non-existent prestige and symbolic function of South Africa's nuclear deterrent, Sagan's model also showcases that ideational factors should not be overlooked when explaining South Africa's nuclear rollback.

It is hard to determine which factor(s) were the most important to South Africa's nuclear disarmament – the emergence of a non-threatening security milieu, the unanimous belief that the nuclear deterrent had limited military utility, or the concessions that South Africa received for NPT-accession and the limited prestige and symbolic value of the nuclear deterrent. But it is apparent that the changing external security milieu – owing to the Tripart Accord in December 1988 and Soviet Union's revised policy in southern Africa - must be considered when explaining South Africa's nuclear disarmament; it is what President de Klerk (WC, p. 4), AEC-head Stump (Stump 1995, p. 6) and numerous studies - Van Wyk (2010), Liberman (2001), Albright – Sticker (2016) – claim to be the principal cause behind the nuclear disarmament decision.

Since the nuclear deterrent was – to a large extent – developed as safeguard against external threats from the Soviet Union and its allies in southern Africa, the diminishment of this threat in 1988 naturally meant a reappraisal of the nuclear deterrent. The belief that there

was a highly limited military utility in retaining a nuclear arsenal – unanimously expressed by people involved in nuclear program and demonstrated by nuclear strategies employed and the decision to produce no more the seven warheads – likely further paved the way for a nuclear rollback against the backdrop of diminishing external threats to South Africa. The level of secrecy attached to the nuclear weapons program had even precluded the nuclear deterrent from becoming an integral part of the SADF, their existence being omitted from the South Africa’s military doctrine (Albright 1994, p. 38).

Moreover, President de Klerk (WC, p. 4-5), officials within the AEC and ARMSOR (Van Wyk – Van Wyk 2015, p. 42) and the foreign office lead by Pik Botha (Möser 2019, p. 564), did also support the nuclear disarmament process partly because adhering to nuclear non-proliferation norms could grant South Africa diplomatic, economic, and technological benefits. It is feasible that the positive outcomes from the NPT negotiations in 1988 – 1991, bolstered South Africa’s decision to finalize its nuclear disarmament process and not, for example, halt the nuclear rollback when half of the arsenal had been dismantled.

Regardless of how important the possible and actual benefits of NPT-accession were to the leadership’s decision to dismantle the country’s nuclear weapons, it is an aspect that cannot be overlooked. It is also conceivable that South Africa’s nuclear rollback was somewhat facilitated by the limited prestige and symbolic value of the nuclear deterrent since it meant that the country would not voluntarily give up institutional influence and prestige by discarding its nuclear arsenal.

The results partly correspond to Hughes’s (2013) previous usage of Sagan’s model; like Hughes’s study this thesis corroborates that the shifting external security environment was important to South Africa’s abandonment of nuclear weapons. The usage of Sagan’s model in this thesis also – unlike Hughes (2013) – illustrates that Sagan’s model can be utilized to analyze nuclear policies by examining the economic and military interests of domestic actors. By demonstrating that South Africa received concessions for adhering to the NPT, this thesis as well disproves Hughes’s claim (Hughes 2013, p. 73, 84) that nuclear non-proliferation norms were insignificant to the country’s nuclear disarmament.

A possible limitation of Sagan’s model is that it omits the psychological and ideological disposition of individuals – notably state leaders – as an element for explaining states’ nuclear decision-making. This is a factor that probably also must be taken into account in the case of South Africa’s nuclear rollback. The stark political and psychological differences between President P.W Botha and President Frederik de Klerk, likely precipitated the swift nuclear

disarmament following de Klerk's election as President in September 1989 (Lieberman 2001, p. 76, 84).

Botha, who was staunch Afrikaner nationalist who led South Africa together with a small group of conservative apartheid-hardliners connected to the security and military establishment, expressed no interest in nuclear disarming during his tenure 1978-1989 and was an ardent supporter of nuclear weapons program ever since its inception in 1977 (Albright Stickner, p. 185-186). In an interview in 1999, de Klerk called the nuclear weapon's program Botha's "pet project" (Lieberman 2001, p. 73-74). In contrast, de Klerk was himself of a more liberal persuasion, keen on radically reforming South Africa and ending the "securocrats" control over South Africa politics (Van Wyk 2010 p. 115). The immediate reappraisal of the nuclear weapons program after de Klerk's ascent to power and his reportedly unwavering support for nuclear disarmament during meetings in the autumn of 1989 (Lieberman 2001, p. 73, 76) indicates that de Klerk, unlike Botha, harbored strong anti-nuclear weapons sentiments and saw nuclear disarmament as essential to transforming South Africa from an international pariah to a respected member of the international community.

5.3 Further Research

This thesis demonstrates that Sagan's model has a high explanatory power when applied to South Africa's nuclear disarmament. To further evaluate the utility Sagan's model, it is possible to employ the model to the Ukraine's, Belarus's, and Kazakhstan's nuclear rollback processes. It is plausible that some aspects, like budgetary concerns, were more important for their nuclear disarmament decisions since their nuclear arsenal was considerably larger than South Africa's.

I have mentioned above that I have consciously excluded the *political* interests of domestic actors - the government, the military, and the nuclear research-establishment – in model 2, since I believe the model focuses on the economic and military interests of domestic actors. However, numerous studies – Lieberman (2001, p. 73-74), Van Wyk (2010, p. 115), (Albright – Sticker 2016, p.184), (De Villiers et al. 1993, p. 102) Hughes (2013, p. 83-84) – mention that de Klerk and his inner circle regarded the nuclear deterrent as a political liability and saw nuclear disarmament as essential to domestically reforming South Africa and ending apartheid. In light of this fact, it would be appropriate to extend Sagan's model by including the political interests of domestic actors.

A factor that I have not investigated in this thesis is the possibility that South Africa's nuclear disarmament decision was taken because the apartheid government feared the prospect of nuclear weapons in the hands of a coming black-majority government. De Klerk and former apartheid leaders have repeatedly denied this (Albright-Stickner 2016, p. 189-190). But there seems to be conflicting opinions about this among scholars. Many studies – Albright (1994), Park & Chung (2022), De Villiers et al. (1993), Stumpf (1995) – completely ignore it, while some studies – Liberman (2001), Purkitt et al. (2002), Albright & Stickner (2016) – deny that this was a consideration, and other studies – Van Wyk (2010), Van Wyk (2015), Babbage (2004) – consider it to be an important aspect. It would hence be relevant to investigate whether this was an important factor or not. Since several studies partly explain South Africa's nuclear rollback by noting the ideological and psychological differences between President Botha and President de Klerk, an examination of the importance of these differences would also be relevant to get a comprehensive picture of South Africa's nuclear disarmament.

6 The Facets of Nuclear Disarmament: Conclusion

The analysis of South Africa's nuclear rollback largely corroborates the assumptions of Sagan's model which suggest that external security concerns, the interest of domestic agents, the influence of non-proliferation norms, and the symbolic value of nuclear weapons should be taken into account when explaining the nuclear decision-making of states; the results show that the changing external security milieu, the belief among domestic actors that the nuclear deterrent had limited military utility, the normative framework of the NPT, and the non-existent symbolic function of the country's nuclear deterrent, together likely facilitated South Africa's nuclear disarmament decision. Seeing that five out of six observable implications are confirmed in the analysis - many of which previous studies have also emphasized – Sagan's model can be considered to have a high explanatory power when applied to South Africa's nuclear disarmament. However, the omission of the psychological and ideological disposition of leaders as a factor in Sagan's model, is conceivably a blind spot that to some extent curtails the explanatory power of Sagan's model.

In this thesis I have utilized new research on South Africa's historical relationship with IAEA and the NPT. As a result, this study contributes new knowledge about South Africa's nuclear disarmament decision by demonstrating that the concessions given to South Africa in NPT-negotiations were possibly an important factor. By employing Sagan's model, I have also expanded on Hughes's previous study and shown that Sagan's theory can be successfully used to analyze the economic and military interests of domestic actors.

Ultimately, the use of Sagan's model in this thesis illustrates that numerous external and internal factors can likely influence the nuclear decision-making of states, and shows that it is appropriate to combine the notions of dominant international relations theories – (neo)realism, (neo)liberalism, and constructivism – in order to sufficiently analyze and understand the nuclear policies enacted by states. This suggests that if the international community's objective of a general nuclear disarmament is to be realized, it will require more than only establishing a mutually secure external milieu. It is likely also important to take steps towards reducing the utility of nuclear weapons by revising the importance of nuclear weapons in the defense strategies of NWS, strengthening the coercive power of nuclear non-proliferation norms, and consciously curtailing the institutional and symbolic prestige of nuclear weapons. It is paramount to think about nuclear weaponry as not only a military deterrent, but also as contested symbolic tool whose proliferation and non-proliferation is dependent on the views of influential groups within the state as well as the legality and utility of nuclear weapons in the international community.

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8 Appendix

8.1 Abbreviations

AEC/AEB - Atomic Energy Agency /Atomic Energy Bureau

ANC – African National Congress

ARMSCOR – Armaments Corporation of South Africa

FNLA – National Front for the Liberation of Angola

FRELIMO – Liberation front of Mozambique

HEU – Higly Enriched Uranium

IAEA – International Atomic Energy Agency

MPLA – People’s Movement for the Liberation of Angola

NWFZ – Nuclear Weapons Free Zone

NWS – Nuclear-Weapons State

NNWS – Non-Nuclear Weapons State

NPT – Nuclear Nonproliferation Treaty

PNE – Peaceful Nuclear Explosion

SACP – South African Communist Party

SADF – South African Defence Force

SWAPO – South West Africa People's Organisation

UNITA –National Union for Total Independence of South Africa