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Modelling the Motivational Correlates
of Nuclear Proliferation (1941-1994)

Julian Schofield

A Thesis

in

The Department

of

Public Policy and Public Administration

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
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Montreal, Quebec, Canada

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ABSTRACT

Modelling the Motivational Correlates of Nuclear Proliferation (1941-1994)

Julian Schofield

Nuclear weapons proliferation activity is a quantifiable phenomena describable by variables that account for the effects of security threats, alliance guarantees, prestige needs, trade dependencies and domestic exigencies. Since the 1960s, the traditional pattern of nuclear proliferation has been influenced by the increasing technical capacity of the developing world, the decrease in the costs of nuclear research and the undetectability of state-sponsored projects. Although the nuclear danger is currently less than at certain points during the Cold War, the progressive erosion of the nonproliferation regime and its attendant nuclear taboo heralds nuclear proliferation to be one of the great systemic factors in the Twenty-First century. This paper proposes to explain nuclear proliferation activity by using an integrated-motivational approach to model five independent variables. The first four variables are assessed against the dependent variable using a dichotomous logistic regression. The remaining independent variable, domestic, is then employed to formulate generalizations to group the remaining test misclassifieds. This is concluded by a second statistic testing a hypothesis on nuclear opacity. The tests are based on the catalogue of proliferation activity listed in the appendix.

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PREFACE

Nuclear weapons have been planned for, built, used, and subordinated to a complex theoretical framework, but even after over half a century, they have never quite been culturally internalized. Perhaps I am wrong, but it seems intuitive that nuclear weapons will eventually become even further integrated into human civilization, probably entailing a fair amount of suffering in the process, and that it will have a profound effect upon future human social organisation. Nuclear weapons may even become 'usable' and nuclear war 'winnable' in a narrow sense. The grand research query here is how humans will live with nuclear weapons; for me this paper was an investigation of the easiest part of that question: how did these devices spread in the beginning?

I would like to thank Dr. Reeta Tremblay, my principal advisor, who read and re-read my endless drafts with great patience and who gave me the freedom to experiment. I owe an equal debt of gratitude to Athanasios Hristoulas and Dr. Gordon Ewing for their guidance in the realm of statistics. I must also thank the members of my family and friends who were eagerly forthcoming with advice.

INTRODUCTION

The probability of a nuclear war occurring increases every time a state elects to engage in the acquisition of atomic weapons. While the decision to produce a nuclear arsenal typically consists of a rational and sober estimation of the range of incentives and disincentives open to the decision-maker, the crisis stresses that entrance state leaders challenge whether judgments to launch are as equally unclouded. It is this unpredictable transition from a condition of deliberate caution, which often guides the decision to cross the nuclear threshold, to confused instability in time of operational use, that portends so much peril.

The significance of the nuclear weapon opportunity alone suggests that no state with the capacity to produce a weapon within its political horizon, probably gazing only a quarter century ahead, can avoid the issue. As tools of political and military activity, nuclear weapons are inherently probabilistic: their possession certifies no perfect security, whereas their absence guarantees no immunity from their effects. Rather, they are the product of a complex puzzle of interactive causes.

The paper argues that the decision to initiate a nuclear weapons project, the dependent variable in the spread of nuclear weapons, is best grounded in the motivational approach, and can be entirely modelled by a statistical

decision-making framework on the basis of security threats, alliance guarantees, prestige claims and trade interdependence. Those cases whose classification cannot be predicted by the model on the basis of the inter-state factors can additionally be so described by the amplificatory or inhibiting effects of particular domestic circumstances. It will furthermore be established that a technical exegesis of nuclear proliferation is too insensitive to the cases to provide any causal account.

Thus, I attempt to synthesize these conceptual islands inasmuch as they affect the construction of a more accurate decision-making model of nuclear proliferation. The focus is thus on the decision-event itself, whether a given state decided yes or no to the question of initiating a nuclear weapons program, and for what reasons. To this end, I endeavor to answer the salient research question: Why do nuclear weapons spread? In seeking an explanation, this study considers the two theoretical approaches, the *technical* and *motivational* schools, and five explanatory variables: *security*, *alliance*, *prestige*, *trade*, and the qualitative variable, *domestic*, each of which will be developed in the following chapters. The main objective, then, is to examine the interactive effects and relative magnitude of these variables in predicting decision-making outcomes, and thus to produce a model that might be useful in foretelling nuclear proliferation.

While significant contributions exist on the analyses of motivational typologies as well as detailed historical case studies, syntheses focused on decision-making have frequently been inaccessible due to the statistically low number of cases. The situation is rapidly changing with the accelerated diffusion of nuclear technology to the developing world, and the conceivability of widespread nuclear weapons possession. This has made unavoidable the imperative for states to make a decision, be it positive or negative.

The rationale for this study is the consummation of previous ideographic studies that have focused on the range of incentives, some by type of motivation, such as superpower relations, security considerations, or prestige, and others by regional classification, particularly concerning Europe, the Middle East and South Asia. It further seeks to address and synthesize what have been two independent contentions. First, whether it is technology or motives themselves that inform, or can at least be best correlated with the emergence of nuclear weapons projects. Second, whether it is the precise interplay between the varying internal, i.e., domestic, or external, security-strategic considerations that determine nuclear procurement.

The former argument, suggested by the *technical school*, emerged from the earliest stages of proliferation in the 1950s and 1960s and attempted to account for what was then quite plainly a technologically-driven spread of nuclear weapons.

All states that could build weapons, would try, and this hypothesis accounted for the vast majority of the programs. This old argument has been reformulated into a sociological hypothesis by some such as S. Flank (of ARPA), who contend that scientists, in a functionalist fashion, continue to define the likelihood of weapons development because of the *inevitability* of invention.¹ This interpretation, besides being rejected by the illustration of just a few non-nuclear exceptions, such as Sweden or Switzerland, can also be addressed on the basis that there has never been a case in which a scientific decision to proceed was a sufficient cause for the initiation of a comprehensive nuclear weapons program.

The latter argument began with the *motivational school's* response to the *technical* approach. While the realist and IPE (international political economy) variants of the motivational school are the more successfully descriptive (the former emphasizing security, alliance, and prestige, and the latter emphasizing trade factors), the domestic variable, which has its origins in the internal workings of the state, is nonetheless crucial in cases where regime type and sub-optimal strategies lead to outcomes not covariable with the state's position in the international system. Internal variables are thus the locus of decision-making because it is there that the stimuli converge, but it is the external as well as internal events or situations that condition the context of that proliferation decision.

The policy relevance of this analysis is twofold. First, it is an attempt at correctly identifying the salient variables necessary for the effective implementation of nonproliferation strategies, regimes and policies. Second, it seeks to model an activity whose increasing frequency will have a proportionately greater effect on international relations in the Twenty-First century.² As such, it is an aid to diagnosis and prediction. What it seeks not to be is a simple catalogue of interrelated trigger events.

The chapter outline is as follows: The First Chapter reviews the aforementioned debate between the technical and motivational approaches. Chapters Two and Three propose a theoretical framework within which to establish the parameters necessary to mount the quantitative model, with the former addressing the military-strategic variables and the latter the political-economic variables. Chapter Four sets up the logistic regression model by demonstrating the method of operationalizing the variables, and Chapter Five assesses the results, discusses the exceptions, and evaluates the utility of the model for further research.

ENDNOTES

1. This viewpoint is best developed in Flank, Steven, "Viewpoint: Nonproliferation Policy: A Quintet For Two Violas", The Nonproliferation Review, Spring-Summer 1994, Vol.1, No.3, pp.71-81.

2. Freedman, Lawrence, "The Proliferation Problem and the New World Order", in Karsh, Efraim, and Navias, Martin S., and Sabin, Philip, Non-Conventional Weapons Proliferation in the Middle East: Tackling the Spread of Nuclear, Chemical, and Biological Capabilities, Clarendon Press, Oxford, 1993, p.163

CHAPTER ONE: Theories of Nuclear Weapons Acquisition

The phenomenon of nuclear proliferation, defined simply as the spread of nuclear weapons among states, has never had a consistent operating theory. Rather, the mechanic of its unfolding has been continuously revised to account for a wide range of observed causes. The initial theoretical framework, the *technical* school, viewed nuclear weapons as spreading with the ability to manufacture them. By the early 1970s this was replaced with the *motivational* school which attributed a series of politico-strategic incentives and disincentives as the root causes of nuclear proliferation. Both frameworks will be reviewed through their origins and development, and it will be demonstrated that an integrated variant of the motivational approach is the more appropriate modelling technique for describing nuclear proliferation activity since 1941. To establish the basis for the motivational approach, the chapter will conclude with a definition and discussion of proliferation decision-making as the dependent variable coupled with an examination of its underlying rationalist presumption.

The term *Nuclear Proliferation* itself emerged in the 1950s and 60s to distinguish it from the spread of indigenous nuclear weapons programs from simple inter-state transfers, called *Nuclear Diffusion*, although current usage incorporates

both meanings.¹ The indicative manifestation of nuclear proliferation has evolved over time, both within the academic and policy communities, in response to the observed environmental changes in the potential for the spread of nuclear weapon applications. Because predictions are unable to register environmental transformation in good time, studies either under-, or more often, over-emphasize the tendency to proliferate. In 1958, the United States National Planning Agency (NPA) estimated that nine to sixteen states would possess nuclear weapons by 1970. John F. Kennedy, in an early 1960s speech, predicted that fifteen to twenty-five nuclear states would develop in the 1970s. In his groundbreaking 1967 study, W.B. Wentz, focusing on the dynamics of technological diffusion, foresaw nine additional nations going nuclear by 1975, with a further ten by 1980.² More recently, T. Kim, in his 1991 examination of nuclear proliferation among developing countries, has suggested that given the emergence of a more turbulent world coupled with increased capability, the number of nuclear states could triple by the early decades of the next century,³ He argues that while there might have been a proliferation deceleration, a sort of industrial 'retooling' interlude in the developing world, the assumption that in the last two decades nuclear proliferation would remain slowed is flawed.⁴

The phenomenon of nuclear proliferation is dizzyingly complex, with some of its dynamics being tangible, such as the

possession of technical capability or overt alliance, and others intangible, such as perceptions of strategic insecurity or particular political-domestic traits. Its causes can also be examined from differing levels of analysis, with some antecedents situated in the inter-state system, others from within the polity, and others still, emerging from the characteristic personality of an individual leader. Academic analysts of the state elites responsible for the acquisition of nuclear weapons are themselves frequently unaware of the conflict that occurs between differing levels of analysis. For a policy example, the singular pursuit of national security, spurred by the desire to obtain unlimited nuclear capacity, tends to run counter to the global process, and may result in what J. Herz called a *Security Dilemma*: the feedback effect where a state that goes nuclear to augment its protection triggers similar competing programs in neighboring states, and hence suffers a net drop in its initial security sum.⁵

To substantiate the model, this study will rely principally upon the level analysis of the 'second-image' associated with the activity emanating from within the state.⁶ This additionally avoids a reductionist ecological fallacy by situating the linkage between the various incentives and disincentives at the inter-state decision-making level.⁷

The selection of the approach was done on the basis of the observations of S. Meyer in his Dynamics of Nuclear Proliferation (1984). In his analysis, he outlined three

possible theoretical explanations for the spread of nuclear weapons. The first posits that there is a technological imperative at work behind nuclear decision-making that makes the convergence of latent capacity (the ability to build) and the actual building of a nuclear weapon inevitable. The second sees the acquisition of nuclear weapons to be the function of decisions related to discrete military-political variables. The third hypothesis, rejected by S. Meyer and not discussed further, suggests that nuclear proliferation instances are largely ideographic *sui generis* events that are beyond study. The first two approaches are reviewed below.⁸

1.1 The Technical Approach

The *technical* approach to nuclear proliferation is posited on the assumption that the most effective way to analyze the nuclear proliferation problem and formulate policy counter-measures is to study indigenous technical capability: "[The]...technical school simply assumes that availability of the technical means and capabilities would automatically push countries toward use of them in acquiring nuclear weapons."⁹ To this end, predicting whether or not a specific state would go nuclear a number of years hence would be determined by some equation aided by counting the number of energy reactors, atomic scientists and uranium mines it currently possessed.

The controversial implication of this approach was that once a state crossed a critical measurable technological

threshold, it would inevitably seek to develop nuclear weapons. Until the late 1950s and the emergence of latent capability in most European states, this model proved very reliable (it described with perfect accuracy the formation of the first four proliferators, the U.S., the USSR, the UK, and France).¹⁰ However, it segregated the source of nuclear proliferation to a narrow band of causes:

Unfortunately, this strong emphasis on technical aspects led large segments of the academic and policy communities to perceive nuclear weapons proliferation as almost entirely a technological problem - much like air pollution or toxic waste disposal. 'Intentions can always change, so we should concentrate on capabilities.'¹¹

Indicators for the technical approach were plentiful, for example, in the detailed listings of the 13,456 foreign scientists from 82 countries that received nuclear instruction and training in the United States between 1954 and 1979.¹² The technical school also had available to it the study of parallel indicators, such as the launch vectors, the most common being the development of missile technology (without which nuclear explosives would have had reduced effectiveness). These can often provide evidence of the advances made in the nuclear weapons field because of the consistent tendency on the part of the proliferating states to ensure simultaneous final development and deployment.¹³ The technical approach offers some tools to interpret behavior based on some necessary causes, for example, the maximum

possible number of nuclear weapons that can be built out of the world's current total of 250 tons of plutonium and 1,500 tons of uranium.¹⁴

Another noteworthy *technical* approach observation has been the tendency of early nuclear states to incautiously offer nuclear help to an immediate ally, and then to promptly sever support in a sort of a recurring 'initial mistake' in each case. For example, the U.S. helped the UK, the USSR helped the PRC, and France helped Israel.¹⁵ Barring the availability of explicit political declarations of intent, the *technical* approach was an effective measure of nuclear capability because of the difficulty associated with fully concealing a nuclear weapons program.

The problems the *technical* approach had in explaining nuclear proliferation were two-fold. First, with the spread of sophisticated nuclear technology to the developing countries and the weakening of the nonproliferation regime, epitomized by the NPT (Non-Proliferation Treaty), and a decline in the necessary investment in nuclear infrastructure, and hence the detectability of technical indicators, the *technical* approach's explanatory power diminished significantly:¹⁶

A 1968 United Nations study estimated the cost of designing, building, and testing a plutonium-based nuclear device at \$100 million. Eight years later, the U.S. Arms Control and Disarmament Agency (ACDA) estimated the cost to be \$51 million. If a country already possessed fissile material, the figures drop to \$30 million in the UN report.¹⁷

Second, the *technical* school relied on explicit indicators to mark its success, such as, for example, a test detonation or other unreserved deployment. This subscription to the conventional definition of nuclear proliferation would eventually fail to account for the emergence of the bomb-in-the-basement phenomenon, as well as for opaque proliferation where deployment of weapon systems did not coincide with declaration.¹⁸ Thus the traditional use of the proliferation ladder, which allowed states to be categorized based on the last threshold they had crossed, was reduced in effectiveness as states refrained from the practice of test-detonations.¹⁹ This has been in part exacerbated by the possibility of proving the workability of fission nuclear weapons by using undetectable zero-yield testing:

This can be done by producing a fission yield high enough to be observable with radiation detectors placed close to the weapon, but still equivalent to less than 1 gram of high explosive. Such extremely low energy releases correspond to about 20 generations of a fission chain reaction, compared with something like 45 generations to build up to a yield equivalent to a few tons or more of high explosive.²⁰

A misconception frequently entertained by the *technical* school, and persisting in socio-technical approaches to nuclear proliferation, as epitomized by S. Flank (ARPA), asserts that nuclear weapons technology has a sociological momentum that drives states to go nuclear. For example, there is a correlation between the level of nuclear-related

scientific infrastructure in a country and the likelihood it is to go nuclear when compared with states that have no capability: every nuclear weapons state has at least one operational research reactor.²¹

The techno-sociological argument that nuclear weapons are an inevitability because they are a product of a scientific community that must seek to actualize itself through every feasible invention, misses the principal inductive observation: that no nuclear weapon to date has been acquired without a political decision by state elites. This is so because in most technocratic environments, despite varying levels of autonomy, scientific establishments are politicized to the extent that they too must compete for part of the greater budget, and to do this they must appeal to the distributor of the funds through the utility of their projects. Where nuclear weapons do not serve the political or security interest of the revenue collectors, funding has been restrained. Thus, given the number of states that had the capability but do not currently possess nuclear weapons, the techno-sociological hypothesis should be restated. A nuclear technological determinism may exist, but it has never prompted a state to cross the threshold without some political cognisance.

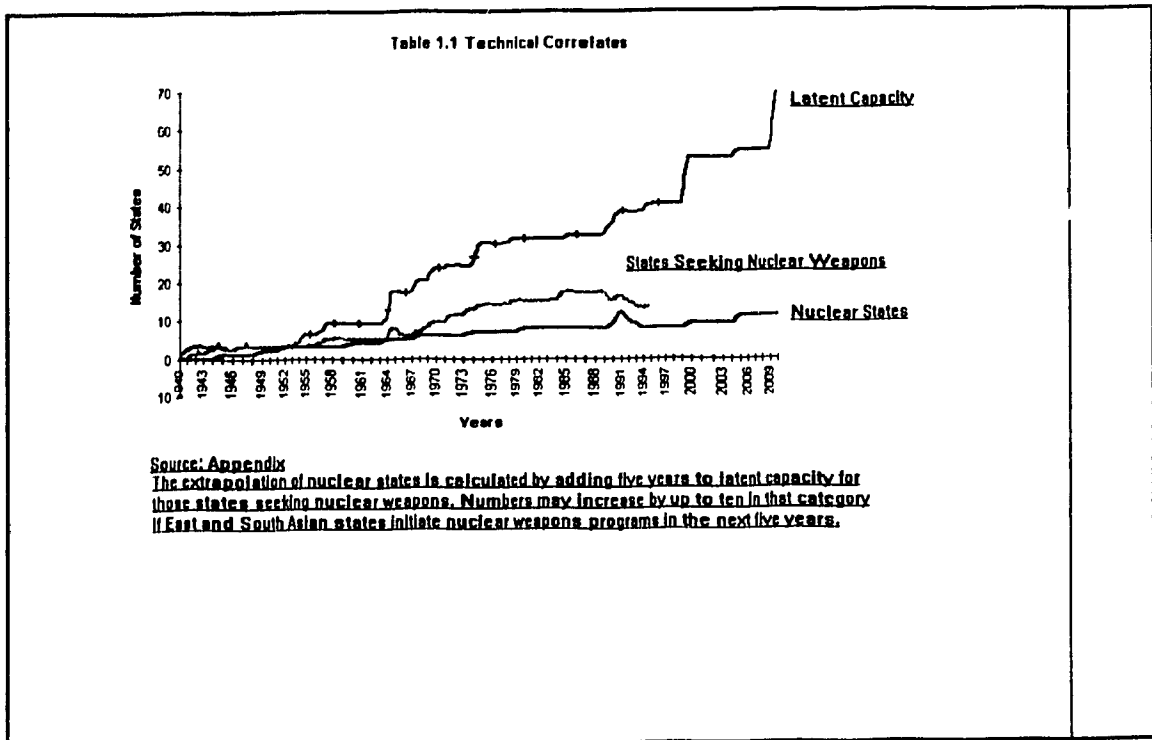
Nevertheless, there are cases where unsanctioned nuclear weapons research continued, such as in India up until 1966, and Israel until 1968, but in neither instance was it the

scientific community that crossed the nuclear threshold: these instances were all eventually explicitly effected by the state leadership. There is, however, ample confirmatory evidence to support some limited notion of an uncontrolled technological momentum, particularly in the example of the Soviet nuclear bureaucracy that generated twice as much uranium as was originally suspected by the U.S. intelligence community:²² "A more benign explanation... was that the arsenal's vast size reflected a bureaucracy run amok and was unconnected to military strategy."²³ Some have argued that it is this technical determinism that runs arms races and pushes certain innovations in nuclear technology, but this seems simplistic: technology creates opportunity, and the existing anomalies of non-nuclear states suggest that technology has motion, but no direction.²⁴

It can probably be more accurately hypothesized that states with some incentives and disincentives are likely to have unaccountable bureaucracies that will create a nuclear option, that is, the deliberate creation of an industrial base that provides it the ability to build nuclear weapons, perhaps for exploitation at an unspecified future date.²⁵ Conceivably as non-state actors in the game gain prominence and technical capacity, the scenario of the criminal-genius or terrorist motivated by purely technical curiosity may at a future date expand this theorem, but this is beyond the reach of this study.

There were fifty-eight states with at least one research or energy reactor as of December 31 1992, but there were at most only ten, and more likely only eight nuclear weapon states at that same date.²⁶ Although most proponents of the technical approach would discount this criticism on the basis of the crude interpretation of the data, it might also be added that the states with the fourth, fifth and seventh largest number of reactors (Japan, Germany and Canada respectively) do not possess nuclear weapons.²⁷ As can be ascertained from Table 1.1, while latent capacity, the desire to build nuclear weapons and nuclear weapon possession, are closely correlated up until about 1965, thereafter, latent capacity far outstrips possession and hence loses its utility as an explanatory variable. This is in part because latent capacity after 1965 ceased to be directed with an end to building nuclear weapons and became a coincidental biproduct of industrial development. In S. Meyer's words:

...before 1955-56 the process of nuclear proliferation was indeed driven by technological imperative, but sometime in the mid-1950s the causal link between acquiring technological capability (latent capacity) and proliferation decisions was broken.²⁸



Notwithstanding the decrease in some aspects of the technical approach's utility, particularly in diagnosing a state's status based on available technical evidence, it is in other aspects still useful for the following reasons. For instance, zero-yield testing does not work as reliably on boosted thermonuclear or fusion weapons (which can be thousands of times more powerful than the upper limit of 500 kilotons for fission weapons).²⁹ Second, some testing is assumed to be necessary for the third generation of nuclear weapon systems which include pure/unboosted-fusion weapons, x-ray, neutron, microwave specific thermonuclear weapons, and directed high velocity plasma nuclear charges.³⁰ As is the case with the United States arsenal, even with frequent testing, fourteen of its forty-one nuclear weapon systems required

corrective modifications immediately prior to or after they were deployed.³¹

There is place for the technical methodologies in long range planning where political factors are too unpredictable to make anything but capability-over-intention assessments. One such study was conducted by the U.S. Commission on Integrated Long-Term Strategy in 1990, and it estimated that by the year 2000, forty nations will possess the nuclear capability to manufacture nuclear weapons, but the report makes no specific forecasts because of the indeterminacy of political outcomes.³²

The *technical* variable is thus reformulated to be a permissive precondition, without which nuclear weapons could not be obtained, but which are unnecessary for the decision to acquire because a policy may be adopted prior to the availability of industrial means. The variable may be a necessary cause for those states that have decided to and succeeded in developing weapons, or states that are seeking to acquire nuclear weapons based on the assessment of the project's feasibility. It is a permissive variable in that states with the capacity have the option to pursue the project or not.

Overall the *technical* school was weakened by its reliance on a monocausal technical variable and its failure to address the conditioning factors of the political-security climate within which they occurred.³³ More importantly, it failed to

account for those anomalous states that had the capability but not the intent to manufacture nuclear weapons in the 1960s, and as such while it is useful in assessing a capability once the commitment of the political elite to the project is known, it makes for a weak predictive model when viewed in the context of the inter-state system. A more faithful criteria for assessing nuclear proliferation would lie in an analysis not in the weapons themselves but in those that seek to use them.

1.2 The Motivational Approach

The *motivational* school (represented by the authors listed in the footnote) is grounded in the assumption that the availability of technical means is just a necessary, and not a sufficient condition for the engagement in nuclear weapon systems procurement, and that therefore the act of proliferating comes about through a precise and discrete political decision.³⁴ The theory emerged out of the observation that there were indeed states with the nuclear capacity but without the intent to possess nuclear weapons, and this was reinforced further by the observation of certain nuclear status reversals, e.g., in the cases of the former Soviet states through 1991-4 and the Republic of South Africa (RSA) in 1993.³⁵ As well, no nation with the technical abilities of the United States in 1941 is ever more than five years away from a nuclear weapon, irrespective of industrial impediments,

so the technical variable is hardly discriminant.³⁶ According to B.I. Spinrad: "there is no technical barrier to nuclear weapon acquisition and weapons proliferation is mainly political."³⁷ To this end, the *motivational* approach emphasizes indicators that are concerned with political, economic and military variables.³⁸

The *motivational* approach thus assumes a set of decision stimuli, or trigger events that force a decision over strategic options. It also presupposes that these proliferation decisions can be systematically related, with some lag, to the actual appearance of nuclear weapons. These choices are in turn informed by a wide range of non-technical variables from political, to military, to domestic.³⁹ Although the *motivational* approach does not require the technical capacity to precede the political decision, since political decisions may cause the formation of latent capacity, it does assume that nuclear weapon status requires a political reason for crossing the threshold.⁴⁰

A frequent argument by proponents of the technical school that the spread of nuclear weapons is very similar to other models of *normal* technological diffusion neglects the latter's special status and history as a weapon of potentially overwhelming destruction.⁴¹ The susceptibility of this particular technological diffusion to the postcontainment era's dispersion of state power emphasizes its closer link to the international distribution of power than any simple model

of the spread of knowledge.⁴²

This study adopts as its technique an integrated motivational approach, which incorporates the importance of the technical factor as a necessary and conditioning variable of nuclear proliferation.⁴³ To be considered in the model, the state must either already possess nuclear weapons, be capable of developing them, or in the case of possessing neither nuclear weapons nor latent capacity, be capable of planning for their development within a quarter century. With the requisites established, it is now essential to situate the proliferation framework within it and the qualified conception of decision-making rationality.

1.3 The Proliferation Decision: the Dependent Variable

The approach used in illustrating the proliferation decision-making process is an 'integrated motivational' approach, which states that decisions emerge as a consequence of a combination of technical and motivational inputs. However, for the integrated motivational approach to be accommodated to the logistic statistical test applied in Chapter Five, some provisions must be made for the role of the technical conditioning variable, the rationalist context within which the decisions occur, and an operationalized definition of the dependent variable. Proceeding through these three subjects, I will illustrate that the most fitting dependent variable for the model is one that posits the state

as a unitary and rational actor that must satisfy both the technical conditioning variable and respond dichotomously to the decision of nuclear proliferation.

The technical variable, that is, the capability of a given state to build nuclear weapons, has been redefined in the approach below to conform with the decision-making focus of this paper. The move to proliferate is viewed here as an essentially voluntarist act, in which an active decision to build nuclear weapons must be explicitly made: "In pursuing this question of why nations go nuclear, the pivotal point in the nuclear proliferation process is the decision to pursue nuclear weapons acquisition, not having the first weapon actually in hand."⁴⁴

The technical factor is thus treated as a conditioning variable in that some latent capability is necessary for a nuclear weapons program among states with little planning proficiency, and some hope of latent capacity at a future date for states with some planning expertise. A state must reach an adequate technical capacity for the task of acquiring the weapons within the political-temporal horizon of the decision-maker, to make a positive proliferation decision (to decide to build nuclear weapons). This is in turn dependent on the planning ability of the state's leadership as well as the state's political culture:

First, nuclear weapons proliferation is not an event but a process. Second, every decision in the process of proliferation is itself a consequence of a perceptual evolution over a period of time. Third, nuclear decisions are largely political decisions rather than military or technical ones.⁴⁵

As an example of a decision influenced by technical factors, the United States in World War II judged its nuclear program an adequate gamble based on the estimation of the possibilities by its scientists of the danger that not developing it would pose on the course of the war. India, seeking technological prestige as a consequence of its colonial experience, initiated its civilian/military nuclear program shortly after independence and was politically prepared to be patient for results. A sub-Saharan state like the Central African Republic is so remote from acquisition capacity that it is deterred simply by the high level of investment required for a positive proliferation decision.

In the cases listed in the appendix, states that are actively seeking or have declared an interest in nuclear weapons but have little probability of acquisition (such as Libya), states that may acquire nuclear weapons in up to twenty-five years if a decision were made in 1995 (such as Bangladesh), and states that possess nuclear weapons are included: "Moreover, this emphasis on decision rather than outcome also implies that failure to produce functional nuclear weapons should not be allowed to mask the fact that

proliferation decisions indeed were made."⁴⁶ The inclusion of the first two series of cases allows for the exclusion of the technical necessary precondition without having to construct a detailed relationship between political culture, technical capacity and far-sighted planning. This also avoids the tendency, noted by S. Meyer, of exaggerating the capacity of states seeking nuclear weapons by including all de facto and potential decision-makers.⁴⁷

Prior to a delineation of the dependent variable, it is essential that some discussion of rationality be made to contextualize the causal connection between the motives for nuclear proliferation and the output which comes in the form of a negative or positive decision. As its basis, this study adopts the 'bounded-rationality' decision-making paradigm employed by S. Meyer in his time-series analysis, in which a realist conception of the state as a unitary and rational actor is used.⁴⁸ This formulation of the dependent variable was selected because it made the cases sensitive to international power-based causes while continuing to situate the decision-making process within the particular rationality of a given state's elite.

Borrowing from 'high reliability theory', used in nuclear weapon control and military organizational auditing, 'bounded rationality' actors will be assumed for the purposes of this study to have clear and consistent goals as measured by the outcome, despite the more likely possibility that they are

internally subjected to a range of organizational dysfunctions (too much rigidity or flexibility) and competing objectives.⁴⁹ Although there are clear differences between the way bureaucracies organize themselves, all states will be assumed to have generalizable elements to the extent that they can all understand and internalize similar understandings of nuclear weaponry:

...nations diffuse their concepts and understandings to each other and that, while each government may act on the basis of its own interpretation of the national interest, the diffusion of concepts and understandings may generate a transnational cognitive structure that conditions collective behavior.⁵⁰

This supposition is confirmed by two facts. The Israeli case in particular (applicable to the developing world's cases of bomb acquisition) reveals that non-Westernized deployment orthodoxy actually differs little from what has been previously discussed in Western publications or policy forums.⁵¹ Second, as has been the case thus far, the organization responsible for the development of nuclear weapons in the People's Republic of China (PRC) and in other successful developing states has invariably been centralized and under complete political control, similar to the experience of the first four possessors.⁵² While this is not to disregard the extensive variation in the rational competency of governments, it does make clear that all states are aware of the basic uses and limitations of nuclear

weapons.

In the context of the integrated-motivational approach, it is posited that nuclear weapons procurement decisions must be systematically related to prevailing environmental conditions.⁵³ This must be distinguished from particular triggers, which, although they may be frequently indistinguishable from the principal cause, are not the focus of this study.⁵⁴ The essential decision-making assumptions employed in this study are borrowed from S. Meyer:

In fact, all that needs to be assumed is that (1) the decision unit is a discrete entity in the sense that where there are several key individuals within a decision unit (e.g. the Soviet Politburo) they all have roughly the same general views about the world (though the group's composition and structure may change over time); (2) the decision unit exists within the context of a defined situation (or set of conditions) that may change over time; (3) decision makers do perceive their situation and its manifest changes; (4) decision makers may react to certain conditions or changes in conditions; and (5) there is usually a range of alternative responses available.⁵⁵

The basic realist notion of the state as a rational decision-maker forms the conceptual foundation for the dependent variable and allows for the assumption that state decisions are generalizable and that they can be systematically related to prevailing external determinants. The dependent variable, the occurrence of a positive-proliferation decision (the determination to proceed with nuclear weapons acquisition), can only be established with

official confirmation, and then in a general fashion, in about seven states that have made some demonstration or declaration to that effect (U.S., USSR, UK, France, PRC, India and RSA). Though there are at least three, and probably four levels of analysis (systemic, bureaucratic and/or domestic, and individual), the dependent variable phenomena will be treated as if on the state decision-making level, although in most cases when described, it will appear to have occurred visibly only at the individual level of analysis.⁵⁶ Borrowing from a definition used in one of the Aspen Reports, a state that is preoccupied with possessing nuclear weapons will exhibit either a desire for an operational arsenal or seek to "...possess the capability to assemble and field a workable nuclear weapon within a matter of hours, or at most a couple of days."⁵⁷

In the case of a positive proliferation decision, this possession must contain a technical capacity competent enough that the brevity of the assembly time is politically significant. The ability to assemble nuclear weapons in six months, or a similar lengthy period of time, provides enough reaction time to allow opposing states to consider non-violent retaliatory or dissuasive methods. This temporal window of political significance is highly contextual. For example, a seven day assembly period for Israel may create enough breathing space to allow for calm reactions among its neighbors, whereas a four-week assembly time for Japan may

create considerable regional anxiety.

What is meant by political significance is that the presence or near-existence of nuclear weapons by one polity would be included in the strategic and security calculations of its immediate neighbors and adversaries. An exception to this generalization are the nuclear weapons of strategic allies, such as between the UK, France, Israel and the U.S., and cases involving operational 'lending' of nuclear weapons, such as with Canada's Bomarc missiles (in which instance the U.S. is nominally in control).

Nuclear weapons begin to present themselves as of immediate political significance at about the time a state reaches the bomb in the basement tier on the proliferation ladder because it is at this point that other proximate states are obliged to react.⁵⁸ The act achieves political significance at this level, and not earlier at latent capacity, or later at the level of a second-strike capability, for the nonarbitrary reason that it is at this point that the state enters seriously into the strategic calculations of other states.

Actual nuclear weapons use is surrounded by a strategic-military doctrine defined by those responsible in actually launching them, but deployment is a political act which is itself informed by an intangible culture of uncertainty underwritten by the fact that there is practically no irrefutable experience in their optimal employment. A state that is about to acquire a nuclear weapon is also about to

undergo a dramatic increase in effective firepower potential, despite a possible decrease in its level of security (because nuclear weapons are symbolic of offensive power, not defensive expertise). At this point, the state becomes a potential threat to surrounding states, and as such it triggers an equally uncertain reaction among them. Thus, when a state makes the 'decision' to go ahead with nuclear weapons, it normally intends to cross this critical threshold.

The very fact of the possibility that a state has or will soon acquire the capacity to begin building nuclear weapons means that in the vast majority of cases states must often make a decision, even if it is to deliberately not build a nuclear weapon. Because of the complexity of the causes of nuclear proliferation, while the end product may be easily described by realist approaches to international relations, its causes are perhaps better described by reference to additional sources that will be covered in Chapter Three.⁵⁹

The dependent variable is thus a decision-event in that at a fixed point in time a state's ruling element decides to cross the threshold from bomb-in-the-basement to operational deployment, and does so for reasons related to various incentives and disincentives. The decision itself can be represented in a binary fashion with either a *yes* or a *no* answer. Putting off the decision relegates the state to abide by the previous decision (a *no* answer if the state made no previous decision), and does not render the dependent variable

trinary. Although this decision-event may be hypothetical, functionalist assumptions will be made about states deciding to go nuclear in the absence of knowledge of a specific meeting, to render the interpretation of the state's behavior meaningful for the quantification of the model.

The paper will employ an integrated motivational approach which incorporates the technical school's precepts as conditioning variables to establish the nuclear proliferation decision-making framework. The phenomena to be described, whether a state decides to build nuclear weapons or not, is described in the dichotomous dependent variable and is coded as a simple *yes* or *no*. For this framework to possess external consistency, it is assumed that states are unitary rational decision-makers and power maximizers that are systematically responsive to a range of positive and negative stimuli to engage in nuclear weapons development. These stimuli are classified as military-strategic, and political-economic variables, of which the former will be dealt with first.

Endnotes

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7. Manheim, Jarol B., and Rich, C. Richard, Empirical Political Analysis: Research Methods in Political Science, Longman, New York, 1986, p.207,215
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9. Kim. Op. cit. p.i,41-2: T. Kim elaborates on the technical school: National Planning Association, 1958; Beaton and Maddox, 1962; Beaton, 1966; Van Cleave, 1967; Wentz, 1968; Barnaby, 1969.

10. There was in the source: Shelton, Garth Lawrence, Nuclear Weapons, Deterrence and Non-Proliferation - The Case of South Africa, PhD Thesis, Witwaterstand University, 1992., a technical quantitative graph lifted from estimates in K.W. Deutsch's A Note on Nuclear Proliferation and the Balance of Power, 1945-1965, Yale University, New Haven, 1966. It showed the tremendous inaccuracy of the technical prediction process after the eighth country (although even there it was +/- 10 years in its accuracy). The model essentially posited that a state would develop its nuclear arsenal so that it would double its arsenal annually for three years and then double it every 18 months thereafter until a saturation level was reached at around ten thousand warheads. After the world's supply of so called proliferation-prone states was exhausted, successful proliferation activity tapered off until the early 1990s for Pakistan, Iraq and the DPRK.

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19. Dunn and Overholt's definition of proliferation is in the terms of 'a ladder of nuclear capabilities, delineating various levels of nuclear proliferation.'" (found in Chun, Woong, Nuclear Proliferation In Developing Countries: A Comparative Study For Selected Countries, PhD Dissertation, University of Georgia, Athens, 1991, p.78):

1. possession of basic nuclear knowledge
2. possession of nuclear reactors
 - a. power, b. research
3. access to fissionable material
 - a. U reserves, b. refining and conversion, c. enrichment, d. fabrication, e. reprocessing
4. possession of rudimentary weapon-design know-how
5. possession of nuclear weapon option
6. possession of unassembled bomb
7. explosion of nuclear device for peaceful purposes
8. overt nuclear-weapon development program
9. possession of stockpile of fission weapons
10. reliance upon 'off-the-shelf delivery systems
11. relatively unsophisticated C3 systems
12. initial articulation of strategic doctrine
13. sophisticated development of 9, 1, 11, 12
14. possession of fusion weapons.

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22. Ibid. p.57

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27. Ibid.
28. Meyer. Op. cit. p.79; Although roughly tabulated linear regressions of the variables listed in table 1.1 show high levels of correlation, it simply points to the generalized notion that an increase in capability over time will have some relationship to the total number of nuclear states in any international system. What it does not show is that the specific determination of a nuclear state from discrete technical inputs, such as number of scientists and reactors, is far less covariable. The technical approach is thus not very effective in determining the specific proliferation cases.
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32. Klare, Michael T., "Wars in the 1990s: Growing Firepower in the Third World", The Bulletin of the Atomic Scientists, Vol.46, No.4, May 1990, p.10
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34. ----, Canada's Nuclear Non-Proliferation Policy, Secretary of State for External Affairs, Government of Canada, 1985, p.2; for a comprehensive survey of the motivational school see Gdaia, Abdulrahman M., Nuclear Proliferation in the Third World: An Analysis of Decision Making in India and Pakistan, PhD Dissertation, Northern Arizona University, 1985, p.29, and T. Kim, : Lawrence and Larus, 1974; Jensen, 1974; Dunn and Overholt, 1976; Quester, 1973 and 1977; Greenwood, Feiveson, and Taylor, 1977; Kapur, 1977 and 1979; Lefever, 1979; Dunn, 1978 and 1982; Scalapino, 1980; Goldstein, 1980; Harkavy, 1981; Potter, 1982; Strong, 1982; Pajak, 1982; Mohan, 1982; Goheen, 1983; Mandelbaum, 1983; Meyer, 1984.
35. Meyer. Op. cit. p.124, and Ham. Op. cit. p.52

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41. Flank. Op. cit. p.71-2
42. Frankel. Opaque Nuclear Proliferation: Methodological and Policy Implications. Op. cit. p.7
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44. Meyer. Op. cit. p.5
45. Moshaver, Ziba, Nuclear Weapons Proliferation in the Indian Subcontinent, MacMillan, Houndmills, 1991, p.176
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48. S. Meyer used a time series with dichotomous independent variables, the advantages of which are a sort of 'artificial' significance effected through an operationalizing of all state-years, irrespective of proliferation interest. The logistic regression focuses only on individual instances, and is, I argue, more inferentially reliable. As well, although I make little reference to it, realism is the basis for this analysis, and the assumptions below are extracted from Doyle, Michael, "Politics and Grand Strategy", in Rosecrance, Richard, and Stein, Arthur A., (eds.), The Domestic Bases of Grand Strategy, Cornell University Press, Ithaca, 1993, p.24: As do all international theories, neorealism assumes that the international system is 'anarchic' in the sense that it lacks a world government, a monopoly of legitimate violence. It also assumes that its units, the actors in world politics, want to survive. but neorealism in some versions adds three ancillary assumptions. (1) that the units of analysis are 'like' units and nations or states are the key units of action, states are hierarchical institutions that possess a monopoly of legitimate violence. (2) that they seek power, either as an end or as a means to other ends, that is, there is a hierarchy of ends with security predominating and power being the primary, or essential, independent means to security under a condition of international anarchy; (3) that the units behave in ways that are, by and large rational, meaning that they process a unitary, egoistic, welfare function and adopt policies designed to maximize outcomes given that welfare function.

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CHAPTER TWO: The Parameters of Proliferation - The Military-Strategic Variables

Nuclear weapons spread because decision-makers see their usefulness in the political context in which they operate: failure to address or satisfy an incentive, or obey a disincentive, whatever its source, leads to consequences that may then adversely affect the continuance of the decision-maker. These incentives and disincentives are rarely monocausal, and are often mediated by technical limitations, party-coalition building, threats to allies and adversaries, and popular-domestic reactions. They also often involve such intangibles as the country's political culture. The five independent variables that explain the outcome of the dependent variable, whether states decide to develop nuclear weapons or not, are labelled *security*, *alliance*, *prestige*, *trade* and *domestic*. This discussion is in turn subdivided into an examination of military-strategic variables below, and economic-political variables in Chapter Three.

The null hypothesis, against which the theory of proliferation below is juxtaposed and which must be disproven for the latter to be accepted, states simply that there is no significant or systematic relationship between the above-mentioned variables and proliferation decision-making. The theory of nuclear proliferation presented below will subsequently be the agent around which the quantitative study will be conducted in Chapters Four and Five.

An exhaustive register of inducements and hindrances to nuclear proliferation was synthesized from the literature, of which the most useful sources were academic papers and government studies. The first step in determining the selection of a variable was if it provided additional explanation to S. Meyer's question: "...the possession of atomic weapons could be helpful if the government wished to..."¹ In the second step the resulting nineteen factors were subjected to a criteria that they would be discarded if there was not at least one unambiguous illustrative case for each. In the third step, with a view to parsimony and not overloading the model, the remaining variables were regrouped into four quantitative variables and one qualitative variable presented below.

The first four variables, *security*, *alliance*, *prestige* and *trade*, will be quantified and employed in the logistic regression equation, whereas the fifth, the *domestic* variable, will be treated in Chapter Five to provide an explanation for those cases unaccounted for by the model. Of the military-strategic variables of proliferation, the *security* variable focuses on the need of the state to protect itself, and possesses a positive association with nuclear weapons, meaning it pushes states to develop nuclear weapons. The *alliance* variable indicates collective security arrangements that counterbalance the *security* variable and has a negative association with procurement decisions, such that it deters

states from building nuclear weapons. While the theory behind each variable will be discussed immediately below, the method of calculating the indicators is made explicit in Chapter Four.

Chapter Two will illustrate and explain the reasons behind the causal connection between the military-strategic independent variables and the tendency to build nuclear weapons, by elucidating their origins and internal logic. This question of causality will be treated through a two part interrogative to which each variable will be subject. The first question, which will occupy the bulk of the explanation, asks *how* a given variable contributes to nuclear proliferation. The second question, which is particularly important in variables concerned with prestige and compellence, asks *what* decision-makers perceive to be the causal connection between a given variable and nuclear proliferation.

2.1 The Security Variable

The *security* variable describes all motives that compel a state to initiate a nuclear weapons program to preserve its vital or secondary national security interests, and can be manifested in two forms. One, the state may either require nuclear weapons to redress an asymmetric conventional relationship it shares implicitly or explicitly with a powerful adversary, or two, to deter the use of nuclear

weapons by another nuclear state.²

In the first case, nuclear weapons are procured to offset the overwhelming conventional force of an adversary, typically through the production of weapons designed to be used against large targets like its cities or troop assembly concentrations. As the technology matures, weapons for tactical battlefield use may be developed and integrated to respond directly to conventional maneuvers. In the second case, nuclear weapons are used to counter an adversary's compellent use of nuclear weapons, which, as the U.S.-USSR rivalry demonstrated, goes through quite a complicated doctrinal evolution.

The answer to the *how* question: 'how do security incentives contribute to nuclear proliferation?' is expressed simply that states acquire nuclear weapons to protect themselves in the belief that through their possession they may deter threats from other states. In the perceptual *what* question: 'what in the security variable do the decision-makers associate with nuclear proliferation?' is somewhat more complicated. As will become evident below in the discussion on each of the *nuclear taboo and compellence* subjects, the success of nuclear weapons as augmenters of security is heavily reliant upon perceptions of them as good deterrents, which is particularly case dependent.

Thus, I intend to propose the argument that explains why states seek nuclear weapons for their protection, and how

these weapons establish that security. I will begin by arguing that the supposed taboo against nuclear weapons is an overstated myth more than easily confronted by past and present evidence of the willingness to use on the part of some state decision-makers, as indicated by their disregard for international reactions to other non-conventional weapons use. By dispelling this cultural artifact and establishing the usability of nuclear weapons, I wish to set the stage for a discussion of the genuine decisions to be made in the deployment of nuclear weapons. I will then contend that nuclear weapons are an investment in deterrence against the possibility of being subject to nuclear attack and are simultaneously considered as effective compellents.

The gradual progression in the lethality of weapon systems has been accompanied by a slower, but nevertheless visible erosion in the culture of nuclear restraint. The *nuclear taboo*, as it is called, represents both the likely hostile global reaction to the use of nuclear weapons under normal circumstances, and their implicit illegitimacy. There is the increasing likelihood, particularly in the developing world, that these conditions of normalcy will be more frequently interrupted by instances of great irregularity and acute shifts in power relationships. Under these conditions, and it is precisely for these conditions that states develop nuclear weapons, the likelihood of nuclear weapons use will be determined by more immediate risk-associated objectives, such

as crisis termination.

The discussion below will address the myth of the illegitimacy of nuclear weapons and the associated *nuclear taboo*. Since the conclusion of the Second World War, there has emerged a culture of unusability of nuclear weapons which has distorted to some extent the security value they offer and the motives states have in their acquisition. I will begin by focusing on the notion of the *nuclear taboo* and its policy manifestation evident in the dangerous proposition by K. Waltz confronted below. These views are balanced by an examination of the issue of nuclear 'conventionalization' that implicitly suggests the possibility of near-routine use of atomic weapons in ongoing military operations.

According to T.V. Paul, the 'nuclear taboo' , or the 'tradition of non-use', is "...an unwritten international prohibition since the Hiroshima and Nagasaki attacks that nuclear weapons should not be used..."³ It has alternatively been called the 'crystal ball' effect of nuclear weapons.⁴ This culture of non-use has further been reinforced by the non-proliferation regime (esp. NPT) in its delegitimization of nuclear weapons:

No nation today, with the possible exception of Libya, is known to reject, or publicly speak against, the general presumption of non-proliferation... It is important to see that the influence of the non-proliferation regime has extended beyond the list of NPT signatories. Even countries which most conspicuously abstained from signing the NPT, India, Israel, Pakistan and South Africa, appear to recognize, even respect, the non-proliferation norm.⁵

The *nuclear taboo* is also relied upon with guarded uncertainty as a measure against the 'routinization' of nuclear weapons:

What Aron has called the *nuclear taboo* has been respected: nuclear weapons have not been used since 1945, and the threat of their use for expansionist purposes has not been hurled either... It remains to be seen whether the same restraints would operate on states with acute local ambitions or reckless leaders confident in their ability to get away with a *fait accompli*, or even on a super-power locked in a confrontation with lesser nuclear state, impatient with results achieved at the non-nuclear level and convinced that the use of nuclear weapons against the state would not bring the other superpower into the battle.⁶

It is often suggested that it is this *nuclear taboo*, rather than mutual deterrence, that has rendered nuclear weapons so unusable. The fear is that once this sacred threshold of use has been crossed, nuclear weapons will be normalised and the frequency of use will increase. The practice of 'conventionalizing' nuclear weapons (deploying them as if they were merely powerful conventional weapons) in doctrine is seen to have a similar effect, particularly since the psychological split between nuclear and conventional weapons established in the late 1940s will be severed after the first such exercise.⁷

This conventionalizing process was present early in the Cold War in initial U.S. nuclear doctrine which for example, made little distinction between conventional strategic aerial

bombardment and the use of nuclear weapons, and more recently, in the interest since the late 1980s in 'tinynukes' designed for battlefield use.⁸ This has crept into the discussion of options for retaliating to a limited nuclear strike, with some suggesting only conventional means (to the detriment of deterrent effectiveness) to preserve the 'nuclear taboo'.⁹ An additional corrosive to the stability of the taboo is the nearly half century that has been spent training with and developing doctrines for, nuclear weapons:

The 'proliferation' came from these nations having become accustomed to having these weapons. Many military units have carried and trained with nuclear weapons for over 30 years. People have become used to them. The novelty factor is gone, and the weapons are just another piece of equipment. People still are in awe of the possible use of these weapons. While the awe remains, so does a certain familiarity. Familiarity breeds attempt.¹⁰

Building upon the 'obsolescence of war' hypothesis of J. Mueller, which describes war as a cultural artifact that is falling prey to the historical progression of pacifism, J.L. Gaddis suggests that this 'nuclear taboo' is far less permanent than suggested, and is akin to a lagging 'initial shock'. The sheer power of nuclear weapons generated a mass-psychological 'punctuated equilibrium' which, by one interpretation, may be prone to wearing off.¹¹ This view argues that while there may have been a *nuclear taboo* at some point, it has been progressively eroded to the point that its transgression is unlikely to evoke an outcry.

There are four likely possibilities through which the 'nuclear taboo', and the nonproliferation regime, its principal legalistic support, may wither and reveal a culture of nuclear weapon usability. The 'bang scenario' sees an anti-Non Proliferation Treaty (NPT) state going nuclear and forcing its NPT and non-NPT neighbors alike to abandon the treaty. The 'clash scenario' is a collapse in the 1995 or subsequent treaty discussions in which a rift forms between Nuclear Weapon States (NWS) and Non-Nuclear Weapon States (NNWS), or between the developed and developing worlds. The 'creep scenario' results in the slow erosion of the NPT over cumulative minor disagreements. The 'abandonment scenario' sees the possibility of the treaty collapsing from an abrupt power or alliance change in the world.¹² The actual disintegration of the nonproliferation regime and its attendant legal agreements will probably be manifested by a trigger event years after the transpiration of one of the above regime failures.

Based partially on the nuclear taboo, and intimating from it a restraining effect, K. Waltz has stated the controversial belief, summarized in the 'more-may-be-better' monograph, that the spread of nuclear weapons in the developed and developing worlds will dampen the salience of regional conflicts and lead to a general rise in systemic stability.¹³ This line of argument is supported by two assumptions. One, that as nuclear weapons spread the illogic of their use is effectively

transmitted: "Indeed, nuclear weapons have become a very effective instrument of cross-cultural education, in that they have made the limitations of military force apparent, in similar ways, to very dissimilar societies."¹⁴ Second, by the supposition that nuclear weapons are no more than political bargaining tools employed in the securing of the commodity of national security.¹⁵

The importance of nuclear weapons in the world today is tied intrinsically to their political value. Nuclear weapons are not instruments for fighting wars and their military value actually derives from the political effects of the existence of nuclear arsenals, including their ability to define and shape political stability between rival nations and blocs.¹⁶

The 'more-may-be-better' policy recommendation is inconsistent with the evidence of the usability of nuclear weapons compellence expanded upon further below, and as such may lead to the erosion of proliferation restraint that would in turn lead to systemic instability by weakening deterrence. The usability of nuclear weapons proposition is based on the fact that as long as there are nuclear weapons ready to be used, as long as there are diminishing resources over which to fight, as long as there are risk-taking state leaderships, the event of a nuclear weapons use, perhaps in a nuclear war, is likely.

Despite the coloring of nuclear proliferation, particularly by the United States, as a black-or-white issue, there are hierarchic gradations of nuclear capacity recognized

by nuclear weapon and non-nuclear weapon states alike. The overwhelming capability of the United States and the former Soviet Union places states with even a hundred nuclear warheads in qualitative positions of significant inferiority. It also suggests that the size of nuclear weapons are viewed on a graduated scale because of their potential for use: states with qualitatively better nuclear weapons have a relative, though not an absolute advantage over other states.

The use of nuclear weapons is as much a matter of psychology as it is a practical concern for the loss of escalatory control. Nuclear weapons are, in the last decade of the twentieth century, more powerful than most conventional, biological and chemical weaponry.¹⁷ Notwithstanding, and depending on the weapons, there can be greater differences in fusion and fission weaponry than between fission and conventional weapons, although in the former comparison the force levels are nonetheless astronomical.

This may suggest that one can learn about the willingness to use nuclear weapons from historical applications of other non-conventional resources on the supposition that in combat weapons are judged not by their psychological effect, but by their ability to 'win' on the battlefield. In fact, many have argued that chemical and biological proliferation are along the same continuum as nuclear proliferation and should be treated as manifestations of the same symptoms of security and prestige needs.¹⁸ By 1990 there were ten confirmed and three

suspected biological weapon states (up from three in 1980), and sixteen confirmed and eight suspected chemical weapon states (up from thirteen in 1980).¹⁹

While some have claimed the dubious military utility of chemical and biological weapons, this is contradicted by the conspicuously large number of states, specifically eleven, currently seeking the capability.²⁰ The parallel development of missile capability is further worrying because it is being pursued by those states with prior interests in nuclear and chemical capabilities.²¹

The supposed 'chemical taboo' of the First World War has had only a limited impression in the developing world, where authenticated use of chemical weapons has transpired in wars including Egypt in Northern Yemen, Iraq against Iran and its internal Kurdish population, and by Vietnam against Kampuchean guerrillas.²²

Because of Iraq's use of chemical weapons, their effectiveness on the battlefield, and the weak international reaction to Iraq's use, the usability quotient for chemical weapons has been enhanced. While chemical weapons proliferation is distinct from nuclear weapons proliferation in both its form and scope, there can be a tight interaction between the two.²³

This same effect has withered the 'missile taboo', particularly after the six week 'War of the Cities' between Iran and Iraq in which over 600 missiles were exchanged, the Libyan launching of two Scud-Bs at the U.S. Coast Guard station on Lampedusa in April 1986, and the missiles launched

by Iraq during the 1991 Gulf War.²⁴ Whereas some argue that chemical weapons are the 'poor-man's' nuclear bomb, others disagree and suggest the increased usability of chemical weapons is in its utility as a weapon against domestic populations at a fraction of the cost of nuclear weapons. However, a decay of the taboo for one is not necessarily transitive to the other.²⁵

This withering of taboos is further likely to be subject to an accelerated weakening in times of military crisis. In a number of wars this century, non-conventional weapons, including nuclear weapons, were employed to break a deadlock or to withstand defeat (or cut losses in an inevitable victory). Examples include the 1915 German introduction of chemical weapons in World War One, the dropping of nuclear weapons on Hiroshima and Nagasaki in 1945, the introduction by Iraq of chemical weapons in the Iran-Iraq War, and the planned first use by NATO of a tactical nuclear weapon to halt a Soviet breakthrough in Central Europe.

Even in an historical vacuum, for nuclear weapons to be useful in contributing to a country's security, they must be considered usable by both the defending state and the state being deterred; to claim that nuclear weapons are unusable is to reject their possible deployment for any purpose, including security, as well as to contradict the inductive evidence as to the motives of the nuclear weapon states summarized in the appendix.

Second World War and Cold War history furthermore affirm that the myth of the unusability of nuclear weapons arises from a failure to appreciate that massive destruction is not the inevitable result of nuclear weapons-activity and that nuclear weapons need not have a purely strategic role. At one extreme, states that seek to maintain the status quo and threaten high costs for challenging it, or conversely, states that seek to challenge an unbearable status quo and accept the high risk in return for a high payoff, both depend on the reality of the qualities of nuclear weapons. If nuclear weapons are considered usable because of their internal logic and the evaporation of their accompanying culture of non-use, then preparations for their deployment must give equal analytical weight to both their defensive (deterrent) and offensive (compellent) applications.

In all cases of its security deployment, I maintain that nuclear weapons are understood by those that deploy them in the context of their security relevance, and not in their philosophic unusability: "Deterrence requires more than the clear communication of defensible commitments against which a range of actions are prohibited; there must also be the unambiguous physical capacity and credibility to carry out the threatened action."²⁶ Those that possess nuclear weapons are aware of the resulting catastrophe in an unrestrained exchange, but are also prepared and have planned for their use in a manner that is popularly underestimated. The pattern of

Nuclear Biological Chemical (NBC) warfare suggests that the greatest deterrent to use is the threat of retaliation, and in the case of chemical weapons in World War Two, Germany's (unfounded) fear of allied possession of nerve gas deterred it to the end of the hostilities.²⁷ In these wartime circumstances, risk propensity will run higher than in peacetime and the taboo is likely to be at its weakest:

The historical record does suggest one common feature regarding the strategic circumstances in which NBC weapons have been employed, namely, that such weapons have been introduced some time after the outbreak of wars rather than being employed from the outset.²⁸

In essence, the philosophic basis for the tenet of nuclear weapon usability lies less in its a priori manipulation than in the need to prepare against that very manipulation by another actor, which in turn demands willingness to adopt a usable option to maintain a credible threat. The effect of an eroding taboo of nuclear unusability is a long-term increase in the level of insecurity felt by states, and a rise in the salience of the security motive as an incentive for the acquisition of nuclear weapons.

While the question of *how* security needs lead to nuclear proliferation is yet to be answered, the question of *what* link decision-makers perceive in that relationship has been partially resolved. Decision-makers, in order to preserve the credibility value of nuclear weapon deterrence, tend to

downplay the role of the *nuclear taboo* and the myth of unusability so that they may respond to the security threats emanating from the lowest common denominator, that is, the nuclear state with the least-risk averse leadership. While this is not posited as an a priori universal phenomenon (it hasn't fully manifested itself in India, for example), at least the first five nuclear states are known to have developed both tactical and strategic nuclear weapons for a wide range of applications (U.S., USSR, UK, France, and the PRC), suggesting at least in procurement action that they do not subscribe to the myth of the *nuclear taboo*. Hence, nuclear proliferation decision-makers prefer to base their reasoning on the reality of nuclear weapons use, which forms the actual motive for acquisition, rather than any amorphous ethic of restraint.

It is because nuclear weapons are so awesome in their effects and are so likely to be used, in the final analysis, that forces other states to invest in them. Nuclear arsenals are powerful systems for destruction, and where their use might be deterred between grand alliances, the threat of disproportionate destruction is much more contextual and may not apply in smaller scale inter-state scenarios, particularly in the developing world. If nuclear weapons are understood as instruments far more independent from their taboos than is currently suggested, the importance in acquiring them becomes much more clear. The stage is thus set for an unfettered

answer to the *how* question of the causal link between security needs and their satisfaction by a nuclear arsenal.

The strongest security incentive for the acquisition of nuclear weapons is as a deterrent against adversarial nuclear and conventionally-armed states. The elaboration of this concept will be dealt with initially by its definition, coupled with an historical policy review of the fashion with which it was dealt with by the United States (this example is drawn upon heavily below because of the exceptional transparency of the nuclear debate within its administration which offers itself as an archetype of nuclear deployment). This will be followed by an inquiry into the role of nuclear 'rationality' and deterrence stability, and will conclude with an examination of the increasingly important notion of compellence.

Four comparable reasons offered by Dunn and Kahn (1976) for security related nuclear proliferation are deterrence of a nuclear rival, defense against an invasion, weapon of last resort, and nuclear intimidation of non-nuclear rivals.²⁹ Given that a weapon of last resort has as its object the survival of the state, it is best subordinated, depending on the circumstances, to one of the first two categories. The use of a nuclear weapon as an instrument of compellence has weak inductive support, despite both the intuitive assumption and the prevailing belief among some state elites that it is a viable strategy. Compellence will be further elaborated upon

after the discussion on deterrence.

Thus the principal motive, or 'whyfore', of investing in nuclear weapons is to deter aggression that would lead to the destruction of the state. A secondary motive is based on the fear of being subject to the *threat* of nuclear destruction, termed *compellence*, as well as the corrolaried option of using nuclear weapons as a means to pressure foreign states with an end to increasing one's security. While the latter is exclusively concerned with deterring an adversary's nuclear weapons use, the former also encompasses deterring conventional forces. Thus, the paramount purpose of nuclear weapons in enhancing security is as a deterrent against an adversary with nuclear or conventional weapons sufficient to threaten the state.

In the first (conventional-targeted) category of deterrence, states that seek or have sought nuclear weapons to countervail conventional threat (either through a fear of direct attack or an anxiety of long term deterioration) include the Republic of South Africa (RSA), the Republic of Korea (ROK), and Israel. The second (nuclear-targeted) category includes states such as the Republic of China (ROC) and Pakistan, in which nuclear weapons were originally sought to offset a nuclear-armed neighbor, but also with a mind to countering the overwhelming conventional strength of an opponent.³⁰ Two other states in the last category include the Soviet Union and the People's Republic of China (PRC).³¹

There is a third category of 'operational' possession in which states that do not own nuclear weapons nonetheless hold them on their soil in accordance with the NATO Programs of Cooperation (POC) bilateral agreements, and would likely have received them from their superpower ally in time of general war.³² These states include Belgium, Canada, Greece, Italy, the Netherlands, ROK, Turkey, the UK, the former-FRG and speculatively Japan, and also couch, depending on the case, a full range of land, sea, and air tactical and intermediate range nuclear weapons. Because access to these weapons were strictly controlled, even in wartime, they are not considered for the purposes of this study as an independent arsenal and are subsumed and coded under the *alliance* variable.

Security brought about by nuclear weapons in response to conventional forces normally comprises at least an ability to strike at the interior of the opposing state, or, very often, to resist the conventional attack by having on hand battlefield nuclear weapons. However, the threat of the use of nuclear weapons against another nuclear armed state involves an examination of the concept of nuclear deterrence.

Nuclear deterrence is simply the threat of the use of nuclear weapons in order to restrain the hostile activities of an opposing state, and normally involves the ability to protect one's nuclear weapons and command and control facilities against a surprise first strike. In principle, nuclear weapons provide deterrence by punishment (destroying

the enemy) rather than by denial (typical of conventional forces, although some argue feasibly done by battlefield nuclear weapons), and involve much shorter, and hence dangerous, time spans of engagement.³³

There are two sub-types of deterrence: *immediate deterrence*, referring to situations where at least one side is seriously considering an attack, and *general deterrence*, where states maintain armed forces to regulate their relationship in an environment with no immediate danger of attack.³⁴ While nuclear weapons are typically deployed for threats related to the first type of deterrence, the second type of deterrence comes to characterize the current relationships of many of the nuclear states that were left when the Cold War ended.

The current conceptual usage of 'deterrence' emerged out of a debate between two schools of thought that began shortly after the U.S. atomic detonation in Japan. The disagreement centered on the issue of nuclear weapon 'usability' and nuclear war 'winnability'. Those that epitomized the notion of nuclear weapon usability were centered around William Borden and his book There Will Be No Time, and they were opposed by those who attested that nuclear weapons heralded a fundamental change to military strategy. These were led by Bernard Brodie, whose principal work is The Absolute Weapon.³⁵ Despite the fact that the former was supported by many U.S. administration officials and fed their assertion that a war winning doctrine was necessary to ensure useful peacetime bargaining, or at

least favourable wartime termination, fears of appearing too provocative eventually compelled the latter to come to the fore in policy circles after the 1949 Soviet fission test.³⁶

Brodie had argued that nuclear weapons were not on the continuum with conventional weapons but heralded a revolution in warfare.³⁷ The conclusion was that nuclear war was not winnable because the losses would exceed the gains in any deterrence-by-punishment interaction, and war avoidance through credible deterrence thus became the focus.³⁸ Credibility and its manufacture thus became paramount in maintaining stability, which in turn contributed to conflict resolution.³⁹ There was also the emergence of the notion, for a brief period (1966-1983), of the desired vulnerability of one's population to maintain that credibility.⁴⁰ It was further maintained that escalation was very difficult to control.⁴¹

Deterrence would be successful, it was argued, because nuclear war between the superpowers was unwinnable in every sense, and as such tended to reinforce the stability of the strategic situation between the superpowers:⁴²

The fighting on a chemical and/or nuclear battlefield may quickly evolve into an exhausted stalemate or a series of duels between the scattered survivors. Historical experience reveals that survivors of high-attrition combat either give up completely or fight only to survive. It will be difficult to carry on a war if the soldiers are either immobilized by shock or ready to fight only in self-defense.⁴³

Some of Borden's prescriptions, such as what H. Morgenthau called 'conventionalization', included the development and integration of nuclear weapons onto the battlefield to make up for deficiencies at the level where strategic forces could not be used as a credible deterrent.⁴⁴ A concurrent development accompanied it in the countervalue targeting of nuclear forces.⁴⁵ Critics, R. Jervis among them, argue that despite the fact that Borden's theory informs some aspects of current U.S. security policy, a limited use of nuclear weapons is difficult to control once an escalatory trend sets in.⁴⁶ This had evolved by the 1980s and beyond into the notion that battlefield nuclear weapons were in fact deterrence enhancing.⁴⁷ In retrospect, it seems likely that micro-scale integration of nuclear weapons is as much a function of a technological revolution in command and control resources as it is a response to the probable reduction of the utility of deterrence when facing developing states with irrational leaderships.⁴⁸ Deterrence is also particularly dysfunctional in situations involving endemic territorial disputes and ambiguous borders, situations typical of developing nuclear proliferators.⁴⁹

The problem with battlefield nuclear weapons is their danger in conferring tactical initiative to the user, a consequence of which has been a serious discussion in the U.S. of the viability of pre-emptive strategies.⁵⁰ Nuclear weapons, in NATO doctrine, were further intended for early use in

Central Europe during the Cold War to offset Soviet doctrinal chemical use and numerical preponderance:⁵¹ "Nuclear war-fighting policies follow from the deployment of accurate strategic and tactical nuclear weapons. If tactical nuclear war-fighting weapons are deployed, they will be integrated into military tactics at relatively low levels of command."⁵² The advantages conventionalized nuclear weapons are believed to confer in fighting and winning decisive *limited war* military victories also bestows upon them significant fungible political clout which has not gone unnoticed by strategic planners.⁵³

The weakening faith in singular strategic nuclear deterrence, particularly in its ability to deal with unstable regimes, has challenged the Cold War doctrines of mutual-deterrence and re-emphasized flexible response.⁵⁴ According to T.G. Carpenter and S. Cropsey, states seeking nuclear weapons generally do so for reasons of regional instability that are also a cause of the unstable domestic situation:⁵⁵

U.S. policymakers must assume that at least one of the 20 countries now possessing or trying to build nuclear weapons will use them... An 'irrational' despot might well calculate the costs of a nuclear exchange differently from strategists in the West, not so much in terms of lives or absolute devastation but rather in terms of what affects or furthers his own grip on power.⁵⁶

In general terms, nuclear weapons as instruments of nuclear deterrence can be said to have a series of effects. First, they can be cost-minimizing relative to conventional

forces, but also threaten a rivalry with risk-maximization, and as such are likely to spread to states with high risk-propensity elites.⁵⁷ Second, as noted by Deutsch and Singer, the greater the specificity of the threat, the greater the pace of arming.⁵⁸ In this context, avoiding explicit nuclear diplomacy may decelerate an armaments race between two adversaries. Third, once nuclear weapons are selected for security purposes, they must at a minimum resist a first strike to be an effective deterrent, if the opponent also has that same capacity.⁵⁹ This is important because states without the resources to develop beyond a nominal capability may forego the opportunity altogether, as was reflected by the earlier *technical* approach (and seek alliance solutions instead). Fourth, the use of nuclear weapons as a tool of national security becomes troublesome when one is forced to select in advance a specific object for defence or a precise action to deter.⁶⁰

The paradox with nuclear deterrence is that it is the threat of usability that both creates the credibility for the deterrence and is the greatest disfunction for wrecking the stability established by that deterrence. So long as nuclear weapons are deemed usable, their use will be considered, and this is as much a prerequisite for a successful deterrence as it is a possible source of challenge to that deterrence.

As much in the West as for example, in India, there are plenty of conceivable scenarios where the use of an

operational nuclear weapon can offer net military gains.⁶¹ Nuclear weapons specifically, and non-conventional weapons more generally offer penultimate resources for launching surprise attacks, localized defense and active battlefield deterrence.⁶² The utility of nuclear weapons has been expounded upon by Arab states opposing Israel in their intended use of it in offsetting the latter's preponderance in advanced-conventional weapons.⁶³

Given the historic fact that the mere possession of nuclear weapons does not deter conventional attack, as was the case with the PRC against the ROK in 1950, Egypt versus Israel in 1973 and Argentina against the UK in 1982, were the nuclear state, for whatever reason, to begin to lose catastrophically, it would be obliged to initiate a nuclear escalation.⁶⁴ This may be especially true in the case of states like Israel, the ROC, the Democratic People's Republic of Korea (DPRK), and the Republic of Korea (ROK) where even a single battlefield defeat would be equated with national conquest.⁶⁵

Nuclear use is further exacerbated by the belief held by some societies, whether true or not, that they have special advantages in resisting nuclear strikes and are hence immune to the effects of deterrence. A case in point is the PRC: "When everything is said and done, China, thanks to its enormous rural population, always has been, and remains, more capable of surviving nuclear war than any other country. This is a fact which the leadership clearly understands, and would

be foolish not to exploit..."⁶⁶ Finally, there is the ever-present possibility of accidental detonation of nuclear weapons.⁶⁷

Notwithstanding the apparent utility of nuclear weapons, their versatility must be historically qualified in the context of their likely use. Most conflicts by the new nuclear powers have their origins in their pre-nuclear modes, as for example with India and Pakistan, which are derived from accumulating events that lead to crises, and infrequently give the opportunity for surprise first strikes. Where India and Pakistan are the most vulnerable to each other, in competing tasks of creating national consensus in the face of potential irredentism, nuclear weapons actually have a limited role.⁶⁸

The related importance of geography in the developing world's conflicts, often underemphasized in the emerging commercial world community, provides a strong incentive for a reliance on nuclear weapons. In so far as ethno-geographic issues lie at the heart of most disputes, it is the object of defense or aggression that would involve most conceivable future uses of nuclear weapons.⁶⁹ This has been, to a limited extent the explicit aspect of conflict between Pakistan, India, and the PRC.⁷⁰ "It must be remembered that, except for the U.S., all of the actors in this nuclear drama have on-going boundary disputes with one or more of their neighbors... And, the geography of the region shows that these countries share some of the longest borders on earth."⁷¹ It is the nature

of the territorial dispute that lies at the heart of regional feuds and will dictate the particular offensive or defensive nuclear strategy to adopt.⁷² The geography, or any other characteristic of a dispute, must nonetheless be situated within the rationality of usability of nuclear weapons themselves.

The stability in the last forty years has often been attributed to the relatively interchangeable rationality employed by all sides following the Cuban Missile Crisis. The suggestion that this process is transmutable again along with the technology to a new generation of nuclear powers is argued by some to be inevitable because of the large number of developing world scientists and world leaders trained in first or second world institutions:

...There seems to be no factual basis for the claims that regional leaders do not understand the nature and implications of nuclear weapons; or that their attitudes to those weapons are governed by some peculiar cultural biases which make them incapable of rational thought; or that they are more adventurous and less responsible in handling them than anybody else.⁷³

However, the mutual learning process that has underwritten nuclear strategy, many others argue, is not transferable to many newly nuclear states, particularly in the tumultuous developing world.

One of the unknowns about the future of proliferation is the degree of evolutionary congruence between technology and strategy. It took decades and billions of dollars for the West, the Soviet Union, and China to integrate strategy and military technology... looking at the problem in the abstract, Brito and Intrilligator note that as the number of nuclear states increases there are more weapons, targets and decision-centers. Further, the chances of an irrational leader appearing are also increased.⁷⁴

Regional leaders may not share in the same understanding in the culture of deterrence understood by the West, and this is further aggravated by the weaker command and control organisations likely to prevail outside the developed world that may put a premium on a first strike strategies.⁷⁵ One of K. Waltz's hypotheses, namely that states that undertake the development of nuclear weapons must also establish an industrial process of such sophistication that it in turn would lead to a more complex and rational bureaucracy, which would become more susceptible to rational notions of deterrence, is challenged by two findings. One, that nuclear weapons require far less investment than was previously supposed, (as in the case of the autocratic and economic cripple in the DPRK) and second, that the archetypal secret-project is better suited to a totalitarian political system than a liberal-democratic one.⁷⁶ Policy makers have also come to recognize this threat to deterrence credibility: "As chairman of the House Armed Services Committee, Les Aspin argued that the new threat to U.S. interests is the

nondeterrable, terrorist state armed with nuclear weapons."⁷⁷

In the Middle Eastern context this could lead to a simple translation of Arab frustration into nuclear weapons use, particularly in times of crisis and if the stakes in a generalized war would become unmanageably high.⁷⁸ In the South Asian context, where none of the last three wars have served any larger or meaningful political or strategic advantage (with the exception of the severing of Bangladesh in 1971) by one account, the acceptance of high human and other costs may not be a deterrent to the use of nuclear weapons.⁷⁹

In the case of developing states, the use of weapons of mass-destruction as a retaliatory measure of last resort would pose less of a risk if war-propensity among these states was lower. The tendency to behave desperately in the last resort may not be restricted to the developing states: "Western nations have shown themselves reluctant to reply in kind, preferring to threaten severe retribution with conventional weapons. However, if Western forces found themselves in danger of defeat or severe damage because of another nation's use of chemical or nuclear warfare, the option of using chemical or nuclear weapons first, or in retaliation, is a real possibility."⁸⁰ The likelihood of use in this case is underwritten by the illustrated willingness of some in the more volatile developing world to consider at least the dangerous threat of use, as did Saddam Hussein by launching Scuds against Israel in 1991.⁸¹

The psychological prompters of a war initiator are, nonetheless, varied. Some are undeterrable and aggressive opportunitists who may prey upon risk averse states, others are driven by unstable domestic situations (discussed in section 3.3) without regard to external danger, and still others are often faced with no option but to wage war and risk dramatic escalation despite the certainty of defeat (as with Egypt in 1973 and Japan in 1941).⁸² Under conditions of warfare, an intangible risk may be sacrificed in exchange for a higher payoff, particularly in selected brinkmanship games.⁸³ Just the possibility of use among a greater number of states over time itself increases the likelihood of an actual nuclear attack in anger (or fear).⁸⁴

In essence, then, the primary use of nuclear weapons is as a deterrent against other threatening states with similar nuclear weapons or overwhelming conventional forces. This then offers an initial answer to the question of how nuclear weapons contribute to security. It can also be inferred that in response to the *what* question, state decision-makers do not rationalize about nuclear weapon uses in the same way, and the Waltzian hypothesis notwithstanding, this is likely to weaken deterrence and increase the likelihood of use as these weapons spread. A secondary use of nuclear weapons, now to be discussed, is as a measure to deter the threat of compellence, and in certain circumstances, to make use of those same weapons for that purpose.

The issue of compellence and nuclear weapons is a sensitive one because the association is contentious on historical grounds. Some, like M. Bundy, argue that most of the alleged compellent uses of nuclear weapons were unintentional or deliberate misrepresentations for domestic consumption.⁸⁵ However, a more likely explanation is that compellence is merely the reverse side of deterrence, and its infrequency has less to do with its illusory nature than the fact that the candidates most likely to use it, the U.S. and the U.S.S.R., were satisfied status quo powers, at least in Europe, by the conclusion of the Second Berlin Crisis.⁸⁶ What is certain is that any non-nuclear state that has ever been the object of even an alleged compellence, has since sought the development of a nuclear capability (The USSR, PRC and India by the U.S., Israel and France by the USSR). Furthermore, some states, particularly Libya, have made overt emphasis of the compellent potential of nuclear weapons and have intimated it as a possible motive for their acquisition.

Even the possibility of compellence, particularly as it is stated by some states in the developing world, highlights both the augmented likelihood and the doctrinal fact that nuclear weapons may be exercised to that end. Whether this will increase or decrease the security of the compelling state, or whether the effects of compellence are frequently unpredictable or outright failures is less relevant than the possibility that some states may attempt it, particularly if

they are a lone regional nuclear power and are seeking local hegemony. Hence, compellence portends a primary dimension of the usability of nuclear weapons.

As a technique of foreign policy, compellence has been unequivocally unsuccessful in the last three decades despite the fact that it persists as a option for most governments, and is increasingly likely to become so for the new nuclear states. The visible reluctance to make use of it during the Cold War seems more a function of the alternate means available and the priority placed upon maintaining alliance cohesion than any inherent weakness in nuclear-assisted intimidation itself.

Alleged instances where nuclear compellence worked, as in the U.S. pressure for the withdrawal of the U.S.S.R. from Iran in 1946, the U.S. pressure against the PRC in the dispute over Quemoy and Matsu (1958), the U.S. threats against the USSR in the Cuban Missile Crisis (1962) and against the DPRK and the PRC during the Korean War (1953), and the Soviet threat against the West in the Suez (1956) and Berlin Crises, were all nonetheless affected to some extent by the spurious variable of U.S. or Soviet conventional strength.⁸⁷ As an historical example of the failure of compellence, President H. Truman and his advisors believed that the possession of a nuclear monopoly would allow the United States to acquire 80 to 85 percent of its objectives in the course of bargaining with the U.S.S.R., but they were proved wrong.⁸⁸ Even in cases

where compellence has floundered, as in the 1971 Enterprise Incident in which the U.S. dispatched a nuclear armed carrier group into the Bay of Bengal to put pressure on Indian advances in East Pakistan, it has had some lasting effect. All of the U.S.S.R., the PRC and India, have sought nuclear weapons, perhaps as a result of the compellence experience or events associated with it.

However, as a caveat, the failure of compellence in those circumstances where the issues confronted were non-vital to the nuclear party should not be drawn upon as a guide to the inevitability of its extinction as a practice. Rather, it appears as if past failures have had no impression upon the current assessment of it as an indispensable, if perilous, foreign policy tool.

The most explicit compellent use of nuclear weapons comes in the 1960s Soviet communication with the United States over a suggestion of a pre-emptive strike against the PRC's capability, which was quickly condemned by the U.S..⁸⁹ As well, although also a deterrent, Israel's compellence against Iraq in 1991, forcing it to rely on conventionally armed Scuds, must leave some lasting impression on the non-nuclear weapon states.⁹⁰ Some government officials have even suggested that the United States use its nuclear advantage to compel near-nuclear states to abandon their programs:⁹¹ "The United States now needs to take a fresh look at the feasibility and desirability of both the preventive war and preemption options

against new nuclear weapon states."⁹² The likelihood of compellence, which underlies the understanding that nuclear weapons are usable, is increased by its doctrinal integration into security tasks other than last resort functions:

On the one hand, there is the constant danger of a shift in non-conventional-weapons policies at the strategic level, from deterrent to compellent thinking. On the other hand, there is a parallel shift towards incorporation of non-conventional capabilities in force structures and operational, war-waging doctrine.⁹³

Despite its historical unreliability, nuclear compellence affords great payoffs and opportunities for status quo superpowers defending vital interests and emerging powers seeking hegemony. In the context of augmenting security, it can afford for one state a powerful diplomatic leveraging tool among those few issue areas where its power remains fungible. As such, nuclear weapons provide security to states through their usefulness as weapons of deterrence.

The passage of time and the spread of nuclear weapons has transformed the nuclear arsenal management issue from one reliant on a cartel of a few status quo global powers to one responsive much more to the impressions exigent within the level of the inter-state system. Nuclear weapons are becoming more usable over time, and this has brought into the question not the effectiveness of retaliation as much as the stability of deterrence itself. It is this new conception of nuclear weapons, as less deterable and more useful in compellence that

is informing the newest generation of aspiring nuclear powers.

As a recapitulation, the answers to the questions of *how* nuclear weapons contribute to security, and thus nuclear proliferation, and *what* causal association is understood by decision-makers, can be briefly reiterated with their attendant observations. First, nuclear weapons contribute to security by providing deterrence against actions by adversarial states that may weaken the state, and second, they offer a risky but high-payoff instrument of compellence. In response to the *how* query, the *nuclear taboo* is often exaggerated in its effect upon decision-makers, and is posited to have a decreasing influence over time. Finally, decision-maker rationality is likely to diverge as nuclear weapons spread, and while this will not decrease the utility of the security incentive, it will shift the motive balance from deterrence to compellence.

In summary, the *security* variable portion of the model argues that states will seek nuclear weapons in response to perceived threats to national survival and secondary interests. It further argues that nuclear weapon strategies are informed by an active consciousness in policy circles of the usability of nuclear arms: in securing them, states are prepared in their use despite the known collective damage that would ensue. The primary fear that nuclear weapons generate revolves around threats of being compelled, while the primary orientation of nuclear weapons is as a keystone in credible

deterrence. Security, according to L. Freedman (1987), is also the primary motive for nuclear weapons: "The point was that, unless there was a compelling strategic case for proliferation, alternative arguments for a nuclear capability lost force."⁹⁴ Its importance as the premier incentive in determining nuclear proliferation will become evident in the test results in Chapter Five.

2.2 The Alliance Variable

The *alliance* variable describes the disincentive effect of military alliance associations on nuclear proliferation, in which typically one state offers another some guarantee of *extended deterrence*. Extended deterrence is defined here as being a relationship in which a nuclear superpower (or possibly a lesser power with the resources to neutralize a threat) assures its weaker ally, through a formal or informal security alliance, that it is committed to its defense.⁹⁵ It is *extended* because a powerful ally offers a level of security necessary to offset a perceived threat on the part of the weaker ally that is comparable to the former's own form of security. It is *deterrence* because while the stronger ally seeks to avert conflict, it will commit itself to combat in the eventuality of an attack. The credibility of an extended deterrent is a function of the likelihood that the larger ally will follow through on its commitments. In a case of a low likelihood, the lesser state is obliged to seek alternate

security measures.

I will argue in this section that alliances constitute a disincentive upon nuclear proliferation. In response to the query of how this has an effect upon the spread of nuclear weapons, I will establish that there is a causal link between alliances and nuclear proliferation that is mediated through the concept of an extended nuclear deterrence. Furthermore, I will explain precisely what link there is between alliances and nuclear weapons that is appreciated by decision-makers, and the role this plays in alliance credibility.

The argument will be cultivated through a cursory review of the concept of extended deterrence and alliance types. I will then proceed to discount the effects of the non-proliferation regime as an exogenous multilateral alliance and address the related topic of the emergence of the phenomena known as nuclear opacity.

Extended deterrence comes in two forms, conventional and nuclear variants, and is manifested overtly in security treaties, and covertly by special contingency arrangements. For example, the U.S. nuclear extended deterrent commitment to the defence of the Federal Republic of Germany (FRG) was detailed in the NATO treaty, whereas the U.S. conventional extended deterrent commitment to Saudi Arabia was underwritten by a history of close relationships and through the association with the less explicit Gulf Cooperative Council (G.C.C.). A third variety include neutral states, such as

Ireland or Switzerland, who benefit from the knowledge that despite their neutrality, they would receive assistance in wartime. This is termed 'incidental' security.

The argument justifying the prescribed disincentive impact of extended deterrence upon proliferation will first clarify the logic of alliances and show that they respond principally to *balance of threat* rather than *balance of power* orientations. It will then outline the utility and purpose of the superpowers' 'nuclear umbrella', followed by two case studies of covert alliances, and concluded by instances of alliance failure.

The *alliance variable*, as a disincentive to a positive nuclear proliferation decision, is a measure of the extent to which a potential nuclear state is protected through the extended deterrence of a superpower or regional power. The rationale is that if a lesser state receives security guarantees from a superpower, it will not need to develop nuclear weapons to redress conventional asymmetry with a rival or seek an autonomous nuclear deterrent against an adversary. This theory also states that for deterrence to be successful, it must be, as a minimum, able to address the maximum threat. For example, offering conventional extended deterrence to a state facing a nuclear rival, as occurred in the relationship of the U.S. and Pakistan, will not keep the latter state from embarking on an independent nuclear deterrent capability. In contrast, offering extended nuclear deterrence to a state with

only a conventional threat, or even the perception of no threat, can lead (although it rarely does) to counteractive policies, as with the U.S. and New Zealand (the latter banned the former's nuclear-powered and armed ships from its ports).

According to P. Shroeder, alliances are formed, and extended deterrence obtained to oppose a threat, to accommodate a threat of power, or offer a superpower management tools over its weaker neighbors (e.g., USSR and its control of the East Bloc).⁹⁶ The systemic dynamic that informs which states seek assurances from what superpower (extended nuclear deterrence has thus far not been offered by a middle power to a lesser power) is best described by S. Walt's concept of 'balancing against threat' in which states arrange themselves in alignment against the most dangerous state in the system.⁹⁷

The alternate concept is 'balancing against power', which results in coalitions roughly comparable in power because smaller states will align amongst themselves so that they preserve the weaker coalition. By ensuring the continuity of the weaker grouping, they in turn preserve their freedom of action by reserving the option to change coalitions and consequently the balance of power in response to being subject to bullying in either of the alliances. The theory is not applicable to nuclear environments, however, because the unlimited nature of nuclear firepower facilitates even a small nuclear state the ability to cripple a large power."⁹⁸ Thus the

imperative of merging into a coalition is an unnecessary measure to maintain state survival.

The phenomenon of *bandwagoning*, in which a state sides with the greatest threat or power to its interests to mollify the opponent state's intentions, is usually found only among the most vulnerable states (e.g.: Finland, Bangladesh, Singapore).⁹⁹ Another reason behind the dynamic balancing against threats can be inferred from J. Snyder (Psychology and Deterrence, 1985). In a nuclear world the *security dilemma* requires that states defend themselves against all other nuclear states, geographically contiguous or not, but that this *reductio ad absurdum* requires in practice a refocusing upon intentions, and not capability.¹⁰⁰ This consequently emphasizes that the technical approach is not only a bad proliferation predictor, but that it is a weak indicator of threat, since simple possession of nuclear weapons does not correlate immediately with a worsening *security dilemma*. For example, France and the UK have never been involved in a nuclear arms race, despite proximity.

Extended deterrence is a subset of alliance theory, possessing a myriad of inconsistent propositions. From the strategic point of view, the 'Nth country problem', as nuclear weapons spread into the state community, has been treated as an alliance management problem.¹⁰¹ As was illustrated in the case of Yugoslavia, "the differences in the behavior of states are correlated more closely with their position in the system

than with the differences among them in terms of ideology, type of regime, and economic system."¹⁰² Although in an anarchic international system the principle of self-help is paramount, some suggested, as do the Waltzians, that in a nuclear world scarce security is no longer a consequence. When the absolute value of the nuclear deterrent is challenged by a risk-taking state this absolute security may turn to absolute insecurity.¹⁰³

The provision of extended deterrence alone does not certify a restraint from nuclear proliferation. Rather, for a threatened state to forego nuclearization would require two conditions. First, that it receive assurances of the appropriate variety from a superpower or major power, and second, that these assurances be credible and beyond possible disruption.¹⁰⁴ It was the determination to give priority to crisis management and resolution, instead of outright assurances of support by their security guarantors that were among the reasons France and the PRC sought independent nuclear options.¹⁰⁵ "Some states perceive their security situations to be so dire that no outside assurance would persuade them to abjure the bomb."¹⁰⁶

Allies of the superpower were protected, but also disciplined by being involved in the greater alliance association, a constant that may become less reliable in a multipolar world.¹⁰⁷ This may have particularly resounding effects upon Japanese and German armament, particularly

critical since these two states are regional security linchpins. Their nuclear armament would lead to significant regional instability, though they are likely to free ride for as long as possible.¹⁰⁸ However, it should probably be pointed out that, as part of its extended deterrence strategy, the U.S. has completed a variety of bilateral agreements with its NATO allies for the positioning of nuclear weapons in supposedly 'non-nuclear' states, such as Germany, that may be handed over to these states in time of war.¹⁰⁹ There is concern that nuclear proliferation will weaken the ability of the superpowers to dampen regional conflict intensity and frequency. Multipolarity may further lead to greater conflict because as alliance discipline breaks down, so opportunity for military solutions to disputes increases:¹¹⁰

The presence of nuclear weapons makes war less likely overall because the costs of going to war are potentially so great; but nuclear weapons by themselves do not make war impossible or obsolete. That is because so long as states remain uncertain as to whether or not nuclear weapons will be used, the world still presents opportunities for the use of force at less extreme levels as well as for competitive risk-taking and brinkmanship in the nuclear realm.¹¹¹

The remarkably slow pace of nuclear proliferation has often been attributed to the bipolar alliance structure that has been very discipline oriented.¹¹² The unipolar structure that is diffusing into multipolarity heralds a likely decrease in discipline and order:

The changes we refer to when we speak of the end of the cold war are structural changes because they are caused by a change in the distribution of capabilities across the system's units, or states. This change increases the number of major actors in the system, making the system multipolar instead of bipolar, which is a structural change. The principle of arrangement of the system, anarchy, has not changed, however.¹¹³

The resulting polarity shift will likely result in an increased pace of proliferation in the 1990s and beyond because it heralds the end of superpower guarantees, which were the most effective means of moderating the temptations of nuclear proliferation.¹¹⁴

As part of its nonproliferation foreign policy objectives (to limit the spread of nuclear weapons), both the U.S. and USSR have offered, at some point, conventional and nuclear deterrence to smaller states. While in some cases this has involved offering extended nuclear deterrence to high risk areas, such as the ROK, it also consists of protecting states with *de jure* nuclear limits on acquisition, such as Japan, Germany and Italy. As states come under more immediate threats, such as the ROK and Japan from the DPRK, the credibility of the extended deterrent diminishes.

As J. Nye has written, "...the credibility of the nuclear umbrella extended by Washington and Moscow over their allies is a major reason why proliferation has been much slower than [President] Kennedy feared."¹¹⁵ Case histories tend to show very strong relationships between the strength of a superpower security commitment and the decision to forego the development

of a nuclear weapon.¹¹⁶ It was this U.S. strategy of extended nuclear deterrence that was so effective in its relationship with Western Europe and Northeast Asia in deterring the pursuit of autonomous nuclear options during the Cold War.¹¹⁷ However, on the other hand, it was precisely this strategy and its failure to affirm the effectiveness of U.S. extended deterrence beyond the immediate frontiers of the territories of two of its allies, the UK and France, that led them toward nuclear autonomy (especially after the 1956 Suez Crisis). Alternately, France and PRC may have left their respective alliances because of strategic predispositions rather than because of the strains of independent nuclear policy.¹¹⁸ Often, anti-nuclear alliance pressures from the superpower guarantor may accelerate proliferation tendencies.¹¹⁹

For the purposes of securing stability, and controlling nuclear proliferation, there are two notable regions where the superpowers, and particularly the U.S., have had peripheral influence. They are South Asia and the Middle East:¹²⁰

...Regional conflicts persist and appear less amenable than ever to external influence. It is probably only a matter of time before the emergence of an Arab-Israeli, and Indo-Pakistani stand-off, and perhaps other nuclear stand-offs in the third world. One of the great uncertainties for the future is whether these regional nuclear standoffs will follow the pattern seen in Europe and in the the U.S.-U.S.S.R. relationship since the 1940s (i.e., relative crisis stability accompanied by continuous 'arms racing') or whether they will produce radically different outcomes, possibly leading to disastrous local nuclear wars.¹²¹

In South Asia, the U.S., would have risked losing all its remaining diplomatic leverage had it gone after either India or Pakistan, and this is illustrative of the fact that international pressure is not enough once technical capacity and determination empower a sovereign state.¹²² Similarly, the Middle East is a complex web of persistent interstate conflicts, with close strategic proximity of most of the key demographic and resource centers, and the high level of interrelatedness making stable balance of power and conflict prevention ineffective.¹²³ The regions' pursuit of unconventional weapons are as much a symptom of the total absence of reliable alliance guarantees in the region as it is an example, in the case of the Middle East, of the difficulty of establishing the *credibility* of alliances in the face of instable governments and volatile populations.¹²⁴

An important variant of extended deterrence is the covert category, which usually consists of some sort of military collusion between a greater and lesser state that cannot be made overt without strategic or domestic consequences. Material declassified in 1992 relating to the U.S. security association with Sweden and Yugoslavia has reinforced the association between their nuclear abstinence and U.S. extended deterrence.¹²⁵ Sweden's initial objective was to secure bilateral U.S. security guarantees, which it failed at first to obtain in 1948.¹²⁶ Instead, in exchange for curtailing its nuclear weapons program, and in conforming its airfields and

other military facilities to NATO standards (so that they may be used in time of war), by 1960 the U.S. adopted an exceptional policy of assisting Sweden in whatever fashion was required:¹²⁷ "U.S. policy was to deny Sweden access to U.S. nuclear warheads and to discourage Sweden from producing its own nuclear weapons."¹²⁸

For similar reasons, the UK and the U.S. were equally receptive to the military integration of Yugoslavia. By 1951, war plans transmitted by Tito to U.S. Secretary of Defense Marshall led to Yugoslavia's military planning integration under the broader plan of the Commander in Chief, Allied Forces, Southern Europe, NATO:¹²⁹ "Yugoslavs attached such great importance 'to military cooperation with the West that they were sending two lieutenant generals to London and Washington as their Military Attachés... Marshall Tito had assured him [Eisenhower] [that] ...in the event of a Soviet invasion the Yugoslavs 'would hold the Ljubljana Gap area and would not withdraw their troops into the mountains in order to fight a guerilla war."¹³⁰

In both these cases, the states in question, despite their regime type, professed ideology, or apparent neutrality, were covertly engaged (because of geographic determinants) in a balance of threat relationship against the USSR.¹³¹ While the U.S. actively discouraged Sweden's nuclear weapons program in exchange for *de facto* security guarantees, the effect could be interpreted to be similar to the arrangement with Yugoslavia.

This same sort of undeclared security guarantee is likely to operate in other inter-state relationships and may, better than 'incidental' security, account for the choice of nuclear abstinence in a number of neutral states such as Switzerland, Egypt or the ROC.

Deterrence failures are normally preceded by a failure of credibility on the part of one of the parties involved in the event, be it the guarantor, adversary or party offered the alliance. According to J. Arquilla and P.K. Davis (1992), extended deterrence can fail for one of five reasons:

1. Defenders misunderstand aggressors motives (insatiable versus appeasable)
2. Aggressors are capable of only a limited type of rationality
3. Aggressors enter crises with control over initiative
4. Outside sponsorship for the aggressor is available
5. Defenders fail to move from general to immediate deterrence.¹³²

In previous quantitative studies of extended deterrence, it has been shown that deterrence is likely to fail if the local balance favors the aggressor, despite the overall balance favouring the defender.¹³³ Furthermore, in most cases of deterrence failure, the aggressor enjoyed some form of direct sponsorship from a powerful guarantor.¹³⁴ Thus, while alliances are the indispensable disincentive to nuclear proliferation, because of their inherently passive nature, they can easily succumb to the sort of confidence dysfunction

that may lead to their collapse as a deterrent.

A crucially misunderstood issue treated and discounted below as an endogenous manifestation of state power under the alliance variable is the *non-proliferation regime*, as embodied in the Non-Proliferation Treaty.¹³⁵ It is treated here because in its ideal circumstance, as is articulated in the NPT, it would serve as a sort of international alliance treaty backed up by the nuclear weapon countries: smaller states that are bullied by powers wielding nuclear weapons are automatically protected by the nuclear-armed states. In practice, however, it does not win nearly enough confidence to be considered a credible deterrent to compellence.

The non-proliferation regime, particularly the NPT, was devised to limit the dangerous spread of horizontal nuclear proliferation (an increase of nuclear states rather than an increase in individual arsenals, which is termed vertical proliferation), although its success to date is in dispute. While most, even realists, attribute to it some importance, the real debate centers on its nature: "Waltz also makes no mention of arms control, apparently reflecting a belief that its net impact upon the nuclear situation is negligible."¹³⁶ Nonetheless, particularly in the debate between the vertical-horizontal proliferation association, and in the broader hypocrisy of the regime, the NPT has become a lightning rod for dissatisfied developing states.¹³⁷

Complex interdependence theorists suggest that it is a

multilateral and collective association, or at least tending to, and represents the prevailing intersubjective interest.¹³⁸ Realists argue that the regime is not exogenous, but an endogenous representation of the real interests of the *status quo* powers, and more specifically the interest of the current hegemonic power, the U.S.: "It is doubtful, however, that a regime exists in the security area."¹³⁹

The non-proliferation regime itself consists of the 1968 NPT with 140 adherents, the Tlatelolco Treaty for Latin America with currently 26 adherents, the South Pacific Nuclear Free Zone, the Nuclear Supplier's Group, the IAEA, and the National Nuclear Export Regulation.¹⁴⁰ The NPT was essentially the product of U.S.-USSR interest convergence to secure global stability in favor of the *status quo*.¹⁴¹ Even states that had refused to sign the NPT, such as France and the PRC, nonetheless supported its antiproliferation policy.¹⁴² Historically, as detente came to the fore, the issue of the NPT and nuclear sales transformed nonproliferation from a policy tool to a policy goal that naturally conflicted with the relations of some key allies of both of the superpowers.¹⁴³ States that revolted against the system, such as India, risked isolation unless they were of considerable size.¹⁴⁴

The most influential realist regime theory of the NPT suggests that it is the product of a bipolar hegemonism only possible under a Cold War structure: "This so-called *hegemonic stability* hypothesis suggests that the presence of a dominant

superpower is crucial not only for the formation of regimes, but also for their maintenance over time."¹⁴⁵ Some interdependence theorists assert that the end of the bipolar situation may provide an opportunity for the regime to emerge on its own and achieve limited exogeneity. Some, such as J. Rosenau and E. Haas suggest that learning theory and frequent state interaction can account for key aspects of common policy of states.¹⁴⁶

However, evidence that the regime is endogenous and dependent upon the world's nuclear weapon states to enforce the regime is based on findings that in every case of nonproliferation, a reason other than the binding legalities of the treaty can be found as the cause.¹⁴⁷ "Demonstrating a causal relationship between a nonproliferation decision and the NPT would be a tall order."¹⁴⁸ More accurately, however, the NPT's effects are likely to be partial, but nonetheless contributing, which is consistent with its role whose target is raising the cost of the individual proliferation decision.¹⁴⁹

A frequently raised issue, particularly among states procuring nuclear weapons after the 1968 NPT, is its inherent discrimination between states possessing nuclear weapons (NWS) and those that do not (NNWS).¹⁵⁰ The specific controversy centers on the link between vertical proliferation (as arsenals of specific states, particularly the U.S. and former-USSR) and horizontal proliferation (proliferation of nuclear

weapons to a greater number of states). The critics of the NPT, particularly India, argue that there is a positive link between the two (as is implied in the NPT) and that the limiting of proliferation requires reduction action in both categories:¹⁵¹ "Vertical proliferation of nuclear weapons is the real problem holding key to the survival of humanity."¹⁵² An alternative view has challenged this and asserted that in fact there is an inverse relationship between the two types of proliferation vis-a-vis systemic stability: the greater the vertical proliferation and the lower the horizontal proliferation, the more stable are selective instances of extended deterrence and alliance guarantees, and hence the system as a whole is more stable.

It may be a cruel irony, but the causal relationship between vertical and horizontal nuclear proliferation may be the opposite of that assumed by Article VI of the NPT. It is precisely the large size and sophistication of the superpowers' nuclear forces, and the avowed willingness of the superpowers to threaten to use them on behalf of their clients, that have prevented a more pervasive nuclear weapons proliferation. The intuition of the authors of the basic intuitive compact, the NPT, was wrong, their logic flawed.¹⁵³

Overall, the NPT fails dramatically in addressing the issue of prestige, as is evident in the objections frequently made by the non-nuclear weapon states on the basis of the regime's discriminatory basis, and the serious case failure in detecting or stopping nuclear proliferation in Iraq as revealed by the conclusion of the 1991 Gulf War. It is going

to be a combination of the regime's important partial effects, countered by its critics in the near-nuclear world that will decide the fate of the treaty's indefinite extension in the April 1995 NPT conference.¹⁵⁴

A subject that is subsumed under the *alliance* variable, and will be treated as a separate sub-test in Chapters Four and Five, is the issue of 'nuclear opacity', here defined as the tendency of a state to treat its deployment objective and possession of nuclear weapons as ambiguously as possible, neither confirming nor denying it, as a method of maximizing its security. I decided to address the issue, in the broad sense, because it is likely to be the characteristic form of proliferation into the beginning of the twenty-first century. I intend to treat it in this subsection because, as will become clear in Chapter Four, its underlying causes are derivatives of alliance factors.

While all nuclear procurement programs are secretive, an opaque state is one which actively discourages public debate on the issue and prefers to present itself as a 'doctrineless' nuclear power. At the same time it seeks to maintain the level of acknowledgment of the existence of its nuclear weapons forces to a level below that which is considered to be the threshold of political significance to potential adversaries.

Nuclear opacity occurs under situations in which there is a combination of a necessary condition of a security threat and the presence of at least one of two mitigating causes:

alliance constraint or threat provocation. The necessary condition is that the state be under a security threat sufficient to cause it to require nuclear weapons and at a point where an alliance association offers only partial or temporary relief.¹⁵⁵ The first mitigating variable consists of the state's benefit from an alliance which would not be available if the state became overtly nuclear, either because it would violate a condition of support, or because it would undermine the guarantor state's policy of antiproliferation. The second mitigating variable is that the state be adjacent or proximate to other non-, near-, or early-nuclear states whose programs would be initiated or significantly accelerated in the event the first state's program became overt:

Under opacity, proliferator states deny the possession of nuclear weapons, although they acknowledge, some more than others, their capability to build such weapons quickly... No direct threats... No military doctrine. In an opaque situation, no military doctrine is publicly promulgated to include nuclear weapons as an integral part of the country's military forces.¹⁵⁶

Cases most frequently cited by A. Cohen and B. Frankel include Pakistan, India and Israel. In the case of Pakistan, the security situation is desperate, and it is faced by a slowly arming India it does not want to provoke. Furthermore it was closely associated with and is a beneficiary of U.S. security guarantees.¹⁵⁷ Conversely, India seeks to gradually buildup its nuclear program to match China's without provoking

it or constraining Pakistan to desperation. Israel seeks a weapon of last resort that is consistent with satisfying both Egypt's domestic-political concerns over security and the U.S.'s antiproliferation policy in the maintenance of the NPT.

Opacity is maintained, in the case of South Asia and the Middle East, as a bargaining procedure that allows the state's elites to withdraw from a confrontational nuclear brink in the face of overwhelming domestic support for nuclear weapons. To some extent, as in all the above cases, explicit public debate over the issue is collectively avoided.¹⁵⁸

Policy critics of nuclear opacity, such as S. Feldman, have argued that nuclear weapons are dysfunctional unless integrated into an explicit deterrence policy, and although occupying a minority position, opacity is often questioned as to its sustainability.¹⁵⁹ Opacity is generally interpreted as the typical second-generation secretive method of acquiring nuclear weapons, and is viewed as a major threat both to the NPT regime, and to the antiproliferation policies of the existing nuclear weapon states. However, an often unstated reason for remaining opaque is that it deliberately localises a nuclear confrontation; otherwise, the seventh overtly nuclear state is likely to become part of the strategic targeting calculation of the previous six nuclear weapon states.¹⁶⁰ Opacity is thus a tactic of strategic compromise.

It is most explicitly obvious in the aforementioned list provided by J. Arquilla, that almost every alliance failure,

and consequently every alliance success, can be attributed in part to its reliability. Thus, in addressing the question of *what* causal links are perceived by decision-makers between nuclear proliferation and alliances, nearly the entire solution resides in gaging the strength of the belief by the weaker state that the promise of the stronger state is adequate, even if available. Thus it can be briefly stated that the mediating link between an alliance and its disincentive effect upon nuclear proliferation lies in its credibility. The corollary answer to the question of *what* causal link actually exists is subordinated entirely to the subjective interpretation of the security guarantees by the parties involved, including the aggressor, guarantor and beneficiary.

In summary, the *alliance* variable acts as a disincentive to nuclear proliferation, and its effect is visible in situations in which a state is subject to a security threat. The *alliance* variable manifests itself in the form of conventional or nuclear extended deterrence from a guarantor to an ally, and must be a sufficient deterrent to mollify needs to develop an autonomous nuclear capacity. The non-proliferation regime, as a sort of multilateral treaty grounded in the nuclear taboo, is considered more a manifestation of nuclear weapon strategy on the part of nuclear states than as an independent incentive to nuclear proliferation. Finally, alliances have a crucial effect on

determining whether states develop opaquely, a sub-hypothesis that will be tested in Chapters Four and Five.

Endnotes

1. Meyer. Op. cit p.47
2. Referring to conventional asymmetry: Meyer. Op. cit p.57; on nuclear deterrence: Ibid. p.48-9 and Chun. Op. cit. p.24
3. Paul, T.V., Nuclear Taboo and War Initiation: Are Nuclear Weapons Irrelevant in Regional Conflicts?", Paper Delivered at the 1984 Annual Meeting of the American Political Science Association, New York, 1994, p.2
4. Sagan. Op. cit p.260
5. Cohen, Avner, and Frankel, Benjamin, "Opaque Nuclear Proliferation", in Frankel, Benjamin (ed.), Opaque Nuclear Proliferation: Methodological and Policy Implications, Frank Cass, London, 1991, p.16
6. Wakaizumi, Kei, "The Problem for Japan", in The American Assembly, A World of Nuclear Powers?, Prentice-Hall, Englewood Cliffs, 1966, p.99
7. Dunn and Kahn. Op. cit. p.xxi; Creveid. Op. cit. p.54
8. Tucker, Robert W., and Weltman, John J., "The Nuclear Future", in Garrity, Patrick J., and Maaranen, Steven A (eds.), Nuclear Weapons in the Changing World: Perspectives from Europe, Asia, and North America, Plenum Press, New York, 1992, p.242; cited in Strain, Frederick R., "Nuclear Proliferation and Deterrence: A Policy Conundrum", Parameters, Vol.23, No.3, Autumn 1993, p.88,98: Thomas Dowler and Joseph Howard, in the Fall 1991 issue of Strategic Review, proposed a system relying on what they termed 'tinynukes'... The author envisions tinynukes as approximately one-kiloton weapons, a size small enough to limit the radius of damage, yet still effective against a nuclear-armed foe's military... the United States should reopen its investigation into the use of the so-called 'neutron bomb'... Since the weapon would have produced little physical damage to terrain, yet was extremely lethal... In a discussion with Dr. Edward Teller of the Hoover Institute in March 1993. Dr.Teller advocated the utility of nuclear weapons of even smaller yield; perhaps in the ten-ton class. Dr. Teller suggested the military utility of large-yield nuclear weapons has passed.

9. Arnett, Eric H., "Choosing Nuclear Arsenals: Prescriptions for New Nuclear Powers", in Frankel, Benjamin (ed.), Opaque Nuclear Proliferation: Methodological and Policy Implications, Frank Cass, London, 1991, p.169; Flournoy, Michèle A., "Implications for U.S. Military Strategy", in Blackwill, Robert D., and Carnesale, Albert, New Nuclear Nations: Consequences for U.S. Policy, Council on Foreign Relations Press, New York, 1993.
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11. Gaddis, John Lewis, 'Nuclear weapons, the End of the Cold War, and the Future of the International System', in Garrity, Patrick J., and Maaranen, Steven A (eds.), Nuclear Weapons in the Changing World: Perspectives from Europe, Asia, and North America, Plenum Press, New York, 1992, p.20
12. Müller, Harald, "European and Global Security in a World without the NPT", in Pilat, Joseph F., and Pendley, Robert E., (eds.), Beyond 1995: The Future of the NPT Regime, Plenum Press, New York, 1990, p.94
13. Garrity, Patrick J., and Maaranen, Steven A (eds.), Nuclear Weapons in the Changing World: Perspectives from Europe, Asia, and North America, Plenum Press, New York, 1992, p.9-10; Gray, Colin S., A Review of Nuclear Proliferation and the Future of Conflict, by Martin M. Creveld, New York, The Free Press, 1993, p.123; Sagan. Op. cit. p.260; Waltz, Kenneth N., The Spread of Nuclear Weapons: More May Be Better, International Institute of Strategic Studies, Adelphi Papers, London, 1981.
14. Gaddis. Op. cit. p.21
15. Weber, Steve, "Security after Revolutions of 1989 and 1991: The Future with Nuclear Weapons", in Garrity, Patrick J., and Maaranen, Steven A (eds.), Nuclear Weapons in the Changing World: Perspectives from Europe, Asia, and North America, Plenum Press, New York, 1992, p.199
16. Chellaney. Op. cit. p.312
17. Zhihai, Zhai, 'The Future of Nuclear Weapons: A Chinese Perspective', in Garrity, Patrick J., and Maaranen, Steven A (eds.), Nuclear Weapons in the Changing World: Perspectives from Europe, Asia, and North America, Plenum Press, New York, 1992 , p.166: much of the air defense and anti-submarine warfare assets, that were nuclear until a few years ago, were replaced with more cost-effective high-precision conventional ordinance, principally because of the revolution in terminal guidance technology.

18. I have chosen not to consider the two, for the purposes of deterrence and compellence, as on the same continuum as nuclear weapons because of the reluctance of some, such as the U.S., to respond in kind. In large part this is because these weapons are quite constraining on the user, and retaliation by conventional means may on occasion offer an equivalent effect. Refer, for example to the 1991 Gulf War, where hypothetical Iraqi chemical use would not have immediately translated into a chemical response by the Coalition; there were a wide variety of more effective conventional means available.

19. Orton, Robert D. (Major General US Army), and Neumann, Robert C. (Major US Army), "The Impact of Weapons of Mass Destruction on Battlefield Operations", Military Review, Vol.73, No.12, December 1993, p.65

20. Ham. Op. cit. p.31; according to the The Aspen Strategy Group. Op. cit. p.2,21, there are eleven states seeking CW capability: the PRC, the DPRK, Egypt, Ethiopia, Iran, Israel, Libya, Myanmar, the ROC, Syria, and Vietnam.

21. The Aspen Strategy Group. Op. cit. p.9

22. Strain. Op. cit. p.86

23. The Aspen Strategy Group. Op. cit. p.6

24. Ibid. p.1

25. Karsh, Efraim, "Rational Ruthlessness: Non-Conventional and Missile Warfare in the Iran-Iraq War", in Karsh, Efraim, and Navias, Martin S., and Sabin, Philip, Non-Conventional Weapons Proliferation in the Middle East: Tackling the Spread of Nuclear, Chemical, and Biological Capabilities, Clarendon Press, Oxford, 1993, p.34

26. Smith, Roger K., "Opaque Proliferation and the Fate of the Non-Proliferation Regime", in Frankel, Benjamin (ed.), Opaque Nuclear Proliferation: Methodological and Policy Implications, Frank Cass, London, 1991, p.108

27. Sabin, Philip, "'Restraints on Chemical, Biological, and Nuclear Use: Some Lessons from History'", in Karsh, Efraim, and Navias, Martin S., and Sabin, Philip, Non-Conventional Weapons Proliferation in the Middle East: Tackling the Spread of Nuclear, Chemical, and Biological Capabilities, Clarendon Press, Oxford, 1993, p.13

28. Ibid. p.11

29. Dunn and Kahn. Op. cit. p.2

30. Office of Technology Assessment, Nuclear Proliferation and Safeguards, Praeger Publishers for the Office of Technology Assessment, New York, 1977, p.94
31. Gaddis. Op. cit. p.27
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CHAPTER THREE: Political-Economic Variables

The discussion on the political-economics factors is subdivided into three distinct variables: *prestige*, *trade* and *domestic*. Chapter Three will illustrate and explain the reasons behind the causal connection between the political-economic independent variables and the tendency to build nuclear weapons, by elucidating their origins and internal logic. This question of causality will also be treated through a two part interrogative, similar to Chapter Two, in which each independent-dependent association will be assessed according to how it contributes to the nuclear proliferation phenomena, and what decision-makers perceive to be the causal connection between a given variable and nuclear proliferation.

The *prestige* variable, associated with hegemonic objectives and power pretensions, has a positive effect on proliferation decision-making. The *trade* variable, which has a negative effect associated with proliferation decisions, focuses on the need of the state to preserve a viable international commercial and political environment. Finally, the *domestic* variable establishes the relationships necessary to explain the outliers in Chapter Five.

3.1 The Prestige Variable

The *prestige* variable is a strong incentive to nuclear proliferation, and comprises those eventualities in which

states seek nuclear weapons to counter declining prestige and those seeking nuclear weapons to augment their status. It is a manifestation in essence of the potential of nuclear weapons, and more specifically, the status that is accorded a state that has the potential to make compelling uses of its nuclear resources. Although in the proliferation literature, prestige is offered other definitions, such as a measure of domestic nationalism or as a way to increase intra-alliance influence, these are not treated here because of insufficient evidence of their presence.

I will argue that more than any other variable, there is a notable divergence between the objective causal link of how prestige causes nuclear proliferation and *what* is perceived to be its utility by policymakers. Despite the evidence to be provided below that regional and international status is not a direct function of nuclear weapons possession, in part because of the repeated inductive failure of compellence, there is a perpetuated myth among state leaderships that it is the controlling source of fungible power. The discussion of the *prestige* variable will involve its definition, its circumstantial variations, and its particular rendering among developing states to illustrate it as an indisputable incentive to nuclear proliferation.

A traditional definition of prestige suggests a state's pursuit of status or global recognition for its technological and military feats.¹ Prestige, as it relates to national

security, relates in essence to power, resource acquisition, and the status needed to acquire both.² The reformulation of prestige used here assumes that prestige is related to the use of power, but unlike in the *security* or *alliance* variables, less specifically. This sort of power currency is the kind used by regional powers to address issues in an umbrella fashion, without having to target a specific state. It is also used as bargaining power, brought to global conferences and forums when establishing agreements or regimes. As such, prestige is the epiphenomenal indicator of non-specific power, and so states pursue nuclear weapons with an intention of acquiring this ephemeral prestige. It is nevertheless, an essential component of hegemonism and is associated most often with states seeking to possess a preponderance of power in at least their regional political forum: "...the classical view that power rests on the demonstration of military (and thus nuclear) strength".³ While not directly equatable with compellence because of the absence of any explicit threat activity, a state with nuclear-sustained prestige attracts deference from other states on the implicitness of the full potential of its power.

Prestige may thus be a long-term objective sought to withstand an eventually deteriorating position, as it was with Britain's acquisition of nuclear weapons, or to secure or increase strategic autonomy, as in the case of India's nuclear program. For France, prestige value was also a hedge against

military and political uncertainty, over and above the absence of a credible U.S. extended deterrent.⁴ The central problem with nuclear-based prestige, outside the dangerous practice of nuclear compellence, is that it is far less fungible than is normally assumed. Very often it is spuriously associated with Great Power status, or even interpreted as the cause and not the effect of that power. Notwithstanding the characteristic unmutability of nuclear weapons in a multipolar context heavily influenced by a superpower(s), states tend to realize only gradually that there are few immediate status benefits of nuclear weapons outside overt compellence and that they do not necessarily translate directly into trading power or confer recognition of a certain reputation. As with compellence, however, the complexity of the foundations of prestige does not then deter states from pursuing it, despite the apparently low rate of success.

Nuclear prestige as power is tangible and clearly observed thus far only in the regard given to the five permanent members of the UN Security Council. There certainly is a manifest connection between the PRC's 1964 nuclear detonation and its acquisition of a seat on the United Nations Security Council eight years later in 1972, a fact that has captured the attention of other hopefuls such as Indonesia, Brazil, and Nigeria, and the more likely candidates, Germany, Japan and India.⁵ Prestige as a motive may thus be present in any state that seeks some sort of special regional or global

status, whether there are specific security threats or not:⁶

Potentially, all nations have the status and prestige incentive. This is likely to be most potent, though, for those states that are emerging as dominant regional power centers with plausible pretensions to being great powers... Current examples are Iran and Brazil (at later dates perhaps Nigeria and Indonesia).⁷

A second motive aspect of prestige, which will be discussed further below, suggests that status may also be linked to national viability and the psychology of post-colonial development.⁸

Nuclear weapons, over time, play a diminishing role in upholding the great power status of a state because it has been recognized that prestige, as in the case of the U.S. and the former-USSR, was a function of resources other than the military: nuclear weapons failed to restore the crumbling empires of the UK, France and the Soviet Union. Nonetheless, it has had some contributing effect toward the widespread acknowledgement of India's special power status in South Asia, despite the fact that it has not been given the predominant recognition over the Indian Ocean that it sought. Those developing states most intent upon securing international or regional prestige are the least likely to accept superpower guarantees because such an alliance would symbolize a position of inferiority that these states wish to escape.⁹

While general prestige and status considerations played some role in the 1960s and early 1970s (and were important to the Soviet Union, Britain, and France in the 1940s and 1950s), they are likely to be increasingly marginal in the 1990s and beyond... Only the relatively backward Islamic countries still appear to regard the successful development of atomic weapons as a suitable national challenge.¹⁰

However, it should be pointed out that while prestige is an indicator of generalized power, it is not a cause of it. A great many states have had far less success affecting the international policy agenda than they would have liked, despite their acquisition of nuclear weapons. Notwithstanding, nuclear weapons are seen as a 'cheap-and-easy' option for non-nuclear weapon states to challenge the international status quo. For the developing world, this may mean the illusory objective that nuclear power could be translated into such activities as resource diversion, something that has yet to be successfully implemented:¹¹ "Frustrated Third World nations may view nuclear weapons as equalizers in their relations with the industrialized world."¹² This is not unusual given the historical association of capital weapon systems, such as battleships and aircraft carriers, with power prestige, particularly among emerging states.¹³

The cases of the UK and the PRC show that one of the principal motives for the acquisition of nuclear weapons was the national desire to attain or preserve international status. For the PRC it was also a matter of regional power, and for the UK the means to preserve the power behind the

security of its declining Empire.¹⁴ "The two countries believed that their success in developing their first weapons would in itself validate the potency of their defense and technological capabilities and advertise their future military potential."¹⁵ The difficulty however is that nuclear weapons quickly lose their relative value as they spread, and as such sustain a lag in expectations of power that may hinder successful alliance integration. Nuclear weapons may, in the guise of prestige, offer some military power, but do not in and of themselves grant prestige: "[for]...Britain and France... one wonders whether their decision to go nuclear was not primarily influenced by pre-war perceptions and experiences rather than their post-war national security requirements."¹⁶ For the first nuclear weapon state (the U.S.), accrued nuclear prestige may have been confounded with the prestige of a technologically advanced society capable of defending itself through a variety of high-technology avenues.

Mere possession of the bomb added immensely to America's already considerable prestige, and paradoxically convinced other countries, Great Britain and the Soviet Union, initially, that they must also become nuclear powers in order to participate in great power politics. In these circumstances, the political significance of nuclear weapons often outweighed whatever military advantages they presumably conferred.¹⁷

The dimension of nuclear prestige for developing states is somewhat more complex, and deals with three different concepts. First, there is independence and nationalism,

second, legitimacy and national viability, and third, regime survival.

The independence component denotes the fact that historical periods of weak internal rule and a subsequent colonial experience, followed by self-government may provide an incentive to nuclearize, as a sort of an unspecific 'never again' reaction. Indian policy, for example, was built around various facets of anticolonialism, a power policy essentially carving out of a third world from the camps of the first and second worlds.¹⁸

Although the anticolonial attitudes may have fuelled the early drive for nuclear autonomy, by the time most developing states have acquired nuclear infrastructure, the anticolonial issue becomes of little national interest as an extension of nuclear diplomacy: "Nuclear weapons never played a significant role in the process of decolonization, nor in the later development of these new states into nonaligned countries."¹⁹ Thus, with the possible exception of the PRC, the issue of independence was a strong contributing influence to the generation of a nuclear option in some early post-colonial states, but was marginalized by the time the option had been realized.

Nationalism is very much the domestic manifestation of national self-assertion associated with anticolonial policy. It was a potent force behind Indian and Pakistani nuclear policy and is evident in the generally broad consensus that

seeks the nuclear option:²⁰ "Nationalism for the newly independent states of Asia and Africa has acquired a much wider meaning than self-determination. It has become a forceful urge to alter the existing international inequities by seeking to narrow the gap between the developed and developing areas in political and economic power and status."²¹

A second associated issue is the pursuit of legitimacy and national viability in the process of nation-building, which is particularly salient because of the underdeveloped nature of the state in most developing countries: "The rigors of nation-building also can come from a problem of national or historical identity. Pakistan (along with Israel, the RSA, and the ROC) belongs to that class of nations whose survival is debated, whose legitimacy is doubted and whose conventional security apparatus may be inadequate to cope with the pressures of hostile neighbors. This in itself is a powerful incentive to weaponization."²² In the case of India and Pakistan, mutual unwillingness to confer legitimacy has created a mutual sense of distrust.²³

A third and final component of the prestige motive in the developing world, but equally applicable to the RSA, Israel, and the Soviet Union in 1991, are fears that minority regimes or unstable governments might make use of nuclear weapons for the purposes of cementing their legitimacy.²⁴ This is the salient motive in the nuclear interest attributed to the DPRK.

A consideration of the prestige value of nuclear weapons

is its potential for diminishing returns. If one were to consider the scenario of a postulable nuclearized Germany, significant prestige and trust may be lost, rather than gained, despite an immediate increase in strategic firepower.⁴⁵ Although prestige is discussed here as a generic pursuit of status, it is rather an umbrella indicator for a wide variety of state activities to do with the use of nuclear weapons because of their implicit compellence potential.

As with the *alliance* variable, the governing aspect of the prestige incentive lies in the answer as to what causal association is attributed by decision-makers to exist between status and nuclear weapons. In fact, given the oversimplified connection between nuclear weapons and fungible power, the response to how the two actually interact is entirely governed by what the perception is of that relationship by the policymakers, particularly since there is in fact only a weak objective connection. Thus while I argue that the reality of the connection is illusory and wholly contingent upon the belief of the phenomenon by decision-makers, it is nonetheless a significant incentive to engage in nuclear proliferation activity. The assumption of the validity of this chimeric association will persist as long as nuclear weapons are mistakenly covariated with influential states, despite the evident manifestation of significantly more fungible power exercised by completely non-nuclear states such as Germany, Japan and Italy.

In summary, prestige has a positive association with nuclear proliferation, although it is considerably less influential than either the security or alliance factors. It is, however, as equally intangible as the relativistic trade variable discussed immediately below.

3.2 The Trade Variable

National security objectives must balance the short-term benefits of military security against the long term benefits of a more economically developed and politically recognized state from which to derive security. Very often the short term goal must be sacrificed to satisfy the long term program. In some cases, the military component may even be sacrificed for immediate non-military benefits, such as international commercial and political transactions, which collectively act as a disincentive to nuclear proliferation.

The *trade variable* hypothesizes that trade dependent states, that have the opportunity of receiving extended nuclear or conventional deterrence, will additionally withhold from the nuclear option if it would hinder their commercial activities and political legitimacy. This hypothesis is best explained by the *complex interdependence* approach in International Political Economy (IPE): "These groups' extensive reliance on the global economy and on international exchange makes them vehemently opposed both to autarkic models of economic development and to proliferation policies that

would sunder them from the international community."²⁶

I will argue, in response to the *how* question regarding the objective causality of the disincentive, that there is a point of diminishing returns in which a pursuit of absolute security will disrupt the economic basis of a state's security apparatus, thus diminishing its level of protection. Specifically, when certain states with a high level of economic and political interdependence seek nuclear weapons, they trigger reactions that may manifest themselves in the form of economic sanctions. Thus the disincentive measure, which is mediated by the *what* question and is concerned with the interpretation of this phenomena by the state leadership, establishes the threshold beyond which a state would sacrifice its security in exchange for normalized political and economic relations. The specific equilibrium point between these two interests is determined by the distinctive historical circumstance of the state itself. In elaborating this association, the trade variable will be reviewed in its general effects, in the cases of pariah states, and in its different political variants.

R. Axelrod, addressing K. Waltz's bipolar realism, suggests that bipolarity is stable (and to the same extent so can multipolarity) because *games theory* suggests the possibility of cooperative behavior in iterative relations in which the gaming condition is known to continue.²⁷ In purely international economic and diplomatic relations, accommodations

are arrived at repeatedly because of the absence of decisive turns that could result in the elimination of one of the core players. In the gaming context of proliferation, however, discovery of a state's covert nuclear program may lead to its sudden economic isolation, a condition whose reversal would require some considerable restitution.

Another view, the 'hegemonic theory of nuclear stability', borrowed from IPE's hegemonic theories on economic trade, states that a singular power establishes and maintains the liberal market, provides countercyclical lending, discounts in crises, manages exchange structures, and sanctions violators.²⁸ Applied to nuclear proliferation, the hegemonic trading power, the U.S., would presumably be expected to regulate the proliferation system with assistance from other *status quo* powers.

Nuclear proliferation in this context has diminished because of the premium put on co-operative economic behavior since the generalized global trading boom began in the mid-1980s: "Some students of international relations argue that growing economic interdependence among states, interpenetration of markets, and the growing importance of transnational actors such as multinational corporations, have moved the international system, or at least its more developed segments, closer to being an organic society."²⁹ More specifically, the trade variable represents the social interdependence level between mutually empathetic societies,

the globalization of both production investment and trade, and the global cultural consensus.³⁰

The core example of proliferation restraint comes in the form of Europe and the Atlantic Alliance, in which economic and social interdependence have had as much an effect on retarding proliferation as alliance formation.³¹ Another example is that of Japan, which sees its security as much a product of its economic health as its international alliance associations. Alienation of its principal trading ally and security guarantor, the United States, would lead to a considerable weakening of Japanese security, sub-optimal advantages from systemic defection notwithstanding:

Deterioration of American-Japanese relations might impair the Japanese economy's access to the enormous U.S. market, which would cause serious difficulties to the overseas dependent, and thus inherently vulnerable, Japanese economy... A Japanese decision to use imported plutonium or uranium for nuclear-weapons production would immediately invite an embargo by traditional suppliers, most of whom are nuclear weapon countries.³²

Another explicit example is in the response of Argentina and Brazil to U.S. prodding to discard their nuclear programs, particularly since those two states became engaged in the growing activity of global trade. More specifically, their apparent program reversals in the 1990s stem from their promised access to U.S. high technology exports and economic assistance.³³

In the Brazilian case, the decisions to reverse the ballistic missile and nuclear weapons programs were intimately connected with the opening to international trade and investment... Faced with an impending regime change and seeing opportunities to end international sanctions and reclaim civilian nuclear export markets, South Africans increasingly viewed their nuclear weapons as an impediment rather than aid to their objectives, which now included political and economic reintegration into the international community... acceptance into the international political and economic mainstream all figured prominently.³⁴

In effect, trade relations act as a disincentive to nuclear proliferation for those states with significant dependence on foreign resources for their survival or legitimacy, through the arbitration of the trade and diplomatic sanction.

The anomalous cases of isolated pariah states occasionally reveal that diplomatic and economic inducements are not effective incentives to refrain them from expansionist activities, although most seek exactly this benefit in a more indirect and less interdependent fashion.³⁵ In general these states seek trade but do so with a view to avoiding any possible leverage it may provide enemies to their national security and the cultural influences that arise as the product of any inter-state exchange. The secondary objective of securing political recognition is crucial in the case of Algeria, whose principal motive for agreeing to sign the NPT was to avoid political isolation. It sought the breathing-space in the international scene to deal with its domestic crisis in the 1990s.

Threshold levels for maintaining economic and political isolation vary between nations, and are largely dependent on intangible domestic-historical factors. Although Israel has significant dependence on the non-Arab world for its survival, it is far more likely to seek isolation than to compromise its security; conversely, some isolated states such as the RSA were economically quite self-sufficient, but were politically unlikely to survive extended isolation from Western contact. The precise measure of a state's tolerance to being severed from those upon which it is dependent can, however, be deduced from the level of commercial and political interaction.

The *trade* variable may also signify sudden domestic changes that may lead to an increase or decrease of a tolerance threshold, as in the cases of Brazil and Argentina where the late 1980s promised a period of renewed economic and political interdependence after three decades of isolation; the principal impetus here was provided by an increase in global commerce and domestic liberalization.

The differing choices made by such states as Israel and Japan in their tolerance to security incentive-instigated isolation is illustrative of the range of responses by state elites seeking to maximize the long-term security and well-being of the state, and thus answers the question of *what* causal association is perceived: for example, "...long-run maximizers may not always deter short-term military maximizers."³⁶ As to *how* the trade variable acts as a

disincentive, simply put, for those states that derive critical resources from outside their sovereign geography, there is a survival imperative that forces it to subordinate itself to the best strategy of resource acquisition, and this is often manifested in a non-military solution.

Thus the trade variable has a negative association with the decision to engage in nuclear proliferation and is often the chief explanatory factor for small regional states whose security interests have been satisfied by alliance associations and by distance from threat. It acts as a disincentive in that states engaging in proliferation activity tend to become subject to political and economic sanctions unless they have sufficient autonomous power to remain strategically independent.

3.3 The Domestic Variable

The *domestic* variable, not included in the logistic regression because of the difficulty in operationalizing it, is presented here because in its diversity it does account for a good portion of the misclassified terms presented in Chapter Five. The *domestic* variable refers to all effects that are exclusively situated within the state, be they bureaucratic politics, domestic political morale (in externalization activity), or party politics, that act as incentives or disincentives to nuclear proliferation.³⁷

Because of the multidirectional causality of the *domestic*

variable upon nuclear proliferation, which may either contribute to or deter a proliferation decision, there is no explicit answer to the questions regarding the *how* of its objective causality or the *what* of its causal perception by state elites. The variety of *domestic* causes alone dissuades a detailed analysis and is instead supplanted by the structural *proviso* that domestic effects tend not to directly influence decisions, as much as they structure the way in which decisions are made by state elites: "Some unit-level factors can strongly influence systemic ones, and there is a constant interaction between systemic and domestic-level forces."³⁸ As was pointed to in Chapter One, state decision-makers must achieve minimum satisficing points to ensure their persistence, and it is within this umbrella activity of coalition building and political interplay that the objective situation is placed entirely at the disposal of the momentary perception of partisan expediency.

The analysis of the *domestic* variable will begin by discounting certain frequently held assumptions about the domestic pacifist indicators of the tendency to proliferate, followed by a discussion surrounding the phenomenon of opacity, and concluded by a consideration of the possible domestic intermediary effects upon proliferation.

Endogenous pulls from inside a state are generally more multifarious and less detectable than the external pushes to nuclear proliferation, and according to A.G. Platias in his

1986 analysis of minor powers, depends greatly on size: the smaller a state, so the security strategy adopted can better be accounted for by Domestic Structure Theory rather than International Structure Theory. A solely externally oriented proliferation theory is inherently reductionist.³⁹

Domestic Structure Theory assumes that there are political satisficing points that political decision-making bodies make in any issue area to satisfy their various constituents and their own security objectives.⁴⁰ "To gain access to such resources, nuclear weapons advocates need to recruit an array of allies: the security elite, the military R&D establishment, commercial subcontractors, or the press."⁴¹ Nuclear development is, despite its inevitable secrecy, a coalition building endeavor.

The political utility of pacifism is that it is frequently mentioned by states to explain their restraint from the nuclear alternative. However, as survey data have shown, populations will frequently shift their nuclear positions based on the security needs of their country, and that there are thus no inherently peaceful populations. Where states do have 'pacifist' tendencies, it is often because the state is free-riding in a greater alliance or there is a spurious relationship between it and the state's trade dependence.

In the case of Japan, it has been acknowledged that the experience of being the only wartime target of nuclear weapons has left a lasting impression,⁴² but it should also be made

clear that "despite the 'pacifist' sentiments of the Japanese public, drastic changes in Japan's international environment might trigger a re-orientation of its security policy."⁴³ The Japanese 'nuclear pacifism' has been exaggerated since 1945: in a 1968 poll, 25 percent of Japanese thought Japan should acquire nuclear weapons, and another 50 percent predicted that Japan would eventually arm itself with such systems.⁴⁴

In the ROK, a Gallup poll conducted in 1993 revealed an extremely hawkish population (more so than the government): 49 percent of respondents said that a military option to dealing with the DPRK's intransigence should be preserved.⁴⁵ In Australia, in 1971, 65 percent of those surveyed, against 30 percent, wanted Australia to preserve the option to defend itself with nuclear weapons (with 41 percent fearing states struck by Communist rebellion and 26 percent suspicious of the PRC).⁴⁶ A 1970 poll held in four of India's largest cities revealed that 69 against 31 percent of respondents were in support of developing a nuclear capability (although regional disparities pitted New Delhi's 76 percent against Madras' 35 percent).⁴⁷

The same could be said of Sweden, though as a small state it is likely to be less in support of the nuclear option in a crisis, particularly given the current nuclear antipathy among key supporters of its political parties.⁴⁸ A poll of Swedish public opinion in 1957 had 40 percent wanting explicit nuclear weapons procurement, while in 1959, largely as a function of

the political debate, this had dropped to 27 percent.⁴⁹ Similar tendencies have been noted in Canada and Switzerland, and to a lesser extent, in India.⁵⁰

The best explanation for this phenomenon of the conformity of popular opinion with the objective security requirements perceived by the elite is most satisfactorily offered by P. Gourevitch. He argues that there are instances where domestic structures may be the consequence of international systems of power and economic distribution, particularly in effects upon the character of regime types.⁵¹ This interdependence can transmit policies or coalition patterns from international to domestic events.⁵² "This state of war induces states to organize themselves internally so as to meet these external challenges. War is like the market: it punishes some forms of organization and rewards others."⁵³ The domestic behavior of populations does, in instances of broad consensus, affirm the real security needs of states as perceived by the ruling elites.

Using this framework, it is possible that there is some interaction between popular opinion, the media, the state structure, and external security imperatives that make public polls more often a lagged dependent variable than the independent determinant it is often attributed. Nonetheless, precise predictions of how and when societies shift their position, and how policy makers influence public opinion are problematic:⁵⁴ "While it is possible to find evidence of this

general consensus, it remains something more than an intuition but less than a theory."⁵⁵

Proliferation beyond the five established powers has involved three democracies, particularly Israel, India, and Pakistan, where the traditionally small coterie of nuclear planners are often inconsistent with the goals of democratic institutions of the state. This problem of maintaining opacity without involving the democratic apparatus has frequently fed suspicion.⁵⁶ A consequence of this is an absence of public debate in nuclear policy and strategic goals, and often, in the first two cases mentioned above, isolation from the rest of the military planning organization:⁵⁷ "The terms associated with features of opaque proliferation discussed earlier, latent, classified, ambiguous, covert, silent, hidden, veiled, are all predicated on different degrees of distance or space, between the public and its leadership."⁵⁸

Nonetheless, it has been hypothesized that not all domestic activity is inherently internally derived, and that there exists a dynamic, perhaps a function of academic and policy dialogue, or the media, by which shared understandings of nuclear weapons are generated and then translated into the domestic political arena. Opacity, as it applies to Israel, appears to be an implicit compromise that leaves the ultimate political utility of these weapons open despite their *de facto* strategic deployment.⁵⁹ The best explanation for the link between opacity and nuclear proliferation is that in the early

stages, at least, the hosting society becomes predisposed to accepting sacrifices in democracy for the benefits of security.

As will become evident in Chapter Five, the overwhelming majority of cases were explained without any references to domestic determinants. Though not epiphenomenal, this suggests that the *domestic* variables are consistently too weak to be discernable or useful as explanatory factors. For example, although there is ample evidence that Prime Minister I. Gandhi's popularity increased over the success of the 1974 test (despite a declaration of emergency in 1975), it is not needed to infer India's intent.⁶⁰ However, of the eight misclassified cases produced by the logistic regression, all five of those states which were seeking nuclear weapons that were classified as non-nuclear are explicable by references to domestic causes, principally of two types: *regime type* and *political culture*.

The *regime type* domestic cause contends that autocratic regimes generally harbour political decision-making systems that, because of over-centralization and rigidity, are more likely to amplify security threats and orient foreign policy to the immediate acquisition of power. This will explain the case of the DPRK in 1979 and Romania in 1985. The *political culture* domestic cause holds that particular collective societal experiences, outside the effects of institutions, may amplify a sense of insecurity and contribute to the pursuit of

military power in situations where other states would refrain. This cause deciphers the unusual behavior of Israel in 1972. The remaining two cases, the Ukraine in 1992, and Argentina in 1975, are explicable through a combination of the two factors.

Just as autocratic regime types have been associated with a greater propensity for internal and external use of violence, so their effect upon nuclear proliferation is viewed with a great deal of concern. Regime instability, and its associated domestic turmoil, when coupled with nuclear weapons, has always been a source of apprehension. This is in part because of the fear of unauthorized seizure, particularly in Argentina and Brazil, and because of the tendency of declining regimes to acquire them for some unspecified regime-bolstering purpose, as with the DPRK.⁶¹

However, domestic turmoil does not appear to be a credible motive for the nuclear option despite claims in this direction in the developing world.⁶² France's and the PRC's nuclear development was isolated enough not to be affected by the generals' revolt in the former or the Cultural Revolution in the latter. The 1991 revolution in the USSR created no last ditch use of nuclear weapons; they have largely become irrelevant to the transition.⁶³

It is further hypothesized that *regime type*, in cases where the determination to build nuclear weapons occurs under the aegis of a prestige incentive, and in the absence of security reasons, has a significant influence on nuclear

proliferation. This was most visible in Argentina, Brazil and Chile with the regime shifts in the 1980s. But "...the domestic political pendulum might swing back to a civilian and more liberal regime which would militate against nuclear weapons."⁶⁴

Another recurrent issue associated with regime type is the one of operational management: for the first six proliferators, political control, with some degree of autonomy, seems to have been exercised rather than military (U.S., USSR, UK, France, PRC, India, Iraq, India and Ukraine).⁶⁵ However, in the developing world where militaries are often the stablest structures in as yet forming states, nuclear weapon projects are more intimately directed by military concerns. Not all states have the compartmentalized differentiation between the government, responsible for direction, and the military, responsible for security.⁶⁶

The military services in many of these states are more powerful, relative to civilian leaders, than is the case in the United States. In states with a less professionalized pattern of civil-military relations, organizational learning is likely to be even more constrained by biased analyses, compartmentalization of information, and incentives to protect the autonomy and reputation of military organizations.⁶⁷

As will be evident in Chapter Five, the political-culture and regime type determinants effectively account for those cases uncovered by the model. Autocratic states and societies

suffering extreme threats to their legitimacy, their historical memories often reinforced by extreme persecution, are more likely to magnify the perceived security threat and hence more likely to pursue nuclear weapons acquisition. Although precise measurements of the effects of domestic decision-making structures is not possible, given the generalized nature of this study, the quantification of effects is liberal enough to lose domestic variables among the statistical noise. What affirms the gravity of this particular variable in the variance it causes is that it accounts for fully two-thirds of the statistical outliers, detailed in Chapter Five. The *domestic* variable is further visible in its effects in the case descriptions shown in the appendix, and generally speaking, offers both incentives and disincentives to the positive nuclear proliferation decision-event.

3.4 Restating the Theory

Illustrated by the detailed review of proliferation discussed under the foregoing two chapters, states choose to build nuclear weapons on the basis of their perceptions of their security concerns, prestige needs, alliance restraints, trade dependencies and the collective effects of these demands as filtered through domestic structures. The effects of pacifism, the NPT regime, and technical determinism are at best rationalizations of a process that is determined at the sub-systemic level as power and economic relations determined

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CHAPTER FOUR: Operationalizing Nuclear Proliferation

The central hypothesis, which models nuclear proliferation, and the ancillary hypothesis, which focuses on the causes of nuclear opacity, will both be tested using a logistic regression in Chapter Five. In Chapter Four, the variables that are inserted into the statistical application are operationalized to conform with the requirements of the method. This chapter will discuss the operationalization, or translation of each indicator into a variable, and will make an argument for the exclusion of certain cases from the case listing. Each test contains its own respective method of variable indication, although the criteria for accepting or rejecting the null hypothesis, discussed in Chapter Five, is similar for both.

The level of analysis, which is a specification of the structural tier at which the model applies, is at the state, and not inter-state level. Although the presence of a referent to an external relationship in each of the four variables suggests an inter-state level of analysis, the decision-making center where the determining stimuli is received locates the analysis to the state level. Consequently, the unit of analysis is an individual decision instance by a state to change status from one category to another, be it from nuclear to non-nuclear, or the reverse, or a significant change in the independent variables that elicited no change in a given

state's decision as compared with a previous decision. There can, as a result, be more than one (and inductively up to four) separate decision-events described for the same state, each temporally differentiated.

An individual case was defined as a single instance in which a state had made a conscious decision (henceforth called a decision-event) to cross a threshold of not possessing nuclear weapons to possessing nuclear weapons or the reverse, or in which there was a systemic inter-state change so significant that it caused a rethinking of a state's status. A decision-event may be positive: a state decides to get nuclear weapons, or negative: a state seeks to eliminate its nuclear weapons or not develop them at all. While in some instances a very specific meeting or document or appointment can be identified as the decision-event, in most cases decision-events are either derived from a triggering manifestation of a long cumulative process, or are based on technical estimates of when a decision would have had to be made to achieve a certain capability (used in cases where there are states that have avoided the issue).

The case selection and specification thus relies on syntality indicators in which event data are judgmentally described.¹ While the validity of this form of data collection is difficult to check for accuracy, its reliability can be ascertained by internal consistency checks, such as a cross comparison of similar and dissimilar cases. For example, all

the cases in which a state was considered to have made a positive proliferation decision were compared to ensure consistent criteria in the use of confirmatory evidence.

States must satisfy two antecedent criteria to be included in the statistical test: they must first be free to choose to build nuclear weapons: i.e., not be occupied or surveyed so closely that an attempt to build nuclear weapons would result in immediate and certain occupation. Second, the time it would take to build nuclear weapons must be within the political horizon of the decision-makers, or more specifically, the time it would take to build the bomb from the positive event-decision must be within the long term planning ability of the state's ruling element. Political horizons can range from as low as a single year in states suffering invasion, and thus more involved in immediate tasks than planning nuclear arsenals, to about twenty and thirty years respectively, as, for instance, for Israel and India, respectively. The political horizon of a state is estimated from the time scale of its public statements and of what is known about its planning, although there is no distinction made between a well-planned project and one which just muddles through from its start as a nuclear energy program with uncertain objectives.

The requirement of a minimum political horizon time seeks to include those states capable of building nuclear weapons who have chosen not to and also those states currently unable

to build but capable of making a positive decision. The exceptions to both criteria (freedom of choice and political horizon) are those states which have made a public declaration or suggestion of the desire to acquire nuclear weapons, despite their technical incapacity or short term political horizons. This formulation is made to account for states that may have sought nuclear weapons through direct purchase, as was the case with Libya and Indonesia in 1965 (as detailed in the appendix), whose ability for autonomous manufacture was beyond their planning horizon.

An example of a state for which there has been a dramatic change in relative international position, despite the absence of any explicit decision-event, is Germany (following Unification and the collapse of the Soviet Union, its principal adversary). Its inclusion in the sample is done with a mind to balancing the cases, since opposite examples exist: states for which the strategic situation got worse, not better, e.g., Pakistan. The Warsaw Pact member states, including Czechoslovakia, Hungary, Poland and Bulgaria, are excluded from the sample until 1991 because I find no evidence they possessed the freedom to decide either way. An explicit illustration of a state declaring its unguarded interest in nuclear weapons is the case of Libya.

The master set of cases, which totals ninety-nine, was selected from secondary sources and earlier works, the majority of which were individual case studies. The presence

or absence of the four key indicators (security problems, alliances, prestige claims and trade dependencies) was noted and recorded under the appropriate variable. Because an explicit quantification of nuclear event data is hampered by the inherent ambiguity that arises when studying an object that is traditionally practiced covertly, the permissible level of detail was limited to a scale of three. Thus, for each given variable, its presence in a case was denoted as a "0" if it was absent, "1" if it was present in a weak state, and "2" if it was demonstrated as having a potent effect. In the case of the test of the nuclear opacity hypothesis, the indication is only dichotomous and is coded a "0" for absence and a "1" for presence. Although there is a significant loss of accuracy in employing a judgmental rather than an interval numerical indicator, there simply is not the evidence for further detail of magnitude, nor the number of cases to statistically sustain a wider range of outcomes.²

To counter possible tautological inferences that can be made of the test, individual case histories have been detailed in the appendix to elucidate as much as possible the range of historical opinions offered for each nuclear proliferation instance. Where the presence of a particular variable is not obvious, competing interpretations are presented and judged according to a criteria of the consistency and reliability of the source. A premier indicator of national intention, particularly for the purposes of prestige, is an overt

declaration by a senior member of the decision-making body that is then acted upon by the state's scientific community. Other indicators include the presence of treaties, recent historical precedents of behavior (e.g., the 1991 Iraqi precedent for seeking regional hegemony), technical evidence of capacity, attributions by fairly reliable sources, and functionally possible inferences from a given situation. This latter technique is used when only inadequate evidence is available and strictly delineated conditions cannot be satisfied, based on what is known of a state's institutions and interests. For example, in the case of Iran, sufficient external evidence of proliferation activity is available for a reasonable inference that the Islamic leadership is seeking the weapon to augment the military power of the state. Measurement errors were additionally minimized by a cross-comparison of case coding to ensure consistency in the application of indicators.

4.1.1 The Main Hypothesis

The main hypothesis posits that states will decide to go nuclear as a function of the interplay of *security* and *prestige* incentives, and *alliance* and *trade* disincentives. Each case is coded, as was defined above, using a trinary code for which a "0" denotes absence, a "1" denotes limited effect, and a "2" denotes a strong presence for each of the four independent variables. This four digit code, which can have up

to eighty-one combinations, is then run directly in the logistic regression as that case's particular proliferation profile. The four variables to be discussed in this context are *security, alliance, prestige* and *trade*. Each section will specify the criteria for indication and the manner of dealing with problem cases.

4.2.1 The Security Variable

A security threat is defined as an eventuality whereby, through military or other armed means, a state's vital or secondary interest is threatened or is perceived to be threatened. It is expected to have the strongest positive association with a positive proliferation decision-event as compared with the other variables. This threat may emerge from any one of, or a combination of, three sources:

- a) it may be from the fear of a well-orchestrated external subversion campaign;
- b) it may be from the danger resulting from an adversary with overwhelming conventional military force;
- c) it may be from the threat posed by a nuclear armed foe.

The indicator records the perception rather than the reality of the threat, because it is that input that guides the decision-makers in whether to proliferate or not. Insofar as the perception of a 'missile gap' is an incentive to an escalated arms race, it is by no means an objective assessment of actual capacity or even intention. As such, what the *security variable* is interested in is the perception that

guides state action, which must be isolated from the politically marginalized but frequently available opinion of extremists, both pacifist and jingoist.

In general terms, the security variable attempts to measure whether the insecurity felt is sufficient to cause a proliferation decision. For this to occur, it is necessary for there to exist a discernably projectable difference that will occur in the situation when a nuclear weapon is introduced, preferably an increased inversion from insecurity to security. In almost all cases, the threshold of insecurity comprises a series of ascending steps from survivability to protecting very limited objectives whose loss would not lead to the incapacitation of the state. Morgenthau cites two such levels of national interest: the *vital* national interest, which is concomitant with state survival, and the *secondary* national interest, which encompasses issues over which there can be compromise.³ Indicators for threat then are taken from what is known about how the state sets its priorities. Although most states reserve the use of nuclear weapons as a last resort on the threshold of survival, the assumption that nuclear-sustained objectives may be limited is not necessarily true: from the practical point of view that similar objectives may be weighted differently by opposing parties.

The security coding scheme also factors in the rough probability of a given event, which is inductively produced on a per case basis. This is done to ensure that reactions to

threat are proportional to a combination of the capacity and intention of the source of the hazard. High threats with a low probability are reduced to low threats, and low threats that have either a high or a low probability preserve their score attributed to low threat events. For example, despite the apparent threat of invasion by the overwhelming military forces of the USSR, Western European countries treated the likelihood of such an occurrence as having a low probability and thus as not constituting a clear and present danger.

As per figure 4.1 below, the coding scheme measures the level of threat from the three threat sources listed above. The first step in the coding of the case requires an ascertainment of whether the given state feels itself under some sort of substantial security threat. If no such threat is evident, the assigned score is "0". The second step is to determine which of the two remaining threat levels best describes the state. If the threat is against the state's secondary interests, such as a danger in the form of piracy or terrorism, the assigned score is "1". If the threat is posed against its survival, or against a vital interest, such as a critical resource on which the state depends for its existence, then the case is assigned a score of "2". If however this high threat has a low probability, then this score is reassigned a value of "1". Both the weaker and stronger security threat levels are sufficient under different circumstances to oblige a positive proliferation decision,

although it was found that in those cases where the threat was categorized as weak, there was always some potential for escalation of the threat to the higher category.

Likewise, if a state faces an extremely low probability of the advent of a high threat, such as Canada vis-a-vis the Warsaw Pact during the Cold War, then despite geographic remoteness, alliance obligations and its vulnerability on the sealanes, suggest a potentially disabling threat sufficient for it to score a "1" under the security variable.

Figure 4.1

Trinary Coding Scheme - Security

a.	No security threat	0
b.	Threat to secondary interests	1
c.	Threat to national survival	2

If a state faces a geographically differentiated internal subversion threat that it believes is externally orchestrated, or may reach salience in combination with an external attack sufficient to destroy or severely weaken it, the variable is coded as a "1" or "2". The penultimate example of this is the decision by the Republic of South Africa (RSA) to initiate nuclear weapons production in the 1970s in response to what it perceived to be a 'total onslaught' engineered against it by the Communist bloc and other southern African states. Despite estimates, at the time, that the RSA could resist almost any conventional attack (even in combination with a general revolt) originating from its neighbors, this circumstance proved to be less relevant than the general anxiety pervading the security decision-makers in Pretoria.

If a state faces a conventional threat from another (usually neighboring) state that exceeds its long-term capacity to resist if attacked, despite its current preponderance, and this threat has a high probability, then the variable is coded "2". The obvious exemplar case for this situation is the state of Israel, whose modest geographical depth and almost universally adversarial relations with other states in the region make it unlikely that it could survive a sustained conventional war between itself and an Islamic alliance. Conversely, there have certainly existed states that would score a "0" despite an active pursuit of nuclear weapons, particularly Argentina and Brazil in the 1970s, but these programs were intended to satisfy *prestige* and not *security* motives.

If a state faces an adversary who possesses, is close to possessing, or shows evidence of wanting to possess nuclear weapons that it might use either to attack or threaten to attack, with the purpose of destroying or severely disabling its neighbor or targets it values, then the variable is coded, at a minimum, a "1". The reason a state fears nuclear weapons is the possibility of its use for limited gains, otherwise a state could simply refuse a nuclear-based threat through a deterrence of denial: the object which the threatening state seeks will be destroyed in the event that the defending state refuses, changing nothing from the outset. A state that has sought nuclear weapons, in part at least, generally does so in

response to fears of being politically or militarily compelled.

In summary, the *security* variable measures the level of threat that is felt by a state that may act as an incentive for it to acquire nuclear weapons. The variable measures whether the threat is against the vital or secondary interests of a given state and then factors in the probability of its occurrence. The resulting graduated code represents states that are under no substantial threat, those that are under a threat to their secondary interests, and those that are faced with a serious threat to their survival.

4.2.2 The Alliance Variable

The *alliance* variable is defined as military and political assistance offered by one state, most frequently a superpower, to a second weaker state, and which is perceived to be sufficient to counter the threats of an adversary. If a state suffers from a combination of differing threats, all of which are of significant concern, then the alliance support must be able to offset all the dangers listed, or the deterrent effect of the alliance will be ineffective. Alliances are viewed as having a negative association with nuclear proliferation with an explanatory strength just below that of the *security* variable and come in the form of formal or covert alliance associations or incidental security circumstances.

The trichotomous coding scheme, as detailed in figure 4.2, ranges from "0", a case in which a state is the beneficiary of no sufficiently credible extended deterrence, to "1", in which a state is the recipient of a conventionally extended deterrence perceived to be sufficient to deter a threat, to "2", in which a state is the beneficiary of a nuclear extended deterrence perceived to be sufficient to deter a threat.

Figure 4.2

Trinary Coding Scheme - Alliance

No credible extended deterrence:	0
Conventionally extended deterrence sufficient to deter threat:	1
Nuclear extended deterrence sufficient to deter threat:	2

States that are the actual or potential objects of internal disorder sufficient to topple the regime and destroy the current state, that nonetheless simultaneously possess alliances with more powerful allies, will automatically not receive a "1" or "2" score because of the low estimated probability of success of friendly foreign interventions in the domestic turmoil of states technologically capable of developing nuclear weapons. This is done to avert the misclassification of a case where a strong alliance association with an internally collapsing state is perceived to act as a deterrent to that state's effort to develop nuclear weapons for internal use, and is designed specifically for the circumstances surrounding the RSA's decision.

Alliance support, in the form of extended deterrence,

comes in a conventional and nuclear variant. A case receives a positive score of "1" if it describes a state at the time of its proliferation decision as having an alliance of the conventional type and of sufficient strength to allay the fear of serious threat. A case receives a positive score of "2" if it describes a state at the time of its decision with an alliance of the nuclear type and of sufficient strength to allay the fear of serious threat. It is assumed that if the extended deterrence type offered is nuclear, then it is also understood to satisfy the externally-based conventional deterrent needs perceived by the recipient.

A conventional extended deterrent suggests that the alliance guarantor has pledged to intervene with conventional military forces to protect the interests of its alliance partner sufficient to counter the threats against it, although it will refrain from making use of its nuclear resources at the outset or in response to an initial nuclear action except in the case of a graduated escalation. A nuclear extended deterrent implies that the alliance guarantor has pledged to preserve the interests of its partner at such a level of commitment that it is willing to introduce nuclear weapons early in a dispute, although it may resort to conventional assets if that is all that is required by the situation. In all circumstances considered, nuclear extended deterrence encompasses conventional extended deterrence, and is thus considered to provide the greater deterrent effect mainly

because it promises to inflict greater punishment on an adversary.

The measurement of the strength of an extended deterrent can be viewed through two aspects: its purpose and credibility. In terms of purpose, the security relationship must be both of the correct type or of the strongest type, and be believable by the weaker state. States with no perceived threats, but receiving security agreements far exceeding their needs, will receive a score of "0". Although it is arguable that this leads to a tautology, that only states with the need to build nuclear weapons receive security guarantees, it allows for a more meaningful measure of the *alliance* variable. The conceptual problem is that alliance guarantees only act as disincentives to nuclear weapons proliferation when the target states feel a security threat. Measuring alliance support in the absence of a threat would amplify the true amount of proliferation disincentives felt by a state, particularly when its only incentive is prestige. Although alliances may have some conflict prevention aspect that subsequently limits the need to proliferate, this is estimated to be marginal and difficult to measure by the techniques employed here, and is consequently not incorporated in the model. In the case listing provided in the appendix, of the 38 cases registering a "0" in the alliance and security variables, only thirteen had alliances that were excluded from the scoring, and of these, none had made a positive-proliferation decision.

Alliance credibility refers to the perception on the part of the weaker beneficiary of an alliance that the guarantor state would assist it under the circumstances specified in its particular alliance agreement. Credibility failure, which weakens the alliance's usefulness as disincentive to nuclear proliferation, can occur in one of two situations: first, if the guarantor state has faltered in one of its alliances, and as such given the impression to the remainder of its allies that it is unreliable; second, if the passage of time has eroded the commitment of the stronger party to the alliance.

The Federal Republic of Germany required conventional and nuclear extended deterrence, and was granted these to its satisfaction through its NATO association. The U.K. and France required the nuclear deterrent to be extended to their overseas interests, but the United States was not forthcoming. In the 1970s, the Republic of Korea (ROK) required only extended conventional deterrence, as did Pakistan, although the latter's guarantee was less credible because it was meant to counter Soviet, and not Indian encroachment. In the same decade, despite the extension of credible conventional deterrence from the United States to Israel, the pledge was judged insufficient by Israel whose small size made it vulnerable to being overrun before effective U.S. military support could be brought to bear in its defense.

For the purposes of receiving a positive "1" or "2" score, the Nonproliferation Treaty (NPT) guarantee under

Article Thirteen, namely that any Non-Nuclear Weapon State (NNWS) automatically receives the protection of nuclear states, is judged insufficient to counter a clear and present danger. The assertion that the article is grounded in the nuclear taboo and that in turn the nuclear taboo is sufficient to deter nuclear weapons use is rarely confided in by states.

There are three basic types of alliances: 1) the formal alliance, which typically has a formal treaty as its indicator, 2) the covert treaty, which can also be grounded in a secret formal arrangement or informal understanding between two states over a number of years of close interaction, and 3) so-called incidental security, in which a state consciously expects to be defended by another state despite a complete absence of military communication between them. Examples of alliance categories include an overt security treaty in NATO, the covert security relationship typified by U.S.-Saudi cooperation, and the incidental security association between NATO and Switzerland.

Alliance support may be indicated by the existence of an applicable security treaty, frequent or regular security interaction, the military or political presence of the guarantor in the defender's territory or by the association referred to as 'incidental security'. By a broader definition, incidental security is a relationship in which the defending state judges, in the absence of any treaty or formal relationship, that it would be protected in times of crisis by

a greater power as a result of the latter's own self-interest (it is similar in many respects to *free-riding*). These cases are detected by explicit references to such association in relevant literature, and exclude covert security relationships that may be disguised to appear like the former. In the informal category of recipients of extended conventional and nuclear deterrence are states like Sweden and Yugoslavia, while examples of incidental security include states such as Switzerland and New Zealand (after its *de facto* exclusion from the ANZUS pact).

Although it is possible that extended nuclear deterrence may be offered from a middle power such as the UK, France or the PRC to their allies, in practice middle powers generally defer to their superpower guarantors and limit discussions on these forms of redundant nuclear guarantees. Exceptionally, however, the UK has offered this form of extended deterrence to NATO allies, despite questions surrounding its credibility.

The *alliance* variable evaluates the strength and type of the extended deterrent offered by one state to another and posits it as a disincentive to nuclear proliferation. The variable is operationalized through a trinary scoring system which records whether in a given case the state is the beneficiary of nuclear or conventional extended deterrence, or whether it has no alliance association to speak of.

4.2.3 The Prestige Variable

The *prestige* variable is defined for the purpose of quantification as evidence of any meaningful state declaration, activity or ascertainable objective to achieve greater regional or global power status through assertions, as detailed in Chapter Three, of systemic independence, hegemonic power aspirations, reference to historical dominance, or ultimately the preservation of declining status. Dramatic changes in the self-image of a state, whether declining or increasing in its international or regional status, tend to lead to discrepancies between what a state receives and what it perceives to be its just prestige apportionment. Such discrepancies often lead to a search for solutions in stabilising the situation in the case of decline and in accelerating or reinforcing the ascension.

This variable implicitly assumes that nuclear weapons are perceived by potential procurers to create power, and not the reverse causal link that states have nuclear weapons as a function of their resources. In this context, nuclear weapons are seen as mutable currency that can be deployed with an end to obtaining the international status necessary to augment a state's access to resources.

As per figure 4.3, prestige is measured trichotomously, with scores ranging from "0" to "2". The indicator "0" represents those states that do not seek any discernable preeminence in status. A "1" delineates states that seek

regional eminence, while "2" indicates states that seek status as global powers or who seek a particularly intense unipolar hegemony in regional affairs. Although some of the coded states have made explicit remarks linking the attainment of prestige with the acquisition of nuclear weapons, this link is not necessary in the coding of this variable, so that states that have made no such declaration are equally admissible if there is alternate supporting evidence. It is assumed that the coding is graduated from "0" through to "2" on the theoretical basis that a state with global power ambitions has either already satisfied regional status aspirations or will acquire it as a function of its global prestige objective.

Figure 4.3

Trinary Coding Scheme - Prestige

No discernable prestige motive	"0"
Regional power prestige	"1"
Global power prestige	"2"

This study relies on secondary sources to determine the attributions, and does not require that the state making the declaration necessarily possess any technical capability to initiate a project, nor that there need be any actual economic or military growth relative to its neighbors.

Difficulties naturally emerge when statements made merely for domestic consumption are subsumed under the above definition and coded as such, but the act of making such a declaration often increases expectations and compels the state to manifest that power. Nuclear weapons may then emerge from

both internal pull factors on societal perceptions of their security and external status push factors. States that make no grand claims of status apart from the right to survive and possess nuclear weapons, such as Israel, would not be coded as seeking or preserving prestige, while a state like the People's Republic of China (PRC), would because of non-nuclear references to global power status. Examples of states seeking to decelerate diminishing global prestige are the UK, France and Russia, while states with rising regional and global aspirations include Germany, Japan and India in relevant coding.

The *prestige* variable measures the intensity of a state's desire for status, and ranges from no desire, to a desire for regional status, to a desire for intense regional or global preeminence. While it may manifest itself in a state with ascending or descending status, it is highly ephemeral and as such is not pegged to any external economic or military indicator of power.

4.2.4 Trade

The *trade* variable is a measure of the dependence of a given state at the instance of a given nuclear proliferation decision concerning access to international commerce and political support that would become vulnerable or uncertain if it engaged in the development of nuclear weapons. An objective indicator was rejected because in adversarial situations

states often refer to relative trade dependence in judging vulnerability, thus making measures of trade as a percentage of gross domestic product ineffectual. A moderately strong negative association is posited between the trade variable and a positive nuclear proliferation decision, particularly among small states that are dependent upon foreign investment and trade for development. The trade variable is thus a codification of levels of politico-economic vulnerability and does not depend on the disposable power of the state as much as on the extent to which it is interdependent with global commercial activity and approbation of its legitimacy.

If a state foresees that an attempt by it to build nuclear weapons would result in international retaliation that could hamper its ability to import or export critical resources, or threaten its use of infrastructural access through a neighboring state, then the variable is coded as a "1", as shown in figure 4.4. If a state believes that this retaliation would result in complete isolation that brings into question its very survival, the variable is coded "2". Cases where states are practically independent of external constraints or are willing to undergo such isolation, are coded "0". The "0" category describes the superpowers, pariah states such as apartheid RSA, and oil exporting states with adequate security apparatus. The "1" category describes oil-exporting states like Saudi Arabia which require alliance protection, Western oriented pariah states like Israel, which

have a dependence on conventional imports, and states such as India which in 1966, suffered economic crises linked to the global economy. This category will also include states in a well established alliance, such as Germany. "2" is awarded to such trading states as Japan whose intentions to go nuclear might lead to regional isolation, and states wholly dependent on trade such as Singapore. Small European states, such as Austria, are also included in this category because of their geographical vulnerability.

Figure 4.4

Trinary Coding Scheme - Trade

Strategic political and economic independence	"0"
Political and economic interdependence	"1"
Complete political and economic dependence	"2"

States whose normal survival requires the acquiescence of other members of the community are less likely to engage in nuclear proliferation and risk a negative reaction, although this is often very difficult to detect until a trade versus nuclear weapon decision clash occurs. This happened in the cases of the ROC and the ROK. The situation equally applies to large but heavily interdependent states such as Germany and Japan. Naturally, it does not apply to states engaged in the export of vital goods, such as petroleum commodities, whose customers are dependent state economies.

The trade variable is thus a measure of the extent to which a state must acquiesce to the strategic demands of other

states in the international system and to the extent that it is vulnerable to non-military pressure. Within the continuum of its values, it incorporates the distinction between states whose national interests are independent, interdependent, and dependent on the cooperation of the international system for their satisfaction.

4.15 Weight by Power

Rather than treat all the cases included in the logistic regression as if they were equivalent members, they were weighed according to the strategic importance of the state described by the case. Although the objection could be proffered that in a philosophic discussion of the strategic effects of nuclear weapons, measuring relative power aspirations are irrelevant in the case of weapons of absolute destruction, in fact, differing nuclear arsenals are clearly graduated in relationship to each other. Relative gradation among nuclear powers continues to be crucial as a state moves up the ladder from primitive command and control, to second strike, and later to a hypothetical space-based defense. It is this difference in relative power that has made the DPRK prefer Soviet over PRC extended nuclear deterrence, and caused Turkey to prefer U.S. rather than French or UK nuclear association (although the complementary support was accepted).

The premise behind the inclusion of this weight in the model maintains that the rate of proliferation is affected by

the size and number of states potentially involved in the process. Large states, when they develop nuclear weapons, invariably become intertwined in alliance associations and the extension of nuclear guarantees, and which in turn decelerates nuclear proliferation. For example, had the U.S. not built nuclear weapons, the Western European states would have had to, up to a certain critical mass, to counter the military capabilities of the USSR. This critical mass, hypothesized arbitrarily to be the equivalent of about a half-a-United States, may have required, for example, any four European powers, or, any three European powers along with any five small European states to build nuclear weapons. Thus, it is affirmed that as the number of large nuclear power states increases, so there is a decrease in small nuclear states, in part as a consequence of the above dynamic operating through alliance management.

In figure 4.5, cases are weighted on a descending scale ranging from "5", designating a superpower, to "1", describing a small state. Interaction effects with the dependent and independent variables are below the selected correlate coefficient threshold of 0.85. Changes in the model before and after the applied weight resulted in a marginal change of difference in explanatory power and no change in the listed outliers, but by relating the cases to each other according to their effect on the rest of the system, and hence the model, weighing generated a more accurate equation coefficient

(partial r equivalent) that better described the ranking of the incentives and disincentives in relation to nuclear proliferation.

Figure 4.5

Weighing States By Power

<u>Status</u>	<u>Coding</u>	<u>Example</u>
Superpower	"5"	U.S., USSR
Major Power	"4"	UK, Japan, Russia, PRC
Regional Power	"3"	Brazil, Indonesia, India
Normal State	"2"	Canada, Italy, Syria,
Small State	"1"	New Zealand, Denmark

Weighing the variables by GDP, demography, geography or military spending either in part or in combination were heavily skewed by outlying states such as Japan, the PRC, and Saudi Arabia. Furthermore, weighing the cases by their possession of nuclear weapons is tautological and threatened interaction effects with the independent variables. Rather, the classification of each case was made arbitrarily based upon that state's general standing within its regional and international context. In essence, weighing the model is an attempt to create a predictive model that is better suited to description by incorporating important elements related to the likelihood of engaging in nuclear proliferation.

4.2 The Determinants of Opacity

The opaque proliferation hypothesis, a corollary of the main hypothesis, and which will be tested in Chapter Five, posits that states are dissuaded from proliferating overtly, and hence induced to proliferate opaquely, because of

disincentives consisting of alliance pressures, designated here as the variable *pressure*, and fears of an arms race, designated as the variable *neighbor*. The dependent variable is coded "n" for an overt nuclear strategy and "y" for a covert or *opaque* nuclear strategy. Both independent variables are coded using a binary notation, with "0" suggesting a negative occurrence of the specified condition and "1" denoting a positive presence of the specified condition in the case.

Touched on in Chapter Three, this sub-hypothesis is important to confirm because it offers a guide to the most likely path of future proliferation. Its variables and their codification are reviewed below, and it is concluded in Chapter Five with a presentation of the findings.

The independent variable, *neighbor*, describes those cases in which the overt deployment of nuclear weapons, complete with an explicit deterrence threat would compel a neighboring state to seek the same capability. Examples of cases coded "1" are Israel in its relationship with Egypt, or the early stages of the Indo-Pakistani nuclear interaction. Cases coded "0" include states at war, which are likely to use the weapons either for compellence purposes or for their explosive value almost immediately upon their readiness, states seeking the prestige payoffs from an explicit nuclear weapons possession declaration, and states already facing or about to face a nuclear-armed state which requires an explicit deterrent threat. Although there are no known explicit decisions in

which this factor was cited, for the purposes of the test it can be functionally assumed that a state facing this specific sort of challenge would undertake the opaque proliferation route.

The other independent variable, *pressure*, refers to cases in which the overt declaration of nuclear weapons possession or development would harm the relationship between the nuclear aspirant state and its alliance guarantor by weakening the latter's antiproliferation policy. Examples of cases coded "1" include those with superpower guarantors practicing antiproliferation policies, such as Pakistan and Israel (with the U.S.) and the DPRK, Egypt in 1965 and Iraq (with the USSR). The "1" classification of the RSA was based on its intended future use of a nuclear weapon as a bargaining chip with the U.S. and other Western powers. Accordingly, states involved in alliances with superpower guarantors are unlikely to develop nuclear weapons overtly, as long as there is some resource dependence in the relationship. Cases coded "0" include states at war and states not dependent on alliances.

The cases were weighted by the variable *power* in an identical fashion with the main hypothesis, and had similar effects: the overall explanatory power of the model was marginally increased. The partial *r* coefficient denoted an increase in the explanatory power of each of the independent variables. As such, it represented the individual contributions of the cases to the overall model based on their

estimated overall effect on the systemic population.

In effect, the opacity sub-hypothesis attempts to statistically verify that the increase in the practice of nuclear opacity is associated with an increase in global alliance interdependence and the decision on the part of a few nuclear states to limit their provocative behavior that could instigate proliferation behavior among their neighbors.

3.3 Case Selection

The main hypothesis and the opaque-proliferation sub-hypothesis case lists, numbering ninety-nine and twenty-three respectively, are listed in the appendix complete with the codings for each of the variables and the weight. Also included are case descriptions for the main hypothesis case list that report a range of generalizable indicators, trigger events and dates for the decisions to initiate, or not to initiate a nuclear weapons program. Each case brief was individually researched and contains the specific sources from which it was drawn. The opaque proliferation case descriptions can be surmised from the main hypothesis case descriptions listed in the appendix.

Based on the aforementioned criteria that a case had to describe a state that either possessed the immediate capacity to build nuclear weapons or either a political horizon with a minimum planning ability of a quarter of a century, a great many potential nuclear powers were excluded. Principal reasons

for failing admission included that the state did not possess the freedom to choose, or that it lacked any discernable technological capacity to build nuclear weapons.

The most notably excluded group, in part because of its latent capacity, was the non-Soviet membership of the Warsaw Pact, including the German Democratic Republic (GDR), Czechoslovakia, Hungary, Poland, and Bulgaria, as well as the Baltic states in Lithuania, Estonia and Latvia.⁴ None of these states, with the exception of Romania, had the freedom to choose because any detection of such a program by the Soviet Union, which was inevitable, would have resulted in interdictive military action by the latter as it would have interpreted itself as the target of such a weapon.⁵ The former East Bloc states were readmitted to the case listing after the collapse of the USSR because of the return of their freedom to choose.⁶ Small and medium European states, such as Albania, Serbia, and Luxembourg, were excluded for similar reasons.⁷

Most sub-Saharan African states were excluded because of technical incapacity, including Tanzania and Kenya. Certain Middle Eastern states, some with reactors such as the United Arab Emirates, and others such as Tunisia and Yemen(s), were omitted because they lacked the critical industrial mass to begin a program in the next quarter century. Likewise, some states in Asia, such as Turkmenistan, Azerbaijan, Myanmar, and Sri Lanka were also deleted from the list.

Although both Germany and Japan were cited again after

the end of the Cold War, the remaining membership of NATO was not for two reasons. First, there is evidence that institutionally, a reversed nuclear proliferation decision on the part of France and the UK would take a period of time longer than the time that has transpired thus far since the end of the Cold War. Second, there are pressures to retain a nuclear deterrent against unspecified future long-term threats from sources other than the former-East Bloc, particularly from the South and East Mediterranean.⁸

I must emphasize that I have encountered problems similar to those experienced by S. Meyer in collecting and interpreting the large pool of data, particularly in the confirmation of reliability and in the operationalization of imprecise measurements. Equally challenging are the ambiguities in indicators that arise when scanning the existing literature for alleged incidents that pertain to secret programs.⁹ To get around this event 'detectability' problem in case specification, I have assumed that all states that have shown no evidence of making a positive nuclear proliferation decision have implicitly (and undetectably) made a negative nuclear decision for the purposes of the cases. This is justified since, as states open their archives, it is apparent that every state has considered the possession of nuclear weapons at some point and the absence of it in the record is not signatory of the absence of the event itself.

In summary, only those cases that have freely-choosing

states that possess either the technical capacity or political planning infrastructure to acquire the nuclear option are included. A complete list and description of each case is included in the appendix.

Endnote

1. Manheim, Jarol B., and Rich, C. Richard, Empirical Political Analysis: Research Methods in Political Science, Longman, New York, 1986, p.207, 215
2. Meyer. Op. cit. p.73: Meyer used only a binary coding scheme and had a similar justification: The indicators themselves were recorded simply as present or absent, reduced to binary form. Although this measurement scheme may seem crude... it is probably consistent with the limitations and precision of the data and the models themselves. A higher level of scaling, or quantitative measurement, might introduce more noise than signal.
3. Roskin, Michael G., "National Interest: From Abstraction to Strategy", Parameters: U.S. Army War College Quarterly, Vol.24, No.4, Winter 1994-95, pp.4-18, p.8
4. Reiss. Op. cit. p.12
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9. Meyer. Op. cit. p.44-5

CHAPTER FIVE: The Test Results

The aim of the theory formulated in Chapters Two and Three was to define a working descriptive model of nuclear proliferation decision-making and allow for the possible derivation of a predictive design that would permit for the application of the overall concept to real world events. To this end, Chapter Five, broadly speaking, will quantify the model by submitting the theory to statistical tests to determine whether the model has the requisite internal and external consistency. Once these conditions have been established, a crude forecasting tool will be developed out of the remaining coefficients.

Chapter Five is sub-divided into two sections. The first will restate and analyse the results of the central hypothesis on nuclear proliferation decision-making, and the second will deal with the corollary sub-hypothesis on nuclear opacity. Each section in turn will discuss the test itself, address the misclassified cases, consider the findings and propose a predictive instrument to allow for the application of the theory. However, this will be preceded by a brief discussion on the statistical method itself.

In both tests the statistical technique employed to ascertain the validity of the hypothesis is a non-linear multivariate logistic regression analysis, which is used when

there is a categorical dependent variable, or more specifically, when the event described varies between two possible events (a positive or a negative).¹ Logistic regression is stochastically oriented, that is, it is best served by large samples because of the unpredictable distributions of the cases it is meant to analyse. This limitation is compensated for by its requirement for only a few structural and distributional assumptions about the behavior of its sample, and is thus very robust. Applied through an iterative algorithm, the logit method uses the non-linear *maximum likelihood method* to select the coefficients that make the observed results most probable and thus generates an optimized model: it is asymptotic in that there is no explicit solution in this statistic. Rather, it estimates the likelihood of a particular independent-dependent variable interaction and from that it derives a coefficient that makes the observed results most likely.²

The logistic regression takes into account the collective ratings of the samples in various independent variable categories and then constructs a generalized model to determine the dynamic that produces the observed group membership. This model is then reapplied to the individual cases to determine where on the logarithmic curve they are located, with some of the more extreme cases placing themselves in the wrong dependent category.

A common predicament recurring in both tests was the

comparatively small number of cases, or small n , which, from a statistical point of view, made the determination of whether or not the results were significant difficult throughout all the steps in the analysis. Typically, the recommended number of cases per parameter is about one to fifty, suggesting that there should have been about two hundred cases in the test of the main hypothesis and one hundred in the test of the opacity hypothesis for there to be some stability in the results. This does not mean that the results are insignificant, but that their simple inferential transposition from the two samples to the population (which are estimated to grow over time) may lead to some forecasting errors. This is partly due to the fact that to obtain an arithmetic increase in significance requires a squared increase in the number of cases (n). Where unconventional methods have been used to verify a conclusion to get around this problem, the methodology will be pointed out and explained.

The core explanation of the logistic regression results were drawn from the model based on Aldrich and Nelson (1984), although the results are at best a composite of additional sources that cannot all be acknowledged here.³ Insofar as mathematical limitations associated with the significance tests forced some parsimony, the priority objective in the model construction was explanatory completeness across the existing sample.

5.1 Central Hypothesis - Procedure

The central hypothesis states that a positive nuclear proliferation decision, that is, an explicit decision to seek to acquire an operational nuclear weapons capability, could be explained on the basis of four trichotomous and one qualitative independent variable, of which the first four were employed in the logistic model and the last one reserved to further analyse the misclassified cases. The whole model was weighted by the variable *power*. The four independent variables included *security*, *alliance*, *prestige* and *trade*; they were applied to a total of ninety-nine cases, each constituting an explicit decision-event.

This section will begin by justifying the codification of the independent variables, followed by a diagnosis to check for a violation of assumptions. This will be concluded by an examination of the test results and the formulation of a few preliminary conclusions.

The trichotomous coding of the independent variables was inserted into the logistic regression with the assumption that the behavior they quantified was more analogous to ordinal than categorical indication. In each variable there was a continuum that ranged from "0" through to "2" that would have resulted in a diminished sample and thus an absence of inferential significance for each category if they had not been included as interval indicators. Thus, to obtain an assessment of the whole model rather than just the sub-

categories, no categorical transformation of the data was undertaken.⁴

The first step in testing the model is to run an inter-variable correlation test in order to determine whether there is any hazardous multicollinear interaction between the independent variables and the weight. With the assumption of a cut-off of 0.5 rather than 0.85 between the variables because of the logistic regression's particular vulnerability to closely related independent variables, the covariations do not significantly exceed the coefficient in the Spearman ordinal correlation trials (all of which were significant in a two-tailed t test), and thus there is no evidence to conclude that there is any multicollinearity. However, the weight, *power*, does exhibit interaction effects upon the variable *prestige* to the strength of 0.76 ($p < .01$). Testing for a spurious relationship by running a correlation trial between the weight and the dependent variable was not possible because of their dissimilar types (continuous versus categorical), but because *power* was distributed normally when plotted against the dependent variable, it is improbable that there would have been any confounding effect.

The model estimation was made by entering the independent variables directly and unconditionally into the logistic regression equation with a constant. None of the cases were excluded, and the algorithm concluded at iteration five when the log likelihood was decreased by less than .01 percent.

FIGURE 5.1

Nuclear Proliferation Decision-Making Model
Classification Table for Raw Accuracy - Unweighted Cases

Observed	Predicted		<u>Percent Correct</u>
	Y	N	
Y	26	5	83.87%
N	3	65	95.59%
	Overall		91.92%

Classification Table for Proportional Accuracy
- Weighted Cases

Observed	Predicted		<u>Percent Correct</u>	
	Y	N		
Y	75	11	87.21%	Null Model: 62.45%
N	9	134	93.71%	
	Overall		91.27%	

Difference between the Null Model and the
 Model including the independent variables: 28.82%

As can be surmised from figure 5.1, the model offers an accurate explanation for the motivational dynamics of nuclear proliferation. The raw accuracy classification table describes the efficiency of the model with the unweighted sample cases, of which there are eight misclassifications if all the cases were of equivalent importance. In this idealized environment the model is 92% effective, although only about 84% of the critical cases are correctly classified. That is to say, 26 of the 31 states going nuclear were correctly identified as such, while five were presumed not to go nuclear; conversely, 65 of the 68 non-nuclear cases were correctly identified, with three misidentifications. Although it may appear that the model is somewhat weak, given the greater number of misclassifieds in the nuclear-interest segment, the results are actually a

function of the fifth qualitative variable, i.e., *domestic*, and at least partially accounted for by it.

The proportional accuracy classification represents what one expects to see in the actual environment, with individual cases weighted according to their strategic reach; this procedure is assumed to be more accurate because one expects in any given environment to find a certain proportion of different types of proliferating states. If the inter-state system were heavily weighted with high-risk pariah states, a war would be expected almost immediately, making a nuclear environment highly unstable; indeed far less stable than has been evinced by the last fifty years of nuclear deterrence. This model does not suggest a steady-state model, but rather that *status quo* powers are created by default, even in an anarchic system.

The difference between the two models is very slight, with the proportional accuracy model suggesting an overall accuracy of 91%, of which the critical sample of proliferators are predicted correctly to the tune of 87%. Although this model suggests a greater number of misclassifieds, given the proportional representation (case component values rather than the actual number of cases is represented), it actually possesses the same eight misclassifieds as the first model, which will be discussed below. The proportional-accuracy model offers a better representation of the real environment, and will therefore constitute the object of the remaining

analyses.

The deciding estimate of model accuracy is the difference between the proportional accuracy model (which is the full model run with all of the independent variables) and the null model, which is calculated by running an independent variable with a universal case value of one and the constant in the model weighted by the variable power. The latter procedure essentially generates the mean of the observed values. This value then shows the increase in explanatory power of the model between the absence of all the independent variables and their inclusion. A value of 28.82% is a significant improvement and suggests that the independent variables selected are valid and explain a significant amount of variance in the dependent variable.

When the outliers were removed, that is, those cases which fell beyond two standard deviations of the center of the logistic regression plane, and were thus effectively beyond the ability of the model to incorporate, the variable significances were unaffected and retained the same level of explanatory power.⁵ However, when the remaining five non-outlying misclassifieds were excluded from the model, as well as three additional cases that were nearly excluded from the model because of excessively high Cook's distances ($>.35$), the number of cases falls from ninety-nine to eighty-eight and the model is unable to bear the four variables.⁶

The model can be rehabilitated through the removal of the

trade variable, which offers the weakest contribution to the explanation of the variance in the dependent variable. This is not particularly troubling since the conventional diagnostic requirement is that only the outliers be excluded and that the model be run again to see whether or not the goodness of fit and regression coefficients are sensitive to the presence of the poorly fitted cases and isn't subject to skewness by them.

The results in figure 5.1, and all subsequent findings are contingent upon the non-violation of three structural assumptions, namely, the test for the 0 value in the coefficients, the test for the normal distribution of residuals (to enable the meaningful use of the t test for regression significance), and the structural assumption that the dependent variable may be represented by positive and negative results.

FIGURE 5.2
Assumption Violation Diagnostics
for the Weighted Proportional-Accuracy Model

-2 Log Likelihood (-2LL)	303.12	n=99
Terminal -2 Log Likelihood	112.59	
Goodness of Fit	145.32	

	Chi-Square	df	Significance
Model Chi-Square	190.53	4	p<.001

As shown in figure 5.2, for a proliferation model that contains only the constant, the -2LL is 303.12, while with the four independent variables included in the model, -2LL

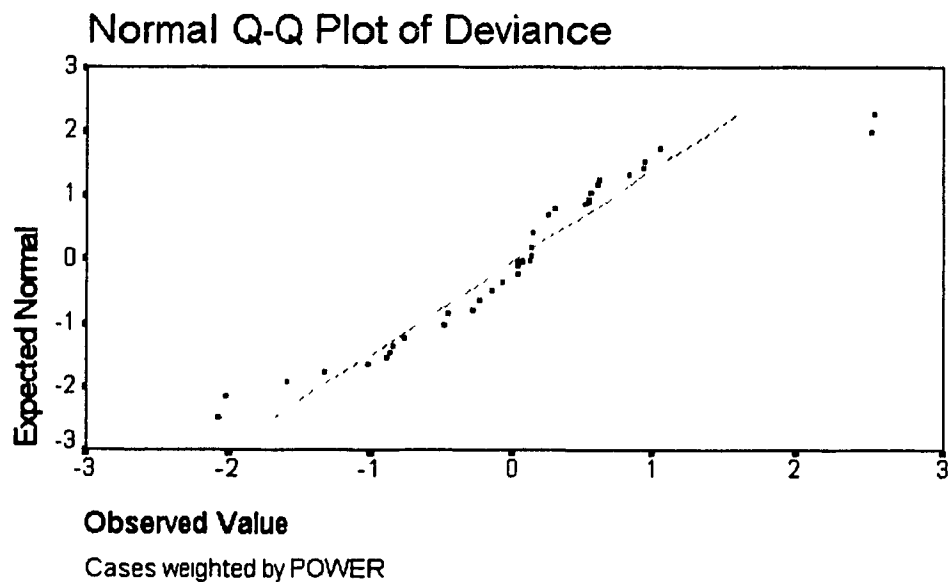
improved to 112.59. This tests whether the model explains a significant amount of the variance and is based on the fact that the difference between the two least likelihood statistics have a Chi-square distribution with four degrees of freedom. Under the null hypothesis, the four variable model explains no more variance than could be expected by any four chance variables compared to the null model. A Chi-square value as large as 190.53 is extremely improbable under the null hypothesis and therefore one is therefore rejected in favour of the alternative hypothesis, namely that the four aforementioned variables explain a significant amount of variance in the dependent variable. As such, the model Chi-Square, 190.53, is the difference between the $-2LLs$ ($LL_m - LL_0$), and by its significance it rejects the null hypothesis that the coefficients for all terms in the model, except the constant, are 0 (the degrees of freedom of 4 are determined as the difference in the number of parameters between the two models).

The second assumption to test (see figure 5.3) is that the residuals $(p/1-p)$ of the logistic regression are normally distributed. Conceptually the ninety-nine cases are arranged in order of magnitude with their corresponding position-value on a standardized distribution, and if on the plot a linear relationship is detected accompanied by a cluster of cases in the center, irrespective of the slope, then the second assumption of the normal distribution of residuals is

satisfied. This then makes valid the use of the t-test for the significance of the regression coefficients.

Finally, the logistic regression is designed to treat symmetric data sets with both positive and negative results, conditions that are satisfied in the logistic procedure itself.

FIGURE 5.3



The core explanatory segment of the logistic regression is the examination of the regression coefficients, summarized

in figure 5.4. The estimated regression coefficient divided by its standard error generates a t-statistic calculation, which provides a test of whether the population regression coefficient is significantly different from 0. The Wald statistic is a more liberal indicator of significance generated by squaring the above quotient of the coefficient and its standard error. As both statistics have Chi-square distributions, both results were subjected to significance tests and were universally significant to $p < 0.005$. From this it was concluded that the results observed in the sample have regression coefficients which are significantly different from 0 and may thus be applied to the population as a whole.

FIGURE 5.4

The Results of the Variable Parameter Coefficients - Central Hypothesis

----- Variables in the Equation -----							
<u>Variable</u>	<u>MLE</u>	<u>S.E.</u>	<u>MLE/S.E.</u>	<u>T-Sig</u>	<u>Wald</u>	<u>F-Sig</u>	<u>R</u>
SECURITY	1.92	.42	4.57	p<.005	20.76	p<.001	.25
ALLIANCE	-1.26	.41	3.07	p<.005	9.34	p<.005	-.16
TRADE	-1.98	.49	4.04	p<.005	16.3	p<.001	-.22
PRESTIGE	1.52	.38	4.00	p<.005	16.16	p<.001	.22
Constant	1.7	.65			6.91	p<.01	

MLE: Maximum Likelihood Estimation (regression coefficient)

S.E.: Asymptotic Standard Error

MLE/S.E.: t-statistic

The R statistic is generated using the Wald statistic and is a coefficient designed to describe the individual contribution of the independent upon the dependent variable in explaining the variance in the dependent variable (ranging

from +1 to -1). The independent variable with the greatest explanatory power is *security*, with a positive effect upon nuclear proliferation with a strength of 0.25. The second most influential variable is *trade*, with a negative effect upon proliferation of 0.22. The *prestige* variable is rated positively at 0.22, and the *alliance* variable is scored negatively at 0.16. It is noteworthy that all the variables are significant and that their effects are in the direction prescribed by the theory, outlined in Chapters Two and Three, with a negative sign designating an inverse relationship between the variable and a positive proliferation decision.

The verification of the fulfillment of the test assumptions, a satisfactory goodness of fit for the model, and a meaningful classification table of results points to the fulfillment of the requirements of internal consistency. The logistic regression coefficient results suggest that it is possible to make reasonable inferences from the sample to the population in the realm of the proliferation phenomenon, and this thus establishes evidence of the external consistency of the theory.

In summary, the model of the main hypothesis is confirmed by the refutation of the null hypothesis which asserted that nuclear proliferation activity could not be explained on the basis of the four quantitative independent variables, *security*, *alliance*, *prestige*, and *trade*. The next step is to account for those cases that were misclassified.

5.2 Central Hypothesis - Misclassifications

The model is unsuccessful in predicting the outcome of eight cases, of which five are in the critical group membership of positive proliferators. *Misclassifieds*, so designated, represent instances in which the model misdiagnoses some cases based on the indicators of the behavior of the rest of the cases in the model, and leads to one of two conclusions: they are *sui generis* cases beyond any nomothetic organisation, or they can be accounted for by alternate qualitative variables.

Of the eight cases that fell out of the model, five can be identified as describing nuclear proliferators, and three as describing non-proliferators. The latter grouping include the UK's 1942 proliferation decision, which is easily explicable in the context of a World War, the case of France in 1946, which was involved in a post-war reconstruction program, and Cuba in 1992, which was intimidated by the likely violent reaction of its neighbor, the United States. Of the five cases in the former grouping, one includes Israel in 1972, another includes Argentina in 1975, a third includes the DPRK in 1979, the fourth describes Romania in 1985, and the last includes the Ukraine in 1991. The examination of the misclassified cases will begin with the five positive proliferation states.

All of the states that chose to pursue a nuclear weapons program, despite being misclassified by the model as

refraining from such activity on the basis of similar choices faced by other states in the sample, are explicable with reference to the effects of domestic factors. The qualitative *domestic* variable is in effect a catch-all explanation used to account for security outputs by states in which the internal bureaucratic, executive or popular context creates a situation that amplifies or reduces the security incentives and disincentives of proliferation activity. It was excluded from the quantitative model for two reasons. First, it had the least explanatory power. Second, it was difficult to establish internal consistency, given the wide range of positive and negative factors. An easier way was to observe its effects when the misclassifieds were produced by allowing the model to control for the other variables. With reference to Chapter Three and the appendix, the five aforementioned cases will be explained in the context of domestic variable explanations.

The DPRK's positive decision-event in 1979 is unusual and was misclassified as a *no*. Under normal circumstances, that is to say, when compared with other cases in the model, states that receive assistance by having a nuclear umbrella extended over them generally do not make a positive nuclear proliferation decision, even if the very existence of the state is at stake. In the case of the DPRK in 1979, which shared close ties with the USSR and cordial relations with the PRC, the threat level was only directed at its secondary interests and as such its decision was unusual. Although there

are a myriad of theories regarding the decision-making dysfunctions at work in the isolated Hermit Kingdom's current regime, they could be generalized to a preoccupation with highly centralized control and limited transmission of relevant information.

The DPRK's decision was likely informed by opportunity: the possibility of building a bigger and better weapon may have led to internal bureaucratic payoffs, or the decision may have been made in response to a serendipitous realization of the eventual weakening of the reliability of its alliance partners. Revelations that the ROK would build a nuclear weapon in response to U.S. peninsular withdrawal may have further led to an expeditious search for a DPRK deterrent. The most likely explanation, however, is that the militarily-oriented state command structure may have seriously exaggerated the probability of a U.S.-ROK campaign against the Kim Il-Sung regime.

The difficulty with codifying the type of autocratic system that characterizes the DPRK's decision-making procedure is that it is not necessarily inefficient, but certainly not always consistent. Perhaps this is serious from the point of view of deterring a nuclear armed DPRK, but it is likely that events including the PRC's 1979 attack upon Vietnam may have awoken it to the unreliability of its neighbors. It is also possible that the DPRK's decision to acquire nuclear weapons was made as a function of the technical opportunity afforded

to its vast military bureaucracy, configured to exploit automatically every technical mean to further national security.

As such, an explanation of the case of the DPRK in 1979 can be attributed to the domestic sub-variable that is concerned with the impact of regime type, and more specifically institution type upon national decision-making. In this particular circumstance, the highly centralized autocracy seems to have amplified the pursuit of security at levels beyond what was necessary for state survival.

Argentina's 1975 decision to proceed with research leading to the development of nuclear weapons differs from Brazil's nearly identical situation. Argentina's prestige motivation was only regional, not global as Brazil's. Argentina's status interests were driven by the overwhelming demographic and physical size of Brazil which threatened its hegemonic influence in the South American continent. As per the mean of the model, states with only regional prestige concerns do not normally have sufficient incentive to constitute a nuclear weapon decision. However, in the case of Argentina, the quest for regional dominance was particularly strong because of the presence of an unusually high level of demand on standards of living.

Argentina is descended of European immigrants whose expectations were largely shaped by their hope in the New World. For reasons associated with tragic mismanagement since

the 1930s, Argentina fell from its high global ranking in quality-of-life levels to the status of a middle-income developing state. However, popular self-perceptions did not change and manifested themselves in regional nationalism that permeated the population as well as the state bureaucracy. As was evinced by the Falklands War in 1982, there existed fertile ground for a variety of nationalistic externalizations.

Although the Argentine nuclear bomb project was hidden from public view, it satisfied what was perceived by the military as a *sine qua non* for securing the regional status Argentina had lost in the previous half century. Thus, in this case, the *domestic* variable took the form of a political culture of social expectations that permeated the state's decision-making structure from below and amplified the prevailing prestige anxiety.

The 1991 Ukrainian decision refers to its delay in the signing of the Start Treaty and the failure to commit itself to the removal of Soviet nuclear weapons from its soil. This was particularly unusual because similar ex-Soviet states, Byelorussia and Kazakhstan, had all agreed unconditionally to disarm. The conventional, and no doubt popular explanation for the hesitancy that lasted nearly four years include references to the legacy of the repeatedly unwelcome Russian occupation, including Stalin's engineered starvation and deportation of

what may have been millions of Ukrainians, as described in the appendix.

There is little doubt that this component plays a role in the regime rhetoric and in popular opinion at large, but its decision-influencing effect is exaggerated in the light of the alternative explanation cited on the consequences of its weak institutional development. In comparing case the case of Ukraine in 1991 and in 1994, one notices a change in the categorization of the security variable: prior to 1994, Ukraine perceived itself, as a young state and regime in an extremely insecure position and threatened by a possible Soviet reassertion as had occurred in the Baltic states in 1990-1. However, the change in the security variable in the two cases was not in response to any objective increase in Ukrainian security or weakening of Russian capability, but in a change in the stated justifications for resisting the nuclear disarmament.

Ukraine in 1991 was beset by difficulties that can be traced to its new independence and consequent insecurity. It was embroiled in disputes over the status of the large Russian minority in Eastern Ukraine and over the division of the Black Sea fleet; it was also facing the near collapse of its economy. Ukraine was further heavily dependent on Russia for energy exports. The mutual territorial/demographic feud may have aggravated the new Ukraine's sense of sovereignty.

Ukraine may have sought to use the nuclear weapons as a bargaining chip with Russia and the aid-offering West as well.

In addition, even as late as 1994, Ukraine had been assessed as one of the least liberalized post-Soviet European states, and as such was burdened with a particularly constraining political decision-making process peopled by former bureaucrats from the defunct USSR. It is suggested here that the four-year adjustment period of political insecurity was one of the facilitative factors that prompted the exaggeration of Ukrainian mistrust of Russia, as well as their respective ongoing disputes. Ukraine differs from the other former-Soviet states in its size: both Byelorussia and Kazakhstan were not in a position to resist sustained Russian objections on the nuclear issue, compounded by the fact that all the states mentioned are at least demographically or economically interdependent.

It is thus hypothesized that it is the combination of economic pressures, Ukraine's desire to be assimilated into the community of states (and thus be eligible for aid), and the election of a more moderate and responsive leadership (President Kuchma) that led to the transition from the case in 1991 to the denuclearization case in 1994. Consequently, the transition can be accounted for by the dysfunctional Ukrainian decision-making process, and not by traditional Ukrainian-Russian mistrust. From the point of view of an explanation derived from the *domestic* variable, Ukraine initially fell

prey to a combination of an exaggerated political culture of insecurity and institutional adolescence.

Israel's 1972 positive proliferation decision is considered a misclassified case because of the impotence of alliance guarantees offered it. The 1972 decision was unusual because it coincided with a level of dependence on the deference of the world community that was significantly greater than that faced by other proliferating states. Although Israel had the requisite security alliances during this period (the U.S. had recently reached a strategic understanding with it) to rationalize an abstention from the nuclear weapons option, its geographic remoteness and low level of cultural animosity from the West made the likelihood of a countervailing alliance improbable.

Just prior to the 1967 War, Israel was experiencing an abandonment by France and neglect from the U.S., and this amplified its pre-existing post-holocaust political culture that emphasized self-sufficiency. As such, Israel was willing to suffer the costs of economic isolation in exchange for security bolstered by the acquisition of a nuclear arsenal. Thus, Israel's atypical proliferation behavior in 1967 can be explained by its clear political culture of self-sufficiency, which naturally carried over into 1972.

The effect of the intervening War of Attrition simply reinforced the necessary credibility of security guarantees beyond the level offered by the United States. While the

special relationship formulated with the U.S., if compared with other states in the sample, was generally sufficient to sustain a non-nuclear decision, the explanation for Israel seeking to maintain a nuclear weapons option finds its explanation in the events within the case itself, and in the general rule of reversibility.

Israel's decision to deploy a nuclear force in response to the preceding crisis of 1967 (the deployment would occur in 1968) was accomplished in an environment of seeming isolation, in which its immediate alliance associations were in a trough between the United States and France, and in which its principal opponents were supported by the nuclear-armed Soviet Union. A national sense of abandonment, following the collective social experience of the Holocaust, reinforced the principle of self-sufficient security over the relative nature of any alliance. U.S. guarantees of conventional deterrence, or at least the exclusion of direct Soviet involvement, were at this point, in 1972, insufficient to push Israel back across the threshold.

The systemic explanation, encapsulated in the general rule of nuclear reversibility, posits that states that reverse a positive nuclear proliferation decision must satisfy two conditions: one, that there be no apparent security threat to even secondary interests, and two, that there exist some trade interdependence acting as an incentive and making the state aware of the effects upon its neighbors of its military power.

Israel's state of security in 1972 is categorized as a threat to its survival, and until this drops to a level of no security threat, which would require significant regional realignment, the remaining cases of the sample in the model actually suggest that Israel had no cause to disarm.

It is thus suggested that the case of Israel in 1972 is a misclassification because the collective experience of the Holocaust and the resulting political-culture prompted the Jewish state towards strategic self-sufficiency. This is interpreted as a variable that may be subsumed under a domestic categorization.

The final misclassified case, describing Romania in 1985, can be accounted for by reference to the extremely dysfunctional state elite in the form of the Ceaucescu regime. Although Romania elicited evidence of regional prestige claims, a minor security threat that was a manifestation of Soviet regional dominance, and no security-enhancing alliance (the Warsaw Pact was really a medium of alliance discipline), the low level of incentives are normally offset by its limited regional interdependence. As such, the balance is in the favour of the disincentives if the reference is taken from the the accompanying cases in the sample.

The effect of the Ceaucescu regime on the nuclear decision-making process was as an amplifier of the prestige and security incentives, and a higher risk propensity (in terms of the discovery of the program) in the area of regional

interdependence. As with comparable autocratic regimes, the DPRK included, nuclearization was effected in a state bureaucratic environment of extreme mistrust in which paramilitary elements had exaggerated influence. The domestic variable can account for the Romanian case to the extent that regime type, particularly in restrictive state systems, tend to place added emphasis on security-seeking activities. In the case of Romania, the Ceaucescu regime was predisposed to seeking a nuclear weapon because of its dysfunctional exaggeration of perceived security threats and prestige needs.

The second grouping of misclassified cases, those states that were wrongly categorized as nuclear proliferators by the model, can be grouped according to two principles, namely, *extreme threat* and a redefinition of national interest. The first two cases, including the UK in 1942 and Cuba in 1992, both fall under the explanatory variable of *extreme threat*. *Extreme threat* may be caused by a type of military threat of pre-emption (from a neighbor or adversary) that occurs while a slow and costly weapons project is underway by the threatened state. The third case specifies France's 1946 decision, which can be accounted for by a simple redefinition of national interest.

The first case illustrates the UK's 1942 decision to cancel the originally approved nuclear weapons development project until after the conclusion of World War Two. This was due in part to the fact that the precise military applications

of nuclear weapons were not fully understood, as well in part because the war would likely have ended prior to the conclusion of the project. Nuclear arming then required time, while the short term priority at hand was winning the war as soon as possible, with all projects not directed to that task were cancelled. No other state in the sample has refused to continue the implementation of a positive proliferation decision in time of a war threatening the survival of the state, and so the model is not successful in modelling this exception. The extreme threat in this case consisted of the imminent danger of defeat in World War II, which cut short expectations that the project would bring any short-term gains.

The second case refers to Cuba's 1992 decision not to undertake a positive proliferation decision despite threats to the survival of the regime as well as an absence of alliance association after the collapse of the Soviet Union. According to other cases in the sample, such a situation would immediately lead to the initiation of a nuclear weapons program, but in Cuba there existed an *extreme threat*. Cuba was under a compelling threat from the U.S. not to engage in nuclear proliferation, and was likely to be subject to unrestrained pre-emption by the U.S. if it was suspected of seeking the nuclear option. Cuba's particular vulnerability lies in its proximity to the world's only current superpower.

That situation has continued to make any nuclear option prohibitively risky for it.

The last case, which describes France's 1946 decision to forego a nuclear weapons program and instead to rebuild its war-disrupted economy, was dictated by the way it viewed its priorities. As with the UK, the first objective was to reestablish itself as a major power, principally by reclaiming its colonies and reestablishing its economic power. The combination of U.S. nuclear unipolarity and Soviet economic weakness, and with the principal threat emanating from the disorderly colonies, France was under no overwhelming security threat nor was it restrained by any alliance discipline. When France had sufficiently rehabilitated its economy and nuclear infrastructure nearly a decade later, its transition to nuclear power was easily made.

In summary then, the *domestic* variable accounts for five of the eight cases in explaining the presence of peculiar political-culture effects, as in Israel and Argentina, and in elucidating bureaucratic decision-making tendencies in the DPRK, Ukraine and Romania. The *extreme threat* variable accounts for the cases of the UK in the midst of a general war as well as for Cuba's unique situation. The case of France in 1946 can unmistakably be called a *sui generis* case, until at least this sort of phenomena recurs.

5.3 Central Hypothesis - Findings

The principal finding of the model is that the hypothesis, namely that a positive proliferation decision-event can be determined from five variables, is significant and the null hypothesis, that there is no such association, is rejected under the strict circumstances specified by the sample. It can be surmised from the efficiency of the model that these mutually independent variables are exclusively the best determinants of the dependent variable.

The R statistic, which represents the partial contribution of each variable to the overall model, reveals that once the cases are weighted, the order of importance of the variables is *security*, *trade*, *prestige*, and then *alliance*. The *security* variable is scored at $z=0.25$, suggesting a moderate association between it and the eventuality of a positive nuclear proliferation decision. When *security* is regressed against the dependent variable, it accounts for 69.9% of the overall cases, although only 29% of the critical cases are explained (sig $p<.005$). When run in concert with *alliance*, the overall model coverage increases to 86% with 73.3% of critical cases correctly classified (sig $p<.005$), suggesting the necessity of its pairing with the *alliance variable*.

Security is conceptually the most important incentive determinant, given that only 3 of the 31 positive decision cases, or 10%, undertook a nuclear weapons project on the

basis of *prestige* alone. As well, 28 of the 64 cases that had a security problem, or about 44%, undertook a positive proliferation decision. As the power of states increase, what were prestige assertions will manifest themselves in time rather as security concerns, given that military capabilities and zones of interest begin to overlap and to phase into mutual exclusiveness, particularly in emerging Asian states. This will most probably lead to a gradual increase in the salience of this particular factor.

Alliance, although its standing in the model is a distant fourth as reflected by the output of the quantitative model, is re-ranked in second place because of its synergistic interaction with security in creating a meaningful variable. As was discussed previously, *alliance* effects are attributed only to those cases registering at least a minimal security threat in order to avoid the exaggerated preventative effects of alliance associations. If those states that have not made a positive proliferation decision, in the absence of security threats, are recorded as having alliance associations, then the overall effect of alliance associations will be depressed even further in those circumstances where it has countered a perceived danger to a state's security.

While the alliance variable may have a braking effect on the spread of weapons in a time-series, it will produce a counter-logical effect in the logistic regression. It is also for that reason that its effect cannot be estimated by being

singularly regressed against the dependent variable. For example, alliance association is judged to have a much smaller inhibitory impact upon prestige than security incentives. At $z=-0.16$, it represents the presumed direction of effect, but this seems to be somewhat understated. The expected effect should probably be proposed closer to $z=2.5$ when compared with the other variables.

The third-placed variable relative to effect is *trade*. It shows a score of $z=-.22$, although this score is probably overstated because there is some overlap with the other disincentive in *alliance*. Since only 4 of 31 cases, or 13%, decided to construct nuclear weapons while under the influence of an international economic restraint, one could assume it is a near-perfect indicator. However, the indicator is actually partially tautological since it is based on the effect of interdependence on decision making perception, which obviously coincides with the perception of the need for nuclear weapons. Singularly regressed against the dependent variable, *trade* is a good indicator of the critical cases with 88% reliability, although it can at best be a supporting variable because it is the most ambiguous indicator.

The *trade* variable was designed to deal with the case of Japan and Germany, which may emerge at the extremes of the model if there was no rationale for them to restrain their prestige and security concerns. This variable may also grow in importance as interdependent links multiply. One should note,

however, that there may also be a reverse trend sometime in the future if insecure states seek nuclear weapons to offset such an increase in commercial interdependence that they see it as the only way to preserve their security, which is evident in the self-isolation of the DPRK in reaction to exogenous pulls.

The fourth, and weakest variable, *prestige*, scores $z=0.22$, predicts only 56% of the critical cases and 80% of the total sample when singularly regressed against the dependent variable. This relative weakness is due to the fact that only 39% of the cases have some level of prestige incentive, which is normally characteristic of hegemonic ambitions in a regional or global arena.

The problem with prestige is that as states rise and wane in the course of history, there is scarcely a state in the world community that hasn't at some time been the *locus* of a regional empire or was not a trading hub with some influence. They either retained some trapping of their old military power or influence or used their ancient status as the basis for current foreign policy. Spain has continued to exercise its preferred influence in Latin America; Indonesia points to the existence of the Srivijayan Empire (although it was centered in Sumatra and not Java) as the basis for some future Southeast Asian macro-state. The question that arises with prestige is whether when states ascend and acquire nuclear weapons, and then decline, do they necessarily relinquish

these weapon systems? Evidence accumulated thus far suggest no.

The collapse of the USSR and the decline of France and Britain have left these states with their nuclear arsenals. Were Iran, the PRC or India, all three ethnically quite diverse, at least geographically if not demographically, to break up, would they retain their old weapon systems? The *prestige* variable is likely to persist in importance so long as power shifts between states in the international system. Until more states reverse their positive nuclear decisions, as the RSA has done, the portent for a rise in nuclear weapons attributable to this variable will continue to loom on the horizon of world affairs.

From the parameter estimation of these four variables and the model as a whole, a number of inductive observations may be made that seem to hold for the sample and may be transferable to the greater population. These include the conditions of reversal, the conditions of pre-threshold reversal, and the prerequisite for a security concern to embark on a program.

As already noted in the discussion relating to the misclassifieds, the conditions for the reversal of a positive nuclear proliferation decision-event once the nuclear threshold is crossed, that is, where, a nuclear explosive device has been built, requires the satisfaction of two conditions. First, the state must have no significant security

threat either to its vital or secondary interests, as indicated by the security variable. Second, the state must have some level of dependence upon international commerce, as represented by the trade variable. This conclusion is drawn from the example of the four cases in which reversal of a positive decision occurred: the RSA in 1993, the Ukraine in 1994, and Kazakhstan and Byelorussia in 1991.

Three of these states were members of a larger union that summarily broke up, and with it the alleged enemies it was organised to deter ceased to be a threat. By 1994, Ukraine, although initially hostile to Russia, eventually altered its perception of the latter and recognized its energy reliance upon it. Byelorussia was oriented from the beginning to follow an intimate economic integration with Russia, while having no immediately perceptible threat to its security from another state. Kazakhstan, despite the historical potential for crisis given its location on the crossroads of Central Asia, viewed a threat to its sovereignty as remote, while at the same time benefitted from trade with Russia in much the same way as it had with the USSR.

The RSA's security threat consisted essentially of expatriates resisting the regime from without, with limited support from other regional states, conditions which evaporated when the regime was liberalized. The priority of economic development also became a major incentive to rely upon international commercial associations.

Another untested sub-hypothesis of this proposition is that states with alliance assurances are more likely to undertake this proliferation reversal, although from the paucity of the sample this is impossible to verify (though cases are expected to emerge confirming this observation). Despite the existence of the CIS Treaty, in the coding of cases this is treated with some suspicion as it is not certain that the USSR will intervene on behalf of the other signatories unless it satisfies its own interests. As such, the credibility level of the arrangement is questionable. Neither was the RSA described as having an incidental security association with the West, despite questions that query likely occidental reactions if the former-ruling minority were subjected to a pogrom. Nonetheless, it is proposed that the introduction of a security guarantee will augment the probability of a proliferation reversal.

The conditions of a pre-threshold (pre-assembly and pre-test detonation) reversal, i.e., when a state alters its positive proliferation decision to a negative proliferation-decision at an early phase of planning, are threefold. First, at the time of the reversal the state's trade variable must show some international interaction, its security variable must not display threats beyond its secondary interests, and its prestige variable must not exceed regional aspirations. There are seven cases upon which this conclusion is drawn, and

of these six can be attributed to domestic causes and one to strategic causes.

The pre-threshold reversal cases attributable to domestic factors consist of India in 1966, which was under some domestic stress and international pressure to conform to financial borrowing conditions, Argentina in 1991 and Brazil in 1991, which underwent changes from autocratic to democratic governments, and hence deemphasized nationalism, Algeria in 1991, suffering from the consequences of a civil war, Indonesia in 1966, as a result of a pro-Western military coup, and Romania in 1992, as a result of a popular uprising. In a generalizable fashion, all of these states were faced with events that shifted the attention from security and prestige decision-making to more pressing domestic problems. The only security-causal example of pre-threshold reversals consists of Egypt in 1975, whose deproliferation decision was heavily influenced by a desire to avoid a costly arms race with Israel, and with whom it was trying to normalize relations with the assistance of the United States.

In none of the above cases, save the Egyptian case, was there the presence of any significant alliance arrangement with a superpower, suggesting the marginal utility of the disincentive. Unlike the previous proposition, the *alliance* variable is not likely to dissuade a state preoccupied with internal rebellion from a proliferation decision unless the guarantor is willing to intervene directly. This is difficult

to confirm since states are often unwilling to declare a preference of regimes until the civil war is resolved in the favour of one party or another, and states with domestic crises sufficient to delay a proliferation decision generally do not require further disincentives.

The final and least surprising finding is that if a state fears a threat to its survival in the absence of a nuclear umbrella guarantee, it is 72% (8 of 11 cases) likely to undertake the manufacture of nuclear weapons. The states that did not include the UK in 1942, Cuba in 1991, and Israel in 1958, the latter of which resisted crossing the threshold because it was satisfied with its easy military victory in the Suez-Sinai campaign of 1956.

To sum up, the null hypothesis that a positive nuclear proliferation-decision event cannot be determined from the variables of *security, prestige, alliance, trade* and *domestic* is rejected and the main theoretical framework affirmed that the aforementioned association does in fact exist in the sample studied. Nuclear proliferation activity is thus a quantifiable political phenomena which can be subject to systematic description, though it is most effective when its cases are analysed in conjunction with a developed qualitative domestic theory.

5.4 Central Hypothesis - Forecasting

The logistic regression allows for the prediction of nuclear proliferation activity of new cases not previously included in the sample and in turn based on the aggregated behavior of the cases in the sample. To accomplish this, referring to figure 5.5, each variable of the variable matrix (located in the appendix) must be multiplied against its associated coefficient (which is equal to the maximum likelihood estimate), and then the constant must be added. This k score is then placed into the equation which renders the probability for a negative event decision. If the resulting output is less than 0.5, then the model is 87.2% certain that the state is engaged in nuclear activity. Conversely, if the score is more than 0.5, then the model indicates a 94% certainty that the state is not engaged in nuclear proliferation activity.

FIGURE 5.5
Per Case Probability Calculation Equation

$$\begin{aligned} k = & 1.7013 \\ & + \text{alliance}(1.2643) \\ & + \text{trade} \quad (1.9785) \\ & + \text{prestige}(-1.5187) \\ & + \text{security}(-1.9234) \end{aligned}$$

$$e = 2.718$$

$$\text{Forecasting Equation} = 1 / (1 + e^{-k})$$

The extrapolation of this model assumes no major deviation in the trajectory of nuclear proliferation from the sample, which would realistically allow us to infer that the model will hold for the population only in the medium term at best. This model is unable to identify the breakpoints that are likely to lead to its invalidation, nor is it possible, given the low number of cases, to break it down into separate time periods to search for generalizable temporal differences in the variables that may lead to the formulation of parameter trends.

Its parameter assumption, that the four quantified independent variables, *security*, *alliance*, *prestige* and *trade*, remain constant, is its principal handicap. For example, the *nuclear taboo*, despite its current erosion, may be re-galvanized if in some future hypothetical nuclear exchange the world community came to realize its disruptive effect upon the ecology. Conversely, the taboo may disappear altogether if it is shown that conventionalized 'tiny' nuclear weapons are practical beyond expectation. Similarly, despite a hypothesized shift toward nuclear compellence activity, a technological breakthrough in anti-missile technology may relegate compellence options to reluctant wealthier states.

Alliances may be further strengthened by improved communications and inter-cultural sympathy, or trade may either be weakened or strengthened as a disincentive, depending on the event of a major depression or continued

growth in Asia. Rather than realize the futility of the pursuit of prestige through nuclear weapons, the illusion may be reinforced by the serendipitous association of nuclear weapons with the successful emergence of formerly underdeveloped states.

The most effective measure to correct for the deviation of the parameter trajectories is to include each additional case involving a proliferation decision into the model so that it may reweigh the comparative influences of the independent variables. Thus, despite its admitted weaknesses, this equation makes possible the prediction of new and hypothesized cases on the basis of the correct description of past proliferation activity. It also allows for the analysis of current cases by determining the minimum threshold of factors that will keep a state from going nuclear, and will assist in the estimation of the optimal combination of factors for the same ends.

5.5 Opacity Hypothesis - Procedure

The sub-hypothesis posits that states are dissuaded from proliferating overtly, and hence induced to proliferate opaquely, by disincentives consisting of alliance pressures, designated as the variable *pressure*, and fears of arms races, designated as *neighbor*. Because of the simple dichotomous relationship present in the independent variables, they were rendered as categorical inputs. The dependent variable, coded

overt or covert proliferation, was regressed against the two binomial independent variables using a non-linear logistic regression identical to that used to test the main hypothesis, by means of the sample of twenty-three cases. The test consisted of the unweighted and unconditional entry of the two independent variables plus a constant into the logistic regression procedure. The likelihood estimation procedure was terminated at iteration five because the log likelihood decreased by less than .01 percent.

In the first step, it was confirmed that there was no intercorrelation between the two independent variables. The second step requires the satisfaction of the three structural prerequisites, as detailed in figure 5.6. The opacity model with only a constant registers a -2LL of 54.85. The model Chi-Square, 28.92 (the difference between the -2LLs) and its significance rejects the null hypothesis that the coefficients for all of the terms in the model, except the constant, are 0 (df of 2). The third test requires that there be a symmetrical normal distribution of the logistically distributed residuals (1 minus the probability of the event) for the coefficients to be accurate, which is satisfied although there is some positive skewness. This was confirmed by plotting the standardized deviances with the Studentized residuals.

FIGURE 5.6

Assumption Violation Diagnostics for the Opacity Model

-2 Log Likelihood (-2LL) 54.85 n=23
Terminal -2 Log Likelihood 25.93
Goodness of Fit 44.68

	Chi-Square	df	Significance
Model Chi-Square	28.92	2	p<.005

As can be surmised from the weighted results in figure 5.7, the classification model suggests that the model works in 68.75% of the critical cases (states that are practicing opaque proliferation), 96% in the uncritical cases, and 85.37% overall in predicting the outcome of opaque proliferation. As well, the explanatory difference between the null and working models is a reasonable 24.39%, which is not unusual for a test with such a large modal category (13 in one category). However, since the model was intended to describe opacity in its current form, it offers no significantly greater predictability than random guessing with respect to the critical cases.

FIGURE 5.7

Modelling Accuracy in Determining Opaque Proliferation

Unweighted Results

Observed	Predicted		Percent Correct
	Y	N	
Y	13	1	92.86%
N	4	5	55.56%
	Overall		78.26%

Weighted Case Results

Observed	Predicted		<u>Percent Correct</u>	
	Y	N		
Y	13	1	96.00%	
N	4	4	68.75%	null model=60.98%
	Overall		85.37%	

Difference between the Null Model
and the Working Model results=24.39%

Figure 5.8 illustrates the maximum likelihood estimates and the division of this coefficient by the standard error generating the significance results (t-statistic equivalents) of $p < 0.025$ for the *neighbor* variable and $p < 0.005$ for the *pressure* variable. From the partial r scores, it is evident that the variable *neighbor* ($r = 0.25$) has slightly weaker explanatory power and significance than *pressure* ($r = 0.33$). This does not make intuitive sense if one considers that states are more likely to avoid overt nuclear proliferation for reasons related to triggering a regional arms race than for secondary reasons such as maintaining alliance associations, which are likely to erode anyway now that the state is nuclear-armed.

FIGURE 5.8

The Results of the Variable Parameter Coefficients
Opacity Hypothesis

----- Variables in the Equation -----

<u>Variable</u>	<u>MLE</u>	<u>S.E.</u>	<u>MLE/S.E.</u>	<u>df</u>	<u>T-Sig</u>	<u>R</u>
NEIGHBOR	2.79	1.18	2.36	21	p<0.025	0.25
PRESSURE	3.87	1.36	2.84	21	p<0.005	0.33
Constant	-3.23	1.10	-2.94			

MLE: Maximum Likelihood Estimation
S.E.: Standard Error

A major weakness of the model is the paucity of cases that renders it very unstable. For this reason, the Wald statistic, which would have fashioned results similar to the t-statistic score used in figure 5.8, was excluded because of its unsuitability for small samples. Furthermore, the model was unable to bear the loss of the one outliers, let alone the five misclassified cases, suggesting in part that the model is not completely appropriate for a statistical analysis. Nonetheless, I think that there are a sufficient number of interesting conclusions that show the test to be useful and suitable. It is probably reasonable to assume that the misclassified cases and outliers from the opacity model are more a product of statistical noise than systematic irregularities, and as such they will not be analysed.

5.6 Opacity Hypothesis - Findings

The significance of the results of the opacity proposition logistic regression test lead to a rejection of the null hypothesis that in the sample involved, the

independent variables *neighbor* and *pressure* do not explain the outcome of the dependent variable. However, while the model can confidently diagnose those states that are engaged in overt proliferation, this misses the point given that these states typically announce their intention through a test explosion or public declaration. The model's utility would have been involved in forecasting those cases where there were no alternate determination of opaque behavior, but rather merely knowledge of a proliferation program and of geo-strategic conditions.

The model, however, does suggest two things. First, it provides evidence of the fact that the phenomena is describable by two discreet indicators: *pressure* and *neighbor*, although I argue it must wait for an increase in the data set for it to acquire stability and an increase in accuracy. Second, it points to the obvious that states seek opaque strategies of proliferation precisely because it is so difficult to distinguish them from cases in which states are not proliferating or where states have chosen overt proliferation. The nonproliferation policy problem then arises in determining the amount of pressure to apply on ambiguous states while considering the proportion of non-proliferating states that will be forced across the critical threshold as a consequence of the pressure.

The variable with the greater effect, despite its weaker comparative score, is *neighbor* ($r=0.25$). This was determined

by removing the single outlier and noting that the model could then only be supported by this variable as *pressure* lost the bulk of its explanatory power. With a significance of $t < 0.001$, *neighbor* alone determined 87.5% of the critical cases, although only 75% of the overt proliferators. Thus it provides the bulk of the explanation of the critical cases in the multivariate opacity model.

As is consistent with the main hypothesis, security concerns generally take precedence; the avoidance of an arms race by relinquishing the use of nuclear weapons for overt deterrence may secure a level of security otherwise not possible. This phenomenon is frequently recognized in various nuclear dyads, as in the configurations India-Pakistan and Egypt-Israel. The question of stability of the opaque proliferation dyad arises when a third party is added, like that of the PRC in the former case, and Iraq or Iran in the latter case. The introduction of a third party may destabilize the relationship and lead to overt deployment and an acceleration in the development of nuclear weapons, as, for instance, often attributed in the late 1980s and 1990s to the situation of India-Pakistan-PRC.

The weaker variable, *pressure*, ($r = .33$) accounts for cases like the United States' pressure upon Pakistan, Israel and the RSA to conform with the NPT, and accounts at least for the restraint of the last case. It is likely to be detectable only in circumstances in which there is no visible security threat

or in cases where the security threat is feared less than the alliance support offered is relied upon for the preservation of stability.

It is my appraisal that this model is likely to be more robust over time than the central hypothesis on proliferation because the determinant variables are unlikely to change. Alliances between states of dramatically differing power levels will afford some continuing leverage effect to the stronger, and states will seek to avoid pointless arms races where solutions are available. Whereas the first five nuclear programs were initiated in wartime, and the subsequent three followed during the Cold War, the third proliferation wave is either post- or non-Cold War related and is well defined by an opacity model.⁷

The only possible drawback of the opacity hypothesis I can foresee is a change in the threshold at which a nuclear acquisition activity becomes politically significant. For current opacity, advertised deployment or a detonation test are signifiers for that. Future indicators may reduce the threshold to, perhaps, possession of a certain type of reactor if technical-surveillance means permit that level of intelligence gathering. Nonetheless, inferring to the population from the sample is expected to be accurate and certainly facilitated by an increase in the sample cases over time.

5.5 Assessment

Both logistic regressions, testing the central proliferation hypothesis and the nuclear opacity sub-hypothesis, were affirmed by reliable significances, confirming their external consistency. While there are discrepancies connected with the small sampling sizes that undermine both models' ability to incorporate such a large number of variables, in general the quantifications include the principle variables identified in the literature, although they may have been grouped to achieve the effect of both conceptual (and particularly mathematical) parsimony and explanatory power. None of the variables in the central hypothesis have been systemically excluded from the tests, confirming their heuristic interaction, and the included cases and outliers have been largely explained by the five-variable proliferation theory. The tests as such are unable to confirm the null hypotheses necessary to reject the result or explanation of the main or contingent theories.

Endnote

1. In cases of multiple independent variables and a categorical dependent variable, conventional multiple regression analysis is of little use because one of the structural assumptions of the data, that the distribution of errors is normal, cannot be satisfied. Nor does the data presented here satisfy the requirements assumptions necessary for a linear discriminant analysis. The loglinear analysis, while it would have been more appropriate for the categorical data available, did not offer the detailed output of the logistic regression. More specifically, its case by case explanation is less detailed and it is not a robust predictive model.

2. The principal sources employed in study are Aldrich, John W., and Nelson, Forrest D., Linear Probability, Logit and Probit Models, Sage Publications, Beverly Hills, 1984 and Noroussis, Marija J., SPSS: SPSS for Windows Advanced Statistics Release 6.0, SPSS Inc., Chicago, 1993, and Noroussis, Marija J., SPSS: SPSS for Windows Base System User's Guide Release 6.0, SPSS Inc., Chicago, 1993. While developing this thesis, a number of alternate statistical methods were available to me. Although it has been pointed out to me that a more appropriate test would have been a hierarchical loglinear statistic, mainly because of its ability to deal with categorical data, the logistic regression was selected for a number of reasons. First, although the logit test can sustain quite a number of categorical independent variables, I have noticed that it is more stable with at least one interval level independent variable. However, because the independent variables are treated as ordinal, and hence mathematically as interval level data, and are trichotomous rather than bivariate, this reduces much of the mathematical instability. Second, the logit regression offers a modular predictive tool absent with as much ease in loglinear analysis. Third, the independent variables, albeit a bit skewed, nonetheless display the attributes of interval level data, such as the possession of a normal distribution.

3. These include the aforementioned works by J. Noroussis and the standard work by Aldrich and Nelson.

4. Two of the variables, *trade* and *prestige* have approximately normal distributions, while the remaining two do not. When the test was run with the independent variables as categoricals, the results were reported per category rather than per variable. In those results, the only significant variables are the *alliance* ($p < 0.001$), *security* ($p < 0.0005$) and *trade* ($p < 0.05$) variables overall. *Alliance* category (0) ($p < 0.005$), and the *security* categories (0) and (1) ($p < 0.0005$ and $p < 0.1$) are the only significant sub-categories. The results were less satisfactory because they did not address the phenomena on a continuum as the theory had specified. Overall, however, the categorical model met all of the structural requirements, with an overall model correct prediction of 89.96% (83.72% of the positive proliferation cases and 93.71% of the negative proliferation decisions). There were four outliers and an additional five misclassifieds.

5. The three outliers are cases the UK-1942, the DPRK-1979, and Cuba-1992.

6. The three cases identified by Cook's distance include Argentina-1975, Ethiopia-1985, and Syria-1992.

7. Meyer. Op. cit. p.7

CONCLUSION

The current course of nuclear proliferation is best predicted by an examination of the motivational correlates rather than an extrapolation of technical factors because the scientific limitations to nuclear weapons development are receding at a steady rate. The hypothesis that a proliferation decision by a state could be deduced from the interaction of five variables -- security threats, alliance guarantees, prestige needs, trade dependence and domestic catalysts, was proposed in Chapters Two and Three, operationalized in Chapter Four and its antithetical null hypothesis rejected in Chapter Five.

The security threat variable was defined as a danger in the form of overwhelming conventional forces of an adversary or an opponent's nuclear weapons that posed a threat either to a state's survival or to its secondary national interests sufficient to cause it to pursue the acquisition of a nuclear arsenal. This weapon system would then serve as a deterrent by punishment against the potentially compellent state.

The alliance variable stipulated that in cases of states suffering from a security threat, the receipt of extended nuclear or conventional deterrence sufficient to credibly deter the source of the threat would act as a disincentive to the acquisition of a security-directed nuclear arsenal.

Extended deterrence was limited in its effects in that it is inapplicable to non-security incentives to nuclear weapons acquisition.

The *prestige* need variable described the use of nuclear weapons by states to either augment their global or regional status, to preserve declining prestige, or to uphold the legitimacy of its regime to avert political isolation. Prestige through nuclear weapons was found to be more likely among states under some autocratic regime, although it was also present among the global powers.

The *trade* variable emphasized the importance of economic and political interdependence in deterring threshold states from engaging in nuclear weapons acquisition by elucidating their aversion to the risk of isolation and disruption of trade access. Although the weakest variable, it is also the most ubiquitous restraint from proliferation activity among non-nuclear states.

The *domestic* variable was employed as a tool in the exegesis of outlier cases that could not otherwise be explained by the model's four quantified variables. The impact of domestic factors in a topic traditionally associated with international power politics underlines the pervasive impact of domestic decision-making structures on state behavior variance.

The overall model, and the nuclear opacity sub-hypothesis both yielded satisfactory outputs, although it must be

emphasized that the results are essentially transitory because the model is adapted to the aggregated behaviors of the sample cases and not the true population. If the dataset were reduced to just those cases prior to 1970, the model would have far less explanatory utility and a shift to technical descriptions would be justified. Likewise, if the sample is increased to include cases significantly beyond the first quarter of the next century, the variables will have far less demonstrative impact.

Questions of the applicability of the model are also begged by fundamental structural doubts about the consistency of certain assumptions. Of critical curiosity is the survival of the state as an entity independent enough to autonomously determine security policy into the latter part of the subsequent century. The quandary arises with the fact that states currently possess sophisticated infrastructural and communications exoskeletons that could quite easily survive and continue to fight a nuclear war long after the demographic base it was designed to protect has been lost. With the preservation of states not in question, how states will manage deterrence to protect people in an environment of increasing interdependence, permeability of technical information, and the likely de-statification of nuclear weapons is unclear.¹ Under these conditions proliferation will quite possibly become an option for more state and non-state actors alike, complicating antiproliferation efforts.

One school of thought on the matter, the security-material approach, suggests that the imperative of nuclear military threat will take the fore in forcing a reorganisation at the system and unit level in search of a stable equilibrium. This translates into a tremendous pressure for at least a majority of the globe to seek a world-state or a functionally differentiated security system to balance the likely inevitability of organised violence in a context of the danger of systemic collapse.² A point worthy of further study is the feasibility of maintaining pariah states continuously under such dramatic, and certainly traumatic, transformation of the state. As technology evolves, so will society with it, and the pattern of security incentives (and in the case of strategic defense systems, disincentives).³ According to M. van Creveld (1993):

Whereas past wars were waged on a set of principles standing midway between politics and tactics and known as strategy, in future conflict that kind of strategy will disappear. Whereas past wars were fought by increasingly large, regular, uniformed armies separate from governments on the one hand and civilian populations on the other, in future conflict that kind of army will be of only very limited use. Whereas pre-1945 wars were conducted by cohesive territorial states numbering millions of citizens, future conflict will be the domain of much smaller, less powerful, and in many ways more primitive political entities similar to those existing before 1648. States as we know them will have to come to terms with the new form of armed conflict now developing under the very shadow of the nuclear weapons that they themselves have introduced.⁴

More current recommendations that can be deduced from the study reconfirm past practices of the antiproliferation states. The nonproliferation regime, particularly the more-proactive neo-proliferation policies of the U.S., and the NPT, must be maintained in turn to sustain a credible nuclear taboo which has a depressing effect upon the status gains of the prestige sources for nuclear weapons acquisition.⁵ This includes the guaranteeing of conventional and nuclear extended deterrence to states facing threats sufficient to cause a decision to build nuclear weapons. As well the use of economic and political threats of isolation to deter autonomous nuclear arsenals, or to reward states that make proliferation reversals. There is additionally the case for the selective preemptive strike, or the forcible dismantling of nuclear infrastructure by threshold states. The compendium of 'easy' solutions, typical of the technical approach, increase the costs of crossing the threshold but additionally offer a greater incentive to try.⁶

While nuclear proliferation is an unprecedented problem, it is not insurmountable. The available evidence, in the form of the proliferation decision-events after 1989 relating to the collapse of the Warsaw Pact, or after 1990 relating to the end of the cold war, tends to intimate a steady subordination of the proliferation phenomena to complex-interdependence trade issues. Of these 27 cases, there are an unprecedented eight positive proliferation reversals (Algeria, Argentina,

Brazil, Ukraine, Kazakhstan, Byelorussia, Romania, and the RSA). All eight possess ameliorations to their security situation for reasons other than alliance guarantees while simultaneously representing increases in trade interdependence. However, what is critical for the determination of future stability is that in every one of these cases the external security threat subsided for reasons related to a change in the domestic situation, and not due to an objective change in the inter-state balance of power.

This in turn points to the depth of penetration of commercial and cultural forces into the contemporary state, particularly with respect to popular and elite expectations. In the cases of Argentina, Brazil, the RSA, and Romania, military or autocratic governments were disposed of in response to a balance of domestic liberalization and international economic imperative. Algeria's reversal is related moreso to a relative increase in the internal over the external security threat, and the consequent dependence on foreign military support, while the reversal of the three former Soviet states is related to their collective dependence on energy and trade access to Russia. If these socio-cultural trends continue, it is probable that they will decelerate the march of nuclear proliferation and increase the level of global security.

The study set out to establish the principal mechanism of nuclear proliferation in the first fifty years of the atomic

age, and from a motivational approach discovered that human society was as yet still driven by antideterminist perceptual forces that are at most only guided by technological possibilities.

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Endnotes

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APPENDIX - CHRONOLOGICAL CASE LIST - MAIN HYPOTHESIS

n=99

<u>Case/ Year</u>	<u>Decision</u>	<u>Security</u>	<u>Alliance</u>	<u>Prestige</u>	<u>Trade</u>	<u>Power</u>
Nazi Germany-1941	yes	2	0	2	0	4
Imperial Japan-1941	yes	2	0	2	0	4
United States-1942	yes	2	0	2	0	5
United Kingdom-1942	no	2	1	1	0	4
Soviet Union-1945	yes	1	0	2	0	5
France-1946	no	1	0	1	0	4
United Kingdom-1947	yes	1	1	2	0	4
Canada-1947	no	1	2	0	2	2
Germany-1954	no	1	2	1	1	3
Norway-1955	no	1	2	0	2	1
Austria-1955	no	1	1	0	2	1
PRC-1957	yes	1	0	2	0	4
Israel-1957	no	2	1	0	1	3
Switzerland-1958	no	1	2	2	0	2
Netherlands-1958	no	1	2	0	2	2
France-1958	yes	1	1	2	0	3
Japan-1959	no	1	2	2	2	3
Italy-1960	no	1	2	1	0	2
Belgium-1965	no	1	2	0	2	2
Australia-1965	no	1	2	0	1	2
Denmark-1965	no	1	2	0	2	1
Egypt-1965	yes	1	1	1	0	3
Yugoslavia-1965	no	1	1	0	0	2
Indonesia-1965	yes	0	0	2	0	3
India-1965	yes	1	0	1	0	2
India-1966	no	1	0	1	1	3
Indonesia-1966	no	0	0	1	1	3
Syria-1967	no	1	2	0	0	2
Israel-1968	yes	2	0	0	1	3
Sweden-1968	no	1	2	0	2	2
Libya-1969	yes	1	0	1	0	1
Iran-1970	yes	1	1	2	0	3
Nigeria-1970	no	0	0	1	1	3
ROK-1971	no	1	2	1	0	2
Israel-1972	yes	2	1	0	1	3
Pakistan-1972	yes	2	1	1	0	2
India-1972	yes	1	0	2	0	3
Saudi Arabia-1973	no	1	1	1	1	2
RSA-1974	yes	2	0	1	0	2
Algeria-1974	no	0	0	0	0	2
Iraq-1974	yes	1	0	1	0	2
ROC-1974	no	1	1	0	1	2
Chile-1975	no	0	0	0	1	2
Cuba-1975	no	1	2	1	2	1
Philippines-1975	no	0	0	0	1	2
Egypt-1975	no	1	1	0	1	3
Finland-1975	no	0	0	0	1	1
Argentina-1975	yes	0	0	1	0	2
Brazil-1975	yes	0	0	2	0	3
Spain-1975	no	0	0	0	1	2
Portugal-1975	no	1	2	0	1	1
Colombia-1975	no	0	0	0	1	2

<u>Case/ Year</u>	<u>Decision</u>	<u>Security</u>	<u>Alliance</u>	<u>Prestige</u>	<u>Trade</u>	<u>Power</u>
Bangladesh-1979	no	0	0	0	1	2
India-1979	yes	1	0	2	0	3
Iran-1979	yes	1	0	1	0	2
DPRK-1979	yes	1	2	0	0	2
Greece-1979	no	1	2	0	1	2
Jordan-1980	no	1	0	0	2	2
Zaire-1980	no	0	0	0	1	2
Venezuela-1980	no	0	0	0	2	2
New Zealand-1980	no	0	0	0	2	1
Vietnam-1980	no	1	2	0	0	2
Mexico-1980	no	0	0	0	1	2
Peru-1980	no	0	0	0	1	2
Iraq-1982	yes	1	0	1	0	2
Algeria-1983	yes	1	0	1	0	2
Romania-1985	yes	1	0	1	1	2
Morocco-1985	no	0	0	0	1	2
Ethiopia-1985	no	0	0	1	0	3
ROC-1987	no	1	1	0	1	2
Pakistan-1988	yes	1	0	1	0	2
Thailand-1989	no	0	0	0	1	2
Malaysia-1990	no	0	0	0	1	2
Gabon-1990	no	0	0	0	1	2
Brazil-1990	no	0	0	1	1	3
ROK-1990	no	1	2	1	0	2
Argentina-1990	no	0	0	0	1	2
Turkey-1990	no	1	2	0	1	2
Singapore-1991	no	1	0	0	2	1
Poland-1991	no	0	0	0	1	2
Ukraine-1991	yes	1	0	0	1	2
Russia-1991	yes	1	0	2	0	4
Armenia-1991	no	1	1	0	0	1
Czech Republic-1991	no	0	0	0	2	2
Byelorussia-1991	no	0	0	0	1	2
Uzbekistan-1991	no	0	0	0	2	2
Romania-1991	no	0	0	0	1	2
Vietnam-1992	no	1	0	0	1	2
Bulgaria-1992	no	0	0	0	1	2
Hungary-1992	no	0	0	0	2	2
Cuba-1992	no	2	0	0	0	1
Kazakhstan-1992	no	0	0	0	1	2
Syria-1992	yes	1	0	0	0	2
Germany-1992	no	1	2	1	1	4
DPRK-1992	yes	2	0	1	0	2
Japan-1992	no	1	2	2	2	4
Algeria-1992	no	0	0	0	1	2
RSA-1993	no	0	0	0	1	2
Ukraine-1994	no	0	0	0	1	2

APPENDIX - CHRONOLOGICAL CASE LIST - OPACITY SUB-HYPOTHESIS

n=23

<u>Case/ Year</u>	<u>Decision</u>	<u>Pressure</u>	<u>Neighbor</u>	<u>Power</u>
Nazi Germany	Overt	0	0	4
Imperial Japan	Overt	0	0	4
United States	Overt	0	0	5
Soviet Union	Overt	0	0	5
United Kingdom	Overt	0	0	4
France	Overt	0	0	3
PRC	Overt	0	0	4
Israel	Covert	1	1	3
India	Overt	0	1	4
RSA	Covert	1	0	3
Pakistan	Covert	1	1	2
Iraq-pre-1982	Overt	0	1	2
Iraq-post-1982	Covert	0	1	2
DPRK	Covert	1	1	2
Libya	Overt	0	0	1
Ukraine	Overt	0	0	2
Russia	Overt	0	0	4
Indonesia	Overt	0	0	3
Egypt	Overt	1	1	3
Argentina	Covert	1	1	2
Brazil	Covert	0	1	3
Algeria	Covert	0	1	3
Romania	Covert	0	1	3

APPENDIX - ALPHABETICAL CASE LISTING

NOTES ON THE APPENDIX:

Latent capacity describes the estimated year in which the state achieved the minimum nuclear infrastructure to initiate a nuclear weapons program. *Bomb acquisition* states whether or not the state in that case initiated a nuclear weapons program. *Trigger event* specifies the instance or immediate cause that is associated with the proliferation decision, be it positive or negative. *Security threats* lists the source and strength of the military danger perceived by the state. *Alliance* describes the active alliances in which the state is engaged in. *Prestige* describes the intensity and scope of the states hegemonic claims. *Trade* characterizes the degree of interdependence the state shares with the global community. *Domestic* delineates the effects of any intra-state phenomena on the proliferation process in that state. The listing of *energy/research reactors* is as of Dec 31 1992. It is listed for the most recent of a series of cases. States with reactors that are not listed include the UAE, Jamaica, Madagascar, Ghana, Sri Lanka, Ecuador and Uruguay, each with one reactor, and the breakdown for the former-Soviet Union is not available. States listed with reactors that are in the late planning or early construction phases, or may have been shut down because of war include Cuba, Iraq, the PRC, and Syria. There is no evidence that Saudi Arabia or Singapore possess a reactor. Sources for this are Sivard, Ruth Leger, World Military and Social Expenditures 1993 15 Ed, World Priorities, Washington D.C., 1993, p.13, Hoffman, Mark S., The World Almanac and Book of Facts 1992, World Almanac, New York, 1992, p.196, and Segal, Ronald and Kidron, Michael, The New State of the World Atlas, Pan Books, London, 1987, p.16. Unless otherwise listed, the source for the data on fifteen nuclear decisions and thirty-six latent capacities was drawn from Meyer, Dynamics of Nuclear Proliferation, pp.8, 41, and 153. Additional information on chemical and nuclear capabilities were drawn from Harris, Elisa D., "Appendix 2: Chemical weapons Proliferation: Current Capabilities and Prospects for Control", in ---, New Threats: Responding to the Proliferation of Nuclear, Chemical, and Delivery Capabilities in the Third World, An Aspen Strategy Report, University Press of America, 1990, p.72 and from ----, Keesing's Record of World Events, Vol.39, Longman, Avenel, 1993, p.39393.

Algeria-1974:

It was estimated in 1974 that Algeria would be technologically capable of producing nuclear weapons by the turn of the century, and its leadership may have been aware of this opportunity. Its alliance associations were only regionally-oriented, and there were no apparent threats to its vital interests. While there was certainly a prestige motive evident in seeking preeminence in the Maghreb, it was of insufficient strength to bring about a nuclear weapons program. Its principal export, oil, gave it the leverage in international trade needed to resist external pressures.¹

Latent capacity: 2000
Bomb acquisition: no
Trigger event: none
Security threats: minimal (Morocco)
Alliance: regional
Prestige: yes
Trade: minimal
Domestic: minimal

Algeria-1983:

In April 1991, there were reports that by the mid-1980s Algeria had engaged in the secret construction of a Chinese-supplied reactor at Ain Oussera. These were coupled with declarations by the Algerian Minister of Defense Nezzar in support of nuclear weapons acquisition in January of the same year.² "Nevertheless, the Algerian Government's lack of candor about this reactor, even after its existence was exposed by the media, has raised concerns about Algeria's long-term intentions."³

Although some speculate that the nuclear project was simply to afford Algeria an option,⁴ others contend that "...it remains unclear why it was built in secret, why it was so heavily defended, and why China concealed its existence throughout the 1980s."⁵ The U.S.'s National Broadcasting Corporation confirmed this in a 26 December 1993 report which stated that there was evidence that Algeria was engaged in a nuclear weapons program.⁶

A possible explanation for its nuclear motive can be grounded in its security concerns: in 1982, Algeria concluded its seven-year guerilla war with Morocco over the Western Sahara in response to a military basing agreement between Rabat and the United States: "Algeria may have feared that US military power would back Moroccan regional political ambitions and that an Algerian nuclear-weapons option could counter such interference."⁷ Nuclear weapons may also have offered some prestige in its bid for the leadership in the Maghreb.⁸ Nonetheless, the precise form of Algeria's intended nuclear doctrine is unknown.⁹

Latent capacity: 2000
Bomb acquisition: yes
Trigger event: May 27 1982 U.S.-Moroccan emergency air
base access agreement¹⁰
Security threats: Morocco and United States (conventional
and nuclear threat)
Alliance: weak association with USSR¹¹
Prestige: yes
Trade: minimal
Domestic: minimal

Algeria-1992:

With the likely democratic victory of the FIS (Front Islamique de Salut), the second round of party elections were canceled on January 2, 1992, and a state of emergency was declared by the existing government on February 4. Although only speculative, it appears that these events were the principal force behind the agreement to place the Ain Oussera nuclear facility under IAEA safeguards in late February, and announcing Algerian adherence to the NPT.¹²

The security attention thus shifted from external to internal priorities, and prestige interests were put on hold as the Algiers government sought to mollify international opinion necessary to secure external commercial support in order to obtain the resources it would need to survive. There is also evidence that the adherence to the NPT was a condition for France's secret military assistance and Western financial support, particularly through the IMF. Algeria may also be constrained to align itself with the policies of foreign states by its remarkably high debt service ratio of 76.9% (the ratio of interest and principal payments to exports).¹³

Latent capacity: 2000
Bomb acquisition: no
Trigger event: February 4 declaration of a state of emergency
Security threats: minimal
Alliance: weak association with USSR¹⁴
Prestige: no
Trade: dependent on international trade
Domestic: internal disorder as disruptive to program
Energy/Research Reactors: 0/2

Argentina-1975

As can be best ascertained, the Argentine nuclear program was secretly initiated in 1975 by the military (the earlier one in the 1950s is considered a hoax). Having no discernable immediate security threat to its vital interests, Argentina's principal motive for nuclear weapons acquisition was prestige and the principal object was the maintenance of Argentina as

a regional power, particularly vis-a-vis a demographically and geographically-large Brazil, and the UK. A good indicator of Argentina's consistent pursuit of regional prestige is its investment in an aging aircraft carrier which is generally considered to be more useful as a symbol of status than as a weapon of war.¹⁵

The unveiling of a successful nuclear weapons program would have won popular support for the autocratic government then in power, and was coupled with pressure from the military. Argentina was also subject to a high level of pressure from prestige factors emanating from the high expectations of its European immigrants, and its status as the leading Spanish-speaking South American state.¹⁶

Argentina's pursuit of nuclear technology during the late 1960s and 1970s was, therefore, to an important extent driven by the perception that Argentina must find a counter to compensate for Brazil's growing capability to project power beyond its borders, a capability that rested on Brazil's larger and more rapidly growing economy and on Brazil's comparative political stability.¹⁷

The 1982 Falklands War was a clear military disaster and Argentina's defeat was preceded by a complete absence of allies. This incident undoubtedly amplified its prestige incentives to establish itself as a nuclear power. Disincentives throughout this period include a range of security associations with the United States and, multilaterally, with other South American states (Rio Treaty). There was also some anxiety that the discovery of its nuclear program, which would occur if it played it too overtly for political gain, would lead to a debilitating regional arms race with Chile and Brazil, and that foreign nuclear and non-nuclear trade would be embargoed or selectively sanctioned.¹⁸

Latent capacity: estimated 1975, more likely 1995

Bomb acquisition: yes

Trigger event: not known

Security threats: minimal (Brazil)

Alliance: Military treaties with the United States (1964-70)¹⁹

Prestige: yes

Trade: dependent on international trade

Domestic: augment popular support for autocratic government

Argentina-1990

In the late 1980s and 1990s, both Argentina (starting in 1983 with elections), and its principal nuclear rival in

Brazil, underwent programs involving political democratization and economic reform that have eased the structural and domestic pressures for the acquisition of nuclear weapons. This resulted in Argentina's signing a bilateral inspection agreement with Brazil on 11 December 1991, signing of the IAEA safeguard agreements on 13 December, and signing of the Treaty of Tlatelolco (South American Non-Proliferation) on 18 January 1994.²⁰

Latent capacity: 1995
Bomb acquisition: no
Trigger event: 1983 democratic elections
Security threats: minimal
Alliance: Military treaties with the United States (1964-70)²¹
Prestige: no
Trade: dependent on international trade
Domestic: demilitarization of political process
Energy/Research Reactors: 3/6

Armenia-1991

Reports that Armenia was attempting to restart its Aboryan nuclear reactor by 1994 or 1995 with Russian and French help, shut down in 1990 in exchange for some international political support for its independence, has led to raised concerns that Armenia may attempt to build a nuclear weapon. Nonetheless, its recent compliance with IAEA regulations, and the time necessary to develop such a program render it unlikely that such a project is either underway or being planned.²²

From a security perspective, Armenia is surrounded by hostile and populous Moslem states and has cultural memories of being subject to an extermination: "Armenia possesses a highly developed nuclear science infrastructure, and when former Soviet troops withdraw from Armenia, . . . the Armenian leadership might conclude that a nuclear bomb would possess deterrent value for a nation without allies."²³ Although Russia continues to maintain 9000 troops in Armenia as a symbolic gesture, their paucity is interpreted to have only a marginal impact upon the desperate situation Armenia faces with respect to its medium-term survival.²⁴

Latent capacity: post-2000 (perhaps 2010)
Bomb acquisition: no
Trigger event: September 24 1991, declaration by Armenia Parliament to abide by the NPT²⁵
Security threats: Azerbaijan, Turkey, and partially from Iran (conventional threat)
Alliance: informal association with Russia
Prestige: no
Trade: dependent on oil imports through Georgia; otherwise

already isolated
Domestic: minimal

Australia-1965

While questions persist as to the Australian government's willingness to develop nuclear weapons at some future date in response to a security crisis, there is no current evidence that it had seriously considered the acquisition of such devices in the past, despite some public calls for an option:²⁶ "Yet strong political support has been at hand (paradoxically even among some NPT backers) for preparatory moves to lay the technological groundwork for any hypothetical bomb decision."²⁷ What interest did exist was limited to a policy and academic minority preoccupied with long-term planning, arguing that indefinite protection of the continent would require a nuclear arsenal. In general, the option of nuclear weapons did not at all affect Australian defense thinking, although the development of a latent capability has been inexorably advanced by its scientific community.²⁸

Nonetheless, Australia postponed its signing of the NPT until it was assured of Japanese ratification²⁹ and "in 1962, the Australian Foreign Minister refused the request of the United Nations Secretary General to unconditionally guarantee that it would not introduce atomic bombs into Asia."³⁰

Australia has no immediate security threats,⁵⁰ but is generally weary of its regional neighbors, particularly Japan, Indonesia and the PRC. This has been counterbalanced by its close association with the United States since World War II through the 1951 Mutual Defense and ANZUS treaties, and SEATO (South East Asian Treaty Organization) in 1954. This association is believed to bring with it a credible conventional and nuclear umbrella against any attack or threat of attack on Australia.³¹ "An American renunciation of the ANZUS Treaty would give a renewed impetus to an Australian nuclear-weapons program, costly though that would be. This is simply because no other power can offer Australia the assurances of protection which the United States affords under ANZUS."³²

A hypothetical engagement in a bomb acquisition project is likely to lead to a weakening of the alliance with the United States, a negative security reaction among its neighbors, particularly Indonesia, and possible economic sanctions related to nuclear or other industries.³³

Latent capacity: mid-1960s³⁴

Bomb acquisition: no

Trigger event: ANZUS treaty of 1 September 1951³⁵

Security threats: Indonesia, Japan (conventional threat),
PRC and USSR (nuclear threat)

Alliance: ANZUS treaty of 1 September 1951 with the United States³⁶

Prestige: no
Trade: danger to trade associations internationally and regionally
Domestic: minimal
Energy/Research Reactors: 0/3

Austria-1955

Austria's political independence was grounded in the 1955 Austrian State Treaty which prohibited the possession, production or testing of nuclear weapons. Although it appeared to suffer a severe, if not immediate security threat from the Warsaw Pact, it gained the benefit of incidental security from the presence of NATO. Despite the absence of formal ties, its strategic location between Italy and Germany would have assured it assistance if territorially threatened. Being landlocked, it was furthermore extremely dependent upon international trade and was unwilling to threaten that commercial access.³⁷

Latent capacity: 1970
Bomb acquisition: no
Trigger event: Austrian State Treaty of 1955
Security threats: Warsaw pact (conventional and nuclear threat)
Alliance: Incidental security, including nuclear umbrella, offered by NATO
Prestige: no
Trade: dependence on access to international trade
Domestic: minimal
Energy/Research Reactors: 0/4

Bangladesh-1979

Nothing is known of the Bangladeshi discussion of nuclear weapons acquisition apart from long-term suspicions expressed by a 1974 Congressional hearing. Bangladesh can properly be said to be too distracted by the attention needs of its domestic situation to engage in intricate alliance building. It is under little immediate security threat (despite India's predominance), and its trade is too dependent on the acquiescence of its neighbor to contemplate developing such a strategic resource.³⁸

Latent capacity: 2000 if begun in early 1970s;³⁹ otherwise 2010
Bomb acquisition: no
Trigger event: Signing the NPT in 1979⁴⁰
Security threats: India (minimal)
Alliance: minimal
Prestige: no
Trade: dependence on acquiescence of India

Domestic: underdevelopment acts as a disincentive to investing
in an option
Energy/Research Reactors: 0/1

Byeloruss-1991

Byeloruss complied fully with the denuclearization program, with two missile regiments due to leave in 1994 and the remaining regiments arriving in Russia by 1995. It is faced by no immediate security threat and has close security and commercial relationships with Russia and the other states of the former-USSR. It is as such one of the few 'reversal states' that have opted for nuclear weapons-free status.⁴¹

Nuclear weapons possession: 1991-95

Latent capacity: 1991

Bomb acquisition: no

Trigger event: Byeloruss signed the NPT in 1993⁴²

Security: none

Alliance: Byeloruss signed the 1992 Tashkent 'collective security' accord of the CIS (Commonwealth of Independent States) in 1993⁴³

Prestige: no

Trade: close association and dependence on Russia,
particularly
for energy

Domestic: minimal

Belgium-1965

Despite suspicious associations between Belgium's nuclear industry and the Fabrique Nationale d'Armes de Guerre, indicating the possibility of a military option, there is no evidence that Belgium had engaged in nuclear proliferation activity. Nonetheless, Belgium had impressive nuclear infrastructure, which placed it sixth globally in the 1960s with an estimated latent capacity that could produce 56 bombs a year.⁴⁴

Belgium was also the beneficiary of five operational nuclear military systems that would have been handed over by the U.S. in time of war. The immediate security threat facing Belgium, in the form of the conventional and nuclear arsenals of the Warsaw Pact, was counterbalanced by its membership in NATO and the nuclear and conventional umbrella afforded by the United States. As a major trading state, it was also critically dependent upon access to markets that would have been disrupted had it engaged in nuclear weapons acquisition.⁴⁵

Latent capacity: 1965

Bomb acquisition: no

Trigger event: Joining NATO on April 4, 1949⁴⁶

Security: Warsaw Pact and USSR (conventional and nuclear)

threat)
Alliance: Agreements with the Brussels Treaty, NATO and
the United States (1948-50)⁴⁷
Prestige: no
Trade: regional economic integration and dependence
Domestic: minimal
Energy/Research Reactors: 7/6

Brazil-1975

Apart from the failed procurement of a reactor from Germany in 1953 (in response to the Argentine nuclear hoax), Brazil's genuine interest in the acquisition of nuclear weapons coincided paradoxically with the coming to power, through a coup, of the 1964-85 pro-U.S. military regime.⁴⁸ In large part due to military interest, by 1967 a study was commissioned to study Brazil's nuclear weapon potential: "The atomic bomb's decisive role in crushing the Japanese at the end of World War II made it obvious to Brazilians interested in attaining great-power status for their country that eventually Brazil would have to master nuclear technology."⁴⁹

The program itself was formally begun in 1975 under the presidency of Army General Ernesto Geisel. This continued on through the administration of José Sarney (1985-1990) in the form of secret and parallel military programs. When President Collor took office in 1990, a congressional investigatory commission finally uncovered the programs, including the construction of a test site, the Iperó facility where about 2-3 bombs could have been assembled per year, and the Pilcaniyeu plant which started operation in 1978. This program was facilitated by alleged covert component trading with such states as the FRG and Iraq. By 1987, a West German intelligence report suggested that Brazil had sufficient technical capacity to begin weapons grade enrichment.⁵⁰

As with Argentina, security considerations were of marginal importance to Brazilian decision-makers, despite their frequent exaggeration. What was critical was the pursuit of prestige, and this rested upon the assumption of the leaders that arose in 1964. The military elite anticipated that Brazil would come to dominate the continent by the next century, and to this hegemonic end they saw a need for it to be recognized as a power. There was, however, a long-term threat from Argentina, which would either pursue an independent nuclear force, or would attempt to arrange a Spanish speaking alliance against Brazil. Evidence of this fear was evident in the mutually driven-need by Brazil and Argentina for aircraft carriers. Another element of Brazil's power pretension was its objective of securing a permanent seat in the United Nations Security Council.⁵¹

Disincentives, which had only enough influence to keep the nuclear programs from becoming overt, came in the form of a loose and doubtful alliance (from the point of view of

Brazil) with the United States, and regionally through the Organisation of American States (OAS). Furthermore, had Brazil ever detonated a nuclear weapon, it was certain that Argentina and Chile would be obliged to follow suit. Finally, there was some international pressure that would have resulted in overt sanctions or commercial disruption had Brazil become a nuclear power.⁵²

Latent capacity: 1990
Bomb acquisition: yes
Trigger event: Military coup of 1964
Security: minimal (Argentina)
Alliance: Agreements with the United States (1952-84)⁵³ and through the OAS.
Prestige: regional power status
Trade: international reaction, especially vis-a-vis debt problem
Domestic: minimal

Brazil-1990

With the advent of a civilian government in Brazil in 1985, culminating in the ascension of President Collor to power in 1990, there emerged a shift towards liberalisation in the domestic political scene. This led in turn to a series of bilateral initiatives aimed at relieving the tension between Brazil and Argentina, (signed on 11 December 1991) consequently leading to a weakening of the prestige incentive contributing to the nuclear program. This was further evinced by the adherence of Brazil to the NPT and the Tlatelolco Treaty (signed 30 May, 1994). This democratization and economic reform process has played part of a broader trend that has included the removal of the military from power and a much lessened likelihood of any Brazilian nuclear ambition.⁵⁴ Brazil had also become concerned with international reaction to its alleged program as it focused its economy towards an export-oriented strategy.

Latent capacity: 2000
Bomb acquisition: no
Trigger event: President Collor comes to power in 1990
Security: minimal
Alliance: Agreements with the United States (1952-84)⁵⁵ and through the OAS.
Prestige: no
Trade: international reaction, especially vis-a-vis debt problem
Domestic: demilitarization of political process
Energy/Research Reactors: 2/4

Bulgaria-1992

Since its independence from the Warsaw Pact, Bulgaria has shown no interest in developing nuclear weapons, nor does it face either the incentive of prestige or security needs, although it does not receive the benefit of any alliance association. However, with an end to rebuilding its economy, it is somewhat dependent upon foreign investment and access to international trade.

Latent capacity: 2000

Bomb acquisition: no

Trigger event: 1991 collapse of the Warsaw Pact

Security: none

Alliance: none

Prestige: none

Trade: partially dependent on foreign investment and world trade

Domestic: none

Energy/Research Reactors: 6/1

Canada-1947

Although Canada was believed to have the capability to build nuclear weapons with little preparation by 1955, and has inadvertently maintained this option, it had decided as early as 1946-7, at the conclusion of its assistance to the Manhattan project, not to.⁵⁶ It would probably have been more accurate to say that the panel responsible for the decision had never taken the option seriously, but had simply put to rest a statement by the Minister C.D. Howe made a few years earlier: "On 5 December 1945, he declared in the House of Commons: 'We have not manufactured atomic bombs, we have no intention of manufacturing atomic bombs.'"⁵⁷

Nonetheless, it should be pointed out that Canada had operational access (in time of war) to nuclear weapons deployed within its territory as part of its NORAD commitment. This included two squadrons of Bomarc 'B' anti-aircraft missiles from 1964-72, nuclear-tipped Genie air-to-air missiles until June 30, 1984, and Honest John surface-to-surface missiles as part of its NATO commitment in Europe.⁵⁸

Canada had decided not to build nuclear weapons, in essence, because of the alliance association with the United States, as well as its close commercial integration within and dependence upon the Atlantic community.⁵⁹ "Canada has always been a country of alliances", according to J.J. Blais, a former minister of defense, because it has no external threat that is unique to it.⁶⁰ Furthermore, it is secure in the knowledge that a threat to it will be constituted as a threat against the United States, and thus bring a reaction from the latter:⁶¹ "It is almost inconceivable that an enemy could attack Canada without suffering retaliation from the strategic

forces of the United States."⁶² It is also bound by its membership to such organisations as NATO and NORAD, which act as disincentives to nuclear proliferation.⁶³

Latent capacity: 1955

Bomb acquisition: no (operational use 1964-84)

Trigger event: C.D. Howe declaration in 1945

Security: conventional maritime and nuclear threat from the USSR

Alliance: Membership in NORAD and NATO.⁶⁴

Prestige: no

Trade: dependence on access to Atlantic community markets

Domestic: minimal

Energy/Research Reactors: 22/14

Chile-1975

Chile's inclusion in the list of possible nuclear powers was always made within the circumstances of its near technological equality with Argentina and Brazil, and its involvement in that particular power struggle as an adversary of the former. Nonetheless, there is no discernable evidence of a Chilean decision to proliferate, due principally to resource constraints. Potential incentives to nuclear proliferation include a mild security dispute with Argentina over potentially oil rich islands in Tierra del Fuego, and a desire to preserve its existing status as a minor regional power. On January 18, 1994, Chile acceded to the Treaty of Tlatelolco, thus cementing its commitment to non-proliferation.⁶⁵

Latent capacity: 2000⁶⁶

Bomb acquisition: no

Trigger event: unknown

Security: marginal dispute with Argentina

Alliance: Close security relations with the United States beginning 1952⁶⁷

Prestige: no

Trade: dependence on access to Atlantic community markets

Domestic: minimal

Energy/Research Reactors: 0/2

Colombia-1975

Although mentioned as a potential twenty-first century nuclear state by a 1974 Congressional hearing, it had few security concerns because of its regional associations through the OAS and with the United States, it had no discernable regional power pretension, and its economy continues to be interdependent enough to encourage restraint, despite its status as an oil exporter.⁶⁸

Latent capacity: 2000⁶⁹
Bomb acquisition: no
Trigger event: unknown
Security: minimal
Alliance: multilateral regional associations in the OAS
Prestige: no
Trade: commercial interdependence on regional economies
Domestic: minimal
Energy/Research Reactors: 0/1

Cuba-1975

Cuba's restraint from developing nuclear weapons was likely a condition for the continued alliance with the USSR, a loss of which would be strategically crippling. Association with the Soviet Union afforded a blockaded Cuba access to the Eastern European market and technical assistance, as well as outright foreign aid, a level of security protection beyond its own best potential (including nuclear guarantees), and which permitted it to augment its regional prestige without fear of direct U.S. retaliation.

Latent capacity: post-2000 (perhaps 2010)
Bomb acquisition: no
Trigger event: offer of Soviet alliance in 1961
Security: United States
Alliance: alliance with Soviet Union
Prestige: regional anti-Americanism
Trade: access to Eastern Bloc markets and financial aid
Domestic: minimal

Cuba-1992

Cuba's apparent technical inability is not incompatible with evidence that it has at various times suggested interest in developing nuclear weapons. Although the close association with the Soviet Union in the course of the Cold War made it likely the latter would restrain the former, there was always the fear expressed that the Cubans could steal and launch a weapon at the continental United States.⁷⁰

Cuba's security situation naturally views the United States as a potential source of invasion, and it may require nuclear weapons as such to address conventional asymmetry and offset nuclear capacity, as well as to add legitimacy to its weakening regime. Following the collapse of the Soviet Union in 1991, it had lost its only significant ally capable of deterring the United States, and given its de facto isolation in trade, there is little commercial dependence to deter it from rash adventurism. It is the remaining state in Latin America not to have signed the Treaty of Tlatelolco. The principal disincentives to a bomb project are the very aggressive reaction by the United States if it becomes aware

of such a program, and simple technical weakness.⁷¹

Latent capacity: post-2000

Bomb acquisition: no

Trigger event: collapse of its principal ally, the Soviet Union

Security: United States

Alliance: non, Pariah status

Prestige: minimal, associated with other Communist pariah states

Trade: commercial isolation

Domestic: minimal

Energy/Research Reactors: 1/2

Czechoslovakia/Czech Republic-1991

Czechoslovakia was estimated to have been technically capable of entering the nuclear club by 1975, although until the collapse of the 1991 Warsaw Pact it had no opportunity to make a decision either way. Since the collapse of the USSR, it has had no obvious security threats, no power pretensions, and is seeking both an association with NATO and an economic interaction with the EEC and European Union (EU). In any case, it is likely to benefit from association with both international regimes without having to actually join. As such, it is unknown to have made a positive decision, although in light of the evidence this is highly unlikely.⁷²

Latent capacity: 1975

Bomb acquisition: no

Trigger event: 1991 collapse of the Warsaw Pact

Security: none

Alliance: incidental security benefits from NATO

Prestige: none

Trade: emerging interdependence

Domestic: minimal

Energy/Research Reactors: 14/4

Denmark-1965

Although Denmark was faced with a conventional and nuclear threat from the Warsaw Pact, it was sufficiently offset by its membership in NATO (affording it a conventional and nuclear umbrella) that it refused to have nuclear weapons stationed on its soil, and decided against acquiring tactical nuclear weapons for its armed forces. It has no power pretensions because of its small size, and its economy is heavily dependent on trade within the EEC and EU, rendering it unlikely to risk regional stability for an autonomous nuclear weapons program.⁷³

Latent capacity: est. 1975
Bomb acquisition: no
Trigger event: political discussions in 1960s
Security: conventional and nuclear threat from the Warsaw
Pact and the USSR
Alliance: security benefits from NATO⁷⁴
Prestige: none
Trade: interdependence in the EEC and EU
Domestic: minimal
Energy/Research Reactors: 0/2

Democratic People's Republic of Korea (DPRK)-1979

As the only developing state facing an explicit nuclear threat from a superpower (the U.S.), the DPRK has shown an interest in the acquisition of nuclear weapons since at least the mid-1970s. The immediate function of such a program would be the deterrence of a nuclear rival, defense against invasion, and strengthening domestic morale for the purposes of preserving the regime.⁷⁵ "Although evidence remains sparse as to the exact timing and motivation for his decision, it appears that by the end of the 1970s, Kim Il Sung had initiated efforts to build the infrastructure needed for a nuclear weapons program."⁷⁶ Military motives for the acquisition of nuclear weapons are less credible given the unlikelihood in the near-term that they could ameliorate the strategic situation facing the DPRK.⁷⁷

According to L. Spector (1990), the DPRK probably made a positive proliferation decision in 1979 or 1980. This estimation is based on the concurrent conventional build-up of the DPRK military, and a realization that the ROK would likely go nuclear on its own in the near-future. There is also evidence that the DPRK appreciated the instability of its longer-term prospects.⁷⁸

The ability of North Korea to threaten Southern cities with nuclear devastation could impose unacceptable costs on the use of nuclear weapons by the United States or South Korea, raising the prospect that the North could prevail in a future conflict by gaining a preponderance of conventional forces. In addition, although the North is generally estimated to have possessed the military edge during this period, Kim Il Sung's apparent decision to acquire nuclear arms may have been influenced by concerns that the regional balance would soon shift because of the South's growing strength.⁷⁹

The DPRK's decision-making process is heavily influenced by a highly centralized and introverted military bureaucracy that is evinced in its relatively aggressive and erratic

foreign policy. The DPRK may have thought that nuclear weapons would allow it to interact more equally with the PRC, USSR, U.S. and Japan. As such, its objective was to make secure its independence and isolation. This may in turn have been motivated by a recognition of the fragility of its domestic situation and the need to secure freedom of action in confronting a social revolution:⁸⁰

Kim, for example, may have believed that an independent DPRK nuclear arsenal would reduce his political and military dependence on Moscow and Beijing and provide greater freedom of action to pursue his designs on the peninsula. Similarly, Kim may have perceived that the domestic and foreign impacts of developing nuclear weapons would boost the legitimacy of his regime and help ensure its future survival under the leadership of his son and heir-designate, Kim Jong Il.⁸¹

Despite Soviet attempts to increase its influence over the DPRK's use of its nuclear assets, prompted by its shared antiproliferation policy with the U.S., there had been a gradual erosion of its overall leverage. It is this reliance on trade and strategic support from the Communist Bloc in the final analysis that has forced the DPRK to cooperate with the antiproliferation policies of the superpowers.⁸²

Latent capacity: est. 1990

Bomb acquisition: yes

Trigger event: conventional military overhaul in 1979

Security: conventional and nuclear threat from the ROK and the U.S.

Alliance: security benefits from the USSR and less so from the PRC⁸³

Prestige: maintenance of regime legitimacy to stave off social revolution

Trade: highly independent and isolated, despite economic weakness

Domestic: high level of regime fragility amplifies security incentives

Democratic People's Republic of Korea (DPRK)-1992

The 1991 collapse of the Soviet Union eliminated the principal alliance support for the DPRK, despite the persistence of the PRC, and constituted a significant shift in the prevalent strategic situation. In effect, developments reinforced incentives rather than revectoring the DPRK's motivation. Although relations with the PRC have been steady thus far, they are being undermined by China's apparent economic relations with the ROK and its interest more in

excluding foreign powers from weakening the legitimacy of communist regimes in general than in the DPRK's security objectives in particular. With the loss of the USSR's support (and the loss of 50 percent of its trade), the DPRK has become more intensely insecure.⁸⁴

North Korea is aware of China's ambivalence toward the two Koreas. While officially expressing great friendship with Beijing, the North Koreans are doubtless suspicious of being betrayed, as they were by Europe's formerly communist states... Even while Kim was in China on his recent visit, Jiang Zemin reportedly told a visiting Japanese politician that 'there are strong bonds [between China and North Korea], but we are not allies'... In its relations with China, time is not on North Korea's side. With the passing of the aging Chinese revolutionaries and the rise of an economically and politically more progressive younger generation, China is likely to have less sympathy and need for North Korea in the coming years.⁸⁵

While the PRC does currently offer patronage in the form of resisting the use of sanctions at the UN to persuade the opening of DPRK nuclear installations to inspection, a veto is not automatically forthcoming. Despite a continuation in military-equipment commerce between the two states (though no longer at 'friendship prices'), it is surprisingly insignificant (at less than one tenth) when compared with PRC trade with the ROK.⁸⁶

It has been estimated by one source that the DPRK may have enough plutonium for roughly 4-7 nuclear weapons by the end of 1995. Russia's Izvestia further claims, on the basis of KGB documents, that it possesses a 'crude' nuclear device as of 1990 and has been working to perfect it since. Additionally, according to Russia's Intelligence Service, the DPRK has parallel chemical and biological warfare programs underway, which may be additional indications of a desire for nuclear weapons capability. Recent events have further suggested the insincere adherence to the NPT, all the more serious considering the grave strategic impact of a nuclear proliferation cascade in Northeast Asia. U.S. sources believe that the DPRK completed a plutonium extraction facility near the main reactor at Yongbyon between 1985 and 1987.⁸⁷

Despite the likelihood that Kim Il Sung would prefer normalized relations (according to the U.S. State Department), there is still strong pressure to keep a nuclear option. The legitimacy of his successor, Kim Jong Il, rests upon the extreme nationalism of his father, and as such there is far less domestic room to maneuver than suspected.⁸⁸ "The North's future now hinges on his son. But judging from the Geneva

accords that Kim Jong Il signed with the United States in August and October 1994, he has not changed his father's policies."⁸⁹ Despite a partial opening of trade relations in pursuant to the agreement, there is insufficient evidence to denote a shift towards sincerity on the part of the DPRK.⁹⁰

The retention of the nuclear option is grounded in the fight over the preservation of the institution of the state: the DPRK leadership is fully aware of that it is likely to receive a worse treatment than meted out in Eastern Europe should unification be carried out on the terms of the ROK:⁹¹ "In analysing North Korea one must recognize that the state is a self-interested institution. What is taking place is not just a struggle between a particular regime and the outside world, but a struggle to preserve the basic identity, structure and capacity of the North Korean state."⁹² Nuclear weapons are thus viewed as the best guarantee that external forces will not intervene to cause a deterioration in the domestic situation.⁹³

Latent capacity: est. 1990

Bomb acquisition: yes

Trigger event: collapse of the Warsaw Pact

Security: conventional and nuclear threat from the ROK and the U.S.

Alliance: association of low reliability with the PRC⁹⁴

Prestige: maintenance of regime legitimacy to stave off social revolution

Trade: highly independent and isolated, despite economic weakness

Domestic: high level of regime fragility amplifies security incentives

Energy/Research Reactors: 1/2

Egypt-1965

Egypt's principal motives for nuclear weapons acquisition was a security threat it felt from a possible Israeli program, and a mixed desire to assert its regional status and avoid being the object of local Israeli or Arab, or superpower nuclear coercion.⁹⁵

Although a weak indicator, the initial evidence of an Egyptian nuclear-weapon project was its receipt of significant financial aid from the IAEA, which has since grown into an early latent capability. President Nasser's objective, by 1967, had been to request that a nuclear device be provided by the USSR, and in the event of a rejection on that avenue, then to request one from the PRC. Its failure to secure such a device from either source resulted in its attention put to indigenous development, with the principal source of imported technology being provided by Europe (France specifically):⁹⁶

He [Nasser] went further to describe the Arab atomic venture 'in the face of the atomic threat from Israel, the Arabs can obtain what they want from the Soviet Union. If the Soviet Union refuses, China might agree. And if China refuses, the atomic bomb after all is not an impregnable hide out away from all hands and eyes.' The Egyptian Foreign Minister, Ismail Fahmy, warned that 'if Israel explodes an atomic device, Egypt will obtain similar a weapon or manufacture it.'⁹⁷

Egypt first became aware of Israeli efforts in the early 1960s, but estimated that they had enough time to pre-empt the Dimona project militarily, and was the principal impetus (not the dispute over water diversion) for the call for Arab solidarity at the convening of the 'Council of the Arab League' in 1961. By the mid-1960s it had become clear to Nasser that Egypt could not pre-empt the Israeli program, and when it sought Soviet and Chinese assistance it was turned down: "Although the USSR refused to supply him with such weapons, it did pledge protection if Israel should acquire such arms."⁹⁸

Latent capacity: est. 1985 (if begun in 1965)

Bomb acquisition: yes

Trigger event: discover of the Israeli Dimona project

Security: conventional threat from Israel

Alliance: nuclear guarantees from the USSR⁹⁹

Prestige: seeking the establishment of regional preeminence

Trade: independent

Domestic: nationalism had some, but only a marginal impact on supporting the nuclear option

Energy/Research Reactors:

Egypt-1975

Right up into the early 1980s, there was still some skepticism in Egypt as to whether Israel had actually crossed the nuclear threshold, and this nuclear opacity was at least a necessary factor that allowed for the signing of the Camp David accord with Israel and the establishment of a modicum of normalized relations. In turn, the peace agreement diminished nuclear concerns and reduced Egypt's need to invest in a nuclear capability. It was precisely its fear of an Israeli nuclear capability, as well apprehension of the dangers surrounding a possible arms race and the need for economic assistance that prompted President Sadat to secure peace in the first instance:¹⁰⁰

President Sadat's policy was to prevent development of a situation where Israel would feel compelled to contemplate the use of nuclear weapons. This means that Egypt would not be threatened by Israeli nuclear weapons nor would it have to pay the political and economic cost of acquiring nuclear weapons.¹⁰¹

Egypt thus chose accommodation with Israel rather than the perpetuation of a security dilemma, consequently isolating itself from former regional allies and transforming itself into a status quo power. Sadat was unwilling to subordinate Egypt's foreign policy to the lengths necessary to acquire nuclear weapons, and thus the principal objective became avoiding a scenario where Israel felt compelled to overtly deploy nuclear weapons.¹⁰² "By adhering to such a policy, Egypt would neither be threatened by Israeli nuclear weapons, nor would it have to pay the political and economic cost of acquiring such arms."¹⁰³ This was made possible because the political culture in Egypt had a particularly extended political horizon:

Unlike India, Egypt during Sadat's time did not feel the urge to stand up to the U.S., U.S.S.R., and China combined. Unlike Pakistan, it has a 7,000 year history, and a corresponding confidence in its own ability, if not to prosper then at any rate to endure and survive. Egypt also differs from both countries in that it has sufficient oil to cover its domestic consumption while leaving something for export.¹⁰⁴

Nonetheless, Egypt has pursued some limited chemical weapons research (although more likely for the purpose of deterring its neighbors) and tied its regulation to proposed controls over Israel's nuclear force. It has additionally carried out development work on nuclear-capable missiles. Temptations may arise to resurrect the program if Russia, for example, chooses to relax the controls over uranium supplies provided Egypt by the USSR. Although Egypt's non-nuclear intentions were reaffirmed as late as 1995, it has never felt fully at ease with a nuclear power as its neighbor.¹⁰⁵ A dramatic strategic shift again in the near future could conceivably force an Egyptian rethinking of their current stance:

In Egypt, there are signs of reopening the debate over the renunciation of the nuclear option. Egyptians are concerned about the scope and objectives of Israel's nuclear arsenal and resentful of the United States (and others') acquiescence in it; they were also shocked at discovering how close Saddam Hussein had come to acquiring nuclear weapons, and fear Iran's nuclear ambitions.¹⁰⁶

Latent capacity: est. 1990
Bomb acquisition: no
Trigger event: peace with Israel
Security: limited threats from Arab neighbors
Alliance: nuclear guarantees from the US¹⁰⁷
Prestige: avoiding foreign military entanglements
Trade: dependent on U.S. investment
Domestic: waning of extroverted nationalism
Energy/Research Reactors: 0/1

Ethiopia-1985

Ethiopia has given no indication of an intention to invest in nuclear weapons construction, although it has purportedly engaged in chemical weapons production. It faces no inter-state security threat, has weak alliances limited to arms transfers, no trade dependencies, although it has regional prestige aspirations that include a desire to regain access to seaports, which may lead eventually to a pursuit of a military solution to acquiring the necessary power.¹⁰⁸

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: none
Prestige: regional aspirations
Trade: none
Domestic: none

Finland-1975

Although attributed with the capacity to develop nuclear weapons since 1970, Finland was an unlikely nuclear candidate because of its vulnerability and dependence upon the Soviet Union, and subsequently Russia. Any attempt to develop nuclear weapons would have been met with immediate Soviet military reaction, coupled with the fact that given the limited demands made of Finland at the end of World War II, the USSR was not seen as having any territorial ambition there. Although some sources have claimed that Finland was the beneficiary of an incidental NATO nuclear umbrella, this does not seem

practically conceivable.¹⁰⁹

Latent capacity: est. 1970
Bomb acquisition: no
Trigger event: not applicable
Security: conditional threat from USSR
Alliance: none
Prestige: none
Trade: required access to Soviet market
Domestic: none
Energy/Research Reactors: 4/1

France-1946

At the conclusion of World War II, France's immediate priority was rebuilding its war torn society and reestablishing its influence in its colonial possessions, particularly Southeast Asia. The Soviet Union was effectively deterred throughout the late 1940s and early 1950s by U.S. extended nuclear deterrence, and France was not as yet in a position to survive free of an alliance association.¹¹⁰ Although France was receiving Marshall Plan aid at the time, it is unlikely that it could not have pursued a completely independent policy had it felt the need.

Latent capacity: est. 1955
Bomb acquisition: no
Trigger event: U.S. and Soviet nuclear acquisition
Security: conventional threat from USSR
Alliance: extended nuclear deterrence from the U.S.
Prestige: reestablishment of colonial influence
Trade: dependent on U.S. Marshall Plan aid
Domestic: none
Energy/Research Reactors:

France-1958

France's definitive positive proliferation decision most likely occurred in 1958 in response to an accumulation of crises which caused it to seek an independent strategic option. The path to proliferation had been prepared, without political consent, by a strong national scientific community that was perched at the threshold when the proliferation decision had finally been made.¹¹¹

Although disputed, France's two principal motives were it seeking a means to preserve its prestige, and second, to compensate for the loss of power after exiting from a constraining alliance relationship with the United States. The French nuclear plan signified the Gaullist dream of a fully self-reliant France. The decision to proceed with nuclear weapons occurred under the Fourth Republic, and built upon an incubating nuclear project throughout the 1950s that was

finally to result in a test explosion in 1960. The project itself was assisted by close cooperation with Tel Aviv, in turn a reaction to links between Egypt and Algeria, but was eventually terminated under deGaulle.¹¹²

Despite the formation of NATO, the loss of Indochina at Dien Bien Phu in 1954 and the adverse U.S. reaction to France during the 1956 Suez Crisis, in which it threatened economic reprisals to force an Anglo-French and Israeli withdrawal, caused France to seek an independent security policy. The shift in its motivational profile thus became a weakening in the credibility of the extended nuclear deterrence provided by the U.S., in that it did not extend beyond continental France (where France had considerable interests) and that it did not appear to credibly compensate it for the nuclear compelling threats received from the USSR during the Suez Crisis.¹¹³

During this period France faced an adversary with the latent capacity (the Soviet Union), perceived itself as facing an overwhelming conventional threat (again, the Soviet Union), and was attempting to regain the regional and global power status it had held before World War II.¹¹⁴

France perceived, as was evident in the Suez Crisis, that the U.S. exerted an influence inimical to French prestige aims, and it deduced from the experience that nuclear weapons allowed for an independent foreign policy. Additionally, however, the French sense of a weak U.S. extended deterrence had an historical basis:¹¹⁵

However, given the American tradition of isolationist retreat after foreign adventures and the British tradition of being the guarantor of security rather than the recipient in its treaty relationships, it is possible that the newly formed NATO did not represent a credible nuclear guarantee.¹¹⁶

France's consequent departure from NATO however was effectively cosmetic and did not reduce its commitment to defending Europe, and as such the disruption to its alliance associations was limited. For example, there was no change in its antiproliferation policy and it continued to oppose the further spread of nuclear weapons. Rather, France sought to use its nuclear weapons as currency to assist in its political relations in Europe, particularly in its multilateral emphasis:¹¹⁷

Other arguments for a French nuclear force voiced by French officials in the 1960's included the need to offset West German economic dominance of the European Economic Community, and the importance of maintaining a high-level scientific and technological capability... defeat and occupation in World War II were followed by the loss of the colonial empire in Indochina, North Africa, and elsewhere, and the retreat from Suez under U.S. and Soviet pressure.¹¹⁸

France was effectively beyond censure when it undertook its nuclear weapons program, and there was almost no public opposition to the move.¹¹⁹

Nuclear weapons possession: 1960
Latent capacity: est. 1955
Bomb acquisition: yes
Trigger event: 1956 Suez Crisis
Security: conventional and nuclear threat from USSR
Alliance: extended conventional deterrence from the U.S.¹²⁰
Prestige: reestablishment of European influence
Trade: not sufficiently dependent on trade to lose its political autonomy
Domestic: rise of nationalism with deGaulle
Energy/Research Reactors: 61/19

Gabon-1990

Gabon is an exporter of yellow cake, although it is not likely to have a latent capacity this century. While security threats to its sovereignty are limited, its alliance association with France provides it with more than adequate conventional assurances in the event of inter-state hostility.¹²¹ Gabon is currently too underdeveloped to manufacture or use the components of a nuclear weapons program, and as such is almost certainly not engaged in any consideration of even a latent capacity. However, a rapid increase in its industrial capacity early in the twenty-first century would leave it in possession of a great deal of the necessary primary resources for a nuclear weapons program.

Latent capacity: est. 2010
Bomb acquisition: no
Trigger event: possible threat from Nigeria or Zaire
Security: limited
Alliance: conventional extended deterrence from France
Prestige: possible future African nationalism
Trade: dependent on trade
Domestic: possible future African nationalism

Germany-(Nazi)-1941

While the first organizational basis for atomic weapons began in 1939 with the formation of the Uran Verein in Berlin, the Third Reich had not seriously begun research with the intention of producing a nuclear device until 1941, and even then the certainty of the feasibility of such a device was never established. Two essential reasons suppressed the interest in nuclear weapons: first, the oppressive state between 1930 and 1935 resulted in a flight of human capital abroad, both German and Jewish, significantly increasing the development horizon. Second, the German industrial complex tended to emphasize the development of projects that could be deployed in the near term with an end to winning the war.¹²²

Nazi Germany was in a struggle for its existence with no strategically significant alliances, complete isolation from international commerce and an interest in affirming its prestige as a global power. Although no nuclear weapon was successfully built, this is an example of the most conducive conditions for proliferation activity.

Latent capacity: est. 1944

Bomb acquisition: yes

Trigger event: beginning of World War II

Security: threat to national survival from Allies

Alliance: militarily negligible alliance associations

Prestige: desire to impress Nazi ideology on Europe and beyond

Trade: complete isolation from world commerce

Domestic: extreme nationalism

Germany-FRG-1954

The Federal Republic of Germany chose not to develop and manufacture nuclear weapons in 1954 because of the credible extended conventional and nuclear deterrence offered by the Atlantic Alliance and the United States. This was affirmed by an official renunciation as a condition for entry into the North Atlantic Treaty Organization. The FRG's legalistic abstention from nuclear weapons was required by the Rome Treaty establishing EURATOM and by the World War II peace settlements. As such, its nuclear role was oriented towards some sort of multilateral influence over nuclear weapons use, whether through SACEUR (Supreme Allied Command Europe) or another European equivalent.¹²³

However, the nuclear debate was reopened briefly in the mid-1950s in response to the perceived necessity of tactical nuclear weapons in war fighting success, which the FRG felt was particularly useful in addressing the overwhelming conventional strength of the USSR. The debate, begun by concerned Bundeswehr officials who viewed nuclear weapons as essentially powerful equivalents of artillery, lasted into the

early 1960s. The argument would eventually subordinate itself to political imperatives that preferred a joint-ownership force.¹²⁴

One of the hidden developments that would afford the Bundeswehr de facto access to nuclear weapons was the operational stationing of U.S. nuclear weapons on FRG soil and the delivery of a range of launch vectors (including aircraft, artillery, and missile). In time of war, these arms would be handed over to the appropriate FRG military units and would be employed under the overall direction of the NATO command. Nonetheless, the FRG is not listed as a nuclear-armed state because of the nearly total political constraint on the use of such weapons, rendering them politically insignificant.¹²⁵

Fears that the FRG would reverse its decision can be found in the occasional political protagonist of an autonomous nuclear weapons arsenal and in the short production time given its sophisticated nuclear infrastructure. However, arms procurements in the critical period of 1957-60 and later have produced little evidence suggesting a covert German program, and Germany's key natural-science/technical defense advisory council, which was involved in internal discussions over the future of the FRG's nuclear status, was dissolved a few years after its founding in 1958.¹²⁶

However, this must be underscored by the fact that the FRG has a sophisticated nuclear infrastructure which could facilitate the rapid assembly of nuclear weapons on short notice. This is coupled by the insistence that its NATO allies provide it with a nuclear data transfer for its own military preparation and prestige as well as by allegations that key FRG nuclear scientists and assembly facilities were made available to Brazil. Germany's nuclear infrastructure affords it the political freedom to act under short notice to change its policy:¹²⁷

In a sense, short lag times allow decision makers to put off the critical decision to move to nuclear weapons fabrication and production. ... Lag time is, in fact, a surrogate measure for the amount of time available for direct antiproliferation intervention, assuming that the United States intelligence is able to detect the proliferation decision within a very short time after it has been made.¹²⁸

The FRG's motives were first and foremost the need for a deterrence against the nuclear force and overwhelming conventional strength of the Warsaw Pact and, principally, the USSR. However, the certain anxious reaction of its neighbors and trading partners to an autonomous nuclear arsenal obliged Germany to enter into an alliance association with NATO and the United States for nuclear and conventional counterweight. Although there were perennial threats to the stability of the

arrangement, such as the launching of Sputnik and the missile gap, the threat of an extremist Poland or GDR, the FRG put a lot of attention to the maintenance of a strategic policy congruent with that of the United States.¹²⁹

The FRG was initially concerned with keeping France out of the nuclear club, but then settled for assurances that France would not make use of its nuclear status to limit its own security prospects.¹³⁰ As such, while Germany is certainly one of the wealthiest economies in the world, its prestige factor is comparably restrained: "The Germans would have to be affected by the 'great power syndrome' that was so important in propelling Britain and France along the road of nuclear armament and that has not worked in the FRG so far."¹³¹ In addition, as is consistent with other Western European states, the FRG's military bureaucracy is marginalized in national security and foreign policy debates, and as such subordinates nuclear weapons to the political realm. In consideration of a possible nuclear role, the FRG was aware of the nuclear anxieties it would arouse in both East and West Europe.¹³²

In Germany, as in all countries, policy toward nuclear weapons is a function of foreign policy. Nuclear weapons are a power instrument... There exists today no important FRG foreign policy objective that could be realized with the help of a nuclear arms acquisition program... Any sign of an autonomous weapons acquisition program would tend to create a combination of its opponents and allies against the FRG, including the two superpowers, the two West European nuclear powers, and other European states.¹³³

Finally, the FRG was in possession of five nuclear weapon systems that would have been handed over to it by the U.S. in time of war.¹³⁴

Latent capacity: est. 1954

Bomb acquisition: no

Trigger event: discussion on entry to NATO

Security: nuclear and conventional threat to national survival from the Warsaw Pact

Alliance: conventional and nuclear extended deterrence from NATO and the U.S.¹³⁵

Prestige: limited regional role

Trade: moderate dependence on access to foreign markets

Domestic: exclusion of military in nuclear decision-making

Germany-1992

With the collapse of the Warsaw Pact and the USSR, and the unification of Germany, the principal threat to Central Europe's national security subsided. This threat reduction

immediately weakened the incentives to acquire nuclear weapons, although its possible medium to long term effect is the unwinding of alliance relationships and the likely tendency to seek such an autonomous capacity in a future crisis.

In 1992 the German defense minister pointed out that Germany would maintain its role in NATO because of the security benefits in dealing with the spread of weapons of mass destruction and the increase in the range of the vectors that will eventually encompass Europe.¹³⁶

The clear German preference has been for the retention of a reliable US nuclear guarantee, with little or no confidence in the political feasibility or strategic credibility of a joint West European deterrent based on the British and French forces.¹³⁷

In 1993 Germany reaffirmed its pledge not to acquire nuclear weapons, despite difficulties in satisfying some of its long-run prestige objectives, such as a permanent seat on the U.N. Security Council. As such, the political vacuum created by the demise of the East Bloc has in the short term led to a reaffirmation of a non-nuclear Germany.¹³⁸

Latent capacity: 1992

Bomb acquisition: no

Trigger event: collapse of the Warsaw Pact

Security: no serious threats to national security apart from an insecure Russia

Alliance: conventional and nuclear extended deterrence from NATO and the U.S.¹³⁹

Prestige: limited regional role

Trade: moderate dependence on access to foreign markets

Domestic: exclusion of military in nuclear decision-making

Energy/Research Reactors: 21/28

Greece-1979

As a member of NATO, Greece faced the nuclear and conventional threats from the Warsaw Pact alongside the friction of its Turkish neighbor, which are events normally sufficient to propel a state towards nuclear weapons acquisition. However, it was provided with extended nuclear and conventional deterrence from the U.S. through its association with NATO, and despite its long history and diaspora population, it has restrained any active desire for regional prestige, due principally to a fear of the adverse reaction of its neighbors:¹⁴⁰

...Any overt attempt by Greece to acquire a nuclear arsenal will result immediately in retaliatory measures from the supplier countries such as the United States, France, West Germany, and Great Britain. These measures will no doubt involve embargoes of essential technological imports to Greece, economic penalties such as loss of most-favored trade status in the United States, and loss of privileges in the EEC.¹⁴¹

Consequently, there is no evidence that Greece has engaged in a nuclear weapons acquisition project, despite perceived dangers that Turkey or other Eastern Mediterranean states may soon initiate their own. It did, however, possess six operational nuclear weapon systems that would have been transferred over from U.S. control in time of war.¹⁴²

Latent capacity: 1979

Bomb acquisition: no

Trigger event: emergence of latent capacity in 1979

Security: conventional and nuclear threat from the Warsaw Pact (and Turkey)

Alliance: conventional and nuclear extended deterrence from NATO and the U.S.¹⁴³

Prestige: politically inactive

Trade: moderate dependence on access to foreign markets

Domestic: civilian and military-government commitment to non-nuclear status

Energy/Research Reactors: 0/2

Hungary-1992

Since the collapse of the Warsaw Pact in 1991, Hungary has evinced no interest in nuclear weapons acquisition. It possesses no security threat and is the beneficiary of incidental security benefits from NATO, in part linked to its application for membership. It has prestige claims limited to dealing with its diaspora population, no domestic nuclear incentives, and is partially dependent upon trade access to develop its economy.

Latent capacity: 1975

Bomb acquisition: no

Trigger event: 1991 collapse of the Warsaw Pact

Security: none

Alliance: incidental security benefits from NATO

Prestige: none

Trade: moderate dependence on access to foreign markets

Domestic: none

Energy/Research Reactors: 4/3

India-1965

India's first positive proliferation decision occurred in 1965 in response to the conventional and nuclear threat from the People's Republic of China, coupled with a minor conventional threat from Pakistan. India had fought two wars with Pakistan in 1949 and 1965, had lost territory in the Aksai Chin to the PRC in 1962, and been witness to the PRC's nuclear test explosion at Lop Nor in 1964. Additional incentives included an anxiety of a threat from the USSR and an embryonic determination to establish India as the regional power. Prime Minister Lal Bahadur Shastri, originally opposed to the acquisition of nuclear weapons, approved the program which was to have produced a test explosion by 1968.¹⁴⁴

As such, India's decision was a culmination of security concerns emanating from recent events associated with its neighbors, as a means of propelling India to the status of a global power, to strengthen domestic morale, and as product of its nuclear technology effort. It was, however, even more cautious of the reaction of foreign states due to the fragility of its technological access to the West.¹⁴⁵

Although work on India's nuclear infrastructure had begun as early as 1954 (under the direction of Dr. Homi Bhabha), the explicit use of this to produce nuclear weapons was not seriously considered until the Chinese nuclear test of 1964, only two years after its resounding defeat in a Himalayan ground war. Strong public and political-opposition pressure to match the Chinese capability made a positive proliferation decision difficult to avoid.¹⁴⁶ It was this challenge from the East more than any other incentive that drove India toward nuclear weapons.

It is widely assumed, because of the wars that have been fought by the two former British colonies, that the Indian and Pakistani nuclear programs are driven by the logic of a tightly interlocked arms race. What is forgotten or neglected is the fact that India's pursuit of a nuclear capability initially began in the 1940s and had nothing to do with Pakistan. By the late 1960s, it had everything to do with the Sino-Indian conflict. It was only in the late 1970s that Pakistan's nuclear program belatedly entered into India's strategic calculus. Beyond the Chinese dimension to India's nuclear program, there is a larger element. If neither Pakistan nor China had nuclear weapons, there is an excellent chance India would still have embarked on a nuclear weapons program. One of the most enduring motivations behind Indian foreign policy is the aspiration for great power status.¹⁴⁷

In part because of the sizes of both India and the PRC,

but also because of their independent foreign policies, neither were conducive to submitting themselves to alliance requirements in return for the protection of a nuclear umbrella. In fact, what alliance opportunity did arise for India, in the form of the USSR, was in practice quite loose and unreliable, particularly in crises:¹⁴⁸ "Again, no one could deny that the Chinese bomb stimulated India's acquisition of nuclear weapons technology which in turn became one of the major catalysts for Pakistan's desperate effort to possess a nuclear deterrent against its overwhelming neighbor... thus prompting a 'action-reaction' cycle of nuclearization."¹⁴⁹ This was further reinforced by India's failure to obtain nuclear guarantees from either the U.S. or USSR to offset the PRC's arsenal.¹⁵⁰

A second driving force behind India's positive proliferation decision was its great-power aspiration, which was probably triggered by external regional challenges to that effect from the PRC. India's leaders, remembering its colonial subjugation, sought a security strategy that would at a minimum avert such a recurrence. While India first believed that it could achieve that status with economic development alone, it quickly discovered in the example of the PRC in the need for some coercive capacity.¹⁵¹

With a strong emphasis on self-reliance and political control over its research agenda, India has employed science as a tool of national autonomy and sovereignty... The desire to seek international respect and prestige is also an important incentive for nuclearisation in India and Pakistan, but particularly for India. As one of the world's oldest and most populous civilizations, India sees the acquisition of a nuclear weapon capability as the key to winning great-power status. India's colonial experience instilled a strong commitment to self-reliance, sovereignty and independence in the country.¹⁵²

The nuclear program in India is driven by a combination of political, military and bureaucratic forces and enjoys consistent popular, and particularly, nationalist, support. The program is furthermore highly insulated from the public and operates independently in affairs related to technical research. This latter fact has led many to assert that India's program is in fact driven by a scientocracy unrelated to political requirements, and while this is almost certainly true with respect to the generation of a latent capacity, there is no evidence of scientific influence in any of the critical discussions involved in crossing the threshold.¹⁵³

Latent capacity: 1964
Bomb acquisition: yes

Trigger event: 1964 PRC Lop Nor nuclear test detonation
Security: conventional and nuclear threat from the PRC and Pakistan
Alliance: no effective security guarantees, despite military assistance agreement with U.S.¹⁵⁴
Prestige: regional and global power ambitions
Trade: effectively insulated from global pressure
Domestic: highly independent nuclear bureaucracy with strong political and popular support

India-1966

Three concurrent events conspired to force a reversal of India's proliferation decision in 1966. First, and most importantly, was India's economic deterioration whose remedy required American foreign credit which in turn required a deceleration of the nuclear program to avoid its discovery. This increased susceptibility to the effects global interdependence which occurred as a result of India's dependence on World bank loans, U.S. President Johnson's influence over the specific uses of the aid, and reliance upon imported Canadian nuclear technology.¹⁵⁵

The second factor in the project cancellation was Prime Minister Indira Gandhi's preoccupation with consolidating her political position within the Congress Party at the expense of the nuclear program. This hiatus would last only two years and the project was fully resumed in 1968. The third reason was an absence of effective spokespersons for the project after the untimely deaths of both former prime minister Shastri and Dr. Bhabha in January 1966.¹⁵⁶

Additional reasons for the indefinite project termination was the absence of any immediate pressing need for nuclear weapons.¹⁵⁷ "India's postponement was largely due to the limited utility of nuclear bombs if any in deterring China and to economic difficulties, not to India's insensitivity to possible Chinese nuclear blackmail or exclusively peaceful purposes of her nuclear programs."¹⁵⁸

Latent capacity: 1964
Bomb acquisition: no
Trigger event: 1966 Indian economic crisis
Security: conventional and nuclear threat from the PRC and Pakistan
Alliance: no effective security guarantees¹⁵⁹
Prestige: regional and global power ambitions
Trade: dependence on foreign credit
Domestic: highly independent nuclear bureaucracy with strong political and popular support

India-1972

In October 1972, Prime Minister I. Gandhi made a second positive proliferation decision which resulted in a successful nuclear test in May 1974.¹⁶⁰ This decision was driven by three cumulative security triggers and one domestic gambit, coupled with a broader desire to ascend to global power status.

First, India's 1971 victory over Pakistan and effective dismemberment of its eastern segment into the new state of Bangladesh propelled it into de facto regional power status. Nuclear weapons prestige would cement this increase of power with fungible regional influence. India was also responding to two streams of implicit nuclear threats from the PRC and the U.S.¹⁶¹

The PRC's ultimatum to India during the 1965 Indo-Pakistani war and its successful hydrogen bomb test in 1968 were both seen as nuclear compellence threats directed at India. During the 1971 Indo-Pakistani War, the U.S. moved the presumably nuclear armed USS *Enterprise* into the Bay of Bengal, ostensibly to pressure India from invading East Pakistan.¹⁶²

There is also evidence that the decision to proceed with a test explosion was motivated by domestic disorder caused by high inflation and unemployment, in which the project's success would be a catalyst for national unity of purpose. As such, the test would divert public attention away from the contemporary problems of violent communalism, separatist movements, and terrorism. However, there were other bureaucratic factors that led up to this decision that were evident as early as 1966. Among these was the increasing influence of the Minister of Foreign Affairs in supporting a positive proliferation decision.¹⁶³

The purpose of detonating a supposed Peaceful Nuclear Explosive (PNE) was two fold: first, it afforded a certain test of India's nuclear weapons technology without having to provoke its neighbors into any arms race, and second, it avoided the severing of its technological links with the developed world: "To reach parity with China, which is already 20 years ahead of India in weapons technology would be a tough task. Thus India will have to face the realpolitik of strategic gaming when vulnerability of its nuclear facilities to pre-emptive strikes by the enemy is quite high at least at the early stage."¹⁶⁴ Developing a PNE was a sufficient minimum response to the PRC to avert further compellence signals.¹⁶⁵

The detonation of the PNE was positively ambiguous, in that it did not immediately dispel India's image as a peaceful power with disarmament objectives, although it did result in the severing of technical assistance from Canada:¹⁶⁶ "In addition, India's relations with Western donor countries and Japan would have suffered, perhaps terminally, if it had tested a second nuclear device or developed a nuclear arsenal. In financial terms, India had been fortunate that the reaction

to its May 1974 event was so mild; although a few countries reduced developmental assistance, this was shortlived."¹⁶⁷ The PNE was also a test of the weapon that could best serve India's immediate security needs: the PNE was essentially an ADM (Atomic Demolition Munition) that would have been useful in closing the Himalayan passes through which the PRC would have had to advance to access the Ganges river valley.¹⁶⁸

Alliance disincentives to the 1974 test were nearly absent, despite the formulation of the 1971 Indo-Soviet alliance, and the de facto military assistance offered by the UK and U.S., and less so by the USSR, during the 1962 Sino-Indian conflict. This was because alliance associations in South Asia were only linked to the eventuality of a superpower conflict, and significant losses of territory, such as those of the Aksai Chin or East Pakistan rarely generated more than protest from the occidental allies.¹⁶⁹

The prestige value of the PNE was substantial, and acted in turn to mollify India's territorial disputes with its other South Asian neighbors, such as with Indonesia over the East Indian Ocean islands, in turn operating as an implicit nuclear compellent to the resolution of conflicts. It also reinforced the Indian claim to exclusive access to the Indian Ocean. While nuclear-technology capacity has conferred upon India some status that sets it apart from its earlier image of an under-developed state with a vast and poor population, it has not yet succeeded in translating that into the sort of status necessary to win it widespread endorsement for a permanent seat on the UN Security Council:¹⁷⁰ "Nuclear weapons capability, it is argued, would greatly enhance strategic autonomy providing India with a wider range of diplomatic choices."¹⁷¹

Nuclear weapons possession: 1974

Latent capacity: 1964

Bomb acquisition: yes

Trigger event: 1971 victory over Pakistan

Security: conventional and nuclear threat from the PRC and Pakistan

Alliance: no effective security guarantees, despite treaty with USSR¹⁷²

Prestige: regional and global power ambitions

Trade: independence from the world economy

Domestic: highly independent nuclear bureaucracy with strong political and popular support

India-1979

1979 marked for India the cross-over from a nuclear option to a deliberate desire to engage in the production of nuclear weapons at an accelerated pace, principally with a view to deterring what was identified as a full-thrust Pakistani program designed to counter Indian regional power

ambitions:¹⁷³ "The Indian elite seems always to have felt that they were faced with a choice as to whether India was to emerge as an influential power in international politics, or not. The verdict appears to have been that India's strategic interest lay in being an influential power."¹⁷⁴ In this context nuclear weapons became components in a deterrence that could quickly escalate into counter-city targeting.¹⁷⁵

Pakistan, because of its proximity and attributed independent nuclear capability that was estimated to reach fruition by the late 1980s, India's strategic focus gave greater and greater consideration to it as a proportion of its security efforts. Mrs. Gandhi had allegedly considered a preemptive strike on Pakistan's nuclear infrastructure in 1984 in response to evidence of nuclear smuggling and its receipt of nuclear assistance from the PRC:¹⁷⁶

As Pakistan's quest for nuclear arms became known in the late 1970s, New Delhi began to reexamine its nuclear posture. Although Moraji Desai, who succeeded Mrs. Gandhi as prime minister in 1977, was committed to a non-nuclear policy, official attitudes began to shift during the tenure of his successor, Charan Singh, who held the office from July 1979 until January 1980. In August 1979, Singh appeared to open a new era in Indian nuclear thinking when he declared, 'We do not want to join the race to make a bomb, but if Pakistan sticks to its plans to assemble a bomb, we will perhaps have to reconsider the whole question.'¹⁷⁷

U.S. intelligence sources have stated that while there is no confirmation that India has any fully ready weapons, at a minimum the time necessary to assemble them is negligible. Other more liberal Western intelligence estimates suggest a range of between ten to twenty warheads. By the mid-1990s, India was attributed with the capacity to build between 20 and 65 nuclear bombs, with enough core material to build hundreds of weapons by the turn of the century. This is coupled with evidence from a 1985 FRG intelligence report that India had embarked on H-bomb research as well as significant miniaturization technology, and that India has begun identifying specific air force units as strategic delivery assets.¹⁷⁸

India's vector programs includes missile programs developing the intermediate range Prithvi, designed for use against Pakistan, and the Agni, produced for deployment against the PRC. By 1993, India had three other missile programs under development, as well as an independent space and satellite program, and a nuclear-powered and missile-launching submarine program.¹⁷⁹ Until the vector and warhead segments of the program are brought into synchronization, India is unlikely to engage in any overt deployment of a

strategic weapons capability: "Indian planners are unlikely to deploy nuclear weapons until the production of Indian IRBMs begins."¹⁸⁰ In many respects, India's opacity has largely been a function of its current strategic vulnerability rather than a genuine aversion to nuclear weaponry:

But Western diplomats here say New Delhi is closer than ever to admitting what the United States and other Western governments have long said that it has an arsenal of nuclear warheads, even if only a small one, and that the missiles it is developing, including the Prithvi and a longer-range ballistic missile, the Agni, are designed to carry them.¹⁸¹

While there is a fair bit of controversy over the point, it is not at all clear that the 1974 PNE test was a deliberate prelude to the building of a full nuclear arsenal. Rather, it appears as if the PNE garnered far less influence for India in international affairs than some policy segments had expected, and in fact stimulated some negative counteraction from certain technology suppliers toward India. What appeared to be a preset path to full nuclear armament is really a function of the continuous stimuli of the instable South Asian strategic arena.¹⁸²

India's decision to engage in a nuclear development project that would provide it a complete strategic arsenal was a function of the increased U.S. naval presence in the Indian Ocean from 1973 onward, the 1979 PRC invasion of one of its neighbors (Vietnam), and the insecurity over the reliability of the Soviet nuclear deterrent to the PRC. According to T. Kim, India's principal objective is great power status, and the growing nuclear threat from Pakistan began as a spurious rationalization, exaggerated for political reasons. The collapse of the USSR in 1991 confirmed in large part India's determination to seek strategic autonomy, although there is significant pressure for it to compete with Pakistan for Western support.¹⁸³

Another explanation for India's push to continue its strategic nuclear weapons effort was the very success of antiproliferation policies targeted at it. By one account, the cumulative restrictive measures placed upon India by Canada and the two superpowers after the 1974 detonation, retarded its nuclear program by between two to eight years. Alongside these projects have evolved strong pro-nuclear bureaucracies that make deceleration, let alone reversal, problematic.¹⁸⁴

Throughout its evolutionary development from a state concentrating on nuclear survival, to regional power ambitions and then to global power ambitions, India has been exploring the power of nuclear weapons without necessarily achieving success in its fungibility: few of the causes for the development of the weapons have been resolved by it. Given its ascension on the proliferation ladder, India has as yet not

made an explicit declaration of its nuclear weapon status, and will refrain from doing so until it has an operational missile capability. This last step may be further delayed as India becomes co-opted into the increasingly interdependent global economy in the 1990s, particularly as Western states will increasingly link non-proliferation to economic cooperation issues.¹⁸⁵

Latent capacity: 1964

Bomb acquisition: yes

Trigger event: Pakistani nuclear weapons program

Security: conventional and nuclear threat from the PRC and Pakistan

Alliance: no effective security guarantees¹⁸⁶

Prestige: regional and global power ambitions

Trade: independence from the world economy

Domestic: highly independent nuclear bureaucracy with strong political and popular support

Energy/Research Reactors: 15/5

Indonesia-1965

In 1965 President Sukarno declared that Indonesia would shortly initiate a nuclear weapons program with help from the People's Republic of China.¹⁸⁷ A year earlier Sukarno had met with Zhou Enlai in Shanghai for secret discussions, followed shortly thereafter by claims by the director of the Indonesian army arsenal that the military would be in possession of a nuclear weapon. There was also evidence that the PRC was preparing to train Indonesian scientists for the task: "Some observers believed that China, which was increasingly confident of Indonesian governmental cooperation, offered to explode a nuclear device in Indonesian territory and let Indonesia take credit for it in order to reduce the army's hostility and weaken Soviet influence."¹⁸⁸

Indonesia's principal motive was to confirm its regional status already suggested by its huge population (fifth-largest population in the world), and to use this to absorb the other archipelagic states, particularly Singapore, Malaysia and portions of the Philippines (which it had failed to secure through conventional military means). From a technical point of view, there was no doubt that Indonesia could achieve nuclear weapons status by the end of the century.¹⁸⁹

The PRC's initial adventurism after the detonation of its own device and after its breakup with the USSR probably emboldened it to acts it regretted within a couple of months: "...China appears to have abandoned the idea of offering Indonesia a nuclear bomb (if, indeed, it had really intended to do so), probably for fear of appearing so irresponsible that the Americans or Soviets might feel justified in making a preemptive strike against China."¹⁹⁰ The probability of an Indonesian bomb without assistance from the PRC was low.

Latent capacity: 1995
Bomb acquisition: yes
Trigger event: PRC 1964 Lop Nor nuclear detonation
Security: no immediate military threat
Alliance: no effective security guarantees, despite association with PRC¹⁹¹
Prestige: strong regional power ambitions
Trade: independence from the world economy
Domestic: marginal impact

Indonesia-1966

President Sukarno was replaced by an anti-Communist military coup in 1966, ending its regional military and nuclear ambitions for the time being, as well as expelling Chinese influence in its internal affairs. The nuclear program was never initiated and Indonesia's preoccupation was shifted to economic development and counter-insurgency, despite the gradual growth of a latent capability.¹⁹² Although the U.S. succeeded in acquiring closer military liaisons with Indonesia, including a recognition of mutual security interests, as with the invasion of East Timor in 1975, there did not develop the close military association that could be classified as an alliance.

A subsequent interest in developing a nuclear infrastructure, perhaps as a prelude to the creation of a latent capacity, took a turn for the worst when a program to establish a nuclear power generating capacity in central Java resulted in a debilitating explosion in 1994. According to its director, the project is estimated to begin operation in 1996. Nonetheless, Indonesia is suspected of chemical weapons production, that may be taken as an indicator of its eventual desire for weapons of mass destruction.¹⁹³

Latent capacity: 2010
Bomb acquisition: no
Trigger event: 1966 coup by Suharto
Security: no immediate military threat
Alliance: no effective security guarantees¹⁹⁴
Prestige: limited regional power ambitions
Trade: partial dependence on the world economy
Domestic: marginal impact
Energy/Research Reactors: 0/4

Iran-1970

A Carnegie Study, citing U.S. intelligence sources, suggested that the Shah of Iran had established a nuclear weapons design group some time in the early 1970s as part of an ambitious plan to establish Iran as a regional power. Even appointed members of the various nuclear energy organisations set up by the Shah pointed out that Iran had no need for

nuclear energy given its wealth of oil (the Shah sought to build an estimated twenty operational reactors by the end of the 1980s). By 1974, the Iranian Nuclear Energy Organisation was founded under Swiss-educated Dr. Akbar Etemad to coordinate the development of a latent nuclear capability. Although later denied, the Shah let slip his interest in a 1974 interview with a French magazine in which he states in response to the question whether Iran would one day possess nuclear weapons: 'Undoubtedly, and sooner that it is believed.'¹⁹⁵

The Shah was anxious to establish Iran as the regional superpower, an ambition which led his government to purchase huge quantities of sophisticated conventional weapons. He probably also wanted the option to manufacture nuclear weapons. In fact, soon after India's nuclear test in May 1974, he said so openly, remarking that Iran should acquire nuclear weapons if any other country in the region did so. The Shah must have known that the nuclear progress of Iraq, Iran's serious rival, and of Pakistan would give these countries the capability to produce nuclear weapons within ten years or so. To avoid the risk of being outdone, he would have wanted Iran to get into a position to acquire nuclear weapons rapidly.¹⁹⁶

The desire for regional power status was matched by the secondary motives that included a need to deter a possible invasion by the USSR. The limited reaction to India's 1974 detonation may have also spurred on the Shah's confidence of its attainability. Iran thus sought to acquire nuclear weapons to cement its mini unipolarity, although the reaction of its Iraqi, Saudi and Pakistani neighbors would likely have put them in the nuclear camp within a decade as well. A disincentive that had little effect because of the strong power ambition motive was that of alliance. It was too difficult to make credible the nuclear umbrella guarantee formalized in the bilateral U.S.-Iranian defense treaty signed in 1959.¹⁹⁷

Latent capacity: 1990
Bomb acquisition: yes
Trigger event: Indian detonation of the PNE
Security: military threat from the USSR
Alliance: conventional military treaty with the U.S.¹⁹⁸
Prestige: strong regional power ambitions
Trade: independence based on strong oil exporting position
Domestic: nationalist impetus

Iran (Islamic Republic of Iran)-1979

Apart from the dissention of the IISS (The London-based International Institute of Strategic Studies), Western and particularly U.S. intelligence are certain that the IRI (Islamic Republic of Iran) is involved in a program, albeit meager, to manufacture nuclear weapons. Allegedly, after the 1979 revolution, work was resumed at the Tehran Research Center almost without interruption, affirming the Ayatollah Khomeini's commitment to nuclear weapons. This has been found to be consistent with claims by various high ranking ayatollahs, despite repeated official claims to the contrary. For example, according to Ali Akbar Hashemi Rafsanjani, the speaker of the parliament and head of the armed forces in October 1988:¹⁹⁹

With regard to chemical, bacteriological, and radiological weapons training, it was made very clear during the war that these weapons are very decisive. It was also made clear that the moral teachings of the world are not very effective when war reaches a serious stage and the world does not respect its own resolutions and closes its eyes to the violations and all the aggressions which are committed in the battle field... We should fully equip ourselves both in the offensive and defensive use of chemical, bacteriological, and radiological weapons. From now on, you should make use of the opportunity and perform this task.²⁰⁰

This is compounded by the statements of Mr. Fereindun Feasharaki in 1987, a former nuclear advisor to the Shah, that he was ordered by the Khomeini regime in 1979 to assist in the manufacture of a nuclear weapon (he since defected to the West).²⁰¹ He was supposedly told, by one of Khomeini's advisors: 'It is your duty to build this bomb. Our civilisation is in danger and we have to do it.'²⁰² "Iran's revolutionary government has attempted to pursue various elements of the Shah's program, but many of the earlier accomplishments were dissipated during the turmoil of the Iranian Revolution and the country's subsequent war with Iraq."²⁰³ One of the constants throughout the two regimes is their single minded pursuit of nuclear reactors in a state with sufficient oil resources.²⁰⁴

Iran's nuclear weapons program is in its rudimentary stages, and estimated to be capable of nuclear weapons production by 2000 at the earliest, but more likely by 2005 (according to the CIA and Israel). Iran is engaged in a large scale procurement program for missiles and aircraft delivery systems, and this is compounded by visits to nuclear-technology exporting states in Eastern Europe (particularly Czechoslovakia) by key Iranian VAVAK intelligence service

personnel. It has also been implicated in various nuclear materials and weapons smuggling schemes throughout Central Asia and Eastern Europe. Iran has a parallel missile program that has links to nuclear weapons development as a launch vector.²⁰⁵

The IRI's motives are remarkably similar to that of its predecessor in that it seeks to secure exclusive regional hegemonic status, as well as a more ambiguous leadership of the Islamic world. Its latter objective has clearly been co-opted by Pakistan, although its former ambitions have been amplified more recently by the dissolution of the USSR to the north and the crippling of Iraq by the 1991 Gulf War. Iran is further propelled by powerful domestic-nationalist pressures and by a complete absence of a secure alliance relationship. Iran further seeks to exclude the United States from interfering in its internal and regional interests.²⁰⁶

Latent capacity: 2000

Bomb acquisition: yes

Trigger event: Invasion by Iraq in 1979 U.S. embargo

Security: military threat from the USSR and Iraq

Alliance: completely isolated apart from minor regional associations

Prestige: regional power ambitions

Trade: diminished exports and isolation

Domestic: nationalist pressure

Energy/Research Reactors: 0/2

Iraq-1974

The first physical indication of Iraq's interest in a nuclear program emerged in its receipt of significant IAEA financial aid to establish atomic industries. This was followed by a more explicit claim by Saddam Hussein to a Lebanese magazine in 1975 that he sought a nuclear weapons capability for Iraq, a statement that was confirmed to a visiting French official. Iraq's precise role in a secret 1973 Paris meeting with Saudi Arabia, Pakistan and Libya regarding nuclear weapons was never made clear.²⁰⁷ Confirmatory evidence of a significant nuclear weapons project initiated in the early 1970s was found by nuclear inspectors at the conclusion of the 1991 Gulf War:

The documents revealed details of Baghdad's efforts to design a nuclear explosive device and to test its non-nuclear components, providing unambiguous evidence of Iraq's ultimate objective and belying Baghdad's claim that the country's nuclear program was intended for nonmilitary purposes.²⁰⁸

Iraq's principal objective was to counter the alleged possession of nuclear weapons by Israel, particularly after its battlefield victories concluding the 1973 October War. A closely linked objective (because Israel was the main impediment) was using nuclear weapon status as a means to ascend to the position of a regional power. Further targets of such a program would include Syria and Iran.²⁰⁹

Iraq's initial strategy was to convince the USSR to provide direct nuclear support and guarantees, or even the purchase of a ready made bomb. Its rejection on that course triggered its initiation of an indigenous program reliant principally on French assistance. The supposed alliance with the USSR was often exaggerated and could better be described as a series of temporary and mutually beneficial balance of power and customer-vendor relations. When supplies from the USSR diminished during the 1970s and 1980s, Iraq's principal supplier became the PRC.²¹⁰

Latent capacity: 1985

Bomb acquisition: yes

Trigger event: 1973 October War defeat against Israel

Security: military threat from Iran and Israel

Alliance: relations limited to guaranteed access to military sales²¹¹

Prestige: regional power ambitions

Trade: independence a function of established oil exporting role

Domestic: nationalist pressure

Iraq-1982

Following a series of covert sabotage operations by Iran and Israel against Iraq's nuclear program, concluded by Israel's destruction of Iraq's Osiraq reactor on June 7 1981, its nuclear project was effectively halted. Saddam Hussein's regime undertook a significant shift in policy toward declared nonproliferation, and initiated a new nuclear program in 1982 designed to withstand detection. Iraq deliberately, but unsurprisingly sought NPT membership as a means to shield its nuclear activities from suspicion.²¹²

Evidence that Iraq was engaged in a nuclear program in earnest emerged in 1989 as a consequence, in part, to the discovery of its deep involvement in component smuggling. By 1991, it was established that Iraq was using an outdated technology, calutrons, to enrich uranium because of its dual use applications. Following the revelations at the conclusion of the 1991 Gulf War, it became known that Iraq had employed 20,000 persons in the nuclear weapons program, and had made substantial progress in three of four technical methods of uranium enrichment (gaseous diffusion, electromagnetic isotope separation, gas centrifuge, and chemical enrichment, of which the first was abandoned, and the second constituted the

majority of the effort).²¹³ Had its program not been largely destroyed by the Gulf War and its aftermath, Iraq could probably have had enough material for two nuclear bombs by the end of 1995, and about fifteen such devices by the end of the century. In addition, it had an extension missile program.²¹⁴

Iraq's objectives were essentially unchanged from its 1974 decision, in that Saddam Hussein sought to counter Israel and achieve regional dominance, except that it was being delayed by the near defeats brought about by the 1982 Iran-Iraq War. As well, Iraq's uninhibited use of chemical weapons to counter internal and Iranian targets made it likely that Iraq would have been more likely to make operational use of nuclear weapons or at least engage in overt nuclear compellence threats.²¹⁵

There is some concern that despite the improved inspection procedures, if the current regime remains in power, the nuclear program may be resurrected for a third time. According to the CIA, Iraq retains some key materials that would facilitate such a course. The precise importance of Iraq's near nuclear status has often been cited as the primary reason for the U.S. intervention in 1991, and the invasion of Kuwait was merely the trigger and not the vital object of the dispute. It is notable that Iraq is the only state to have been forcibly denuclearized.²¹⁶

Latent capacity: 1995

Bomb acquisition: yes

Trigger event: 1981 Israeli bombing of Osiraq and War with Iran

Security: military threat from Iran and Israel

Alliance: relations limited to guaranteed access to military sales²¹⁷

Prestige: regional power ambitions

Trade: independence a function of established oil exporting role

Domestic: nationalist pressure

Energy/Research Reactors: 2/0

Israel-1957

On October 1957 it was decided by D. Ben-Gurion to take steps to establish for Israel a technical capability sufficient to give it a nuclear option, following pressure from both superpowers to withdraw from the Sinai it had recently captured in the 1956 campaign. Although there was some political dissent from opposition parties, U.S. threats of economic and political sanctions and Soviet threats of military action were overwhelming determinants:²¹⁸

There was a widespread belief in Israel and in France that the United States, considered to be Israel's superpower friend, had backed down in the face of the Soviet nuclear threat... Eisenhower's refusal to back the attack on Egypt had nothing to do with the Bulganin threat, which was analyzed at an all-night meeting at CIA headquarters and subsequently discounted as a bluff.²¹⁹

The decision to initiate the precursor to a bona fide nuclear program was based on the long term awareness of Israel's conventional weakness, although restraint from a full blown program was itself a function of the continuing desire of establishing close relations with the U.S. that had failed since the 1947 arms embargo established by President Truman. Israel did possess a critical alliance with France that withstood the Suez Crisis, which provided access to arms and nuclear research facilities, but it was insufficient to counter threats from both Arab and Communist states, nor provide the legitimacy Israel needed to ensure its place in former Palestine. Israel was also coming under pressure from a rising tide of Arab nationalism, foremost among these was the emergence of Nasser's Pan-Arabist doctrine following his replacement of King Farouk of Egypt in 1952-4.²²⁰

In fact, Israel had investigated its nuclear potential as early as 1948 in a Negev desert uranium survey conducted by the Israeli Defense Ministry, and pushed ahead with the project when in 1956 there was no international protest over a Canadian reactor sale to Israel. D. Ben-Gurion, serving as prime minister and defense minister from 1948 to 1963 with one brief interlude, began laying the groundwork for a covert nuclear bomb project as early as 1953 with the assistance of France and financed by European and American jews.²²¹

In effect, Israel's motives were principally security, and encompassed the preparation for the development of a weapon to deter conventionally superior neighbors, as a weapon of last resort, and as a battlefield weapon.²²²

Latent capacity: 1968

Bomb acquisition: no

Trigger event: superpower pressure following the Suez Crisis

Security: military threat from Arab neighbors

Alliance: security association with France, despite 1952
written agreement with U.S.²²³

Prestige: none

Trade: dependent on arms and seeking U.S. support

Domestic: avoidance of open discussion

Israel-1968

Israel's first positive proliferation decision occurred shortly after the end of the Six-Day War and the preceding

three week perilous wait (*hamtana*) during which Israel was subject to an arms embargo by France, and could not obtain a formal security guarantee from a superpower or membership in any alliance.²²⁴ This catalysed the Defense Minister, Moshe Dayan to recommend crossing the threshold: "'Israel has no choice. With our manpower, we cannot physically, financially or economically go on acquiring more and more tanks and more and more planes. Before long you will have all of us maintaining and oiling tanks.'"²²⁵

The 1968 decision may also been the product of a 1963-64 rift between the pro-U.S. and pro-French elements in Israel's government, and according to some Arab sources, as a means of securing legitimacy for Israel's control of the occupied territories. Alternate explanations illustrated in the Jerusalem Post suggest Israel's determination to avoid the fate of Czechoslovakia and Biafra. In the same year Israel had acquired latent capacity and a scientific base sufficient to initiate a project in earnest (since 1955 an estimated 250 Israeli scientists had been trained at the U.S. Atomic Energy Commission laboratories).²²⁶

Israel's principal motive for nuclear acquisition in 1968 was to guarantee against the unreliability of its alliance relations in countering external security threats emanating principally from its Arab neighbors. Israel also sought to counter its pariah status. By 1968 it had fought three regional conflicts against states whose objective included the destruction of the Israeli state.²²⁷ It was also reported that Israel had discovered stockpiles of chemical weapons in the Sinai and awoke it to Arab interests in weapons of mass destruction: "This discovery of Arab weapons of mass destruction may well have hastened the Israeli decision to produce the components for nuclear weapons."²²⁸ To this end, Israel's nuclear weapons were originally conceived as a weapon of last ditch-deterrent and not for flexible response.²²⁹

Although the Kennedy Administration began defensive arms sales to Israel, and Johnson opened arms sales even further, relations were weak because of the U.S. reaction to the discovery in 1960 by one of its spy planes of the secret Dimona reactor. The Franco-Israeli alliance was weakened by de Gaulle's arms embargo on the eve of the Six Day War to discourage an Israeli initiation of conflict.²³⁰ As such, Israel felt that it was being isolated and pushed towards an autonomous security solution.

Israel's second decision was however reversible, and this was emphasized by the close relationship it developed with the U.S. following the Six Day War. It subsequently decided to maintain its nuclear weapons under extreme secrecy so as to not threaten this association. Israel was thus given an opportunity to reverse this proliferation decision that was to be supplanted by the beginning of the 1973 Yom Kippur War.

Nuclear weapons possession; 1968

Latent capacity: 1968
Bomb acquisition: yes
Trigger event: isolation prior to the Six Day War
Security: military threat from Arab neighbors
Alliance: isolation
Prestige: none
Trade: dependent on arms and seeking U.S. support
Domestic: avoidance of open discussion

Israel-1972

Israel's second positive proliferation decision was made, with a fair degree of certainty, on the 8th of October 1973 during the Yom Kippur War by Prime Minister Golda Meir in response to fears that Syria was about to overrun northern Israel. The weapons, consisting of Jericho I missiles with unassembled nuclear warheads, were again deployed around 24 October 1973 when U.S.-Soviet relations quickly deteriorated over the crisis and there was evidence that the USSR had sent nuclear warheads to the Middle East for Syria's SCUD launchers.²³¹

Given the above timing, Israel probably had weapons ready to assemble by December 1971 as a consequence of the second proliferation decision in 1968. The fact that the second decision was not reversed, despite an effective security relationship with the U.S., may have been due to Soviet threats in response to the worsening Arab situation during the 1970 War of Attrition.²³²

The Mordechai Vanunu revelations suggest that Israel could have produced, at most, sufficient plutonium for ten weapons per year, although its output levels decelerated after 1985. More conservative estimates put Israel's arsenal at between 52 and 94 warheads by the end of 1990, of which a portion may be boosted thermonuclear, and miniaturized tactical weapons. Jane's Intelligence Review claimed in 1994 that Israel stores about fifty Jericho II missiles with warheads at Kefar Zekharya in the Judean hills west of Jerusalem and a smaller number of tactical weapons near Eilabun in eastern Gallilee.²³³

Israel's second proliferation decision was made in 1973 under wartime conditions, and while it retained for them the same essential purpose as was envisioned as far back as 1957, it was additionally intended to deter the rise of chemical and nuclear weapons that were gaining interest among Middle East countries. Nuclear weapons also played a role in ensuring Israel's offensive military strategy through their conventionalization.²³⁴ Israel further became aware of the growing demographic differences between it and its neighbors:

Nevertheless, there are indications that Israel's relative conventional strength may be diminishing... As its population is small and becoming smaller in proportion to those of the other nations in the area, Israel has also become more vulnerable to a situation of prolonged warfare leading to a high number of casualties among its civilians or its military... the relatively small size of its territory; the sustained hostility between itself and the great majority of states of the region and that the one state that might support it in a conflict is geographically remote.²³⁵

Despite the nuclear guarantee proffered by the U.S. to Israel, the latter has chosen to retain its nuclear arsenal not because of a lack of credibility, but because the high speed of wars in the region brings into question the capability of the U.S. to intervene quickly enough. Given Israeli historical experiences, it is unlikely any alliance guarantee would have been accepted. The U.S. has thus accepted the existence of an Israeli arsenal insofar as it does not interfere with its antiproliferation policy, collaborating in effect to the maintenance of an opaque deterrent. This stance has also benefitted Israel in allowing its neighbors to avoid the issue of having to directly address its nuclear capability, while it also keeps Israel from becoming the object of international isolation.²³⁶

The successful maintenance of this policy of opacity is ascribable to a variety of cultural, political and technical factors, although its current success is evidence that it is the preferred posture for players on all the different levels:²³⁷

Among these are: the reluctance of those sensitive of the Holocaust, to criticize Israel; the political influence of the Israeli lobby; the importance of Israel as the primary strategic asset of the United States in the Middle East; admiration for the achievements of a democratic Jewish state in a hostile environment; the image of Israel as a responsible actor as far as the use of nuclear weapons is concerned; a sense that the Arab states have accommodated themselves to the reality of Israel's nuclear arsenal; and the perceived difficulties of implementing a regional non-proliferation regime in the Middle East.²³⁸

Latent capacity: 1968

Bomb acquisition: yes

Trigger event: Crises emanating from the 1973 Yom Kippur War

Security: military threat from Arab neighbors

Alliance: credible but incapable U.S. security guarantee
Prestige: none
Trade: dependent on arms and seeking U.S. support
Domestic: avoidance of open discussion
Energy/Research Reactors: 0/1

Italy-1960

Although Italy has had the technological capacity to build nuclear weapons for some time, with one estimate in the late sixties estimating 132 bomb a year following some minor preparation, it has made no conscious decision to go execute such a project. Legally, Italy's Second World War peace settlement precludes it from developing nuclear weapons.²³⁹ "Italy is generally acknowledged as having little or no interest in independently acquiring intermediate or strategic systems. Financial, operational, and intraparty ideological grounds may all be cited in support of that assessment."²⁴⁰

While Italy has an interest in its perceived status, it is normally within the context of the European Community or NATO. Strong disincentives are provided by the nuclear umbrella and security guarantees secured through NATO and the U.S., and the probable reaction of its economic allies to a positive proliferation decision. Although occasional criticisms emerge with respect to Italy's nuclear abstention, it has consistently abided by the NATO policy on weapons of mass destruction as purely retaliatory and defensive in nature. Italy has possessed between four and seven operational nuclear weapon systems that would have been handed over by the U.S. in the event of war.²⁴¹

Domestically, Italy's military has little policy influence despite its occasional criticism of the inhibitory effect of the NPT on the future possibility that nuclear weapons may become necessary. Conceivable instances where their arguments may become policy could occur if there is significant nuclearization of the southern or eastern Mediterranean; the principal concern in the 1970s, however unrealistic, was that the PRC would deploy nuclear weapons to Albania.²⁴² Italy is nonetheless active on the issue and treats the issue as a bargaining chip in intra-NATO bargaining:

Foreign Ministry officials are accustomed to trading concessions; although there is no sentiment in Italy for producing nuclear weapons, the legal option of producing them might have been held for barter against something in exchange.²⁴³

Latent capacity: 1965
Bomb acquisition: no
Trigger event: none
Security: Warsaw Pact and USSR
Alliance: NATO and U.S. (nuclear umbrella)²⁴⁴

Prestige: limited
Trade: interdependent on Europe
Domestic: minimal
Energy/Research Reactors: 0/5

Japan-Imperial-1941

Japan's interest in nuclear explosives, under investigation from as early as 1939, was assisted by Nazi Germany and became a government program by 1941.²⁴⁵ Because of critical wartime shortages and Japan's undeveloped scientific resources, coupled with a lack of awareness as to the precise object of such research, the first positive proliferation decision had no discernable results.

Japan's incentives were twofold and overwhelming: winning the war to avoid conquest, and using whatever weapon it could to rise to preeminence in the western Pacific. Knowledge of the destructive effects of nuclear weapons would have deterred its use by other countries such as the United States. Japan did not have the benefit of an effective alliance and was completely isolated from the world except those regions it had directly occupied.

Latent capacity: 1945
Bomb acquisition: yes
Trigger event: World War Two
Security: Allies
Alliance: weak coordination with Nazi Germany
Prestige: seeking East and South Asian hegemony
Trade: isolated
Domestic: minimal

Japan-1959

While there is no singular established point at which Japan decided not to make a positive proliferation decision, its continued nuclear abstinence at various critical stages qualifies it as a non-nuclear state, despite capacity and in some cases developed latent capacity. There has been little serious discussion of nuclear weapons in Japan, in part because of the preoccupation with economic development and the relegation of security issues to its alliance mentor in the U.S.:²⁴⁶ "Due to its relatively small size and military weakness after the Second World War, Tokyo adopted a broad interpretation of national defense and how best to promote the country's security."²⁴⁷

By 1959, Japan had sufficient nuclear infrastructure and economic strength to begin nuclear weapons research. By the end of the 1960s, miscellaneous nuclear materials used in scientific, industrial and technological infrastructures such as power generation, radiation physics and medical applications allowed for the manufacturing of an estimated

half-dozen nuclear weapons and probably an equal number of thermonuclear devices. There were allegations made that Japan's pursuit of good relations with the RSA were in part attributable to the former's desire to secure a supply of uranium for an indigenous weapons program.²⁴⁸

Incentives for Japanese acquisition included deterring the Soviet Union and the PRC, as a means to cement national unity, and to achieve global status and influence, although disincentives include the likely adverse reaction of its regional neighbors.²⁴⁹ Japan countered threats from the Communist world by entering into an alliance with the U.S. codified in the 1952 Security-Treaty, the 1960 Treaty of Mutual Cooperation and Security, and the latter's 1970 extension. "With the protection offered by the American nuclear umbrella, Tokyo saw little need to develop its own nuclear armaments."²⁵⁰ The formal U.S. security guarantee were seen to protect Japan from nuclear blackmail or attack from the PRC or USSR, conventional threats from the DPRK, threats to its islands, and interference with its commercial shipping. While Japan's restraint was facilitated by U.S. security assurances, it was nonetheless apprehensive about any attempt by the PRC to exploit its non-nuclear status.²⁵¹

Latent capacity: 1958

Bomb acquisition: no

Trigger event: unspecified

Security: conventional and nuclear threat from PRC and USSR

Alliance: credible nuclear umbrella afforded by U.S.²⁵²

Prestige: seeking global influence

Trade: dependent on access to global market

Domestic: conditionally pacifist population

Japan-1992

The collapse of the USSR in 1991 has removed the single greatest threat to Japanese security, although the apparent liberalization of the PRC has not removed suspicions that it will seek global military status, and hence threaten the viability of Japan. While this striking development has altered Japan's security for the better, at least temporarily, it has not changed its non-nuclear status for the moment because of the persistence of credible U.S. security guarantees. However, Japan has been engaged in the last ten years in an unmistakable development of a latent capability in response to possible nuclearisation developments in the DPRK, and by extension, in the ROK and ROC.²⁵³

Whether Japan will continue to maintain its present passive and non-military posture through the 1990s and beyond depends on two closely related factors: how the Japanese public views the country's security role and how Japanese leaders perceive the changing security environment.²⁵⁴

The once unthinkable topic of Japanese nuclear weapons has become much more frequently discussed, for example, by an outgoing foreign minister who warned that Japan needed the will to defend itself. This issue may be intertwined in the future with a rising Japanese nationalism that is not the inverse of a commercial society, but a product of it. Already there are serious misgivings in some elements in Japanese society over the handicapping effect of the NPT in affording the flexibility needed to confront future security threats. Rightist factions have argued that the alleged Japanese nuclear allergy has been waning in the face of the threat from the DPRK and the disarmament stance of the Tokyo government serves a less useful function as even medium powers are gaining access to nuclear weapons.²⁵⁵

However, it is important to note that this minority group came into being at exactly the same time as the Chinese nuclear tests, and if China continues to test and develop nuclear weapons, it is presumed that their number and influence will grow.²⁵⁶

Japan currently possesses the world's largest nuclear construction program and is expected, in the next thirty years, to extract more plutonium from its civilian reactors that is now contained in the combined superpower arsenals. Japan, in seeking nuclear self-sufficiency, is emphasizing breeder-reactors, despite the obvious proliferation risk because of its weapons-grade output. The danger is amplified by the expected commercial shipment of weapons-grade material between Japan, and the UK and France. There are already reports by the U.S. Defense Department seriously considering the ramifications of Japanese nuclear armament in the medium term:²⁵⁷ "Japan may pursue perfection of a 'ready to go nuclear' status while she can justify her nuclear programs in terms of economic and technological necessity."²⁵⁸

Corollary programs, such as the Japanese dual-purpose H-11 rocket project, despite its greater cost than imported missiles, is clearly an element in the nuclear 'ready-to-go' strategy. This missile class is scheduled to place unclassified surveillance satellites in orbit beginning in 1999. Discussion of the applicability of nuclear anti-submarine weapons for the Japanese Navy has already been under discussion.²⁵⁹

Conditions for the continued Japanese abstinence from nuclear weapons include a credible U.S. nuclear umbrella and

continued efforts in proposing Japan as a permanent member of the U.N. Security Council as an indication of its acknowledged global great nation status. Japan does not interpret the reduction of U.S. forces in the Western Pacific as a weakening of commitment, as do most of the smaller states, but as a pragmatic attempt at strengthening the U.S. economy. Japan is well aware that any decision by it to go nuclear may well trigger an acceleration of regional proliferation and result in a backlash against Japan that may imperil its economic and security interests in the region.²⁶⁰

Latent capacity: 1958
Bomb acquisition: no
Trigger event: unspecified
Security: conventional and nuclear threat from PRC and DPRK
Alliance: credible nuclear umbrella afforded by U.S.²⁶¹
Prestige: seeking global influence
Trade: dependent on access to global market
Domestic: conditionally pacifist population
Energy/Research Reactors: 55/19

Jordan-1980

Jordan currently has no plans for an energy program, let alone nuclear weapons acquisition, although it possesses a sophisticated enough leadership that the nuclear option may at some future date be sought. It has been the recipient of IAEA monies to investigate the possibility of establishing a nuclear infrastructure.²⁶² Jordan has suffered an occasional security threat from all of Israel, Syria, the Palestinian nation and Iraq, and has no enduring counteracting alliances apart from secured arms sales from the UK and U.S.. However, it is poor and thus dependent upon regional markets and financial support for survival. Apart from seeking a suppression of militant Islamic fundamentalism and Palestinian nationalism in order to preserve the legitimacy of the Hashemite kingdom, it has no prestige pretensions.

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified security threat
Security: Israel, Syria, Iraq
Alliance: temporary balance of power relations only²⁶³
Prestige: none
Trade: dependent on access to regional markets and financial and oil support
Domestic: none
Energy/Research Reactors:

Kazakhstan-1992

With the breakup of the USSR, Kazakhstan found itself in possession of a large quantity of nuclear arms (the majority of the 7000 outside Russia), but promptly decided for a non-nuclear status. It acceded to the NPT in February of 1994 and negotiated safeguard agreements for its nuclear facilities with the IAEA. It is also on schedule for the gradual return of nuclear warheads to Russia by mid-1995. Its antiproliferation position was grounded in part on the Western condition that its recognition depended on it acquiring non-nuclear status. As evidence of its compliance, in 1994, Kazakhstan had secretly moved 600 kilograms of enriched uranium from its warehouses into U.S. storage.²⁶⁴

Kazakhstan faces no tangible external security threats, and receives security benefits from the CIS treaty to which it is a party. It further has no prestige claims and is dependent upon Russia as a source for some water, food and energy supplies. Kazakhstan is finally vulnerable to Russian preemption were it to engage in any nuclear weapons procurement program.

Nuclear weapons possession: 1991-1995
Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: CIS association
Prestige: none
Trade: dependent on access to Russian goods and infrastructure
Domestic: none

Libya-1969

Moammar Qaddafi has allegedly been interested in acquiring nuclear weapons capacity for Libya since his ascension to power in a 1969 coup, but what makes this case unusual is that Libya is so heavily surveilled, undeveloped, and untrusted, that it has virtually no chance in the near future. Qaddafi confirmed this objective in a 1975 interview with the Lebanese newspaper An Nahar in which he predicted that Libya too would one day possess a nuclear weapon. Even into the 1990s there is evidence that Libya has continued its program.²⁶⁵

Libyan proliferation efforts began with covert efforts to buy nuclear weapons for \$1 billion at first from the PRC in 1969 or 1970, which were refused, and then by exchanging technology for financing with Pakistan:²⁶⁶ "Up to 1979 Qaddafi had generously financed the Pakistani nuclear program and provided more than 450 tons of uranium, purchased from Nigeria."²⁶⁷ Libya was also identified in a 1973 meeting in Paris with Saudi Arabia, Iraq and Pakistan over the financing

of a collective 'Islamic Bomb'.²⁶⁸

Libya had been refused in a request for Soviet security guarantees and nuclear assistance, and has since turned to smuggling technology from Europe. In the early 1970s it had established close links with Egyptian scientists, despite the actual poor relations between Tripoli and Cairo, at a time when Egypt had all but given up trying to match the Israeli arsenal. As an interim to the nuclear arsenal it has settled for investment in chemical weapons.²⁶⁹

Libya seeks nuclear weapons principally as a means of securing for itself regional power status, and quite possibly to intimidate its neighbors. While its implicit target is Israel, the development of a nuclear weapon is linked to Libya's conception of the need for an 'Islamic Bomb'. Its adherence to the NPT can be interpreted in this context as a mere cover.²⁷⁰ Essentially Libya has no security threats facing it apart from those it has provoked, no alliances apart from other distant pariah states, an overly ambitious prestige objective, and as a key oil exporter, it is not vulnerable to sanctions.

Latent capacity: 2010
Bomb acquisition: yes
Trigger event: arrival of Khaddafi to power in 1969
Security: distrusted by most other states
Alliance: engaged with other pariah states²⁷¹
Prestige: exaggerated regional ambitions
Trade: oil exporting state
Domestic: nationalism
Energy/Research Reactors: 0/1

Malaysia-1990

Although Malaysia has not shown any interest in acquiring nuclear weapons, the fact that it is caught in a fast growth economic region with unresolved disputes may lead it sometime in the near future to its consideration and the pursuit of a latent capability. Malaysia has no immediate security threats, and has no alliance relations apart from the waning Five Powers Defense agreement and the ASEAN consultation process. It has made no prestige claims, although its growth is trade dependent and makes it vulnerable to economic sanctions.

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: latent threats from Indonesia
Alliance: defunct Five Powers Defense Agreement²⁷²
Prestige: none
Trade: partially trade dependent
Domestic: none
Energy/Research Reactors: 0/1

Mexico-1980

Mexico does not pose any proliferation risk in the traditional sense, though it has challenged the U.S. nonproliferation policy on the basis of its unfairness to Non Nuclear Weapon States. It does possess a rudimentary latent nuclear capability. Although it is a strong supporter for a Latin American nuclear free zone, it was the key challenger that blocked a U.S. proposal to introduce stiffer NPT rules for trade in nuclear materials because in return, the nuclear powers would not agree to ban tests. Mexico faces no security threat, is a beneficiary of incidental U.S. security protection, is partially dependent on regional and global market access, and has no discernable prestige claims in the region.²⁷³ Attempts by it to develop nuclear weapons would likely be preempted by the U.S.

Latent capacity: 2005
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: incidental security from the U.S.²⁷⁴
Prestige: limited
Trade: requires access to U.S. and global market
Domestic: limited
Energy/Research Reactors: 2/2

Morocco-1985

Apart from receiving IAEA monies to investigate the possibility of establishing a nuclear energy industry, Morocco offers no evidence of desiring the acquisition of nuclear weapons. As the world's largest exporter of phosphates (it possesses an estimated 50 billion tons) from its possession of the Western Sahara, and as the southern flank of the access to the western Mediterranean, it is considered strategic by the U.S. Morocco concluded a security agreement with the U.S. that led to the end of a low level of hostility with Algeria and reinforced its claim to the Western Sahara.²⁷⁵ Morocco faces no current threat apart from frontier clashes with Algeria, is possessed of a defense arrangement with the U.S., has considerably relaxed its prestige claims since the 1960s, and is partially dependent upon the world market to export its natural phosphates.²⁷⁶

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: security arrangement with the U.S.
Prestige: none
Trade: requires access to U.S. and global market

Domestic: none
Energy/Research Reactors: 0/1

Netherlands-1958

There is no record of any proliferation decision having taken place in the Netherlands: "The production of nuclear weapons is so far removed from the practical considerations of Dutch foreign policy that there is not even an explicit decision not to produce nuclear weapons."²⁷⁷ Although it possessed by 1958 the capability to produce an autonomous nuclear arsenal, it calculated that an alliance such as NATO was sufficient to deter a nuclear attack upon it through the extension of the U.S. nuclear umbrella. The likelihood that Dutch targets would be hit in isolation was considered remote enough that any security venture would be most efficiently expedited as a member of a coalition of states.²⁷⁸

The security threat to the Netherlands consisted of the Warsaw Pact and the USSR, but it was countered by the extended conventional and nuclear deterrence offered by the U.S. and NATO. It was further the beneficiary of six nuclear weapon systems that would have been handed over to its control from the U.S. in time of war.²⁷⁹ Its prestige claims are non-existent and it is highly dependent upon the stability of its access to the European market.

Latent capacity: 1958
Bomb acquisition: no
Trigger event: formation of NATO
Security: Warsaw Pact and USSR
Alliance: security arrangement with the U.S. and member of NATO²⁸⁰
Prestige: none
Trade: dependence upon access to the European market
Domestic: none
Energy/Research Reactors: 2/3

New Zealand-1980

New Zealand has a weak latent capacity and has not engaged in a positive proliferation decision. New Zealand has faced no security threats apart from remote submarine threats to its commerce from the Soviet navy during the Cold War, and these were more than compensated for by its ANZUS alliance with Australia and the U.S.²⁸¹ It has no prestige ambitions and is highly dependent upon trade access that would make any nuclear acquisition decision commercially expensive.

In 1985, due to domestic reasons, New Zealand banned ambiguously nuclear armed, powered or possessing warships, effectively ending its formal security relations with the U.S. and British navies.²⁸² This is illustrative of New Zealand's free-riding tendency because it is aware that irrespective of

its port-docking facility, its exports will not be blocked and it will continue to benefit from incidental security benefits from all its former allies.

Latent capacity: 2005
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: incidental security benefits from U.S. and Australia²⁸³
Prestige: none
Trade: dependence upon access to the global market
Domestic: powerful anti-nuclear advocates
Energy/Research Reactors: 0/0

Nigeria-1970

Nigeria has in the statements of some of its government officials shown a strong desire to acquire nuclear weapons, principally as a means to cement the quest for regional hegemony. The rhetoric to this end has tended to call for the development of nuclear weapons to secure a seat on the U.N. Security Council, or to counteract the apartheid government of the RSA and its alleged nuclear capability by becoming the leader of anti-RSA coalition. In fact, however, Nigeria has no significant nuclear activities that would suggest an actual desire to possess such weapons, apart from calls to deter the RSA:²⁸⁴

During the 1980s, Nigerian leaders repeatedly declared their interest in obtaining nuclear arms, despite the fact that Nigeria is party to the Non-Proliferation Treaty. In August 1987, for example, former Nigerian Foreign Minister Bolanji Akinyemi, implicitly invoking the nuclear threat from South Africa, called for Nigeria to develop nuclear weapons to forestall nuclear blackmail of the black race.²⁸⁵

Nigeria has no threats to its security or vital interests, and is outside most global alliance structures, and has a limited dependence on the global community for trade access and aid. Where nuclear weapons make sense are in Nigeria's pursuit of regional hegemony: "Nigeria, as the largest black country on earth, may need someday a dynamic nuclear foreign policy to back up her size and to elevate national prestige."²⁸⁶ There is however no evidence that the pro-nuclear government statements were designed for anything more than popular consumption.

Latent capacity: 2010
Bomb acquisition: no

Trigger event: unspecified
Security: none
Alliance: none²⁸⁷
Prestige: active desire to become predominant in Western Africa
Trade: dependence upon foreign aid and technology transfer
Domestic: limited
Energy/Research Reactors: 0/0

Norway-1955

Norway acquired latent nuclear weapons capacity in 1965, and a significant research capability as early as the late 1940s. Despite a 1955 recommendation by the Norwegian military that tactical nuclear weapons be made available to its armed forces, whether from external or indigenous sources, it was decided that Norway would retain a non-nuclear status:²⁸⁸

Indigenous production of Norwegian atomic weapons has never constituted a serious policy option. The possible stationing of tactical nuclear weapons under a dual-key arrangement with the United States was the subject of rather intense examination [but not done]...²⁸⁹

Security threats to Norway came from the Warsaw Pact and the USSR, but was counteracted by its nuclear and conventional umbrella provided by NATO and the U.S. Norway has no prestige requirements and is very dependent upon access to the global market and community.

Latent capacity: 1965
Bomb acquisition: no
Trigger event: 1955 military report
Security: Warsaw Pact and USSR
Alliance: NATO and U.S.²⁹⁰
Prestige: none
Trade: dependence upon foreign markets
Domestic: none
Energy/Research Reactors: 0/2

Pakistan-1972

Pakistan is attributed with a positive proliferation decision by President Bhutto in Multan on January 1972, in the wake of its defeat in the 1971 Third Indo-Pakistani War in which East Pakistan was dismembered. However, the infrastructural groundwork was begun as early as 1966 with the formation of the Atomic Energy Commission. The stated purpose of the program was to counter India's substantial conventional military and its significant but undemonstrated nuclear weapons capability. The CIA claimed to have detected

Pakistan's program as early as 1974. The principal trigger event for the decision was Pakistan's bitter experience of defeat in 1971, and particularly its abandonment by its superpower ally, the U.S.²⁹¹

Pakistan's nuclear program began with weapons-dedicated facilities in the 1960s, although its interest and earliest nuclear infrastructure was emplaced in the 1950s. Relying upon its foreign-educated diaspora and repatriated students, and smuggling of nuclear plans for processing technology, by 1986 Pakistan had an indigenous enrichment process and sufficient weapons-grade material for one to four nuclear weapons per year. Despite a plethora of technical problems typical of crash-programs, its capacity since increased to five to ten devices per year.²⁹²

Allegedly Pakistan has had two crucial links in its program: one, with various sympathetic Moslem countries which have provided capital and uranium, and two, the PRC, which has offered technical advice and testing facilities. Indian reports suggest that in the 1970s and early 1980s Pakistan was making use of Niger uranium supplies and was a recipient of Libyan and Saudi financing (in return for which it would provide nuclear weapons, in the case of Libya, or nuclear guarantees, in the case of Saudi Arabia):²⁹³

It was reported that as early as 1973, Saudi representatives met in Paris with Pakistani, Libyan and Iraqi envoys to explore the creation of a Pan-Islamic atomic weapons development program proposed by Pakistan which has been one of the closest allies of Saudi Arabia and was one of the earliest and foremost eager supporters of King Feisal's Pan-Islamic Movement in the 1960s.²⁹⁴

According to the CIA, help from the PRC came in the form of technical assistance, and supposedly test resources linked to a speculative Pakistani detonation in Xinjiang in May 1983 (the test detonation was attended by Pakistan's foreign minister). However, Pakistan came under strong U.S. pressure in September 1986 and thereafter apparently ceased its use of PRC aid.²⁹⁵

Pakistan's essential reasons for pursuing nuclear weapons capability are as a counter-city deterrent and battlefield weapon to offset the superior Indian conventional ability and nuclear program. More peripherally it provides Pakistan with the prestige of having developed the first Islamic bomb necessary to continue receiving financing and guaranteed oil supplies from wealthy Islamic states such as Libya, Saudi Arabia and the Persian Gulf States.²⁹⁶

The loss of East Pakistan to India, coupled with the Indian-Soviet Defense Agreement of 1971, and the inability of the PRC and the unwillingness of the U.S. to assist Pakistan during the 1965 and 1971 wars, was the principal Pakistani

motive for nuclear weapons acquisition. The peripheral benefits related to intimidating foreign supporters of its tribal separatists, and of achieving technological leadership status in the Moslem world alone could not justify the alienation of foreign sources of aid and arms and the possibility that any proliferation activity would make impossible a diplomatic settlement with India. While there was overwhelming public support for a Pakistani bomb, the public reaction was weighed quite low by a leadership seeking to redress a disastrous military defeat. Where public reaction had been harnessed was in the Pakistani linking of its potential nuclear capability over the resolution of the crisis in the Kashmir.²⁹⁷

Despite Pakistan's 1959 security treaty with the U.S., it was always rather loose and was weakened by U.S. attempts to limit Pakistan's nuclear aspirations. Where the USSR posed a threat, being in a Cold War context, U.S. (and even UK) security guarantees were considered credible, but this same umbrella did not extend to Pakistan's regional conflicts:²⁹⁸ "It has also been argued that Pakistan's plea for security guarantees from the great powers against Indian nuclear threat went unheard."²⁹⁹ In effect, Pakistan had no disincentives to proliferate in the context of its regional rivalry with India.

Pakistan sought the prestige of being the first nuclear Islamic state in order to generate the support in the Middle East necessary to sustain its oil and financial assistance. Additionally, nuclear capability offers it the legitimacy it otherwise lacks because of its heterogenous national identities and its artificial creation as a state. The reliance on a secular democracy weakened Islam as the organizing basis for its national identity, particular among those who viewed India's long term objective as the absorption of Pakistan, and thus reinforced the nuclear option.³⁰⁰

In terms of domestic forces, since the principal advocate against nuclearization prior to 1971, the military, promptly reversed its decision after its 1971 defeat, it has formed a strong nuclear bureaucracy. The nuclear program has since become associated with powerful nationalist and religious forces, been linked with issues such as Kashmir, and enjoyed overwhelming popular blessing. While the support of these elements was unnecessary to start up the program, it will not be possible to decelerate it without their backing.³⁰¹

Latent capacity: 1986

Bomb acquisition: yes

Trigger event: defeat in the 1971 Indo-Pakistani War

Security: India and USSR

Alliance: treaty with U.S. versus USSR , none to counter India³⁰²

Prestige: state legitimacy and technological prestige to obtain support

Trade: willingness to sacrifice conventional arms dependence

on U.S.

Domestic: intermeshing of nuclear issue with nationalism

Pakistan-1988

Evidence either of Pakistani nuclear ambition or capability from public statements can be evinced as far back as 1974 and most recently in the 1994 statement of former prime minister Mian Nawaz Sharif, in which he claimed that Pakistan unequivocally has the nuclear bomb. This marks for Pakistan an important shift away from practiced nuclear opacity and denial, and entry into overt political exploitation of the weapon as a deterrent and compellent, and as such an entry of the weapon into political significance beyond the simple Indo-Pakistani dyad. While there are claims that Pakistan had halted further nuclear research on the basis that it had achieved the necessary level of nuclear deterrence, they are unlikely and without precedence, particularly given Pakistan's ongoing interest in ballistic missiles.³⁰³

A retired Pakistani general denied yesterday that he had said Pakistan had tested a nuclear weapon. Gen. Mirza Aslam Beg, who was Chief of Staff of the Pakistani Army from 1988 to 1991, was quoted in a report on Friday as saying Pakistan had built a nuclear bomb and carried out a successful laboratory test of it in 1987.³⁰⁴

Zulfikar Ali Bhutto himself declared in 1978: 'Pakistan is on the threshold of full nuclear capability.'... American nonproliferation pressure toward both India and Pakistan has not been quite effective because of increasing nationalism of the two countries and conflicts between the US nonproliferation policy and geopolitical interests in the region.³⁰⁵

Pakistan's ranking as the ninth state to join the global nuclear club, and the first Islamic state to do so, was being boasted through informants as early as 1987, confirming preceding CIA claims. U.S. intelligence sources had concluded that Pakistan either had a small arsenal already in place or one which was quickly assembleable. Pakistan has also been accused of initiating research on miniaturization technology necessary for battlefield weapons, although this and thermonuclear technology would still take a number of years to be developed.³⁰⁶

Indian reports have stated that the PRC revived its relationship with Pakistan in a 1986 nuclear cooperation deal that culminated in a 1988 nuclear test for Pakistan at Lop Nor (this time based on the visits by Abdul Qadir Khan, one of

Pakistan's chief nuclear scientists). If production was undertaken at full capacity, Pakistan should have a stockpile that could reach 430-520 kg by 1995, or sufficient for 20-25 nuclear warheads.³⁰⁷

Although its security threat from India is constant, Pakistan's deterrence strategy against India seems to be evolving around the capability of striking at New Delhi and Bombay. Although the alliance relationship with the U.S. has been weakened, particularly by legal restrictions placed upon the U.S. executive in assisting proliferating states, there is still debate within Pakistan itself on the optimal strategic course. The first school, and the weakest, recommends nuclear autonomy, while the second pro-American school continues to emphasize links necessary to acquire advanced conventional weapons that cannot be obtained from the PRC. The third, nationalist Muslim, school, advocates that Pakistan align itself according to Islamic objectives and position itself to counter all of India, the U.S., and Israel. Although the third school is gradually overtaking the second, they are both progressively being subordinated to the first school whose policy is being de facto implemented.³⁰⁸

Pakistan's pursuit of status has more to do with linking its nuclear capability with high-stakes objectives, as in the Kashmir, than in transferring its nuclear technology to those states that offered it support, such as Libya. Nonetheless, Pakistan has chosen to sacrifice its commercial relations for strategic autonomy, especially in the facts that it has threatened its trade with the U.S. (which amounts to ten percent of its economy), and the leases on a large portion of its navy.³⁰⁹ This has further weakened Pakistan's ability to modernize because of threats upon its international credit and access to Western technology: "Washington's 1990 decision to cut all military and economic aid to Pakistan has aggravated Islamabad's balance-of-payment crisis and prompted other Western nations to link assistance with non-proliferation pledges."³¹⁰

Nuclear weapons have even become elements in Pakistan's domestic inter-party rivalry as each seeks to seize from the other the more hawkish platform, and this has implications in strengthening any further proliferation decision that is made.³¹¹

Nuclear weapons possession; 1990

Latent capacity: 1986

Bomb acquisition: yes

Trigger event: sufficient capability for overt deterrence-1988

Security: India and USSR

Alliance: U.S. versus USSR , none to counter India³¹²

Prestige: state legitimacy and technological prestige to gain support

Trade: willingness to sacrifice conventional arms dependence on U.S.

Domestic: intermeshing of nuclear issue with nationalism
Energy/Research Reactors: 1/1

Peru-1980

There is no record of Peru seeking a nuclear weapons option, although indications that it is seeking some special weapons capability in allegations that it is involved in chemical weapons production may indicate a future nuclear interest.³¹³ Peru is under no significant inter-state security threat, is the beneficiary of no alliances, has no prestige claims, but is nonetheless vulnerable to trade sanctions if local states or the U.S. chose to retaliate through trade. The domestic situation is likely to act as a disincentive as long as the level of domestic disorder persists.

Latent capacity: 2000
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: none
Prestige: none
Trade: partial dependence on foreign trade
Domestic: civil disorder may deter a weapons program
Energy/Research Reactors: 0/2

Philippines-1975

There is no evidence that the Philippines has any immediate desire to engage in the production of nuclear weapons, despite alleged medium-term capability to manufacture an option and the current attribution of a latent capacity. "The Philippines, consistent with the national interest, adopts and pursues a policy of freedom from nuclear weapons in its territory."³¹⁴ Apart from ambiguous and residual threats from all of the USSR, PRC, Japan, and Vietnam, and territorial disputes with Indonesia and Malaysia, the Philippines has no tangible security threats facing it. This is coupled with an implicit security guarantee from the U.S. based at least on their long history of security interaction. It is heavily dependent on the international migration of its workers and credit to the extent that it has no incentive to jeopardize those interests, and it further has no nuclear prestige claims.

Latent capacity: 1975
Bomb acquisition: no
Trigger event: unspecified
Security: intangible
Alliance: U.S. security guarantees³¹⁵
Prestige: none
Trade: interdependence with U.S.

Domestic: none
Energy/Research Reactors: 0/1

Poland-1991

Poland reaffirmed its non-nuclear intentions after its 1991 independence in part because of its reliance on Western credit for development and eastern energy supplies, although it has possessed the nuclear option since the mid-80s.³¹⁶ The West, particularly Germany, has offered it NATO membership, suggesting at least a strong incidental security benefit to Poland. What threat may emanate from Russia is realistically remote, and Poland itself has no notable nuclear-linked prestige objectives: "The security solution preferred by the Poles (and others) is a deepening of links to the West, not a national nuclear weapons program, despite the prominence of this theme in the strange Polish presidential campaign of Stanislaw Tyminski in 1990."³¹⁷ In essence, Poland is committed to non-nuclear status.

Latent capacity: 1991
Bomb acquisition: no
Trigger event: independence in 1990
Security: long-term fears of Russia only
Alliance: incidental Western security guarantees
Prestige: none
Trade: dependent on Western credit for development
Domestic: none
Energy/Research Reactors: 0/3

Portugal-1975

Despite its NATO membership, Portugal was remote enough that the only security threat was to its shipping in the unlikely event that general war broke out in central Europe. Its membership in NATO, the collapse of its remaining colonial possessions in 1974-5, and consequently its global prestige, and its needed access to international markets characterised its essential non-nuclear status, despite a recognition of some latent capacity.³¹⁸

Latent capacity: 1975
Bomb acquisition: no
Trigger event: collapse of colonial possessions in 1974-5
Security: few
Alliance: NATO membership with security guarantees³¹⁹
Prestige: none
Trade: dependent on Western markets
Domestic: none
Energy/Research Reactors: 0/1

People's Republic of China-1957

The precise positive proliferation decision-event by the Communist Chinese leadership occurred somewhere between 1956 and 1958, and as such is situated in 1957, with the initiation of the actual program beginning in 1958. The reconfiguration of the program to carry on without Soviet assistance occurred about 1959.³²⁰

The successful culmination of the program was facilitated in part to assistance from the USSR:

The Chinese success must be attributed in some part to the Soviet Union's careless gift of aid which could readily be used for military purposes, which was given in the hope that the Communist alliance (by which perhaps maintain enough leverage to veto any Chinese bomb decisions) might yet thereby be preserved.³²¹

This assistance would allow the PRC, whose program had started a decade after India's, to precede the latter's first test detonation by ten years. The majority of the weapons from the program are either mobile or stored in the Himalayas. The PRC had pursued a deterrence triad of missiles, bombers and a ballistic missile submarine that was achieved by the late 1980s, and its nuclear arsenal was expected to double between 1986-96. Despite its clear nuclear status, the PRC has one of the most ambiguous nuclear doctrines, with a completely undiscernible set of guidelines for operational employment.³²²

The PRC's pursuit of nuclear weapons was partially influenced by the security threat it recognized in the U.S. (it had threatened the PRC with nuclear attacks in 1953 during the Korean War and in 1958 during the Second Taiwan Straits Crisis). More vaguely, it sought nuclear weapons to counter those states that would resist its push for world revolution and to counter fears of a recurrence of a traumatic Sino-Japanese conflict. After the Sino-Soviet split, the USSR was also viewed suspiciously.³²³

Although the PRC was the formal beneficiary of security guarantees, including nuclear, from the USSR, the latter's reluctance to assist the PRC in the Quemoy-Matsu Crisis, in the Korean War Stalin had encouraged, and in its support of Indonesian Communists, led to a weakening of the credibility of the deterrence. In effect, the USSR's offer was defensive and did not purport to offer the PRC protection from compellence in any of its adventurist campaigns. Implicit nuclear threats from the U.S. and UK during the 1962 Sino-Indian conflict may have led to an early termination of the campaign and further reinforced its program.³²⁴

In 1959 the USSR unilaterally breached the 1957 technology sharing agreement, completed the withdrawal of its assistance by 1960, and left a profound effect upon the PRC's

determination for strategic autonomy. The absence of a reliable alliance, in part because of the PRC's reckless foreign policy, was a function of its strong prestige desire for global power status, and its belief that nuclear weapons would deliver that power.³²⁵

There is evidence that symbolically, at least, nuclear weapons confer status in that there was a mere eight year difference between the PRC's first nuclear detonation and admission to a seat on the UN Security Council. Certainly prestige was a paramount motivation for the PRC. While nuclear weapons have had some beneficial effects on its international prestige and influence, as well as its place in East Asia, their effect has been exaggerated:³²⁶

Even China's much-vaunted attainment of super-power status, which seemed to many to be a natural consequence of its combination of vast population and nuclear weapons, did not materialize. Its economic weakness limited its ability to exert more than a regional influence.³²⁷

Evidence that there exists a double-standard between states that may venture toward nuclear weapons and those that may not is evinced by the fact that there was only limited dissuasion either in the form of economic costs or international censure to the development of the PRC's nuclear weapons arsenal.³²⁸

Nuclear weapons possession: 1964

Latent capacity: 1957

Bomb acquisition: yes

Trigger event: conclusion of Quemoy-Matsu Crisis

Security: U.S., Japan, eventually the USSR

Alliance: non-credible association with the USSR³²⁹

Prestige: strong pressure for global status

Trade: independent

Domestic: none

Energy/Research Reactors: 3/8

Republic of China (ROC) -1974

With the rise of U.S. interests in befriending mainland China in the early 1970s, Taiwan became increasingly apprehensive at the reliability of the security guarantees offered it by the U.S. As a consequence, between 1974-75, the Taipei government elected to initiate a nuclear weapons program. The attempt to build a secret plutonium extraction plant was discovered, and after a combination of U.S. diplomatic pressure and threat of economic sanctions, the decision was reversed in 1977-78. Given the lag in the whole decision process, it is treated as a single case with an extended decision time. Taiwan, however, did not fully abandon

its objective of seeking to keep the nuclear option open by further developing a weapons-related nuclear infrastructure, for which it had a covert interest since the 1960s.³¹⁰

Taiwan's principal motive for nuclear weapons was as a deterrent to counter invasion threats it faced from the PRC and circumstantially in response to weakening U.S. alliance guarantees. It was also a means of demonstrating national viability and legitimacy by demonstrating strategic autonomy. Taiwan's security threat revolved around the fact that the PRC did recognize the ROC and did not hide its intention to eventually unify the two, by force if opportune.³³¹ For Taiwan to develop nuclear weapons, it must also pass through the option to operational stage very quickly because of its military vulnerability: "China has said repeatedly that it would invade Taiwan if Taipei deployed atomic weapons."³³²

The reliability of U.S. security guarantees were undermined by the Sino-American Shanghai Communiqué, and the subsequent withdrawal of U.S. troops from Taiwan, coupled with the parallel failures of the U.S. in Vietnam and in the lack of assistance for its ally Pakistan in 1965 and again in 1971. The U.S. further decelerated its arms sales to the ROC in order not to alienate Beijing. In a 1974 CIA report, the link between Taiwan's proliferation decision and the quality of its alliance relationship was heeded.³³³

Despite the apparent decision to proceed with a nuclear option, the ROC is described as not having made a positive proliferation decision because of evidence that the decision itself was a component of a sophisticated strategy to pressure a return of strong U.S. security guarantees and to gain international support, which it ostensibly did. It simultaneously demonstrated willingness to exercise a nuclear capability and thus offered the ROC as a credible alternative to the Beijing interpretation of China.³³⁴

The overriding disincentive to nuclear weapons acquisition was the ROC's trade, security and arms reliance on the U.S., and its dependence for uranium and other energy supplies from other foreign states. Any move to nuclear weapon status by a medium to small country would likely result in economic sanctions, particularly in Northeast Asia.³³⁵

Latent capacity: 1965

Bomb acquisition: no

Trigger event: Shanghai Communiqué

Security: invasion threat from the PRC

Alliance: alliance with the U.S.³³⁶

Prestige: limited

Trade: partial dependence on U.S. and foreign markets

Domestic: none

Republic of China (ROC)-1987

In 1987, the ROC began the secret construction of a small scale plutonium extraction unit with the intention of producing nuclear weapons. As with the 1974 case, this was also motivated by questions surrounding the reliability of the U.S. security commitments and the general impression that it was withdrawing from Asia. There is little doubt, from a technological viewpoint, that the ROC could build an unsafeguarded fuel cycle without external assistance, despite a strict plutonium-reshipment and control regime with the U.S.³³⁷

In March 1988, under U.S. pressure, Taiwan agreed to halt the construction of the facility in accordance with a secret agreement and to supplementarily dismantle a Canadian research reactor. Although it is estimated that there is currently no active program, U.S. administration officials contended that Taiwan was deliberately developing the requisite nuclear weapons infrastructure.³³⁸

The security circumstances were identical with the 1974 case in that the ROC was not confident in the U.S. commitment to its independence and security. Notwithstanding the apprehensions, Taiwan is sufficiently confident in the U.S.'s strategic dependence on its location that it will rise in importance in relation to the PRC as the Soviet threat subsides.³³⁹

Taiwan served U.S. strategic interests as a base from which to monitor and, if need be, attack mainland China... Through the 1970s and much of the 1980s, however, the importance of Taiwan to U.S. interests declined. Washington attached far greater value to strategic relations with mainland China, which could serve as a counterweight to the Soviet Union.³⁴⁰

To the U.S., the ROC lies astride key sea lanes of communication (SLOCs) linking Southeast and Northeast Asia, and it has in turn secretly offered its bases to U.S. forces in the event of a regional crisis. In addition, both the ROC and the U.S. have close interests in the promotion of free enterprise, free trade and democracy in Asia. With the emergence of democracy, the ROC's traditional assumption of being linked with the mainland has been undermined by the rise of an independence movement, which has been greeted with great hostility by the PRC. As with the 1974-case, the fundamental and overpowering disincentive to the making of a positive proliferation decision is the ROC's trade and security dependence on the U.S.³⁴¹

Latent capacity: 1965
Bomb acquisition: no

Trigger event: drift of U.S. towards the PRC in mid-1980s
Security: invasion threat from the PRC
Alliance: alliance with the U.S.³⁴²
Prestige: limited
Trade: partial dependence on U.S. and foreign markets
Domestic: none
Energy/Research Reactors: 6/6

Republic of Korea (ROK)-1971

The South Korean decision to proceed with the development of nuclear weapons was initiated in 1971 or early 1972 in response to a report from the Weapons Exploitation Committee recommending a nuclear weapons capability. This decision was uncovered by the U.S. in 1978 and reported to Congress.³⁴³ The triggering event for the positive proliferation decision was the progressive withdrawal of U.S. troops from the ROK, but the decision was reversed when the U.S. reacted to reinforce its alliance credibility in response to South Korean complaints.

The ROK's capability was developed enough that by 1976 its scientists possessed the necessary theoretical and technical knowledge to begin construction, although it already had an early latent capacity by 1972. It further had opportunity to divert plutonium from spent fuel in its civilian energy program.³⁴⁴

South Korea's underlying motive was to deter invasion from the DPRK, or, in the eventuality, to deter its nuclear threats. Statements from government officials and even President Park before and during the 1975 ratification of the NPT hinted continuously that the ROK's commitment to nonproliferation was wholly dependent on U.S. security guarantees. These statements were coupled with references to the ROK's capability to engage in weapons production if necessary, to offset the vulnerability caused by the withdrawal of U.S. troops.³⁴⁵

The U.S. withdrawal began in 1971 with the removal of two divisions in accordance with the Nixon Doctrine that U.S. allies fight their own battles. In 1976, President Carter declared his intention to withdraw all remaining U.S. troops over the next four to five years:³⁴⁶ "Two months after Carter's announcement, South Korean officials stated that if the United States would go through with the plan, South Korea would build its own nuclear weapons..."³⁴⁷ This was critical decision because it was a similar withdrawal in 1949 that is believed in the ROK to have caused the Korean War. The ROK's threat to embark on a nuclear weapons program resulted in a reaffirmation by the U.S. in 1975 that it would retain the use of nuclear weapons on the peninsula to counter an attack by the DPRK.³⁴⁸ Thus, the ROK's alliance with the U.S. was the crucial factor:

The key variable in South Korea's motivational profile is nuclear ally, its defense alliance with the United States. This dissuasive condition minimized the effects of such motive conditions as nuclear threat (China), overwhelming conventional threat (North Korea plus China), and regional nuclear proliferation (China-1964).³⁴⁹

The second most critical factor acting as a disincentive to the acquisition of nuclear weapons by the ROK was its dependence on its access to U.S. and global markets:³⁵⁰ "The threat of an economic cutoff [with the US] was particularly potent."³⁵¹ The U.S. also threatened to revoke its nuclear security guarantee in the event that the ROK sought nuclear autonomy. The only notable domestic element that put pressure for nuclear weapons are some quarters of the South Korean military.³⁵²

Latent capacity: 1972

Bomb acquisition: no

Trigger event: U.S. military withdrawals in 1971

Security: invasion threat from DPRK

Alliance: alliance with the U.S.³⁵³

Prestige: limited

Trade: partial dependence on U.S. and foreign markets

Domestic: none

Republic of Korea (ROK)-1990

It was alleged by one news source that the ROK had reinitiated a nuclear weapons program and it was currently underway in 1993, although there was a failure in making a distinction between a weapons program and the steady improvement of a latent capability. As can be best ascertained, the ROK is not currently engaged in a weapons acquisition program. Certainly the ROK has the technology to build the unsafeguarded reactors necessary for the rapid assembly of nuclear weapons without external assistance.³⁵⁴

The ROK's principal motive is security against invasion by an increasingly impoverished and desperate DPRK. The DPRK's isolation by the PRC and Russia may lead to a more erratic foreign policy that may in turn lead to conflict with the ROK. Despite the PRC's pursuit of peninsular stability and its objective of preserving old communist regimes from collapse to perpetuate its own legitimacy, its economic interest in the ROK has weakened its security guarantees to the DPRK, consequently reducing its tempering influence.³⁵⁵ The DPRK is furthermore engaged in a nuclear weapons program which is viewed very seriously from Seoul. The ROK may eventually choose security autonomy as the U.S.'s regional credibility is diminished, though that threshold will not be crossed any time soon:

Increased nationalism and desire for independent national defense in South Korea can rekindle the country's nuclear-weapons development program at any time.³⁵⁶

For the moment the ROK has confidence in the U.S. security guarantees, despite the latter's relatively aggressive diplomatic behavior with the DPRK. It is made optimistic, as well, by the reluctance of the PRC to openly threaten its veto power on sanctioning the DPRK for its nuclear program. The ROK is unlikely to engage in a nuclear weapons program, despite a nuclearized DPRK, until its own resources can provide security greater than the benefit of the U.S. alliance because of its dependence on international political support and market access. The ROK is reliant upon U.S. technology and fuel-cycle services, as well as supplies of enriched uranium and the handling of spent fuel, and can thus be debilitatingly sanctioned. It is further predisposed to operate five operational nuclear weapon systems that may be handed over to it by the U.S. in the event of war.³⁵⁷

Lat. at capacity: 1972

Bomb acquisition: no

Trigger event: 1990 DPRK nuclear weapons development

Security: nuclear threat from DPRK

Alliance: alliance with the U.S.³⁵⁸

Prestige: limited

Trade: partial dependence on U.S. and foreign markets

Domestic: none

Energy/Research Reactors: 14/3

Republic of South Africa (RSA)-1974

The first public hint that Pretoria was interested in the development of a nuclear device occurred in some 1965 statements by members of the South African Atomic Energy Board. The point at which a positive proliferation decision-event occurred was in 1974, when it was decided to begin the construction of nuclear weapons, with the later aborted decision to execute a nuclear test planned for August of 1977. Although the construction of a nuclear weapon was considered as far back as the first few years after the victory of the National Party in 1948, advocacy for the project by the military was saliently evident in the early 1970s.³⁵⁹

By 1968 the RSA had the minimum infrastructure necessary to begin the manufacturing of nuclear weapons, and by 1977 the principal manufacturing plant was on-line, at the low cost of \$200 million and only four hundred workers:³⁶⁰

South Africa began research on the peaceful uses of nuclear explosives (so-called 'PNEs') in 1971; the programme was approved by the government in 1974. Within a few weeks of taking office in 1978, Mr.P.W. Botha had re-directed the programme to military ends, envisaging the production of seven nuclear warheads, six of which were actually manufactured; the first in 1980 and the last 1989.³⁶¹

The RSA had also begun research on a missile program of which there is evidence that its intended range was about 1,000 miles, putting much of southern Africa within reach of the RSA's nuclear arsenal.³⁶²

The RSA's principal incentive was its security concern in the form of a conventional attack from neighboring black African states, further reinforced by the presence of the Cuban and Soviet militaries in southern Africa after the collapse of the Portuguese colonies of Angola and Mozambique in 1975:³⁶³

In explaining the 1974 decision of the South African government to 'develop a limited nuclear deterrent capability', President de Klerk maintained that 'it was taken... against a background of a Soviet expansionist threat in Southern Africa, as well as prevailing uncertainty concerning the designs of the Warsaw Pact members.'³⁶⁴

South Africa's nuclear weapons were never envisioned for internal use, principally because its internal security apparatus was more than adequate. Although the RSA's conventional forces were sufficient to repulse two of three of Africa's largest states in any combination (Nigeria, Zaire, or Ethiopia), the first and last were too distant and it shared an arrangement with the second. The criteria for use of nuclear weapons would either be as instruments to pressure the West for support or in conditions where this support was already alienated and demographic targeting to its north would prove diplomatically beneficial in easing the military pressure on its borders.³⁶⁵

Because of its apartheid policy, the RSA was unable to win the alliance relationship it felt necessary to guarantee its protection against the 'total onslaught' it viewed coming from communist Africa. To the RSA, the U.S. was abandoning Africa to communism. Nonetheless, the U.S. retained sufficient influence through its assistance in the construction of the Simonstown naval base, its customer relations as an importer of strategic minerals, and their cooperation in assisting UNITA that the U.S. could at least keep the RSA from open deployment.³⁶⁶ Thus, nuclear weapons were employed to demonstrate national viability by making the RSA a regional

power reinforced by nuclear weapons acquisition.

The RSA had already been isolated and rendered an international pariah so that economic or political pressure would have had little effect. The RSA could, by targeting the NPT, pressure the West for political assistance or ambiguously threaten the regime by revealing its test sites.³⁶⁷

Nuclear weapons possession: 1980

Latent capacity: 1968

Bomb acquisition: yes

Trigger event: imminent collapse of the Portuguese colonies

Security: future conventional threat from black African states

Alliance: international pariah, despite treaties affecting superpower security³⁶⁸

Prestige: demonstrate national viability

Trade: isolated from normal commercial relations

Domestic: none

Republic of South Africa (RSA)-1993

In March 1993 the RSA admitted that it had produced six nuclear weapons between 1980 and 1989, and had declared that it reversed its proliferation status by destroying its nuclear arsenal between 1990 and 1991. In 1990, the uranium enrichment facility was shut down.³⁶⁹

The dismantling of apartheid and liberalization of the political system removed the domestic segregation incentives for making the RSA confrontational with the remainder of black Africa, and hence removed its security concerns. Its *de facto* status as a regional economic power did not require nuclear weapons for enforcement, and although it did not possess any new alliances, it was no longer an international pariah.³⁷⁰ The RSA additionally sought to denuclearize itself to facilitate its entry into international trade and to remove fears that an inexperienced African government would acquire nuclear weapons.

As soon as Mr de Klerk took office it was apparent that the days of the white minority government were numbered. If South Africa were to retain its nuclear arsenal and the means of expanding it, the arsenal would relatively soon come under the control of a multiracial or purely black government (or possibly of white extremists who might make a desperate bid to seize control). Indeed, there had been a few African voices that looked forward to South Africa as the first black nuclear-weapon state.³⁷¹

Latent capacity: 1968

Bomb acquisition: no

Trigger event: 1990 imminent collapse of apartheid

Security: few

Alliance: none³⁷²

Prestige: none
Trade: partial dependence on world commerce
Domestic: internal liberalization lead to greater security
Energy/Research Reactors: 2/1

Romania-1985

It was revealed in 1992 that the Ceaucescu regime had initiated a nuclear weapons project sometime in the 1980s (1985 according to the Russian intelligence service), albeit at an extremely slow pace.³⁷³ The time span within which the program was conceived would have taken it, despite the presence of an espionage network geared to smuggling nuclear material, probably more than a decade.³⁷⁴ Romania faced no security threat apart from the highly constraining influence of the USSR. It possessed no *bona fide* alliances, sought regional prestige, particularly vis-a-vis the Balkans, and was constrained by some regional trade interdependence, particularly access to the Mediterranean.

Latent capacity: 1975
Bomb acquisition: yes
Trigger event: access to Candu reactor
Security: constraining influence of USSR
Alliance: no legitimate alliances
Prestige: regional power status
Trade: partial dependence on regional market access
Domestic: domestic nationalism

Romania-1991

There is no record of Romania making a nuclear weapons proliferation decision since the collapse of the Warsaw Pact and the uprising that toppled the Ceaucescu government, but it does possess a moderate nuclear infrastructure out of which to produce a nuclear option in the future.³⁷⁵ It faces no security threats, despite minor territorial disputes with its neighbors, and possesses no alliance association, although it has shown interest in NATO membership. It has no prestige claims and is partially dependent on market access to develop its economy.

Latent capacity: 1975
Bomb acquisition: no
Trigger event: 1991 toppling of Ceaucescu
Security: minor
Alliance: none
Prestige: none
Trade: partial dependence on access to European market
Domestic: none
Energy/Research Reactors: 4/2

Russia Federation-1991

Following the collapse of the USSR, the independent state of Russia decided to retain nuclear weapons as a continuation of the policy of the USSR: in many respects its interests are geopolitically similar. Russia continues to have security concerns, nuclear in terms of the PRC, Europe, and the U.S., and conventional concerns from some neighboring states: "Russia cannot afford to be flanked by newly nuclear states on its southern borders; or to allow the ethnic strife in and between ex-Soviet republics to turn nuclear."³⁷⁶ Its possesses no deterring alliances and continues to possess strong prestige incentives, at least regionally in the heartland of Asia. As a large economy and energy exporter, it is not susceptible to international embargo.

Nuclear weapons possession: 1991

Latent capacity: 1942

Bomb acquisition: yes

Trigger event: 1991 collapse of the USSR

Security: perceived moderate threats from the PRC and other states

Alliance: none

Prestige: strong regional status claims

Trade: independence from global market

Domestic: none

Saudi Arabia-1973

It appears that in 1973 there was a secret meeting in Paris between state representatives from Saudi Arabia, Pakistan, Libya and Iraq over the construction of a nuclear weapon, but evidence since that encounter gives no suggestion that Saudi Arabia has attempted to develop such a weapon on its own. Although it has significant sums to invest in nuclear infrastructure, and tried in 1975 to secretly purchase a nuclear reactor from France, there have been no hints since then that it is pursuing a nuclear project. Given its current resources, Saudi Arabia could develop nuclear weapons within about a decade.³⁷⁷

Saudi Arabia has faced security threats from Iran, Iraq, and more the populous Yemens, as well as Israel, and has a military capacity that is realistically insufficient to deal with the first two. It may thus seek nuclear weapons to offset the conventional superiority of its northern neighbors, to deter their nuclear weapons programs, or to challenge their pursuit of regional hegemony. Generally, however, the acquisition of nuclear weapons would result in an increase in tension incompatible with the commercial requirements of the oil-exporting Gulf states.³⁷⁸

The key counter to these security threats is the special alliance association with the U.S. that dates back to the

1950s, and is most evident in the sale of AWACS and F-15s, the naval escorts made available in the Persian Gulf during the 1980s and the quick reaction during and after the 1991-Gulf War. The implicit nuclear umbrella offered to Saudi Arabia is made more credible by the knowledge of its importance as an oil exporting state. Saudi Arabia has likely identified that it receives better security from the U.S. than it would a from a national nuclear weapon arsenal, and has signified this by submitting to U.S. diplomatic pressure and adhering to the NPT. Additional incentives for nuclear weapons include its pursuit of regional power status, already evident in its purchase of long range missiles from the PRC, as custodian of Mecca, and the largest oil producer after Russia.³⁷⁹ Saudi Arabia is restrained, however, by its dependence on imported arms and foodstuffs.

Considering that Saudi Arabia probably helped finance the Pakistani bomb, and the close security relationship between the two states, it is possible that Pakistan may in turn be bound to provide some extended deterrence security the moment its technical capability is up to the task.

Latent capacity: 2000

Bomb acquisition: no

Trigger event: 1973 Arab defeat in October War

Security: threats from Iran, Iraq, Israel

Alliance: special relationship with the U.S.³⁸⁰

Prestige: regional status claims to counter those of Iran and Iraq

Trade: dependence on imported food and arms

Domestic: none

Energy/Research Reactors: 0/0

Singapore-1991

Although there is no evidence that Singapore has engaged in a positive proliferation decision, the 1990 Iraqi invasion of Kuwait had a profound impact on Singapore's security perceptions. Coupled with the dramatic rise in regional defense expenditures as a function of the development of local economies, Singapore has developed a moderately sophisticated conventional force designed, as is claimed by one source, to carry out regional interventions to protect diaspora Chinese.³⁸¹ Singapore, which was once the military target of Indonesia in the 1960s, and has since had numerous ethnic disputes with Malaysia, is a small city-state that is both wealthy enough to purchase the region's most advanced air force and insecure enough at least to contemplate undertaking measures necessary to develop nuclear weapons.

Singapore's alliance disincentive is grounded on a base access agreement with the U.S., and a less credible Five Power Defense Arrangement between it and Malaysia, the UK, Australia and New Zealand. Its fear of communist, and particularly PRC

and Soviet threats to its commercial lanes, upon which it depends, have diminished in the early 1990s.³⁸² The detection of a Singaporean nuclear weapons program is likely to result in a debilitating commercial isolation from its neighbors.

Latent capacity: 2000
Bomb acquisition: no
Trigger event: 1990 Iraqi invasion of Kuwait
Security: threats from Indonesia and Malaysia
Alliance: loose association with U.S. and UK
Prestige: none
Trade: very dependent on open sea lanes
Domestic: none
Energy/Research Reactors: 0/0

Spain-1975

Spain demonstrated a short-lived interest in the establishment of a nuclear-weapons infrastructure, which was subsequently revised with its political liberalization, indicated by its accession to the NPT regime under U.S. diplomatic pressure. This is qualified by a 1976 statement by Spain's Foreign Minister that affirmed its commitment to a nuclear option. While Spain unquestionably could have built a nuclear weapon by the turn of the century, the absence of security threats and prestige claims, and the likely adverse reaction of other European states deterred it from the program.³⁸³

Latent capacity: 1968
Bomb acquisition: no
Trigger event: 1975 collapse of Franco regime
Security: none
Alliance: NATO membership in 1982³⁸⁴
Prestige: none
Trade: dependent on access to European markets
Domestic: none
Energy/Research Reactors: 9/1

Sweden-1968

Sweden initiated a nuclear weapons program in 1945, immediately after the Second World War, and had established a military research organization distinct from the civilian energy sector by 1947. Following almost twenty years of deliberately developing a latent nuclear capability, in which it succeeded by 1965, the Swedish government's final decision not to cross the threshold in February 1968 was publicly declared by the Parliamentary Commission on Defense. Sweden's early nuclear course was initiated by its 1949 refusal to join NATO and a 1952 Air Force report recommending the acquisition of nuclear weapons.³⁸⁵

Although the specific development of the option itself was by no means consistent, decelerating and accelerating through 1958-9, Sweden continued its interest in the techniques of bomb manufacture in response to a military request in 1965. This evolution continued at a controlled pace in part because it provided Sweden a delay that allowed it to put off the critical decision.³⁸⁶

Sweden and Switzerland are two cases in point. In each of these cases, national interest was perceived as being better served by forswearing nuclear weapons than by obtaining them or by retaining an option to decide one way or the other at a future time. And in both cases, national interest was seen as better served by making a formal commitment to this effect than by a unilateral declaration of intent.³⁸⁷

While there is little dispute over the establishment of a significant nuclear infrastructure in Sweden, there remains a dispute over the precise capability level it achieved by 1968. At the positive end of the spectrum it is claimed by one newsgathering source that Sweden has secretly stockpiled up to ten nuclear weapons since 1972, while another source suggests that Sweden assembled a single 20-kiloton prototype as early as 1958. Mainstream sources suggest that Sweden had operational plans for weapons assembly by 1965, and a marginal spectrum source claims that Sweden never had the capability because it was reliant on weapon-grade materials that were under consistent surveillance:³⁸⁸

To be sure, Sweden never had the technical means to acquire nuclear weapons. After 1958, proponents of acquisition had based their plans on obtaining weapons-grade material from the unsafeguarded Marviken plant... Development for military purposes was only possible under these conditions by abrogating international treaty obligations.³⁸⁹

Sweden's essential incentive to develop nuclear weapons was to preserve its neutrality and security by deterring the conventional and nuclear forces of the USSR and Warsaw Pact. In a 1957 Supreme Commander's Report (OB 57), it was argued that Sweden would need nuclear weapons, particularly of a tactical nature, to deter a conventional strike by the Soviet Union:³⁹⁰ "Sweden's defense would be strengthened by the ability to deliver these weapons by aircraft against an invasion force."³⁹¹

Although the military began planning the integration and doctrine for nuclear weapons use as early as 1957, it was ultimately decided that Sweden's security situation would worsen had its nuclear acquisition been known, although an

ambiguous option-capability was retained.³⁹²

The principal disincentive to Swedish nuclear weapons acquisition was its secret alliance association with NATO and the U.S.. In exchange for the extension of the U.S. nuclear umbrella over Sweden, it was directly and indirectly pressured from developing its nuclear weapon option:³⁹³ "Starting in 1956, the bilateral nuclear cooperation agreements negotiated between the United States and Sweden prohibited the use of American-supplied nuclear materials and equipment for nuclear explosives, or for research on nuclear explosives."³⁹⁴ In exchange for the security guarantees, Sweden undertook to lengthen its airfields for possible NATO use and integrated its intelligence gathering and military planning with NATO. Sweden was also the beneficiary of incidental security benefits: it was considered strategically and geographically important enough by NATO that an isolated attack upon it without a Western European response was highly unlikely.³⁹⁵

Sweden has no prestige claims that are not already satisfied in Scandinavia through its economic predominance. Sweden's foreign policy is directed at optimizing commercial access with the rest of Europe and the world, an objective that would have been threatened had Sweden crossed the threshold: "Swedes have bitter memories of being blockaded and cut off from essential imports in two world wars in which they took no part."³⁹⁶ Although there was general consensus supporting the nuclear option, the only faction supporting the crossing of the threshold was the military, which was faced down by equally powerful political opposition.³⁹⁷

Latent capacity: 1965

Bomb acquisition: no

Trigger event: alliance association with NATO and U.S.

Security: conventional and nuclear threats from Warsaw Pact

Alliance: bilateral security relations with U.S.

Prestige: none

Trade: dependent on access to European markets

Domestic: none

Energy/Research Reactors: 12/2

Switzerland-1958

The Swiss consideration of the acquisition of tactical nuclear weapons began in 1954 at the instigation of its military strategists urging modernization, and was reinforced by the threatening Soviet moves into Hungary in 1956 and against the West in general. This culminated in a press release by the government on July 11, 1958, that it felt inevitably compelled to acquire tactical nuclear weapons to protect its neutrality. Two initiatives, in 1962 and 1963, were overwhelmingly rejected by the electorate and gave the government *carte blanche* over the course of nuclear policy. In

part because of incidental security benefits received from NATO, there is no evidence that Switzerland had developed nuclear weapons.³⁹⁸

Although Switzerland has the technical knowledge to build nuclear weapons, its infrastructure is underdeveloped because of the difficulty of its obtaining unsafeguarded nuclear materials. Switzerland currently has the materials to assemble a few such devices, but the arsenal would hardly be politically significant in the nuclear intensive central Europe of the Cold War. Instead, Switzerland chose to pursue the nuclear option at a slow rate, perhaps to prepare the crossing of the threshold in a crisis situation.³⁹⁹

Its principal incentive to develop nuclear weapons was the conventional and nuclear threat that was posed by the Warsaw Pact, although the overpowering disincentive was the incidental security benefit of being geographically nestled within NATO, despite the absence of any formal alliance. Switzerland's ability to repulse a Soviet onslaught, ultimately, rested upon the likelihood of NATO's direct assistance.⁴⁰⁰

Among the government's reasons for not committing her to a nuclear course is that she is surrounded by friendly powers which have no territorial ambitions against her. Should a major nuclear confrontation develop between East and West in Europe, Switzerland, if seriously threatened or actually attacked, would come under the NATO umbrella... Switzerland's safety valve for the foreseeable future remains NATO.⁴⁰¹

Switzerland has no prestige claims nor any particularly differentiating domestic factor in its nuclear decision making process, but like other small landlocked European states, it is heavily dependent upon trade access to the rest of Europe to maintain its economic and political viability.

Latent capacity: 1965

Bomb acquisition: no

Trigger event: 1956 Soviet invasion of Hungary

Security: conventional and nuclear threats from Warsaw Pact

Alliance: incidental security benefits from NATO

Prestige: none

Trade: dependent on access to European markets

Domestic: none

Energy/Research Reactors: 5/5

Syria-1967

Syria, because of a recognized lack of ability and the abbreviated political horizon within which it was operating in

the 1960s and 1970s, particularly as it was responding to the Israeli strategic challenge, did not even seriously consider an indigenous nuclear weapons option. Although it was the recipient of IAEA financial aid to establish civilian nuclear energy programs, it would be subject to safeguards and of little covert use.⁴⁰²

Nonetheless, Syria had a serious security motive, particularly after its defeats in 1967 and 1973 to Israel. Nuclear weapons would facilitate the deterrence of Israel's ambiguous nuclear capability and superior conventional forces. Though this motive has been partially assuaged by success in the development of chemical weapons, it should be interpreted as only a temporary surrogate.⁴⁰³

The deciding disincentive was the alliance relationship with the USSR that provided diplomatic deterrence, principally, but was extended to conventional and nuclear deterrence in special crises.

Syria's decision not to go beyond its nascent nuclear infrastructure was influenced by the nuclear guarantees extended to it by the Soviet Union. Syria's defense minister Mustafa Tlas and Soviet Officials asserted that the Soviet Union would assist Syria militarily, including using tactical nuclear weapons, if the latter were to be attacked by Israel.⁴⁰⁴

Although the USSR had refused to provide Syria with an overt nuclear guarantee or a ready made nuclear device, the Syrian defense minister confirmed while being interviewed by Der Spiegel, and Kuwaiti and Syrian newspapers that the USSR would deploy nuclear weapons on its behalf if Israel did so.⁴⁰⁵ Syria's prestige incentives are marginal and are limited to achieving influence in Lebanon, as are those commercial connections that are vulnerable to sanction in the event it chose to cross the threshold. There are no determining domestic factors.

Latent capacity: 2000

Bomb acquisition: no

Trigger event: defeat in the 1967 and 1973 wars with Israel

Security: conventional and nuclear threats from Israel

Alliance: informal nuclear and conventional extended
deterrence from the USSR⁴⁰⁶

Prestige: none

Trade: none

Domestic: none

Syria-1992

Although the precise timing is unknown, Syria is alleged by the U.S. Arms Control and Disarmament Agency to have begun

a nuclear weapons project in response to the collapse of its superpower guarantor, the USSR, in 1991.⁴⁰⁷ Although its attempts to develop a latent nuclear option can be found as early as 1978, when it secretly negotiated with India to obtain nuclear arms, it "...does not have the ability to do so in the near future."⁴⁰⁸ Syria's attempt to create a nuclear option included sending its specialists to France for training, and is best indicated by Syria's continued investment in a wide range of chemical weapons and nuclear capable missiles.⁴⁰⁹

Syria's security problem has become more acute in the 1990s because of the demise of its security guarantor, and the emergence of its rival, Iraq, in the strategic weapons field.⁴¹⁰ "Today the Assad regime faces the harsh reality that any conflict with Israel entails hostilities with a state backed by the world's only superpower, the United States."⁴¹¹ Syria has no significant prestige claims, nor domestic factors restraining its nuclear interest. It is currently isolated from aid and investment, particularly with the U.S., because of its terrorist-state status.⁴¹²

Latent capacity: 2000

Bomb acquisition: yes

Trigger event: collapse of the USSR in 1991

Security: conventional and nuclear threats from Israel

Alliance: none

Prestige: none

Trade: none

Domestic: none

Energy/Research Reactors: 1/0

Thailand-1989

There is some concern in the U.S. over the possibility of a Thai nuclear weapons program, based almost exclusively on a dramatic rise in its technical interest. However, despite evidence of Thai cooperation with Argentina and India over the sale of advanced nuclear research reactors, and the latter's signing of a nuclear cooperation agreement, it has apparently canceled the most recent reactor purchase because of escalating costs. There are other indications that Thailand is interested in chemical weapons production, which may indicate an eventual interest in nuclear weapons.⁴¹³

While Thailand has no immediate security threat since the departure of Vietnam from Kampuchea, apart from an intangible threat from the PRC, it faces no dangers sufficient to trigger a nuclear weapons project. Thailand's Cold War alliance with the U.S. has been sufficiently weakened to be considered nonfunctional in affairs that do not directly affect the latter.⁴¹⁴ Thailand's prestige claims to Indochina are considered secondary at the moment to internal economic development. To this end, Thailand is vulnerable to sanctions

that may be raised if such a program became known, particularly among its ASEAN colleagues. There are no distinguishing domestic factors.

It is far more likely that Thailand is engaged in non-weapons related infrastructural development as a product of its general economic growth, and as safeguard against the possibility of its oil resources running out.

Latent capacity: 2000

Bomb acquisition: no

Trigger event: withdrawal of Vietnam from Kampuchea

Security: few

Alliance: weak association with U.S.⁴¹⁵

Prestige: latent regional aspirations in Indochina

Trade: partially dependent as foreign markets

Domestic: none

Energy/Research Reactors: 0/1

Turkey-1990

Although there is no consistent evidence that Turkey has decided to engage in nuclear weapons production, it has sought a nuclear weapons option that was established, according to one account, by the late 1980s. Another account places Turkey's latent capacity at around the end of the century. Evidence for this includes its acquisition of a heavy-water reactor predisposed to facilitating training with weapons-grade fuels, and evidence relating its covert nuclear technology transactions with Pakistan:⁴¹⁶ "The State Department suspects that Pakistan 'may have offered Turkey nuclear technology in exchange for its cooperation."⁴¹⁷ A former Greek prime minister, A. Papandreou, has even suggested that Turkey is in the process of building a bomb with Pakistani assistance.⁴¹⁸

Turkey's Cold War motive for the development of nuclear weapons, the conventional and nuclear threat posed by the USSR, was replaced after its collapse in 1991 by the threat of the proliferation of nuclear weapons to Turkey's neighbors in Iraq and Iran, particularly the former. Although it has also been accused of seeking nuclear weapons to compel its non-nuclear Greek neighbor, this is a reasonably unlikely motive. This incentive is wholly subordinated to Turkey's highest security priority, which is the maintenance of good relations with the U.S., which, as a NATO member, is the beneficiary of extended conventional and nuclear deterrence. Turkey is further in possession of four operational nuclear weapon systems that may be handed over by the U.S. in time of war.⁴¹⁹

Turkey has limited prestige claims and no particularly notable domestic factors, although in its attempt to secure access to the European Union, revealing a nuclear weapons program would jeopardize that vital objective and this is doubtful so long as the development of its economy is the

principal domestic concern.

Latent capacity: 2000

Bomb acquisition: no

Trigger event: 1990 Iraqi nuclear weapons program

Security: Warsaw Pact and Middle Eastern dictatorships

Alliance: strong security alliance with U.S.⁴²⁰

Prestige: limited prestige claims

Trade: partially dependent on foreign markets, particularly the EU

Domestic: none

Energy/Research Reactors: 0/2

Ukraine-1991

The collapse of the USSR left the new state of Ukraine in possession of nuclear weapons, and its positive nuclear proliferation decision, or rather, the absence of a decision to comply with the removal of the nuclear weapons, has classified it as a nuclear weapons state. Ukraine's capability is confused given that it controls warheads, but not the missiles (which are controlled by Moscow) and while it can maintain warheads, the Ukraine has never actually built one, despite its thousands of scientists.⁴²¹

The implied reasons that the Ukraine chose to retain nuclear weapons were principally related to its security concerns over the threat of Russian intervention, justified by history, and the large Russian minority in the eastern Ukraine. J.J. Mearsheimer has argued that the Ukraine could not normally rely on the West for its security because of their distance, but that the possession of nuclear weapons could at least pressure them to offer some form of association with NATO.⁴²²

Other explanations for Ukraine's stance are either that it had not yet made a clear decision, but did not want to foreclose the option, or that it sought nuclear weapons status but was not prepared to embrace the international consequences of an unambiguous weapons capability, or finally, that it sought to use the weapons as fungible tradeoffs for non-security related benefits, perhaps energy.⁴²³ None of these motives were informed by either prestige options, of which the Ukraine has none, nor tempered by domestic or trade factors. In fact, as can be ascertained in the reversal of its decision in 1994, the Ukraine's motivation stemmed in part from the inexperience of its state structure and for reasons related to domestic conditions.

Nuclear weapons possession; 1991-94

Latent capacity: 1991

Bomb acquisition: yes

Trigger event: collapse of the USSR in 1992

Security: perceived threats from Russia

Alliance: none
Prestige: none
Trade: energy dependence on the Russia
Domestic: insecure state amplified security problem

Ukraine-1994

On November 16, 1994, newly elected President Kuchma of Ukraine ratified the NPT and resumed Ukraine's project of military denuclearization. The dramatic change of policy was driven as much by the change of government, which viewed dangers of Russian intervention in eastern Ukraine less likely, which had resolved most of the dispute over the Black Sea Fleet, and which was less fearful of Russian nuclear compellence, as by a natural strengthening of the state. The previous government was less experienced, less stable, and hence, more likely to inadvertently exaggerate security threats or refuse to ratify international agreements.⁴²⁴

The Ukraine's perception of a security threat from Russia subsided, its awareness of its dependence upon the latter's energy supplies and on international financial assistance to rebuild its economy grew, and the normalization of its domestic situation led to a nuclear weapons decision reversal.⁴²⁵

Latent capacity: 1994
Bomb acquisition: no
Trigger event: victory of Kuchma as President
Security: none
Alliance: none
Prestige: none
Trade: energy dependence on the Russia
Domestic: normalization of domestic politics

United Kingdom-1942

Following the British Government's establishment of the Maud Committee in April 1940 to explore the feasibility of a fission bomb, and its report that such a weapon 'could prove decisive in war', it was initially decided to proceed with the program. Because of short term priorities imposed by the conduct of World War II, the UK was unable to run an independent program and thus in 1942 decided instead to assist in the early stages of the Manhattan project.⁴²⁶ The UK was eventually cut out of the program by the U.S. and the project was put aside by the British government until after the conclusion of the war.

The principal incentive for the project was the war, although the close alliance with the U.S. made victory a strategic inevitability and thus reduced the need for the development of weapons of desperation. The UK's prestige motives were entirely tied to the success of the resolution of

its security challenges, and it had no trade or domestic factors.

Latent capacity: 1947

Bomb acquisition: no

Trigger event: 1940 Maud Committee findings and World War Two

Security: threat to survival posed by Axis

Alliance: alliance with U.S.

Prestige: synonymous with security

Trade: none

Domestic: none

United Kingdom-1947

The British nuclear weapons program began immediately after the Hiroshima attack on October 29, 1945, with a determination to secure a nuclear-weapons infrastructure. With its establishment in 1947, the positive proliferation decision was made in January 1947, with the principal object being the preservation of prestige vis-a-vis the two new superpowers.⁴²⁷

The principal security threat to the UK emanated from the USSR, both to itself and to its colonial possessions abroad, and nuclear weapons were the principal method by which it intended to offset its numerical weakness in manpower. They would also provide a nuclear deterrent to the USSR's expected nuclear capability, and counter threats in the colonial possessions where the U.S. nuclear umbrella did not extend:⁴²⁸ "The British moved to acquire national nuclear arms, in part to reestablish themselves as an international force just at the time the empire was beginning to crumble, and in part to demonstrate their continued progress and value to a powerful American ally."⁴²⁹

Although the links between the UK and the U.S. were strategically close, there was nonetheless questions about the reliability of a U.S. extended deterrence once the USSR could place warheads on U.S. soil, as well as a worry that the U.S. could return once again to an attitude of isolationism leaving the UK strategically stranded. The UK had an independent claim to global status, even if as a medium power, in large part because of its preceding tradition and colonial possessions, even after the Indian subcontinent's independence.⁴³⁰

The UK was undissuaded by the threat of economic sanctions, despite a U.S. denial of atomic technology, because it had emerged relatively less damaged than the remainder of Europe. Furthermore, the nuclear weapon arsenal met with little domestic opposition.⁴³¹

Nuclear weapons possession: 1952

Latent capacity: 1947

Bomb acquisition: yes

Trigger event: achievement of latent capacity in 1947

Security: threat to interests posed by USSR
Alliance: alliance with U.S.⁴³²
Prestige: seeking to reestablish global prestige
Trade: none
Domestic: none
Energy/Research Reactors: 38/10

United States-1942

Although preliminary nuclear research programs began as early as 1939, with a government organization set up by 1941, it was not until between June and September 1942 that presidential authorization was given for a full scale program, known as the Manhattan Project. The program was initiated with Germany as the target, although by 1944 it had become clear that Japan would be the sole remaining Axis power at its completion. The U.S. also had post-war compellence uses for the weapon in mind, particularly against the USSR, and to that end had decided as early as 1944 to preserve the project's secrecy.⁴³³

Although the technology was available to the U.S. after its demonstrated use on Japan, the weapon would not actually receive full confidence as strategic asset until after their success in deterring the USSR during the 1948 Berlin Crisis: "From this it was not hard to conclude that a larger nuclear stockpile would be even more effective, a definite and distinct asset in any possible future confrontation."⁴³⁴ Although some claim the nuclear weapons were considered for a significant post-war role, in fact, "...U.S. nuclear bombs were actually used for ensuring victory against the enemy."⁴³⁵

Thus, the overriding incentive for the development of nuclear weapons was to counter the possibility of a similar program underway among the Axis powers, and to decisively apply the weapon to war termination. This attitude that nuclear weapons were entirely war-related would persist into the early post-war period. The U.S. was concurrently aware of prestige incentives in the compellent use of nuclear weapons to determine the precise economic and political order of the world community:⁴³⁶

As the international control debate continued, Washington also began to discover that possessing the bomb did not readily translate into the political leverage that some imagined. Truman may have briefly believed, at the time of the 1945 Potsdam Conference, that the bomb could be applied as a diplomatic lever... The Soviets may have feared the bomb. But they disguised their concern and convinced Western policymakers that they would not be easily intimidated.⁴³⁷

The U.S. was unaffected by any of the alliance, trade or

domestic disincentives to the development of a nuclear arsenal.

Nuclear weapons possession: 1945
Latent capacity: 1942
Bomb acquisition: yes
Trigger event: presidential approval of Manhattan Project
Security: threat to U.S. posed by possible Axis nuclear weapons program
Alliance: none.
Prestige: seeking to reestablish global order
Trade: none
Domestic: none
Energy/Research Reactors: 111/65

Union of Soviet Socialist Republics-1945

Although it appears as if Stalin and the Defense Committee formally initiated the nuclear weapons program in the summer of 1942, with its start in 1943, it was not until the summer of 1945 that the project got seriously underway. The immediate requirements of winning the war and absence of resources was the principal source of delay in initiating a comprehensive program. The principal Soviet consideration was the maintenance of its security given the possession of these weapons by the most powerful of the 'capitalist' states, coupled with the latter's general threat to the USSR's pursuit of global prestige.⁴³⁸

Realistically, no one could deny that the 1945 American nuclear test and its post-World War development of nuclear weapons were serious threats to the prestige and security of the Soviet Union, which in turn sped the latter's impulse to catch up.⁴³⁹

The USSR had no alliance or trade disincentive, nor a notable domestic factor; the USSR's pursuit of nuclear weapons was entirely the product of its concern over its strategic vulnerability and the threat to its international prestige.

Nuclear weapons possession: 1949
Latent capacity: 1945
Bomb acquisition: yes
Trigger event: end of World War Two
Security: U.S. nuclear capability
Alliance: none.
Prestige: seeking to reestablish global order
Trade: none
Domestic: none
Energy/Research Reactors: 52/24

Uzbekistan-1991

There is no record of Uzbekistan having shown any interest in nuclear weapons, but it possesses a limited nuclear infrastructure left by the industrial projects of the USSR. It possesses no apparent security threats, has no prestige claims, and is both the beneficiary of the CIS Treaty and incidental security benefits from Russia. It is vulnerable to the cutoff of its water supply, thus making any nuclear weapons bid unlikely. It has further sought Western recognition by satisfying the condition of certifying its non-nuclear status.⁴⁴⁰

Latent capacity: 2010

Bomb acquisition: no

Trigger event: 1991 collapse of the USSR

Security: limited

Alliance: CIS Treaty and incidental security benefits from USSR

Prestige: none

Trade: dependent on water supply

Domestic: none

Venezuela-1980

There is no evidence that Venezuela has ever considered developing a nuclear weapons option, despite the probability that if in the late 1970s or early 1980s it had decided for such an option, it could have equipped itself by the end of the century. It has no serious security threats, receives incidental security benefits from the U.S. and is a signator of the Rio Treaty. It has very marginal regional status claims, and is very likely to suffer debilitating sanctions from the U.S. if it undertakes such a program.⁴⁴¹

Latent capacity: 2000

Bomb acquisition: no

Trigger event: unspecified

Security: none

Alliance: Rio Treaty⁴⁴²

Prestige: none

Trade: proximity to U.S. could lead to embargoing its oil exports

Domestic: none

Energy/Research Reactors: 0/1

Vietnam-1980

Vietnam has shown no evidence of a desire for nuclear weapons, despite its receipt of a research reactor. Nonetheless, it faced a security threat from the PRC, which grew over time as the latter developed industrially,

culminating in an invasion in 1979. This was countered by a close security interaction with the USSR that brought with it conventional and nuclear extended deterrence in the event of a dire threat to its survival.⁴⁴³ This acted as well as a disincentive to an independent nuclear capability because of an adverse Soviet and PRC reaction. Vietnam was furthermore economically isolated, had only marginal prestige claims, particularly in Kampuchea (that were satisfiable through conventional military force), and no overriding domestic variable.

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: threat from the PRC and possibly U.S.
Alliance: security arrangement with USSR⁴⁴⁴
Prestige: limited
Trade: none
Domestic: none

Vietnam-1992

Vietnam's strategic situation changed in 1991 with the collapse of its security guarantor, the USSR, but it continued to show no sign of an interest in nuclear weapons. It is estimated to have an early latent capability. It has shown interest in chemical weapons, which may indicate an underlying security concern sufficient at some future date to trigger a weapons proliferation project.⁴⁴⁵ While the security incentive to invest in a nuclear weapons program persisted in the threat posed by the PRC, the emerging disincentive came in the form of Vietnam's attempts to economically liberalize, requiring access to foreign markets and investment and thus avoiding military provocations. Vietnam had, as before, no particular prestige or domestic factors.

Latent capacity: 2010
Bomb acquisition: no
Trigger event: collapse of the USSR
Security: threat from the PRC
Alliance: none⁴⁴⁶
Prestige: limited
Trade: need to attract foreign investment
Domestic: none
Energy/Research Reactors: 0/1

Yugoslavia-1965

At some time in the 1960s, Yugoslavia briefly considered, but rejected, the proposal to engage in an autonomous strategic weapons program on the basis that its security could be guaranteed at far less political and economic cost.

Although possessed of a latent capacity since the 1970s, the temptation of building an elaborate weapons-oriented infrastructure was resisted, in part, because of the U.S. and NATO security guarantees offered in return for Tito's cooperation as far back as the late 1940s. This informal arrangement was designed to counter Yugoslavia's perceived threat from the USSR and the Warsaw Pact, although these guarantees would have been threatened, and Yugoslavia's net security likely decreased, had it chosen an autonomous nuclear capability.⁴⁴⁷

Latent capacity: 1970
Bomb acquisition: no
Trigger event: unspecified
Security: threat from the USSR
Alliance: informal security guarantees from the U.S. and NATO
Prestige: none
Trade: none
Domestic: none
Energy/Research Reactors: 1/3

Zaire-1980

Zaire has shown no reported interest in nuclear weapons, although it does possess the potential for the generation of a latent capability, and possesses a small research reactor that was purchased prior to its independence. It faces no inter-state security threat, has no alliances because of its human rights pariah status, (despite supporting Western anti-communist security interests), has no discernable prestige claims, and is partially dependent on international trade to export and import vital goods and its natural minerals.⁴⁴⁸

Latent capacity: 2010
Bomb acquisition: no
Trigger event: unspecified
Security: none
Alliance: none⁴⁴⁹
Prestige: none
Trade: partially dependent
Domestic: none
Energy/Research Reactors: 0/1

APPENDIX ENDNOTES

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