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Section IV. Minimum Deterrence: Promises of Effectiveness at Very Low Nuclear Force Levels

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Table of Contents

Introduction.....	1
Underlying Presumptions.....	10
Testing Minimum Deterrence Presumptions and Arguments.....	13
Reliable Predictions	13
Societal Threats.....	17
History and Minimum Deterrence Presumptions About Deterrence Decision Making	20
Four Illustrative Cases	21
Bottom Line	29
Cognition, Decision Making, and Deterrence.....	30
Recent Experience, Including Conflicts Involving Gains or Losses	30
Prospect Theory	31
Role of Emotion.....	33
Perception or Misperception of Threats.....	35
Attribution of Credibility to U.S. Deterrence Threats	38
Distorted Decision Making.....	38
Bottom Line	39
Minimum Deterrence Promises: Why the Future Will be Different From the Past	40
Deterrence via Conventional Superiority.....	41
Russia and China: No Pertinent Threat.....	44
Problems of Logic.....	46
Minimum Deterrence vs. Evidence of the Deterrence Value of Greater Numbers	47
Nuclear Crisis Outcomes	48
Why Might Nuclear Force Numbers Matter?	49
Bottom Line	51
Summary and Conclusions: Available Evidence and Minimum Deterrence Promises of Deterrent Effect at Very Low Nuclear Force Levels.....	53
Annex A: Details of the Analysis	A-1
Annex B: Details of the Analysis.....	B-1

Section IV. Minimum Deterrence: Promises of Effectiveness at Very Low Nuclear Force Levels

Introduction

The most prominent elements of the Minimum Deterrence narrative, unsurprisingly given its subject, are its presumptions and arguments about the functioning of deterrence and the requirements for deterrence. Over the course of decades to the present, the fundamental theme of Minimum Deterrence proposals has been that U.S. nuclear deterrence requirements, in quantitative and qualitative terms, are far less than the extant U.S. arsenal at the time or plans for that arsenal. At heart, Minimum Deterrence offers a theoretical and policy framework for defining “How much is enough?” in terms of the quantity and the qualities of the U.S. nuclear arsenal. Minimum Deterrence proposals claim that the United States can and should reduce its nuclear arsenal quantitatively and limit its qualities, and that the United States can do so while retaining an arsenal adequate for nuclear deterrence purposes. This theme linking claims about specific limits on the quantitative and qualitative requirements for deterrence and the advocacy of deep U.S. nuclear reductions has been the consistent mainstay of Minimum Deterrence proposals for decades.

In this regard, Minimum Deterrence proposals typically focus on a specific number or narrow range of U.S. nuclear weapons that they identify as adequate for U.S. nuclear deterrence and extended nuclear deterrence (i.e., the U.S. nuclear umbrella for allies) purposes, now and in the future. For example, “No current or conceivable threat to the United States requires it to maintain more than a few hundred survivable nuclear weapons. The delivery of fewer than a hundred warheads could destroy the society and economy of any country, and tens of detonations could kill more people than have ever been killed in any previous war.”¹ There is no single number commonly deemed as adequate for deterrence by all Minimum Deterrence proposals. They do,

¹ Union of Concerned Scientists, *The Obama Administration’s New Nuclear Policy: An Assessment of the “Nuclear Posture Review,”* (Washington, D.C.: Union of Concerned Scientists, April 8, 2010), available at http://www.ucsusa.org/nuclear_weapons_and_global_security/nuclear_weapons/policy_issues/Obama-administration-npr.html.

however, typically identify a specific number or a range from “several second-strike nuclear weapons” to “hundreds.”²

On occasion, the specified number of U.S. nuclear weapons deemed adequate for deterrence is linked directly to the number and type of an opponent’s targets to be threatened for deterrence purposes. For example, one such proposal asserts that the “assured” U.S. nuclear capability to retaliate “against only ten cities” would be adequate;³ another asserts that U.S. nuclear deterrence needs would be met, even “in extremis,” by the number of weapons necessary to destroy Russia’s “economic and military potential”—judged to be well below 1000 deployed weapons.⁴

Minimum Deterrence presentations typically assume, implicitly or explicitly, that the opponent’s targets to be held at risk for deterrence purposes should be societal assets, e.g., civilian population, industry, energy infrastructure, transportation hubs, etc. As one prominent British Minimum Deterrence proponent recently acknowledged: “The proponents of MD [Minimum Deterrence] tend to agree that a ‘counter-value’ strategy that targets population centres and perhaps a few regime-specific strategic targets per opponent is sufficient to deter prospective nuclear opponents.”⁵ Or, as a prominent U.S. academic commentator on the subject, Professor Robert Jervis, observed with regard to deterrence and the threat of societal destruction: “The healthy fear of destruction, which cannot be exercised short of the attainment of a first-strike capability, *makes deterrence relatively easy*.”⁶

In fact, the opponents’ assets to be held at risk for deterrence purposes may be a key to the deterrent effect achieved. Most obviously, if the opponent does not value its assets held at risk by the United States, the intended deterrent effect logically will not be realized. If deterrence is

² See a listing of such recommendations in, Keith B. Payne and James R. Schlesinger, *Minimum Deterrence: Examining the Evidence* (Fairfax, VA: National Institute Press, 2013), pp. 4-5.

³ Bruce Blair, Victor Esin, Matthew McKinzie, Valery Yarnich, and Pavel Zolotarev, “Smaller and Safer,” *Foreign Affairs*, Vol. 89, No. 5 (September-October 2010), p. 10.

⁴ Ivo Daalder and Jan Lodal, “The Logic of Zero: Toward a World Without Nuclear Weapons,” *Foreign Affairs*, Vol. 87, No. 6 (November/December 2008), p. 85.

⁵ Ted Seay, *Minimum Deterrence: Examining the Examination*, British American Security Information Council, September 4, 2013, available at <http://www.basicint.org/blogs/2013/09/minimum-deterrence-examining-examination>.

⁶ Robert Jervis, “Why Nuclear Superiority Doesn’t Matter,” *Political Science Quarterly*, Vol. 94, No. 4 (Winter 1979-1980), pp. 617-618. (Emphasis added).

to function reliably *in extremis*, as is the officially declared U.S. goal, the value the opponent attributes to the U.S. deterrent threat must be paramount in its calculation of benefits and risks: the prospective cost of the U.S. deterrent threat must be decisive in the opponent decision making and overshadow any conceivable gains from an attack on the United States and allies.

Over many years, most Minimum Deterrence commentary and proposals have asserted the connection between threats to U.S. opponents' societal assets and "easy" deterrence requirements:

- "Would the Soviets be deterred by the prospect of losing ten cities? Or two cities? Or fifty cities? No one knows, although one might intuitively guess that the threshold is closer to ten than to either two or fifty."⁷
- "It is hard to imagine that the leader of any nation would order the initiation of nuclear war knowing that even one city in his own land would probably be destroyed. However, to avoid any doubts, American defense planners for the past several years have used the ability to kill 25 percent of the Soviet population as the criterion for an 'assured destruction' capability...Much lower casualty levels would undoubtedly deter any remotely rational leader."⁸
- "As we look ahead a few years into the future, the total Responsive Force should have 400-500 warheads, a number comparable to the operationally deployed one. This number would be adequate to target roughly 200 additional Russian sites, for example, those affecting industrial recover—the major nodes in the electric power grid and air, ground, and rail transportation systems, as well as major industrial sites."⁹
- "The targeting scheme offered here is for the transitional minimal deterrence mission on the path toward nuclear zero...A new targeting category and policy that we term infrastructure targeting would focus on a series of targets that are crucial to a nation's modern economy, for example, electrical, oil, and energy nodes, transportation hubs."¹⁰
- "Many planners still contend that deterrence also requires the ability to retaliate against an opponent's leadership bunkers and nuclear installations...But this Cold War doctrine

⁷ Glenn Snyder, *Deterrence and Defense: Toward a Theory of National Security* (Princeton, NJ: Princeton University Press, 1961), p. 57.

⁸ Herbert Scoville and Robert Osborn, *Missile Madness* (Boston: Houghton Mifflin, 1970), p. 17.

⁹ Sidney D. Drell and James E. Goodby, *What are Nuclear Weapons for? Recommendations for Restructuring U.S. Strategic Nuclear Forces* (Washington, D.C.: Arms Control Association, October 2007), p. 15.

¹⁰ Hans M. Kristensen, Robert S. Norris, Ivan Oelrich, *From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons* (Washington, D.C.: Federation of American Scientists and the National Resources Defense Council, April 2009), pp. 31-32.

is out of date. Deterrence today would remain stable even if retaliation against only ten cities were assured.”¹¹

- “The bottom line is that approximately one-third of Russia’s citizenry become casualties from an attack with only 150-200 warheads. Obviously, through the choice of targets, the United States can hold at risk any number of Russian citizens from zero up to these egregiously high levels with only a few hundred strategic nuclear warheads...Regardless of our actual targeting policy, under their worst case planning assumptions, our friends in Russia would know that our weapons hold millions of people at risk.”¹²

In the 1960s, Secretary of Defense Robert McNamara’s *declaratory policy* regarding nuclear deterrence policy identified a specific U.S. threat to Soviet society (population and industry) as a basis for nuclear deterrence. In his then-classified *Draft Presidential Memorandum*, Secretary McNamara identified the U.S. strategic nuclear requirements for deterrence as the U.S. ability to destroy “25 percent of [Soviet] population (55 million people) and more than two-thirds of [Soviet] industrial capacity.”¹³

This “Assured Destruction” measure represented the “flat of the curve” with regard to the number of U.S. nuclear weapons and the consequent level of destruction of Soviet population and industry. Beyond a specific number of weapons, the additional level of societal destruction possible with each additional weapon rapidly diminished. The force level associated with that “flat of the curve” for additional weapons and consequent societal destruction became the defining level of forces declared adequate for deterrence and the level of societal destruction declared necessary for deterrence. The computation of the declining marginal value of additional U.S. nuclear weapons against Soviet societal targets determined the percentiles declared as deterrence standards and the capabilities necessary to meet those standards.¹⁴

¹¹Bruce Blair, et al., “Smaller and Safer,” op. cit., p. 10.

¹² Matthew McKinzie, Thomas Cochran, Robert Norris, and William Arkin, *The U.S. Nuclear War Plan: A Time for Change* (Washington, D.C.: Natural Resources Defense Council, June 2001), pp. 130-131.

¹³ *Draft Memorandum for the President, Secretary of Defense to the President [Lyndon B. Johnson], Subj: Recommended FY 1966-FY1970 Programs for Strategic Offensive Forces, Continental Air and Missile Defense Forces, and Civil Defense*, December 3, 1964, p. 4 (Sanitized and declassified on January 5, 1983).

¹⁴ See Alain Enthoven and K Wayne Smith, *How Much is Enough? Shaping the Defense Program, 1961-1969* (New York: Harper and Row, 1971), pp. 67, 207-208. And, *Draft Memorandum for the President, Secretary of Defense to the President [Lyndon B. Johnson], Subj: Recommended FY 1966-FY1970 Programs for Strategic Offensive Forces, Continental Air and Missile Defense Forces, and Civil Defense*, op. cit., p. 17.

By similarly focusing on societal targets for U.S. nuclear deterrence purposes, most minimum Deterrence proposals implicitly or explicitly attribute to all potential U.S. opponents a value hierarchy that places highest priority on societal assets: deterrence, it is claimed, will work reliably and predictably at low or very low force numbers because rational opponents will place decisive value on the preservation of their societal assets, and thus be deterred when those value are put at risk.

Holding an opponent's societal assets may be "easy," but those assets may not be what opponents' value most and thus may not be most effective for deterrence purposes. The frequent Minimum Deterrence assertion that this is the approach that will provide reliable, predictable deterrent effect reflects the legacy of McNamara's Assured Destruction metric. It also reflects the underlying presumption that all opponents, present and future, will hold a hierarchy of values shared by most Western leaders, i.e., "mirror-imaging," rather than a conclusion based on any analysis. Indeed, it would be impossible for any actual analysis to support such a conclusion about the deterrence of future, possibly unknown leaders engaged at an unknown time in deterrence decision making over future, and unknown stakes. Minimum Deterrence bases its fundamental conclusions about the functioning of deterrence on this presumption regarding opponent values, not analysis.

A focus on societal targets for U.S. nuclear deterrence purposes has consistently been rejected as inadequate by Democratic and Republican administrations for decades. And, it should be noted that Secretary McNamara specifically said that his "Assured Destruction" declaratory policy focusing on societal threats to the Soviet Union did not address or reflect how the United States actually planned to employ nuclear weapons;¹⁵ other senior Pentagon officials said that the "Assured Destruction" measure was used at the time primarily as a quantitative tool for rejecting military requests for additional nuclear forces.¹⁶ And, following the 1960s, U.S. nuclear

¹⁵ Draft Memorandum for the President, Secretary of Defense [Robert S. McNamara] to the President [Lyndon B. Johnson], Subj: Recommended FY 1965-FY 1969 Strategic Retaliatory Forces, December 6, 1963, p. I-12. (Originally classified; sanitized and declassified on January 5, 1983); cited hereafter as 1963 DPM. See also, Draft Memorandum for the President, Secretary of Defense [Robert S. McNamara] to the President [Lyndon B. Johnson], Subj: Strategic Offensive and Defensive Forces, January 15, 1968, p. 9. (Originally classified; sanitized and declassified on January 5, 1983); cited hereafter as 1968 DPM.

¹⁶ Henry S. Rowen, "Formulating Strategic Doctrine," Commission on the Organization of the Government for the Conduct of Foreign Policy, Volume 4, Appendix K: *Adequacy of Current Organization: Defense and Arms Control*

deterrence policy moved increasingly away from Secretary McNamara's earlier "Assured Destruction" declaratory deterrence policy to a much broader concept of the threat requirements for deterrence.¹⁷

A narrow focus on societal targets for deterrence purposes fits the overall Minimum Deterrence narrative nicely because it suggests that deterrence is "easy," and enables the policy recommendation of deep U.S. nuclear force reductions: threatening an opponent's societal targets establishes a relatively low standard of adequacy for U.S. nuclear force numbers because societal targets generally are relatively few and highly vulnerable to nuclear weapons.¹⁸

Correspondingly, Minimum Deterrence proponents often identify additional weapons beyond the number deemed adequate to threaten societal assets to be useless "overkill" capability at best.¹⁹ In addition, they often claim that additional U.S. forces—particularly those that could threaten an opponent's own military and retaliatory nuclear deterrent (U.S. "counterforce" targeting and missile defense for cities)—could "destabilize" deterrence. Beyond being useless for deterrence, such U.S. capabilities, it is said, would cause an opponent to rely on dangerous launch-on-warning tactics and/or be motivated to strike the United States preemptively for fear of a U.S. first nuclear strike, and thereby such U.S. capabilities are deemed to destabilize deterrence.²⁰

Minimum Deterrence proponents have for decades also argued *against qualitative* features of U.S. nuclear systems beyond those minimal requirements necessary to hold societal targets at risk, including accuracy, promptness or the capability to threaten hardened targets. Instead,

(Washington, D.C.: USGPO, June 1975), p. 227. See also, Enthoven and Smith, *op. cit.*, pp. 23-24, 170-171, 179, 194-195.

¹⁷ Keith B. Payne, *The Great American Gamble* (Fairfax, VA: National Institute Press, 2008), Chapter 4 and 5.

¹⁸ As noted in, Steven Pifer and Michael E. O'Hanlon, *The Opportunity: Next Steps in Reducing Nuclear Arms* (Washington, D.C.: Brookings Institution Press, 2012), pp. 20-21.

¹⁹ Seay, *op. cit.*, *Minimum Deterrence: Examining the Examination*. For an early Cold War discussion see, Ralph Lapp, *Kill and Overkill* (New York: Basic Books, 1962).

²⁰ This belief regarding enemy perceptions and behavior has been an ingredient of the Minimum Deterrence narrative for many years. See for example the testimony of Herbert Scoville in, U.S. Senate, Committee on Foreign Relations, Subcommittee on Arms Control, International Law and Organization, *ABM, MIRV, SALT, and the Nuclear Arms Race*, 91st Congress, 2nd Session (Washington, D.C.: USGPO, 1970), p. 233. More recently, see Bruce G. Blair *et al*, *Toward True Security*, (Washington, D.C.: Union of Concerned Scientists, February 2008), p. 17, available at <http://www.ucsusa.org/assets/documents/nwgs/toward-true-security.pdf>; Blair, *et al.*, "Smaller and Safer," *op. cit.*, p. 10.

again it is claimed that such capabilities could destabilize deterrence.²¹ This fits the general long-standing Minimum Deterrence narrative of defining the adequacy standard for nuclear deterrent effect in terms of threatening an opponent's societal assets, and unsurprisingly finding that standard places minimal quantitative and qualitative requirements on the U.S. nuclear arsenal.

Corresponding to this Minimum Deterrence theme of pointing to the limited quantitative and qualitative requirements for deterrence are the recommendations that the United States can prudently end its traditional policies intended to support deterrence and extended deterrence: 1) maintaining a Triad of strategic nuclear forces: heavy bombers, submarine launched ballistic missiles (SLBMs), and land based intercontinental ballistic missiles (ICBMs); and, 2) maintaining U.S. nuclear bombs forward-deployed in NATO countries for possible deployment on NATO dual-capable aircraft (DCA).

With regard to the elimination of the traditional Triad, some Minimum Deterrence proposals recommend without specificity the elimination of one of the missile legs of the Triad: "If the goal is to move to deep cuts and reduce the role of nuclear weapons, then one of the ballistic missile legs will have to be cut."²²

Other Minimum Deterrence presentations are more specific regarding the leg of the Triad to be eliminated. For example: "Due to their offensive and overt nature, we consider nuclear-armed SSBNs to be incompatible with a minimal deterrence posture and an obstacle to transparency and verification."²³ Another such proposal instead recommends the elimination of the land-based ICBM leg of the Triad: "The United States no longer needs land-based missiles, which, because

²¹ A classic presentation of Minimum Deterrence along these lines offered in opposition to President Carter's "Countervailing Strategy" is, Seymour Melman, "Limits of Military Power," *The New York Times*, October 17, 1980, p. A-31. More recently, see Sidney D. Drell and James E. Goodby, *What are Nuclear Weapons for? Recommendations for Restructuring U.S. Strategic Nuclear Forces*, op. cit., pp. v-vi.

²² Hans M. Kristensen and Robert Norris, "Reviewing Nuclear Guidance: Putting Obama's Words into Action," Arms Control Association, November 2011, available at http://www.armscontrol.org/act/2011_11/Reviewing_Nuclear_Guidance_Putting_ObamaZ_Words_Into_Action.

²³ Kristensen, Norris and Oelrich, *From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons*, op. cit., pp. 43-44.

of their inherent vulnerability, confront the president with a use-them-or lose-them dilemma he can do without.²⁴

The withdrawal or elimination of U.S. nuclear forces deployed to NATO Europe also is a typical Minimum Deterrence recommendation: “The United States should therefore promptly retire all nonstrategic nuclear weapons and dismantle them in a manner transparent to Russia and the international community, again allowing verification, including on-site inspection, by a consortium of other nations. Although the United States should make every attempt to encourage Russia to reciprocate, it should not make this effort contingent on Russian actions.”²⁵

The fundamental rationale underlying the Minimum Deterrence narrative favoring deep force reductions, the elimination of the SLBM or ICBM leg of the Triad, the withdrawal of U.S. nuclear forces from NATO countries and qualitative limitations, is this nearly-unbounded claim that in the *absence of* these forces the United States surely would retain adequate nuclear deterrent capabilities for the present and the future, including for extended deterrence. Beyond the need for rational opponents, this prediction about requirements for the functioning of deterrence generally is independent of time, place or contingency.

This prediction about the functioning of deterrence is perhaps the single most important element of the Minimum Deterrence narrative. It is on this basis that proponents assert that the U.S. can move forward *prudently* with the reductions and limits they advocate—whether the preferred number of remaining U.S. nuclear weapons is “several” or “hundreds.” Minimum Deterrence proponents thereby effectively claim with near-universal assurance that there would be no tradeoff or downside, now or in the future, in terms of useful nuclear deterrent effect attending the force limitations and reductions they advocate—deterrence will continue to function, now and in the future to prevent severe provocation of the United States and allies. This has been the common and central feature of Minimum Deterrence presentations on the subject for decades.

²⁴ Daalder and Lodal, “The Logic of Zero,” *op. cit.*, pp. 85-86. Another Minimum Deterrence proposal that recommends elimination of the ICBMs is, James Cartwright, et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture* (Washington, D.C.: Global Zero, May 2012), p. 7, available at http://www.globalzero.org/files/gz_us_nuclear_policy_commission_report.pdf.

²⁵ Bruce G. Blair, et al., *Toward True Security*, *op. cit.*, pp. 22-23.

For example:

- “A force of 311 weapons would allow that state to strike back over 150 times before it had to negotiate. There is not a state on the planet that could withstand that sort of punishment or a leader who would run that sort of risk.”²⁶
- “From a practical perspective, several second-strike nuclear weapons are more than enough to keep the most aggressive adversary at bay.”²⁷
- “No current or conceivable threat to the United States that requires it to maintain more than a few hundred survivable nuclear weapons”.²⁸
- “The United States and Russia could reduce their overall nuclear stockpiles substantially—to 1000 warheads—while retaining sufficient firepower to deter nuclear attack by any current or potential adversary.”²⁹
- “A total stockpile on the order of 500 weapons would satisfy the principal objectives of strategic nuclear deterrence in ‘rational’ scenarios where strategic deterrence is a useful concept.”³⁰
- “Ten to one hundred survivable warheads should be more than enough to deter any rational leader from ordering an attack on the cities of the United States or its allies.”³¹
- “An enemy who can be deterred, will be deterred by the prospect of a counterattack, even if it consists of only a few nuclear weapons.”³²
- “Thus, 100 deliverable warheads should be more than enough to deter any rational leader from ordering a nuclear attack on the cities of the United States or its allies.”³³

²⁶ James Wood Forsyth Jr., B. Chance Saltzman and Gary Schaub Jr., “Minimum Deterrence and its Critics,” *Strategic Studies Quarterly*, Vol. 4, No. 4 (Winter 2010), p. 6.

²⁷ *Ibid.*, pp. 6-7

²⁸ Union of Concerned Scientists, *The Obama Administration’s New Nuclear Policy: An Assessment of the “Nuclear Posture Review,”* op. cit.

²⁹ Daryl G. Kimball, *Trimming Nuclear Excess* (Washington, D.C.: Arms Control Association, April 2011), available at http://www.armscontrol.org/act/2011_05/focus.

³⁰ Jeff Richardson, “Shifting From a Nuclear Triad to a Nuclear Dyad,” *Bulletin of the Atomic Scientists*, Vol. 65, No. 5 (September/October 2009), p. 40.

³¹ Steve Fetter, “Nuclear Strategy and Targeting Doctrine,” in Harold A. Feiveson, ed., *The Nuclear Turning Point* (Washington, D.C.: Brookings Institution Press, 1999), p. 57.

³² Jeffrey Lewis, “Minimum Deterrence,” *The Bulletin of the Atomic Scientists*, Vol. 64, No. 3 (July/August 2008), p. 38.

³³ Bruce G. Blair, et al., *Toward True Security*, op. cit., p. 19.

Such promises about the functioning of deterrence are often made, but rarely questioned, tested or defended. A useful question rarely asked of these ubiquitous and all-important Minimum Deterrence claims about the functioning of deterrence is: why should we believe that Minimum Deterrence proponents have such refined knowledge of the future? Why should we believe that these critical claims are true or even probable? It is important to understand and examine the presumptions and logic underlying this critical element of the Minimum Deterrence narrative.

Underlying Presumptions

First is the presumption that the decision making and behavior of rational opponents in response to U.S. deterrence threats can be predicted with confidence, unbounded much or at all by time, place or leaderships: rational opponents now and in the future will decide to stand back from an attack or provocation they otherwise would undertake, i.e., they will be deterred at very low U.S. nuclear force levels.

In fact, the presumption about the opponent in this Minimum Deterrence narrative is not only that opponents will be *rational*; the typically-implicit presumption is that they also will be *reasonable and prudent* per the Minimum Deterrence definition of what that means in terms of decision making and behavior.³⁴ Opponents are presumed to be rational, reasonable and prudent in the sense that, now and in the future, they will:

- Perceive and understand U.S. nuclear threats to their societal values;
- Attribute credibility to those U.S. threats;
- Accord higher value to the preservation of those threatened assets (usually defined in terms of societal assets) than to whatever goal could otherwise motivate them to provoke the United States and thus put those assets in jeopardy;
- Identify those actions that would put their highly valued societal assets at intolerable risks given U.S. threats;
- Calculate their prospective costs and benefits without great distortion and with decisive regard for the U.S. threat to societal values; and
- Decide to be deterred.

³⁴ For a discussion of the distinction between rational and reasonable as it pertains to deterrence theory and policy, see, Keith B. Payne, *The Fallacies of Cold War Deterrence and a New Direction* (Lexington, KY: Kentucky University Press, 2001), pp. 7-15.

This chain of perceptions and decision making attributed to the opponent and context is essential to the claims made by Minimum Deterrence proponents about the functioning of deterrence. The presumption is that this reasonable and prudent decision making will occur near universally among rational opponents, and will result reliably in the desired deterrent effect. It is the presumption of an opponent with specific perceptions and thought processes, value hierarchy (with societal assets generally deemed to be of supreme value) and governing prudence with regard to the preservation of those values. This virtually-unbounded presumption of and definition of *rationality*, i.e., meaning undistorted perceptions and reasonable/prudent decision making, is the fundamental basis for the Minimum Deterrence assertion that opponents will be deterred by U.S. threats to their societal values at the recommended small number of U.S. nuclear weapons. The central Minimum Deterrence claims about deterrence are derived from these presumptions—whether the recommended number of U.S. nuclear weapons is “several,” “ten,” or “hundreds.”

In short, Minimum Deterrence proponents essentially make very specific presumptions about the nature, character, perceptions and calculations of opponents, and on that basis derive specific predictions about how opponents will make decisions and behave with regard to deterrence. On this basis, they then assert that their recommended nuclear deterrent threat will work now and in the future—because deterrence is “easy.” The Minimum Deterrence narrative assumes into being a specific type of opponent that is highly susceptible to being deterred by nuclear threats to societal assets, defines that opponent as rational, and claims that for all such opponents, deterrence decision making will follow the set pattern corresponding to their claims: opponents will perceive U.S. deterrent threats as intended, be rational, reasonable, attribute highest value to the threatened material assets of society, and thus ultimately behave prudently, as judged by Minimum Deterrence standards. With these stylized presumptions and derived assertions, deterrence-related decision making and behavior is highly predictable: only “irrational” leaders would perceive, think and behave in an aberrant way.

With this highly-structured presumption regarding opponents, of course, deterrence will, by definition, work against any rational opponent. Because the Minimum Deterrence narrative deems all “rational” opponents to be so predictable, it correspondingly deems the functioning of

deterrence of all rational opponents to be equally predictable at their recommended level of forces—whether it be 100, 500, or 1000 nuclear warheads.

As such, the Minimum Deterrence narrative reduces the measure of U.S. nuclear force adequacy for deterrence to a simple output metric—the count of U.S. nuclear warheads: some low or very low number of nuclear weapons will be adequate for deterrence. This is an *output metric that simply assumes the intended deterrent effect or outcome* based on presumptions about the opponent and the recommended number of warheads, i.e., its metric for deterrence adequacy. *The Minimum Deterrence narrative* appears to focus wholly on this single output metric and to dismiss or ignore in its calculation of requirements the need to understand and measure the actual effects of U.S. deterrence strategies on opponent deterrence decision making, i.e., the need for *outcome metrics*.

Once the Minimum Deterrence narrative reduces the U.S. nuclear deterrence requirement to such a simple numeric output measure, promises about deterrence functioning similarly are reduced to easily-met U.S. force requirements—again whether it be 100, 500, or 1000 nuclear warheads. This is the meaning behind the observation, occasionally made explicit by Minimum Deterrence proponents that deterrence is “easy,” and, “not much is required to deter,” and that deterrence requirements are, “a problem easily solved.”³⁵

The problem with this Minimum Deterrence narrative and conclusion, of course, is that its recommended simple and easily-met metric may tell us something about the potential physical effects of highly constrained U.S. nuclear capabilities, but little or nothing about if and how deterrence will function—the outcome of U.S. deterrence efforts. Minimum Deterrence conflates output with outcome in its recommended measure of adequacy.

In the absence of these presumptions about the nature of the opponent and deterrent effect, Minimum Deterrence proponents have no basis whatsoever for their fundamental, repeated claims about the working of deterrence, present or future, and specifically no basis for their

³⁵Robert Jervis, “Why Nuclear Superiority Doesn’t Matter,” *op. cit.*, pp. 617-618; Kenneth N. Waltz, “More May Be Better,” in, Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons* (New York: W.W. Norton, 2003), pp. 22, 26.

assurances that their recommended force levels will prove adequate for deterrence. The claim that their recommended policy directions can be undertaken prudently is built on these presumptions about the opponent and context that appear designed to make deterrence “easy” and predictable, but as is demonstrated below, on occasion correspond very poorly to the reality of opponents and contexts.

Testing Minimum Deterrence Presumptions and Arguments

The analytic goal here is to test these Minimum Deterrence presumptions and related claims: does logic and available evidence support the proposition that opposing leaderships will reliably and predictably exhibit the deterrence-related perceptions, decision-making and behavior necessary for deterrence to function as predicted in most Minimum Deterrence proposals?

Reliable Predictions?

First, it is important to understand that, at the most basic level, Minimum Deterrence assurances of reliable deterrence at low nuclear force levels are speculative and generally lack supporting analysis or evidence. In fact, proponents do not know and cannot know if, or the degree to which, their claims about opponent perceptions, decision making and behavior will prove accurate or flawed. This limitation applies to their claims about deterrence functioning in the present, but particularly to their predictions about the future in which the opposing leaderships, stakes and contexts are ambiguous at best. As such, the Minimum Deterrence narrative offers false precision and confidence because the perceptions, decision making and behavior of foreign leaderships, including those deemed fully rational, simply are not so predictable as to permit the claims about the functioning of deterrence that are central to the Minimum Deterrence narrative. This ignorance is not unique to proponents of Minimum Deterrence, and is not a matter of inadequate analysis, interpretation, methodology, or modeling—it is inherent in the subject matter and inescapable.³⁶

³⁶ See the discussion of this point in, Keith B. Payne, “Understanding Deterrence,” in, Keith B. Payne, ed., *Understanding Deterrence* (London: Routledge Press, 2013), pp. 3-11.

The fundamental problem of Minimum Deterrence claims regarding deterrence is that they mistake the nature of the subject. Minimum Deterrence proponents essentially treat their consideration of deterrence and related predictions as if they are dealing in a physical science with knowable and generally constant parameters that render possible the confident predictions possible in the physical sciences. But deterrence is not a physical science; it is an art that focuses on leadership decision making—typically in the context of ambiguous information and high-stress circumstances. All of the vicissitudes of human decision making and behavior across time, cultures and geography can be involved, with a myriad of possible factors working against the prospects of the well-informed, reasonable and prudent opponent presumed in the Minimum Deterrence narrative.³⁷

Emanuel Derman, physicist turned Wall Street quantitative financial analyst (a “quant”), has worked for decades on the subject of human decision making pertinent to financial matters. His conclusions regarding the profound and inherent epistemological limitations of prediction in this area apply even more acutely in the prediction of deterrence decision making by unknown or largely unfamiliar foreign leaderships, under stressful, unfamiliar circumstances, over unknown or unfamiliar stakes:

- “In physics you’re playing against God, and He doesn’t change His laws very often. In finance you’re playing against God’s creatures, agents who value assets based on their ephemeral opinions. The truth, therefore, is that there is no grand unified *theory* of everything in finance”
- “Unquantifiable uncertainty is, for example, the likelihood of a revolution in China or the detonation by terrorists of a nuclear bomb in midtown Manhattan. These events are unlikely, but there is no reliable method of estimating their odds... The best you can do with unquantifiable uncertainty is to be aware of it and aware of your inability to quantify it, and then to act accordingly.”
- “In human affairs, history matters, and people are altered by every experience... Its not only the past that leaves its trace on humans. In physics, effects propagate only forward through time, and the future cannot affect the present. In the social sciences the imagined future can affect the present, and thereby the actual future too.”

³⁷ For a monograph-length study devoted to an examination of this point, with numerous illustrative historical case studies, see, Keith B. Payne, ed., *Understanding Deterrence*, *ibid.*

- “There are no isolated social systems on which to carry out the repeated experiments the scientific method requires, and so it is hard to study the regularities that might reveal the putative laws that govern them.”³⁸

Minimum Deterrence posits as universal for rational leaders several very specific types and patterns of perceptions, decision making and behavior. From this presumption, they derive critical claims about the predictable functioning of deterrence at their recommended minimal nuclear force levels. But, as the conclusions by Derman above emphasize, predictions regarding human perceptions, decision making and behavior must remain highly-speculative, with or without reference to rationality. His conclusion, directed toward decision making in finance, again applies even more acutely to the key specific promises about deterrence that are at the center of the Minimum Deterrence narrative: “Any assurance economists pretend to with regard to cause and effect is merely a pose or an illusion. They whistle in the dark while they ... ignore the humans behind the equations.”³⁹

What is known with high confidence is that strategic decision making can reflect a very wide range of influences and that deterrence decisions are made by distinctive individuals with unique sets of often contradictory motives. Deterrence behavior on both ends of the threat relationship is the result of a wide variety of possible mixtures of perceptions, calculations and goals. Anticipating that behavior is an art; it is neither a science nor a social science, as is the implicit presumption underlying the Minimum Deterrence narrative. This is not merely an academic-sounding caveat; it is an inconvenient fact that should govern any and all analysis of deterrence. Minimum Deterrence promises about the future functioning of deterrence based on the number of U.S. forces, offered with confident detail and precision, are not supportable—regardless of the proponent’s credentials or methodology.

Renowned strategic analyst and military historian, Professor Colin Gray, makes this point in direct connection to the challenges of prediction for defense and deterrence planning purposes. “No matter the scholarly discipline and tradition to which a defense planner owes allegiance, he or she needs to recognize and attempt to understand fully a personal and institutional condition

³⁸ Emanuel Derman, *Models Behaving Badly: Why Confusing Illusion With Reality Can Lead to Disaster, on Wall Street and in Life* (New York: Free Press, 2011), pp. 140, 154, 156, 190-191.

³⁹ *Ibid.*, p. 192.

of awesome ignorance of detail about the future. Further study, more cunning analytical methodology, yet more powerful computers—none of these can reveal with any certainty what the future brings....Hard science, soft social science, and the humanities, are none of them, severally or together, capable of telling us what we really need to know about the future.”⁴⁰

Indeed, careful analyses of leadership decision making in conflicts and crises over the course of centuries point to a wide range of factors that can drive leadership decision making. These can be highly idiosyncratic and personal to those small groups or individuals in leadership positions. Such factors may be largely or wholly opaque to outside observers. They include perceptions of honor, fear and interest, knowledge, will, personalities, spiritual and ideological beliefs, hatreds, values, risk tolerances, and health.⁴¹ As Yale Professor Donald Kagan concludes in his classic and voluminous study of war causes, “The reader may be surprised by how small a role in the instances studied here, and I believe, in many other cases, considerations of practical utility and material gain, and even ambition for power itself, play in bringing on wars and how often some aspect of honor is decisive, “with honor being understood broadly as the striving for, “deference, esteem, just due, regard, respect or prestige.” With this broad understanding of honor, Kagan concludes (along with Thucydides), “we will find it an important motive [of conflict among] nations in the modern world.”⁴² Factors such as these that are subjectively defined and intangible often are the ultimate inspiration and motivation for conflict—as opposed to some common, predictable set of perceptions and calculations of expected utility for material gain or loss.

Consequently, there are inherent and inescapable limitations in predicting the perceptions, judgments, calculations and behavior pertinent to deterrence decision making. These limitations are effectively denied in the confident predictions of the Minimum Deterrence narrative.

⁴⁰ Colin S. Gray, *Defense Planning For National Security: Navigation Aids For the Mystery Tour* (Carlisle, PA: U.S. Army War College Press, March 2014), pp. 1, 3.

⁴¹ See for example, Donald Kagan, *On The Origins Of War* (New York: Double Day, 1995); John Stoessinger, *Why Nations Go to War*, Sixth Edition (New York: St. Martin’s Press, 1993); Jonathan Roberts, *Decision-Making During International Crises* (New York: St. Martin’s Press, 1988), pp. 181-226; Bert E. Park, *Ailing, Aging, Addicted: Studies of Compromised Leadership* (Lexington, KY: University Press of Kentucky, 1993); and, Nassir Ghaemi, *A First-Rate Madness: Uncovering the Links Between Leadership and Mental Illness* (New York: The Penguin Press, 2011); and, Keith B. Payne, “Understanding Deterrence,” *op. cit.*, pp. 3-37.

⁴² Kagan, *op. cit.*, p. 8.

Societal Threats

An example of this fallacy in the Minimum Deterrence narrative is its frequent underlying presumption, as noted above, that a U.S. nuclear threat of societal destruction against opponents will serve reliably as the mechanism for deterrence. This presumption may or may not hold true depending on the value hierarchy and goals of the opposing leadership, and many other possible factors. There are numerous historical examples from antiquity to the present wherein leaderships have consciously accepted a high risk of societal destruction in pursuit of, or defense of a goal deemed even more important than avoiding the risk of societal destruction.

For example, the Greek historian Thucydides tells us that in 416 B.C., the islanders of Melos—trusting “in fortune”—willingly chose to risk a credible Athenian threat of annihilation rather than submit to Athenian demands and a loss of their long-standing freedom.⁴³ In this case, the willingness to court annihilation led to annihilation.

More recently, in 1945 following the atomic attacks on Hiroshima and Nagasaki, the Japanese War Minister, Korechika Anami, and Navy Chief of Staff, Toyoda Soemu, in apparent deference to their concepts of honor, sought the continuation of the war even if it meant the destruction of Japan.⁴⁴

In 1958, Mao Zedong ordered a massive shelling of the small island of Quemoy for the purpose of eliciting US nuclear threats. He later wrote to Soviet leader Nikita Khrushchev that he, “would be only too happy for China to fight a nuclear war with America alone. ‘For our ultimate victory,’ he offered, ‘for the total eradication of the imperialists, we are willing to endure the first strike. All it is a big pile of people dying.’”⁴⁵

⁴³ Thucydides, *The Peloponnesian War* (New York: Random House, 1951), pp. 330-337.

⁴⁴ See the discussion in David McCullough, *Truman* (New York: Simon and Schuster, 1992), p. 459. See also, Edwin P. Hoyt, *Japan's War: The Great Pacific Conflict* (New York: Cooper Square Press, 2001), pp. 402-403; and Thomas R. Flavel, *The History Buff's Guide to World War II* (Naperville, IL: Cumberland House, 2012), pp. 240-241.

⁴⁵ Quoted in, Jung Chang and Jon Halliday, *Mao: The Unknown Story* (New York: Alfred Knopf, 2005), pp. 413-414.

In 1962, Nikita Khrushchev moved nuclear weapons to Cuba despite his expectation that, as a consequence, “they can attack us and we shall respond. This may end in a big war.”⁴⁶ During the same crisis and in an expression of ideological fervor, the Cuban leadership demanded that the Soviet Union launch a nuclear attack against the United States despite its recognition that the consequences would be a horrific war and the destruction of Cuba.⁴⁷

And, in 1973, to restore national honor, Egypt and Syria launched a massive armored attack against Israel, despite the reported risk of Israeli nuclear retaliation.⁴⁸

These examples should not be considered far outside the norm of decision making by rational leaderships; there is little if any evidence to suggest that these leaders were irrational. Yet their apparent decision making and behavior, on these occasions, contrast sharply with the definition of rational leadership decision making presumed in the Minimum Deterrence narrative, i.e., reasonable, prudent, with avoidance of the risk of societal destruction at or near to top of the value hierarchy.

The point, of course, is that in some cases, the deterrent threats specified in the Minimum Deterrence narrative may be effective for deterrence. In other cases, an alternative approach to deterrence may be necessary. Minimum Deterrence, again, generally presumes all opponents share modes of calculation and the common highest priority of avoiding risk to societal assets, and derives its predictions about deterrence on that presumption. Yet, history provides ample evidence that at least some leaders, some of the time, do not hold to this presumed value hierarchy and predicted type of calculation/behavior—whether because they have a different value hierarchy and/or because they believe that, for some reason, they can run great risk without fear of great loss.

⁴⁶ Quoted in, Aleksander Fursenko and Timothy Naftali, *One Hell of a Gamble: Khrushchev, Castro and Kennedy, 1958-1964* (New York: W.W. Norton and Company, 1997), pp. 171, 241.

⁴⁷ Viktor Semykin, interview for, “The Missiles of October; What the World Didn’t Know,” *ABC News*, Journal Graphics transcript no. ABC-40, October 17, 1992, p. 21.

⁴⁸ Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998), p. 342.

During the Cold War, Democratic and Republican administrations believed that a more varied deterrent threat than societal destruction was needed for the deterrence of Soviet leaders, and rejected societal targeting as the basis for U.S. deterrence strategies. President Carter's Secretary of Defense, Harold Brown and other U.S. senior leaders addressed the question, 'What does it take to deter?' and emphasized that, in principle, the U.S. deterrent threat should hold at risk those assets most highly valued by opposing leaderships: "We need to remember in making a judgment on that matter that we are trying to deter the Soviet leaders from aggressive actions and specifically from nuclear war. We therefore need to form a judgment on what it is that is so valuable to them that they would be left in no doubt that, whatever kind of nuclear attack they might launch, the U.S. response would leave them worse off in terms of those assets that they consider valuable...it is important for U.S. forces to be able to threaten retaliation against the assets that the Soviet leaders appear to prize..."⁴⁹

While this deterrence principle evolved during the Cold War, it is not therefore now an outmoded "Cold War" notion. It is a principle that logically applies in general across the spectrum of opposing leaderships, including in the contemporary period: if deterrence is to be as effective as possible, U.S. deterrent threats should seek to hold at risk that which the opponent values, and preferably values most highly. Those values may or may not be the material assets of society. Presuming that those values are and will be the material assets of society certainly corresponds well to the Minimum Deterrence recommendation of low force numbers. As Henry Kissinger observed of this Minimum Deterrence presumption in 1973: "They believe in assured destruction [societal threats] because it guarantees the smallest expenditure."⁵⁰ However, such a presumption does not correspond to considerable historical evidence.

⁴⁹ See the prepared statement by Harold Brown in, United States Senate, Committee On Armed Services, Hearing, *MX Missile Basing System And Related Issues*, 98th Congress, 1st Session (Washington, D.C.: USGPO, 1983), pp. 6-7. See also, R. James Woolsey, "US Strategic Force Decisions for the 1990s," *Washington Quarterly*, Vol. 12, No. 1 (Winter 1989), p. 82.

⁵⁰ And, as Kissinger concluded, "To have the only option that of killing 80 million people is the height of immorality." National Archives, Nixon Presidential Materials, NSC Institutional Files (H-Files), Box H-108, Minutes of Meetings, Verification Panel Minutes, Originals 3-15-72 to 6-4-74 [3 of 5]. Top Secret; Sensitive. The meeting took place in the White House Situation Room. Declassified and available in *Department of State, Foreign Relations of the United States, 1969-1976*, Vol. XXXV, *National Security Policy, 1973-1976* (Washington, D.C.: USGPO, 2014), p. 105.

Whether based on the usual Minimum Deterrence confidence in societal threats or on some variant approach to targeting, assurances by even the most credentialed proponents about the precise functioning of deterrence at their recommended nuclear force levels are, and can be little more than speculative. The fundamental truth is that the many claims contained in the Minimum Deterrence narrative in this regard cannot be deemed credible given the inherent limitations on anyone's capacity to make such precise predictions about the functioning of deterrence, present or future.

This is the central fallacy underlying the most fundamental and repeated claim of the Minimum Deterrence narrative that: the United States should now undertake deep nuclear force reductions, and can do so prudently because deterrence will function reliably against any opponent deemed rational at the reduced force levels recommend by Minimum Deterrence. This promise reflects hope and manifest hubris, not substance or analysis.

History and Minimum Deterrence Presumptions About Deterrence Decision Making

It is impossible to prove or disprove via direct empirical evidence that an opponent *now or in the future* will pursue the specific course of decision-making and behavior claimed as near-universal in the Minimum Deterrence narrative, and thus that opponent will be deterred reliably at very low force levels. It is possible, however, to test against actual historical experience the reasonableness of the Minimum Deterrence presumption that opposing leaderships will think and behave as predicted. It also is possible to bring into the discussion some of the recent advances in cognitive studies that seek to better understand the parameters and sources of human decision making. The following employs these different streams of available evidence to test the core Minimum Deterrence claims regarding opponent decision making and deterrence.

Minimum deterrence presumptions are sweeping—positing nearly universal and specific claims about prospective opponent decision making and behavior, including the very definition of what constitutes rational behavior. Pertinent historical experience should be highly consistent with the expectations that follow from these Minimum Deterrence claims: opponents will prove to be rational, reasonable and prudent in their decision making and behavior as those terms are defined

by Minimum Deterrence; in doing so they will place at highest value the preservation of specified assets (again, typically defined as societal assets) when choosing among alternative courses of action and thus choose to be deterred when necessary to protect those assets. As already noted above, however, pertinent historical cases and experience provide evidence that the presumptions underlying Minimum Deterrence predictions about deterrence are contrary to past experience.

If historical evidence consistently reflected Minimum Deterrence presumptions about opponent decision making and behavior, then the burden of proof would be on those who dispute Minimum Deterrence claims about deterrence to explain why the future will be different from this past experience. However, past experience demonstrates decision making and behavior that is contrary to Minimum Deterrence presumptions, and thus the burden of proof is on Minimum Deterrence proponents to explain why the future should be expected to so differ from past experience in this regard.

There is considerable historical evidence demonstrating that the basic Minimum Deterrence presumptions about leadership decision making often are inconsistent with actual experience. At least on occasion, some apparently rational leaderships are not reliably put off from taking great risks—even if doing so severely endangers themselves and their countries. Whether during the nuclear era or earlier, historical illustrations of this point demonstrate the mistake underlying claims by Minimum Deterrence proponents regarding the predictability of reasonable and prudent leadership decision making, as those characteristics are defined in the Minimum Deterrence narrative.

Four Illustrative Cases

Four historical case studies follow. These four very different cases all illustrate the fragility of prediction based on the presumption of an opponent's reasonable and prudent decision making, again, as defined in the Minimum Deterrence narrative. The point that each case makes clearly is that such a presumption about all apparently-rational opponents is itself imprudent. It is unmistakably evident that in a wide range of actual historical contexts, deterrence did not work as U.S. leaders anticipated (based on what seemed to be solid grounds) because opponents did

not behave according to such U.S. expectations. It is worth noting that numerous additional historical cases illustrate the point, including those identified briefly above. In all of these historical cases, apparently rational opponents made decisions and engaged in behavior far outside the reasonable and prudent boundaries presumed by Minimum Deterrence.

The overarching lesson from the historical cases offered above and below is that the Minimum Deterrence presumption that all rational opponents will operate reliably within predictable boundaries of reasonableness and prudence is contrary to empirical evidence. Some new factors not operating in the past would need to enter into international and human relations to make Minimum Deterrence presumptions plausible. This cannot be considered impossible, but the burden of proof surely is on the Minimum Deterrence narrative to identify these factors, explain how, when and why they will intervene in history to dramatically alter leadership decision making and the functioning of deterrence, i.e., they must explain how and why past experience no longer is instructive and, instead, why Minimum Deterrence presumptions about opponents and deterrence will prevail—when they so obviously have not done so in the past. The functioning of nuclear deterrence may affect the lives of scores of millions and the prospects for national survival. Consequently, this is not a subject that should see policy acceptance of fragile presumptions and “easy” solutions that are contrary to much evidence.

Case 1: The United States and the Empire of Japan, 1940-1941. In 1940-1941 the United States sought consistently both to discourage further Japanese imperial expansion, both in South-East Asia and most especially in mainland China. The basic economic strength of the United States was beyond dispute, notwithstanding the limited success of President Roosevelt in spurring recovery from the Great Depression. A significant part of the Roosevelt answer to the economic crisis that had matured all too rapidly after the Stock Market crash of 1929, lay in a substantial measure of naval and aerial modernization and rearmament, both of which were well known internationally by 1940.

Imperial Japan was not confused about the mobilization potential of the United States, but in the historical context of 1940-1941, it chose to believe that American political will to evict them from recent gains would be fragile. On balance, it is reasonably certain that Tokyo simply decided

to ignore the difference between a certainty and a hope, and elected to move forward on the basis of the latter to take a high-risk path. Americans clearly comprehended the Japanese diplomatic position, but they failed to grasp the intensity and depth of the Japanese commitment to their policy and strategy course on the mainland of Asia. Yoshimichi Itara, the President of the “Imperial Council” and also of the “Imperial Throne Council of War,” said that:

If we were to give in to the United States, then we would not only give up the fruits of the Sino-Japanese War, and the Russo-Japanese War, but also abandon the results of the Manchurian Incident. There is no way we could endure this ... It is clear that the existence of our empire is threatened, that the great achievements of the Emperor Meiji would all come to naught, and that there is nothing else we can do.⁵¹

Or, consider the opinion of Mitsumasa Yonai, Imperial Navy Admiral, Prime Minister, Minister of Marine, etc. He believed that Japan could not win a war against the United States. When asked by Minister of Finance Ishiwata if the Imperial Japanese Navy could defeat the American or British navies, he replied: “No. The Imperial Japanese Navy is not designed to open fire against them”. However, Yonai is quoted as saying that “Japan is fully prepared to take appropriate steps in the event that the United States continues its oppression”.⁵²

The core issue was explained all too clearly by Prime Minister Hideki Tojo, when on 14 October 1940 he stated the following:

For the past six months, ever since April, the foreign minister has made painstaking efforts to adjust relations. Although I respect him for that, we remain deadlocked ... the heart of the matter is the imposition on us of withdrawal from Indochina and China ... If we yield to America’s demands, it will destroy the fruits of the China incident. Manchukuo will be endangered and our control of Korea undermined.⁵³

The fundamental weakness of the Japanese situation was appreciated very clearly indeed by Isoroku Yamamoto, Chief of General Staff of the Combined Fleet.

⁵¹ Herbert P. Bix, *Hirohito and the Making of Modern Japan* (New York: Harper, 2001), p.431.

⁵² Quoted in “Japanese Hurl Veiled Threat,” *Los Angeles Times*, February 11, 1940.

⁵³ Herbert P Bix, *Hirohito and the Making of Modern Japan* (New York: Harper, 2001), p. 417.

In the first six to twelve months of a war with the United States and Great Britain I will run wild and win victory upon victory. But then, if the war continues after that, I have no expectation of success.⁵⁴

Japan was neither ignorant of, nor significantly confused about the danger of war with the United States. But the scale of the American threat to the new Japanese holdings in Mainland China was deemed so severe that the risks of attacking the United States—recognized as very high—were judged less intolerable than the alternative. The Japanese leadership’s calculation was tragic: “In their view, Japan had no alternative but to go to war while she had the power to do so. She might lose, but defeat was better than humiliation and submission. ‘Japan entered the war,’ wrote a prince of the imperial family, ‘with a tragic determination and in desperate self-abandonment.’”⁵⁵ As noted earlier, this mode of thinking prevailed among some in the senior Japanese leadership even after atomic attack

Case 2: The United States, North Korea and the People’s Republic of China, 1950. As with the 1940-1941 case, albeit on a smaller scale, the leading issue in 1950 pertained to the credibility of the relatively few American expressions of concern over the security condition of South Korea. In this case, North Korean and especially Chinese communist leaders appear not to have been acutely sensitive to the probability of disciplinary action by the United States. North Korean, Chinese, and Soviet leaders obviously proved to be in error in their expectation that the United States would not fight for the integrity of South Korea. In 1950, all sides in the Korean imbroglio were uncertain as to the scale of the political and strategic stakes in Korea. U.S. policy action and subsequent strategy is not hard to understand today, but at the time it appeared sufficiently soft as to give America’s foes grounds for the hope of a very limited, if not actually token, strategic commitment. Arranged by date of delivery, from earliest to latest, the following Chinese statements help explain why Beijing was not inclined to decide that it would be deterred in 1950-1951.

⁵⁴ Quoted in, Ronald Spector, *Eagle Against the Sun: The American War with Japan* (London: Vintage, 1985). This was a statement of Cabinet Minister Shigeharu Matsumoto.

⁵⁵ Quoted in, Louis Morton, “Japan’s Decision for War,” in Kent Greenfield, ed., *Command Decisions* (Washington, D.C.: USGPO, 1990), p. 124.

Our national defence will be consolidated and no imperialist will be allowed to invade our territory again. Our People's armed forces must be maintained and developed with the brave and steeled People's Liberation Army as their foundation. We will have not only a powerful army but also a powerful air force and a powerful navy.⁵⁶

The atom bomb is a paper tiger which the US reactionaries use to scare people. It looks terrible but in fact it isn't. Of course the atom bomb is a weapon of mass slaughter, but the outcome of a war is decided by the people, not by one or two new weapons.⁵⁷

Since the enemy annihilated by the Chinese people was armed by the US Government, then we can completely affirm that the Chinese people have not only won victory over the enemy at home, but also over the enemy abroad – that is, imperialist interventionists of the United States. If the American imperialists still want to intervene in and invade China with whatever new means and in whatever new forms, they will then meet with the same defeat that befell the Kuomintang.⁵⁸

The Chinese people, who defeated Japanese imperialism and Chiang Kai-shek, the hireling of American imperialism, will surely be victorious in driving off the American aggressors and in recovering Taiwan and all other territories belonging to China ...⁵⁹

The Chinese People enthusiastically love peace, but in order to defend peace they never have been and never will be afraid to oppose aggressive war. The Chinese people will not tolerate foreign aggression nor will they supinely tolerate seeing their neighbors savagely invaded by imperialists. Whoever attempts to exclude the nearly 500 million Chinese people from the UN and whoever set at naught and violate the interests of this one-fourth of mankind in the world and fancy vainly to solve any Eastern Problem directly concerned with China arbitrarily will certainly break their skulls.⁶⁰

In 1950 the PRC was barely a year old and the communist party leadership plainly was determined to be defiant against American threats, real or only perceived. The rich mixture of reasons for Beijing's bold public statements is very understandable. A generation of internal struggle finally had seen off the ambitions of the Nationalists, led by the American-supported military leader, Chiang Kai-shek, as well as the imperial pretensions of Japan. Whether or not

⁵⁶ Mao Tse Tung, "Opening Address at the First Plenary Session of the Chinese People's Political Consultative Conference," (September 21, 1949).

⁵⁷ Mao Tse Tung, "Talk with the American Correspondent Anna Louise Strong," *Selected Works* (Peking: Foreign Language Press, 1961), Vol. IV, p. 100.

⁵⁸ PRC Premier, Zhou Enlai, "Report to the National Committee of the People's National Conference," *World News and Views*, Vol. 30, No. 41 (October 14, 1950).

⁵⁹ PRC Premier, Zhou Enlai, "Statement on President Truman's statement of June 28, 1950," New China News Agency, June 29, 1950.

⁶⁰ Premier Zhou Enlai, "Report to the National Committee of the People's National Conference," *World News and Views*, Vol. 30, No. 41, October 14, 1950.

America's military strengths in 1950 truly were awesome, both at the time as well as in retrospect it is quite evident that Mao's new China would fight hard to protect its new domain (with the final victory registered as late as 1949). Virtually regardless of the military context at the time, it is as clear today as by and large it was then, that Chinese intervention in the Korean War was not deterrable. The political stakes simply were too high for Mao to do anything other than to oppose the US-led UN action in Korea. The PRC was beyond deterrence in 1950 for this contingency. Regardless of how great or small had been the Chinese support for the invasion of the South, China could not acquiesce in the North's defeat. This particular historical case tells us that political leaders can find themselves trapped by their own rhetoric into a refusal to be deterred. From an American point of view, Korea in 1950 illustrates the impossibility of predicting the outcome of a deterrent policy and strategy when the intended deterree is committed resolutely to resistance.

Case 3: The United States, the USSR, Cuba, and the Missiles of October 1962. The Cuban Missile Crisis which occupied 13 days in October 1962 is the clearest example of the unpredictable nature of deterrence. Although the historical details in this particular episode were, of course, vitally important, it is more important to understand that acute international crises usually are endowed abundantly with unique detail, some small fragment of which mattered profoundly.

If we step back from the fascinating detail of this particular crisis and understand some of the underlying dynamics, we can appreciate how international relations can be driven by a combination of factors, including human nature and its motivations, to produce surprising and unexpected crises and conflicts. The truth is that there can be no predictable certainties attending the course and outcome of such "Black Swan" events as October 1962.

The following quotations capture and convey much of the flavor of danger about October 1962.

Only in the event of a landing of the opponent's forces on the island of Cuba and if there is a concentration of enemy ships with landing forces near the coast of Cuba, in its territorial waters ... and there is no possibility to receive directives from the U.S.S.R. Ministry of Defence, you are personally allowed as an exception to take the decision to apply the tactical nuclear Luna missiles as a means of local war for the destruction of the

opponent on land and on the coast with the aim of a full crushing defeat of troops on the territory of Cuba and the defence of the Cuban Revolution.⁶¹

But, Andrei Gromyko, the Foreign Minister of the U.S.S.R. had observed reassuringly that: “A USA military adventure against Cuba is almost impossible to imagine!”⁶²

You, Mr. President, are not declaring quarantine, but rather are setting forth an ultimatum and threatening that if we do not give in to your demands you will use force. Consider what you are saying! And you want to persuade me to agree to this ... You are no longer appealing to reason, but wish to intimidate us.⁶³

Placing weapons in Cuba will give the Imperialists a more realistic idea of the danger of thermonuclear war.⁶⁴

The deployment of Soviet Strategic weapons will succeed in bringing the aggressors to their senses.⁶⁵

My thinking went like this; if we installed the missiles secretly and then if the United States discovered the missiles where they were already poised and ready to strike, they would think twice before trying to liquidate our installations by military means.⁶⁶ In addition to protecting Cuba, our missiles would have equalized what the West likes to call the balance of power. The Americans had surrounded our country with military bases and threatened us with nuclear weapons, and now they would learn just what it feels like to have enemy missiles pointed at you. We were doing nothing more than giving them a taste of their own medicine.⁶⁷

Finally, it is worth quoting Fidel Castro who told the following to *Le Monde*:

They explained to us that in accepting them we would be reinforcing the socialist camp the world over, and because we have received important aid from the socialist camp we accepted them. It was not in order to assure our own defence, but first of all to reinforce socialism on the international scale. Such is the truth even if other explanations are furnished elsewhere.⁶⁸

⁶¹ Marshal Rodian Malinovsky, Defence Minister of the U.S.S.R., Order delivered in late September – early October 1962 to General Issa Pliyev, Commander of Soviet forces in Cuba. General Staff Archives, “Anadyr,” File 6, Vol. 2, p. 144.

⁶² Harvard Kennedy School Belfer Center for Science and International Affairs, available at <http://www.cubanmissilecrisis.org/dp-ussr/foreign-minister-andrei-gromyko/>.

⁶³ Nikita Khrushchev, “Khrushchev Letter to President Kennedy,” United States Library of Congress, available at <http://www.loc.gov/exhibits/archives/x2jfk.html>.

⁶⁴ Nikita Khrushchev, quoted in A.L. Horelick and M. Rush, *Strategic Power and Soviet Foreign Policy* (Chicago: University of Chicago Press, 1966) p. 130.

⁶⁵ Nikita Khrushchev, quoted in Horelick and Rush, *Strategic Power and Soviet Foreign Policy*, op. cit., p. 130.

⁶⁶ Strobe Talbott, trans. and ed., *Khrushchev Remembers* (Boston: Little, Brown, 1970), p. 392.

⁶⁷ Loc. cit.

⁶⁸ Claude Julien, *Le Monde*, March 22, 1963.

Among the “lessons” of the Cuban Missile Crisis is the reminder that flawed human beings make nuclear policy and conduct statecraft. We know now, for example, that a Soviet submarine commander came exceedingly close to firing a nuclear-armed torpedo at a U.S. warship, and failed to do so only because the decision to fire was narrowly prevented on board. So rich is the granular detail of strategic history, as was illustrated in October 1962, that the type of precise prediction common to Minimum Deterrence can only be judged contrary to even a basic understanding of the evidence of history.

Case 4: The United States and North Vietnam, 1964-1965. The reasons for including Vietnam 1964-1965 in this narrative concerning deterrence is because it enables consideration of deterrence-relevant data in a context quite distinctive from those others already examined. The United States was a power that so outclassed North Vietnam on all standard criteria of comparative strategic advantage as to render comparison between them all but irrelevant. But, the historical record shows unmistakably that in 1964-1965, the United States failed to persuade Hanoi to desist from its long-standing efforts to destabilize the U.S. supported government in Saigon. If anything, North Vietnamese insurgency/invasion increased in 1965. Both in fairly long retrospect and even at the time in the mid-1960s, it was entirely clear that Hanoi had decided that it would not be intimidated either by coercive threats or by the prospect of suffering great harm in the future. What this case illustrates is the fact that the U.S. superpower proved unable either to threaten or coercively to compel North Vietnam into a radical change in its policy and strategy.

It should not be forgotten that the United States that sought in vain to deter in Vietnam in 1964 and 1965, had all but humiliated the superpower USSR over its missiles in Cuba only two or three years previously. The America of 1964-1965 at least looked to be supremely powerful and self-confident in its grip on and grasp of the essentials of deterrence theory and practice (with respect to credibility of commitment in particular). The America of 1964-1965 was not the wearied polity that it became by the end of the decade.

Looking back, it is plainly evident that a, if not the, leading reason for U.S. failure in Vietnam was the size and depth of the gap between American and North Vietnamese perceived interests in this conflict. What follows is appropriate illustration of the reasons why mind sets in Hanoi were not readily to be swayed by the anticipation of pain near certain to be delivered by a superpower from another continent.

If they want to make war for twenty years then we shall make war for twenty years. If they want to make peace, we shall make peace and invite them to afternoon tea.⁶⁹

You can kill ten of my men for every one we kill of yours. But even at those odds, you will lose and we will win.⁷⁰

Remember the storm is a good opportunity for the pine and the cypress to show their strength and their stability.⁷¹

Ho Chi Minh may have been an evil man; Nixon may have been a great man. The Americans may have had the just cause; we may not have had the just cause. But we won and the Americans were defeated because we convinced the people that Ho Chi Minh is the great man, that Nixon is a murderer, and the Americans are invaders.... The key factor is how to control people and their opinions. Only Marxism-Leninism can do that.⁷²

Bottom Line

The historical cases discussed above illustrate the point that the predictions about deterrence functioning common to and central to the Minimum Deterrence narrative appear fundamentally ignorant of historical experience. The argument here is not that deterrence cannot work; very often it does so well enough in practice. Rather, the problem for the Minimum Deterrence narrative is that the functioning of deterrence holds the potential for numerous uncertainties and is not predictable in detail; it may not work as Minimum Proponents believe it “should” work and as they assert it will work per their conception of its narrow and easily-met measures of adequacy. The only conclusion that fits the very diverse and complex evidence of history is that

⁶⁹ Ho Chi Minh, Prime Minister and then President of the Democratic Republic of North Vietnam (d. 1969). Quoted in Marilyn B. Young, *The Vietnam Wars, 1945-1990* (New York: Harper Perennial, 1991).

⁷⁰ Ho Chi Minh, cited in, Stanley Karnow, “Ho Chi Minh,” *Time*, April 13, 1998, available at <http://content.time.com/time/magazine/article/0,9171,988162,00.html>.

⁷¹ Ho Chi Minh cited in Peter Anthony DeCaro, *Rhetoric of Revolt: Ho Chi Minh's Discourse for Revolution* (Westport, CT: Greenwood Publishing Group, 2003), p. 66.

⁷² Mao Chi Tho, Secretary at the Ministry of Home Affairs, quoted in, Doan Van Toai, “A Lament for Vietnam,” *The New York Times Magazine*, March 29, 1981.

the virtually unbounded Minimum Deterrence claims about the working of deterrence are contrary to considerable available historical evidence. Deterrence is a policy goal well worthy of the U.S. priority accorded it; but—contrary to the promises of Minimum Deterrence—unavoidable uncertainties often attend its functioning in practice.

Cognition, Decision Making, and Deterrence

As noted above, implicit in the Minimum Deterrence claims about the functioning of deterrence is the presumption of reasonable, prudent and thus predictable decision making by all opponents deemed rational: they will perceive U.S. nuclear threats as intended; attribute some level of credibility to those threats; calculate the costs and benefits of their options, and make prudent decisions that minimize risk to their values (generally assumed to be societal assets), and thus be deterred in the face of U.S. power.

As illustrated above, however, historical cases demonstrate that leadership decision making and behavior does not consistently follow this pattern. Studies of human cognition (i.e., the process of knowing), evaluating options, and making decisions help to explain the variability and absence of such consistency in human decision making. These studies provide evidence that human decision making and communication processes often are not wholly analytical and the outcomes (e.g., decisions and actions) are far from uniform. This variability demonstrated by both history and studies of human cognition and behavior precludes confidence in the uniformity of adversary decision making presumed by Minimum Deterrence proponents. Factors that can affect cognition and decision making pertinent to the functioning of deterrence include: recent history, emotion, perception and misperception, and impairments to cognition such as those caused by addiction to drugs or other health factors.

Recent Experience, Including Conflicts Involving Gains or Losses

One factor that can affect human decision making and deterrence is the historical experience of the adversary decision maker and the country involved. Recent work in the area of cognition, commonly referred to as Prospect Theory, demonstrates that leaders of countries that have recently experienced a devastating loss are likely to be more risk prone and therefore more

difficult to deter than adversaries without a history of recent loss. Even though rational, per se, they are unlikely to conform to the behavioral model of reasonable prudence presumed in the Minimum Deterrence narrative.

Prospect Theory

As economists studied how individuals make choices involving risk, it became apparent that decisions by humans are not based purely on an analytical assessment of the perceived value of the outcomes and risk involved. Instead, human decision making is known to be biased in predictable ways. In 1979, two economists, Daniel Kahneman and Amos Tversky published their landmark paper that human decision making is biased by recent events, perceptions of gain and loss, and choices involving the potential for further gains or losses from a reference point—typically the status quo. Kahneman and Tversky performed experiments that documented how behavior involving risk can change depending on whether a question or decision is posed in terms of an expected gain or loss. Individuals considering a choice that could result in a perceived gain or having benefited from a recent gain tended to be more risk-averse; those that viewed the outcome of a decision as a possible loss or who experienced a recent loss tended to be more risk-acceptant.⁷³ This general analysis of human behavior is referred to as *Prospect Theory*. Since the publication of Kahneman and Tversky's initial paper on Prospect Theory,⁷⁴ their findings have been applied to foreign policy decision making by international relation scholars.⁷⁵

One social science scholar explains an application of Prospect Theory to international relations: “If you’re in an eroded security position and you try to upset the status quo, there’s a very good chance that that might make you worse off. But there’s some chance that you might actually improve your position. This is a classic prospect theory or behavioral decision theory choice,

⁷³ Jack S. Levy, “An Introduction to Prospect Theory,” *Political Psychology*, Vol. 13, No. 2, Special Issue: Prospect Theory and Political Psychology (June 1992), pp. 171-186.

⁷⁴ Daniel Kahneman and Amos Tversky, “Prospect Theory: An Analysis of Decision under Risk,” *Econometrica*, Vol. 47, No. 2 (March 1979), pp. 263-291.

⁷⁵ Jack S. Levy, “Applications of Prospect Theory to Political Science,” *Synthese*, Vol. 135 (2003), pp. 251-241. Also see, Robert Jervis, “Political Implications of Loss Aversion,” *Political Psychology*, Vol. 13, No. 2 (1992), p. 187-204.

this choice between a certain bad outcome and a gamble.”⁷⁶ Noted academic, Robert Jervis, summarized, “More than the hope of gains, the specter of losses activates, energizes, and drives actors, producing great (and often misguided) efforts that risk—and frequently lead to—greater losses.”⁷⁷ Thus, actors motivated to accept great and, perhaps, misguided risks can present unusual challenges for deterrence.

The application of the central finding of Prospect Theory to conflicts between states in the twentieth century suggests the following conclusion, “States and societies that have suffered catastrophic military defeats and experienced threats to their identity and existence develop an angry determination never to allow a repeat of such humiliation.”⁷⁸ States included in this category include Germany in the 1920s and 30s dealing with the harsh terms of the Treaty of Versailles, China in the 1950s, India after suffering a humiliating defeat in the 1962 border war with China, and Pakistan following the 1971 war with India which resulted in the loss of East Pakistan.⁷⁹

The Pakistani case has been well documented and will be used here to illustrate the tendency of aggrieved states to engage in risky behavior in an attempt to restore a sense of honor and possibly reverse a painful loss. The humiliation felt by the leaders in Pakistan following the 1971 Indo-Pakistan War brought to power Zulfikar Ali Bhutto as Pakistan’s President. Bhutto had long been enamored with nuclear technology and he took advantage of the galvanized nationalistic mood to pursue his agenda. Just days into his presidency, Bhutto is famously quoted as saying, “We are fighting a thousand year war with India, and we will make an atomic bomb *even if we have to eat grass*.”⁸⁰

⁷⁶Jeffery Berejikian, Interview on National Public Radio, “Military Conflict Decisions: Why Weakness Leads to Aggression,” March 10, 2014 available at <http://www.npr.org/2014/03/10/288492921/military-conflict-decisions-why-weakness-leads-to-aggression>.

⁷⁷ Robert Jervis, “Political Implications of Loss Aversion,” op. cit., p. 187.

⁷⁸ Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Stanford, CA: Stanford University Press, 2010), p. 70.

⁷⁹ Khan, *Eating Grass*, op. cit., p. 70.

⁸⁰ Ibid., pp. 83-87. (Emphasis added).

Despite being technology poor, Pakistan successfully developed and built an arsenal of nuclear weapons. According to accounts of Pakistan's nuclear weapons program, this was accomplished with significant technical assistance from China as well as a determination by Pakistani leaders to never again experience such a defeat. However, Pakistan's possession of a nuclear arsenal was not automatically accompanied by a prudent doctrine concerning its use, threatened use, and non-use. At the time of the Kargil crisis of 1999, Pakistan possessed an inventory of operational nuclear weapons. Of importance to this discussion of cognition and decision making is the conclusion by scholars that, because of its recent history, even the potential for nuclear war with India did not cause Pakistani leaders to act with caution. For a time, India and Pakistan appeared to be on the brink of a nuclear exchange. One scholar concluded, "They [Pakistani leaders] acted as if they lived in a pre-nuclear, conventional world, mainly concerned with operational imperatives and restoring honor."⁸¹

The Pakistan case study illustrates a central finding of Prospect Theory that, following a significant loss, decision makers typically are willing to accept significant risk in pursuit of an outcome that restores that loss. For countries such as Pakistan, the perception of loss, such as the 1971 defeat and loss of East Pakistan, can be heightened by strong emotion generated by the national humiliation felt by Pakistan's leaders at the time. Emotion clearly played a role in the psyche of Pakistani leaders in this circumstance and heightened the sense of loss and national disgrace leading to a risk-acceptant decision calculus.

Behavioral scientists also have studied the role of emotion in decision making and, as is discussed below, conclude that emotion can significantly affect cognition and behavior.

Role of Emotion

In a 2008 report from the National Academy of Sciences, "Human Behavior in Military Context," the discussion of emotion was introduced in the following way:

Emotion represents a universal and intrinsic aspect of human consciousness, which functions as an evaluative representation of the environment to the person experiencing

⁸¹ Ibid., p. 317.

the emotion. Emotion *moderates important cognitive, behavioral, and physiological phenomenon*. Emotions produce *effects at every level of cognition* and influence many social behaviors. Moreover, reliable and important *individual differences can be found in these effects*.⁸²

... Emotions are triggered automatically, happen to people, and cause them to act in specific and diagnostic ways. An offense triggers anger. A death triggers sadness. A gun triggers fear. As the pent-up energy of an emotion is discharged, the result is a largely inescapable set of stereotyped outputs that occur rapidly, involuntarily. ... The given quality of a person's own experience, and the way that emotion seems to control behavior without awareness, is usually taken as proof that *emotions are automatic responses to things that happen in the world over which people have little control*.⁸³

The way the brain is “wired” and operates suggests that individuals are likely to feel more and calculate less. Professor Joseph LeDoux, a neuroscientist at New York University, explains that “the wiring of the brain at this point in our evolutionary history is such that connections from the emotional systems to the cognitive systems are stronger than connections from the cognitive systems to the emotional systems.”⁸⁴ In other words, emotion, not rational cost-benefit calculations can be the dominant factor.

Emotional reactions become a special concern for considerations of deterrence when dealing with authoritarian leaders who issue orders and demand prompt obedience and action. Such concerns should be even more acute when the dictator is youthful, as is Kim Jong-Un of North Korea. The cognitive functions governing judgment and risk tend not to develop fully until the late twenties in humans. A Princeton University neuroscientist, writing about brain maturity, expresses worry that at Kim Jong-Un's young age the connections in the frontal part of the brain—responsible for restraining impulses and making long-term plans—are not fully developed.⁸⁵ This factor may contribute to the variability of responses to deterrence threats, especially among young leaders.

⁸²James J. Blascovich and Christine R. Hartel, eds., Committee on Opportunities in Basic Research in the Behavioral and Social Sciences for the U.S. Military, *Human Behavior in Military Contexts* (Washington, D.C.: The National Academies Press, 2008), p. 16. (Emphasis added).

⁸³ *Ibid.*, p. 189. (Emphasis added).

⁸⁴ David Ropeik, “Inside The Mind of Worry,” *New York Times*, September 30, 2012, p. SR 11.

⁸⁵ Marc Fisher, “In North Korea, young Kim Jong Eun will Test Age-Old Reliance on Maturity,” *Washington Post Online*, December 22, 2011.

The precise predictions of the functioning of deterrence common to the Minimum Deterrence narrative must be considered suspect for many reasons, including the evidence that emotion can significantly affect decision making and behavior, and individuals can vary widely in their emotional responses to stress and threats. This finding alone undermines assertions by Minimum Deterrence proponents that rational adversaries, now and in the future, will be reasonable and prudent, and therefore deterred predictably at their recommended U.S. nuclear force levels.

Perception or Misperception of Threats

Claims by Minimum Deterrence proponents that deterrence can reliably be assured by a small number of U.S. nuclear weapons implies that adversaries would perceive accurately the threat and likely damage from a U.S. response to a hostile act and that this prospect would deter them from taking hostile action. However, abundant empirical evidence shows that: 1) leaders often do not perceive their environments similarly or predictably; 2) some may not view communicated threats as credible; and 3) some will not be deterred from action even by near-certain destruction of their country.

Misperception. Behaviorists have studied how people perceive their environment and conclude that people with strong views about the correctness of a desired action or the proper role they and their country *should* play in the world have a natural tendency to search for confirming rather than disconfirming evidence. They also tend to perceive their environment in ways that discount disconfirming evidence. Behaviorists refer to this human trait as “confirmation bias.”⁸⁶ Past experience is replete with examples of leaders who have blundered into war with predictably disastrous results.

Leaders of countries that appear to have based misperceptions on confirmation bias, with disastrous results, include Josef Stalin, when in 1941, Stalin ignored evidence that Adolf Hitler was planning to attack the Soviet Union. In another example, in November 1950, both the CIA

⁸⁶ Richard H. Thaler, “Anomalies: The January Effect,” *The Journal of Economic Perspectives*, Vol. 1, No. 1 (Summer 1987), pp. 197-198.

and Gen. Douglas MacArthur advised President Truman that China would not intervene in the Korean War. They believed that Mao Zedong would fear igniting a global conflict.⁸⁷

Another example is Israel in 1973. Israeli leaders were deeply aware of Egypt's determination to regain the Sinai Peninsula, but were convinced that Egypt's President Anwar Sadat would not attack until the Egyptian Air Force improved its ability to attack deep behind Israeli lines. With this preconceived calculus, Israeli (and American) leaders systematically and mistakenly discounted evidence that Egypt was preparing to attack.⁸⁸

In 1973, U.S. leaders were also stunned by Egypt's and Syria's attack on Israel. Apparently U.S. leaders did not understand the internal and cultural pressures on Egypt's leaders. According to then-Secretary of State Henry Kissinger, "Our definition of rationality did not take seriously the notion of [Egypt and Syria] starting an unwinnable war to restore self-respect. There was no defense against our own preconceptions."⁸⁹

Tolerance for Loss. Some leaders may not be deterred by the apparent high risk of loss, particularly if they deem that risk unavoidable in pursuit of an extremely high-value objective. In some cases, they appear to have a tolerance for the suffering of their own countrymen, extending even to the destruction of their society. Several historical examples demonstrate that this trait has been observed in national leaders, including Mao Zedong of China in the 1950s, and Francisco Solano Lopez, the President of Paraguay from 1862 to 1870.

Mao of The Peoples' Republic of China. Biographies of Mao Zedong report his unusually high tolerance for the pain and suffering of his country's people, even those of his own family. In fact, Mao is reported to have experienced "a kind of ecstasy never experienced before" while observing Chinese peasants being beaten to death by wealthy landowners.⁹⁰ Mao certainly does not appear to have possessed the "reassuring, narrow definition of 'rational'" and prudence that

⁸⁷ Keith B. Payne, "Understanding Deterrence," *Comparative Strategy*, Vol. 30, No. 5 (2011), p. 398.

⁸⁸ Janice Gross Stein, "Threat Perceptions in International Relations," in Leonie Huddy, David O. Sears, and Jack S. Levy, eds., *The Oxford Handbook of Political Psychology* (Oxford: Oxford University Press, 2013).

⁸⁹ Quoted in Keith B. Payne, "Understanding Deterrence," *Comparative Strategy*, op. cit., p. 398.

⁹⁰ Jung Chang and Jon Halliday, *Mao: The Unknown Story* (New York: Alfred A. Knopf, 2005), pp. 18, 42, 125-126, 148-149, 196, 266.

is implicit in the Minimum Deterrence narrative.⁹¹ For example, as noted above, in August 1958, Mao ordered a massive shelling of the small off-shore island of Quemoy for the purpose of eliciting nuclear threats from the United States. Mao reportedly took such action to motivate Russian leaders to help arm China with nuclear weapons for a forthcoming, certain nuclear war with the United States. Mao told Russian leaders that over the long-term China would prevail and he was willing for China to “take the full consequences of this war.”⁹²

Lopez of Paraguay. Francisco Solano Lopez was the President of Paraguay from 1862 to 1870. While President, Lopez exhibited a shocking tolerance for violence and death within Paraguay. Lopez took over as president shortly after the death of his father, and he consolidated power by murdering and silencing hundreds of critics. One person who worked for Lopez called him a “monster without parallel.”⁹³ As President, Lopez plunged Paraguay into a disastrous six-year war with Brazil, Argentina, and Uruguay. During the war, Lopez ordered the executions of his brothers, and the torture of his mother and sisters after members of his family were suspected of cooperating with his opponents. One account of Lopez includes the following passage:

Thousands of others, including Paraguay’s bravest soldiers and generals, also went to their deaths before firing squads or were hacked to pieces on Solano Lopez’s orders. Others saw Solano Lopez as a paranoid megalomaniac, a man who wanted to be the “Napoleon of South America,” willing to reduce his country to ruin and his countrymen to beggars in his vain quest for glory.⁹⁴

The result of Lopez’ disastrous rule was the deaths of 85 percent of Paraguay’s population during six years of war. By the end of the war in 1870, the population had been reduced from the pre-war estimate of 1.4 million to just over 200,000.⁹⁵

⁹¹As described in, Keith B. Payne, *The Great American Gamble*, op. cit., p. 277.

⁹²Quoted in Keith B. Payne, *The Great American Gamble*, op. cit., p. 278. Also see, Chang and Halliday, *Mao: The Unknown Story*, op. cit., pp. 413-414.

⁹³U.S. Library of Congress, “Country Study: Paraguay,” <http://countrystudies.us.paraguay/10.htm>.

⁹⁴U.S. Library of Congress, “Country Study: Paraguay,” op. cit.

⁹⁵R. Ernest Dupuy, and Trevor N. Dupuy, *The Encyclopedia of Military History* (New York, NY: Harper and Row, 1970), as cited in Barry Wolf, *When the Weak Attack the Strong: Failures of Deterrence*, RAND Report N-3261-A (Washington, D.C.: RAND Corporation, 1991), p. 7.

Attribution of Credibility to U.S. Deterrence Threats

Adversaries are likely to attribute credibility to U.S. deterrence threats based on a wide spectrum of possible factors, many highly subjective, including their cultural values and particular worldviews. Usama bin Laden, for example, developed a view of the United States as being weak and unwilling to pursue a course of action once the conflict turned bloody. He cited U.S. departures from Vietnam, Lebanon, and Somalia as evidence that the people of the United States would not stomach protracted conflict and loss. According to a close associate of bin Laden,

bin Laden, felt certain that U.S. forces would not wage a ground war and would not fight them face to face. This was the al-Qa'ida view ever since it returned to Afghanistan (from the Sudan) in 1996. To them, the idea that the U.S. forces would establish a presence on the ground in Afghanistan was unthinkable. To bin Laden, the Americans were "cowards"; in his own words "we tested them in Somalia and they proved they were merely paper tigers."⁹⁶

As discussed above, Minimum Deterrence promises regarding the deterrent effect of low or very low force numbers essentially presume opponents to make decisions and behave according to a common script. In so doing, they fail to account for the potentially great variability in credibility that opponents can attribute to U.S. deterrence threats. Indeed, Minimum Deterrence proponents effectively ignore this variability in their claims that a set low, or very low number of nuclear weapons will be adequate for deterrence now and in the future. Establishing and sustaining the credibility of U.S. deterrence related threats has been and will continue to be a challenge, with unpredictable results on at least on some occasions. Whether a Minimum Deterrence-type force will be suitable to help inspire that credibility hardly is certain or predictable.

Distorted Decision Making

A collection of factors associated with brain function can affect cognition and behavior. As just one example, chemicals associated with drugs or alcohol can affect how the brain functions. In particular, the circuits in the brain's reward system, activated by the more primitive parts of the modern human brain, are altered with continued drug and alcohol use. Some national leaders

⁹⁶ Camille Tawil, *The Other Face of Al-Qaeda* (London: The Quilliam Foundation, November 2010), pp. 10-11.

have had serious drug and alcohol addictions: Mao took massive doses of sleeping pills; Adolph Hitler was addicted to methamphetamines and cocaine; and Boris Yeltsin was an alcoholic.⁹⁷

Not only does addiction affect brain function, but the behavioral effect can vary over time. For example, in Mao's case, his early use of sleeping pills is reported to have enabled him to work tirelessly for long periods of time and then sleep soundly. Mao found this to enable him to outwork his competitors and he viewed sleeping pills as a sort of wonder drug. As his dependency on drugs progressed over many years, he increased the dosage until he, reportedly, was taking ten times the daily dose for an adult—a dose that could be lethal for a person who has not built up a tolerance for these drugs. Over several decades of drug use, Mao's personality was transformed significantly. In his early life, Mao's life was characterized by fearlessness and bold adventurism; however, toward the end of his life, Mao lived in a constant state of fear and paranoia.⁹⁸ Mao's behavior changed over time as his addiction progressed. His past behavior was no longer an indicator of future behavior. This illustrates the Minimum Deterrence mistake in predicting a common deterrence outcome at a particular number of U.S. nuclear weapons—even vis-à-vis the same opponent over time.

Bottom Line

This discussion has touched on some of the factors that can affect human behavior and decision making pertinent to the functioning of deterrence. The human decision process is complex and variable. Deterrence decision making, as with many other subjects of decision making, is not uniform nor likely to be highly predictable. The evidence of historical case studies and findings from the behavioral sciences converge to warn against the Minimum Deterrence presumptions about the predictability of adversary deterrence decision making and behavior, and correspondingly suggest skepticism regarding the many confident Minimum Deterrence claims about the functioning of deterrence. The typical assertions about deterrence by Minimum Deterrence proponents, such as those listed on pages 3-4 and 9 above, are inconsistent with considerable available evidence regarding decision making, cognition and behavior.

⁹⁷ Thomas Scheber, "Evolutionary Psychology, Cognitive Function, and Deterrence," *Comparative Strategy*, Vol. 30, No. 5 (2011), p. 464.

⁹⁸ Chang and Halliday, *Mao: The Unknown Story*, op. cit., pp. 331, 389, 508.

Minimum Deterrence Promises: Why the Future Will be Different From the Past

While not addressing the above points, Minimum deterrence proponents on occasion assert implicitly or explicitly that the future will be different from past experience for one or more reasons, and thus that their deterrence promises may be trusted. For example, a frequent claim is that far fewer nuclear weapons are and will be adequate for deterrence because the increasing lethality of U.S. non-nuclear capabilities now enables the United States to support deterrence and extended deterrence in whole or part with non-nuclear forces, i.e., conventional forces can, to a large degree, substitute for nuclear forces for deterrence purposes.⁹⁹

Another, or an additional reason Minimum Deterrence proponents say that far fewer U.S. nuclear weapons will be adequate for deterrence now and in the future is because the Cold War is over, Russia and China do not and will not pose threats pertinent to nuclear deterrence. Therefore, the United States can prudently engage in further deep nuclear force reductions.¹⁰⁰ Per the Minimum Deterrence narrative, suggestions to the contrary reflect “Cold War” thinking and thus are unworthy of contemporary consideration.

The problem with these explanations of why ‘something new and different’ has or will enter into leadership decision making and deterrence considerations to make deep nuclear reductions prudent is that each simply extends the presumption that Minimum Deterrence proponents are able to predict opponent decision making and behavior with confidence, now and in the future:

⁹⁹ For example, “As our conventional weapons have become more precise, we do not have to cling to nuclear weapons to accomplish our objectives.” Ellen Tauscher, “The Second Annual Nuclear Deterrence Summit,” Alexandria, VA: February 17, 2010, available at <http://www.state.gov/t/us/136797.htm>. And, “Deterrence depends on the credibility of response. A massive and potential conventional response to non-nuclear aggression is highly credible.” Under Secretary of State Ellen Tauscher, quoted in, Amy Woolf, *Nonstrategic Nuclear Weapons, CRS Report for Congress* (Washington, D.C.: Congressional Research Service, February 14, 2012), 7-5700, RL32572, pp. 24-25, available at <http://www.fas.org/sgp/crs/nuke/RL32572.pdf>. See also Cartwright, et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, op. cit., 2, 9, 11, 13, 18, 19, 21; Benjamin H. Friedman, Christopher Preble, and Matt Fay, *The End of Overkill? Reassessing U.S. Nuclear Weapons Policy* (Washington, D.C.: Cato Institute, 2013), pp. 12-13, 16, 19; George Perkovich, *Extended Deterrence on the Way to a Nuclear-Free World* (Canberra, Australia: International Commission on Nuclear Non-proliferation and Disarmament, May 2009), p. 16, available at http://icnd.org/Documents/Perkovich_Deterrence.pdf.

¹⁰⁰ See for example, Cartwright, et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, op. cit., pp. 1-2, 6, 11; James Doyle, “Why Eliminate Nuclear Weapons?,” *Survival*, Vol. 55, No. 1 (February 2013), pp. 20-21; and, Sidney D. Drell and James E. Goodby, *What are Nuclear Weapons for? Recommendations for Restructuring U.S. Strategic Nuclear Forces*, op. cit., pp. 1, 10.

nuclear weapons should be reduced because opponents will be deterred reliably by U.S. conventional forces; and/or, the United States will have sufficiently constant and amicable relations with Russia and China such that nuclear deterrence considerations are not and will not be pertinent. Thus the United States can further reduce the number of nuclear forces needed for deterrence.

These explanations of the veracity of Minimum Deterrence promises about what is and will be adequate for deterrence are based on specific presumptions about the deterring effect of U.S. conventional forces, and/or the nature of U.S. relations with Russian and China, now and in the future. These presumptions, that U.S. conventional forces will deter reliably and adequately, and that U.S. relations with Russian and China are and will be relatively constant and amicable, are themselves highly-speculative expressions of hope.

Deterrence via Conventional Superiority

For example, the contention that U.S. conventional superiority permits the United States now to dramatically reduce or eliminate its nuclear forces for deterrence purposes presumes the existence of a pervasive and enduring U.S. conventional superiority vis-à-vis all pertinent opponents. Given the rapid dissemination of advanced military technology and the robust military expansion of some states, such as China, the presumption that the U.S. has and will retain such significant conventional force advantages is an appropriate aspiration and hope, but it cannot be considered a prudent planning assumption. As Adm. Samuel Locklear, the Commander of U.S. Pacific Command rightly observed recently: “We need to think about all scenarios, not just the ones we’ve been dealing with over the last several years where we’ve enjoyed basic air superiority and basic sea superiority. There are places in the world where in this century we won’t have them.”¹⁰¹ In some such contexts, the need for U.S. nuclear capabilities for deterrence purposes may parallel the earlier the Cold War experience in which Soviet conventional force advantages essentially compelled the United States and the West to rely on nuclear weapons for deterrence and extended deterrence purposes.

¹⁰¹ Quoted in , Guy Taylor and Rowan Scarborough, “Stark Warning: Admiral Concedes U.S. Losing Dominance to China,” *The Washington Times*, January 17, 2014, p. A-1.

In addition, an earlier study, *Minimum Deterrence: Examining the Evidence*, discusses the considerable differences between the prospective effects and operational limitations of the even the most powerful advanced conventional weapons and nuclear weapons.¹⁰² As a former Commander of STRATCOM, Admiral Richard Mies, observed in this regard, “Pound for pound, nuclear weapons were several million times more potent.”¹⁰³ That study continues, “Conventional forces are not structured to maintain alert levels equivalent to strategic nuclear forces. In addition they may:

- lack sufficient lethality to hold some types of targets at risk, including hard and deeply buried targets;
- not function as necessary in the context of limited target information and/or fewer delivery inaccuracies, e.g., in the absence of support from Global Positioning System satellites;
- have uncertain system reliability and survivability in nuclear and electromagnetic pulse (EMP) environments;
- lack the ability to penetrate heavily defended areas with a high probability of success; and,
- lack the delivery system range for many targets deep in an adversary’s interior.”¹⁰⁴

In some cases, opponents’ recognition of these differences could be key to U.S. deterrence strategies working or not. This is particularly likely to be the case if at least some opponents perceive nuclear weapons as uniquely deterring. Available evidence suggests that at least some opponents do perceive them as such:

Multiple historical cases suggest that, at least on occasion, nuclear weapons can contribute uniquely to deterrence success because their presence can make the risks of provocation appear incalculable and uncontrollable to an aggressor. Some recent anthropological studies suggest the same. This nuclear deterrent effect may otherwise be difficult or impossible to establish. A cursory review of the motives and perspectives of some leaderships in the post-Cold War period suggests that this dynamic is why “conventional deterrence is likely to be less reliable than nuclear deterrence.” Evidence supports then-Commander of U.S. Strategic Command (STRATCOM) General Kevin

¹⁰² Payne and Schlesinger, *Minimum Deterrence: Examining the Evidence*, op. cit., pp. 22-25.

¹⁰³ Adm. Richard Mies, USN (ret.), “Strategic Deterrence in the 21st Century,” *Undersea Warfare* (Spring 2012), p. 12.

¹⁰⁴ Payne and Schlesinger, *Minimum Deterrence: Examining the Evidence*, op. cit., p. 23.

Chilton's observation in 2010 that, "The nuclear weapon has a deterrent factor that far exceeds a conventional threat."¹⁰⁵

The contention that U.S. conventional force superiority can substitute for nuclear forces for deterrence purposes presumes that conventional forces can, at least on occasion, have comparable deterrent effect. Yet, abundant historical evidence demonstrates that, without a doubt, deterrence based on non-nuclear threats fails periodically and catastrophically. Minimum Deterrence proponents present no evidence that supports their assertion that U.S. conventional forces can now transcend this two thousand years of historical experience and predictably provide adequate deterrent effect—and therefore permit the prudent substitution of conventional forces for nuclear forces for deterrence purposes.

The references by Minimum Deterrence proponents in this regard to the lethality of modern conventional weapons, in fact, offers little to buttress their claim: these references typically point to the potential effects of modern conventional weapons on selected types of enemy targets, *but offer little or no useful evidence about their deterrent effects*. The prospective effect of advanced conventional weapons on enemy targets, however predictable, is a different question than their effects on enemy deterrence decision-making; these are two different questions that typically are conflated in the Minimum Deterrence narrative.¹⁰⁶ They should not be. Generalizations about conventional weapons physical effects on targets may be reasonable—although even here there are considerable uncertainties; but confident predictions about their effect on opponent deterrence decision making must be met with skepticism because a wide spectrum of additional and independent factors can contribute to that deterrent effect, or lack thereof.

Again, Minimum Deterrence proponents conflate output with outcome: the claim that modern U.S. conventional forces can now substitute for nuclear forces given their lethality conflates prospective weapons effects with prospective deterrence effects. As Thomas Schelling observed in response to the proposition that conventional forces now can serve as an adequate substitute for deterrence, "One might hope that major war could not happen in a world without nuclear

¹⁰⁵ Ibid., p. 13.

¹⁰⁶ Cartwright, et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, op. cit., pp. 2, 11.

weapons, but it always did.”¹⁰⁷ As this comment by Schelling suggests, hope is again the common ingredient underlying these Minimum Deterrence claims.

The question remains, given ample historical experience with the periodic failure of conventional deterrence, why should we believe that it can now function reliably and predictably as claimed in the Minimum Deterrence narrative? What evidence, as opposed to assertion, leads to that conclusion? Beyond the points discussed above, here the Minimum Deterrence narrative is silent.

It is equally important to note that some U.S. allies fully reject the notion that U.S. conventional forces are an adequate substitute for U.S. nuclear forces for extended deterrence purposes. Indeed, the evidence is overwhelming that at least some allies see U.S. nuclear capabilities as an essential component of deterrence and their assurance,¹⁰⁸ and recent key NATO documents continue to highlight the consensus NATO position that nuclear weapons continue to be essential to NATO deterrence capabilities.¹⁰⁹ There is no indication that this perspective among at least some allies is shifting in favor of substituting U.S. conventional forces for this purpose. Indeed, Russia’s war against Georgia in 2008 and annexation of part of the Ukraine in 2014, and on-going China’s expansionist actions in the East China Sea, appear to have reinforced the importance of U.S. nuclear weapons for at least some key allies.

Russia and China: No Pertinent Threat

A recent and highly-prominent proposal by the Global Zero Commission, *Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, establishes much of its argument for Minimum Deterrence and deep U.S. nuclear reductions on the claim that Russia is not and will not be a

¹⁰⁷ Thomas Schelling, “A World Without Nuclear Weapons?” *Daedalus*, Vol 138, No. 4 (Fall 2009), p. 125.

¹⁰⁸ See Kurt Guthe, *NATO Nuclear Reductions and the Assurance of Central and Eastern European Allies* (Fairfax, VA: National Institute Press, October 2013); Aaron Stein, “Iran’s Nuclear Diplomacy: A Response From Turkey,” Royal United Services Institute, January 27, 2014, available at <http://www.rusi.org/analysis/commentary/ref:C52E63FEA90AB8/>; and, David Santoro and Brad Glosserman, “A Conference Report, Building Toward Trilateral Cooperation on Extended Deterrence in Northeast Asia; The First US-ROK-Japan Extended Deterrence Trilateral Dialogue,” CSIS, *Issues & Insights*, Vol. 13, No. 14 (September 2013), pp. v, 2, 12, 13.

¹⁰⁹ See for example, North Atlantic Treaty Organization, *Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organization*, Adopted by the Heads of State and Government at the NATO Summit in Lisbon, 19-20 November, 2010, p. 15.

U.S. opponent pertinent to nuclear deterrence considerations. Therefore, so the argument goes, the number of deployed U.S. nuclear weapons is far more than is needed for deterrence, now and in the future. To support this key claim about Russia's future disposition toward the United States and allies, the report states: "The dramatic shift in the threat environment from the 20th to the 21st century is underscored by last year's [2011] survey of several hundred experts by the Council on Foreign Relations. Russia is not even mentioned among the top twenty (20) contingencies that in their view directly threaten the U.S. homeland of countries of strategic importance to the United States."¹¹⁰

It should be noted, however, that calling on any number of authorities, however astute, to validate such predictions about future Russian leadership decision making and state behavior is fallacious because that decision making and behavior pertinent to the details of deterrence is not foreseeable in the near-term, much less deeper into the future. As if to demonstrate this point, the Council on Foreign Relations repeated its survey of experts in November 2013 and the possibility of Russian military intervention in the Ukraine did not make the top thirty (30) threats anticipated by the experts.¹¹¹ Of course, Russia did precisely that within four months of the survey.

The Minimum Deterrence assertion of a relatively constant and benign threat environment, including in U.S. relations with Russia and China, reflects an unsupportable confidence in the ability of Minimum Deterrence proponents to predict the future. There is ample and indeed increasing contemporary evidence to suggest that future U.S. relations with Russia and China may be characterized by conflict and crises in which nuclear deterrence considerations could be pertinent.¹¹² This is not inevitable, of course, but for Minimum Deterrence proponents essentially to deny the distinct possibility of such a future is to ignore contemporary evidence and uncertainties about the future. It is a prediction based on understandable hope, but contrary

¹¹⁰James Cartwright, et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, op. cit., pp. 2-3.

¹¹¹ Council on Foreign Relations, Center for Preventive Action, *Preventive Priorities Survey 2014* (Washington, D.C.: Council on Foreign Relations, December 2013), available at <http://www.cfr.org/peace-conflict-and-human-rights/preventive-priorities-survey-2014/p32072>.

¹¹² See Payne and Schlesinger, *Minimum Deterrence: Examining the Evidence*, op. cit., pp. 27-31; Keith B. Payne and John S. Foster, Jr., *Nuclear Force Adaptability for Deterrence and Assurance: A Prudent Alternative to Minimum Deterrence* (Fairfax, VA: National Institute Press, 2014), pp. 6-13.

to considerable contemporary evidence. Such a prediction cannot be deemed reliable or even subject to a credible estimate of probability.

In short, the two reasons offered in the Minimum Deterrence narrative to support the contention that past experience need not guide future considerations are each as speculative and hope-based as are the assertions about deterrence they are intended to validate.

Problems of Logic

The Minimum Deterrence narrative regarding the functioning of deterrence also includes logical contradictions. One in particular affects the typical Minimum Deterrence recommendation about the size and character of U.S. nuclear forces. As noted above, Minimum Deterrence proponents generally favor threats to an opponent's societal values for the purposes of deterrence because these assets are said to be inescapably vulnerable to nuclear attack even at relatively low nuclear force levels. They also criticize U.S. counterforce capabilities as "destabilizing," i.e., U.S. counterforce capabilities, if sufficiently robust, are said to undermine the reliability of deterrence by motivating an opponent to strike first for fear of a U.S. pre-emptive, counterforce strike. In classic deterrence theory parlance, this is known as "crisis instability." On this argument, the Minimum Deterrence narrative deems U.S. counterforce capabilities as unnecessary for, and a potentially "destabilizing" hindrance to the functioning of deterrence.

Yet, if the conditions presumed by the Minimum Deterrence narrative are in place, i.e., U.S. nuclear deterrence threats are reliably effective based on the inescapable vulnerability of the opponent's societal assets to U.S. nuclear retaliation, then there is no *logical* reason why additional U.S. counterforce capabilities should cause deterrence to fail. If the opponent is, in fact, reliably deterred by nuclear threat, as is presumed in the Minimum Deterrence narrative, then additional U.S. counterforce capabilities cannot *logically* undermine that deterrent effect. Indeed, if an opponent chose to strike first in such a case, it would simply *ensure* the execution of the retaliatory blow that is presumed to deter the opponent effectively—a decision that cannot be made by rational leaders per the Minimum Deterrence narrative. The only logical advantage to the opponent in striking first would be if doing so would render the U.S. deterrent threat

tolerable, which by definition, could not be the case as presumed at the outset. Consequently, if deterrence functions as is claimed by Minimum Deterrence, it cannot logically be undermined by U.S. counterforce capabilities as often is the charge by Minimum Deterrence proponents.

Thomas Schelling, the pioneering deterrence theorist who provided the original observations on the potential for “crisis instability,” understood and even explained this this potential for deterrence “instability” would pertain *only if by striking first the opponent expects to reduce the U.S. response to tolerable levels*.¹¹³ If and when that is case, deterrence cannot be considered stable in any event.

In short, Minimum Deterrence claims that deterrence will function predictably at the recommended low or very low nuclear force levels; and simultaneously, that U.S. counterforce capabilities will “destabilize” that deterrence relationship, cannot both logically be true. Leadership decision making, in practice vice theory, might not proceed in line with logic. But, when so, the Minimum Deterrence presumption of the predictable functioning of deterrence must be deemed suspect in the first instance.

Minimum Deterrence vs. Evidence of the Deterrence Value of Greater Numbers

The Minimum Deterrence claim that low or very low numbers of U.S. nuclear weapons will prove adequate for deterrence, now and in the future, also appears inconsistent with state-of-the-art scholarly analyses of the directly pertinent empirical record regarding the apparent value of superior weapon and launcher numbers.

For example, recent academic research demonstrates that, from 1945 to 2001, states with numerical nuclear superiority over their nuclear-armed rivals were, on average, less likely to be challenged militarily and were more likely to achieve their basic goals in crises when they were challenged. In other words, nuclear-armed states in a position of numerical nuclear inferiority (including states with a Minimum Deterrence-type capability) were more likely to be challenged

¹¹³ Thomas Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960), pp. 207, 231. (Emphasis in original).

militarily and less likely to achieve their goals in crises. Of course, these statistical findings do not prove causation; but they do at least show an association that is ignored by the Minimum Deterrence narrative.

To explain these findings, scholars have built upon the classic work of deterrence theorist, Thomas Schelling, to argue that deterrence-related engagements in the nuclear age are “competitions in risk taking.”¹¹⁴ Correspondingly, they suggest that states with a nuclear advantage, in general, have shown a greater willingness to pursue their goals in such “competitions”—perhaps because they are relatively more risk tolerant or because they perceive less risk in doing so—and thereby have a strategic advantage in the competition. These findings suggest that the maintenance of nuclear superiority can contribute to the effectiveness of deterrence strategies and that a Minimum Deterrence-type posture that is inferior to that of likely opponents may entail a strategic disadvantage in deterrence-related “competitions in risk taking.”

These findings based on considerable available empirical evidence and related explanations of these findings, certainly do not “prove” that numeric nuclear superiority will provide deterrence success on every occasion. But they do challenge the basic presumption underlying the typical Minimum Deterrence narrative regarding the functioning of deterrence, i.e., a Minimum Deterrence-type nuclear force posture now, and in the future, will prove adequate to meet U.S. nuclear deterrence requirements.

The following summarizes this scholarly research and its implications for Minimum Deterrence arguments.

Nuclear Crisis Outcomes

In 2013, Matthew Kroenig, Professor of Government and Foreign Service at Georgetown University, published an article in *International Organization* that examined the relationship between nuclear capabilities and nuclear crisis outcomes.¹¹⁵ The article analyzed 52 nuclear crisis participants in 20 separate nuclear crises from 1945 to 2000. The article found that states

¹¹⁴ Thomas Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966), p. 166.

¹¹⁵ Matthew Kroenig, “Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes,” *International Organization*, Vol. 67, No. 1 (January 2013), pp. 141-171.

with numerical nuclear superiority over an opponent were 17 times more likely to achieve their goal in a crisis than nuclear inferior states. In other words, states that had a minimum nuclear deterrent, but possessed fewer warheads than their opponent, were 17 times less likely to win than their nuclear superior opponent. This finding held even after controlling for conventional military power, the balance of stakes, and other factors that might influence the outcome. [See Annex A for Details of this Analysis]

In a separate, yet-unpublished study, Kroenig extended this examination of nuclear weapon numbers and deterrence.¹¹⁶ In an analysis of all states from 1945 to 2001, He found that nuclear superior states are five and a half times less likely to be challenged militarily than a nuclear-armed state with inferior numbers. In other words, states that possess forces that may be described as consistent with Minimum Deterrence, but that have a numerically smaller arsenal than a potential opponent, are five and a half times more likely to become the target of an international military challenge by that opponent. This association of force numbers to threats again contrasts with Minimum Deterrence assertions about low force numbers and the functioning of deterrence (see Annex B for details of this analysis).

Why Might Nuclear Force Numbers Matter?

Why might nuclear superiority matter? Why does a minimum nuclear deterrent with relatively inferior force numbers appear to carry increased risk? Kroenig follows Thomas Schelling in conceptualizing rivalry in the nuclear era as a “competition in risk taking.” Few leaders are likely to engage in a self-destructive nuclear war intentionally, but many appear willing to accept great risks if the contested issue is deemed sufficiently important. When states knowingly risk nuclear war in a crisis, they are engaging in nuclear brinkmanship and in these crises competitions the state willing to run the greatest risk (which can also be thought of as the state with the greater determination and cost tolerance given the stakes involved) may have the advantage and be more likely achieve its goals in a competition of wills.

¹¹⁶ Matthew Kroenig and Michael Weintraub, “The Nuclear Balance and International Conflict,” unpublished working paper, available at www.matthewkroenig.com.

Building on Schelling's brinkmanship theory as formalized by Robert Powell and others, Kroenig models a state's resolve in a crisis as its: payoff to winning the crisis, its payoff to losing the crisis, and the cost of nuclear war if the crisis spins out of control.¹¹⁷ Building on the nuclear strategy literature, Kroenig argues that the expected cost of nuclear war is perceived to be lower for nuclear superior states than for nuclear inferior states for two reasons. First, in a complete nuclear exchange it would absorb fewer warheads than its nuclear inferior opponent. Second, its larger arsenal may be thought to give it a counterforce advantage, making it better able to limit the damage its opponent could inflict in the event of nuclear war. If the cost of nuclear war is perceived to be lower for one state than the other (even if the cost of nuclear war is high, and indeed even unacceptable, for both), then that state's effective resolve should be higher and its probability of winning the competition of wills greater.

Or in more colloquial terms, the logic of the argument is that in a game of chicken, we might expect the smaller car to swerve first even if a crash would be fatal for both. If this is true, then we can understand why nuclear superior states may be more likely to enforce their will in an international crisis and, because states should be reluctant to initiate crises they expect to lose, to be less likely to be challenged in the first place. This is what the data suggests.

Other recent academic studies appear to corroborate Kroenig's findings. Vipin Narang, an Assistant Professor of Political Science at the Massachusetts Institute of Technology, recently published a book on the nuclear postures of regional nuclear powers.¹¹⁸ Narang conceptualizes nuclear posture broadly to include nuclear arsenal size, delivery vehicles, doctrine, declaratory policy, etc., and aggregates these factors into three ideal-typical nuclear postures: catalytic, assured retaliation, and warfighting. These postures essentially vary on a spectrum from smaller arsenals and passive doctrines (catalytic) to larger arsenals and more aggressive doctrines (warfighting). Among the regional nuclear powers, Narang finds that states with warfighting doctrines are the least likely to become the targets of MIDs.

¹¹⁷ Robert Powell, "Nuclear Brinkmanship with Two-Sided Incomplete Information," *American Political Science Review* Vol. 82, No. 1 (1988), pp. 155-178.

¹¹⁸ Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton University Press, 2014).

Erik Gartzke, an Associate Professor of Political Science at the University of California at San Diego, has recently presented an as-yet unpublished working paper on delivery vehicles and deterrence, co-authored with several of his PhD students.¹¹⁹ In the paper, Gartzke and his co-authors find that states with more delivery platforms are more likely to initiate MIDs and less likely to be the target of MIDs initiated by other states, again providing support for the idea that larger nuclear force numbers provide states with a perceived competitive advantage.

Bottom Line

In light of this recent academic research on the pertinent empirical record over the past seventy years, it appears that states with fewer warheads than competitors are more likely to become the targets of military challenges and are less likely to achieve their basic goals when they are challenged. In addition, states with a minimum nuclear deterrent, but fewer delivery platforms than their opponents, are also more vulnerable to militarized challenges.

Does this mean that states with larger nuclear arsenals are sure to be more successful in deterrence crises? No. As emphasized above, many factors can contribute to deterrence decision making, some obvious, some likely hidden. And, to be sure, the systematic statistical research on nuclear deterrence is in its early days (the first study reviewed here was published in 2013); these studies are not the last word on this subject and they may reveal an association vice causation with regard to force numbers and deterrence outcomes.

Nevertheless, these studies point in the same direction and the evidence presented is much more systematic than anything provided in the Minimum Deterrence narrative. At a minimum, this scholarly literature suggests that there is an additional burden of proof on those who claim that the United States can move to low or very low force numbers without risk to its deterrence strategies. The empirical record over the past seventy years as reflected in the recent scholarly research described here provides additional evidence that puts in doubt Minimum Deterrence explicit and implicit assertions of competence to predict precisely the future functioning of deterrence.

¹¹⁹ Erik Gartzke, Jeffrey Kaplow, and Rupal Mehta, “Deterrence and the Structure of Nuclear Forces,” presented at the 2013 Annual Meeting of the International Studies Association, San Francisco, California.

Summary and Conclusions: Available Evidence and Minimum Deterrence Promises of Deterrent Effect at Very Low Nuclear Force Levels

The central recommendations of the Minimum Deterrence narrative proceed from a series of presumptions and derived arguments that are at some points internally contradictory and generally are contrary to ample available evidence from historical and cognitive studies. Most important in this regard are fundamental Minimum Deterrence claims that U.S. requirements for nuclear forces for deterrence, now and in the future, will predictably be met at nuclear force numbers ranging from “several” to hundreds. Consequently, so the Minimum Deterrence argument has proceeded for decades, the United States can prudently reduce its nuclear forces to the recommended low or very low levels.

The implicit presumption underlying this common claim is that it is possible to predict in detail how rational opponents, now and in the future, will perceive, calculate costs and benefits, make decisions and behave with regard to U.S. deterrence threats, i.e., rational opponents will choose to be deterred at the U.S. force levels advocated by the Minimum Deterrence narrative. In making this claim, Minimum Deterrence proponents typically presume that all rational leaders share the various characteristics that would render them deterrable to the types of threats recommended, usually threats to societal assets, and then calculate and behave in accord with the presumed characteristics. Opponents are presumed to be reasonable by Western standards, prudent, well-informed and communicative; and they do and will place high value on avoiding the risk to their societal assets posed by a relatively small number of U.S. nuclear weapons. These characteristics are attributed to all “rational” opponents, and thus the conclusion is drawn that all rational opponents are and will be deterred by the recommended type of U.S. threat.

Given this select set of presumptions about how all rational leaders perceive, think and behave, and the related universal definition of what it means to be a rational decision maker, as noted above, Minimum Deterrence proponents claim deterrence to be “easy,” and that, “not much is required to deter,” and that deterrence requirements are, “a problem easily solved.”¹²⁰ Indeed,

¹²⁰ Robert Jervis, “Why Nuclear Superiority Doesn’t Matter,” op. cit., pp. 617-618; Kenneth N. Waltz, “More May Be Better,” in, Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons* (New York: W.W. Norton, 2003), pp. 22, 26.

the Minimum Deterrence definition of rational and its select presumptions about opponent decision making appear to be structured in the manner necessary to fit the recommendation for deep nuclear force reductions.

On the basis of this particular definition of rational and presumptions about opponents, the Minimum Deterrence narrative conflates the prospective physical effects of a low or very low number of U.S. nuclear forces with their prospective deterrent effects. The likely fact that they could in principle threaten an opponent's societal assets is treated as if the deterrent effect of that capability is known and predictable; yet, it is not, and cannot be so.

In addition, this basic Minimum Deterrence narrative is contradicted by an enormous body of available evidence regarding the character of leadership decision making and behavior.

Historical examples abound of apparently rational leaders perceiving, calculating, deciding and behaving far outside the boundaries of rational behavior as defined narrowly in the Minimum Deterrence narrative.

Historical studies demonstrate the variety of actual leadership decision making and behavior, and studies of cognition over the past two decades help explain why there is such variety in human decision making and behavior, including as it pertains to deterrence decision making. For some set of reasons, understood at least in part by the findings of cognitive studies, leaders frequently have not perceived, calculated and behaved in the manner presumed by Minimum Deterrence: they have not been deterred predictably by the vulnerability of, and apparent great risk to their societal and other assets, including by nuclear threat. Minimum Deterrence appears simply to dismiss or ignore this evidence that so contradicts its fundamental presumptions about the definition of rationality, the similarity of opponents and the corresponding predictability of deterrence.

Given this ample historical evidence, the question never answered and rarely addressed by Minimum Deterrence proponents is: why should we believe the implicit Minimum Deterrence presumption that the future will be very different from this past experience? The points that Minimum Deterrence proponents occasionally put forward in this regard essentially seek to

validate their hope-based and speculative presumptions about opponents and the functioning of deterrence via equally hope-based and speculative presumptions about U.S. relations with Russia and China and the deterrence effect of U.S. conventional forces.

First, they claim that relations with Russian and China have changed so dramatically since the Cold War that nuclear deterrence considerations are no longer pertinent to those relations and will not be so in the future. From this claim, the conclusion is drawn that the United States can move away from Cold War nuclear force levels and policies. To be sure, the United States has long since departed from Cold War nuclear force levels, reportedly having reduced its deployed nuclear arsenal by approximately 85%. Nevertheless, the recommendation for further deep nuclear reductions is linked to this claim about relations now and in the future with Russia and China.

It is not possible to prove or disprove that U.S. relations with Russia and China will be of the character typically asserted by Minimum Deterrence proponents. However, current evidence with regard to U.S. and allied relations with Russia and China suggests that the presumption that no serious security crises will develop is highly questionable. Severe Chinese pressure and threats against Japan and comparable Russian pressure threats to NATO countries in Central Europe contrast sharply with the relatively benign relations asserted by Minimum Deterrence proponents. Again, the Minimum Deterrence narrative is inconsistent with contemporary evidence, and appears to be built on the hope-based presumptions needed for their recommendation to dramatically reduce the number of U.S. nuclear weapons.

Second, contemporary Minimum Deterrence proponents also often claim that the increasing lethality of advanced U.S. conventional forces and general superiority of U.S. conventional forces over those of other powers allows those forces to substitute for U.S. nuclear weapons for deterrence purposes—thus the United States can prudently reduce or essentially eliminate its nuclear forces for that purpose. This assertion about the deterrent effect of U.S. conventional weapons fits well with Minimum Deterrence policy recommendations. But it is contrary to considerable evidence and correspondingly is asserted, not demonstrated.

It also should be noted that the presumption of U.S. conventional force superiority is unlikely to hold in all present or future scenarios of potential interest. Beyond that basic point, however, it is not possible to predict with precision and confidence the future deterrent effects of U.S. conventional forces, much less whether they are or will be able to substitute for nuclear forces for the desired deterrence effect. Abundant historical evidence demonstrates that conventional deterrence fails periodically and catastrophically and contemporary evidence suggests that at least some opponents perceive nuclear weapons as uniquely threatening and potentially destructive, and thus they may provide unique advantages for deterrence dismissed by the Minimum Deterrence argument. Again, the burden of proof is on Minimum Deterrence proponents to explain why, how and when this experience will not be repeated in the future.

Minimum Deterrence proponents again conflate physical effects with deterrent effects: advanced U.S. conventional forces may well be increasingly lethal against a wider set of targets than was the case in the past; even so, that apparent fact tells us little about their prospective deterrent effects against a variety of future opponents in unknown circumstances over unknown stakes.

Historical evidence and findings from studies of cognition do not prove that all rational leaders in the future will reflect an equally variable approach to deterrence decision making, but they do suggest that the burden of proof is on Minimum Deterrence proponents to explain how, why and when all future leaders deemed to be rational will fit their description of that word and why all future leadership perceptions, decision making and behavior will change dramatically so as to fit Minimum Deterrence presumptions.

Minimum Deterrence proponents have failed to do so; indeed, there is almost no apparent effort to marshal evidence in support their key assertions about the functioning of deterrence. Instead they simply repeat the assertion that the U.S. nuclear force levels and policies they recommend will be adequate for deterrence for the asserted reasons. In each case, these assertions appear to be based on hope and speculation—hardly a prudent foundation for national security policy.

Finally, recent statistical research focusing on nuclear weapons and deterrence effectiveness suggests that in relations between nuclear powers, the side with the larger nuclear arsenal is less likely to be challenged and is more likely to prevail in a contest of wills involving deterrence or coercion. These findings may reveal association rather than causation, and cannot be presumed to be predictive. Nevertheless, they do suggest a possibility that is implicitly or explicitly denied absent any competing evidence by the Minimum Deterrence narrative, i.e., there is potential deterrence value in retaining nuclear force numbers beyond that level deemed necessary to meet the minimalist standard set by Minimum Deterrence. This contention may or may not be supported by further statistical analysis, and may or may not prove true in future practice. Nevertheless, the contemporary analyses that suggest this possibility cast further doubt on the largely assertion- and hope-based Minimum Deterrence narrative.

The conclusion that can be drawn from this examination of Minimum Deterrence against available evidence is that it is predicated on presumptions and derived arguments that are inconsistent with considerable available evidence, and in some cases are sharply contradicted by that evidence. Its underlying presumptions and derived arguments appear to be structured with little regard for evidence and no attempt to address for contrary evidence. They appear instead to be designed to support the given conclusion that U.S. nuclear forces should be reduced to the recommend low or very low levels.

Annex A: Details of the Analysis

Nuclear Crises. To identify nuclear crises and nuclear crisis participants, Kroenig began with the International Crisis Behavior (ICB) dataset maintained by the University of Maryland at College Park.¹²¹ The dataset contains a list of every international crisis from 1815 to 2001. He then reviewed the list and identified the crises that contained at least two nuclear-armed participants. This procedure produced 20 separate nuclear crises and 52 participating states. The list of crises and participants is available in Table 1.

Table 1. Nuclear Crises, 1945-2001

Crisis Name	Year	Nuclear-Armed Participants
Korean War	1950	Soviet Union, United States
Suez Crisis	1956	Great Britain, Soviet Union*, United States*
Berlin Deadline	1958	Great Britain, Soviet Union, United States
Berlin Wall	1961	France, Great Britain, Soviet Union*, United States
Cuban Missile Crisis	1962	Soviet Union, United States*
Congo Crisis	1964	Soviet Union, United States*
Six-Day War	1967	Israel*, Soviet Union, United States*
Sino-Soviet Border War	1969	China, Soviet Union*
War of Attrition	1970	Israel, Soviet Union
Cienfuegos Submarine Base	1970	Soviet Union, United States*
Yom Kippur War	1973	Israel, Soviet Union, United States*
War in Angola	1975	Soviet Union*, United States
Afghanistan Invasion	1979	Soviet Union*, United States
Able Archer Exercise	1983	Soviet Union, United States
Nicaragua, MIG-21S	1984	Soviet Union, United States
Kashmir	1990	India, Pakistan
Taiwan Strait Crisis	1995	China, United States*
India/Pakistan Nuclear Tests	1998	India, Pakistan
Kargil Crisis	1999	India*, Pakistan
India Parliament Attack	2001	India*, Pakistan
<p>Note: A state's victory in a crisis is denoted by an asterisk. Not all crises have victors and some crises have multiple victors. For a list of when countries acquired nuclear weapons, see Kroenig and Gartzke 2009.</p>		

Victory in Nuclear Crises. To measure whether a state “won” the crisis, Kroenig simply used an existing variable in the ICB dataset, which codes whether each participating state achieved its

¹²¹ Center for International Development and Conflict Management, University of Maryland, available at <http://www.cidcm.umd.edu/icb/data/>.

basic political goals in the crisis. If the state achieved its goals, it was coded as winning crisis. If it did not achieve its goals, whether because of stalemate, compromise, or outright defeat, it was coded as not winning the crisis. For example, since the United States achieved its basic goal of forcing Soviet missiles out of Cuba, it was coded as winning the Cuban Missile Crisis and the Soviet Union was coded as not winning the crisis. (Since it is conceivable that both or neither state achieves its basic goals, some crises have multiple winners and others have multiple losers). The winners of each crisis are denoted with an asterisk in Table 1.

Nuclear Capabilities. To measure whether a state possessed numerical nuclear superiority over its opponent, Kroenig created two variables. The first simply assessed whether the state possessed more nuclear warheads than its opponent. The second variable took the ratio of the warheads possessed by State A, divided by the total combined warheads in the arsenals of both State A and State B. Admittedly, these are fairly crude measures of nuclear capabilities, but conducting a more fine-grained analysis for every pair of states in every year from 1945 to 2001 (what would be required for a large-n statistical analysis) would have been an enormous undertaking if not impossible and was beyond the scope of the study.¹²² To distinguish between nuclear superiority and other nuclear capabilities, Kroenig also measured simply whether or not each state possessed nuclear weapons and also whether it possessed a secure, second-strike capability, defined as whether it possessed either SLBMs or mobile, nuclear-capable missiles.

Results. To begin the analysis, Kroenig conducted a simple cross tab test. The results are presented in Table 2. Turning to Table 2, we can see that it is uncommon for states to achieve their goals in nuclear crises. The average crisis participant wins in only 35% of cases. Next, however, we can see that nuclear superior states do much better, winning in 54% of cases. Indeed, nuclear superior states perform much better than nuclear inferior states, which achieve their basic goals in only 15% of the cases.

¹²² Nevertheless, if statistically significant relationships are found using even crude measures, this can be taken as powerful evidence of an underlying relationship, which might show up in even sharper relief with better measures.

Table 2. Cross Tabulations of Nuclear Crisis Outcomes, 1945-2001

		Outcome		
		Win	Loss	Total
Superiority	Yes	14 (54%)	12 (46%)	26 (100%)
	No	4 (15%)	22 (85%)	26 (100%)
	Total	18 (35%)	34 (65%)	52 (100%)
		$\chi^2 = 8.497$ (p=0.004)		

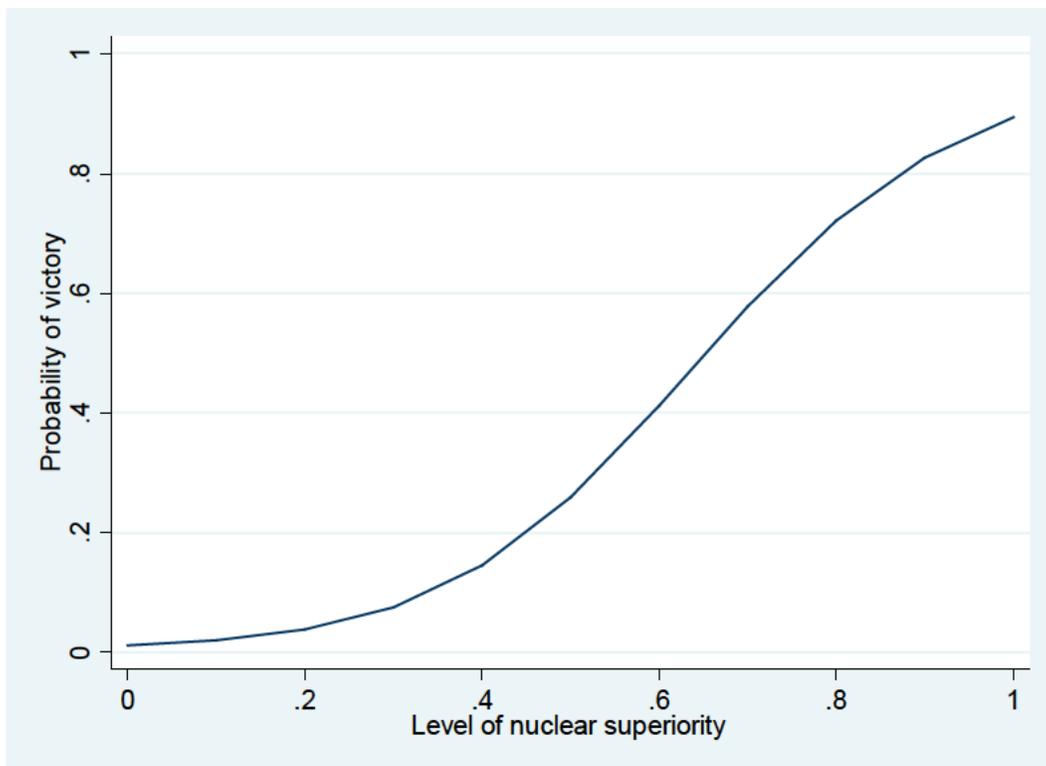
This is strong evidence that superiority provides an advantage in a crisis; but might these results be due to other factors? States with nuclear superiority might also have conventional superiority, they might enjoy an advantage in the balance of political stakes, or perhaps there is some other factor that accounts for this correlation. Is there a basis for concluding that the results are due to nuclear superiority and not to these other factors? To account for this possibility, Kroenig conducted a multivariate regression analysis in which he controlled for: nuclear possession; nuclear second-strike capabilities, conventional military power; political stakes; geographical proximity of the crisis; domestic political system; security environment; population size; and the level of violence experienced in the crisis. To measure these factors, Kroenig used standard variables from standard datasets commonly used in the international relations literature.¹²³

In each regression, he found that nuclear superiority was positively correlated with the outcome of the crisis and statistically significant. This result was highly robust and did not depend on definitions or measures of key concepts or on the data used. In addition, he found that the substantive effect of nuclear superiority was quite large. Figure 1 illustrates this substantive effect. At the extreme left of the figure, we see that countries that possess few of the aggregate number of nuclear weapons within a dyad have less than a 5 percent chance of winning a nuclear crisis. As we move to the right of the figure, however, we see that an increase in the proportion of nuclear weapons that a state possesses within a dyad results in a corresponding increase in the

¹²³ Data are drawn from the Correlates of War composite capabilities index, version 3.02 and extracted using EUGene. On the Correlates of War, see J. David Singer, Stuart Bremer, and John Stuckey, "Capability, Distribution, Uncertainty, and Major Power War, 1820–1965," in Bruce Russett, ed., *Peace, War, and Numbers*, (Beverly Hills, CA: Sage, 1972). On EUGene, see Scott D. Bennett and Allan Stam, "EUGene: A Conceptual Manual," *International Interactions*, Vol. 26, No. 2, pp. 179–204.

probability of victory. Indeed, as we arrive at the extreme right of the figure, we see that the probability of victory increases to over 85 percent for states that possess nearly all of the nuclear weapons within a dyad. In other words, states with considerable nuclear superiority are over 17 times more likely to achieve their basic goals in a crisis than a state with a minimum nuclear deterrent. Alternatively put: states with at least a minimum nuclear deterrent, but fewer warheads than their opponent, are 17 times less likely to win nuclear crises.

Figure 1. Conditional effect of the degree of nuclear superiority on the probability of victory in nuclear crises, 1945-2001.



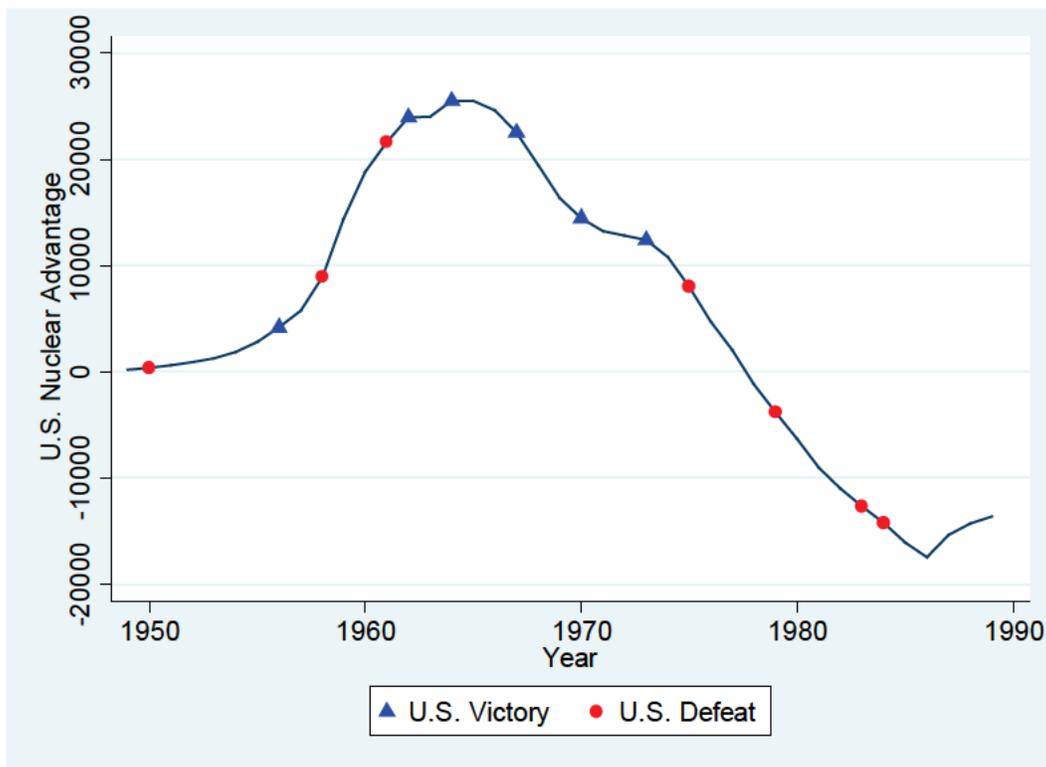
Note: Estimates obtained from Model 5. Level of nuclear superiority is from lowest (0) to highest (1).

Next, Kroenig analyzed the effect of the relationship of nuclear forces within a single strategic competition over time: the US-USSR rivalry during the Cold War. The results are depicted in Figure 2. The figure displays the shift in the nuclear balance of power, measured in numbers of nuclear warheads, over time in addition to Cold War nuclear crises between the superpowers and their outcomes. We can see that the United States was more likely to win nuclear crises when it possessed nuclear superiority. While Washington enjoyed a nuclear advantage over Moscow, it

achieved its basic goals in six out of ten, or 60%, of the nuclear crisis in which it was involved. This is much higher than the 35% winning percentage experienced by the average nuclear crisis participant.

Moreover, the figure also shows that Washington's success in nuclear crises improved as its level of nuclear superiority over the Soviet Union increased. We can see that when Washington had at least ten thousand more nuclear warheads than Moscow, it won five out of six, or 83%, of the crises in which it was involved. In contrast, the United States' winning percentage was much lower from a position of nuclear inferiority. When the United States possessed fewer warheads than the Soviet Union, it won zero out of three, or 0%, of the nuclear crises in which it was involved.

Figure 2. U.S.-U.S.S.R. nuclear balance and crisis outcomes, 1949-1989.



Note: The y-axis depicts the U.S. nuclear advantage relative to the Soviet Union measured in numbers of nuclear warheads.

Annex B: Details of the Analysis

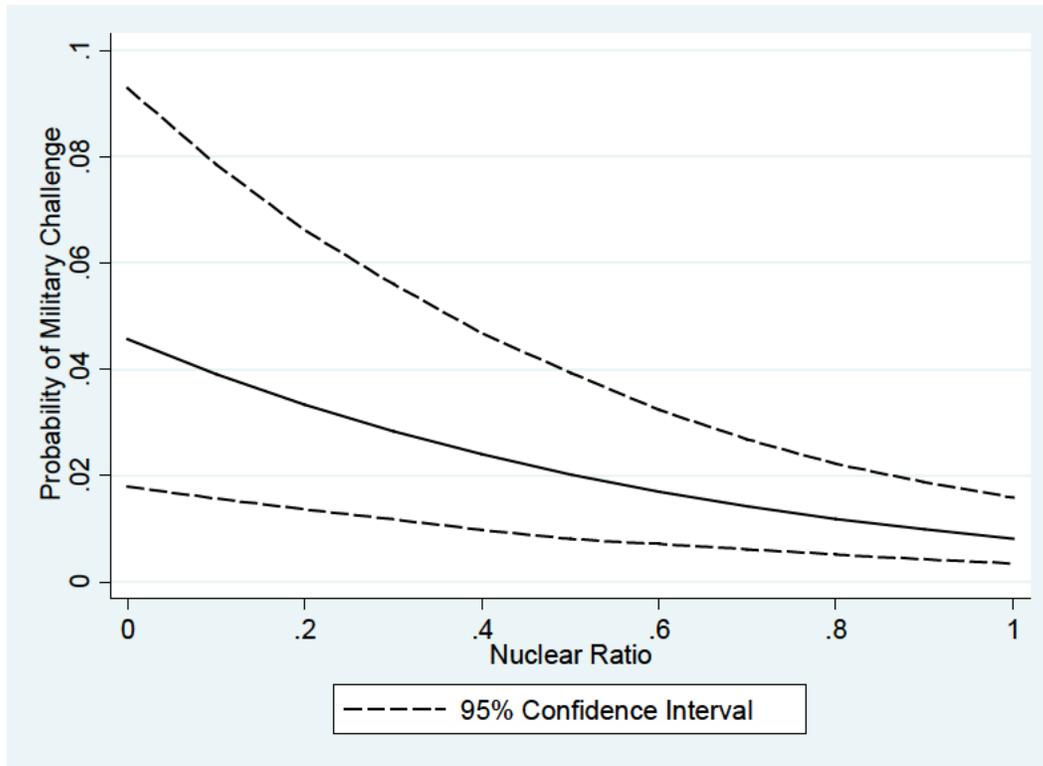
Militarized Interstate Disputes. There are, of course, zero instances of full-scale war (nuclear or conventional) between nuclear-armed states, but there are many examples of Militarized Interstate Disputes (MIDs). Since there are so few full-scale wars, international relations scholars often study MIDs in order to better understand military conflict. MIDs are wars and serious military challenges short of war, such as threats to use force; demonstrations of force, such as military mobilizations; and limited uses of force. In the standard dataset employed by Kroenig, from 1945 to 2001 there were 1,258 MIDs, including 322 MIDs initiated by nuclear-armed challengers, 242 MIDs against nuclear-armed targets, and 71 MIDs by nuclear-armed challengers against nuclear-armed targets. Professor Kroenig analyzed whether states with superior nuclear force numbers were less likely to be targets of MIDs than similar nuclear inferior states.

Nuclear Capabilities and Control Variables. To measure nuclear capabilities, Professor Kroenig employed the same variables used above, including: whether a state possessed: more nuclear warheads than its opponent; the nuclear warhead ratio, nuclear possession, and a secure second-strike capability. To account for factors that might influence the likelihood of conflict between states, he also controlled for: conventional military power, security environment, domestic political systems, geographic distance between states, trade levels between states, and a state's openness to the international economy.

Results. In the multivariate regressions, Kroenig found that states that enjoyed nuclear superiority over an opponent were less likely to be challenged militarily. In each test, nuclear superiority was negatively correlated with becoming the target of a MID and statistically significant.

The relationship was substantively significant as well. These substantive results are presented in Figure 3. The figure shows that nuclear-armed states with a numerically smaller arsenal were over five and a half times more likely to be challenged in a MID than those states that possessed a large share of the warheads.

Figure 3. Conditional effect of the nuclear balance on the probability of being challenged militarily, 1945-2001.



Note: Estimates obtained from Table 1, model 1. *Nuclear ratio* is from lowest (0) to highest (1). *Second strike* is set at 1, *Joint democracy* is set at 0 and all other variables are set at their mean.