

Minimum Deterrence and its Critics

Three things came to mind while writing “Remembrance of Things Past: The Enduring Value of Nuclear Weapons.”¹ First, the intent was to reinvigorate debate within the policy-making community regarding nuclear weapons; second, to introduce the idea of minimum deterrence;² and third, to sketch out a force structure suitable for the United States to achieve minimum deterrence. Judging from the attention the article received, we were successful in our first bid, less successful in the second, and largely unsuccessful in our third.³ Before addressing our critics, it is important to clarify the meaning of “minimum deterrence” and specify how the number 311 was derived.

Minimum Deterrence

Minimum deterrence is an argument about states, security, and nuclear weapons.⁴ It makes three assumptions. First, minimum deterrence assumes that all states strive to survive; all statesmen want a state to rule. Second, it assumes that nuclear weapons produce political effects; that is, they compel statesmen to behave cautiously in the face of grave danger. This cautiousness produces restraint, which shores up international stability. Third, minimum deterrence assumes that large arsenals buy statesmen little. As in other areas of competition, there comes a point of diminishing returns, and with nuclear weapons that point comes quickly. This presupposes that statesmen are not sensitive to the actual number of nuclear weapons a state may possess. The mere fact that a state may have a nuclear weapon or seek to acquire one is enough to condition them to act cautiously, even in times of crises. As Steve Walt aptly put it, “American policymakers clearly understand the logic of minimum deterrence or they would not be so worried when a state like North Korea or Iran makes a move to join the nuclear club.”⁵ In other words, they freely recognize that a handful of nuclear weapons in the hands of a hostile country can constrain what we can do to that country. If a small number of weapons can produce such sobriety on our part, why do we need thousands?

A small number of nuclear weapons is all that is needed for states to achieve relative security. Security is always relative, and deterrence is no different. As Bernard Brodie once described it, the effectiveness of

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE Minimum Deterrence and its Critics				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Strategic Studies Quarterly,155 North Twining Street,Maxwell AFB,AL,36112-6026				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 10	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

deterrence “must be measured not only in terms of the power it holds at bay, but the incentives to aggression which form the pressure behind that power.”⁶ In effect, nuclear weapons socialize statesmen to the dangers of adventurism, which conditions them to set up formal and informal sets of rules that constrain behavior. Statesmen do not want to be part of a system that constrains them, but that is the kind of system that results among nuclear powers. Each is conditioned by the capabilities of the other, and the relationship that emerges is one tempered by caution despite the composition, goals, or desires of its leaders. In short, leaders of nuclear powers are risk averse; they must act with deliberate restraint, even if this is not their preference.⁷

Leaders in Russia, China, and the United States understand this. Adopting a minimum deterrent strategy, China’s nuclear numbers remain relatively small compared to those held by Russia and the United States. Yet, despite these rather large nuclear inequities, China continues to modernize its conventional capabilities, extending its influence throughout the region. How does one explain this behavior? China has reasoned that its small nuclear arsenal is sufficient to deter its most powerful rivals. There is little Russia or the United States can do, militarily, to dissuade China from pursuing its armament program. The three countries have, tacitly, entered into a period of mutual deterrence; nothing official has been declared, but all know that the stakes are too high for anyone to make a run, militarily, at the other.

If leaders of the big three understand this, others do too, which is why the slow, steady spread of nuclear weapons is likely to continue. Unlike the spread that occurred during the Cold War, however, where the United States and the Soviet Union raced to increase nuclear stockpiles, new nuclear states will mimic the behavior of India, Pakistan, and North Korea and keep their arsenals relatively small. In other words, as the number of nuclear states in the world increases, the actual number of weapons in the world will decrease. Much has been written about deterrence in the post-Cold War world, but this has been overlooked: The age of minimum deterrence has arrived.

311—All the Nukes you Need

Nothing has drawn more attention than the number 311, so it is important to explain how it was derived.⁸ First, we assumed that deterrence and

war winning are not the same thing. Second, we assumed that the nuclear triad is worth maintaining. Lastly, we assumed that the political effects produced by nuclear weapons do not stem from countervalue or counterforce targeting but from the destructive power of the weapons themselves.

A state does not have to demonstrate a capacity to win a nuclear war to deter one, because the devastating consequences of nuclear war are transparent, well understood, and universally recognized. Reflecting on this, McGeorge Bundy commented, "A decision that would bring even one hydrogen bomb on one city of one's own country would be recognized in advance as a catastrophic blunder; ten bombs on ten cities would be a disaster beyond history; and a hundred bombs on a hundred cities are unthinkable."⁹ Along these lines, Brodie observed that "few people were unexcited or unimpressed with the first atomic weapons. That something tremendously important had happened was immediately understood by almost everyone."¹⁰ That the United States would propose to turn over its nuclear weapons to an international governing council under the Baruch Plan at a time when it enjoyed an unbroken monopoly of nuclear weaponry testifies to the collective realization that these weapons were, in today's parlance, game changers. From the very beginning, nuclear weapons and policy were devised to prevent the outbreak of a nuclear war, not to win one.

Even in an age of minimum deterrence, readiness, survivability, and flexibility are vital ingredients of nuclear deterrence, and the nuclear triad appears to be the most effective scheme to achieve those aims. That a small state like Pakistan can achieve deterrence without one does not mean that the United States ought to abandon its. On the contrary, if small states could afford a nuclear triad, they would probably opt for one, because it enhances flexibility and complicates an adversary's task.¹¹ Therefore, it makes sense to maintain a land, sea, and air leg. The land component would be comprised of two ICBM squadrons of 50 Minuteman III missiles located at two different locations. These missiles would be spread over a large area in two wings, complicating enemy targeting. The naval component would be comprised of 192 SLBMs with 24 weapons loaded on each of eight *Ohio*-class submarines, with four in port at any given time. This would allow four fully armed submarines to simultaneously patrol both the Atlantic and Pacific Oceans. The air component would include 19 B-2 bombers, which would provide the needed flexibility for escalation control and strategic signaling. While it would be ideal to enable the B-2s

to carry air-launched cruise missiles (ALCM) to give them standoff capability, this is not necessary to ensure a viable triad.

Lastly, the political effect of nuclear weapons does not stem from counter-value or counterforce targeting but from the destructive power of the weapons themselves.¹² Put another way, the mere prospect of the punishment delivered by nuclear weapons tames the most bellicose of statesmen. This cannot be overstated: one 300 Kt weapon is more than enough to destroy a city the size of London. If a bomb of that size were detonated above Trafalgar Square on a workday, approximately 240,000 people would die instantly and 410,000 casualties would be sustained. Nearly everything within a 3 km radius would be destroyed, with burn victims reaching out as far as Victoria Park. The same bomb detonated above Mumbai on a workday would kill over one million people and produce more than two million casualties.¹³ Even if one were to assume the worst, a “bolt from the blue” where a state loses 50 percent of its nuclear capability to a first strike, a force of 311 weapons would allow that state to strike back over 150 times before it had to negotiate.¹⁴ 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. So why would a state need thousands?

311 and Its Critics

Apparently, there are several reasons.¹⁵ First, critics contend that we overlook or downplay the importance of large numbers when considering deterrence. That Russia holds thousands of weapons and China hundreds makes a force of 311 untenable; fewer weapons means less target coverage, which means less deterrence in an uncertain world. Secondly, they claim a smaller force would be less efficient and more difficult to maintain than a larger one; a smaller force means a smaller industrial base, which means greater dependencies on a relatively small number of suppliers. This would result in a situation where one supplier’s actions could have a devastating impact on its competitors. Lastly, there is the issue of force management. Just how small can a force become before it does not resemble a force at all?

With respect to the first line of criticism, one must ask: How many nuclear weapons are needed to prevent nuclear war? Theoretically, the smallest number is two: one that an adversary might be able to take out with a first strike and one that it knows it cannot. Because deterrence holds as a result of a viable second-strike capability, that capability need

not be large. From a practical perspective, several second-strike nuclear weapons are more than enough to keep the most aggressive adversary at bay. To make this logic dramatic, let us put it to the test. Suppose an adversary was contemplating a first strike. The second question put to the leader would be: And which of our cities are you willing to give up in exchange? The example is illustrative for two reasons. First, strategy is not contingent upon the first move but the following ones.¹⁶ Second, in high-stakes games like nuclear war, there are no viable second or third moves. Everything turns on deterring the first move, which makes the game relatively easy to understand and simple to play. Moreover, leaders understand this, which is why during the Cold War no one dared to move first.¹⁷ But suppose someone did; what then? In a situation where deterrence broke down and an attack occurred, one need be prepared to fight a nuclear war. How many weapons does one need to fight a nuclear war? Again, the answer is simple: enough to muster a viable second-strike capability against your most dangerous opponent. Twenty-five years ago that meant thousands. But if the gradual spread of nuclear weapons has taught leaders anything, it is this: while numbers count, a small number of them are more than enough to deter an adversary, even one with comparatively larger numbers. The relative peace between India and Pakistan illustrates this idea.

Prior to the arrival of nuclear weapons on the subcontinent, India and Pakistan fought three times. In the summer of 1999, one year after nuclear tests were successfully conducted within both countries, another war erupted in the mountains along the line of control in Kashmir. Yet, the war in Kargil did not escalate beyond small-scale fighting. Why? Nuclear optimists stress the pacifying effect nuclear weapons played in resolving the crisis; pessimists claim both sides got lucky by avoiding nuclear war.¹⁸ The truth might be somewhere in between, which is why Kargil should be considered a close call. Even in a close call like this one, both sides opted for something other than nuclear war, which says something about the pacifying effects of nuclear weapons. Because nothing threatens survival more than nuclear war, leaders restrain themselves from engaging in conflicts that could lead to all-out war. Although critics disagree, it seems fair to conclude that nuclear weapons have conditioned leaders on the subcontinent to act cautiously in the face of grave danger, even if they would prefer not to do so. Moreover, leaders on both sides seem to understand that while the use of nuclear weapons is to be avoided, that does not render

them useless. Quite the opposite; nuclear weapons might be the most politically useful weapons a state can possess.

Related to this idea is extended deterrence. Critics contend that a small number of nuclear weapons will prevent the United States from extending its nuclear deterrent to allies and friends who might be threatened by other nuclear states. One might think, "Thank goodness." Throughout the Cold War, America's policy of containment rested squarely on the shoulders of an extended deterrent regime, but that relationship was not always a happy one.¹⁹ Despite American guarantees, France developed nuclear weapons of its own, highlighting the fact that security considerations are but one of many factors contributing to the development of a nuclear weapons program. In Taiwan, a reluctant America extended a security guarantee that took many forms over time and was reinforced by substantial arms sales and foreign assistance. In South Korea, the United States entered into a bilateral commitment reinforced with a large troop deployment and integrated military command. As is typical with such arrangements, America became something of a junior partner, having to yield to the demands of its ally, which is why alliances should be considered matters of expediency, not principle. Generally, states will shun alliances if they are strong enough to go it alone or think the burden of the commitments resulting from them outweighs the advantages. Therefore, when considering the virtues of extended deterrence, policymakers ought to ask: Are alliances useful?²⁰

Alliances can be indirectly linked to the outbreak of war.²¹ They have been related to an increase in arms expenditures, and serious disputes taking place during an arms race tend to escalate into wars. Beyond this indirect linkage, alliances have been associated with an increase in the number and types of belligerents who enter a war once it has begun.²² As scholars have noted, "They engender larger, more complex conflicts, particularly when the war in question involves the key ally of a larger country. Alliances can decrease the interaction opportunities available to states and may stimulate intense competition over the acquisition of additional partners. Additionally, should competition for new allies result in the creation of extremely rigid blocs, the magnitude and severity of any war that is fought will be high, especially if these blocs possess relatively equal capabilities."²³ When nuclear weapons are added to this equation, things do not bode well for any state seeking to avoid nuclear war, which is why policymakers ought to be careful when devising security arrangements

based on alliances. Put another way, alliances might be necessary but they are not always useful. The corollary to this is simple: while extended deterrence might have been our fate, it should not automatically be our policy.

The second charge appears to be more problematic. Presumably, a smaller force would be less efficient and more difficult to maintain than a larger one because a smaller force would result in a smaller industrial base, which means greater dependencies on a relatively small number of suppliers. Theoretically, this is cause for concern, but in reality it is not. The entire nuclear weapons complex has been a government enterprise since the beginning. It currently consists of eight sites that research, develop, produce, procure, assemble, maintain, disassemble, and test the nuclear and nonnuclear components of the arsenal.²⁴ The production of nuclear weapons requires a very large capital investment and is characterized by the predominance of fixed costs and a single consumer of its products, the US government. Indeed, the same physical plant would be necessary to produce 10 or 1,000 nuclear weapons. This suggests it is a natural monopoly that has been controlled by the government for its entire existence. The supply of delivery vehicles, such as long-range bombers, booster rockets, and SSBNs, however, is subject to the vagaries of the marketplace, as consolidation of the defense industrial base over the past few decades makes clear.²⁵

Lastly, there is the question of force management. Just how small can a force become until it does not resemble a force at all? That is a difficult question to answer. Certainly, large numbers can lead to organizational competencies and the development of a professional cadre. However, as originally suggested, a small force can also achieve those aims. The Navy's SEALs are selective, well funded, and effective. One might wonder how a nuclear force with similar qualities might look. For starters, it would attract the best candidates. To enhance recruitment, incentives might be offered; bonuses being one, prestige another. The services are expert at managing both, so this should not be too problematic. Nuclear warriors also deserve the best equipment, which gets back to designing, testing, and deploying new systems, if required. Lastly, there is effectiveness. In the nuclear arena, effectiveness is synonymous with security. Once upon a time the Strategic Air Command had a simple imprimatur: "Peace is our profession, deterrence is our mission." Those eight words galvanized American nuclear policy, operations, and security for some 50 years. What

words are used today to convey a similar message? The answer rests ably in the hands of others to decide.

Conclusions

Security has always been relative, and deterrence is no different; a small number of nuclear weapons are all that is needed to achieve relative security. To be fair, 311 may not be the answer, but a smaller force is in our future. Importantly, a smaller force does not preclude designing, testing, or deploying new weapons and delivery systems, if required. Moreover, not all of the political or logistical challenges associated with reducing or redesigning the force have been factored into this analysis. These challenges will be substantial. However, if the United States makes nuclear reduction one of its goals, these challenges can be overcome. Small states have found ways to cope with small numbers for some time; countries like Britain and France have effectively sustained small nuclear forces; India, Pakistan, and China do so today. We are living in an age of minimum deterrence; American nuclear strategy can be devised accordingly.

James Wood Forsyth Jr., PhD

Professor of Political Science and

National Security Policy

School of Advanced Air and Space Studies

B. Chance Saltzman, Colonel, USAF

Chief, Strategic Plans and Policy Division

Headquarters Air Force

Gary Schaub Jr., PhD

Assistant Professor of Leadership and Strategy

Air War College

Notes

1. James Wood Forsyth Jr., B. Chance Saltzman, and Gary Schaub Jr., "Remembrance of Things Past: The Enduring Value of Nuclear Weapons," *Strategic Studies Quarterly* 4, no. 1 (Spring 2010): 74–89.

2. Minimum deterrence is essentially a realist argument, but there are many realist authors and many forms of realism. The classical argument begins with Thucydides, Thomas Hobbes, and Niccolo Machiavelli. The theological argument is found in the works of Reinhold Niebuhr

and Herbert Butterfield. Nicholas Spykman and Alfred Thayer Mahan represent the geopolitics school. The modern account begins with Hans Morgenthau, E. H. Carr, and George Kennan. The English School is best represented in the work of Martin Wight and Hedley Bull. The contemporary argument is found in Kenneth Waltz, John Herz, Robert Tucker, Robert Osgood, and John Mearsheimer.

3. In major media, see Fareed Zakaria, "GPS: What in the World? Nuclear Magic Number," *CNN*, 4 April 2010, <http://transcripts.cnn.com/TRANSCRIPTS/1004/04/fzgps.01.html>; David E. Hoffmann, "Despite New START, the U.S. and Russia Still Have Too Many Nuclear Weapons," *Washington Post*, 11 April 2010; Gary Schaub Jr. and James Forsyth Jr., "An Arsenal We Can All Live With," *New York Times*, 24 May 2010; and "Letters to the Editor, The Right Number of Nuclear Weapons?" *New York Times*, 31 May 2010, <http://www.nytimes.com/2010/06/01/opinion/101nuke.html>. Internet blog sites that discussed the article include Steven M. Walt, "All the Nukes You Can Use," *foreignpolicy.com*, 24 May 2010, <http://walt.foreignpolicy.com/category/topic/military>; Max Berman, "Air Force Strategists Say US Should Unilaterally Cut Nukes By 90 Percent," *Wonk Room*, 17 March 2010, <http://wonkroom.thinkprogress.org/2010/03/17/air-force-strategists-say-us-should-cut-nukes>; and Charli Carpenter, "USAF Strategists: US Should Drastically and Unilaterally Reduce Nuclear Arsenal," *Lawyers, Gun\$, and Money*, 17 March 2010, <http://www.lawyersgunsmoneyblog.com/?s=Schaub&x=0&y=0>.

4. The idea of minimum deterrence is not new. This version stems from work in security and peace studies, as well as arms control. See Freeman Dyson, *Disturbing the Universe* (New York: Harper and Row, 1979); and Leo Szilard, "Minimal Deterrence vs. Saturation Parity," in *Problems of National Strategy*, ed. Henry Kissinger (New York: Praeger, 1965). For one of the best discussions of the objectives of arms control, see Donald G. Brennan, "Setting the Goals of Arms Control," in *Arms Control, Disarmament, and National Security*, ed. Donald G. Brennan (New York: George Braziller, 1961). For what remains the finest work on the subject of mutual defense emphasis, see David Goldfischer, *The Best Defense: Policy Alternatives for U.S. Nuclear Security from the 1950s to the 1990s* (Ithaca: Cornell University Press, 1993).

5. Walt, "All the Nukes You Can Use."

6. Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959), 275.

7. This theme reverberates throughout Kenneth Waltz's writings. See *Theory of International Politics* (New York: McGraw Hill, 1979). For a psychological account of this phenomenon, see Gary Schaub Jr., "Deterrence, Compellence, and Prospect Theory," *Political Psychology* 25, no. 2 (June 2004).

8. See "Letters to the Editor," *New York Times*, 28 May 2010.

9. McGeorge Bundy, "To Cap the Volcano," *Foreign Affairs* 48, no. 1 (October 1969): 9–10.

10. Brodie, *Strategy in the Missile Age*, 150.

11. Indeed, Israel has reported deployed nuclear weapons on submarines. See Martin Sieff, "Israel Buying 3 Submarines to Carry Nuclear Missiles," *Washington Times*, 1 July 1998; and Uzi Mahnaimi, "Israel Stations Nuclear Missile Subs off Iran," *Sunday Times*, 30 May 2010.

12. In "An Arsenal We Can All Live With," we incorrectly calculated the equivalent megatonnage (EMT) of our proposed force posture. It is closer to 190 EMT than 1,900—an arithmetic error that we regret but that does not change the basic logic of our argument.

13. International Commission on Nuclear Non-proliferation and Disarmament (ICNND), *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers* (Canberra/Tokyo: ICNND, November 2009, December 2009), <http://www.icnnd.org/reference/reports/ent/index.html>. For the general argument, see Barbara G. Levi, Frank N. Von Hippel, and William Daugherty, "Civilian Casualties from 'Limited' Nuclear Attacks on the Soviet Union," *International Security* 12, no. 3 (Winter 1987/88).

14. We include among our 50 percent losses those weapons and their delivery systems that are not available or cannot reach their targets due to reliability and penetration issues. See Albert Wohlstetter, "The Delicate Balance of Terror," *Foreign Affairs* 37, no. 2 (April 1959).

15. We received a number of criticisms from scholars and practitioners and have clumped them together into three categories. Many insist that minimum deterrence is vague and insufficient to deter America's adversaries or secure American allies. See Lt Col Andrew S. Kovich, "The Arsenal We Need: A New 'New Look'," *The Wright Stuff* 5, no. 12 (10 June 2010), <http://www.au.af.mil/au/aunews/archive/2010/0512/0512Articles/Kovich0512.pdf>; and Ernie Regehr, "The Appeal, and Folly, of Minimum Deterrence," *CIGIOnline.org*, 19 March 2010, <http://www.cigionline.org/blogs/2010/3/appeal-and-folly-minimum-deterrence>;). Others claim 311 is too large a number for current requirements. See William Hartung, "The Gravest Danger," *TPMCafe*, 28 May 2010, http://tpmcafe.talkingpointsmemo.com/2010/05/28/the_gravest_danger/; and "Letters to the Editor: The Right Number of Nuclear Weapons?" *New York Times*, 31 May 2010, <http://www.nytimes.com/2010/06/01/opinion/l01nuke.html>. Additionally, we received a number of e-mails from officers and civilians regarding industrial base and force management issues. We have chosen to respect their privacy and have kept their names anonymous.

16. We credit and thank Everett Dolman for this statement.

17. During the Cuban missile crisis, President Kennedy and his team were not as interested in the number of weapons the Soviets might have placed in Cuba as they were in the fact that the Soviets had put any there in the first place. As the crisis evolved, each leader—Kennedy and Khrushchev—tried to avoid nuclear war.

18. See Kenneth Waltz and Scott Sagan, *The Spread of Nuclear Weapons: A Debate Renewed* (New York: W. W. Norton and Co., 2003).

19. See Parker H. Wright, "Bombs and Umbrellas: Defending U.S. Middle East Allies from a Nuclear Armed Iran" (Unpublished master's thesis, School of Advanced Air and Space Studies, Air University, June 2010).

20. See Stephen M. Walt, *The Origins of Alliances* (Ithaca: Cornell University Press, 1987); Glenn H. Snyder, *Alliance Politics* (Ithaca: Cornell University Press, 1997); Jack Levy, "Alliance Formation and War Behavior: An Analysis of the Great Powers, 1945–1979," *Journal of Conflict Resolution* 25, no. 4 (December 1981); and Michael Wallace, "Alliance Polarization: Cross-Cutting and International War, 1815–1964," *Journal of Conflict Resolution* 17, no. 3 (December 1974).

21. The great powers in 1914 saw alliances as necessary, but most scholars believe the cataclysmic war that followed to have been at least in part caused by those very alliances. In both World Wars, Germany was emboldened to act by the presence of allies, who as the war progressed became more and more of a liability. This was especially true of Austria-Hungary (1914–18) and Fascist Italy (1940–43).

22. Jack S. Levy, "The Contagion of Great Power War Behavior, 1495–1975," *American Journal of Political Science* 26, no. 3 (August 1982).

23. See Charles W. Kegley and Gregory A. Raymond, *Alliances and the Preservation of the Postwar Peace: Weighing the Contribution in The Long Postwar Peace*, Charles W. Kegley Ed. (Harper Collins, 1991), pp. 270–290.

24. Charles R. Loeber, *Building the Bombs: A History of the Nuclear Weapons Complex*, 2d ed. (Albuquerque, NM: Sandia National Laboratories, 2005), 174–75.

25. See Eugene Gholz and Harvey M. Sapolsky, "Restructuring the U.S. Defense Industry," *International Security* 24, no. 3 (Winter 1999/2000); John Deutch, "Consolidation of the U.S. Industrial Base," *Acquisition Review Quarterly* (Fall 2001); and William E. Kovacic and Dennis E. Smallwood, "Competition Policy, Rivalries, and Defense Industry Consolidation," *Journal of Economic Perspectives* 8, no. 4 (Fall 1994).