STRATEGIC STUDIES QUARTERLY

Rethinking the US Nuclear Triad

Darius E. Watson

Abstract

For over 50 years, the structure of the US nuclear triad has remained the same. Relying on strategic bombers, intercontinental ballistic missiles (ICBM), and submarine-launched ballistic missiles (SLBM), the United States has sought to deter strategic threats from a variety of sources. The current threat environment, however, is radically different from what was being considered when the triad was created. From the continued evolution of terrorism to the increasing threat of cyberattacks, both the nature of the threats facing the United States and the deterrence frameworks necessary to counter them have changed. The United States needs to critically reassess the current triad with an eye toward eliminating redundant or potentially ineffective delivery systems such as the strategic nuclear bomber.

* * * * *

The US nuclear triad has been the foundation of the country's strategic deterrence framework since the mid-1960s. Comprising strategic bombers, intercontinental ballistic missiles (ICBM), and submarine launched ballistic missiles (SLBM), the triad has been the backbone of US efforts to deter threats from other states. From an analytical perspective, proving the effectiveness of deterrence is highly problematic. "After all," wrote noted strategy scholar Colin Gray, "episodes of successful deterrence are recorded as blanks in the pages of history books."[1] However, from the policy perspective, the US "victory" in the Cold War has come, for many, to represent clear evidence that the nuclear triad, and US strategic deterrence in general, have been successful. As a result, the United States continues to maintain the same general framework developed over 60

Darius Watson is a professor of political science and security studies as well as a senior consultant at Watson Consulting & Analysis, LLC. He earned a doctorate in international relations from the State University of New York–Albany.

years ago to combat an aggressive Soviet Union that no longer exists. There are undoubtedly still traditional state-level nuclear threats that require a robust and dynamic nuclear component to US strategic deterrence. But changes in the international threat environment since the end of the Cold War now require the United States to reevaluate that framework critically. From the evolution of terrorism to the rapid rise of cyber and space threats, traditional state-level nuclear attack no longer represents the primary threat to be deterred by the United States. Thus, it is time the US strategic deterrent reflect this new reality.

To begin the debate, this analysis specifically considers the continuing utility of the strategic bomber leg of the nuclear triad. As the first component of the US nuclear triad, the strategic bomber fleet represents both the historical and practical foundations of US strategic deterrence. For the entirety of the Cold War, strategic bomber forces were the primary component of the triad due to the wide variety of basing options offered vis-à-vis both strategic and extended deterrence policies.[2] As a result, bombers also became the central method through which the United States conducted "signaling" as a component of the threat-response framework associated with strategic deterrence. For many, their greatest asset was their flexibility relative to doctrine and planning due to their ability to be recalled.[3] Finally, they represent the long-standing central importance of the Air Force in the development of US strategic deterrence policy. It is the strategic bomber that created historical and contemporary perceptions of the "vital" role of airpower for US nuclear deterrence and stood as a symbol of US power in general.

The decline in the potential applicability and relative effectiveness of the strategic bomber is at the core of the current debate.[4] The argument offered here is that these underlying rationales for continuing investment and development of strategic nuclear bomber forces are either outdated regarding the threat environment, ineffective due to technological advancements, or increasingly inefficient because of the relative unit cost for nuclear deterrence attained through ICBMs and SLBMs. The United States must begin to consider eliminating the strategic bomber leg of the nuclear triad to both streamline the nuclear deterrent and permit strengthening deterrence within the cyber and space domains.

Why the Triad?

One of the most important things to consider regarding the current structure of the US nuclear triad is that it was never planned. The current reliance on strategic bombers, ICBMs, and SLBMs is the direct result of an intertwined evolution of nuclear weapon and delivery system technologies, changes within the global strategic environment, and "because each of the military services wanted to play a role in the US nuclear arsenal."[5] Thus, the rationale for the nuclear triad was never based on a clear and consistent understanding of US strategic threats, interests, and needed capabilities. Instead, it is the result of sometimes ad hoc responses to a wide variety of often disconnected technological, political, military, and bureaucratic considerations. This in turn has led to an enormous commitment to maintain the triad despite long-standing questions regarding both its effectiveness and efficiency.

In examining the continued utility of the strategic bomber as a leg of the nuclear triad, it is important to examine two specific arguments behind its perceived importance to US strategic deterrence: its historical position as a nuclear delivery system and the symbol of US global power and its flexibility relative to nuclear doctrines and geostrategy. These two considerations have created a commitment to the strategic bomber leg of the nuclear triad that hinders further development and improvement of other US strategic deterrence capabilities in general. The doctrinal focus on a "flexible nuclear response" that was created under the Kennedy administration in early 1960s would become the foundation of the belief in the need for a nuclear triad—and strategic bombers specifically.[6] However, the continued use of World War II–era perspectives on strategic bombing in conjunction with conventional conflicts such as the Vietnam War obscured necessary questions regarding its utility as a nuclear delivery system. Over time, this leg of the nuclear triad also came to represent the primary signaling mechanism toward the Soviet Union, as it was considered "the only portion of the triad that provides the ability for signaling of alert readiness changes (signs of escalation)."[7] Both considerations in turn served to reinforce the long-standing historical perception of airpower as the primary illustration of strategic power and thus the logical foundation of US strategic deterrence. The result has been a commitment to the strategic bomber leg of the nuclear triad driven by outdated arguments and perspectives, rather than a comprehensive understanding of its value to contemporary US strategic deterrence efforts.

Nuclear Deterrence and Nuclear Bombers

The strategic bomber has enjoyed a unique position within the nuclear triad and US deterrence efforts precisely because it was the first (and still the only) delivery method that has been used. This position has assured that regardless of the rhetoric and reality associated with the various developments of US nuclear doctrine, the bomber has always assumed an unquestioned role in the nuclear triad. Prior to development of the ICBM (and later the SLBM), "concepts of strategic bombing that had emerged before and during the Second World War [continued] to provide an adequate framework for thinking about how atomic war would be fought."[8] This meant that the highly quantified and sterile examinations of strategic bombing during World War II then became the foundation of US nuclear doctrine well into the 1960s. This is typified by the widely held belief during much of the Cold War that the problem of creating a nuclear doctrine that satisfied deterrence and war-making requirements in the thermonuclear age "was in essence an economic problem—and thus the kind of problem that professional economists were best equipped to deal with."[9] While there was recognition of an increase in the level of destructiveness associated with the new weapon, there was a more general assumption that the nature of war had not really changed. But the development of the hydrogen bomb in 1952 was the first of many technological advancements that would challenge this assumption and as a result affect US nuclear policy. It certainly played a role in the development of the policy of massive retaliation under the Eisenhower administration, as well as in the growing concerns and resistance to it as US nuclear policy.[10] The exponential increase in the destructive capability of thermonuclear weapons for many threatened to undermine traditional relationships between political goals and war. This in turn would lead to deeper questions regarding the very morality of nuclear weapons and the use of various deterrence strategies. Regardless of the problems associated with exactly how and when thermonuclear weapons would be used, there was little question during the majority of the 1950s that the strategic bomber would be the primary weapon of the next war.

During the early 1960s the strategic bomber was still the unquestioned central pillar of US deterrence strategies. Although ICBM technologies were rapidly improving the viability of US second-strike capabilities, it was commonly understood that US bomber forces still represented the

primary strategic deterrent for the United States. A significant part of this psychology was directly related to the US experience with strategic airpower during World War II and the clear belief that it had played a decisive role in the defeat of Germany and Japan.[11] With the advent of nuclear weapons, this perception of strategic airpower as the central component of US global power was strengthened. The combination of US victory in World War II and its nuclear dominance in the immediate postwar period created a psychology in which critical evaluation of the role of bombers in nuclear deterrence seemed unnecessary. According to airpower historian Richard R. Muller, "the advent of nuclear weapons was seen initially as a quantitative, though not necessarily qualitative, change in the means of conducting aerial warfare."[12] Not only did this serve to ensure the role of bombers in the nuclear triad would not be questioned later, but it also cemented the Air Force and the doctrine of massive retaliation as the cornerstones of US deterrence policy.

In the early 1950s, Air Force bombers were the nation's primary means for delivering strategic nuclear weapons, and the Air Force also had the lead in developing missile technology. Its budget authority went from $11.5 billion in 1954, in the wake of the Korean War, to $18.6 billion in 1960—about a 25 percent increase adjusting for inflation.[13]

The result was the unquestioned commitment to strategic bombers as part of the US nuclear triad, despite growing evidence that both ICBM and SLBM technologies were potentially more effective vis-à-vis US deterrence and strike strategies.[14] The advances in both delivery systems were, however, overshadowed by improvements in the design of strategic bombers and the lethality of thermonuclear weapons. With the development of both the B-52 and the first USAF supersonic bomber, the B-58, the arguments regarding the potential advantages for US deterrence stemming from ICBM and SLBM technologies were defeated relatively easily by the continued perception of the dominance of the strategic bomber fleet. This was reinforced by resistance from the Air Force to any significant changes in its dominance of the US nuclear arsenal and deterrence policy, noted as far back as this history from 1967: "The Air Force's hesitation resulted from its devotion to the concept of strategic bombing, its belief in the application of maximum military power to important targets, and its desire to retain a monopoly of nuclear weapons."[15] By the time the US policy of flexible response was in place in the late 1960s, the Air Force had established firm control of US nuclear deterrence

policy. In turn, this guaranteed that the role of strategic bomber as part of the nuclear triad would remain generally unquestioned.

The 1960s represented the development of several potential threats to the role of the bomber within the US strategic deterrence framework. After a decade of development, the first nuclear ICBMs became operational in 1959. When combined with the hydrogen bomb, the ICBM's advantages in both range and delivery immediately led to questions regarding the future structure of the US nuclear deterrent. These questions manifested most directly in doctrinal, and subsequently policy, disagreements between the Air Force and the Army and Navy. Against the Air Force's continued promotion of the strategic air offensive as the foundation of US strategic doctrine and nuclear policy, "the other services flatly denied that strategic airpower alone could insure victory. While they generally agreed that Soviet aggression presented the greatest threat to US security . . . they argued that the conflict would be much more complex than the Air Force expected and that no single kind of military force could decide the issue."[16] The result was a disagreement between the branches that focused on what a future war would look like and what role nuclear weapons would most likely play in that war. The impact on policy showed in debates throughout the 1960s at places like RAND between those who supported the "stability doctrine" or mutually assured destruction (MAD), versus those who believed US deterrence structures could be formed around the concept of limited war.[17]

By the early 1970s, the US Army had relented in its attempts to develop its own nuclear capability. The Navy, however, increasingly began to challenge both the Air Force and its doctrinal assumptions relative to the continued evolution of the nuclear triad. Through successful development of the Polaris program, the Navy could now substantively add to the US nuclear deterrent framework. More importantly, the debates that surrounded the program throughout the 1950s and early 1960s were portents for the same discussions had today. First, they exposed "the nuclear weapon dominance that the newly created Air Force had in the early years the Cold War."[18] By the end of the Eisenhower administration, the Air Force was in control of three of the four primary ballistic missile projects, with the lone Jupiter missile project controlled by the Army. Without development of its own delivery system, the Navy was relegated to secondary status to the development of the country's nuclear posture. It had focused initially on development of so-called

super carriers able to service nuclear capable long-range bombers. But Truman, "citing budget constraints, canceled the program in favor of increased investment in the Air Force's B-36 strategic bomber."[19] This defeat led to a shift from the super carrier to the fleet ballistic missile as the primary nuclear delivery system for the Navy.

A second connection between nuclear force structure debates during the Cold War and today is the importance of technology for understanding capability—and thus policy and strategy. Combined with significant advances in submarine technology, shifting from an air-based to a missile-based focus in the late 1950s was an obvious and ultimately effective change in strategy for the Navy. But it also served to insulate strategic bombers from broader considerations of how to develop (and fund) the evolving nuclear triad. This is because the focus on missile technologies tended to make ICBMs the natural comparative weapon system for the new SLBMs, and neither seemed capable of fully supplanting the perceived advantages of the strategic bomber at the time. Potential advancements in missile defense systems (such as "Star Wars") and a growing faith in stealth technology to enhance the effectiveness of strategic bombers created a short debate.[20] The practical aspects of questions regarding the future of strategic nuclear bombers were symbolized by the development, cancellation, and subsequent reinvigoration of the B-1 bomber program in 1985. In the end, development of the B-1 and subsequent B-2 strategic bomber programs seemed to close the door on lingering questions. Indeed, the future role of the nuclear bomber seemed secure with deployment of the stealth-capable B-2 bomber in 1997. The Cold War was won, US strategic power was unchallenged, and both seem to be directly related to the development and maintenance of the nuclear triad as the foundation of the nation's deterrence framework. What was less considered was how the new global threat environment would once again raise questions regarding the most appropriate framework for US nuclear deterrence.

Signaling the Soviets

Aside from their role in the delivery of nuclear weapons, strategic bombers' most important use has been as a tool for signaling within the US deterrence framework. Few questioned the capability of the United States to follow through on the various threats associated with its deterrence policies. Instead, most of the academic- and policy-driven

examinations of US deterrence policy have focused on the ability to communicate intentions to use that capability in a credible manner. The primary means of signaling during the Cold War involved stationing nuclear weapons on an ally's territory or within potential striking distance of an adversary. With the development and expansion of extended deterrence, the United States found itself in an increasing number of situations where it had to send nuclear signals to potential adversaries for both its own and its allies' interests.[21] The use of signaling was not aimed solely at adversaries like the Soviet Union or China, "it aimed also to discourage allies from seeking nuclear arms of their own."[22] As the role of signaling evolved relative to changes in the US nuclear doctrine, there was an ever-increasing need for flexibility and graduation within US response options. Because bombers offered more flexibility than the stationing of ICBMs, they increasingly became the preferred method for signaling US deterrence policy. The B-52 in particular became the symbol of US nuclear strength and deterrence policy, a role that it continues to play to this day.[23]

The use of bombers as the primary signaling method was an essential component of the US-Soviet deterrence framework during the Cold War. Interestingly, they played less of a role in Europe than they did in Asia for a variety of reasons. From a general perspective, ICBMs are the most static component of the nuclear triad and thus offer few options as a method of signaling intentions in individual crises. There are no spare missiles or extra silos, the missiles cannot be moved, and they remain constantly ready. ICBMs were useful for more general and long-term signaling in the European context precisely because US deterrence was intertwined with the regional security framework (i.e., NATO).[24] This aside, bombers offered flexibility in terms of deployment and control. Even the possibility of using low yield or tactical nuclear weapons was part of an escalation ladder. This is most clearly summarized by one supporter's claims that "nothing demonstrates American resolve better than putting fully loaded strategic bombers on alert or deploying them to a forward base as the spy satellites of a target nation pass overhead. The ability to signal in a nuclear crisis is a characteristic found only in the bomber force."[25] This flexibility was evident not only against the Soviets but also following the successful development of nuclear weapons by China in 1964. In both instances, however, this was at least partially

due to the differing structures of deterrence that developed within Asia relative to Europe.

The reality is that most of the direct conflict associated with the US-Soviet rivalry during the Cold War took place in Asia. If the US-Chinese rivalry is added to the equation, nuclear doctrine and strategy were tested far more often in the Asian theater than they were in Europe. In addition to (or perhaps because of) the almost constant existence of conflict in Asia, the United States also had the problem of potentially unstable or ill-equipped allies who were considering development of their own nuclear arsenals. At one point or another, the United States engaged Taiwan, South Korea, Japan, and Australia in quiet but firm efforts to convince them that pursuit of nuclear weapons was unnecessary due to US extended deterrence.[26] Due to a variety of factors, including the Japanese adoption of its antinuclear principles and questions regarding the stability of some allies, the United States had no real opportunities to use missile deployments as a signaling method in the same way the strategy developed in Europe from the 1960s onward. The need for signaling within the Asian context, however, increased dramatically with the nuclearization of China. The difference between the two contexts involved more than just the signaling utility of missile basing, however.

The US nuclear deterrent in Europe is embedded in the American commitment to the NATO alliance, particularly Article V of the Washington Treaty. By contrast, the United States has no parallel multilateral alliance structure in East Asia. The US extended deterrent there is based on bilateral relationships and agreements, so any nuclear debate there would be viewed mainly through a bilateral lens.[27]

Through its membership in NATO, the United States used a single signal (the basing of theater and intermediate range nuclear weapons throughout Western Europe) to illustrate extended deterrence to all of its allies in the region at the same time.[28] The need to rely on bilateral relationships in the Asian context meant that the United States often found itself demonstrating its commitments more frequently, and in a much more specific manner. Rather than potentially defending Europe from a general Soviet threat, the United States had to engage its bilateral deterrent relationships within individual, often crisis-laden contexts. This only further limited the utility of missile deployments as a method of signaling, a reality that was finalized when the George H. W. Bush administration removed all tactical nuclear weapons from the region in

the early 1990s. The more critical takeaway, however, was that the signaling role of the strategic bomber was being affirmed in the post–Cold War era, if only because it was the only option.

It could be argued that the stationing of nuclear-capable submarines represented a potential form of signaling for US deterrence policy similar to the basing of missiles, especially as it related to extended deterrence.[29] One of the reasons for this was the development of multiple independently targetable reentry vehicle (MIRV) technology and its impact on the deterrence value of SLBMs. The ability to mount three warheads on each individual SLBM, and survivability aspects of the submarine platform, quickly increased its importance in the nuclear triad and thus as a potential source of signaling. Combined with the Soviet rejection of the US proposed ban on MIRV technologies in 1970, "the Navy's deterrent and retaliatory capabilities increased multifold."[30] The stationing of nuclear submarines could represent a significant message to both allies and adversaries of the US commitment to extended deterrence in a region. In recent attempts to deter North Korea from further developing its nuclear capabilities, nuclear submarine forces have played a prominent role in US signaling.[31]

Despite the limited use of both ICBMs and SLBMs to signal US intentions and deterrence capabilities, the strategic bomber has remained the dominant method of nuclear signaling into the post–Cold War period. There is little to suggest that the relationship between the three legs of the nuclear triad will ever change the relative utility of strategic bombers for signaling. What should be considered, however, is the contemporary need for nuclear signaling within the US framework of deterrence. Like other aspects of US nuclear doctrine and strategy, it may be the case that the need for nuclear signaling has diminished in combination with the decline of state-level nuclear crises. With changes in the international threat environment have come changes to the application of US deterrence strategies. In those instances where there have been state-level nuclear threats to US security, the threats have come from rogue states like Iran and North Korea. As will be discussed, traditional frameworks of deterrence are less useful in these instances precisely because rogue states already indicate their willingness to ignore attempts to deter their nuclear ambitions or policies. This means that while the strategic bomber continues to be the primary signal, both the instances for and effectiveness of its use have declined in the post–Cold War era.

The Declining Utility of Nuclear Bombers

To this point, this analysis has sought to clearly explain the foundations of the US reliance on strategic bombers as an essential component of the country's deterrence policy and nuclear doctrine. The underlying reason for this discussion has been the desire to assess the continuing value of strategic bombers as part of the nuclear triad. The current position is firmly grounded in the historical value of strategic airpower for US hegemony, the practical need to have both a flexible response and dynamic signaling options, and in the general dominance of the Air Force within the area of US nuclear policy. The argument offered here is that these points no longer justify the continuing maintenance of the US strategic nuclear bombing option. First, whatever the historical value of strategic airpower for US geostrategy, technology has steadily eroded and perhaps eliminated that advantage. Although the Air Force argues that stealth technology represents a path to overcoming problems in this area, it is precisely the costs of producing an entirely new line of stealth-capable strategic bombers that has reduced the relative value of the strategic bomber leg of the triad. A second point to consider is the sea change that has taken place in the international threat environment since the end of the Cold War and since 9/11 in particular. Because of the general transition from states to nonstate actors as the primary threat and the associated transition in focus from nuclear conflict to terrorism and cyberwar, the utility of the US nuclear deterrent has diminished. There is no doubt that the global war on terrorism has illustrated the continued essential need of strategic bombing capabilities within conventional theaters. It is when one considers their decreasing effectiveness as a delivery platform, in conjunction with increasing costs relative to the other platforms, that the overall viability of the strategic bomber must be questioned.

Too Much "Buck"

The strategic bomber leg of the nuclear triad has consistently represented the most expensive component of the US nuclear arsenal. According to one study, "The annual cost of maintaining this fleet of aircraft ranges from $3.1 to $3.5 billion across the FYDP [Future Years Defense Program] (2014–18) for a total of $16.5 billion."[32] There were several years when this cost was double that associated with the deployment of ICBMs, and even with the associated cost of the development and support of submarine forces it still outpaced those expenses as well.

During that same period, for instance, the cost of ICBM maintenance ranged from $1.7 to $1.9 billion per year, with the cost of maintaining the nuclear submarine fleet resting at around $2.9 billion a year.[33] The key is understanding the costs associated with delivery platforms, that is, the bombers themselves. Other examinations, such as the Harrison-Montgomery study conducted for the Center for Strategic and Budgetary Assessments, project much lower costs for maintaining the airborne components of the nuclear triad precisely because they do not include the full costs of the B-2 or the proposed B-21. The previously mentioned success of strategic bombers in the conventional context allows for rationalizing part of the cost as a "dual-use system."[34] There is, however, some mathematical judo taking place as the cost of development, deployment, and support of strategic bomber forces is extremely high for anyone solely considering the need to maintain nuclear capabilities. "In the minds of detractors, bombers are overkill and the costs associated with maintaining nuclear capable bombers are no longer justifiable."[35] This has not deterred supporters from continuing to promote the strategic bombing leg as untouchable during budget negotiations or reviews of US nuclear doctrine.

The primary responses offered rest on the belief that the bombers offer significant levels of flexibility for US deterrence efforts, flexibility that more than makes up for its expense relative to other legs of the triad. One aspect of this perspective rests on the nature of the weapon system itself. Incorporation of the human element into the bomber leg as represented by the crews of the bombers offered this component of the nuclear triad a higher level of responsiveness to changing conditions and contexts. This was most directly represented by the argument that bombers and their crews represented the only nuclear weapon system that could be both scrambled and recalled. This made them much more useful than the other two legs of the triad relative to "escalation/de-escalation during a conflict"—that is, signaling.[36] In the post–Cold War context, it has been their flexibility relative to the sudden increase in the conventional role for long-range bombers that offers evidence of their continued importance to the nuclear triad. What has been interesting is that the overall justification for the contemporary costs of maintaining a strategic bomber fleet often has been justified more by "the need for long-range strike capabilities . . . than an interest in maintaining the nuclear role for bombers."[37] This recognition has been reinforced by

US combat experiences in Afghanistan, Iraq, and elsewhere. The role and utility of long-range bomber forces continue to be fully justified by the wide variety of combat requirements facing conventional US forces today. But the dominance of nonstate actors and the threat of terrorism within that framework require a separation of the role of bombers in the conventional sense versus their position and usefulness as part of the nuclear triad. On their own, long-range bombers represent an enormous investment of state resources and capabilities. The additional requirement of making the weapon system dual capable relative to the delivery of nuclear weapons adds a significant level of cost. It is for this reason that some cost projections have development and maintenance of the new long-range strategic bomber reaching $8 billion a year by 2030.[38] In the end, acceptance of the significant and steadily increasing costs associated with maintaining strategic nuclear bombers is not justified by its diminishing role within the nation's deterrence framework.

Too Little Bang

The primary argument offered here against the continuation of the strategic bomber leg of the nuclear triad is its vulnerability and relative weaknesses when compared to ICBMs and SLBMs. These are not new concerns as they represent consistent themes in the recurring debates regarding the structure of the triad. Ever since the establishment of the strategic bomber, a primary consideration for its effectiveness has been its ability to penetrate enemy airspace. This practical issue dominated analyses of strategic bombing during World War II, and its importance did not diminish with the advent of nuclear weapons. One of the more significant rationales behind the development of the Polaris SLBM system in the early 1960s was the recognition that the effectiveness of strategic bombers depended almost totally upon the degradation of Soviet air defenses.[39] For this reason the emphasis on the flexibility and responsiveness of strategic bombers is much more applicable with regard to signaling than it is to the practical planning of a nuclear strike.

The potential weaknesses of strategic bombers as nuclear delivery systems are well documented and have been scrutinized since World War II. They are slow and vulnerable to air defenses as well as to surprise attacks on their bases, and they "provide only minimal second-strike capability."[40] When combined with the increasing ability to utilize ICBM and SLBM forces to satisfy both extended deterrence and counterforce

requirements, there is (for some) a steadily decreasing role in deterrence to be played by strategic bombers. One way in which the Air Force has attempted to address these criticisms is through the development of stealth technology. Unfortunately, experiences with the B-2 bomber indicates problems that call into question its overall effectiveness, especially as air defense technologies continue to improve.[41] Even though current plans for the development of the new stealth B-21 bomber are in the works, there is no indication that their potential to defeat or evade enemy air defenses has improved relative to the problems that existed in the immediate post–Cold War era. What is important to understand is that the costs of developing and maintaining new replacement bombers in conjunction with upgrading existing B-52 and B-2 weapon systems is estimated to drive the overall cost of the strategic bombing leg of the triad to more than $8 billion a year by 2019.[42] This expense could be justified if strategic bombers represented the most effective and efficient method by which to deliver nuclear weapons. But when the cost is considered relative to evidence that strategic bombers might in fact end up with the lowest success rate among other nuclear delivery platforms, the overall investment in maintaining and further developing them becomes increasingly questionable.

Conclusion

There has been a long-standing acceptance of strategic bombers as an essential component of the US nuclear triad. Its dominance has been based upon historical understandings of the importance of strategic airpower to US hegemony, as well as their practical use in signaling US deterrence strategies. The role of the strategic bomber has been supported further by the long-term dominance of US nuclear doctrine by the Air Force. There have been various instances in which the role of ICBMs was critically reviewed in terms of their continuing importance to US deterrence efforts. Similarly, the Navy encountered an uphill struggle in its attempts to develop the SLBM as the last leg of the nuclear triad. But it is in fact the strategic bomber leg of the triad that has most consistently been a source of concern when the US nuclear posture was under review. During the transition from mutually assured destruction to flexible response, and within the regular reviews of US nuclear doctrine, the role of the strategic bomber has continually been questioned, mostly by those outside the Air Force and beyond the culture of strategic airpower.

It is now time to engage more fully the questions and doubts surrounding the role of the strategic bomber as part of the nuclear triad, especially given the potential doubling of maintenance and support costs over the next decade.

While both the cost and efficiency arguments have value, the history of the debate surrounding the nuclear triad clearly demonstrates that it is the perceptions and influence of the Air Force that will most directly determine the future of strategic bombers. Some indications show their position on the nuclear triad is changing by the steady realization that the threat environment that the nuclear triad was designed to respond to no longer exists. While there is certainly a need to maintain traditional strategic deterrence vis-à-vis states such as Russia and China, the threat of terrorism and irregular warfare, as represented by increasing conflict with weak states and nonstate actors, has changed the dynamic within which the United States promotes its current deterrence policy. This perspective is highlighted further by the rise of both the cyber and space domains as areas in need of significant investments in deterrence capabilities. The United States must begin to recognize that despite its enormous economic strength, the ability to invest in a truly dynamic deterrence framework remains limited. It must begin to recognize that US deterrence efforts need to address new and more dynamic types of threats and attacks. This will mean that during the next nuclear posture review the Department of Defense will need to make hard choices regarding investing in increased cyber and space capabilities versus reinvesting in the increasingly narrow and potentially ineffective strategic bomber leg of the nuclear triad. These choices will require sacrifices in other areas as well, but the suggestion offered here is that the strategic bomber leg of the nuclear triad represents a potential area to start with. SSQ

Notes

1. Colin Gray, *Maintaining Effective Deterrence* (Carlisle Barracks, PA: Army War College Strategic Studies Institute, August 2003), 1, http://www.dtic.mil/get-tr-doc/pdf?AD=ADA417180.

2. Alex Wellerstein, "A Brief History of the Nuclear Triad," *Restricted Data: The Nuclear Secrecy Blog*, 15 July 2016, http://blog.nuclearsecrecy.com/2016/07/15/brief-history-nuclear-triad/.

3. Thomas C. Kirkham, "Modernizing the Nuclear Bomber Force: A National Security Imperative," in *The Strategic Challenge of the US Nuclear Arsenal: AY14 Nuclear Issues Research*

Group, ed. Albert J. Mauroni (Maxwell AFB, AL: US Air Force Center for Unconventional Weapons Studies, 2014), 45–46, http://cpc.au.af.mil/assets/strategicchallenge.pdf.

4. Amy Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, RL33640, Congressional Research Service, 8 August 2017, 37, https://fas.org/sgp/crs/nuke/RL33640.pdf.

5. Ibid., 2.

6. Francis J. Gavin, "The Myth of Flexible Response: United States Strategy in Europe during the 1960s," *International History Review* 23, no. 4 (2001): 847–75, http://doi.org/cx5763.

7. Maj Kenneth Fetters, "The Role of the Long-Range Strategic Bomber," Center for Unconventional Weapons Studies, Trinity Site Papers, March 2014, 4, http://cpc.au.af.mil/assets/trinity_site_paper3.pdf.

8. Marc Trachtenberg, *History and Strategy* (Princeton, NJ: Princeton University Press, 1991), 4.

9. Ibid., 12.

10. Lt Col Keith A. Barlow, *Massive Retaliation*, Research Paper no. AD-764 412 (Carlisle Barracks, PA: US Army War College, 8 March 1972), 12, http://www.dtic.mil/dtic/tr/fulltext/u2/764412.pdf; and Trachtenberg, *History and Strategy*, 6–12.

11. Richard R. Muller, "The Origins of MAD: A Short History of City Busting," in *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice*, ed. Henry D. Sokolski (Carlisle, PA: Strategic Studies Institute, 2004), 45.

12. Ibid., 6.

13. Benjamin Friedman, Christopher Preble, and Matt Fay, *The End of Overkill? Reassessing US Nuclear Weapons Policy* (Washington, DC: Cato Institute, 2013), 2.

14. Thom W. Ford, *Ballistic Missile Submarines of the United States and the Soviet Union: A Comparison of Systems and Doctrine* (Monterey, CA: Naval Postgraduate School, 1972), 8.

15. George F. Lemmer, "The Air Force and Strategic Deterrence, 1951–1960," USAF Historical Division Liaison Office, December 1967, 14, http://nsarchive.gwu.edu/nukevault/ebb249/doc09.pdf.

16. Ibid., 24.

17. Trachtenberg, *History and Strategy*, 31–32.

18. Harvey M. Sapolsky, "The US Navy's Fleet Ballistic Missile Program and Finite Deterrence," in *Getting MAD*, 124.

19. Ibid., 125.

20. Donald M. Hale Jr., "US Nuclear Triad: Is It Sustaining the Cold War or 21st Century Framework?" (master's thesis, Johns Hopkins University, December 2013), https://jscholarship.library.jhu.edu/bitstream/handle/1774.2/37599/HALE-THESIS-2014.pdf.

21. *See* Matthew Fuhrmann and Todd S. Sechser, "Signaling Alliance Commitments: Hand Tying and Sunk Costs and Extended Nuclear Deterrence," *American Journal of Applied Science* 58, no. 4 (2014): 919–35, http://doi.org/f6m34m; and Steven Pifer, Richard C. Bush, Vanda Felbab-Brown, Martin S. Indyk, Michael O'Hanlon, and Kenneth M. Pollack, "US Nuclear and Extended Deterrence: Considerations and Challenges," *Arms Control Series, Paper 3*, Brookings Institute (May 2010), https://www.brookings.edu/wp-content/uploads/2016/06/06_nuclear_deterrence.pdf.

22. Pifer et al., *Nuclear and Extended Deterrence*, 7.

23. Mike Benitez, "The Nuclear Bomber: Fighting Conflated Deterrence in the 21st Century," *Breaking Defense*, 2016, http://breakingdefense.com/2016/03/the-nuclear-bomber-fighting-conflated-deterrence-in-the-21st-century/.

24. Pifer et al., *Nuclear and Extended Deterrence*, 18–19.

25. Kirkham, *Modernizing*, 46.

26. *See* Pifer et al., *Nuclear and Extended Deterrence*; and Richard C. Bush, "The US Policy of Extended Deterrence in East Asia: History, Current Views and Implications," Brookings Institute, Arms Control Series, Paper 5, 24 February 2011, https://www.brookings.edu/research/the-u-s-policy-of-extended-deterrence-in-east-asia-history-current-views-and-implications/.

27. Bush, "US Policy," 5.

28. Michaela Dodge, "US Nuclear Weapons in Europe: Critical for Transatlantic Security," Backgrounder Report no. 2875, The Heritage Foundation, 18 February 2014, http://www.heritage.org/defense/report/us-nuclear-weapons-europe-critical-transatlantic-security.

29. David J. Trachtenberg, "US Extended Deterrence: How Much Strategic Force Is too Little?," *Strategic Studies Quarterly* 6, no. 2 (Summer 2012): 84, http://www.airuniversity.af.mil/Portals/10/SSQ/documents/Volume-06_Issue-2/summer12.pdf.

30. Ford, *Ballistic Missile Submarines*, 68.

31. Franz-Stefan Gady, "Trump: Two Nuclear Subs Operating in Korean Waters," *The Diplomat*, 25 May 2017, http://thediplomat.com/2017/05/trump-2-nuclear-subs-operating-in-korean-waters/.

32. Jon B. Wolfsthal, Jeffrey Lewis, and Marc Quint, *The Trillion Dollar Nuclear Triad* (Monterey, CA: The James Martin Center for Nonproliferation Studies, 2014), 18.

33. Ibid., 13.

34. Todd Harrison and Evan Braden Montgomery, *The Cost of New US Nuclear Forces: From BCA to Bow Wave and Beyond* (Washington, DC: Center for Strategic and Budgetary Assessments, 2015), 32–33, http://csbaonline.org/research/publications/the-cost-of-u-s-nuclear-forces-from-bca-to-bow-wave-and-beyond/publication.

35. Kirkham, *Modernizing*, 46–47.

36. Ibid., 51.

37. Woolf, *US Strategic Nuclear Forces 2016*, 32.

38. *See* Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2014 to 2023*, Pub. No. 4618, December 2013, https://www.cbo.gov/publication/44968; and Wolfsthal, Lewis, and Quint, *Trillion Dollar Nuclear Triad*.

39. Friedman, Preble, and Fay, *End of Overkill?*, 10.

40. Kirkham, *Modernizing*, 49.

41. *The U.S. Nuclear Triad: GAO's Evaluation of the Strategic Modernization Program*: *Testimony before the Committee on Governmental Affairs*, 103rd Cong. (1993) (Statement of Eleanor Chelimsky, assistant comptroller general, Program Evaluation and Methodology Division, US Government Accountability Office).

42. Wolfsthal, Lewis, and Quint, *Trillion Dollar Nuclear Triad,* 20.

Disclaimer