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Crisis Stability and Long-Range Strike

A Comparative Analysis of Fighters, Bombers, and Missiles

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Summary

Crisis stability can be described as the degree to which mutual deterrence between dangerous adversaries can hold in a confrontation. Crisis stability and the means of achieving and maintaining it—crisis management—are not about warfighting. They are about building and posturing forces in ways that allow a state, if confronted, to avoid war without backing down.

These topics have received little attention since the end of the Cold War, but nuclear proliferation and the reemergence of great power competitors will make dangerous interstate confrontations increasingly likely in the future. When managing these crises, U.S. leaders will need to defuse the threat of war without compromising important political or military interests. They will prefer to do so while the confrontation remains at a conventional level, before tensions escalate and one or both sides resort to nuclear brandishing. In such situations, crisis management will require balancing threats with restraint while limiting each side's vulnerability to surprise attack. Long-range strike assets—strike fighters, bombers, ballistic missiles, and cruise missiles—will play an important role.[1] The question is, however, whether any of these systems are more conducive to crisis stability than others and why.

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[1] Although cyber warfare capabilities can also strike quickly and from afar, they were not included in this analysis because crisis stability and crisis management rely heavily on deterrence and signaling. To be effective, both of those functions require the ability to threaten in ways that are visible, tangible, and credible to the opponent. Cyber attacks *might* create significant effects in future conflicts, but the substance and potency of those effects are as yet unproven to potential adversaries. Given these uncertainties and the substantial differences

Approach and Methodology

To answer this question, this report draws from the prominent works in the field to illuminate the nature of international crisis, the principles of crisis management, and the relationships between force structure and crisis stability. From these insights, it identifies which attributes are desirable in strike assets and presents an analytical framework to evaluate the degree to which various strike systems exhibit those attributes.

The report then applies this framework to an evaluation of the relative strengths and risks of posturing several alternative strike systems in an effort to stabilize a notional military confrontation with a dangerous regional opponent in the 2025–2030 time frame. The systems analyzed are strike fighters (F-35s), legacy bombers (B-52s and B-1s) with standoff weapons, future penetrating bombers (B-Xs),[2] and conventionally armed intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and sea-launched cruise missiles (SLCMs). The findings of this analysis are then used to generate a set of propositions regarding these systems' potential influences on stability during a crisis and their utility as tools of crisis management. The report then tests these propositions against the historical record in a survey of how strike asset postures influenced the outcomes of 48 international crises since the end of World War II. Finally, it integrates the findings of these analyses and puts them into perspective.

Study Findings

Importance of Force Structure in Crisis Management and Stability

Crisis management is largely about strategy, but force structure is also important. Efforts to manage a crisis can be undermined if the

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between kinetic and cyber warfare, the latter's potential effects on crisis stability should be evaluated in a separate study.

2   Because future penetrating bombers have not yet been designed, the study used notional bombers with B-2 range and payload specifications as a proxy for these aircraft, which is why B-2s were not evaluated separately. See Appendix B for more on the methods used in the attribute analysis of alternative strike systems.

underlying structure of the geopolitical environment is unstable. Military forces are an important part of that structure, either bolstering or eroding its stability. They are among the principal tools to which national leaders turn in efforts to manage international crises. It is critical to emphasize at this point that the objective of crisis management is to achieve and maintain stability: It is more about deterrence than warfighting.[3] While all military forces contribute to deterrence, long-range strike systems are especially important because they can be brought to bear more quickly than other forces and can pose deterrent threats from afar. The RAND study identified three attributes that air and missile strike systems need to strengthen structural stability and three others that make them effective tools of crisis management.[4]

Structural Stability Attributes

To bolster structural stability, strike assets should have the following characteristics.

They Should Be Sufficiently Potent to Deter a Conventional Attack

Deterrence is the foundation of structural stability. Because nuclear threats may lack credibility in the face of conventional aggression, and because U.S. leaders will want to stabilize crises well below the nuclear threshold, potent conventional strike assets must be available to posture during an international crisis.

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[3] This does not suggest that warfighting capabilities are not important considerations in crisis management. As discussed later, crisis management requires both conventional and nuclear deterrence, which requires posturing forces in ways that cause an opponent to doubt that it could succeed with a conventional attack. U.S. leaders will also need to be prepared to fight, manage escalation, and prevail in war should crisis management fail. Nevertheless, the political and military objectives of crisis management center on deterring wars with nuclear-armed opponents and some conventional opponents—wars that would be so costly that national leaders would prefer to avoid them if they can do so without surrendering important U.S. interests.

[4] This report explores, among other things, the concept of "structural stability." Structural stability is determined by preexisting conditions in the strategic environment, such as geography, political relationships, and force structure (e.g., size, composition, disposition, technology, doctrine), which, in turn, contribute to or detract from stability when a crisis arises.

They Should Be Able to Minimize U.S. Vulnerability to Surprise Attack

If posturing forces to project a deterrent threat requires making them vulnerable to a surprise attack, then a risk-tolerant opponent might be tempted to launch a preemptive strike. Structural stability requires forces that are powerful enough to deter a potential enemy but employable in ways that minimize their exposure to surprise attack.

They Should Be Able to Mitigate the Threat of U.S. Surprise Attack

This attribute is counterintuitive. Surprise has always been a highly valued means of achieving tactical objectives in war, but crisis management is not war. During an international crisis, posturing powerful strike forces in a way that suggests that a surprise attack is imminent can lead an opponent to conclude that it has no alternative but to launch a preemptive strike. Therefore, structural stability requires forces that can be postured to impose a potent deterrent threat while mitigating—*though not completely eliminating*—the peril of U.S. surprise attack.

Crisis Management Attributes

Important as it is, structural stability is only a prerequisite to effective crisis management. Once in a confrontation, U.S. leaders will want to do more than simply deter the aggressive ambitions of other states. They will want to defuse the crisis on terms that are favorable to U.S. interests. This will require strategies that apply coercive pressure on opponents, as well as the forces to execute those strategies. Strike assets will need the following attributes.

They Should Be Flexible

Strike assets should have utility in a wide variety of scenarios, and they should bring a broad selection of employment profiles to each scenario.

They Should Be Responsive

Since crises can erupt suddenly in distant places, strike assets must be capable of prompt alert, deployment, and employment. Furthermore, because crisis management is as much a political function as a military one, the military tools employed to support it should have the ability

to modulate their operating tempo in coordination with diplomatic actions.

They Should Offer Capabilities for Signaling

Strike assets need to be employable in ways that visibly communicate a nation's capability, resolve, and restraint. In other words, they need the ability to signal a determination and ability to prevail should the crisis devolve to war with a willingness to allow time to seek a negotiated settlement.

Strengths and Risks of Alternative Strike Systems

Evaluating the attributes of alternative strike systems and validating those findings against the historical record led to the following insights.

Short-Range Strike Can Be Dangerously Destabilizing

Strike fighters can generate a potent deterrent threat. When based close to enemy targets, they can deliver high volumes of conventional ordnance in short periods of time. In 12 of the 15 cases examined in which conventional confrontations were effectively managed, the victims of aggression or the states intervening to defend those victims brandished aircraft to stabilize the crises. In all cases, states postured short-range strike fighters close to their opponents, either at land bases or on aircraft carriers, to generate the potency needed to deter the aggressors. This approach has worked well in the past because the state or states brandishing aircraft (the United States was usually the central actor) have enjoyed the luxury of confronting adversaries that largely lacked the capabilities to strike the bases and aircraft carriers on which the aircraft were being postured. In essence, the defenders reaped the benefits of long-range strike even when posturing only short-range strike assets. Unfortunately, that era may be coming to an end.

With the proliferation of space, missile, and precision-guided munition technology, future opponents confronting the United States are likely to have sizable arsenals of precision-guided ballistic and cruise missiles able to accurately target air bases and aircraft carriers at ever increasing ranges. Figure S.1 illustrates the structural instability that

Figure S.1
The Structural Instability That Results from Close Basing
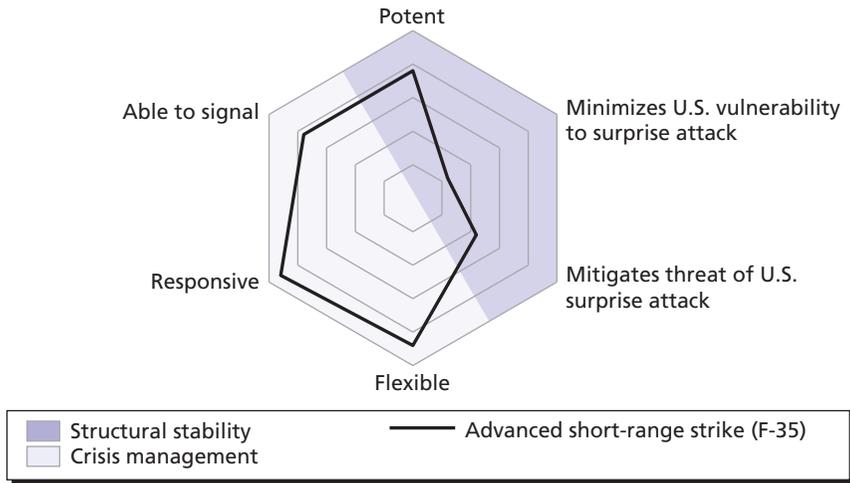
would result from posturing strike assets close to opponents with these capabilities.[5]

In the 2025–2030 scenario examined here, close-based F-35 advanced strike fighters were able to pose a potent threat to the opponent. They generated high sortie rates and, when refueled just outside the surface-to-air missile threat envelope, held a considerable number of enemy targets at risk. However, posturing the U.S. strike force within range of a substantial portion of the opponent's conventional missile forces made it highly vulnerable to enemy surprise attack. At the same time, the short distances from U.S. bases and carriers to enemy tar-

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[5]   This figure and those that follow are radar plots displaying scores attributed to alternative strike systems in each of the six aforementioned categories. The study team scored systems on a scale of 0 to 25 points for each attribute. Each plot is a six-dimensional graph marked off in five-point increments from the center out. That is, the inner ring connects the five-point markers on all six dimensions, and the outer ring connects the 25-point markers. Point values are not displayed on the rings because the numbers are not important in any absolute sense. What is important are the relative positions of each strike system's scores compared with the scores of other strike systems. For more on the analytical methods used and the actual factored scores of each strike system, see Appendix B.

gets resulted in short warning times for enemy forces and compressed decision times for enemy leaders—in other words, a substantial threat of U.S. surprise attack. This combination of high threat and mutual vulnerability would invite enemy preemption, making it difficult to stabilize the crisis.

The case-study analysis corroborated this finding. Although the United States has been able to safely posture short-range strike aircraft close to opponents in multiple crises, other states were not so fortunate. Confrontations between Israel and its hostile Arab neighbors have demonstrated the dangers of close basing, the most notable examples being the 1967 Arab-Israeli crisis and the 1973 Yom Kippur crisis. In both cases, powerful air forces based close to each other (due to the region's political geography) created a crucible of instability that exploded in surprise attacks. The 1971 Bangladesh crisis, which culminated in a Pakistani preemptive air strike on 15 Indian air bases, exhibited some of the same dynamics.

Neither Adding Legacy Bombers with Standoff Weapons nor Moving Fighters Back Solves This Problem

Options examined for dealing with this problem included supplementing close-based strike fighters with legacy bombers armed with standoff weapons and moving strike fighters to more distant bases, but neither of these approaches offered a reliable solution. Figure S.2 illustrates the dynamics that these options create.

Distant-based legacy bombers would be safer from surprise attack, but, due to limitations in the number of standoff weapons available, they would not be very potent. Nor would adding them to the equation reduce the vulnerability of the close-based strikers. Since that is where the potent threat would reside, that is where the opponent would most likely focus a preemptive attack. As Figure S.2 indicates, moving the strike fighters back would reduce their vulnerability as well as the threat they present of U.S. surprise attack, but it would also drive down sortie rates, substantially reducing their potency. Seeing that posture, even in combination with standoff bombers, an aggressive, risk-tolerant opponent might attack a regional friend of the United States, doubt-

Figure S.2
Strike Fighters Supplemented by Bombers with Standoff Weapons
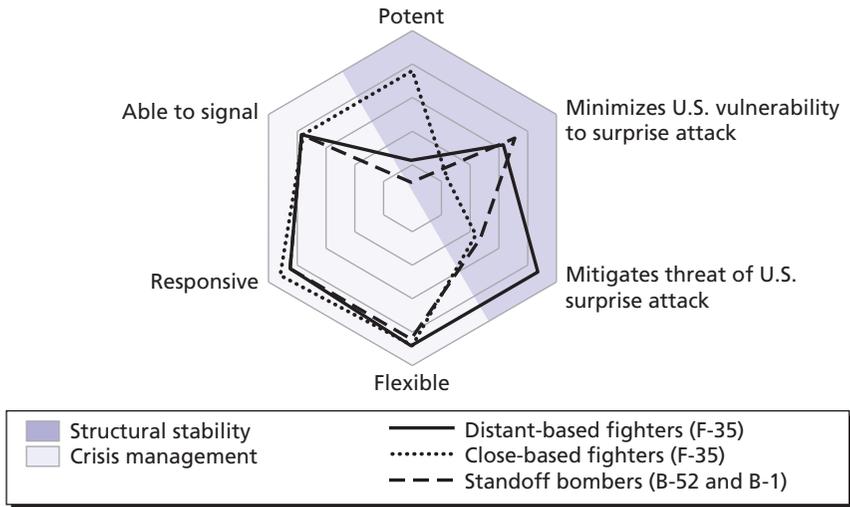
ing that U.S. strike forces could provide adequate firepower to defeat it from afar.

Penetrating Bombers Offer Potency Without Excessive Vulnerability

Penetrating, long-range bombers (i.e., aircraft with sufficient range and payload to operate effectively from distant bases and with sufficient passive and active defenses to survive in the opponent's defended airspace) offer one possible solution to this dilemma.

As Figure S.3 illustrates, penetrating bombers generate a potent deterrent threat without exposing U.S. forces to an inordinate amount of vulnerability to surprise attack. Distant basing also mitigates the threat of U.S. surprise attack. With their stealthy characteristics and deep reach into the opponent's defended airspace, future penetrating bombers would present a greater threat of surprise attack than strike fighters operating from the same ranges, but U.S. leaders could manage this threat by coordinating tactics within a broader crisis man-

Figure S.3
Penetrating Bombers, Distant-Based Strike Fighters, and Standoff Bombers
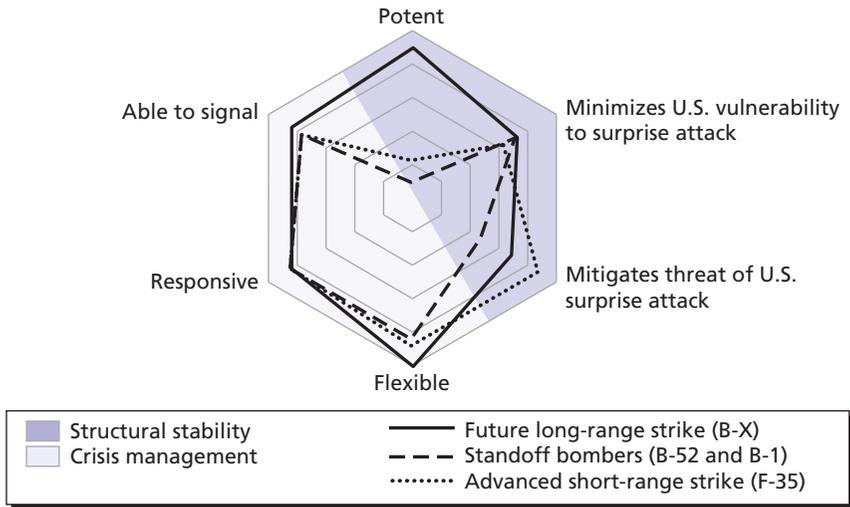
RAND *MG1258-S.3*

agement strategy.[6] Substantial numbers of standoff and penetrating bombers could be deployed to regional bases to generate a deterrent threat but kept well away from the opponent's defended airspace to mitigate the threat of surprise attack. Should U.S. leaders decide to intensify the threat, bomber patrols could be moved closer to the opponent or increased in number and frequency. Given the flexibility and responsiveness inherent in airpower, bombers would give U.S. leaders the ability to modulate threats to send the signals needed in carefully nuanced crisis management strategies.

Aircraft Are Excellent Tools of Crisis Management, but Sub-Surface Missiles Are Not

As Figure S.3 also indicates, all the aircraft types examined in this study proved to be well endowed with the attributes needed to be effective tools of crisis management. Aircraft excel in flexibility, respon-

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[6] The analysis assumed that the next generation of penetrating bombers would have advanced active and passive defenses, making them stealthier than B-2s and considerably stealthier than F-35s.

siveness, and the ability to signal. These capabilities allow them to be employed in a variety of operational profiles, making them useful across a wide range of scenarios. As a result, bombers and fighters offer crisis managers capable tools for signaling U.S. levels of concern and sending discernible messages to friends and opponents alike.

Sub-surface missiles are poor tools of crisis management, however. As Figure S.4 illustrates, although these missiles are responsive and relatively invulnerable to conventional surprise attack, their underground or submarine basing limits their flexibility and ability to signal.

All three sub-surface missile systems examined in this study were restricted in the range of scenarios in which they could be employed and the kinds of attacks and weapons effects they could create. Similarly, while the United States could signal concern during a crisis by flushing submarines from port or putting ICBMs on alert, little more could be done with these systems after that to send discernible messages to an opponent.

Figure S.4
Conventional Missiles: ICBMs, SLBMs, and SLCMs
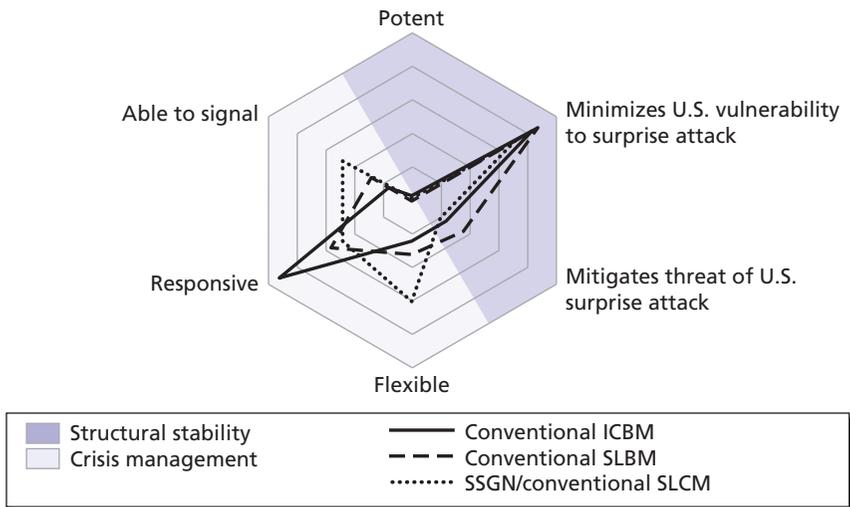
NOTE: SSGN = guided-missile submarine.
RAND *MG1258-S.4*

The case-study analysis corroborated these findings. In a significant number of the international crises surveyed, aircraft were brandished but missiles were not. In the cases in which missiles were brandished, it was usually in the form of raised defense readiness conditions to communicate nuclear threats, and bombers were usually brandished as well. Conventional missiles were rarely used to signal in international crises.

Cruise Missiles as Enablers of Other Crisis Management Tools

In contrast to conventional ballistic missiles, cruise missiles—whether fired from aircraft or naval vessels—have demonstrated their utility in war. Due to the relationship between warfighting ability and conventional deterrence, these weapons also have important roles to play in structural stability and crisis management. But their principal value derives little from any independent contribution to deterrence. Inventory limitations on weapons delivered from all platforms and the inability to quickly reload weapons fired from submarines drive cruise missile potencies down to levels that make them unlikely to pose significant deterrent threats by themselves.[7] Rather, their ability to salvo against key targets in an opponent's integrated air defense system (IADS) endows them with an important enabling capability, amplifying the potency of penetrating aircraft. This dynamic, however, exemplifies the proverbial "double-edged sword." If the aircraft projecting the principal threat are postured in a way that makes them vulnerable to preemption, the added threat of cruise missiles disabling the opponent's IADS will only increase the resultant instability. Conversely, if aircraft are postured to project a potent deterrent threat from positions that are safe from surprise attack, the cruise missile threat will heighten the strength of the deterrent, adding to structural stability.

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[7] This analysis used weapon inventory projections provided by Headquarters U.S. Air Force, Directorate of Operational Capability Requirements. Cruise missile inventory limitations were driven by the high costs of these weapons. For an analysis comparing these costs to those of penetrating bombers, see Thomas Hamilton, *Comparing the Cost of Penetrating Bombers to Expendable Missiles Over Thirty Years: An Initial Look*, Santa Monica, Calif.: RAND Corporation, WR-778-AF, 2011.

Putting the Findings into Perspective

This study found that, considered individually, aircraft are the strike assets that offer decisionmakers the most flexible and responsive tools for crisis management, and long-range penetrating bombers are the strike assets able to contribute the most to structural stability. However, this analysis does not suggest that decisionmakers should acquire any single kind of strike asset exclusively—either for crisis management or for warfighting—or that they should posture or employ them individually to create desired effects. Nor does this report argue that decisionmakers should procure strike assets to the exclusion of other force elements, although it does point out that long-range strike can bring deterrent threats to bear from afar and more quickly in a crisis.

Crisis management and war are about strategy. In both cases, decisionmakers must marshal the means at their disposal and coordinate them in ways that achieve desired objectives. Military systems and forces do not operate independently in war, nor do opponents consider their potential effects independently when deciding whether to abide by deterrent threats or defy them. Orchestrated properly, force elements work synergistically, bringing the nation's power to bear to achieve its leaders' objectives in the most effective and efficient manner possible.

Therefore, this report does not suggest that penetrating bombers should constitute the nation's sole deterrent, conventional or nuclear. Nor does it imply that other strike assets or other force elements are not needed to perform missions aside from fighting wars, deterring wars, or managing crises. Ultimately, the nation will continue to need a suite of capabilities that operate in multiple domains to ensure its security.

That said, the analysis does indicate that long-range, penetrating bombers offer a combination of attributes that are important for stabilizing international crises, and these attributes are not exhibited as robustly by other strike assets. Since the end of World War II, bombers have been important arrows in the nation's quiver of force projection capabilities. They will likely remain so in the future.