

# Russian-U.S. Nuclear Force Reductions and Nuclear Proliferation

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*Russia and the United States have a special responsibility to connect “vertical” nuclear disarmament and “horizontal” nonproliferation. Russian and American behavior will influence the choices made by nonnuclear states about the decision for a nuclear weapons capability or for the acquisition of a complete nuclear fuel cycle with the potential for weaponization. This study uses an analytical model to examine the stability of a possible future world in which nonproliferation efforts “hold the line” against new nuclear states, while the U.S. and Russia maintain stable deterrence at reduced levels of deployed forces.*

## Introduction

The Nuclear Non-Proliferation Treaty (NPT) anticipated that the acknowledged nuclear powers would work to reduce the size of their own nuclear weapons arsenals, with the eventual goal of eliminating nuclear weapons from their respective inventories. For many reasons, things have not turned out that way. Yet the relationship between nonproliferation and “vertical” disarmament of existing nuclear weapons will not go away. If the current nuclear stakeholders prefer to grow, instead of reduce, their inventories of weapons and launchers, nonnuclear states have additional incentives to join the nuclear club. More nuclear weapons states not only increase the risks of crisis instability and deterrence failure, but at a certain tipping point, the entire nonproliferation regime may collapse.

Russia and the United States, as the legatees of the Cold War nuclear superpowers, and as the states currently deploying the largest numbers of intercontinental or “strategic” nuclear forces, have a special responsibility with respect to the linkage between vertical nuclear disarmament and nonproliferation. Their example of nuclear restraint or indulgence, with respect to arms control and disarmament, will send signals to other nuclear powers about their behavior space for nuclear reticence or assertiveness. As well, Russian and American behavior will influence the choices made by nonnuclear states about the decision for a nuclear weapons capability or, more opaquely, for the acquisition of a complete nuclear fuel cycle with the potential for weaponization.

This study partly deconstructs the complex DNA molecule that wraps together Russian-American nuclear force reductions and nonproliferation. First, some of the important political and military-technical context for downsizing U.S. and Russian nuclear forces is established, with particular attention to U.S. missile defenses. Second, an analytical model is used to examine the stability of a possible future world in which nonproliferation efforts “hold the line” against new nuclear states, while the U.S. and Russia maintain stable deterrence at reduced levels of deployed forces. Third, the study draws conclusions for present and future Russian and American policies with respect to nuclear arms control, nonproliferation and missile defense.

## Common Interests

Despite recent disagreements over the planned deployment of U.S. missile defenses in Eastern Europe, the United States and Russia have more common than opposed interests. One of these interests is the prevention of nuclear weapons spread, especially among states having grievances against regional neighbors or the existing international order. Another common interest is keeping nuclear weapons out of the hands of nonstate actors, including terrorists, who may be beyond the reach of nuclear deterrence. A third shared interest between the United States and Russia is to prevent the outbreak of accidental or inadvertent nuclear war.

In order to accomplish these objectives, the United States and Russia must fulfill their obligations under the Nuclear Non-Proliferation Treaty (NPT) and reduce their arsenals of deployed nuclear weapons on intercontinental launchers: land-based ballistic missiles, submarine-launched ballistic missiles, and long-range bombers. So long as the Americans and Russians maintain large nuclear arsenals, the incentives for other nuclear powers to increase, or at least not to reduce, their own nuclear weapons inventories are powerful. Russia and the United States are the “gold standards” against which other nuclear states measure their relative power positions.

However, getting the United States or Russia to reduce reliance on long-range nuclear weapons is easier said than done. Both states have maintained large inventories of nuclear weapons, including deployed weapons on intercontinental launchers, long after the end of the Cold War and the demise of the Soviet Union. In part, this attachment to nukes is cultural. As nuclear arms control expert Joseph Cirincione has noted:

In the United States, perhaps more than in any other country, the atom is tied directly to the national ego. For many political leaders, it is inconceivable that the United States would give up the weapon we invented.<sup>1</sup>

U.S. interest in maintaining a strategic nuclear arsenal second to none is driven by factors other than nostalgia. First, since the end of the Cold War, the United States has assumed an ambitious geopolitical profile in world politics. Under the administrations of both Bill Clinton and George W. Bush, the United States assumed responsibilities for world order that would have been previously unthinkable. From its traditional role as an offshore balancer in Europe and Asia, the United States has evolved into something its critics refer to as a global hegemon, and its defenders as an international sheriff.

Whether one approves of or disparages this higher profile of American global reach and responsibility, compared to the Cold War, the relationship between a higher demand for U.S.-provided security and nuclear weapons is, at best, indirect. This is so for two reasons. First, U.S. military primacy since the Cold War is primarily due to its lead in advanced technology, conventional weapons, and delivery systems, especially those for C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance). As U.S. conventional military prowess improves, its need for nuclear weapons as anything other than a residual deterrent against enemy nuclear weapons is diminished.

A second reason why the connection between American nuclear weapons and the political influence supported by military power is indirect revolves around the character of nuclear weapons themselves. They are, in their military, political, and social effects, the opposite of long-range, precision-guided weapons that have been the trumps of warfare since Desert Storm. Nuclear weapons have not been used in anger since 1945 because even their possessors recognize that they exist for the purpose of war avoidance, not for the

actual fighting of war. The notion of military victory as most Americans and other civilized peoples understand it is missing in the collateral damage attendant to even small numbers of nuclear weapons.

There remain three reasons for U.S. interest in maintaining a large number of deployed long-range nuclear weapons: the three “Ps” of protection, prestige, and politics.<sup>2</sup> Protection refers to the inclusion of U.S. allies under the umbrella of American nuclear deterrence. Protection of allies in Western Europe against the threat of a Soviet conventional invasion was one of the reasons for deploying U.S. nuclear weapons in Europe during the Cold War. Prestige attaches to nuclear weapons for some states because they are symbols of great power status and give a “seat at the table” or access to important international forums. Other states have not failed to notice that the five permanent members of the United Nations Security Council are also the first five states to have built and deployed nuclear forces.

The third “P” supporting U.S. interest in a second-to-none nuclear arsenal is politics, domestic politics in this instance. Powerful interest groups combine with government bureaucrats and members of Congress to form “iron triangles” on behalf of particular defense programs. Members of Congress need to “bring home the bacon” of military deployments in their districts, including bases and other installations. Although nuclear weapons are not big spenders in domestic politics compared to conventional armies, navies, and air force elements, nuclear weapons programs have their own momentum in the service or Department of Defense bureaucracies, or on Capitol Hill. In addition, the nuclear motivations of prestige and protection also have their own foreign pressure groups and U.S. domestic constituencies.

### **The Many-Sided View from Moscow**

Russia’s conventional armed forces crashed and burned, in quantity as well as in quality, during the first decade after the end of the Cold War. During the 1990s, Russia’s nuclear weapons were its only justification for claiming major power status. Since the turn of the century, President Vladimir Putin has begun to rebuild his military, aided by expanding worldwide demand for energy. His defense plans include not only improvements in conventional forces, but also the modernization of strategic and other nuclear forces.

Russia military doctrine under Putin has made clear the perceived necessity of its military leadership to plan for the use of nuclear weapons, apart from situations of possible nuclear attack against Russia. In addition, Russia will consider the first use of nuclear weapons in case of invasion of Russian state territory or attacks on or near the periphery of Russia with the potential for causing significant damage to Russia.

Russia’s willingness to entertain the possibility of nuclear first use in case of conventional attack is a departure from the Cold War Soviet precedent of no first use. Of course, declaratory policies may not always be honored in the event of actual crisis or war. But the current disposition of Russia’s political leaders and military planners since 1991 to rely on prompt use of nuclear weapons reflects the parlous state of Russia’s conventional forces: for deterrence, and for prevailing in war if deterrence fails.

One reason for Russia’s concern about the balance of power in Europe is the expansion of the North Atlantic Treaty Organization (NATO) since 1991. NATO, an alliance of some sixteen Western states during the Cold War, has now extended its membership to include twenty-six countries. A number of these states were formerly members of the Soviet-dominated Warsaw Treaty Organization (Warsaw Pact). NATO’s pub crawl to the doorstep of Russia’s borders since the end of the Cold War is taken by many Russians as a breach of a tacit promise by former U.S. Secretary of State James Baker, during the administration of

George H. W. Bush, that the unification of East and West Germany would mark the end of NATO expansion.

Related to this is Russia's frustration over the Conventional Forces in Europe (CFE) Treaty negotiated during the Cold War and adapted in 1999. The adapted treaty has yet to come into force because NATO has linked its ratification to the implementation of the "Istanbul commitments" by Russia—i.e., the withdrawal of Russian troops from Georgia and Moldova. For its part, Russia wants major changes in the adapted CFE, including the removal of all "flank" restrictions on force deployments (increasing flexibility for Russia) and the addition of collective ceilings on heavy weapons (limiting NATO's tanks and infantry fighting vehicles deployed on the territories of its easternmost members).<sup>3</sup> From the perspective of "order of battle," NATO does not appear to be more threatening to Russia than hitherto: as of September, 2007, NATO's 26 member states had 20 percent less manpower and equipment than the original sixteen members were permitted under the 1990 treaty.<sup>4</sup> But Russia is concerned as much about U.S. and NATO political intentions as it is about current force capabilities.<sup>5</sup>

Apart from the expansion of NATO and the imbalance of NATO and Russian military forces in Europe, Russia has two other concerns that lead to its decision to modernize its nuclear forces and to limit its strategic nuclear force reductions. The first concern is the preservation of Russia's deterrent in the face of U.S. existing and future deployments of ballistic missile defenses (BMD). The second is the uncertain balance of military power in Asia, and the possibility of an increasing nuclear arms race in Asia. Russia's more immediate concern is the question of missile defenses in Europe (more discussion follows below), but Russia is also mindful of the uncertainties attendant to nuclear arms competition in Asia.

Already nuclear Asia includes Russia, China, India and Pakistan. North Korea declared itself in the ranks of nuclear powers in 2005 and conducted its first nuclear test in 2006. The United States and four other states (Russia, China, Japan, and South Korea) reached an agreement with North Korea in February 2007 that would freeze and eventually dismantle its nuclear programs, and a timetable established in early September 2007 called for declaration of, and dismantling of, all of North Korea's nuclear weapons and production facilities. According to chief U.S. envoy for the North Korean negotiations Christopher R. Hill, "One thing that we agreed on is that the DPRK will provide a full declaration of all of its nuclear programs and will disable their nuclear programs by the end of this year, 2007." However this timetable lapsed beyond 2008 into 2009.<sup>6</sup>

If North Korea is successfully disarmed of nuclear weapons capability, it would reverse the proliferation momentum in the region, beginning in 1998 with the nuclear "coming out" tests by India and Pakistan, and followed by North Korea's walkout from the Non-Proliferation Treaty in 2002. The prospect of an irrevocable North Korean nuclear weapons arsenal was dangerous to regional rivals like Japan and South Korea, but also to major powers in Asia, including Russia, China, and the United States. A shift in the Bush administration's approach to North Korea during the second term, encouraging multilateral talks with the DPRK as well as selected one-on-one conferences between diplomatic principals, paid dividends in a breakthrough in principle in 2005 and in a more conclusive agreement among the six states in 2007.

Reversing North Korea's nuclear status and slowing down the risk of unconstrained proliferation in Asia creates more maneuver space for Russia and China with respect to their bilateral relations, and with respect to their relations with the United States. A regional nuclear arms race might have created, in addition to new nuclear states, new uncertainties among the Moscow–Beijing–Washington triangle with respect to the control of nuclear weapons and the reliability of nuclear deterrence. A more stable nuclear Asia opens the

door wider for arms reductions between the Americans and Russians. It also encourages nuclear restraint on the part of China, which has already been moving toward greater political and military cooperation with Russia, including joint military exercises of unprecedented size. As well, China has been making strides in modernizing its armed forces, especially its nuclear ballistic missiles.

If its back door in Asia is not bubbling over, Russia can be a more confident participant in Russian-American discussions about nuclear arms reductions. On the other hand, the apparently stabilizing containment of North Korea's nuclear ambitions might be offset by Russia's objections to U.S. plans for the deployment of components of its global missile defenses system in Poland and the Czech Republic. Further deterioration of the U.S.-Russian relation over missile defenses in Europe could outweigh the cooperative security points scored in U.S.-Russian collaboration to restrain North Korea, to the detriment of future bilateral cooperation on nonproliferation.

Russia's objections to U.S. missile defenses are not limited to those parts of any BMD system deployed in Eastern Europe. In fact, Russian skepticism about American missile defenses dates from the Cold War and continues into the post-Cold War world. But the current political climate of adversity that influences Russian views of U.S. and NATO security policies is the result of two cascading forces: a growing sense of self-confidence on Russia's part, and an undisguised resentment of the 1990s, during which many Russians felt weak and dominated by the West. Added to this is the suspicion on the part of Russian leaders that the United States intends to operate globally as a hegemonic power. In an address to the Russian Federal Assembly in May, 2006, Putin referred to the United States as "a wolf which knows who to eat and is not about to listen to anyone, it seems."<sup>7</sup> Putin created greater waves with his harsh rhetoric at the Munich Security Conference in February 2007, where he criticized the "unipolar" (meaning American-dominated) international system and added:

Today we are witnessing an almost uncontained hyper use of force—military force—in international relations, force that is plunging the world into an abyss of permanent conflicts.<sup>8</sup>

From this perspective, of Russian reaction to perceived U.S. unilateralism and imperialism, Putin's objections to American ballistic missile defenses, especially if deployed in Europe, are of more than passing significance. Russian Foreign Minister Sergei Lavrov emphasized this point in a speech September 3, 2007, to students at the Moscow State Institute of International Relations. Lavrov referred to opposition to U.S. missile defenses in Eastern Europe (and Russia's policy on Kosovo) as "red lines" that were beyond negotiation.<sup>9</sup> In July 2007, Russia had already indicated its intent to suspend temporarily its cooperation with NATO under the CFE Treaty, on account of the U.S. plan to deploy BMD interceptors in Poland and a radar in the Czech Republic.<sup>10</sup>

At the "lobster summit" with the two presidents Bush in early July, Putin took the diplomatic advantage by offering a substitute plan for the U.S. plan to deploy BMD components in Eastern Europe. Putin's plan called for the use of radar installations in Azerbaijan and in southern Russia, which Russian experts contended would be more appropriate if, as the U.S. claimed, the BMD system was really intended to detect missiles launched from Iran.<sup>11</sup> In connection with this plan, Putin also proposed that Russia and NATO fulfill earlier expressions of intent to establish shared missile warning centers in Moscow and in Brussels.<sup>12</sup>

In addition the "carrot" of BMD cooperation, Putin and other Russian officials have not been slow to play the "stick" card of offensive force modernization to offset U.S. defenses.

Russia has undertaken strategic nuclear force modernization plans that include deployment of newer land- and sea-based missiles (ICBMs and SLBMs) as well as a new generation of ballistic missile submarines. Reportedly Russia has also experimented with maneuvering reentry vehicles or other technologies and techniques to defeat any defense that might otherwise weaken nuclear retaliatory strikes.<sup>13</sup> Further to the image of improved strategic force readiness and assertiveness, Russia has resumed its former Cold War practice of flying nuclear bomber sorties near U.S. military airspace or territory on a regular basis.<sup>14</sup>

## **Managing Change in Favorable Directions: Challenges to Russian-American Cooperation**

### *Policy Issues*

Does the preceding catalogue of U.S. and Russian security concerns, and their possible reasons for continuing interest in larger than necessary nuclear arsenals, argue for a continuation of the status quo in their nuclear deterrence and arms control policies? Not necessarily. Pressures against the status quo are considerable, and from at least three directions. First, maturing missile defense technologies may improve the performance of candidate BMD systems significantly, especially against the more limited threats posed by small powers. Second, proliferation remains a threat to existing security communities in Europe and Asia. Even with the favorable assumption that North Korea is effectively disarmed of a nuclear weapons capability by the end of the calendar year 2009, other stresses loom for the non-proliferation regime. For example, Iran continues to work against the clock of UN sanctions in order to position itself for a nuclear weapons breakout.

Third, the continuation of political distrust between the United States and Russia threatens to turn the issue of mutual deterrence, and the role of missile defense technology, from a matter of cooperative security into an issue of competitive rivalry. As in other matters, so, too, in nuclear arms control: politics drives strategy. Deterioration of the political relationship makes it more difficult for the United States and Russia to engage in additional disarmament of respective long-range nuclear arsenals. Stalemate (or worse) between the United States and Russia discourages other nuclear states from arms limitation or reductions, and it encourages other states to consider the possibility of going nuclear.

On the other hand, it is easier for theorists to advocate for or against security policies than it is to accomplish them in political action. The gravitational forces pulling in favor of the status quo in nuclear weapons deployments are formidable. Certainly, in the case of the United States, any movement of national policy from the status quo requires painstaking incremental adjustments and negotiated compromises among competing interests and power centers. Large changes occur only in the aftermath of crisis or war; prudent nuclear policy is intended to avoid both.

Politicians in Russia and the United States will also depend on their armed forces and security experts for advice about nuclear arms control and deterrence. Although there are experts aplenty in nuclear physics and in the politics of nuclear arms control, there are (thankfully) no experts in nuclear wars. Conventional military conflicts over the centuries have provided a database that can be used to sift through hypotheses and theories. Expectations about the outcomes of nuclear wars, and about the performances of nuclear forces fired in a war between two or more states, are at best logical deductions from hypothetical scenarios.

The preceding point, about the character of nuclear war as an abstraction or deduction, is important because it permits analysis to drift toward the extremes of policy debate. For example, during the 1980s, proponents of the Reagan Strategic Defense Initiative (SDI) contended that the Soviet Union was bent on acquiring a nuclear first-strike capability against the American land-based missile force (the so-called “window of vulnerability”). Opponents of missile defenses contended that it would provoke a new arms race in offensive nuclear weapons and increase the risk of nuclear war. In fact, SDI in the 1980s was a view-graph proposal for a series of technology demonstrations, not even close to a workable or deployable BMD system.

Future administrations, including the Clinton and the two Bush administrations, ran away from SDI and scaled back the military objectives and the technology ambitions for missile defenses. Instead of a system providing comprehensive societal protection against massive attacks, U.S. national missile defense research emphasized protection against accidental launches and limited strikes. As a result of this experience, the present debate about missile defenses is more realistic with respect to BMD capabilities against responsive threats. Current U.S. BMD research and development programs include a variety of technologies for land-based, sea-based, and airborne intercept.<sup>15</sup>

Despite some progress in midcourse and terminal theater missile defense, and the ability to do nationwide defense, there is no breakthrough over the horizon that will remove states and their societies from their nuclear hostage condition. In fact, nuclear deterrence has outperformed the predictions of its worst critics throughout the Cold War and subsequently. One reason for the unexpected durability of nuclear deterrence is the slower-than-anticipated spread of nuclear weapons among states. Projections made in the 1960s suggested that there might be an avalanche of nuclear weapons states by the end of the twentieth century, instead of the seven declared (excluding North Korea, which declared only in the present century) and one de facto but undeclared nuclear power (Israel).

But another reason for the durability of nuclear deterrence and the widespread assumption of a nuclear “taboo” is the progression of time that has elapsed since the bombing of Nagasaki. States with nuclear arsenals have, at least since the Cuban Missile Crisis of 1962, for the most part refrained from nuclear brinkmanship and other adventurism supported by explicit or tacit nuclear threats. This caution on the part of nuclear states does not argue for complacency about the viability of deterrence in the new world order. But it does indicate that experienced nuclear powers like the United States and Russia should no longer be fixated on maintaining arsenals of certain size and character for reasons of inertia or braggadocio. It requires very few nuclear weapons to create a good deal of menace.

### ***Getting Down and Dirty: Arsenals to the Chopping Block?***

If the preceding arguments have merit, then the United States and Russia should be able to reduce the sizes of their nuclear arsenals even below those agreed under the Moscow Treaty of 2002, otherwise known as SORT (for Strategic Offensive Reductions Treaty).<sup>16</sup> SORT requires Russia and the United States to reduce their numbers of operationally deployed strategic nuclear weapons to 2,200-1,700 by December 31, 2012. The treaty allows each state to determine its own force structure of weapons and launchers, with freedom to mix among different types, under the overall ceiling of deployed warheads. SORT does not mention verification protocols, although it does provide that the earlier START I Treaty remains in force.

How far could Russian and U.S. reductions in strategic nuclear weapons go, and still meet the requirements of stable deterrence? Some experts have expressed optimism in this

regard. General Eugene Habiger, commander in chief of U.S. Strategic Command in the 1990s, told an international conference in 1995 that Russia and the United States could reduce their arsenals to 600 warheads each.<sup>17</sup> Physicist Wolfgang K. H. Panofsky, who served as science policy advisor to Presidents Eisenhower, Kennedy and Carter and worked on the Manhattan Project from 1943 to 1945, argues that deterrence has not become obsolete in the post–Cold War world. However, the character and requirements of nuclear deterrence in the present international order differ from those of the past. According to Panofsky:

Deterring Russia, as well as China and other states that have acquired nuclear weapons, remains a justifiable function of U.S. nuclear weapons policy. But several thousand U.S. nuclear warheads are not needed to discharge that mission; a few hundred would suffice.<sup>18</sup>

Harvard University political scientist Stephen M. Walt advocates a “grand bargain,” in which the U.S. exchanges for a more viable nonproliferation regime the following concessions: (1) abandon Bush administration plans to build a new generation of nuclear weapons; (2) reduce significantly the U.S. nuclear arsenal, retaining “a few hundred” warheads as a deterrent against direct attacks on the United States; and (3) reduce the threat posed by the United States to so-called “rogue” states provided those states, such as Iran and North Korea, give up their nuclear ambitions.<sup>19</sup> Rejecting anticipated criticism that his recipe amounts to a form of appeasement, Walt adds:

Unless it makes a series of catastrophic blunders, the United States will be the strongest country on the planet for the next several decades, and its primacy will not be altered whether it has five thousand nuclear warheads or only fifty.<sup>20</sup>

Agreement that U.S. forces could be reduced well below Moscow Treaty levels crosses the political spectrum and includes prominent officials and advisors to Republican presidents. Former National Security Council and Defense Department official Franklin Miller stated in November 2005: “It’s my personal belief that the levels of U.S. strategic weapons can and should decline further from those allowed in the Treaty of Moscow. I would hope that the administration takes steps in the next year or so to produce that.”<sup>21</sup> And, according to former Reagan administration official and George W. Bush defense policy advisor Richard Perle: “I see no reason why we can’t go well below 1,000. I want the lowest number possible, under the highest control possible . . . The truth is we are never going to use them. The Russians aren’t going to use theirs either.”<sup>22</sup>

Are these optimistic expressions about the possible scope of Russian and U.S. strategic nuclear arms reductions within the range of political feasibility and operational plausibility?<sup>23</sup> Political feasibility is a larger subject than the present study, but operational feasibility is something that can be addressed here. One can ask in this context whether sub-SORT nuclear arms reductions can leave in place the expectation that both Russia and the United States can fulfill their requirements for deterrence and arms control stability. If they can do so at lower levels, the accomplishment should favor proliferation restraint by nonnuclear states and less ambitious growth in the arsenals of existing nuclear powers.

### ***Model and Data Analysis***

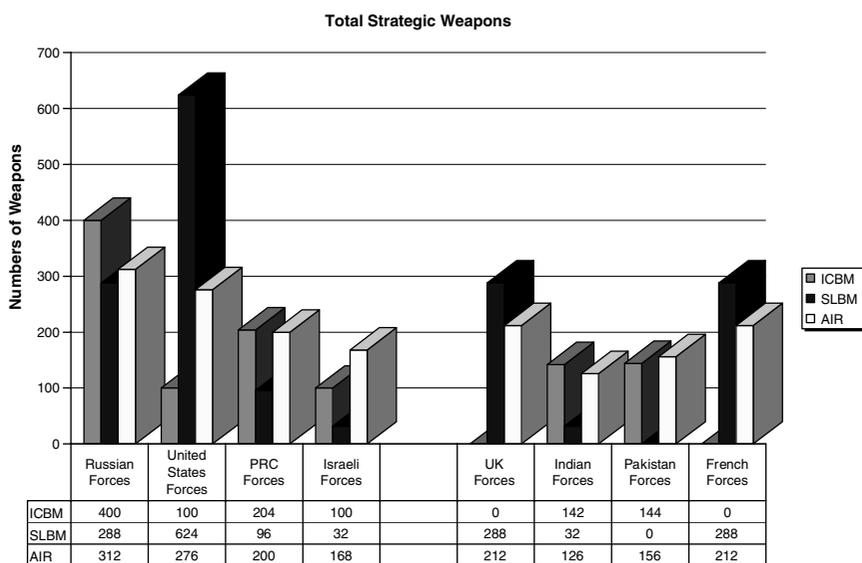
In this section, a constrained model of nuclear proliferation between now and 2015 (with a permissive band of a few years on either side) is combined with an assumed post-SORT

reduction in the numbers of deployed U.S. and Russian strategic nuclear weapons. The constrained model of proliferation limits membership in the nuclear club to eight already recognized or widely acknowledged nuclear weapons states (The United States, Russia, Britain, France, China, India, Pakistan and Israel). It excludes North Korea on the optimistic assumption that Pyongyang follows through on its existing commitments to complete and verifiable nuclear disarmament, per the outcome of the six-party talks, in 2009.

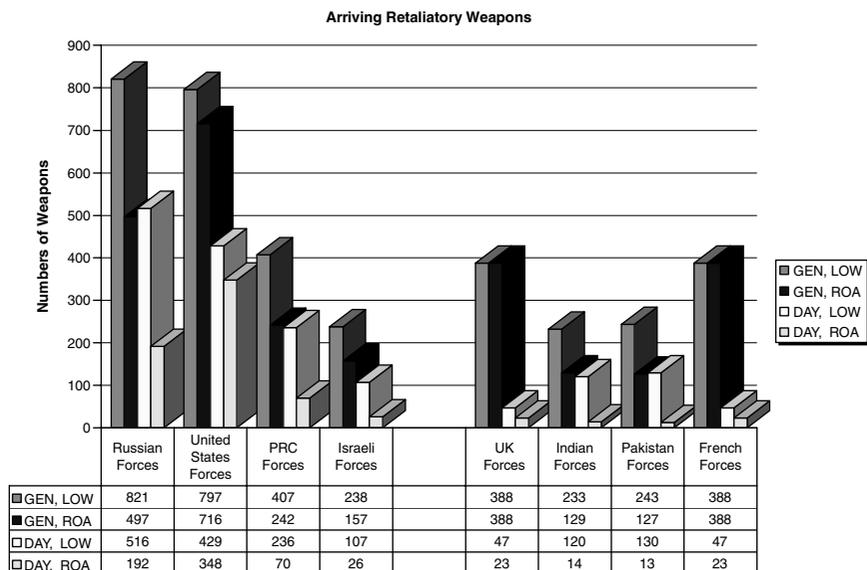
For purposes of analysis, Russian and American forces are sized at a maximum of 1,000 deployed intercontinental nuclear weapons. Britain, China, and France each deploys a maximum of 500 warheads, and India, Israel, and Pakistan a maximum each of 300 warheads. These assignments are arbitrary, but not unreasonable, given the topline established for the United States and Russia and the assumption that Moscow and Washington would only go below SORT levels if other nuclear powers were qualitatively, as well as quantitatively, inferior.

However, flexibility must be allowed for the political reality that some states in this group may not need weapons of transcontinental range in order to produce “strategic” effects against their probable opponents. Depending on their threat perceptions of the moment, states in the Middle East or South Asia could strike at enemy forces or society with preemptive or retaliatory blows using theater-range or shorter-range missiles or aircraft.<sup>24</sup> In view of this, excessive specificity in estimating future forces, especially for these states, is unnecessary, and probably misleading. Projections are generic as to capabilities and deployments of kinds of weapons: land- and sea-based missiles, and bombers. Projected forces are also notional, and not necessarily predictive. The same warning labels also apply to hypothetical missile defenses, introduced at a later stage in the analysis.

The following figures summarize the findings of the analysis, as follows. Figure 1 summarizes the projected prewar forces for each state.



**Figure 1.** Total Strategic Weapons. The author gratefully acknowledges Dr. James Scouras for use of his AWSM@ model in preparing this and subsequent charts for this study. Dr. Scouras is not responsible for any of the database or analysis, nor for any arguments or conclusions herein.

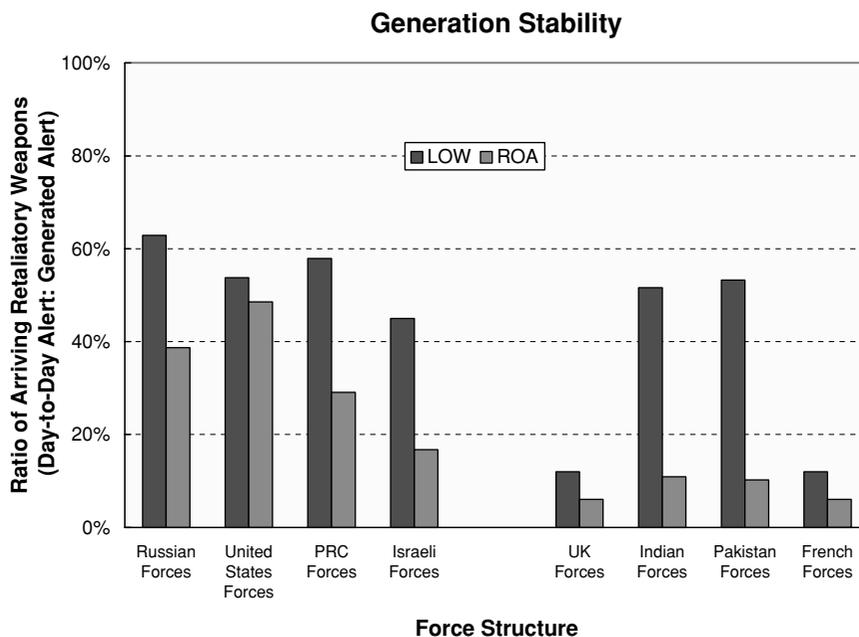


**Figure 2.** Arriving Retaliatory Weapons, No Defenses.

In Figure 2, the numbers of second-strike surviving and retaliating weapons (arriving at targets) are summarized for each state by type of weapon system and operational condition: preattack forces were on generated alert and launched on warning (GEN-LOW); forces were on generated alert, and riding out the attack (GEN-ROA); forces were on day-to-day alert, and launched on warning (DAY-LOW); and, fourth, forces were on day-to-day alert and riding out the attack (DAY-ROA). Generally speaking, although not always in the outcomes of force exchange models, the progression from GEN-LOW to DAY-ROA is a sequential decline, from the maximum numbers of surviving and retaliating warheads to the minimum number. During the Cold War, canonical U.S. models of nuclear war assigned both the U.S. and the Soviet Union a “generated alert, riding out the attack” posture, although experts suspected that either or both states might have trouble meeting this condition or not be inclined to try.

The outcomes of Figure 2 show that all eight states can meet their requirements for assured retaliation under most conditions after having absorbed a counterforce first strike. Admittedly, states vary in their ability to do so. Larger arsenals, such as those of the United States and Russia, offer a comparative advantage in providing for more target coverage and attendant damage in second-strike retaliation. In addition, operational conditions at the time of war and the prewar posture of nuclear forces also matter. For example, Russia’s second-strike warheads range from a high of 821 retaliators (on generated alert and launch on warning) to a low of 192 warheads (on day-to-day alert and riding out the attack). UK surviving and retaliating second-strike warheads range from a high of 388 (GEN-LOW) to a low of 23 (DAY-ROA). Similar figures for India range from a high of 233 (GEN-LOW) to a low of 14 (DAY-ROA).

The findings in Figure 2, if interpreted superficially, might suggest an alarmist interpretation with respect to the differences between states’ performances under conditions of generated alert, compared to normal alert, and with regard to the differences between states’ performances under launch on warning, compared to riding out the attack. An empirical



**Figure 3.** Generation Stability, No Defenses.

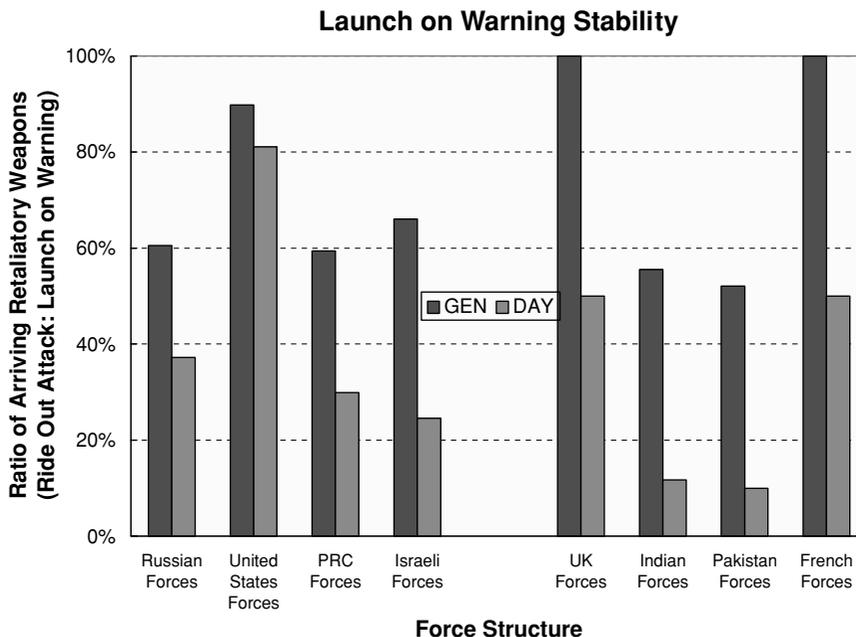
test of how much concern is actually mandated can be performed by computing the ratios of arriving retaliatory weapons on day-to-day alert, compared to generated alert, under each of two conditions: launch on warning, and riding out the attack. The results of this comparison are depicted in Figure 3.

The graphs in Figure 3 summarize the ratios of arriving retaliatory weapons on day-to-day alert compared to generated alert for all states. For each country, the left bar shows the ratio of normal to generated alert weapons under conditions of launch on warning; the right bar, the ratio of normal to generated alert weapons when riding out the attack. Thus, each pair of vertical bars is the equivalent of a matrix with four cells.

Inspection of Figure 3 reveals that the differences between the retaliatory performances of states' forces on generated alert, compared to day-to-day alert, are much less significant when states decide to launch on warning instead of riding out the attack. Do these statistical findings have any substantive importance? After all, war is not algebra, as Clausewitz reminded his readers.

With regard to substance, it would be preferable for crisis stability if states did not attempt to compensate for inadequate prewar alertness by adopting launch on warning. Therefore, with respect to the outcomes shown in Figure 3, it would be useful for each state to push both its bars higher, and even more useful to close the gap between the left and right bars. To see the preceding point more clearly, the flip side of the Figure 3 analysis appears in Figure 4.

In Figure 4, the bar graphs for each state show the ratio of its retaliating weapons when riding out the attack, compared to launch on warning, under two conditions: generated alert (left bar) and day-to-day alert (right bar). As expected, states have more second-strike retaliating warheads when their prewar forces are on generated alert, compared to normal or day-to-day alert. This finding also showed up in Figure 2 earlier, in the disparities between



**Figure 4.** Prompt Launch Stability, No Defenses.

generated and day-to-day alerted forces for both larger and smaller powers. In addition, Figure 4 shows how launch on warning stability for each state varies with the level of prewar alertness.

The data summarized in Figure 4 show that states' prompt launch stability is adversely affected by lower, compared to higher, levels of prewar alertness. As with the result of the data on generation stability summarized in Figure 3 earlier, Figure 4 shows that a potentially dangerous "double helix" connects generation and prompt launch stability. Figure 3 x-rays this DNA from the perspective of generation stability; Figure 4, from the standpoint of prompt launch or launch on warning stability.

Taken together, Figures 3 and 4 offer bracing news. States in a multipolar, nuclear international system, even under optimal conditions of constrained force sizes, and assuming debellitized political conditions, are caught in a series of tradeoffs between the requirements of deterrence (old style) and the imperatives of crisis stability (new style). Crisis stability "new style" means crisis stability that is viable within a post-Cold War world of uncertain political alignments, and within a world order that is stalked by precarious norms against proliferation. Trying to practice the old medicine in a new world order will be futile. States cannot improve the quality of deterrence simply by building larger forces, because both large and small forces will have to handle the possible trade-offs between deterrence and crisis stability. As well, states' forces will have to manage the nuanced relationship between generated and prompt-launch stability under uncertainty exacerbated by eight (or more) players.

### ***Missile Defenses: Evolution or Revolution?***

Missile defense technologies have existed for many years on the menu of military-technical promissory notes and great expectations. Realists in the application of science

and technology to military affairs now recognize that missile defenses, at least in the near term, will not overturn the entire basis of deterrence between nuclear armed states. Equally true, however, is the prospect that missile defenses, relative to ballistic missile offenses, will improve in the twenty-first century. Neither science nor technology stands still, and ballistic missile technology dates from the Second World War (or even earlier, if one includes prewar rocket experiments by people like Robert Goddard).

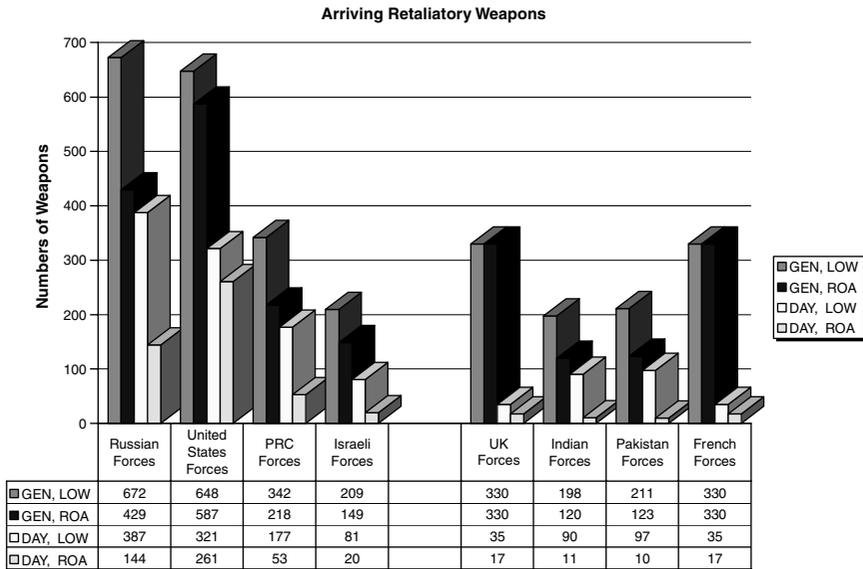
Projecting the evolution of missile defense technologies is not as intangible as sooth-saying, but fairly close. The U.S. Missile Defense Agency has itself invested in a variety of research and development and technology demonstration projects for national as well as theater missile defenses.<sup>25</sup> The competitive technologies approach of MDA has resulted in some progress in ground-based midcourse, airborne, and sea-based systems. The next decade may see significant qualitative advances in missile defense capabilities, or it may be marked by more incremental try-and-see developments on the part of states seeking additional denial or deterrent capabilities.

From the outset, missile defenses were an integral part of the George W. Bush national security strategy. Bush withdrew from the ABM Treaty, announced plans to begin fielding and operating a limited ground-based system for homeland defense, and included missile defenses in his tool kit for counterproliferation against rogue states seeking weapons of mass destruction. The United States has established national missile defense interceptor sites in Alaska and California and has announced plans to deploy components of its worldwide missile defense system in NATO Europe. In addition, components of the missile defense system participating in defense of the United States are geographically distributed in space, at sea, in Japan, and in the United Kingdom. Whatever the correct judgment might be about the future plausibility of missile defense *technologies*, Bush has moved the bar in missile defense *politics* into a new era. Even if the next administration has less ambitious plans for BMD, walking backward into an offense-only world would be a politically difficult sell to security partners such as Israel, NATO, and several Asian states that might be interested in acquiring U.S. BMD protection. Of course, it also follows that if our (hypothetical) world of “holding the line” is followed by further and substantial nuclear disarmament among the P-5, then missile defenses may either become: (1) more appealing, on account of the easier tasking against less competent offenses; or (2) less appealing, due to reduced threat assessments in more disarmed nuclear world. Politics is the realm of paradox!

Given these and other uncertainties about the politics and technology of missile defense, the projections included in this section of the analysis are as notional as were the offenses in the first section. That is, it would be excessively ambitious and strategically foolish to predict the exact weapons mixes and performance characteristics of future U.S. or other national or theater missile defense systems. Instead, the analysis that follows proceeds generically. We will road test the durability of our projected world of constrained nuclear offenses by subjecting it to “system shocks” with the addition of defenses of various capabilities.

This interactive defense-on-offense will be performed by assuming a continuum of defense capabilities, relative to the offenses employed against them. Specifically, each state is sequentially assigned defenses capable of intercepting or otherwise destroying some 25 percent, 50 percent, or 75 percent of the second-strike retaliating warheads of any opponent. The following charts show the outcomes of those exchanges in three stages.

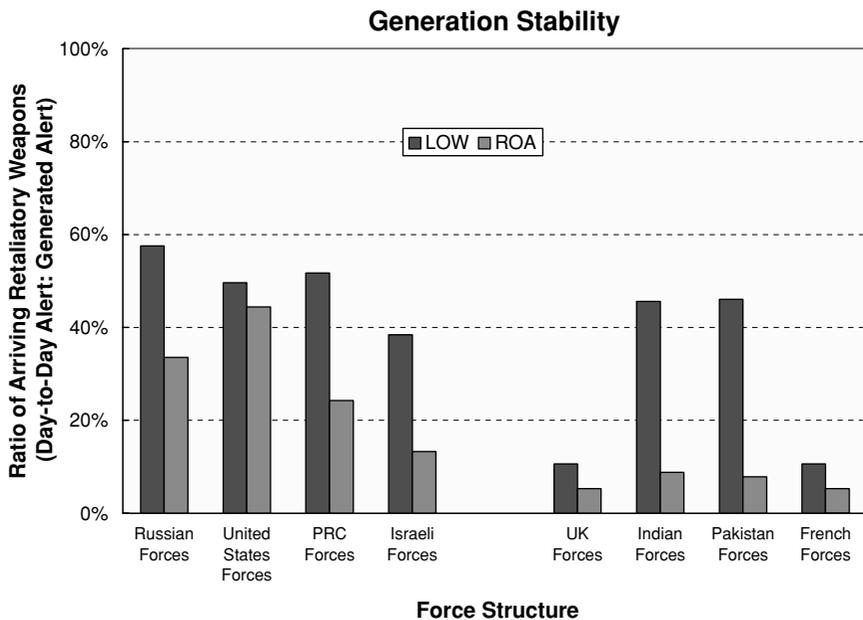
First, Figures 5 through 7 summarize the outcomes for defenses that successfully intercept 25 percent of retaliating offensive warheads. Figure 5 shows the arriving strategic weapons by operational posture for each state. Figure 6 graphs the generation stability that results from this scenario, and Figure 7 depicts the degrees of prompt launch stability for the same situation.



**Figure 5.** Arriving Strategic Weapons, Defenses 0.25.

Second, Figures 8 through 10 summarize the outcomes for defenses that successfully intercept 50 percent of retaliating warheads. Figure 8 depicts the arriving retaliatory weapons by operational posture for each country. Figure 9 shows the outcomes for generation stability in this case, and Figure 10 graphs the results for launch on warning or prompt launch stability.

Third, Figures 11 through 13 provide the most serious test for the viability of a constrained-offense regime as posited earlier. Figure 11 summarizes the outcomes for



**Figure 6.** Generation Stability, Defenses 0.25.

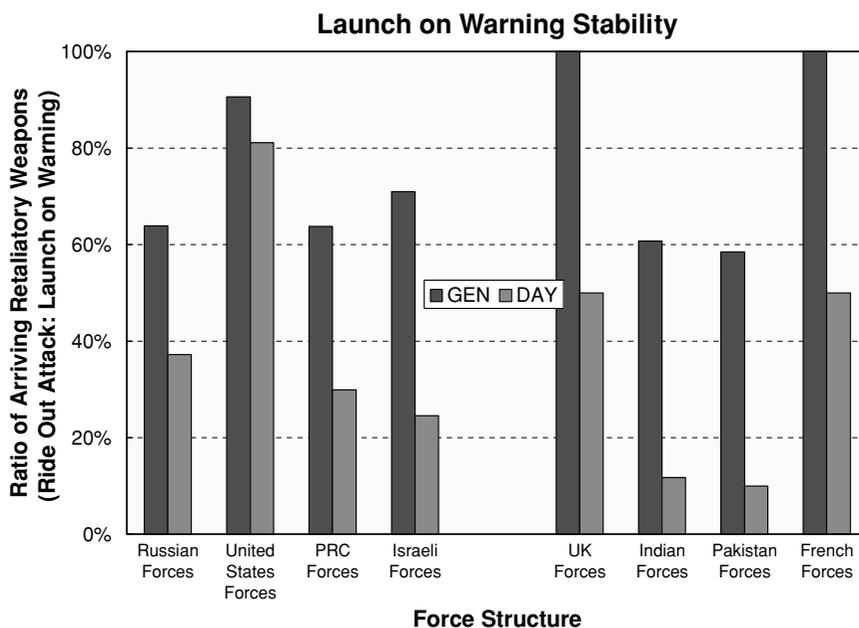


Figure 7. Prompt Launch Stability, Defenses .25.

defenses that are 75 percent effective against second-strike retaliating offenses. Figure 12 interprets these outcomes from the perspective of generation stability, and Figure 13 summarizes the outcomes with respect to prompt launch stability.

Interpretation of these findings for offensive-defensive interaction is as follows. First, even very competent antimissile defenses will not repeal the nuclear revolution; nor will

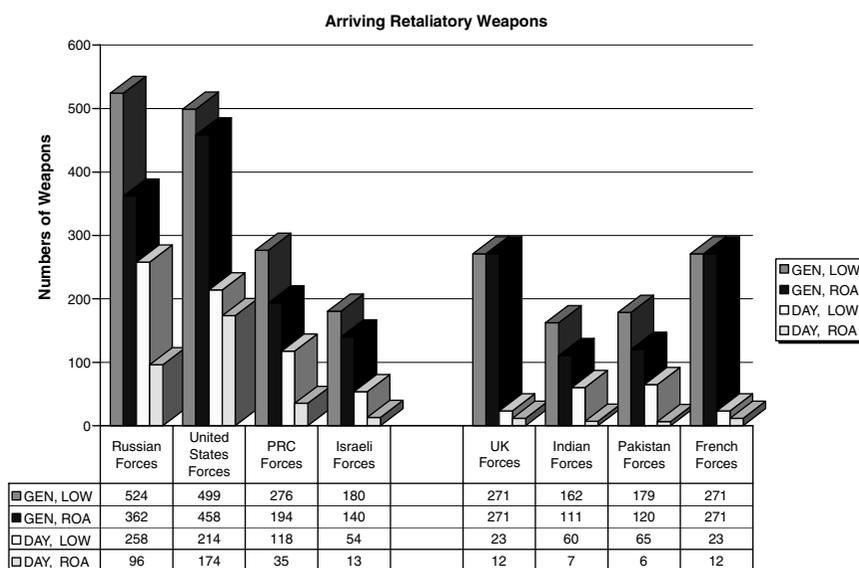


Figure 8. Arriving Retaliatory Weapons, Defenses 0.50.

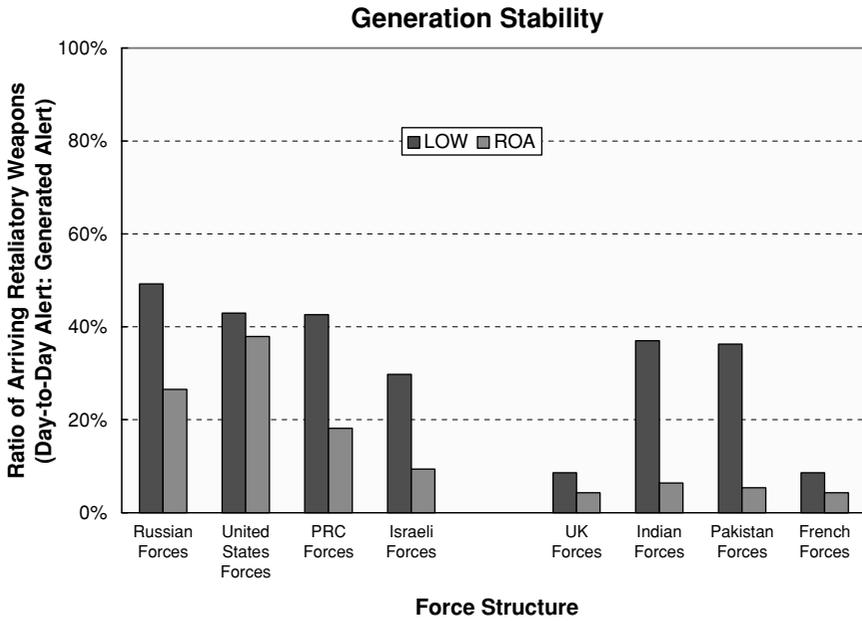


Figure 9. Generation Stability, Defenses 0.50.

they remove these states’ societies from their hostage condition. The basis of nuclear stability remains the credible threat of unacceptable retaliation. How much destruction is “unacceptable” depends on national political judgments and cultural proclivities of each state—challenges for the intelligence collectors and analysts of the others!

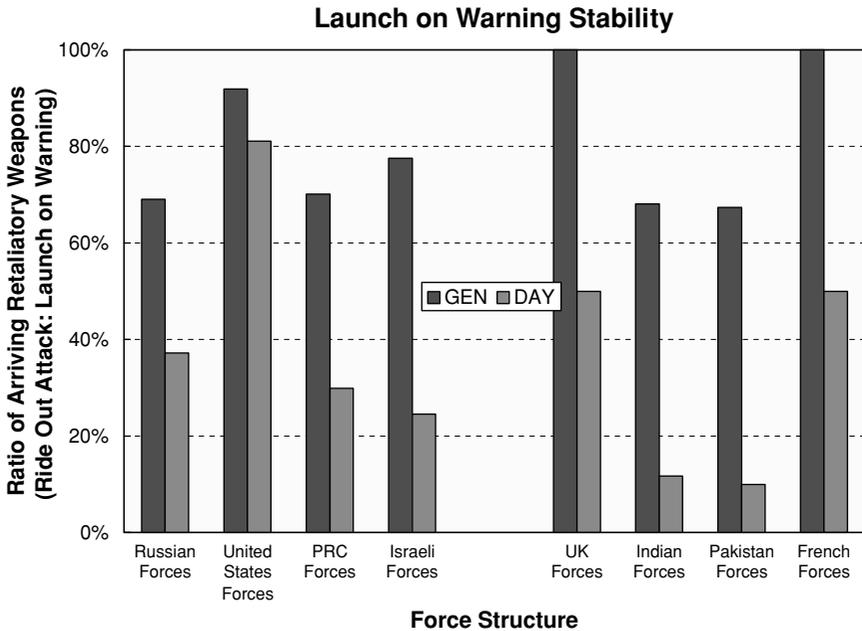


Figure 10. Prompt Launch Stability, Defenses 0.50.

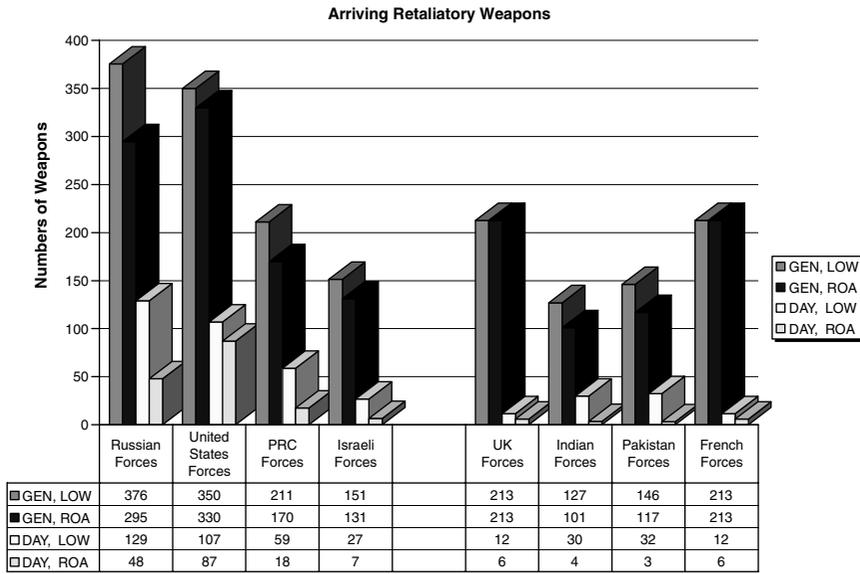


Figure 11. Arriving Retaliatory Weapons, Defenses 0.75.

Second, defenses will complicate the problem of deterrence by making more uncertain the estimates of prospective attackers and retaliators. Defenses may, in the hands of possible first strikers, increase their temptation, on account of their perceived ability to reduce the strength of the opponent’s retaliatory blows. On the other hand, defenses may reinforce second-strike deterrence, either by raising uncertainty for first strikers, or by being preferentially deployed and tasked to protect retaliatory forces instead of cities. Even limited

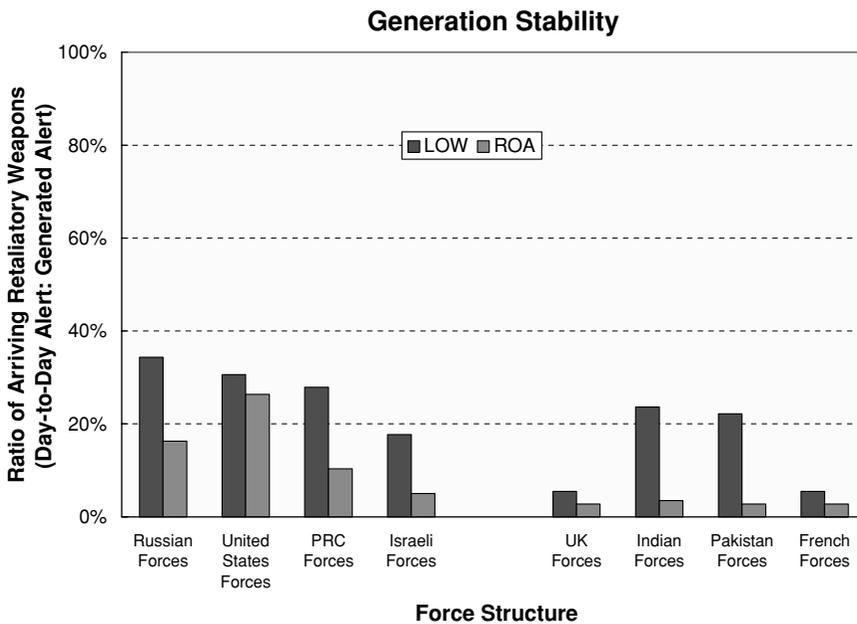
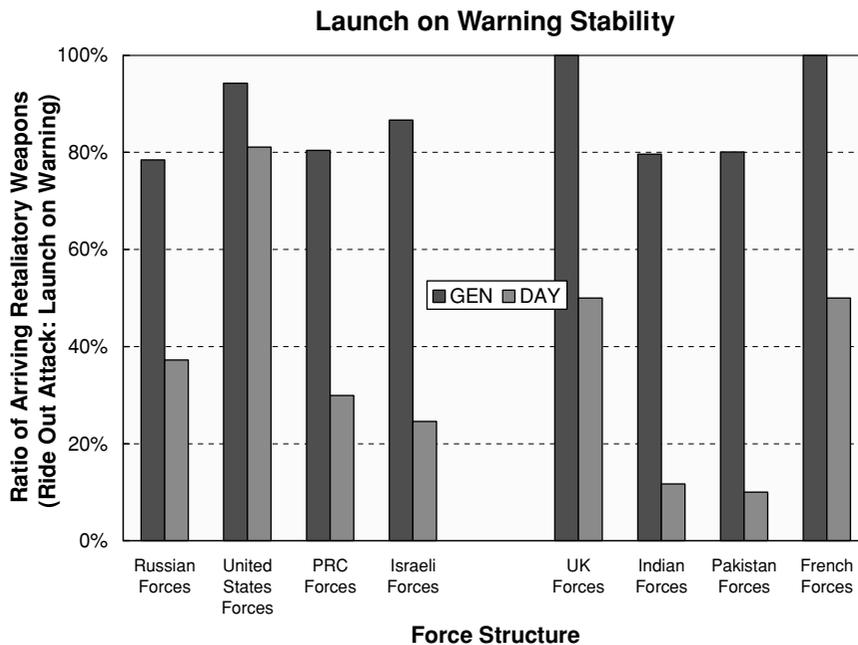


Figure 12. Generation Stability, Defenses 0.75.



**Figure 13.** Prompt Launch Stability, Defenses 0.75.

defenses could add significant denial capabilities against a prospective first striker with a small nuclear arsenal, such as “rogue” states that might threaten or actually attack the United States or one of its regional allies.

Third, there is a danger that future investigators may mislead themselves by assuming that the addition of defenses to offenses, in the context of nuclear scenarios, is merely a linear extrapolation from past models. This optimism is unlikely to be realized. Instead, the cognitive complexity of future estimates of offense-defense interaction, assuming viable missile defense technology, will be on the order of logarithmic change. The reasons for this are various and highly nuanced, but three categories of challenges will bedevil future model builders: (1) uncertainties with respect to the exigent performances of offensive and defensive systems in action, as opposed to technology demonstrations or simulations; (2) uncertainties as to how the availability of deployable BMD technology will affect the political intentions and military-strategic priorities of states; and (3) the extent to which candidate BMD technologies will be used for “extended deterrence” to protect allies as well as one’s own state territory.

Regardless of these future uncertainties, the analysis in this section benchmarks one present, and probable future, reality. Except for the contingency of nuclear weapons and launch systems deployed in the “day-to-day alert, riding out the attack” posture (unlikely in a nuclear crisis), even defenses that can reliably intercept or destroy three-fourths of the retaliating warheads cannot preclude the assured destruction of their societies. And, in that most pessimistic case for military planners with respect to their second-strike capability, sufficient weapons can survive and arrive at their targets to guarantee “existential deterrence,” as famously described by McGeorge Bundy. A little nuclear catastrophe goes a long way, unless leaders are insane or apocalyptic. Perhaps they may be, if they are terrorists, but on the evidence of history, heads of state prefer to retain both their heads and their states.

## Conclusions

Conclusions of this study can be summarized as follows. First, a deterrence-stable and crisis-stable nuclear world can be imagined, and even arranged, if sensible diplomacy can be combined with realistic expectations about military plans and technologies. It's a win-win for the existing nuclear weapons states to make their interactions more predictable and less threat based. It's also a win-win for them to keep other states from joining the nuclear club. The case for optimism about nuclear weapons spread has been made elsewhere by theorists, but few diplomats or military planners tasked with managing the problem of proliferation have been favorably impressed.<sup>26</sup>

Second, the dialogue between proponents of missile defenses and BMD skeptics needs to rise above the level of the demolition derby that has marked many past discussions. On one hand, notwithstanding the worst fears of BMD detractors, missile defenses will not be good enough to make rational or sensible heads of state into nuclear provocateurs. The more likely path to nuclear war lies in accidental or inadvertent nuclear war growing out of regional crisis or conventional war—with or without defenses. On the other hand, the defense-dominant aspirations of some scientists and military planners, making nuclear weapons obsolete or nearly so by postnuclear, space-based, or other new approaches, have given way to incremental improvements in existing and near-term technologies against limited threats.

Third, the “hold the line” world projected here for purposes of analysis is not necessarily the “best” world for either analysts or future policymakers. Future opportunities may present themselves to reduce states' inventories of nuclear weapons and delivery systems to even lower levels than those sketched here. If so, those opportunities should be pursued. The fact that so much destruction can be caused by so few nuclear weapons argues against the excess quantities now held by some states, and in favor of further mutual and verifiable reductions. In turn, flattening the pyramids of vertical proliferation may spill over into a better environment for the containment of horizontal weapons spread among states. Political trust is the driver in this equation, not military capability.

## Notes

1. Joseph Cirincione, *Bomb Scare: The History and Future of Nuclear Weapons* (New York: Columbia University Press, 2007), p. 133.
2. The motives for states to acquire nuclear weapons also include technology and economics. See *ibid.*, p. 47 and *passim*.
3. Andrei Zagorski, “Moscow Seeks to Renegotiate Relations with the West,” *Russian Analytical Digest*, no. 26 (September 4, 2007) 1: 2–5.
4. *Ibid.*, p. 3.
5. Col.-Gen. Vladimir Zaritsky, chief of artillery and rocket forces for the Russian ground troops, warned in November, 2007 that Russia might send short-range, nuclear-capable Iskander missiles to Belarus as part of Russia's response to U.S. plans to deploy parts of its BMD system in Poland and the Czech Republic. Analysts also suspected that the announcement about possible Russian missile deployments in Belarus was part of Russia's diplomatic strategy to obtain NATO's ratification of the adapted CFE treaty. See “Sale of Missiles to Belarus to Put Pressure on US, NATO—Analysis,” ITAR-TASS, November 15, 2007, in *Johnson's Russia List 2007*, no. 238 (November 16, 2007).
6. Choe Sang-Hun, “North Korea Says U.S. Will Lift Sanctions,” *The New York Times*, September 4, 2007, [www.nytimes.com/2007/09/04/world/asia/04korea.html](http://www.nytimes.com/2007/09/04/world/asia/04korea.html).
7. Dr. Mark A. Smith, *A Review of Russian Foreign Policy* (Conflict Studies Research Centre, Defense Academy of the United Kingdom, July 2007), p. 1.

8. Ibid., p. 2.
9. Associated Press, "Missile Defense, Kosovo are 'Red Lines' for Russia, Foreign Minister Says," *International Herald Tribune Europe*, September 3, 2007, [www.iht.com/articles/2007/09/03/asia/russia.php](http://www.iht.com/articles/2007/09/03/asia/russia.php).
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11. Jim Rutenberg, "Putin Expands on His Missile Defense Plan," *New York Times*, July 3, 2007, <http://www.nytimes.com/2007/07/03/us/03putin.html>.
12. Vadim Solovyev, "Report on Russian Expansion of Offer to Create Joint Missile ABM System," *Nezavisimoye Voyennoye Obozreniye*, July 15, 2007, in *Johnson's Russia List 2007*, no. 155 (July 16, 2007), [davidjohnson@starpower.net](mailto:davidjohnson@starpower.net).
13. Norman Polmar, "Improved Russian Missile Tested," June 4, 2007, Military.com website, [www.military.com/forums/0,15240,138051.00.html](http://www.military.com/forums/0,15240,138051.00.html); and *Der Spiegel*, "Russia Plans ICBM to Counter US Missile Shield," *Spiegel On Line International*, August 6, 2007, [www.spiegel.de/international/world/0,1518,498338.00.html](http://www.spiegel.de/international/world/0,1518,498338.00.html).
14. Associated Press, "Russian Bombers Force U.S. Jets to Scramble," August 9, 2007, Military.com website, [www.military.com/NewsContent/013319,145423,00.html](http://www.military.com/NewsContent/013319,145423,00.html).
15. For pertinent assessments, see U.S. Government Accountability Office, *Defense Acquisitions: Status of Ballistic Missile Program in 2004* (Washington, DC: GAO, March 2005), and Lisbeth Gronland et al., *Technical Realities: An Analysis of the 2004 Deployment of a U.S. Missile Defense System* (Cambridge, MA: Union of Concerned Scientists, May 2004). Challenges facing national and theater missile defenses are also analyzed in Dean A. Wilkening, *Ballistic-Missile Defence and Strategic Stability* (Oxford, UK: Oxford University Press, 2000).
16. *Treaty Between the United States of America and the Russian Federation on Strategic Offensive Reductions*, Moscow, May 24, 2002, in *Arms Control Today*, June 2002, [www.armscontrol.org/documents/sort.asp](http://www.armscontrol.org/documents/sort.asp).
17. Cirincione, *Bomb Scare*, p. 132.
18. Wolfgang K. H. Panofsky, "Nuclear Insecurity," *Foreign Affairs*, September/October 2007, in *Johnson's Russia List 2007*, no. 180 (August 23, 2007).
19. Stephen M. Walt, *Taming American Power: The Global Response to U.S. Primacy* (New York: W.W. Norton, 2005), p. 240.
20. Ibid.
21. Miller, quoted in Cirincione, *Bomb Scare*, p. 132.
22. Perle, quoted in *ibid.*
23. Some analysts contend that Russia will have little choice. According to one study published in 2007 by the Institute for National Strategy, Moscow, the revival of the Russian military under Putin is mostly a myth and the armed forces have actually degraded during his tenure. If current trends continue, warns the report, the Russian long-range nuclear arsenal over the next decade may decline from some 680 intercontinental ballistic missiles to between 100 and 200 missiles. See Associated Press, "Experts See Decline in Russia's Military," November 13, 2007, in *Johnson's Russia List 2007* no. 236 (November 14, 2007).
24. For a nontrivial illustration, see Anthony H. Cordesman, *Iran, Israel, and Nuclear War* (Washington, DC: Center for Strategic and International Studies, rev. November 19, 2007).
25. For examples of pertinent assessments, see U.S. Government Accountability Office, *Defense Acquisitions: Status of Ballistic Missile Program in 2004* (Washington, DC: GAO, March 2005), and Lisbeth Gronland et al., *Technical Realities: An Analysis of the 2004 Deployment of a U.S. Missile Defense System* (Cambridge, MA: Union of Concerned Scientists, May 2004). Challenges facing national and theater missile defenses are also analyzed in Dean A. Wilkening, *Ballistic-Missile Defence and Strategic Stability* (Oxford, UK: Oxford University Press, 2000).
26. For point-counterpoint on this topic, see Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate* (New York: W. W. Norton, 1995). This study predates the burst of interest in nuclear terrorism after 9-11. For that topic, see Graham Allison, *Nuclear Terrorism: The Ultimate Preventable Catastrophe* (New York: Henry Holt and Co.—Times Books, 2004).

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