STRATEGIC STABILITY:
CONTENDING INTERPRETATIONS

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CHAPTER 6

ANYTHING BUT SIMPLE: ARMS CONTROL AND STRATEGIC STABILITY

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"Strategic stability" does not appear to have any generally-agreed definition. Contributors to this volume, for instance, take a range of positions—from focusing very specifically upon the incentives nuclear-armed powers face to alter their nuclear force posture for fear of pre-emptive strike, to very broad understandings that sweep within their reach almost the entire spectrum of interstate violence. This chapter will outline one particular conception of strategic stability—a definition focusing upon the incentives for general war between great powers—before exploring the relationship between *this* idea of stability and arms control policy.

I will argue herein that despite the common assumption in the U.S. and global policy communities that arms control is essential to strategic stability, the reality is that the two concepts actually have an ambivalent relationship, and that arms control sometimes fosters stability and sometimes undermines it. Moreover, stability, per se, is of indeterminate value. In assessing whether to seek strategic stability and whether to use arms control in its pursuit, one cannot rely upon a priori assumptions but must instead carefully examine the circumstances involved and the interests served by various different policy options—including nontraditional forms of arms control, or perhaps none at all.

"STRATEGIC STABILITY" AND ITS IMPLICATIONS

A Working Definition.

This chapter conceives strategic stability in the geopolitical arena as being loosely analogous to a military "Nash Equilibrium" between the principal players in the international environment (i.e., the "great powers") as it pertains to the possibility of their using force against each other. It defines strategic stability as being a situation in which no power has any significant incentive to try to adjust its relative standing vis-à-vis any other power by unilateral means involving the direct application of armed force against it. General war, in other words, is precluded as a means of settling differences or advancing any particular power's substantive agenda. The environment is thus strategically stable if no player feels itself able to alter its position *by the direct use of military force against another player* without this resulting in a *less* optimal outcome than the alternative of a continued military stalemate and the pursuit of national objectives by at least somewhat less aggressive means.

This model, of course, is—like all social science models—only an imperfect description of any situation in the real world, and does not purport to incorporate every relevant component of, or possibility for, state behavior. It revolves, for instance, around a general assumption of rationality, presuming that decisions on matters of war and peace usually occur as the result of calculations about the costs and benefits of contending courses of action, and not simply randomly, accidentally, or as a matter of emotional reflex (e.g., visceral hatred or exuberance). This Nash-

inspired approach does not well accommodate these latter possibilities. Accidental war, for instance, might yet occur between powers in a "stable" relationship—a question that has arisen with particular acuteness in the era of nuclear weaponry.

This model also tends to assume that players are generally at least passably knowledgeable about their adversaries' capabilities—that is, that they are not radically incorrect in the beliefs they hold and assumptions they make about other players. I do not assume *perfect* information, of course, and indeed, as we shall see, this model explicitly envisions that confidence-building measures may be able to lessen misperceptions and at least partly attenuate the security dilemma created as uncertainty about one's opponent drives behaviors that themselves elicit seemingly threatening countermoves by that opponent. Nevertheless, this model has some difficulty accommodating the possibility of *dramatic* misapprehension, for in extreme cases divergences of perspective may become the functional equivalent of eliminating my assumption of basic rationality, for neither side would *really* be responding to the actions and position of the other at all.

Despite its flaws, however, I believe this Nash-inspired conception of stability is useful in the way that good models are supposed to be. As a heuristic, it provides a way of describing important aspects of real world behavior, identifying characteristic trends or tendencies, and providing a valuable tool with which policy choices and outcomes can be evaluated. As we shall see, this model offers a valuable prism through which to think both about stability dynamics within the international system, and about the potential benefits and costs of arms control.

It is important, however, to be clear about what the model actually envisions. Its focus upon the preclusion of general war between the great powers, for instance, does not imply that *all* means of conflict are ruled out. Indeed, strategic stability may *create* incentives for other types of competition, or for more indirect military clashes, if basic political or systemic rivalries are displaced into other arenas that carefully stop short—or are at least *intended* to stop short, for statesmen do not always get their calculations right, of course—of direct military conflict. This is what tended to happen during the Cold War, when both the United States and the Soviet Union became in various ways ensnarled in proxy wars, either themselves fighting adversaries supported by the other superpower or becoming involved in sponsoring the opponents of such forces.

Nor does my Nash-inspired concept mean that *change* in the major powers' relative positions is ruled out, nor even one or more powers' encouragement of other (nonmilitary) dynamics calling into question the very existence of another power's government. If such "existential" challenges arise by means *not* involving the direct application of another power's military force, I would still be willing to say that the environment remains strategically stable. This concept of strategic stability does not envision freezing a global status quo in place forever, but merely ruling out certain *modes* of competition and conflict—specifically, general war. Struggle may and in a sense must continue withal, and great powers may rise or fall by other means and for other reasons.

The persistence of *some* warring, even on a small scale, clearly makes it impossible, as an analytical matter, to rule out the escalation of minor conflicts

into larger ones. The point is not that general war between major states is *impossible*, however, but that certain configurations seem to make it less likely than others. As demonstrated by the U.S.-Soviet rivalry of the Cold War, it is apparently quite possible for low-level proxy conflicts to occur without such combatants dragging their sponsors into the fray. The Korean War of 1950-53, however, illustrates the potential for problems, having brought Chinese and American forces into direct conflict—albeit one contained to a particular theater which did not escalate into a broader or more "existential" clash between these powers. One may deem a system strategically stable to the degree that relationships between the great powers are merely *resistant* to such escalatory pressure. Without recourse to a crude determinism, one can do no more than identify tendencies and likelihoods.

Nor, of course, is it inevitable that a strategically stable configuration will always remain so, for it may be that economic or other trends generate instabilities over time, such as by dramatically changing the balance of military power between states and thus making seem feasible direct military actions that might previously have been "unthinkable." This does not make present-day strategic stability meaningless, however, for what it *takes* to create such a turnaround will presumably vary, with a *more* stable status quo ante requiring more to change before it will degenerate into instability than would be necessary to degrade a *less* stable initial situation. Here again, stable systems will tend to be resistant to change, but this does not mean that none can occur.

It should also be recalled that the definition of strategic stability offered here only focuses upon the principal players in the international system: the states one

might call the great powers. Through this lens, *small* players may perhaps face existential military crises from time to time without the stability of the system as a whole being affected. Their particular trajectories might be unhappy indeed, but it does not necessarily follow that international politics as a whole is thereby *strategically* unstable. It would surely set the bar too high to define system stability as the complete absence of *all* violent conflict. A Nash-inspired notion of strategic stability might usefully apply *as between* smaller powers in their local context, of course, but that is not our task here. For present purposes, we shall be discussing the global strategic *aggregate*, and confining our analysis to major states because major states are those that can materially affect that aggregate in the most direct and important ways.

As it is used herein, the concept of strategic stability is value-neutral. This is not to suggest that there is necessarily anything inherently "good" about its achievement, though of course this may frequently be the case. Especially where nuclear weapons are widely possessed among the great powers, for instance, the argument seems compelling. In most circumstances, ruling out general war is presumably a very good idea. But I would stop before saying that strategic stability is a per se good.

Indeed, strategic stability might sometimes impose tremendous costs, for it tends to privilege the status quo between the powers in question. How one evaluates the merits of such stability will depend upon who one is in the constellation of players, what status quo that stability enshrines, and what it serves to *permit*.

- For a power that seeks fundamental *change* in the strategic environment, strategic stability is probably unwelcome, for it imposes sharp limits on how change may be sought.

- Nevertheless, in some circumstances, strategic stability could serve to protect an aggressive rising power while it prepares itself for a *future* military challenge to the global order. (War by France and Britain against Adolf Hitler's Germany over the Austrian *Anschluss* or the invasion of Czechoslovakia in 1938 would technically have been an affront to strategic stability in Europe, but might have prevented greater stability challenges still to come.)
- Even where one might think strategic stability to be a salutary objective, moreover—as, for instance, in a balance between very powerful states whose clash could be catastrophic—it may have significant justice costs, such as by essentially "immunizing" a tyrannical regime against well-deserved foreign efforts to replace it by direct military means. (Strategic stability between the Axis and Allied powers on the eve of World War II, for instance, would have consigned much of Asia permanently to the Japanese yoke, and much of Europe to the jackboots of the Gestapo and the Nazi death camps.)
- Arrangements to ensure strategic stability might *facilitate* aggression against smaller powers, as occurred in 1939 when the Molotov-Ribbentrop Pact opened the door for aggression in erasing Poland from the map and dividing it between Nazi Germany and the Soviet Union. Even if not thus pre-arranged, furthermore, the immunity strategic stability tends to offer a power against direct military challenge from other important states could encourage unilateral external aggression against systemic "small fry"—or at least those *lacking* strong

military alliance relationships with other major states, at any rate—by leading an aggressor to believe that the victims of such predation will not be saved or avenged by outsiders. This may to some extent have been the case with the Soviet invasion of Afghanistan in 1979, or with the North Korean invasion of South Korea in 1950 after U.S. officials created the impression—not just in Pyongyang but also in Moscow and Beijing—that the Republic of Korea was outside America's "defense perimeter." (As for those smaller states that *do* have strong alliance relationships with great powers, however, one might argue that strategic stability is a precondition for their security, for it may be that these relationships provide deterrents to aggression only to the extent that they enable a minor player to *participate* in the stability of a great-power balance. *Post*-1953 South Korea may be a case in point.)

Depending upon the circumstances, therefore, stability can have decidedly unpleasant results. Though stability is presumably indeed often "good," it can in other circumstances help empower the perpetrators of both internal and external aggression, coexist with *local* violence and instability, act as an enabler for aggression, protect the instigators of brutal internal repression, or serve to protect a power during its rise to a position from which it can *challenge* the existing great-power balance. A policy of seeking strategic stability is not, therefore, necessarily a sign of international benevolence and virtue. Details matter, and the point here is that it is not substantively or morally sustainable to argue that strategic stability is a per

se good. It may be good, or it may be, on the whole, harmful. In order to assess its net value, one needs to know a good deal more than simply that things were "stable."

Strategic Stability and Nuclear Weapons.

Though the term comes up frequently in discussion of nuclear weapons and arms control policy, moreover, I do not envision strategic stability as being inherently about nuclear weaponry. That said, of course, nuclear weapons *are* of special salience in this arena, because they may seem to offer some states a real hope of achieving security—that is, of leading *other* powers to conclude that general war against them is inadvisable—to a great extent *independent* of the state's actual ordinary (i.e., conventional) military strength. Nuclear weapons may have an enormous impact upon strategic stability, in other words, but the stability question neither begins nor ends with them. (Indeed, particularly with regard to new possessors among the minor states, nuclear weapons might provide relative security to some individual countries at a *cost* to strategic stability as we have defined it here, if such proliferation helped increase the risk of conflict between major powers—e.g., through the escalation of regional conflicts made more ugly and/or more likely by a proliferator's emboldenment, or if major states were forced to undertake policies in response to proliferation that affect their capabilities vis-à-vis other great powers.)

Here lies a broader point. The impact of nuclear weapons is probably especially great in geopolitical terms precisely because they *aren't* useful *only* to deter other such weapons—though many in the disarma-

ment community would have it otherwise. They are important because they also deter *conventional* weapons, and nuclear weapons' possessors often hope to use them as a sort of fast-track road to security without the expense and inconvenience of having to defend themselves by other means. The United States and its North Atlantic Treaty Organization (NATO) allies relied upon nuclear deterrence to make up for a perceived disadvantage vis-à-vis Warsaw Pact conventional forces in Central Europe during the Cold War, for instance, and nuclear weapons seem today to be prized—or sought—by planners in Moscow, Beijing, Pyongyang, and Tehran alike for their presumed ability to counterbalance others' advantages in sophisticated conventional arms. Nor should one forget that nuclear weapons were first *used* not against a nuclear power but in order to help win a bitter *conventional* war.

Accordingly, one would argue the need to decouple the concept of specifically *nuclear* stability from *strategic* stability more generally. They are to some extent analytically distinct concepts, and conflating them would tend to obscure important points—such as the reasons why many states have pursued nuclear weapons in the past, why some seek them today, and an important reason that a country might *use* "the Bomb" (i.e., to win or to stave off defeat in an otherwise conventional conflict). Theoretically, moreover, a nuclear balance characterized by "complete" stability in nuclear terms—that is, a case in which more than one power possessed nuclear weapons but *no* circumstances existed in which these devices would be considered "usable"—might well be *unstable* under the definition of strategic stability used here: if asymmetries of conventional force or other circum-

stances made war attractive, nuclear weapons in this case might not deter it. This is why hopes for strategic stability in a nuclear-armed world *presuppose* that participants' nuclear arsenals are not *entirely* "self-canceling." In a multi-nuclear world, to deter general war with nuclear weapons requires some real possibility of weapons use—which is another way of saying that the success of nuclear deterrence requires that it be, to some degree, *imperfect*. Strategic stability and the specifically nuclear aspects of power-balancing are clearly related, but should not be confused.

In any event, on the assumption that this Nash-inspired concept of strategic stability is both coherent and useful, the following discussion will offer some thoughts on its relationship to arms control.

ARMS CONTROL AND ITS RELATIONSHIP TO STRATEGIC STABILITY

Categorizing Arms Control.

One sometimes hears it suggested that "arms control" and "disarmament" represent fundamentally different things—with the latter relating to the abolition of weapons, while the former amounts merely to *managing* and perpetuating a balance between their possessors. (Disarmament, in such characterizations, is invariably the true and noble calling; mere arms control smacks of compromise, and of granting at least some such devices an ongoing, and immoral, legitimacy.) Many observers, moreover, are not sure how to categorize agreements that focus not upon limiting capabilities but upon regulating behavior or transparency and confidence-building measures (T/CBMs). Because such measures emphasize infor-

mation-sharing or other aspects of arms-related relations between the parties rather than arms limits per se, they are sometimes not afforded the status of arms "control."

In real world practice, however, such distinctions are hard to maintain. What are usually styled "arms control" agreements, for example, can involve not just caps (e.g., the Strategic Arms Limitation Treaty of 1972[1]) but cuts (e.g., the Strategic Arms Reduction Treaty [START] of 1991[2]), or even the prohibition and dismantlement of certain types of capability (e.g., intermediate-range ballistic missiles with the Intermediate Range Nuclear Forces [INF] Treaty of 1987[3]). At the same time, reputedly "disarmament" agreements sometimes permit the retention of some capabilities (e.g., riot control agents under the Chemical Weapons Convention [CWC],[4] or biological weapons agents retained for "prophylactic, protective, or other peaceful purposes" under the Biological and Toxin Weapons Convention [BTWC][5]), while both arms control *and* disarmament agreements commonly contain important T/CBM provisions regarded as being integral to their function (e.g., the notification and "cooperative measures" provisions of START,[6] the notification provisions in the New Strategic Arms Reduction Treaty [New START] protocol of 2010,[7] or the declaration provisions of the CWC).

It has also become routine for U.S.-Russian strategic arms agreements to establish a forum for bilateral consultation in which compliance concerns and other implementation issues can be raised[8]—a function for which the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) uses a forum of its entire membership, meeting as part of that treaty's ongoing "Review Conference" process.[9] Finally, the category of CBMs

frequently shades into weapons-independent behavioral regulation, as with the U.S.-Soviet Incidents at Sea Agreement of 1972, which set forth basic "Rules of the Road" designed to reduce the danger that confrontational maritime interactions would lead to broader conflict, including the use of nuclear weaponry.[10]

Rather than reify stark theoretical categorizations that do not exist in practice, this paper will adopt a broad understanding of arms control that includes: (a) bilateral and multilateral agreements and arrangements related to limiting, reducing, proscribing, and/or dismantling some sort of weaponry or other military-related technology (i.e., *capability-regulatory* measures); (b) efforts to develop and promote "best practices" or codes of conduct pertaining to the *use* of certain types of technology or capability (i.e., *behaviorally-regulatory* measures); and (c) steps related to transparency and confidence-building (i.e., *information-concessive* measures). (These are not mutually exclusive forms of arms control, of course, and they may be—and often are—employed in some combination.) One way or the other, these categories address themselves to the nature or scope of the threat states seem to pose to each other through their actual or potential possession of a particular type of military tool: capability-regulatory measures seek to restrict the availability of that tool, behavioral measures seek to constrain what is *done* with what tools one does possess, and information measures seek to make parties better informed about the situation they face.

Arms and Instability.

What, then, is the relationship between arms control—thus conceived—and strategic stability? Too of-

ten, discussions of arms control and strategic stability get bogged down by a quasi-theological assumption that (a) that strategic stability is per se good, and (b) arms control is *also* both per se good and inherently strategically stabilizing. It is useful, however, to explore these issues more carefully, for while strategic stability *can* be (and often is) a benefit to international peace and security—and while arms control *can* (and sometimes does) contribute thereto—neither of these things can be tenably asserted on an a priori basis. Having already exploded the first part of syllogism (i.e., the idea that strategic stability is inherently good), one can turn now to the second.

A serious discussion of the relationship between arms control and strategic stability requires understanding that the former does not *invariably* promote the latter. The most obvious example in this regard is perhaps the polar case, and in some ways the most ambitious one, of modern arms control: weapons elimination in the specific form of nuclear disarmament. (For present purposes, this discussion will leave aside the idea that it might be possible to devise "a Treaty on general and complete disarmament under strict and effective international control."[11] "Nuclear zero" is ambitious enough without waiting for the last steak knife to be beaten into a soup spoon, and nuclear abolition is at least still *talked about* in some quarters as a notional policy goal.[12]) Here the potential strategic stability argument *against* arms control is perhaps at its most stark, for if such stability is characterized by a balance of military power such that each major power finds general war with another such power to be less desirable than all other unilaterally-available alternatives, the successful abolition of a particular category of weaponry could in some circumstances *destabilize*,

by removing one important reason for those war-dissuasive conclusions.

This is one of the things opponents of nuclear "zero" have said for some time: precisely to the degree that nuclear arsenals may *contribute* to strategic stability, their elimination would be destabilizing, by "mak[ing] the world safe again for large-scale conventional war" between the major states.[13] In fact, we have already encountered a similar problem above, where it was suggested that one power's use of nuclear weaponry to *perfectly* deter nuclear weapons use by a rival power could destabilize by removing a powerful disincentive for conventional conflict as the two arsenals' "self-cancel." Both circumstances—that is, "perfect" nuclear deterrence and complete nuclear disarmament—might actually end up being very similar situations, in that they would turn out to be highly *unstable* in strategic terms, notwithstanding their having precluded nuclear weapon use.

In reality, of course, no such deterrence could be perfect, since an attacker might have many reasons to worry that his maintenance of a nuclear arsenal might fail to *guarantee* immunity from a nuclear reprisal by the victim. Launch might occur accidentally or without authorization in time of crisis, for instance, or in a frenzy of emotional irrationality, or as a vengeful consequence of the perception that the victim had "nothing to lose" now anyway. Or perhaps the attacker might simply have miscalculated. As Thomas Schelling long ago made clear, risk manipulation and uncertainty play critical roles in deterrence.[14] Complete nuclear disarmament, however, is analytically very close to the hypothesized situation of perfect nuclear deterrence in which counterpoised arsenals cancel each other out *entirely*, for in both cases nuclear

weaponry would, in a functional sense, cease to exist. For this reason, arms control advocates who desire strategic stability might wish to steer clear of *both* polar cases.

Nor, though arms control is frequently touted as a way to increase strategic stability by preventing arms races, does it seem to be true, a priori, that arms competitions are inherently destabilizing. Racing behavior would presumably tend to be strategically destabilizing if it continued unconstrained in circumstances in which an uneven distribution of available financial or technical resources between the competing powers meant that such racing would over time give one of them a decisive advantage (e.g., one party could build weapons faster, better, and/or for longer). A race could be destabilizing if one party felt itself to have "won," if such a "victory" allowed it to make further favorable adjustments to its position—or fend off potential threats to that position—by means of general war. Alternatively, a race could be unstable if one side felt that the *other side's* progress was such that an acceptable status quo was likely to be upended if military action were not taken quickly to stop it.

Nevertheless, technically speaking, racing per se would not seem to be destabilizing in this conception as long as the competitors remain evenly matched enough that general war still seems inadvisable—or alternatively, where the parties' capabilities are so far *apart* that general war is felt to be unnecessary for the stronger and pointless (or even suicidal) for the weaker. There might be other reasons to desire capability-regulatory arms control in such a race situation—e.g., to save money, or to delimit the potential consequences of accidental or otherwise unplanned general hostilities (e.g., keeping arsenals small in order to limit

the likely damage if deterrence fails)—but whether or not any particular "arms race" is strategically stable is an empirical question, not one to which the answer can be known a priori. Again, details matter.

POTENTIAL PITFALLS OF ARMS CONTROL

Destabilizing Capability "Lock-In."

It may also be useful here to introduce the idea—discussed, for instance, by Kenneth Lieberthal in a very different context[15]—of "static" versus "dynamic" stability. One may approach this challenge through the prism of Complexity Science and its offshoots in organizational theory, which suggest that in complex adaptive systems, something akin to stability is best achieved by frameworks inhabiting a sort of "sweet spot" between the flaccid incapacity of extreme flexibility and the dangerous brittleness of ossified rigidity, which some commentators describe as being "on the edge of Chaos" but carefully not *over* that edge. In terms of organizational behavior, such systems "live" longer where their elements link tightly enough to each other that the system can respond adaptively *as an organization* to unexpected perturbations from the environment, but not so rigidly that such perturbations cannot be *absorbed* without shattering it.[16]

Looking at arms control, nuclear weapons policy, and strategic stability through the lens of Complexity—as some commentators try to do, the author among them[17]—the question of strategic stability becomes one of whether arms control measures are likely to increase or decrease the strategic system's ability to absorb perturbations without dissolution. Here Complexity seems to underscore our point about the

difficulty of identifying an a priori rule, inasmuch as while it is to some extent the purpose of arms control to *prevent* perturbations (e.g., to prevent one party from "winning" an arms race and being tempted to try to revise the strategic map by means of general war), it might also be that the very restrictions some forms of arms control impose can *increase* the rigidity—and perhaps thus the brittleness—of the system. (Rather than trying to prevent perturbations, therefore, sensible approaches to capability-regulatory arms control should presumably aim to find the force postures that best position parties to *handle* strategic perturbations within the parameters of the control regime. Unfortunately, arms control does not always do this.)

The world is a dynamic place, after all, and the ambition of capability-focused arms control (in particular) to freeze in place some particular static snapshot of the parties' technological or numerical position may not always actually serve the interests of real stability over time. In some circumstances, then, arms control frameworks might actually be maladaptive incubators for instability. Even if shrewd statesmen can agree on a particular theory of precisely what is beneficially stabilizing, for instance, and can identify a particular mix of capabilities that it is desirable to try to fix in place, it is not a given that this theory will remain valid—or that a particular mix of capabilities remain conducive to strategic stability—over time as *other* parameters of the system change. Should circumstances change, arms control might destabilize the system by retarding one or more parties' ability to adapt safely to the new developments.

Using a hypothetical scenario as an illustration, imagine that future U.S. and Russian negotiators devised an ambitious arms reduction program pursuant

to which both sides would cut their forces down to a strategic "monad" of the type of delivery system classical American nuclear theorizing regards as being most "survivable" and thus likely to guarantee the stability of a deterrence relationship: submarine-launched ballistic missiles (SLBMs) based on quiet, nuclear-powered submarines (SSBNs) on continuous long-range deterrence patrols far out at sea. Some might say that such forces are stabilizing because their immunity to pre-emptive attack allows their possessors to guarantee that any aggressor would face second-strike retaliation. Into this world, however—hard-wired as it would thus be for SLBM-dependent deterrence—imagine that there were introduced a "wild card" in the form of one party's sudden discovery of just the kind of miraculous new method for strategic anti-submarine warfare that eluded U.S. and Soviet scientists during their search for competitive advantage during the Cold War. In this context of technological surprise, arms control would have set the stage for a radical instability, tying the other party to a monadic deployment upon which it would now suddenly be entirely *unable* to rely in deterring potential aggression by its rival.

For analogous reasons, in fact, the seminal nuclear strategist Herman Kahn once warned against the perils of disarming "too much." He reasoned that a nuclear deterrent balance might actually be *more* stable with arsenals that were *not* extremely small, because such a posture might be able to absorb the impact of the sudden discovery of a hidden cache of illegal weaponry. "The ability to correct violations means that the military effect of the violations must be small in percentage terms of the current strategic balance," he wrote, and a larger arsenal base offers better chances of en-

suring this.[18] His point about *numerical* absorptive capacity in the face of violations might also be made as strongly with regard to the ability of a more *diverse* arsenal to preserve deterrence in the face of technological change. "As a general rule . . . strategic 'hedging' is best served by diversity, such as in keeping a range of operationally deployed and stockpiled weapon types available in order to protect against single-mode failure or unwelcome technological surprise."[19] To the extent that it is the ambition of capability-focused arms control precisely to *constrain* parties' ability to respond to their strategic environment at discretion—e.g., by prohibiting the possession of certain numbers or types of systems—it seems inescapable that there is some potential for arms control to "lock in" maladaptive circumstances.

Such possibilities, indeed, are often implicitly recognized in arms control agreements themselves, which commonly contain withdrawal clauses. The NPT, for instance, provides that each party has "the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country."[20] The recent New START agreement similarly provides that each party may withdraw "if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests."[21] (Under the Vienna Convention on the Law of Treaties, a party's departure is permitted even where denunciation or withdrawal is *not* actually provided for in the instrument itself, as long as such a right "may be implied by the nature of the treaty."[22]) There would seem to be few, if any, arms control agreements from which their drafters imagined there to be *no* conceivable circumstances in which withdrawal was ap-

propriate. Such mechanisms serve the function of trying to attenuate the dangers of "lock-in," by making escape from capability restrictions legally available.

The history of the Anti-Ballistic Missile (ABM) Treaty of 1972[23] may illustrate the problematic dynamics of "capability lock in" as well as any hypothetical. This agreement was, in effect, rooted in a particular theory of strategic stability—specifically, about the negative relationship between ballistic missile defense (BMD) and stability in the U.S.-Soviet context—pursuant to which defenses were thought to be destabilizing, in part because they would encourage a spiraling offense/defense arms competition and perhaps even prompt a pre-emptive strike if one superpower believed defenses would protect it against the other's retaliation. Under the ABM Treaty, each side was permitted to retain a minimalist, point-based defensive system at two sites, but nationwide defenses were banned. (The Soviets opted to build and keep active a BMD site protecting Moscow, and indeed have retained and somewhat updated it ever since, but the Americans shut down their only site in 1975 after only a few months in operation.[24])

What seemed like a good idea to the Americans at the time, however—on the basis of an anti-defense theory of strategic stability and under the conditions of highly competitive U.S.-Soviet nuclear rivalry during the Cold War—did not look so compelling in the post-Cold War era. Beginning to feel the pressure of changing circumstances, the administration of President Bill Clinton pursued negotiated re-interpretation of some treaty understandings with the Russians in order to accommodate the developing U.S. ABM testing agenda, and toyed with the idea of actually amending the instrument. Things came to a head under Presi-

dent George W. Bush, when American officials concluded, in effect, that the ABM Treaty had locked in a capability-regulatory status quo that under modern circumstances was potentially *destabilizing*—albeit not in the sense that it unsettled America's relationship with the other treaty party (Russia), but rather because of its impact vis-à-vis third parties.

What had been changing? After the collapse of the Soviet Union and the end of the Cold War, the competitive pressures of the Russo-American dyad looked much less menacing, and indeed both sides had been dramatically reducing their arsenals ever since the early 1990s. At the same time, however, the United States had come to perceive an ominous emerging threat from *third parties*: "rogue states" such as North Korea and Iran, which were rapidly developing and improving long-range missile capabilities even while working in various overt and covert ways to develop nuclear weapons that could be mounted upon such missiles.

In this new context, there now seemed to the Americans to be little danger of a spiraling offense/defense competition with the Russians—and indeed, despite post-Cold War reductions, Moscow's missile arsenal remained considerably larger than necessary to overwhelm any feasible U.S. defensive shield—and much to be gained from limited defenses capable of stopping attacks mounted by the kind of "entry-level" nuclear arsenals sought by the rogues. Thanks to the waning of the Russo-American nuclear competition and the rise of such small third-party threats, in other words, the anti-defense status quo of the ABM Treaty came to be seen in Washington as maladaptive, fixing in place a force mix that was no longer necessary for its original purpose but yet seemed likely to empower

rogue states such as North Korea and Iran to use their emerging arsenals to bully their neighbors or even threaten the great powers, all of whom would be more or less defenseless against long-range ballistic missile attack. This was not "strategically destabilizing" in the sense that it necessarily increased the likelihood of general war between the existing great powers, but it seemed likely to make major regional conflict more probable and more costly—with some concomitant risk of great power involvement—to make major states more vulnerable vis-à-vis third-party proliferators, and even to help increase the *number* of major powers in the international system.

Accordingly, in December 2001 the United States announced its intention to withdraw from the ABM Treaty pursuant to its withdrawal clause. (These provided that a party could withdraw on 6 months' notice if it determined that "extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests."[25]) As White House officials explained:

> The circumstances affecting U.S. national security have changed fundamentally since the signing of the ABM Treaty in 1972. . . . Today, our security environment is profoundly different. The Cold War is over. The Soviet Union no longer exists. Russia is not an enemy, but in fact is increasingly allied with us on a growing number of critically important issues. . . . Today, the United States and Russia face new threats to their security. Principal among these threats are weapons of mass destruction and their delivery means wielded by terrorists and rogue states. A number of such states are acquiring increasingly longer-range ballistic missiles as instruments of blackmail [sic] and coercion against the United States and its friends and allies. The United States must defend its homeland, its forces and its friends and allies against these threats.

> We must develop and deploy the means to deter and protect against them, including through limited missile defense of our territory.[26]

U.S. officials did not use the phrase, but they had clearly decided that it was necessary to escape the "capability lock-in" imposed by the Americans' own 1972 arms control agenda. Their withdrawal became effective in June 2002, and, despite ongoing Russian complaints about the alleged perils even of current scaled-back U.S. plans for missile defense,[27] the ABM Treaty remains today a dead letter.

The administration of President Barack Obama has been considerably more diffident about missile defense than its predecessor, but even present-day U.S. officials claim to remain committed to the goal of building a missile defense network capable of defending the entire United States—as well as key friends and allies overseas—from the new threats invoked by the Bush administration in the U.S. withdrawal from the ABM Treaty. Current policy, for instance, promises to "augment our current protection of the U.S. homeland against long-range ballistic missile threats, and to offer more effective defenses against more near-term ballistic missile threats."[28] Even Obama's scaled-back BMD plans involve capabilities beyond what the ABM Treaty would have permitted.[29] Flexibly coping with 21st century threats by avoiding the capability-regulatory "lock-in" imposed by a mid-Cold War anti-defense theoretical paradigm, has thus become a bipartisan priority in the United States.

Clearly, therefore, it is at least a *potential* problem for arms control that a particular capability-regulatory status quo, fixed in place today by an agreement, might not serve useful purposes tomorrow, and might

actually destabilize. Implicit recognition that arms control regulations are capable of creating a problematic and potentially destabilizing ossification may perhaps also be found in the fact that the two most recent strategic agreements between the United States and Russia—the Moscow Treaty of 2002[30] and its successor, the New START agreement of 2010—permit each side considerable freedom to structure its specific mix of weapons systems as it sees fit within an overall set of treaty caps. This reflects the understanding that the two nuclear powers do not face identical situations, and that their needs may also evolve even during the duration of an agreement—and accordingly that it could be harmful to specify *too much* in an arms control agreement. Flexibility within the terms of a treaty—that is, a willingness *not* to provide for *complete* control of parties' future decisionmaking on weapons acquisition and deployment—seems to be valued in such negotiations, presumably at least in part because it reduces the danger that capability lock-in will imperil the interests of either side.

It is also not uncommon for arms control agreements to "sunset" after a specified period of time, thus automatically allowing an opportunity for whatever renegotiation the parties feel is appropriate under the prevailing circumstances at that point. (START expired on its own terms in December 2009, for instance, while New START specifies that it will terminate after 10 years.[31]) Along with the near-ubiquity of withdrawal clauses, such provisions suggest a clear understanding that changed circumstances can sometimes transform yesterday's wise arms limitation into tomorrow's dangerous straightjacket. Indeed, it was arguably one of the structural failings of the ABM Treaty that it had *no* "sunset" provision, even though

it was negotiated simultaneously with the force caps of SALT I, which itself was merely styled an "interim" agreement with an intended duration of only 5 years.[32] Arms controllers thus need to be conscious of the challenges presented by "lock-in" dynamics, which in the right (i.e., wrong) circumstances can impede dynamic stability within the strategic system.

Displacement Effects.

To add to this litany of at least potential challenges, it is worth mentioning that just as conditions of strategic stability can serve to displace great power rivalry to alternative venues (e.g., proxy wars), arms control may sometimes have the effect of encouraging the *displacement* of arms competition to other areas—potentially in ways *more* detrimental to strategic stability than unregulated competition would have been in the capabilities that were actually subject to the agreement's regulation. The Washington naval treaties of the interwar years, for instance, went to some trouble to regulate great power competition in large battleships, but arguably at the cost of encouraging parties' more rapid transition to *less* (or non) regulated naval capabilities—specifically, submarines and naval aviation—that actually turned out to be genuinely "disruptive technologies" in the field, and the means by which later naval wars of the 20th century were won or lost. At the very least, the battleship-regulatory regime did not turn out to have quite the soothing strategic impact that its drafters presumably intended.[33]

More pointedly, many argue that the numerical limits imposed in the mid-1970s on U.S. and Soviet delivery systems[34] helped push the superpowers more quickly and thoroughly into the deployment of

multiple, independently-targeted re-entry vehicles (MIRVs) aboard the ballistic missiles whose numbers were capped by SALT in 1972. Unable to aim at more targets by building more missiles than they had previously done—but still *wishing* to be able to hit more targets—Washington and Moscow invested in ways to do so with their *existing* missile force. MIRVing, a technology that emerged in the 1960s and had already begun to appear on the U.S. Minuteman missile in 1970, effectively became that answer, and it was ever more enthusiastically embraced by both sides thereafter.

This was, however, problematic, because nuclear analysts tend to believe that using MIRVs—at least in land-based silos the locations of which are known or knowable to an adversary—is less "stabilizing" than using single-warhead missiles, because the former make it more attractive for an adversary to strike pre-emptively, in order to maximize his counterforce "return on investment." In theory, for example—although this is a simplification of the complexities of nuclear targeting, which frequently involves assigning more than one weapon to each target, in order to ensure a high probability of destruction[35]—a single attacking weapon, hitting a MIRVed missile in its silo, can take several enemy warheads out of action with the expenditure of but a single attacking warhead. (Because firing a single MIRVed missile might allow this to occur several times, moreover, mutual possession of MIRVs makes preemption incentives especially high.) This gives each side the incentive to launch a first strike in time of crisis, for this highly-favorable exchange ratio advantage is lost if the other side fires first. These dynamics may also increase incentives to adopt launch-on-warning (LOW) postures pursuant

to which one's own weapons fire upon learning of an incoming enemy attack, so that they depart before *his* missiles land. On account of the very short warning times involved, LOW is widely believed to be vulnerable to false alarms and other sorts of catastrophic accident.[36] The net effect may thus be greater strategic instability than before, especially in time of crisis.

This theory of MIRV instability was reflected in the START II agreement of 1993, which actually undertook to *prohibit* MIRVed land-based missiles,[37] though the treaty was never ratified by the Russian Duma. This notion is, moreover, still reflected in U.S. nuclear policy: the Obama Administration's 2010 *Nuclear Posture Review* pledged to reduce all U.S. intercontinental ballistic missiles (ICBMs) to a single warhead each, on the grounds that this step "will enhance the stability of the nuclear balance by reducing the incentives for either side to strike first."[38]

As noted, however, even though MIRV technology predated SALT, and would surely have been adopted to some degree whether or not there was a treaty, SALT restrictions gave the superpowers more incentives to move to pervasive MIRVing, including the eventual development of extremely large silo-based missiles carrying many warheads each: the U.S. Peacekeeper with 10, and the Russian SS-18 with potentially even more. Even today, most U.S. and Russian land-based intercontinental systems—and all submarine-based systems—are still MIRVed. If the common assumption about MIRV instability is correct, it may thus be that SALT-era *missile* limitations actually left the Cold War strategic arms race more "unstable" and pre-emption-evocative than they found it.

It would appear, therefore, that the possibility of such "displacement effects" is yet another factor that

one must consider in evaluating the stability impact of arms control measures. Such dynamics presumably do not *always* occur, nor do arms control agreements by any means *necessarily* encourage alternative methods of competition that prove more unstable than the modalities of rivalry such agreements proscribe. Nevertheless, these are potential dynamics that cannot be taken lightly, and which deserve careful thought if arms control strategists are to maximize the odds of real success.

As an example of how displacement effects need to be taken into consideration in evaluating the likely impact of proposed future agreements, such issues might arise in connection with the Comprehensive Test Ban Treaty (CTBT)[39]—an agreement rejected by the U.S. Senate in 1999, but which the Obama administration has stated it wishes to re-introduce. In the improbable event that CTBT ever enters into force,[40] the treaty seems likely—by making it much harder for countries to engage in yield-producing nuclear tests—to tend to displace nuclear weapons competitions into areas that *don't* require testing (e.g., "gun-type" uranium weapons, or devices based upon "pre-tested" designs such as China's so-called CHIC-4 "export model," plans for which were reportedly supplied to Pakistan and then to Libya and perhaps also Iran, and which may also be the basis for a current North Korean weapon).[41] If this results in the proliferation of *secret* nuclear arsenals, without at least the "public accountability" of overt testing, it is an open question whether it would be an overall advantage for international peace and security over today's status quo of a world in which yield-producing tests are at least theoretically available. The CTBT's likely net impact upon strategic stability is far from clear, of course, and might yet be positive,

particularly if the present-day rarity and general stigmatization of nuclear testing produces such displacement effects anyway, *irrespective* of the Treaty's entry into force.[42] This is, however, the *kind* of question that sophisticated arms control advocates need to address. So far, though, few do.

When Arms Control Fails.

Before concluding this discussion of the potential strategic stability *costs* of arms control, it is worth highlighting one more line of argument. There is extensive literature critiquing arms control agreements, or at least particular ones, on the basis of how difficult it is to evaluate the degree to which the other side is actually *complying* with them—either because of some potential for undetected violations, the difficulty of detecting cheating in time to be able to do anything in response to it, or a paucity of responsive options. Other critiques have focused upon the peculiar challenges that may arise when open, liberal democracies negotiate agreements with authoritarian states, political challenges to honesty in compliance assessment, the perils of overestimating one's ability to verify an agreement, the ways in which the negotiating *process* can be a tool of potentially destabilizing manipulation, and the potential impact of adversarial negotiation in *impeding* improvements in one's relationship with the other side.

Although these critiques raise important points—ones that deserve careful attention from any serious practitioner of the arms control art—they do not, for the most part, bear directly on the questions of strategic stability that are the focus of this chapter. For the most part, these challenges represent a different category of problem than those hitherto discussed,

insofar as in such cases the damage is done more by the *incompleteness* of the arms control process (e.g., ineffective verifiability, one party's noncompliance, or simply an agreement's procedural stillbirth) than by its *success* in imposing the constraints it aims to create. Such circumstances of procedural defect represent instances in which arms control has *failed* on its own terms. As an analytical matter, the more interesting issues emerge where arms control measures may *succeed* on their own terms (e.g., successfully constraining both sides' development of a particular suite of capabilities) and yet may *still* have an ambivalent or even negative impact upon strategic stability. Bypassing such *failure* cases, therefore, the next section will discuss the problems arms control can create even in its "success."

Strategic Manipulation.

Into the category of arms control that can destabilize by succeeding, one must put measures that one side actually seeks for this reason—that is, steps that appear valuable to one state precisely *because* of their likely effect in *decreasing* another state's security through one or more of the dynamics discussed here. Indeed, it is for fear of such possibilities that some authors have urged that policymakers should maintain a cautious wariness, informed by awareness of how the *ideal* of arms control can sometimes be invoked for purposes of strategic manipulation.[43]

As an example of such a manipulative effort, one might cite Soviet support in the early 1980s for a "nuclear freeze,"[44] which seems clearly to have been an outgrowth of Moscow's desire to preclude NATO nuclear responses both to Soviet deployments of new ballistic missiles and to the Warsaw Pact's then-as-

sumed conventional superiority in Europe.[45] Doubtless mindful of their numerical advantage, Soviet officials were also fond of declaring their support for the principle of not being the first to use nuclear weapons in a conflict[46]—something envisioned as a possibility by NATO nuclear planners precisely out of their fear that without such an option, weight of numbers might enable the Warsaw Pact to carry the day in a European war. Similarly, Russian and Chinese proposals for a convention aimed at "Prevention of an Arms Race in Outer Space" (PAROS)[47] have long been phrased in such a way as to shut down what these governments felt might be an area of (possible future) U.S. advantage in *space-based* weaponry, while leaving untouched their own (existing) ability to threaten critical *American* space assets through the use of *terrestrially-based* anti-satellite systems.[48] (Ground-based anti-satellite weapons would not be covered because they were not "in outer space.") Such arms control proposals were, in effect, *designed* to be strategically destabilizing as a result of capability-regulation lock-in effects that would affect the two sides in very different ways.

THE POSITIVE SIDE OF THE LEDGER

So far, the reader might be forgiven for concluding that arms control is at least valueless—and often downright dangerous—from the perspective of strategic stability. This, however, is not the case. Admittedly, this chapter has so far focused on the negative aspects with particular intensity, for they are not always well enough understood in the policy community. Yet, however useful it is to remember the potential negative side, this is *not* the whole story. In reality, arms control *can* play a valuable role in helping achieve or

reinforce strategic stability. If there is a central point to this chapter, it is simply that this is not *always* the case. The analytical challenge for policymakers is to avoid the potential traps that arms control can create, while taking advantage of the benefits it can offer.

Capability-Regulatory Arms Control.

The Other Side of Strategic Manipulation.

Before addressing the question of when arms control-driven "lock-in" might actually *increase* strategic stability, let us briefly note—and then put aside—the possibility that one might actually *want* to create less stable circumstances. Strictly from the standpoint of strategic stability, maladaptively rigid "capability lock-in" is indeed undesirable. To conclude that an arms control agreement creating instability is per se a bad agreement, however, is to presume that strategic stability is a per se good. As discussed earlier, one should be cautious about such an assumption, for stability can have its costs.

Moreover, from the particular perspective of a *participant* in the world's geopolitical struggles, certain kinds of instability might be desirable. This is the flip side of the potential trap of strategic manipulation discussed above: sometimes a lopsidedly structured proposal would work to one's *own* advantage. Every historical instance of a destabilizingly manipulative arms control effort, after all—e.g., the "nuclear freeze" idea, or the various Sino-Russian PAROS proposals—presumably took that form precisely because, for its advocates, *that* kind of instability seemed advantageous. Accordingly, national leaders can be expected to look not disapprovingly upon arms control ideas that fa-

vor their side *irrespective* of these proposals' potentially negative impact on strategic stability. Where one stands on such questions, as the saying goes, depends upon where one sits, and what may be a trap for one person is simply a shrewd gambit for the other. That said, the focus here is on strategic stability, so the next section will cover the more interesting analytical question of when arms control can indeed serve that end.

Constraining Destabilizing Advantage.

To begin with, although arms races are not *intrinsically* destabilizing, a situation in which one side or the other "loses" such a race can be very much so. To the extent, therefore, that a capability-regulated arms control regime can keep a numerical arms race from developing to the point that the sheer pace of competition overwhelms one party's ability to keep up—e.g., if it lacks the financial resources or technical capacity to match its rival's build-rate—that regime would indeed conduce to strategic stability by preventing the more capable arms-builder from achieving a decisive advantage. From the advantage-possessing party's perspective, of course, such arms control might be "bad arms control," but a successful scheme of numerical restraint in such circumstances would leave the strategic environment more stable withal. Arms control promotes strategic stability not by constraining an arms race per se, but by preventing one side from *winning* it. This it is indeed capable of doing.

Capability-regulatory forms of arms control can also promote strategic stability where they prevent possession of or reliance upon a particular *type* of capability in ways, or to a degree, that would tend to destabilize the relationship. As noted earlier, for instance,

it is widely believed that multiply-MIRVed silo-based ballistic missiles are intrinsically more "destabilizing" than single-warhead delivery systems, because they create especially acute incentives for an adversary to contemplate pre-emption in times of crisis.

If this theory of "MIRV instability" is correct, arms control between two nuclear powers could promote strategic stability by prohibiting multiple-warhead systems—precisely as the START II agreement *would* have done had it been ratified by Russia. Today, much work apparently remains to be done in constraining the presumed destabilizing effect of MIRVed missiles, for while the Americans are now planning to *de*-MIRV their silo-based force, the Russians announced in 2011 that they would be building a *new* heavy ICBM capable of carrying between 10 and 15 separate warheads.[49] This is a strange choice for a country that is supposedly concerned about the possibility of a U.S. first strike,[50] since by the warhead-for-warhead logic of MIRV instability theory, Russia's continuing attachment to MIRVs would seem to make American pre-emption *more attractive* in a crisis. At any rate, the example of MIRV technology and the crisis-instability it creates offers a concrete example of the type of situation in which capability-regulatory arms control could perhaps provide significant stability benefits.[51]

Arms control could also perhaps restrain parties to an agreement in a reciprocally asymmetrical way—*across* competitive domains—that conduces to strategic stability. If one country most fears the other's aircraft and that country most fears the first country's ships, for example, it might be fruitless to try to negotiate aerial or naval capability restrictions alone, and perhaps even destabilizing if they did. On the other hand, an arms control agreement that limited

aircraft, while also constraining ships for both sides, would seem not just to offer something to each side, but actually to address the potential instability challenge presented by the specter of each side's unconstrained pursuit of some special comparative advantage. Otherwise, whoever moved fastest or managed to go furthest along their own particular road might be tempted to rewrite the strategic balance by force. Each side would have an incentive to abide by such an agreement, moreover, for fear that noncompliance would lead to the end of constraints upon the other side's asymmetric advantage. Such a scenario of imposing cross-domain restraints upon mutually-asymmetric comparative advantage is no doubt far from easy, but it offers another potential way to promote strategic stability.

Nonproliferation Regimes.

Multilateral capability-regulatory arms control of the sort that seeks to keep certain capabilities (e.g., weapons of mass destruction [WMD]) from proliferating beyond a pre-established group of possessors—as with the NPT, the most well known example of this type—presents an interesting analytical challenge. The principal aim of such instruments is, in effect, to promote a kind of strategic stability by preventing the spread of capabilities potent enough to permit new-acquirers to overawe or simply destroy their rivals, and to forestall the emergence of a world of ubiquitous WMD brinksmanship dangerously susceptible to unpredictable escalatory dynamics. To the extent that such regimes succeed in constraining such proliferation, therefore, one might conclude that stability is indeed well served.

Nevertheless, the stability calculus is more complicated than this simple description would suggest. In part, this is because strategic stability can potentially be threatened by a range of military tools beyond just the specific capabilities regulated by a WMD control regime. Where this is the case, the possessor of powerful nonregulated forces (i.e., conventional weaponry) might be able to threaten weaker states in ways to which the nonproliferation regime might actually serve to help *prevent* an effective response. In such cases, nonproliferation constraints could theoretically destabilize.

This, in fact, is the claim all but explicitly made by the Iranian theocracy vis-à-vis the United States as Tehran pushes forward with its development of a nuclear weapons capability in violation of its NPT obligations. One might even imagine such a proliferation-justification argument being made in the future against the People's Republic of China (PRC) by threatened governments in Australia, Japan, Mongolia, the Philippines, South Korea, Taiwan, or Vietnam—or perhaps against Russia by Georgia, one of the Baltic States, or others from among the endemically bullied ex-Soviet countries of the Kremlin's "near abroad." How plausible and legitimate such claims would be, of course, would depend greatly upon the circumstances. Nevertheless, they cannot be dismissed a priori as a matter of strategic logic.

Nonproliferation has been applied in different contexts. It has been used, for instance, as part of *prohibitory* capability-regulation systems, aiming to prevent the spread of dual-use materials or technologies that would make it easy for states to violate the abolition regime. This is, for instance, the approach taken with chemical weaponry under the CWC, and to

some extent also with biological weaponry under the BTWC. By attempting to constrain parties' capability to achieve potentially militarily advantageous regime "breakout," such nonproliferation constraints aim to serve the interests of strategic stability.

Nonproliferation constraints have also been used in systems *not* built upon a foundation of complete prohibition. The NPT, for instance, has an explicitly two-tiered system in which a few states are in effect *permitted* nuclear weaponry, at least for the indefinite future.[52] (Their eventual disarmament is envisioned, but it is not actually required.[53]) For most parties, however, such tools are disallowed. The nonproliferation constraints built into the NPT system, therefore, are designed to prevent *others* from acquiring powerful tools that *some* are allowed to retain.

However understandable and unavoidable such a two-tiered structure may be as a matter of history and geopolitical reality, it can potentially create some tension within the regime from the perspective of strategic stability, insofar as the system offers no intrinsic barrier to *possessor* states' use of nuclear weaponry to intimidate or even attack nonpossessors. One could certainly debate whether it is *reasonable* for nonpossessors to fear the possibility of facing such nuclear threats in the modern world, but this is an empirical question that cannot be answered a priori. It might well be that such potential "nuclear threat" problems are in practice less troublesome—from a strategic stability perspective—than those that would be presented by having no NPT at all, and that there is no way to resolve the tensions within the treaty without either retreating to the magical thinking of immediate global abolition or permitting a *pro*-proliferation "cure" that would be worse than the disease. Nevertheless,

analytical honesty compels one to acknowledge the existence of the problem: two-tiered systems do face potential internal tensions.

There is a further potential stability challenge inherent in any nonproliferation regime. If the managers of such a nonproliferation regime lack the good sense to couple their *weapons* nonproliferation rules with rules that also constrain the *facilitating technologies* used in developing such tools—or if they are simply *unable* to implement such rules—the net stability benefit of the regime would lessen over time. Already, for instance, the CWC's nonproliferation system is under considerable stress from the reconfigurable flexibility, global ubiquity, and increasing miniaturization of modern chemical production technology. The BTWC's effect in constraining the states' ability to develop biological and toxin weapons is under even more strain, given the worldwide spread and rapidly-evolving character of modern biotechnology, which made an effective verification protocol impossible.[54] Even "dual-use" nuclear weapons-related technology is harder to verify today than ever, thanks in part to the spread of potentially-plutonium-producing nuclear power reactors,[55] and in part to the development and spread of efficient and relatively concealable uranium-enrichment centrifuge technology that has replaced the huge and inefficient gaseous diffusion and other industrial-scale facilities of yesteryear.[56] In the NPT context, moreover, there seems to be considerable confusion about what the rules actually *are*, or should be, with respect to constraining technological diffusion.[57]

This is a potentially very serious problem, and is worth emphasizing. Especially, but hardly exclusively, in a world in which significant conventional

military asymmetries persist, weapons nonpossessors have some incentive to "hedge" their strategic bets by preparing for the possibility of "breakout" from a nonproliferation regime. The motives for this, of course, might vary. Such hedging might be attractive, for example, in order to prepare for the possibility of *facing* aggression from a foreign power, but it might also be undertaken in order to make one's *own* anticipated future aggression more feasible. One country's hedging, moreover, might tend to elicit analogous behavior from others, giving its potential rivals more reason to prepare for the worst themselves. On account of the structural tensions described above, hedging might be all the more attractive for nonpossessors within the context of a tiered, "have/have not" regime such as the NPT system.

At any rate, if strategic hedging by technological acquisition is not *itself* to become the locus of considerable strategic instability, robust technology-diffusion controls are critical. To the extent that a nonproliferation regime ends up taking a *laissez-faire* approach to dual-use (i.e., potentially weapons-facilitative) technology, nonpossessors will have the *opportunity* to indulge any taste they develop for such hedging strategies by reserving a future nuclear weapons "option" for themselves.

There are some who have argued that the massive proliferation of nuclear weapons capabilities—or indeed nuclear weapons themselves[58]—would foster stability by creating a kind of universal deterrence. In fact, however, a system full of "virtual" weapons states, each merely a metaphorical stone's throw away from weaponization, would be quite problematic, for while a world of widespread nuclear "latency" is perhaps less immediately dangerous than a world of

actually nuclear-armed powers, it could still, in crisis-stability terms, be perilous indeed. As noted at the beginning of this chapter, the Nash-inspired model of strategic stability tends to presume both that national decisionmaking is the rational product of cost-benefit calculations and that players are not radically mistaken in the beliefs they hold and assumptions they make about their counterparts. These assumptions are a useful heuristic, but they clearly abstract somewhat from reality. Significantly, the *degree* of their departure from that reality would probably nowhere be as great as in the case of a *fully* proliferated world, which—by forcing players simultaneously to try to calibrate security strategies along more axes than it is probably reasonable to expect fallible humans to be able to handle[59]—would give maximum scope for every mistake or miscalculation to spiral into catastrophic warfare.

Moreover, even through a prism of rational decisionmaking, a world of ubiquitous nuclear weapons "options" would compound long-understood problems of crisis stability arising out of what the seminal Cold War nuclear strategist Herman Kahn once described as a "mobilization war"—that is, a form of competition between two rival powers in which each positions itself to be most quickly able to activate an otherwise at least somewhat dormant military capability, and thereby to "achieve a militarily dominant position, enabling it to inhibit the diplomatic or military initiatives of its opponent."[60] As Thomas Schelling has pointed out in his powerful critique of the likely stability of a nuclear weapons abolition regime, such relationships can be very dangerous, for they not only give rise to dramatic escalatory possibilities in a crisis—as each side scrambles not to be caught napping by the *other's* mobilization—but could create incen-

tives for the "winner" of such a race actually to *use* his weapons first, before the other side completes its own mobilization.[61] Kahn agreed, noting that mobilization racing from a position of disarmament could "create pressures toward preventative war,"[62] a dynamic which has elsewhere been compared to the partly mobilization-driven escalatory disaster that occurred in Europe in the summer of 1914.[63]

A world of ubiquitous nuclear "latency" among NPT non-nuclear-weapon states would be not unlike the world of mobilization-ready disarmed powers described by Kahn and Schelling, with all of its ugly potential to escalate uncontrollably even when facing only a relatively small crisis. In Schelling's description, such an environment sounds like a perilous one indeed:

> Every crisis would be a nuclear crisis, any war could become a nuclear war. The urge to preempt would dominate; whoever gets the first few weapons will coerce or preempt. It would be a nervous world.[64]

To be sure, Schelling's comments were aimed in particular at the stability challenges of a *wholly* nuclear-free world. A world of "mixed" capacities, in which some players already have nuclear weaponry while others merely hover on the *brink* of exercising a weapons "option," may be in some ways different. (If a weapons possessor were to provide credible "extended deterrence" to a nonpossessor ally, for example, this might help lessen the destabilizing pressures of crisis-stability logic by reducing the ally's incentives to rush to build and/or use its own weapons. U.S.-Japan and U.S.-South Korean relations already provide examples of this dynamic.) Nonetheless, in

the relationships of "option"-possessing players *outside* such alliance frameworks—or wherever extended deterrence is insufficiently credible—Schelling's logic would seem to speak powerfully to a world of mixed capabilities as well.

A nonproliferation regime that neglects to give sufficient attention to stopping the spread of weapons-facilitative technologies, therefore, seems likely to undermine itself and sow the seeds for considerable strategic instability. This danger deserves more attention than it has hitherto received in the NPT context, where all too many otherwise sensible people seem astonishingly willing to join would-be proliferators in the regime-corrosive view that one should—or indeed "must"—actually *promote* the free flow of weapons-facilitating dual-use technology.[65] From the perspective of strategic stability, as an old mariners' map might have put it, there be dragons.

Transparency and Confidence-Building Measures.

So far, however, this chapter has focused almost entirely upon capability-regulatory arms control. As explained earlier this is only one of three approaches to arms control. What about behaviorally-focused and information-concessive arms control measures?

Information-focused approaches, for example—namely, transparency and confidence-building measures (T/CBMs)—"do" less than capability-restriction regimes, in the sense that they do not in themselves oblige any change in a party's force posture. Indeed, they do not usually, in themselves, change "facts on the ground" at all. Nevertheless, information-concessive arms control seems capable of providing some strategic stability benefit, and may be less vulnerable

than a capability-focused regime to some of the rigidity problems we discussed earlier.

How can merely information-focused arms control affect stability? A key function of T/CBMs is to increase parties' understanding of the realities of the situation they face, though naturally the impact of such understanding will depend upon what this situation actually is. T/CBMs—e.g., data exchanges, the development of fora in which compliance or other concerns can be discussed, and other interactions designed to increase each side's understanding of the other's doctrines, capabilities, intentions, and strategic thinking—can make a relationship more stable where they help dispel distrust and suspicion rooted in *false* perceptions that otherwise might spur the sides to adopt policies or acquire capabilities that could destabilize the balance between them.

If one side believes the other is violating an existing agreement, for instance, the use of a discussion forum—a body such as the Joint Compliance and Inspection Commission set up under the START framework,[66] or the Bilateral Consultative Commission now established by New START[67]—might be able to resolve the issue to the extent that it results from a misunderstanding or difference in treaty interpretation. This could help avoid a situation in which one party feels the need to withdraw from the treaty, or to take some other measure that could destabilize the balance between them. Similarly, T/CBMs may be able to help ameliorate tensions and forestall destabilizing choices where one side wrongly believes the other is engaged in acquiring capabilities or is developing doctrines that present a new and dangerous threat. Even those with a reputation of being somewhat skeptical about

arms control, after all, concede that "[n]egotiations can serve a straightforward purpose of communication between the parties," and that:

> [p]roblems that result from misunderstanding may become solvable if the parties come to understand more facts, better grasp each other's views, and appreciate a fuller range of possible solutions.[68]

T/CBMs may be useful, for example, in dispelling one party's uncertainty about the other side's approach to strategic issues, making it seem less important for the first party to adopt "hedging" strategies or other measures that might themselves tend to inflame tensions and elicit countervailing moves, with potentially destabilizing effect. This is, in fact, a claim frequently made about the potential utility of T/CBMs in the U.S.-China strategic relationship—that is, if only Beijing would accept them and move away from its traditional posture of deliberate opacity. According to a recent U.S. Government report on Chinese military power:

> many uncertainties remain regarding how China will use its expanding military capabilities. The limited transparency in China's military and security affairs enhances uncertainty and increases the potential for misunderstanding and miscalculation.[69]

As it is argued elsewhere—and as former U.S. Secretary of Defense Robert Gates himself indicated[70]—continuing American uncertainty about the nature and trajectory of China's ongoing buildup of nuclear forces is emerging as a "brake" on the willingness of U.S. leaders to consider deeper reductions in our nuclear arsenal.[71] At the same time, concerns about Bei-

jing's intentions vis-à-vis its neighbors in the context of a considerable Chinese build-up of sophisticated *conventional* forces and regional power-projection capabilities[72] have led U.S. officials into a more ostentatious posture of countervailing moves in the Western Pacific, as part of a broad strategy of claiming to be "back" in Asia,[73] as well as a heightened interest among regional powers in capabilities that would provide means to resist Chinese encroachments.[74]

To the extent that transparency measures can help clear up such uncertainty by demonstrating that Beijing is *not* seeking or likely to become a formidable threat to the United States, or that Washington is not seeking to achieve military dominance over China, this would presumably do much to promote stability. Where mutual threats are misunderstood to be worse than they really are, in other words, T/CBMs can help make it less likely that each party will make destabilizing choices by making clear precisely how threatening the other side *isn't*. Partly for this reason, it is a high U.S. priority to promote military-to-military contacts and other interactions with the PRC that would reduce the opacity of Chinese strategic thinking and shed light on how officials there really view strategic policy, as well as demonstrate the benevolence of U.S. intentions and plans. The degree to which T/CBMs can ameliorate concerns about another party's intentions is limited, of course—since intentions are notoriously difficult to "know" with real assurance, and can in any event change—but such measures can provide at least *some* window upon intentions, and can offer considerable insight into another country's ability to *act* upon its intentions, even if they prove malign.

Of course, the degree to which genuine transparency reduces distrust and fear will depend upon

what is revealed. It might be, for instance, that information-concessive measures serve not to *dispel* dark apprehensions but rather to *confirm* them. Sometimes there really *are* threats out there. Nevertheless, even where transparency *reveals* threats, dispelling uncertainty and misconceptions about the *lack* of a threat is hardly without value. Indeed, such transparency may serve the interests of strategic stability more directly even than in cases where it turns out to reveal the absence of a threat. Forewarned, as the saying goes, is forearmed—and a country that faces a threat *but does not know it* will probably do too little to protect itself, thereby increasing the odds that its challenger will be able to revise the strategic balance by force. An unwelcome encounter with strategic surprise, after all, is not conducive to strategic stability.

Some experts argue that the pursuit of arms control agreements can also have an important *symbolic* value, in that *seeking* arms control can *itself* function as a sort of confidence-building measure. Such a policy might, for instance, convey the message—accurately or otherwise—that the seeker wishes to live in peace, and seeks no strategic advantage over the other party. When this is the case, the mere pursuit of agreements in apparent good faith may serve as a form of confidence-building measure, helping soothe tensions and forestall destabilizing policy choices by the other party. It may be, furthermore, that negotiating is sometimes:

> useful as a way of making a point to *third parties*, whether or not agreement is achieved, or even expected. Talks can show the public in your own country or elsewhere, for example, that you are interested in a peaceful solution, even if the other side is not. Negotiations can [also] show that you have "gone the extra mile" before you resort to other action.[75]

Such ancillary effects, however, are probably not directly relevant from the perspective of strategic stability, for they do not clearly or directly bear upon the question of whether one power is able to adjust the strategic balance by force.

It may also be that reaching an arms control treaty may have value for one or more parties to some extent *irrespective* of the agreement's actual content. (Russia's insistence upon codifying already-agreed unilateral reductions into the Moscow Treaty of 2002, for example, may bespeak the Kremlin's desire to continue having legally-binding arms control arrangements with the United States less for their specific provisions than on account of a perception that such strategic arms deals represented the symbolic coinage of a diminished and insecure Russia's continued status as a genuine "superpower.") Sometimes the act of negotiating may *itself* amount to giving the other side a concession—as seems to be the case today with North Korea, which shows not the slightest sign of being willing to give up its nuclear weapons but nonetheless seeks nuclear talks with the United States in order to feed its own self-image as a nuclear weapons state and a world power that others must take seriously.[76] There does not seem to be a clear relationship, however, between such symbolic roles and the question of strategic stability that concerns the United States, so it is probably best to focus here upon information-concessive arrangements that more directly affect transparency, for this really can shape parties' reciprocal threat assessments.

Behavior Controls.

The reader will recall that "behavior-regulatory" arms controls are measures that seek to constrain not what parties actually *have* but instead what they *do* with it. Behavioral measures may seek to do this in a mandatory or legally-binding way, or as the sort of "best practices" guidance provided by a merely hortatory code of conduct. In effect, behavioral approaches seek to channel participants' policy choices away from forms of competition or interaction that are particularly destabilizing.

In general, behavioral measures are probably less susceptible to the potentially problematic "lock in" dynamics than is capability-focused arms control, because what is at issue here is only what one *does* with one's tools, rather than whether one can possess them at all. It is presumably easier just to employ something differently than it is to develop that thing in the first place, and if one needs to adjust to strategic surprise or to another party's perfidy, it is easier to revoke one's obligation to adhere to certain modes of behavior than it is to build a new weapons system or reactivate a demobilized military capability.

The flexibility and comparatively easy revocability of behavioral arms control commitments, however, are as much their weakness as their strength. Behavioral approaches may be somewhat less likely to ensure strategic stability than a well-crafted capability regime in part because all participants would understand how easy it *is* to change behavior for the worse. Through this lens, one might say that for this type of arms control, "verifiability" boils down only to ascertaining whether the rules have hitherto been followed. This may provide some window into a country's good faith and intentions to date, but such

insight is inherently retrospective. In contrast to some capability-regulatory regimes—in which, for instance, violations may require time to execute (e.g., in building and deploying prohibited systems)—verifiers can here provide little assurance even about the very immediate future.

For this reason, the more dramatic sorts of behavioral pledges—whether or not they style themselves as being legally binding—often suffer from credibility problems. Perhaps the classic case in point here is the idea of a nuclear weapons "no first use" (NFU) rule. It has long been a high priority of the nuclear disarmament community to elicit NFU promises from the world's nuclear weapons possessors. In 2010, in fact, the Obama administration gestured to this movement by articulating a highly qualified negative security assurance (NSA) pledge whereby the United States promised not to use, or threaten to use, nuclear weapons against "non-nuclear weapons states that are party to the NPT and in compliance with their nuclear nonproliferation obligations."[77] The principal challenge with NFU promises, however, is not how cleverly or carefully they can be qualified, but rather the degree to which other parties feel they can really *rely* upon such pledges being followed in a grave crisis, when it matters most.

An NFU arms control agreement, such as Beijing promotes, would basically be a pledge—whether "legally binding" or otherwise—that no party would ever be the *first* to use nuclear weapons against another party. (If someone broke this pledge and *did* go first, all bets would presumably be off.) On a superficial level, this might sound pleasing, though it takes little reflection to recognize that precisely to the extent that such pledges *did* bind the parties, such an arrangement

might present destabilizing "lock-in" problems where the signatory states were of greatly differing degrees of *conventional* military power. (If truly "immunized" against nuclear first use, the stronger state might feel free actually to *employ* its comparative advantage in conventional force.)

But the real problem of NFU is less such "lock-in" than the fact that such a pledge would probably not be believed in the first place. As I have pointed out elsewhere:

> it seems inherently unbelievable that an NFU pledge would be followed in all imaginable circumstances. Even if the promise had been sincerely offered and resolutely intended, one might wonder whether a country with nuclear weapons would be willing to place such stock in [its] NFU [pledge] that it would choose to lose a major war or countenance the emergence of a dramatic new threat without employing the one tool that might be able to turn things around.[78]

NFU promises might be credible coming from a country blessed with such conventional might that it would not *need* nuclear weapons in a confrontation with an adversary state, but in such circumstances NFU wouldn't really *add* anything either. The real value of an NFU pledge would come only where the nuclear weapons possessor might *need* to employ such tools—in which case the credibility of the promise would erode in direct proportion to the gravity of the situation facing that state. NFU would be most believable, in other words, only when it was most unnecessary.

Treating NFU as a sort of asymptotic case of behaviorally regulated arms control, therefore, one might suspect that agreements promising restraint

in extreme circumstances are largely unbelievable. Indeed, as suggested by the example of NATO's long-standing "nuclear sharing" policy, it seems to be understood that whatever peacetime agreements may provide, parties will probably be willing to do, in extremis, whatever they think they need to do in order to survive. (Article I of the NPT provides that a nuclear weapon state may not transfer control of a nuclear explosive device to a non-nuclear-weapon state,[79] but NATO policy expressly anticipated that in the event of full-scale war with the Soviet Union, the United States would turn over pre-positioned stocks of nuclear gravity bombs for delivery by allied aircraft from nonweapon countries such as the Netherlands, Germany, and Turkey.[80] Even if it had been intended that the NPT would remain in force in time of war—and here one must remember that it has apparently always been NATO's legal position that in the event of general war the NPT "would not be controlling" in any event[81]—if a nuclear World War III were underway, issues of treaty noncompliance would surely seem trivial,[82] with few planners apparently willing to treat the law, as the saying goes, as a suicide pact.)

This is not to say, however, that behaviorally-focused measures are *always* incredible, for indeed it may be that behavior *can* be constructively modified in many instances. Such methods, in fact, may be especially valuable in *peacetime* contexts in which what is at issue is the proliferation of dangerous technologies such as ballistic missiles or nuclear weapons. Such circumstances do not raise the immediate and "existential" issues that bedevil NFU promises, and available historical examples suggest that even comparatively weak "code of conduct"-type approaches can often provide real benefits in this area. Since the

spread of powerful military capabilities—if it *does* occur—can indeed have a significant impact upon strategic stability, it seems reasonable to impute to this sort of behavioral arms control a potentially valuable stabilizing effect.

The Missile Technology Control Regime (MTCR)[83]—and its associated Hague Code of Conduct (HCOC)[84]—provide a case in point. For the most part, there are few "hard" rules in the MTCR system, which is only "politically binding" anyway,[85] with members being left subject only to good-faith self-enforcement with regard to their collective pledge to exercise restraint in the transfer of ballistic missile technology to non-MTCR members.[86] Nevertheless, the normative force of the MTCR seems to have had some impact in constraining missile-related transfers.[87]

An analogous effort to establish standards for the transfer of sensitive nuclear technology, the Nuclear Suppliers Group (NSG), provides standards for restraint in exports of items listed on a "Trigger List" and a schedule of controlled dual-use goods.[88] Meanwhile, the Australia Group (AG) has similarly tried, since 1985, to address the proliferation of chemical- and biological-related technology.[89] (Today, efforts are also underway—involving the European Union and the United States—to develop an International Code of Conduct for Outer Space Activities, which it is said "will help maintain the long-term sustainability, safety, stability, and security of space by establishing guidelines for the responsible use of space."[90] Precisely what impact, if any, such a code would have in terms specifically of strategic stability is presently unclear, but the "code of conduct" model is clearly alive and well.) One need not believe that such constraints are foolproof, nor that they will necessarily be observed if the government in question thinks it is

really important to do something a code discourages, in order to acknowledge that behavior-regulatory approaches can indeed have valuable effects in such things as slowing the spread of technologies that if unchecked could indeed affect strategic stability.

CONCLUSION

So what, then, is one to make of all this? If there is an overriding lesson to be learned from this long exploration of the relationship between arms control and strategic stability, it is that this relationship is exceedingly complicated. It is not merely that the value of strategic stability itself needs to be carefully examined rather than assumed uncritically, though this is certainly the case, but also that arms control does *not* always conduce to stability anyway. Details matter, complexity is pervasive, and it would be entirely unwarranted to posit a per se answer—either positive or negative—about the merits of arms control.

In designing arms control regimes, many traps await the unwary or the credulous. Subtle shadings of circumstance can turn a well-designed and stability-promoting arrangement into a destabilizing geopolitical canker, and indeed one's negotiating partner may be working very hard to skew stability dynamics in his favor. Capability-regulatory arms control can impose destabilizing rigidities as easily as it can restrain dangerous competitive dynamics, and the balance between such effects may also shift over time. At the same time, capability-focused regimes are certainly capable of providing real value, as can behavioral and information-centered approaches in their own distinctive ways.

For the policy community, then, the key lesson may simply be to avoid ideological complacency, remembering that arms control is neither inherently bad *nor* inherently good. It is simply a tool, and if one wishes to promote strategic stability—and to avoid engendering instability—there are many variables to take into consideration, and many dynamics of which one must be aware. Arms control *theory* needs to be de-theologized if arms control is to be *practiced* well, and the endeavor needs to be approached with an intellectual humility rooted in awareness that the strategic environment is difficult to shape, that effects are hard to predict, and that the world has a stubborn habit of changing over time in ways that sometimes make yesterday's certainties implausible or even counterproductive. One could do worse than to approach the task of arms control planning with a wary eye.

ENDNOTES - CHAPTER 6

1. Interim Agreement Between the United States of America and the Union of Soviet Socialist Republics on Certain Measures With Respect to the Limitation of Strategic Offensive Arms, May 26, 1972, entered into force October 3, 1972, (hereinafter SALT I), available from *cns.miis.edu/inventory/pdfs/aptsaltI.pdf*.

2. Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms [START], July 31, 1991, entered into force December 5, 1994, available from *www.state.gov/www/global/arms/starthtm/start/start1.html*.

3. Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles, December 8, 1987, entered into force June 1, 1988, available from *www.state.gov/www/global/arms/treaties/inf1.html*.

4. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and On Their Destruction, January 13, 1993, entered into force April 29, 1997, at Arts. I(5) & II(1) &, 7, banning chemicals that can cause harm used "for purposes not prohibited by this Treaty," but permitting the use of chemical agents for riot control purposes as opposed to "as a method of warfare," available from *www.opcw.org/index.php?eID=dam_frontend_push&docID=6357*.

5. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, April 10, 1972, entered into force March 26, 1975, at Art. I, banning "[m]icrobial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes," available from *www.opbw.org/convention/documents/btwctext.pdf*.

6. Protocol on Notifications Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, July 31, 1991, entered into force December 5, 1994, available from *www.state.gov/www/global/arms/starthtm/start/notfypro.html#notfyproII.13*.

7. Protocol to the Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, April 28, 2010, entered into force February 25, 2011 (hereinafter New START Protocol) at Part Four, available from *www.state.gov/documents/organization/140047.pdf*.

8. See, e.g., START, *supra*, at Art. XV, establishing Joint Compliance and Inspection Commission; Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction of Strategic Offensive Arms, April 8, 2010, entered into force February 25, 2011 (hereinafter New START), at Part Six, discussing Bilateral Consultative Commission.

9. Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, entered into force March 5, 1970 (hereinafter NPT), at Art. VIII(3) providing for meetings every 5 years "to review the operation of this Treaty with a view to assuring that the pur-

poses of the Preamble and the provisions of the Treaty are being realised," available from*www.iaea.org/Publications/Documents/Infcircs/Others/infcirc140.pdf*.

10. Agreement Between the Government of The United States of America and the Government of the Union of Soviet Socialist Republics on the Prevention of Incidents On and Over the High Seas, signed and entered into force May 25, 1972, available from *www.state.gov/t/isn/4791.htm*.

11. *NPT*, *supra*, from the Preamble.

12. See, e.g., President Barack Obama, remarks in Prague, April 5, 2009, available from *www.acronym.org.uk/docs/0904/doc10.htm*.

13. Christopher A. Ford, "Why Not Nuclear Disarmament?" *The New Atlantis*, Spring 2010, quoting foreign diplomat, available from *www.thenewatlantis.com/publications/why-not-nuclear-disarmament*.

14. See, e.g., Thomas C. Schelling, *Arms and Influence*, New Haven, CT: Yale University Press, 1966, pp. 92-125, discussing risk manipulation in NATO nuclear strategy and other contexts.

15. See David Shambaugh, *China's Communist Party*, Washington, DC: Woodrow Wilson Center Press, 208, at 177-178, citing Lieberthal and using concepts in understanding the Chinese Communist Party's adaptation to changing circumstances.

16. See generally, e.g., Russ Marion, *The Edge of Organization: Chaos and Complexity Theories of Formal Social Systems*, Thousand Oaks, CA: Sage Publications, 1999, pp. 162, 167-169.

17. See Christopher A. Ford, "Playing for Time on the Edge of the Apocalypse: Maximizing Decision Time for Nuclear Leaders," George P. Shultz *et al*., eds., *Deterrence: Its Past and Future*, Stanford, CA: Hoover Institution Press, 2011, pp. 217, 238-240. Scott Sagan's analysis of nuclear weapons accident risk reduction also owes much to such a framework, though he does not explicitly use the language of Complexity Science. See, e.g., Scott D. Sagan, *The Limits of Safety*, Princeton, NJ: Princeton University Press, 1991, pp. 264-278, discussing Charles Perrow's "normal

accident" theory, which partakes of a theory of maladaptively tight coupling.

18. Herman Kahn, *On Thermonuclear War,* Princeton, NJ: Princeton University Press, 1960, p. 248.

19. Christopher A. Ford, "Nuclear Weapons Reconstitution and its Discontents: Challenges of 'Weaponless Deterrence'," *in* Shultz *et al.*, *supra*, pp. 131, 188; see also, e.g., Patrice Stevens, "Strategic Weapons in the 21st Century: Hedging Against Uncertainty," *Nuclear Weapons Journal*, issue 2, 2009, pp. 3-4.

20. NPT, *supra*, at Art. X(1).

21. New START, *supra*, at Art. XIV(3).

22. Vienna Convention on the Law of Treaties, May 23, 1969, entered into force January 27, 1980, at Art. 56(1)(b, available from *www.ilsa.org/jessup/jessup11/basicmats/VCLT.pdf*. One imagines that arms control agreements—the purpose of which is generally thought to be to ensure the stability of a military balance between the parties—might have a plausible case to make that withdrawal rights are reasonable when the alternative is turning an agreement into an instrument of strategic instability.

23. Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, May 26, 1972, entered into force October 3, 1972, terminated June 13, 2002 (hereinafter ABM Treaty), available from *cns.miis.edu/inventory/pdfs/aptabm.pdf*.

24. See, e.g., Arms Control Association, "The Anti-Ballistic Missile (ABM) Treaty at a Glance," undated fact sheet, available from *www.armscontrol.org/factsheets/abmtreaty*.

25. ABM Treaty, *supra*, at Art. XV(2).

26. Statement by the White House Press Secretary, December 13, 2001, available from *www.acq.osd.mil/tc/treaties/abm/ABMwithdrawal.htm*. It is commonplace in security studies to refer to the dangers of nuclear "blackmail" when in fact "extortion" is the more accurate term.

27. See, e.g., "Russia May Boost Nuclear Potential," *RIA Novosti*, February 26, 2012, quoting Russian Deputy Defense Minister Anatoly Antonov that the North Atlantic Treaty Organization (NATO) ballistic missile defense (BMD) is an outgrowth of "aspirations to shift the strategic balance of forces in Europe," available from *en.rian.ru/mlitary_news/20120206/171166824.html*.

28. See, e.g., White House Office of the Press Secretary, "Fact Sheet on U.S. Missile Defense Policy: A 'Phased, Adaptive Approach' for Missile Defense in Europe," September 17, 2009, available from *www.whitehouse.gov/the_press_office/FACT-SHEET-US-Missile-Defense-Policy-A-Phased-Adaptive-Approach-for-Missile-Defense-in-Europe*.

29. Compare, e.g., U.S. Missile Defense Agency, "The Ballistic Missile Defense System," fact sheet, July 19, 2011, available from *www.mda.mil/global/documents/pdf/bmds.pdf*, describing multi-layered approach to defending the United States against long-range missiles as well as shorter-range attacks, involving, inter alia: ground-based interceptors; sea-based BMD assets; networked ground- and sea-based radars; programs for boost-phase, mid-course, and terminal interception; and a national "command, control, battle management, and communications network," *with* ABM Treaty, *supra*, at Arts. I(2) and III, describing permissible BMD system as consisting of only two sites with a 150-kilometer radius centered on the national capital and a single intercontinental ballistic missile (ICBM) field limiting the number and location of ABM radars, and prohibiting "a defense of the territory of the country [as a whole]" and even "defense of an individual region".

30. Treaty Between the United States of America and the Russian Federation on Strategic Offensive Reductions, May 24, 2002, (hereinafter Moscow Treaty), available from *www.armscontrol.org/documents/sort*.

31. START, *supra*, at XVII(2), "This Treaty shall remain in force for 15 years unless superseded earlier by a subsequent agreement on the reduction and limitation of strategic offensive arms." New START, *supra*, at XIV(2), "This Treaty shall remain in force for 10 years unless it is superseded earlier by a subsequent agreement on the reduction and limitation of strategic offensive arms."

32. Compare SALT I, *supra*, at Art. XVII(2), "This Interim Agreement shall remain in force for a period of five years unless replaced earlier by an agreement on more complete measures limiting strategic offensive arms," *with* ABM Treaty, *supra*, at XV(1), "This Treaty will be of unlimited duration."

33. See, e.g., Conference on the Limitation of Armament Between the United States of America, the British Empire, France, Italy, and Japan, February 6, 1922, entered into force August 21, 1923, available from *www.ibiblio.org/pha/pre-war/1922/nav_lim.html*, from the Preamble, proclaiming parties' intention, with the treaty, to "maint[ain] . . . the general peace, and to reduce the burdens of competition in armament."

34. See SALT I, *supra*.

35. Even if one assumes that the attacker will allocate two weapons per target, the warhead-to-warhead exchange ratio against multiple independently-targeted re-entry vehicle (MIRVed) systems—or, alternatively, the ability of an attacking ballistic missile to destroy multiple enemy counterpart missiles, which is another way of looking at the same question—can still be sharply favorable. This effect was perhaps less dramatic with smaller systems such as the U.S. Minuteman, which carries three MIRVs, but it would become more salient over time with the "heavy" missiles that both sides came to develop in the 1980s, each capable of carrying 10 or more warheads.

36. See, e.g., Bruce Blair, *The Logic of Accidental Nuclear War*, Washington, DC: Brookings Institution Press, 1993.

37. Treaty Between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms, January 3, 1993 (hereinafter START II), at Art. II(1), "each Party undertakes to have eliminated or to have converted to launchers of ICBMs to which one warhead is attributed all its deployed and nondeployed launchers of ICBMs to which more than one warhead is attributed . . . and not to have thereafter launchers of ICBMs to which more than one warhead is attributed," available from *www.acq.osd.mil/tc/treaties/start2/text.htm*.

38. U.S. Department of Defense, *Nuclear Posture Review Report*, April 2010, p. 23, available from *www.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf*.

39. Comprehensive Nuclear-Test-Ban Treaty, September 10, 1996 (hereinafter CTBT), available from *www.ctbto.org/fileadmin/content/treaty/treaty_text.pdf*.

40. For the CTBT to enter into force, it must be ratified by all countries listed in Annex 2 of the Treaty. See CTBT, *supra*, at Art. XIV(1). At present, even if the United States does ratify—an event that most observers think unlikely, at least in the near future—ratifications would remain to be had from the remaining Annex 2 countries of China, Egypt, India, Iran, Israel, North Korea, and Pakistan. Getting all of these is increasingly believed to be all but impossible, leading even fervent CTBT proponents such as United Nations (UN) Secretary-General Ban Ki-Moon to argue the need to "consider an alternate mechanism" to bring a comprehensive test ban into force. See UN Secretary-General Ban Ki-Moon, opening remarks to the Exhibition on "Putting an End to Nuclear Explosions," New York City, May 4, 2010, available from *www.un.org/sg/statements/index.asp?nid=4528*.

41. See Christopher A. Ford, "Test Ban Treaty, Take Two," *The New Atlantis*, Summer 2009, pp. 112-116, available from *www.thenewatlantis.com/publications/test-ban-treaty-take-two*. For more information about the CHIC-4, See Thomas C. Reed and Danny B. Stillman, *The Nuclear Express: A Political history of the Bomb and Its Proliferation*, Minneapolis, MN: Zenith Press, 2009, pp. 131, 250-252, 261-262, discussing CHIC-4; See *also* International Atomic Energy Agency, "Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran," GOV/2011/65, November 8, 2011, pp. 33-35, discussing evidence suggesting that Iran received information from [the A.Q. Khan] nuclear smuggling network similar to that provided to Libya, including a nuclear weapons design, available from *www.iaea.org/Publications/Documents/Board/2011/gov2011-65.pdf*.

42. This is, however, a question to some extent analytically distinct from whether or not it is in the U.S. *interest* to ratify CTBT. That is a subject for another day.

43. See, e.g., Christopher Ford and Douglas Feith, "International Negotiations: A Tool to Serve our Interests," Hudson Institute papers on "Perspectives for the New Administration," January 2009, pp. 2-3, available from *www.hudson.org/files/publications/Ford%20and%20Feith%20-%20final%20lo-res.pdf*.

44. See, e.g., Leonid Brezhnev, "Prevention of Nuclear Catastrophe," *Pravda*, June 16, 1982, reprinted in *The USSR Proposes Disarmament, 1920s-1980s,* Moscow, Russia: Progress Publishers, 1986, pp. 245, 247; Yuri V. Andropov, "Excerpt from the Report by Yu. V. Andropov at a Jubilee Meeting in the Kremlin to Mark the Sixtieth Anniversary [sic] of the Formation of the Union of Soviet Socialist Republics," *Pravda*, December 21, 1982, reprinted in *Ibid.,* pp. 268, 269; "Statement by the Soviet Government," *Pravda*, May 28, 1983, reprinted in *Ibid.,* at 281, 283; Yuri V. Andropov and Tengiz N. Menteshashvili, "Excerpt from the Resolution of the USSR Supreme Soviet on the International Situation and the Soviet Union's Foreign Policy," *Pravda*, June 16, 1983, reprinted in *Ibid.,* pp. 285, 285-86.

45. See, e.g., Bill Winter, "Lawyers Join Hands Against Nuclear Arms," *ABA Journal*, Vol. 68, October 1982, p. 1202, recounting U.S. Defense Secretary Caspar Weinberger's complaint that a freeze would place the United States in "a position of permanent inferiority to the Soviets."

46. See, e.g., Yuri V. Andropov, "Excerpt from the Report by Yu. V. Andropov at a Jubilee Meeting in the Kremlin to Mark the Sixtieth Anniversary [sic] of the Formation of the Union of Soviet Socialist Republics," *Pravda*, December 21, 1982, reprinted in *The USSR Proposes Disarmament*, *supra*, p. 268; Brezhnev, *supra*, pp. 246-247.

47. See, e.g., "Draft Treaty on the Prohibition of the Stationing of Weapons of Any Kind in Outer Space," *Pravda*, August 12, 1981, reprinted in *The USSR Proposes Disarmament*, *supra*, pp. 240-242; "Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects," working paper presented by the delegations of China, the Russian, Federation, Vietnam, Indonesia, Belarus, Zimbabwe, and Syria to the UN Conference on Disarmament, June 28, 2002, avail-

able from *www.cfr.org/china/possible-elements-future-international-legal-agreement-prevention-deployment-weapons-outer-space-threat-use-force-against-outer-space-objects/p12181.*

48. See, e.g., Christopher Ford, "Getting Ready to Get 'Space Weapons' Wrong," *New Paradigms Forum* website, August 27, 2009, available from *www.newparadigmsforum.com/NPFtestsite/?m=20090827*.

49. See, e.g., Mark Schneider, "The Nuclear Forces and Doctrine of the Russian Federation and the People's Republic of China," prepared testimony before the U.S. House of Representatives Armed Services Subcommittee on Strategic Forces, October 14, 2011, p. 2.

50. See, e.g., André de Nesnera, "McFaul Takes Up Duties as US Ambassador to Russia," *VOA News*, January 12, 2012, available from *www.voanews.com/english/news/usa/McFaul-Takes-Up-Duties-as-US-Ambassador-to-Russia--137189763.html*.

51. See, e.g., James M. Acton, Michael S. Gerson *et al*., *Beyond New START: Advancing U.S. National Security Through Arms Control With Russia*, September 2011, p. 8, warning of stability implications of continuing Russian reliance on heavy MIRVed missiles and advocating a prohibition on new MIRVed ballistic missile systems, available from *csis.org/files/publication/110824_Acton_BeyondNewSTART_WEB.pdf*.

52. See NPT, *supra*, at Arts. I, describing nonproliferation obligations specific to nuclear weapon states (NWS); II, describing nonproliferation obligations specific to *non*-nuclear-weapon states (NNWS); III, describing safeguards obligations for NNWS; and IX (3), defining category of NWS.

53. See *id.*, at Art. VI, describing nuclear disarmament-related obligations); see also generally, e.g., Christopher Ford, "Debating Disarmament: Interpreting Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons," *Nonproliferation Review*, Vol. 14, No. 3, November 2007, at 401-28, available from *cns.miis.edu/npr/pdfs/143ford.pdf*.

54. See e.g., Ruth Whitehair and Seth Bruegger, "BWC Protocol Talks in Geneva Collapse Following U.S. Rejection," *Arms*

Control Today, September 2001, quoting Bush administration officials that proposed BTWC Protocol would have "almost no chance of discovering anything useful to the BWC" and "serve to misdirect world attention into non-productive channels," available from *www.armscontrol.org/print/900*; "U.S. rejects biological weapons checks," *Reuters*, December 9, 2009, quoting Obama administration officials reconfirming unfeasibility of protocol, available from *www.reuters.com/article/2009/12/09/us-arms-biological-idUSTRE5B82DG20091209*.

55. See e.g., Henry Sokolski, "Reactors and Bombs," *Weekly Standard*, January 23, 2012, available from *npolicy.org/article.php?aid=1138&rt=&key=reactors%20and%20bombs&sec=article&author=*.

56. See e.g., Ford, "Nuclear Technology Rights and Wrongs," *supra*, pp. 50-53.

57. See *generally* e.g., *Ibid.,* pp. 8-27, describing existence of, and arguments made by, different interpretive camps.

58. See e.g., Kenneth N. Waltz *et al*., *The Spread of Nuclear Weapons: More May Be Better*, Adelphi Papers, Vol. 21, No. 171, 1981.

59. Henry Sokolski has illustrated the challenges of such dynamics through charts comparing strategic relations in the present-day world of seven major nuclear-armed players—which produces 21 separate interactive dyads, each of which contains some potential for "strategic miscalculation"—and a more proliferated world of 17 players, in which the number of dyads spirals to 136. The emergence of still more players, of course, would make the contrast even sharper. See Henry Sokolski, "Nuclear 1914: The Worry Yet to Come," PowerPoint presentation at the Sandia National Laboratory, February 14-15, 2005, available from *www.npolicy.org/article_file/Slides021105SandiaNuclear19_020211_0809.pdf*.

60. Herman Kahn, *Thinking the Unthinkable in the 1980s*, New York: Simon & Schuster, 1984, p. 156.

61. See Thomas C. Schelling, "A World Without Nuclear Weapons?" *Daedalus*, Fall 2009, pp. 124, 127.

62. Herman Kahn, *On Thermonuclear War*, Princeton, NJ: Princeton University Press, 1960, p. 230.

63. Ford, "Nuclear Weapons Reconstitution and its Discontents," *supra*, pp. 149-50.

64. Schelling, *supra*, p. 127.

65. See generally Christopher Ford, "Misinterpreting the NPT," remarks at the Carnegie Endowment for International Peace, September 30, 2011, critiquing views advanced by Daniel Joyner in *Interpreting the Nuclear Non-Proliferation Treaty*, Oxford, UK: Oxford University Press, 2011, available from *www.newparadigmsforum.com/NPFtestsite/?p=1100*. For an alternative to the proliferation-facilitating interpretation of the NPT's technology-transfer provisions, see Ford, "Nuclear Technology Rights and Wrongs," *supra*.

66. START, *supra*, Art. XV.

67. New START, *supra*, Part Six.

68. Ford & Feith, *supra*, p. 2.

69. U.S. Department of Defense, *Annual Report to Congress on Military and Security Developments Involving the People's Republic of China,* Washington, DC: Office of the Secretary of Defense, 2010, p. 1, available from *www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf*.

70. See Amy Butler, John M. Doyle, and Michal Bruno, "Many Issues Still Unaddressed by Gates," *Aviation Week & Space Technology*, January 2, 2009, available from *www.aviationweek.com,* quoting Gates that "I'd begin to get pretty nervous if we begin to talk about below 1,500 [deployed U.S. warheads] just in view of the array of countries developing these systems and modernization programs in both Russia and China."

71. See, e.g., Christopher Ford, "The Treaty After Next?" remarks to the working group of the Project on Nuclear Issues at the Center for Strategic and International Studies, October 6, 2010,

available from *www.newparadigmsforum.com/NPFtestsite/?p=510*; Christopher Ford, "A Survey of the Nuclear Weapons Landscape," remarks to the Phoenix Committee on Foreign Relations, April 12, 2011, available from *www.newparadigmsforum.com/NPFtestsite/?s=brake*.

72. See, e.g., Jim Fanell, "Marking China's 'Peaceful Rise,'" *Naval Intelligence Professionals Quarterly*, Winter 2011-12, p. 19, quoting *People's Daily* comment about China's sea trials of the ex-Soviet aircraft carrier *Varyag* that "China will use the aircraft carrier and other kinds of battleships to solve disputes."

73. See, e.g., "America in the Asia-Pacific: We're Back," *The Economist*, November 19, 2011, available from *www.economist.com/node/21538803*; Peter Alford, "US back in Asia to stay: Hillary Clinton," *The Australian*, January 14, 2010, available from *www.theaustralian.com.au/news/nation/us-back-in-asia-to-stay-hillary-clinton/story-e6frg6nf-1225819009663*.

74. See, e.g., Leithen Francis, "Turning Tide," *Defense Technology International*, February 2012, pp. 28-29, discussing Vietnamese, Filipino, Singaporean, and Malaysian military procurement strategies in light of Chinese claims and provocations in the South China Sea.

75. Ford & Feith, *supra*, p. 2, emphasis added.

76. See, e.g., Christopher Ford, "Challenges of North Korean Nuclear Negotiation," in Charles King Mallory IV, ed., *Aspen DPRK-USA Dialogue*, 2011, pp. 63, 69, available from *aspeninstitute.de/en/publication/download/29/Aspen+DPRK-USA+Dialogue+.pdf*; Christopher Ford, "Looking Ahead to the 2012 Nuclear Security Summit," remarks to the conference on "The Nuclear Security Summits: Impact and Assessment," Hudson Institute, September 13, 2011, available from *www.newparadigmsforum.com/NPFtestsite/?p=1092*.

77. It was also noted, however, that the United States "reserves the right to make any adjustment in the assurance that may be warranted" by biological weapons threats. The report also indicated that there still exists a role for potential nuclear weapons first use in "deterring conventional or CBW attack" from nuclear

weapons possessors or states not in compliance with nuclear non-proliferation obligations. *Nuclear Posture Review Report*, *supra*, pp. viii, 15-16, 46.

78. Christopher Ford, "The Catch-22 of NFU," *New Paradigms Forum* website, January 4, 2011, available from *www.newparadigmsforum.com/NPFtestsite/?p=562*.

79. NPT, *supra*, at Art. I, "Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices."

80. See generally, e.g., Christopher Ford, "NATO, 'Nuclear Sharing,' and the 'INF Analogy,'" *New Paradigms Forum* website, March 30, 2011, available from *www.newparadigmsforum.com/NPFtestsite/?p=793*.

81. See generally, e.g., Brian Donnelly, "The Nuclear Weapons Non-Proliferation Articles I, II and VI of the Treaty on the Non-Proliferation of Nuclear Weapons," undated, arguments of British diplomat that the NPT "does not deal with arrangements for deployment of nuclear weapons within allied territory as this does not involve any transfer on nuclear weapons or control over them, unless and until a decision were made to go to war, at which time the Treaty would no longer be controlling," available from *www.opanal.org/Articles/cancun/can-Donnelly.htm*. U.S. officials made the same point to the U.S. Senate during the NPT's ratification debate in 1968. See, e.g., Martin Butcher *et al*., "NATO Nuclear Sharing and the NPT—Questions to be Answered," PENN/BASIC-BITS-CESD-ASPR Research Note 97.3, June 1997, available from *www.bits.de/public/researchnote/rn97-3.htm*.

82. While NATO policy envisioned such transfer *in the event of full-scale war with the Soviet Union*, of course, such war thankfully never actually transpired. As a result, no such NPT Article I violation by the United States occurred. Those who maintain that the very existence of this NATO contingency plan amounts to an

NPT Article I violation—i.e., that anticipating the *possibility* of an Article I violation is *itself* a violation—are on embarrassingly weak analytical ground. *Cf.* Mayor Wolfgang Leidig [of the German municipality of Schwaebisch Gmuend], "NATO's Nuclear Sharing: A Threat to the NPT," remarks to the 2008 Preparatory Committee Meeting for the 2010 Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons, April 29, 2008, p. 2, "NATO nuclear sharing appears to breach these [NPT] obligations," available from *www.reachingcriticalwill.org/legal/npt/prepcom08/ngostatements/NuclearSharing.pdf*.

83. Agreement on Guidelines for the Transfer of Equipment and Technology Related to Missiles, April 16, 1987, 26 I.L.M. 599 (hereinafter MTCR).

84. Hague Code of Conduct, November 25, 2002, available from *www.hcoc.at/#*.

85. See, e.g., Austrian Federal Ministry for European and International Affairs, "Hague Code of Conduct against Ballistic Missile Proliferation, HCOC," information sheet, undated, available from *www.bmeia.gv.at/index.php?id=64664&L=1*.

86. See generally Christopher Ford, "The Nonproliferation Bestiary: A Typology and Analysis of Nonproliferation Regimes," *NYU Journal of International Law and Politics*, Vol. 39, No. 4, Summer 2007, pp. 937, 970-971.

87. To give just one very recent example, it has been reported that even though Russia proved willing to transfer an entire nuclear-powered attack submarine to India—a sophisticated *Akula II*-class vessel recommissioned in Indian service as the *INS Chakra* on January 23, 2012—Moscow did *not* transfer the submarine's usual complement of long-range (3,000-kilometer) cruise missiles as well, because to do so would have constituted a breach of MTCR standards. See "India Acquires Nuclear Sub," *Defense Technology International*, February 2012, p. 10.

88. See International Atomic Energy Agency (IAEA), "Communication Received from the Permanent Mission of Brazil Regarding Certain Member States' Guidelines for the Export of Nuclear Material, Equipment, and Technology," IAEA Doc.

INFCIRC/254/Rev.9/Part 1, November 7, 2007, available from *www.ornl.gov/sci/risk/TriggerList11-2008.pdf*, transmitting guidelines and Trigger List.

89. See generally Australia Group, "The Origins of the Australia Group," undated, available from *www.australiagroup.net/en/origins.html*.

90. U.S. Secretary of State Hillary Clinton, remarks regarding plans for an International Code of Conduct for Outer Space Activities, January 17, 2012, available from *www.cfr.org/space/clintons-statement-international-code-conduct-outer-space-activities-january-2012/p27108*. The United States, however, has not proven willing to agree to a "space code" effort drafted earlier by the European Union.

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