

Bombs Away? Being Realistic about Deep Nuclear Reductions

There are about 22,000 nuclear warheads in the world today.¹ Reducing that number—eventually to zero—is a major element of U.S. President Barack Obama’s foreign policy. To date, his administration’s progress toward this goal has been modest, even with agreement on a new round of U.S.–Russian cuts with the New START treaty. Nonetheless, opponents of his agenda, particularly in Congress, worry that any further arms control will pitch the United States down a slippery slope toward zero. Simultaneously, supporters increasingly complain that Obama has not been bold enough. Their frustration, which is felt in capitals across the world, risks compromising the willingness of key states to support important U.S. foreign policy objectives, especially those related to nonproliferation.

Neither these fears nor these frustrations are fair. Skeptics and supporters tend to ignore the practical realities of deep reductions. Nuclear-armed states will only agree to deep reductions if at least three demanding conditions are met:²

- Arms build-ups in China, India, and Pakistan must be stabilized. Because nuclear-armed states exist in a web of interconnected deterrence relationships, the emerging nuclear competition in Asia could impact the U.S.–Russian reductions process in the not-too-distant future. Further proliferation, particularly in the Middle East, would complicate the reductions process yet further.

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Some of the key barriers to progress lie outside of Washington.

- Nuclear-armed states—especially Russia and China—will have to be convinced that arms control will not undermine the survivability of their nuclear forces, a task complicated by developments in conventional weaponry, particularly ballistic missile defense and long-range high-precision conventional munitions.

- Nuclear-armed states will also have to be satisfied that reductions will not exacerbate existing imbalances in conventional forces.

Two important observations immediately emerge from this list. First, some of the key barriers to progress lie outside of Washington. While the United States can certainly take the lead in the reductions process—as indeed it has done—it cannot succeed without the cooperation of other nuclear-armed states. This realization should prompt supporters of further arms control to recalibrate their expectations.

Second, creating these conditions—if, indeed, they can be created—will take time. However, if efforts in this direction are not made, states’ concerns are likely to fester and prompt them to take countermeasures that will negatively impact regional and global security. This twin realization should help persuade opponents that further reductions are almost certain to be gradual and—much more importantly—that their pursuit is worthwhile.

New Actors: Nuclear Reductions in a Multipolar World

During the Cold War, nuclear reductions were essentially a U.S.–Russian bilateral issue. This will change in the not-too-distant future when the downward trajectory of the American and Russian arsenals risks colliding with the upward trajectory in China, India, and Pakistan. Additionally, further proliferation in the Middle East would add yet more complexity to the reductions challenge.

A New “Big Five” and Beijing’s Coming Central Role

The future evolution of the world’s nuclear arsenals will depend principally on the interactions of five states. Conceptually, as shown in Figure 1, these states form two triangles. The first consists of the United States, Russia, and China; the second: China, India, and Pakistan.

Each state in the U.S.–Russia–China triad can envisage major war with either of the other two and so seeks to deter both of them. Historically, the United States and Russia have tended to view China as something of a “lesser included case” for deterrence purposes, and so Beijing’s nuclear weapons have exerted relatively little influence on the development of their own arsenals. Since the end of the Cold War, however, the United States and Russia have

Figure 1. The web of major deterrence relations between the nine nuclear-armed states. Solid lines show those that will exert a first-order effect on the nuclear reductions process. Dashed lines mark those with a secondary influence.



become increasingly attentive to Chinese nuclear capabilities. China is currently building up its arsenal, especially its long-range forces, very slowly.³ The United States and Russia both worry that if they continue to make reductions, China might be prompted to build up much more rapidly in an attempt to “sprint to parity.”⁴

To be fair, Beijing’s arsenal is at least a factor of ten—and possibly twenty—times smaller than either Washington’s or Moscow’s, and so further U.S.–Russian reductions should be possible before a Chinese sprint to parity becomes a realistic possibility. However, at some point in the arms control process—possibly after the next round of bilateral cuts—the United States and Russia will simply refuse to make further reductions unless China is willing to involve itself. (Similarly, there will also come a point when Russia, which has tended to view British and French nuclear weapons as extensions of the U.S. arsenal, will make its involvement in further

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Further reductions are almost certain to be gradual and—much more importantly—worthwhile.

arms control contingent upon France and the United Kingdom also taking part.⁵)

China is the point where the two triangles meet. When it comes to defense planning, Beijing looks not only north and east, it also looks south—to India. Although the 1962 Sino–Indian war sparked New Delhi’s quest for nuclear weapons, historically India has probably only been a background element in China’s nuclear planning. In fact, China has tended to view India just as the United States and Russia used to regard China—as a lesser included

case. However, some Chinese officials are privately starting to acknowledge that events on the subcontinent may force them to take India’s nuclear weapons much more seriously in the future.

An arms race in nuclear material between India and Pakistan appears to be in the offing. Worried about its growing conventional inferiority and India’s growing nuclear capability, Pakistan is rapidly building up its nuclear arsenal. To facilitate this expansion, Pakistan is currently augmenting its capability to produce nuclear material. In addition to its long-standing uranium enrichment efforts (fathered by the notorious scientist and black-market trader A.Q. Kahn), Islamabad is increasing its number of plutonium-production reactors from one to four.⁶

So far, India has not responded. All the nuclear material for its weapons appears to have been produced in just two plutonium-production reactors (one of these has recently been shut down although there are plans to replace it).⁷ If India’s patience runs out, however, it could rapidly augment its arsenal. India has a large stockpile of separated plutonium, nominally reserved for use as fuel in its first large-scale “breeder” reactor which is currently in the final stages of construction. However, India has more than enough material for this purpose, and some of it could be used in weapons. Moreover, breeder reactors are so called because they produce (or “breed”) more plutonium than they consume. It so happens that this material is particularly suitable for use in nuclear weapons. In fact, when the United States and India negotiated the deal that paved the way for India to engage in global nuclear commerce, New Delhi ensured that its breeder program, its stockpile of separated plutonium, and eight of its power reactors would not be subject to International Atomic Energy Agency (IAEA) inspections, raising concerns that they were a strategic hedge. Finally, India also has an expanding enrichment program that, while apparently intended to produce fuel for submarines, could also be employed for weapons purposes.

If Pakistan’s quest for nuclear materials sparks a counter-reaction from India, then China might feel obliged to respond in turn. This would impede future

U.S.–Russian reductions. The prospects for preventing these dynamics by forestalling a South Asian competition in nuclear materials are poor. For almost 15 years, the international community has sought to negotiate a treaty banning the production of nuclear material for weapons. Currently, Pakistan is blocking negotiations from even beginning. Not entirely unreasonably, it points out that the established nuclear powers—the United States and Russia

especially—only became interested in such a treaty after they had produced more nuclear material than they know what to do with. However, even if Pakistan were to drop its objections, there are serious questions about whether China, India, and Israel would be willing to negotiate in good faith.

The future of the world's nuclear arsenals will depend principally on five states.

The Wild Card: Further Proliferation

While interactions among the new “big five” are likely to slow and complicate the reductions process, the biggest wild card is the possibility of further proliferation. Iran is not the only possible candidate for entry to the nuclear club, but it is most likely to be next. The tremendous political and psychological shock waves of an Iranian nuclear weapons test would be felt in all the nuclear-armed states (except perhaps North Korea), but most profoundly in Israel, the United States, and Pakistan. The reverberations would also rock U.S. friends and allies including Egypt, Turkey, and the Gulf states. One probable consequence—and not the most serious by far—would be derailing arms reductions efforts (whether or not further reductions would actually have an impact on deterring Iran). The prospects for reductions would be even further undermined if an Iranian bomb sparked a Middle Eastern proliferation cascade (which is neither inevitable nor unimaginable). Beyond political and psychological shock, interactions among the nuclear weapons programs of new proliferators and more established powers could exacerbate the strategic problems explored above. For instance, if nuclear weapons cooperation between Pakistan and Saudi Arabia materialized, leading Pakistan to produce enough nuclear material for two, it would become even harder than it currently is to restrain a South Asian nuclear arms race.

North Korea could make these problems even worse by providing nuclear weapons assistance to Middle Eastern states. Indeed, proliferation *from* North Korea could affect global nuclear arms reductions much more than the development of its own small nuclear arsenal. North Korea sold Syria the plutonium-production reactor that Israel destroyed in September 2007 and, in late 2010, it revealed the existence of a large-scale centrifuge program.⁸ There is

real cause for concern, therefore, that Pyongyang may take up where A.Q. Kahn left off and sell centrifuges or, even more seriously, highly-enriched uranium to clients in the Middle East or elsewhere.

Israel's small nuclear arsenal could also impact proliferation—and hence the reductions process—although any effect would be much less direct than North Korea's. Israeli nuclear weapons are a hedge against losing conventional superiority to its neighbors and do not appear to have a significant impact on the nuclear planning of any other state that currently possesses nuclear weapons. Indeed, if Israel features at all in such planning, it is only as a second-order consideration in Russian and Pakistani thinking. However, there has been some speculation that an Iranian bomb might push Israel into publicly acknowledging its possession of nuclear weapons.⁹ This provocative step might add to the inflationary pressure on Pakistan's nuclear arsenal and exacerbate regional proliferation dynamics. Indeed, to make matters worse, Israel's nuclear arsenal appears to somewhat increase the resistance of some Arab states to strengthening the nonproliferation regime. They argue (somewhat self-defeatingly perhaps) that it is unreasonable for them to accept tougher IAEA safeguards, for instance, while Israel remains outside of the nonproliferation regime.

Familiar Calculations: Force Survivability

Even though the range of relevant actors has increased in the last 20 years, nuclear strategy is, in many respects, much as it ever was. Force survivability, in particular, is a major preoccupation of all nuclear-armed states, especially potential U.S. adversaries, and concerns about it will slow the pace of nuclear reductions. With the possible exception of North Korea, whose views on nuclear deterrence remain utterly opaque, all nuclear-armed states worry that arsenals that were too small would lack survivability (although they have reached different conclusions about what “too small” means in practice). Russian and Chinese concerns, in particular, are exacerbated by developments in ballistic missile defense as well as high-precision long-range conventional munitions. These concerns act as a break on the willingness of some states to contemplate further reductions.

Size and Survivability

Russia and China, in particular, worry about the possibility that, in a deep crisis, the United States might launch a pre-emptive first strike that would destroy their nuclear forces and hence their ability to retaliate. In the modern world, such fears may appear anachronistic, like something that could concern only Dr. Strangelove. But states retain nuclear weapons, in part at least, out of the fear that they will find their vital interests—and perhaps even their very

existence—threatened. Consequently, nuclear planners have to analyze and insure against extreme steps that could be taken in the heat of a life-or-death crisis.

Russian concerns about the survivability of its nuclear forces are a manifestation of its essential post-Soviet strategic challenge of defending a vast country with an aging population, limited resources, and an antiquated industrial base. According to

Russia's 2010 Military Doctrine, the single biggest threat it faces is "the desire to endow the force potential of the North Atlantic Treaty Organization (NATO) with global functions carried out in violation of the norms of international law and to move the military infrastructure of NATO member countries closer to the borders of the Russian Federation, including by expanding the bloc."¹⁰ To many Western ears, this threat sounds utterly fanciful; in Russia, the possibility that a conventionally superior NATO could turn hostile is a basic assumption of defense planning.

Moscow believes that its conventional weakness is exacerbated by the frailty of its nuclear forces. Specifically, Russian defense planners fear that if Washington ever came to believe it could launch a disarming first strike, Russia's nuclear deterrent would be compromised, and conventional bullying by NATO would become more likely. To be clear, these fears are about the future. Moscow recognizes that the United States could not conduct a successful first strike today.¹¹ However, if Russian nuclear forces were smaller and hence easier to destroy, it worries that a first strike could become a realistic option for the United States in a future crisis. In consequence, the Russian government has stated that it will only consider further nuclear reductions if the United States addresses its concerns about force survivability.¹²

China has similar but more acute concerns than Russia—after all, the Chinese arsenal is considerably smaller. Indeed, Beijing's fears about the survivability of its forces may be a significant driver in its current, very gradual modernization (this process began 20 or 30 years ago when the United States enjoyed even greater numerical superiority than it does today). Historically, China has used opacity about the size of its force to enhance survivability; if an adversary does not know exactly how many nuclear weapons China has, it cannot be certain it could eliminate them all in a first strike. Today though, China is coming under increasing pressure to be more transparent. The United States and Russia, in particular, view greater Chinese transparency as the first step toward convincing themselves that continued bilateral reductions would not spur Beijing to attempt a sprint to parity. Such transparency is,

Transparency is only likely if Beijing has increased confidence in its nuclear forces survivability.

however, only likely to be forthcoming if Beijing has increased confidence in the survivability of its nuclear forces.

The prospects for further reductions have been enhanced by steps that both Russia and China have taken to enhance the survivability of their nuclear forces. Talk of invulnerable delivery platforms typically conjures up images of nuclear-armed submarines silently prowling the oceans, and indeed both states are close to fielding new classes of submarines. Missiles on submarines at sea are almost certainly more survivable than missiles in silos (or “tombs” as the Chinese sometimes call them). Nevertheless, given the United States’ lead in anti-submarine warfare and the low operational status of both Russian and Chinese boats, they are actually *not* the most survivable systems that either state possesses.

The most survivable Russian and Chinese forces are their road-mobile ballistic missiles. Russia currently has about 140 road-mobile intercontinental ballistic missiles (ICBMs).¹³ The U.S. intelligence community estimates that China has about 95–120 transporter-erector launchers for nuclear-capable missiles of a variety of ranges.¹⁴ Both states have had mobile missiles for decades but, surprisingly, their significance is frequently overlooked. Once dispersed, road-mobile missiles are exceptionally difficult to destroy.¹⁵ Not only must they be located (and their potential roaming grounds are vast) but they then must be eliminated within minutes, before they have fired or been moved to a new location. Incredibly close and rapid coordination between ISR (intelligence, surveillance, and reconnaissance), strike assets, and the national authority authorizing a strike would be required.

The first attempt by the United States to destroy an adversary’s mobile missile force was the great Iraqi Scud Hunt of 1991. A total of 1,460 air sorties were launched against Scud-related targets without a single confirmed kill.¹⁶ The United States has been working hard to rectify this deficiency, but its capabilities still fall far short of what would be required to effectively destroy even a fraction of Russia’s and China’s mobile missiles. A 2009 study by the U.S. Defense Science Board, a Pentagon advisory panel, examined the challenge of destroying 10 nuclear-armed mobile ICBMs in a “regional power” (i.e., North Korea or Iran, not Russia or China). It estimated that even with \$20 billion of spending on new strike systems, ISR, and command and control, the United States would still lack a “good” capability.¹⁷ Yet, the challenges of destroying North Korean or Iranian missiles pale in comparison to those the United States would face if it wished to conduct a similar operation against Russia or China. These additional challenges would include a much more contested battle space (including significantly better air defenses), sophisticated anti-satellite capabilities that could take out U.S. satellites involved in reconnaissance, targeting, and communications, and much wider potential deployment areas.

That said, their robust mobile missile forces have not enhanced Russian and Chinese confidence in the adequacy of their nuclear deterrents as much as might be expected.¹⁸ This lack of confidence is largely a result of concerns that their nuclear forces could, in the future, become vulnerable to U.S. *conventional* weapons—a fear that has largely emerged since the end of the Cold War.

Ballistic Missile Defense

Ballistic missile defense has stoked controversy between the United States and Russia since the 1960s (although its intensity has ebbed and flowed and the two sides have actually switched positions). The issue was effectively put to rest during the second half of the Cold War by the 1972 Anti-Ballistic Missile Treaty, which severely limited deployments. The controversy was reignited, however, in 2001 when President George W. Bush announced that the United States would withdraw from the treaty. Washington has justified its development of ballistic missile defenses since the end of the Cold War in terms of combating emerging threats from regional powers, consistently stating that the goal is not to undermine Russia's or China's nuclear deterrents. And indeed, both Moscow and Beijing understand that existing U.S. defenses have essentially no capability against their ICBMs. However, both worry that, after further development, expanded defenses could enable the United States to “mop up” any weapons it could not destroy in a first strike, including mobile missiles. This reduces Moscow's interest in further arms reductions and Beijing's interest in capping its arsenal since such steps would, in theory at least, make missile defense easier.

Russian concerns (and probably those of China too) stem partly from the U.S. domestic debate, to which Moscow pays close attention. Russian defense planners are well aware of a vocal constituency within the United States that does not want to rule out the option of developing and deploying defenses to negate Russia's deterrent.¹⁹ Moscow worries that further reductions would, in the words of four highly respected Russian analysts including two retired generals, “be destabilizing if, after Obama, the Republican Party returns to power in the United States and resumes after 2020 a massive deployment of strategic missile defenses, including ground-based, sea-based, air-based, and space-based systems.”²⁰

Ballistic missile defense technology is, however, no longer confined to the two former Cold War rivals. In an underappreciated development, China, India, and Israel are all developing their own defenses, while France and the United Kingdom are due to be covered by a shield that NATO is committed to building. Especially in the China–India–Pakistan triad, defenses may make arms build-ups harder to contain, as concerns about the effect of rivals' defenses on force survivability will exacerbate pressures to build larger forces.

Cooperation on ballistic missile defense, while highly desirable from many perspectives, may actually worsen these arms race dynamics. To ease Russian concerns about U.S. ballistic missile defenses, the Obama administration (like its predecessor) has offered to pursue their development cooperatively. Intensive negotiations to develop a framework for cooperation are currently ongoing. While successful cooperation would probably help ease Russian concerns, it would also have the unintended side-effect of intensifying Chinese fears. Moreover, NATO has recently sought to initiate cooperation with India, which is currently considering the offer.²¹ Neither Beijing nor Islamabad would likely view such cooperation, if it gets off the ground, as benign.

Long-Range High-Precision Conventional Weapons

Over the long term, ballistic missile defenses may, in fact, not turn out to be the most significant of what might be termed “strategic conventional” capabilities; long-range high-precision conventional munitions could ultimately claim that title.²² The possible effect of such weapons on the reductions process is, however, similar: worries that high-precision conventional weapons will become capable of eliminating nuclear forces before launch increase states’ reluctance to engage in arms reduction efforts.

Conventional Prompt Global Strike—an embryonic U.S. initiative to develop high-precision conventional weapons capable of hitting a target anywhere in the world within an hour—is the most high-profile program of its ilk. Originally oriented toward developing conventionally-armed ICBMs, the Obama administration has recently refocused this program toward “boost-glide” vehicles, rocket-launched gliders that travel at hypersonic speeds in the upper atmosphere.

Washington has stated that Conventional Prompt Global Strike is not intended to change the strategic balance with Russia or China.²³ However, both Moscow and Beijing are concerned that, once the technology is ready, the United States might expand deployment plans to the point where their nuclear forces are threatened. Russian and Chinese officials and experts have even discussed the possibility that, with a combination of high-precision conventional weapons and ballistic missile defense, the United States might become able to disarm Russia and China without crossing the nuclear threshold.²⁴ In light of these concerns—and also similar concerns about the threat from conventional cruise missiles—it should come as no surprise that Moscow is investing heavily in air defenses. Indeed, Russia’s 2010 Military Doctrine states that a key task of the Russian military is defending Russia from “air and space attack” (its term for high-precision weapons and their spaced-based enabling systems).²⁵

Beyond exacerbating Russian fears about the survivability of its forces, Conventional Prompt Global Strike could affect U.S.–Russian nuclear dynamics

in other ways. Recent writing in the Russian literature suggests that Moscow may be starting to view its tactical nuclear weapons as a counterweight to U.S. high-precision conventional weapons.²⁶ Tactical nuclear weapons are a diverse category of generally short-range weapons that, really, have just one common attribute: they are not subject to “strategic” arms control. Curtailing Russia’s much larger force of tactical nuclear weapons is a major goal of the United States and its allies. The nascent linkage between tactical nuclear weapons and high-precision conventional weapons will make that harder.

Long-range high-precision conventional weapons are often talked about as though they were the exclusive preserve of the United States and its allies. In fact, although a sophisticated technology, they are probably easier to develop than ballistic missile defense (if the latter requires “hitting a bullet with a bullet,” the former is analogous to using a sniper rifle to hit a stationary or slowly moving target). It is hardly surprising, therefore, that similar weapons are relatively widespread among the nuclear-armed states. China, India, Pakistan, and North Korea all have conventionally-armed ballistic missiles with ranges that, while far short of intercontinental, are still substantially longer than any existing U.S. or Russian systems. Moreover, some Chinese, Indian, Russian, and possibly Pakistani ballistic missiles possess relatively sophisticated terminal guidance systems that would be a useful starting point for developing accurate longer-range conventional missiles. In the not-too-distant future, it is possible that these weapons (and also long-range conventional cruise missiles) could significantly impact nuclear deterrence between Russia and China, China and India, and India and Pakistan by threatening an adversary’s nuclear forces. By contrast, developments in high-precision conventional weaponry are much less likely to compromise U.S. nuclear forces, which have a highly survivable submarine-based component (which is not to say that they won’t impact U.S. security in other ways).

Conventional (Im)Balances

Ballistic missile defense and long-range high-precision conventional weapons are examples of strategic conventional capabilities. However, imbalances in troops, tanks, planes, ships, aircraft, and so on—“general purpose” forces that can be used to project power or defend against power projection—are also highly relevant to nuclear arms reductions. Nuclear weapons have always been seen as a counterweight to conventional imbalances. Consequently, evolving balances in general purpose forces—between the pairs of NATO and Russia, the United States and China, Russia and China, China and India, India and Pakistan, and Israel and its neighbors—will also have significant implications for nuclear-armed states’ views on the desirability of deep reductions.

During the Cold War, NATO saw nuclear weapons as a counterweight to Russia's perceived conventional superiority in Europe. Today, Russia is conventionally inferior to both NATO and China. In consequence, it has come to view its nuclear forces—particularly its tactical weapons—as compensation. It should come as no surprise, therefore, that Russian doctrine relies much more heavily on nuclear weapons than Soviet doctrine did, although Russia's 2010 Military Doctrine did slightly reduce the role of nuclear weapons compared to its predecessor from 2000.²⁷ At what stage Russian fears about its conventional weakness will impact nuclear reductions is not knowable; that they will at some point is much clearer.

The Sino-U.S. balance in the West Pacific is also significant. Because the United States currently enjoys conventional superiority in the region, nuclear weapons play a relatively small role today in American thinking about how to fulfill its defense commitments to Japan, South Korea, and Taiwan. However, if China is successful in closing the conventional gap, then interest amongst the United States and its allies in further reducing the role and number of nuclear weapons could wane. Conversely, if China is unsuccessful in closing the gap, it may decide to rely more heavily on nuclear weapons and become even less willing to provide the United States and Russia with the assurances they want about Beijing's long-term nuclear intentions.

Concerns about imbalances in general purpose forces can interact with concerns about the survivability of nuclear forces. Long-range high-precision conventional weapons not only have implications for nuclear deterrence through the possibility of holding nuclear weapons at risk, they could also impact conventional imbalances by threatening the survivability of general purpose forces. These concerns are already playing out between the United States and China. Washington is growing increasingly concerned that Chinese conventional ballistic missiles could undermine its ability to project power and hence fulfill its defense commitments in the West Pacific. The development of the DF-21D, a Chinese conventional ballistic missile designed to target U.S. aircraft carriers and hence contribute to "anti-access/area-denial" operations in the Taiwan Straits, is particularly notable.²⁸ The Pentagon is currently considering the pros and cons of boost-glide weapons, which could potentially penetrate highly defended airspace and destroy key enemy assets (such as command and control nodes or radars), as a potential countermeasure. In turn, these systems exacerbate Chinese fears about the survivability of its nuclear forces. Breaking these dynamics could prove extremely difficult.

Finally, conventional imbalances are having a dramatic impact on arms race dynamics in South Asia. Pakistani fears about its conventional inferiority have been aggravated over the last few years by India's controversial Cold Start doctrine.²⁹ In the event of another terrorist atrocity on Indian soil, this doctrine

calls for a rapid, shallow conventional thrust into Pakistan to try to force Islamabad to clamp down on terrorist activities sponsored by elements within the Pakistani state. Although Indian political leaders have recently distanced themselves from Cold Start, and the current chief of staff of the Indian army has issued a “non-denial denial” of the doctrine’s existence,³⁰ it still looms

large in Pakistani thinking. Islamabad is increasingly looking to tactical nuclear weapons to respond, apparently viewing them as some form of “super-artillery” that could be used to annihilate advancing Indian armor.³¹ As NATO discovered early in the Cold War, the number of nuclear weapons needed to implement such a strategy is large. Pakistani nuclear strategy may thus help fuel the unstable nuclear dynamics among it, India, and China.

Further reductions will require states to manage the problems that make them hard to achieve.

Conclusions: Take a Breath

There is no easy or quick way to create the conditions required for deep reductions or to gloss over the complex and interacting concerns raised here. Pakistan’s nuclear build-up has been greeted with consternation for the security of its weapons and nuclear material. This build-up, coupled to Indian conventional superiority, also stokes tensions on the sub-continent. Meanwhile, these dynamics have the potential to affect the United States through China, which sits at the center of the web of deterrence relations with India, the United States, and Russia. None of the states in the U.S.–Russia–China triad is entirely comfortable with existing conventional balances. The problem is not simply—as it is sometimes portrayed to be—that by pursuing ballistic missile defense and long-range high-precision conventional weapons, the United States is threatening Russia’s and China’s nuclear forces and undermining their security. Chinese and Russian developments, including their pursuit of conventional precision strike capabilities, simultaneously undermine legitimate U.S. security interests. Even beyond their complicating effects on nuclear reductions, these dynamics damage relations among these states.

Given the complexity and fluidity of the underlying dynamics, grand “über-solutions” are destined to fail. Muddling through—solving each problem one by one as the political conditions allow—is realistically the best that can be hoped for. This will not be accomplished quickly, not least because cooperation among multiple states is required; the United States cannot create the conditions by itself. The daunting nature of the challenge naturally raises the

fundamental question of why: Why even bother to try to make further reductions given all the difficulties?

The best answer to this question lies with the process—the proverbial journey along the way—not just the outcome. The goal of reducing nuclear numbers is worthwhile precisely because it will require states to manage the problems that make it hard to achieve.³² An emerging arms race in South Asia will have to be stabilized and further proliferation prevented. Confidence in force survivability will have to be enhanced and conventional balances stabilized. Motivating the collective action required to do all this will be extremely difficult. But the alternative—simply ignoring these challenges—is likely to lead to a less secure world.

This is a challenge that was never likely to be accomplished in one U.S. presidential term, or by one president. It is likely to last, and be useful for, generations. Ultimately, further significant nuclear reductions will only be achievable if states succeed in simultaneously improving international relations. For that reason, if for no other, they are a worthwhile goal. But they won't be accomplished any time soon.

Notes

1. This figure includes weapons awaiting dismantlement. Robert S. Norris and Hans M. Kristensen, "Global Nuclear Weapons Inventories, 1945–2010," *Bulletin of the Atomic Scientists* 66, no. 4 (July/August 2010): p. 78.
2. For recent analyses of whether states' concerns are justified see James M. Acton, *Deterrence During Disarmament: Deep Nuclear Reductions and International Security*, Adelphi 417 (Abingdon: Routledge for the International Institute for Strategic Studies, 2011); Malcolm Chalmers, Andrew Somerville, and Andrea Berger eds., *Small Nuclear Forces: Five Perspectives*, Whitehall Report 3–11 (London: Royal United Services Institute, 2011), http://www.rusi.org/downloads/assets/Whitehall_Report_3-11.pdf.
3. For a description of Chinese modernization efforts largely based on available U.S. intelligence estimates see Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2011," *Bulletin of the Atomic Scientists* 67, no. 6 (November/December 2011): pp. 81–87.
4. See, for example, remarks by then Secretary of Defense Donald H. Rumsfeld during the hearing before the Senate Foreign Relations Committee on "Treaty on Strategic Offensive Reductions: The Moscow Treaty," July 2002, p. 111, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=107_senate_hearings&docid=f:81339.pdf; and Brad Roberts, "On Order, Stability, and Nuclear Abolition," in *Abolishing Nuclear Weapons: A Debate*, eds. George Perkovich and James M. Acton (Washington, D.C.: Carnegie Endowment for International Peace, 2009), p. 167, http://www.carnegieendowment.org/files/abolishing_nuclear_weapons_debate.pdf.
5. In fact, a number of senior Russian officials have stated that the next round of arms control should be multilateral, although it seems more likely than not that Russia will relent on this demand. See, for example, the remarks of the Russian Ambassador to the United States, Sergei Kislyak, at "What's Next After New START?" 2011 Carnegie

- Nuclear Policy Conference, Washington, D.C., March 28–29, 2011, p. 6, http://carnegieendowment.org/files/Whats_Next_After_New_Start.pdf.
6. For a detailed discussion of Pakistani nuclear material production see “Pakistan,” in International Panel on Fissile Materials, *Global Fissile Material Report 2010: Balancing the Books: Production and Stocks* (IPFM, 2010), chapter 10, http://www.fissilematerials.org/ipfm/site_down/gfmr10.pdf. Since this report was published, evidence of a fourth plutonium production reactor has emerged. See Joby Warrick, “Nuclear Experts say Pakistan may be Building 4th Plutonium Reactor,” *Washington Post*, February 9, 2011, <http://www.washingtonpost.com/wp-dyn/content/article/2011/02/09/AR2011020906388.html>.
 7. For a detailed discussion of Indian nuclear material production see “India,” in International Panel on Fissile Materials, *Global Fissile Material Report 2010*, chapter 9.
 8. Sigfried S. Hecker, “What I Found in Yongbyon and Why it Matters,” *APS News* 20, no. 3 (March 2011): p. 8, <http://www.aps.org/publications/apsnews/201103/upload/March-2011.pdf>.
 9. For example, Eric S. Edelman, Andrew F. Krepinevich, and Evan Braden Montgomery, “The Dangers of a Nuclear Iran: The Limits of Containment,” *Foreign Affairs* 90, no. 1 (Jan/Feb 2011), p. 69.
 10. “The Military Doctrine of the Russian Federation,” February 5, 2010, para. II.8.a (unofficial translation), http://carnegieendowment.org/files/2010russia_military_doctrine.pdf.
 11. As discussed further below, Moscow currently views ballistic missile defense as the single most important factor affecting the survivability of its nuclear arsenal. Given U.S. plans, Russian analysts often identify 2020 as the point at which the survivability of their nuclear forces could become seriously threatened. See, for example, Dmitri Trenin, “Russian Perspectives on the Global Elimination of Nuclear Weapons,” in *Unblocking the Road to Zero: Russia and the United States*, ed. Barry Blechman (Washington, D.C.: Henry L. Stimson Center, 2009), p. 15, http://www.stimson.org/images/uploads/research-pdfs/Russia_US_Format_FINAL.pdf. See also note 20.
 12. For example, Sergei Lavrov, “Remarks to the State Duma,” January 14, 2011, Moscow, http://www.mid.ru/brp_4.nsf/0/B4B970B7D9B7FAD9C3257818005CDBD2 (in Russian).
 13. Hans M. Kristensen and Robert S. Norris, “Russian Nuclear Forces, 2011,” *Bulletin of the Atomic Scientists* 67, no. 3 (November/December 2011): table 1. Russia’s mobile missiles are RS-12M (SS-25), RS-12M1 (SS-27 Mod 1), and RS-24. The exact number of launchers and their deployment locations are declared to the United States pursuant to New START.
 14. Office of the Secretary of Defense, *Military and Security Developments Involving the People’s Republic of China 2010* (Department of Defense, 2010), p. 66, http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf. China’s nuclear-capable mobile missiles are DF-3 (CSS-2), DF-21 (CSS-5), DF-31, and DF-31A. Given that some DF-21 variants are conventionally armed, China is estimated to have about 100 nuclear-armed missiles for its mobile launchers. Kristensen and Norris, “Chinese Nuclear Forces, 2011,” table 1.
 15. Acton, *Deterrence During Disarmament*, pp. 44–46.
 16. Barry D. Watts and Thomas A. Keaney, “Effects and Effectiveness,” in *Gulf War Air Power Survey*, Volume II, Part II (Washington D.C.: 1993), pp. 330–332, http://www.airforcehistory.hq.af.mil/Publications/fulltext/gulf_war_air_power_surveyvol2.pdf.

17. *Report of the Defense Science Board on Time Critical Conventional Strike From Strategic Standoff* (Washington, D.C.: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 2009), <http://www.acq.osd.mil/dsb/reports/ADA498403.pdf>.
18. For discussions based on Russian and Chinese sources see Alexei Arbatov, "Endgame or Gambit? The New State of Arms Control," Carnegie Moscow Center, March 2011, pp. 17–23, http://www.carnegieendowment.org/files/gambit_endgame.pdf; and M. Taylor Fravel and Evan S. Medeiros, "China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure," *International Security* 23, no. 2 (Fall 2010): pp. 81–83.
19. See, for instance, the remarks of Senator Jim DeMint (R-SC) at hearings of the Senate Foreign Relations Committee on "The New START Treaty," May 18, 2010, p. 71, <http://foreign.senate.gov/download/?id=A0C2E5F0-8CB7-46B8-A3C1-014024059D16>.
20. Sergei M. Rogov, Viktor Esin, Pavel S. Zolotarev, and Valeriy Yarynich, "Sood'ba Stratyegichyeshkih Vooroozhyenyi Poslye Pragi" [The Fate of Strategic Arms after Prague], *Nyezavisimoye Voennoye Obozryeniye* [Independent Military Review], August 27, 2010, http://nvo.ng.ru/concepts/2010-08-27/1_strategic.html.
21. "NATO Offers Missile Defence Cooperation to India," *The Hindu*, September 4, 2011, <http://www.thehindu.com/news/national/article2424128.ece>.
22. For Russian and Chinese analyses of the potential of these weapons see Yevgeny Miasnikov, "The Counterforce Potential of Precision-Guided Munitions," in *Nuclear Proliferation: New Technologies, Weapons, Treaties*, eds. Alexei Arbatov and Vladimir Dvorkin (Moscow: Carnegie Moscow Center, 2009), chapter 5, http://carnegieendowment.org/files/12574Blok_YadernoyeRaspr_Eng_fin1.pdf; and Tong Zhao, "Conventional Counterforce Strike: An Option for Damage Limitation in Conflicts with Nuclear-Armed Adversaries?" *Science and Global Security* 19, no. 3 (2011): pp. 195–222.
23. U.S. Department of Defense, "Nuclear Posture Review Report," April 2010, p. 34, <http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf>.
24. For example, Anatoly Antonov, now Deputy Defense Minister, stated in 2007 that "we see a direct link between U.S. plans for global missile defense and the prompt global strike concept...This concept, when combined with global missile defense, becomes a means for world domination, politically and strategically." Quoted in Eugene Miasnikov, "On the Relationship between Nuclear and Conventional Strategic Arms in the New START Treaty," Center for Arms Control, Energy and Environmental Studies at Moscow Institute of Physics and Technology, September 10, 2010, p. 3, <http://www.armscontrol.ru/pubs/en/em091010.pdf>. For Chinese concerns, see Fravel and Medeiros, "China's Search for Assured Retaliation," p. 83.
25. "The Military Doctrine of the Russian Federation," para. III.27.f.
26. Rogov, Esin, Zolotarev, and Yarynich, "Sood'ba Stratyegichyeshkih Vooroozhyenyi Poslye Pragi."
27. For insightful analyses of the doctrine see Arbatov, "Endgame or Gambit?" pp. 4–7; and Nikolai Sokov, "The New, 2010 Russian Military Doctrine: The Nuclear Angle," James Martin Center for Nonproliferation Studies, February 5, 2010, http://cns.miis.edu/stories/100205_russian_nuclear_doctrine.htm.
28. Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China 2011* (Department of Defense, 2011), p. 3, http://www.defense.gov/pubs/pdfs/2011_cmpr_final.pdf. This document implies development of this system is not yet complete. For doctrine associated with this weapon, see Andrew S. Erickson and David D. Yang, "Using the Land to Control the Sea? Chinese Analysts Consider the Antiship Ballistic Missile," *Naval War College Review* 62, no. 4 (Autumn

- 2009): pp. 53–86, <http://www.public.navy.mil/usff/documents/using-the-land-to-control-the-sea--chinese-analyst.pdf>.
29. Walter C. Ladwig III, “A Cold Start for Hot Wars? The Indian Army’s New Limited War Doctrine,” *International Security* 32, no. 3 (Winter 2007/08): pp. 158–190.
 30. General V. K. Singh has stated that “There is nothing called ‘Cold Start.’ As part of our overall strategy, we have a number of contingencies and options, depending on what the aggressor does. In recent years, we’ve been improving our systems with respect to mobilization, but our basic military posture is defensive.” Quoted in N. V. Subramanian, “India Denies ‘Cold Start’ Plan,” *The Diplomat*, September 11, 2010, <http://the-diplomat.com/indian-decade/2010/09/11/india-denies-cold-start-plan/>.
 31. Rodney W. Jones, “Pakistan’s Nuclear Poker Bet,” *Foreign Policy*, May 27, 2011, http://afpak.foreignpolicy.com/posts/2011/05/27/pakistans_nuclear_poker_bet.
 32. An additional reason, advocated by analysts including the author, is that by making good faith progress toward the abolition of nuclear weapons, the nuclear weapon states can garner the international coalition required to strengthen the nonproliferation regime. The somewhat-tired debate over this argument is not rehearsed here because there is a compelling case for the pursuit of deep reductions that does not rely on their potential nonproliferation benefits. For a flavor of the debate about the relationship between disarmament and nonproliferation, see Jon Kyl and Richard Perle, “Our Decaying Nuclear Deterrent,” *Wall Street Journal*, June 30, 2009, <http://online.wsj.com/article/SB124623202363966157.html>; and James M. Acton, Pierre Goldschmidt, and George Perkovich, “Defending U.S. Leadership on Disarmament,” Carnegie Endowment for International Peace, July 7, 2009, <http://www.carnegieendowment.org/2009/07/07/defending-u.s.-leadership-on-disarmament/3mbz>.