CHAPTER 3

A Realist's Rationale for a World without Nuclear Weapons

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Introduction

Speaking in Prague on April 5, 2009, President Barack Obama declared "America's commitment to seek the peace and security of a world without nuclear weapons." The president attached important qualifiers to his objective. "This goal will not be reached quickly—perhaps not in my lifetime," he said, and also, "As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary. . . ."[1] Many, however, ignored the measured language and immediately dismissed the president's goal as unattainable, idealistic, and even naïve.

Sometimes it takes a great goal to inspire great achievement, even if reaching that goal, or planning to do so, will be difficult. President John F. Kennedy in 1961 set the objective of putting a man on the moon by the end of the decade, even though the United States at the time had taken just baby steps in space. When he delivered his May 25 speech calling for

1. The White House, Office of the Press Secretary, "Remarks by President Barack Obama, Hradcany Square, Prague, Czech Republic," April 5, 2009.

"longer strides," only one American, Alan Shepard, had been in space—and just on a suborbital flight. Eight years later, Neil Armstrong and Buzz Aldrin stood on the moon.

Obama's goal may seem idealistic to some. But acknowledged realists also have called for a world without nuclear weapons. Writing in the *Wall Street Journal* in January 2007, four senior American statesmen—George Shultz, Bill Perry, Henry Kissinger, and Sam Nunn—noted the growing risks posed by nuclear weapons and endorsed "setting the goal of a world free of nuclear weapons and working energetically on the actions required to achieve that goal."[2] The authors developed that theme in subsequent *Wall Street Journal* opinion pieces, proposing a "joint enterprise" to move toward the objective. The goal of a world free of nuclear weapons has been endorsed by other senior statesmen who are considered realists, including many associated with the Global Zero movement.

When Americans consider the goal of a world without nuclear weapons, two main questions arise. First, is the objective desirable from the point of view of US security interests? Second, is it feasible to achieve that goal safely?

This chapter makes a realist's argument for why a world without nuclear weapons is a desirable objective. In particular, it argues why such a world would be less risky and in the national security interest of the United States. The chapter closes with some brief comments on the feasibility of achieving that goal.

As we approach the seventieth anniversaries of the first detonation of a nuclear weapon at Alamogordo, New Mexico, and of the destruction of Hiroshima and Nagasaki in Japan, nuclear deterrence remains the fundamental underpinning of US security, as it has since the 1950s. Nuclear weapons and nuclear deterrence protected the United States and its allies during their Cold War with the Soviet Union. By all appearances,

2. George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn, "A World Free of Nuclear Weapons," *Wall Street Journal,* January 4, 2007.

nuclear deterrence worked . . . but with one important qualifier: in several instances, we were lucky. Events quite plausibly could have played out in another way, with disastrous consequences for the United States and the world.

Will the United States and others stay lucky in a nuclear world, one in which not all nuclear-armed states inspire confidence in their ability to responsibly and safely manage their destructive arsenals and in which the number of nuclear-weapons states might increase? The growing risk that a nuclear weapon could be used provided a major motivating factor behind the Shultz/Perry/Kissinger/Nunn articles.

A world without nuclear weapons should be of interest to Americans. It would eliminate the risk that nuclear arms might be used against the United States—either intentionally or by miscalculation or accident. Moreover, blessed with a favorable geographic position, a global network of allies, and the world's most powerful and technologically advanced conventional military, the United States would be in a strong position to ensure its security and that of its allies in a nuclear weapons-free world.

Deterrence would not vanish in such a world; it would merely change in character. Conventional US military forces would still have the capability to threaten risks and impose costs that would outweigh the benefits an adversary might hope to achieve from conventional aggression and would thereby deter the aggression in the first place. Some adjustments would be needed, to be sure. The United States would have to devote adequate resources to its conventional forces, and allies would likely have to contribute something more toward their own defense. But the safety of a world without nuclear arms compares favorably to the risks the United States and the world will run if nuclear weapons remain.

Of course, ridding the world of nuclear arms, or even achieving the conditions for a world without nuclear arms, poses a daunting task. In the end, it might not be achievable. There is nevertheless a realist's argument for the objective.

Nuclear Deterrence

Nuclear deterrence has provided the bedrock of US security policy since the early 1950s. Deterrence seeks to create a situation in which the risks and costs of aggression far outweigh any gains or benefits that the aggressor might hope to achieve. Successful deterrence requires getting into the mind of a potential adversary, understanding his motives, and then being able to hold the things he values at risk. It requires creating in the adversary's mind a credible prospect of a potentially devastating response.

Nuclear weapons, with their immense destructive capabilities, proved ideally suited for deterrence. Their potential retaliatory use confronts a possible adversary with unimaginably huge consequences for aggression. What potential gains might entice an opponent to use military force to pursue those gains if that raised a credible risk of nuclear retaliation, including the destruction of much of his military, industrial base, and population—indeed, the possible end of his country's existence as a functioning society?

In the short-lived period of overwhelming American nuclear dominance, Washington adopted a policy of massive retaliation. By the early 1960s, the United States was well on its way to building a robust strategic triad—consisting of long-range heavy bombers, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs)—augmented by nonstrategic nuclear weapons, many of which were deployed forward in Europe and the western Pacific. These gave the US military the capability to impose tremendous damage on any possible opponent.

By the mid-1960s, the Soviet Union had begun building a strategic triad of its own and Washington had moved away from massive retaliation to a policy of flexible response. As both Washington and Moscow acquired sufficiently capable, survivable, and diverse strategic forces that could inflict massive destruction on the other, even after absorbing a first strike, a state of mutual nuclear deterrence evolved. This balance, often

referred to as mutual assured destruction, was one of the defining characteristics of the face-off between the United States and the Soviet Union during the Cold War.

The United States and the Soviet Union piled on nuclear arms in the 1950s, 1960s, and 1970s. In 1967, the US nuclear arsenal topped out at 31,255 weapons.[3] The total number declined thereafter, though the number of American ICBM and SLBM warheads and strategic bomber weapons climbed into the late 1980s, peaking at more than ten thousand attributable weapons when the 1991 Strategic Arms Reduction Treaty was signed. The Soviet arsenal may have reached as many as forty-five thousand weapons in the 1980s.[4] The large numbers were driven in part by strategies that went way beyond mere deterrence to include doctrines of counterforce (to target and destroy an adversary's nuclear and other military forces), damage limitation (to destroy as much of an adversary's nuclear capability as possible in order to reduce damage to one's own country), and follow-up strikes (to try to achieve a dominant position following a nuclear exchange).

By all appearances, nuclear deterrence worked. The United States and Soviet Union opposed each other politically, militarily, economically, and ideologically. They engaged freely in proxy wars around the globe. But, despite tensions and hundreds of thousands of American and Soviet soldiers facing off for decades in Central Europe, the two countries avoided direct conflict. Finding historical examples in which two states found themselves in such intractable opposition and yet did not go to war is no easy task. Nuclear weapons appear to be a major reason why the US-Soviet rivalry did not go the way of other great-power confrontations and lead to war. Nuclear deterrence seems to have worked.

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3. Department of Defense, "Fact Sheet: Transparency in the U.S. Nuclear Weapons Stockpile," April 29, 2014.

4. Nuclear Threat Initiative, "Country Profile: Russia—Overview," http://www.nti.org/country-profiles/russia.

The Risks of Nuclear Deterrence

At several points, however, there were very close calls, and the United States was lucky. Over the past sixty years, there have been numerous cases where a miscalculation in a time of crisis, a computer or mechanical error, a human mistake, or some combination could have produced unprecedented disaster.

First of all, the United States and Soviet Union were fortunate to avoid a direct conflict. Given NATO's conventional inferiority in the 1960s, 1970s, and 1980s, US and North Atlantic Treaty Organization policy envisaged rapid escalation to use of nuclear weapons if conventional direct defense failed. NATO military and civil-military exercises regularly included nuclear consultations and nuclear use procedures. And it was discovered after the end of the Cold War that, despite Moscow's declared policy of "no first use" of nuclear weapons, Soviet and Warsaw Pact doctrine envisaged early use of nuclear arms, even if NATO did not go nuclear first.

Other cases illustrate how fortunate the United States was during the Cold War. Take the 1962 Cuban missile crisis. The Soviet deployment to Cuba of nuclear-tipped SS-4 and SS-5 intermediate-range ballistic missiles that could reach much of the United States sparked the most dangerous crisis of the Cold War. President Kennedy applied a naval quarantine—a blockade—of the Caribbean island while conducting a quiet exchange of letters with Soviet leader Nikita Khrushchev. Kennedy's wise leadership and effort not to box in Khrushchev ultimately defused the crisis and resulted in withdrawal of the Soviet missiles and nuclear warheads.

But the standoff could have turned out very differently. When the president opted for a naval quarantine of Cuba, he set aside the policy course favored by many of his advisers, including all members of the Joint Chiefs of Staff: conventional air strikes on Cuba followed shortly by a ground invasion. This would have been a major military operation. The first wave of air strikes envisaged a thousand combat sorties, and the Pentagon

planned to land as many as one hundred eighty thousand troops on the island.[5] The forces had massed in southeastern US ports and were prepared to launch an airborne assault on five days' notice, with an amphibious element to follow three days later.[6] Many Soviet soldiers (and a lot of Cubans) would have died.

What Kennedy, the US military, and the Central Intelligence Agency did not know in 1962 was the control procedures for Soviet nuclear weapons in Cuba. And, while well aware of the presence of Soviet intermediate-range missiles and their nuclear warheads, Washington had no idea that Moscow had also deployed shorter-range tactical nuclear weapons to Cuba. At a 2002 conference on the crisis, a retired Soviet military officer said that, although General Issa Pliyev, the commander of Soviet forces on the island, needed an explicit order from Moscow in order to launch missiles against the United States, he had been given release authority for use of tactical nuclear weapons in the event of a US attack.[7]

Indeed, Khrushchev had personally notified Pliyev that, if the United States attacked Cuba and he was unable to contact Moscow for instructions, he would be permitted to decide whether to use nuclear-armed short-range missiles or Il-28 nuclear-armed bombers to attack the American invasion force. Soviet Minister of Defense Rodion Malinovsky ordered that this exceptional guidance not be confirmed in writing, but a draft message dated September 8, 1962, confirmed that twelve Luna nuclear-armed

5. Robert S. McNamara, James G. Blight, Robert K. Brigham, Thomas J. Biersteker, and Herbert Y. Schandler, *Argument Without End: In Search of Answers to the Vietnam Tragedy* (New York: Public Affairs, 1999), 10.

6. Office of the Historian, US Department of State, "Foreign Relations of the United States, 1961–1963, Volume X, Cuba, January 1961–September 1962, Document 439," https://history.state.gov/historicaldocuments/frus1961-63v10/d439.

7. Robert S. Norris, "The Cuban Missile Crisis: A Nuclear Order of Battle, October/November 1962," presentation at the Woodrow Wilson Center, October 24, 2012, http://www.wilsoncenter.org/sites/default/files/2012_10_24_Norris_Cuban_Missile_Crisis_Nuclear_Order_of_Battle.pdf.

missiles and six Il-28 bombers armed with nuclear bombs were being shipped to Cuba.[8] The message reiterated that the weapons were to be used for "destruction of the enemy on land and along the coast" at the instruction of the Soviet Ministry of Defense, or at Pliyev's discretion if communications between Cuba and Moscow were lost.

Alternative history is more art than science. But consider what might have happened if Kennedy had approved the recommendation for conventional air strikes and landings on Cuba, and the Soviet commander had responded with nuclear strikes against the US naval base at Guantánamo Bay and the American beachhead. Thousands of US servicemen would have died. The president would have faced tremendous pressure, probably irresistible pressure, to launch a retaliatory nuclear strike against Soviet forces in Cuba.

Could the nuclear exchanges have been confined to Cuba? No one can say "yes" with any degree of confidence. One of the big fears confronting Kennedy was that US action in Cuba might trigger a Soviet move against West Berlin, where numerous Soviet and East German divisions far outnumbered the US Berlin Brigade and its British and French counterparts. That could have easily led to a broader clash in Central Europe and escalated to use of nuclear weapons there. The Cuba scenario or Cuba-plus-Berlin scenario would also have raised a significant likelihood of US and Soviet strategic nuclear attacks on the other's homeland; the Strategic Air Command's plans at the time leaned heavily toward early and massive use of nuclear weapons.

We were lucky.

A second episode from the Cuban missile crisis again shows how close things came to getting out of hand. As part of the naval quarantine, the US Navy pursued an aggressive antisubmarine warfare effort, using active sonars and small depth charges (sometimes just hand grenades, designed to annoy but not sink submarines). US destroyers sought to force Soviet

8. Anatoli I. Gribkov, William Y. Smith, and Alfred Friendly, *Operation Anadyr: U.S. and Soviet Generals Recount the Cuban Missile Crisis* (Chicago: Edition Q, 1993), 5–6.

submarines to surface and turn away from Cuba. The Soviets had four Foxtrot-class diesel attack submarines approaching the island. One of the submarines was the B59, which among its armaments carried a nuclear-tipped torpedo.

With US destroyers continuously harassing the submerged B59, its electric batteries running low, and no communications with Moscow, the submarine's commander ordered preparations to launch the nuclear-armed torpedo.[9] One of three officers required to authorize a launch, Vasiliy Arkhipoy, objected and averted the torpedo launch. The B59 instead surfaced and turned back toward the Soviet Union.[10]

What would have happened had Arkhipoy gone along with his commander, and the B59 launched its nuclear torpedo? The use of a nuclear weapon at sea likely would have had less momentous consequences than the use of nuclear weapons against US forces in Cuba. It nevertheless could still have triggered unforeseen effects, including US use of nuclear weapons against Soviet submarines and perhaps a broader nuclear exchange.

Again, we were lucky.

Other close calls involved the North American Aerospace Defense Command (NORAD, formerly the North American Air Defense Command), which maintains a constant watch for missile and aircraft threats to the United States and Canada. In 1979 and 1980, its main watch center, buried under Cheyenne Mountain outside of Colorado Springs, Colorado,

9. Report prepared by USSR Northern Fleet Headquarters, "About participation of submarines 'B-4,' 'B-36,' 'B-59,' 'B-130' of the 69th submarine brigade of the Northern Fleet in the Operation 'Anadyr' during the period of October–December, 1962," trans. Svetlana Savranskaya, *National Security Archive,* George Washington University, http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB399/docs/Report%20of%20the%20submarine%20mission.pdf.

10. Leon Watson and Mark Duell, "The Man Who Saved the World: The Soviet submariner who single-handedly averted WWIII at height of the Cuban Missile Crisis," *Mail Online,* September 25, 2012, http://www.dailymail.co.uk/news/article-2208342/Soviet-submariner-single-handedly-averted-WWIII-height-Cuban-Missile-Crisis.html.

accidentally and falsely reported that the United States was under ballistic missile attack:

> On November 9, 1979: "For about three minutes, a test scenario of a missile attack on North America was inadvertently transmitted to the operational side of the 427M system in the Cheyenne Mountain Complex Operations Center. The test data was processed as real information, displayed on missile warning consoles in the command post, and transmitted to national command centers. About eight minutes elapsed between the time the test data appeared and NORAD assessed confidence that no strategic attack was underway."[11]
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> On June 3, 1980: "Failure of a computer chip within a line multiplexer (Nova 840 computer) of the NORAD Control System caused false missile warning data to be transmitted to Strategic Air Command, the National Command Center, and the National Alternate Command Center."[12] . . . "Displays showed a seemingly random number of attacking missiles. The displays would show that two missiles had been launched, then zero missiles, and then 200 missiles. Furthermore, the numbers of attacking missiles displayed in the different command posts did not always agree."[13]

Things happened during those eight minutes in November 1979. NORAD officers woke people in Washington to pass the alert and immediately convened a threat assessment conference involving commanders at Cheyenne Mountain, the Pentagon, and the Alternate National Military Command Center at Fort Ritchie, Maryland. Launch control centers for

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11. North American Aerospace Defense Command, Office of History, "A Brief History of NORAD," December 31, 2013: 23.
12. Ibid.
13. Geoffrey Forden, "False Alarms in the Nuclear Age," *NOVA,* PBS, November 6, 2001, http://www.pbs.org/wgbh/nova/military/nuclear-false-alarms.html.

the US Minuteman ICBM force received preliminary warning of a possible attack. NORAD also alerted the Strategic Air Command (SAC), which began sending the alarm to alert bombers—B-52s at various airbases around the country with nuclear weapons on board and ready to take off within minutes in hopes of being able to get away from the airbases before the Soviet ICBM warheads arrived. The entire continental air defense interceptor force was also put on alert, and at least ten aircraft took off. Even the National Emergency Airborne Command Post, the president's "doomsday plane," took off, albeit without the president on board.[14]

Happily, both cases turned out to be false alarms. What might have happened had it taken longer for the NORAD watch center to conclude that a test scenario or a faulty computer chip rather than a real attack had triggered the alert? How might the Soviets have reacted had they suddenly seen a spike in SAC's alert level and radio traffic and the hurried launch of some US bombers and their accompanying tanker aircraft? The Soviet military could have activated its own alert which, when detected by US sensors, might have been interpreted to reaffirm the mistaken initial reports of a missile attack.

Again, we were lucky.

Moscow also had its false alarms. On September 26, 1983, just weeks after a Soviet fighter plane shot down a Korean Air Lines Boeing 747 with sixty-two Americans on board, triggering a major crisis between Washington and Moscow, the Soviet early warning system reported ballistic missile launches from the United States. The duty officer at the time, Stanislav Petrov, believed the warning to be a false alarm. He ignored the protocol—to immediately alert his chain of command so that a retaliatory strike could be considered—and instead reported "a system malfunction." It turned out that Petrov was right; there was no US ICBM attack.[15]

14. Ibid.

15. Pavel Aksenov, "Stanislav Petrov: The Man Who May Have Saved the World," BBC Russian Service, September 26, 2013.

On January 25, 1995, a joint Norwegian-American research rocket took off from northern Norway. The Russian early warning system detected the rocket as it climbed higher into the atmosphere and incorrectly categorized it as a US Trident II SLBM launch, perhaps a precursor to a more massive nuclear strike. The alert reportedly went all the way to Russian President Boris Yeltsin. His nuclear suitcase (the equivalent of the nuclear "football" that is never far from the US president) was activated as he consulted with his defense leadership. Fortunately, this came at a time when there was no crisis—instead, relatively positive US-Russian relations—and Yeltsin took no action.[16]

What might have happened had Petrov followed procedure and sounded the alarm? US-Soviet relations in September 1983 were extremely tense because of the KAL shoot-down and the looming deployment of US intermediate-range nuclear missiles to Europe. Would the Soviet protocol have held back a nuclear strike on the United States? If the Soviet military instead just increased its alert levels, how would that have been interpreted by American intelligence and military watch officers? As for the January 1995 incident, that is the only reported instance when a Russian leader was personally alerted of a potential nuclear threat.

In both of these cases, we were lucky.

One last example of our good fortune: in 1961, a US B-52 bomber broke up over Goldsboro, North Carolina, releasing both of the Mark 39 nuclear bombs that it carried on board. Each of the weapons had a yield of three to four megatons.[17] One bomb plunged into a bog and broke apart, requiring a good amount of digging to find most of the pieces. The second was more easily recovered. The good news: its parachute had deployed, allowing the weapon to land intact (the parachute was

16. David Hoffman, "Shattered Shield: Cold-War Doctrines Refuse to Die," *Washington Post,* March 15, 1998.

17. Strategic Air Command, "Chart of Strategic Nuclear Bombs," http://www.strategic-air-command.com/weapons/nuclear_bomb_chart.htm.

designed to slow the bomb's descent in order to give the B-52 time to get away before the bomb detonated). The bad news: its parachute had deployed, which was one of the six steps in the bomb's arming sequence. When technicians recovered the bomb, they found that five of the six arming steps had triggered. One more, and North Carolina would have suffered a nuclear explosion between two hundred and two hundred seventy times larger than the yield of the bomb that destroyed Hiroshima.[18]

To be sure, an accidental detonation of a US nuclear weapon is an extremely low-probability event. The US military, Department of Energy, and nuclear establishment take extraordinary care to build safe nuclear weapons that will detonate only on an explicit and authorized command. There has never been an accidental detonation of a US nuclear weapon that produced a nuclear yield. But these are extraordinarily complex pieces of machinery. For example, each B61 nuclear gravity bomb contains more than six thousand parts in more than one thousand eight hundred sub-assemblies manufactured by five hundred seventy suppliers and nine primary contractors.[19] The United States maintains about four thousand five hundred nuclear weapons of various types in its arsenal (not counting several thousand more that have been retired and await dismantlement). Moreover, can we be confident that other countries, including states such as North Korea, take equal care with regard to the safety of their nuclear arms?

Maintaining nuclear weapons means continuing to live with a degree of risk—the risk of miscalculation in a crisis, the risk of misreading of errant data, the risk of accidents. And there is the risk that nuclear weapons might be used intentionally.

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18. Eric Schlosser, *Command and Control: Nuclear Weapons, the Damascus Accident, and the Illusion of Safety* (New York: Penguin, 2013), 245–249.

19. Jeffrey Lewis, "After the Reliable Replacement Warhead: What's Next for the U.S. Nuclear Arsenal?" *Arms Control Today,* https://www.armscontrol.org/act/2008_12/Lewis.

The sum total of these risks poses one of the paradoxes of the modern nuclear age. During the Cold War, there was a possibility—small but certainly not zero—of a US-Soviet nuclear exchange that would have brought an end to both countries, to say nothing about effects on other states. Today, the chances of that kind of conflict between the United States and Russia are almost infinitesimally small. Yet the odds of a nuclear weapon being used in anger are greater than they were during the Cold War, in part because more states have acquired nuclear weapons since the Cold War ended.

North Korea, whose leadership can be described most charitably as erratic, has a small nuclear arsenal. Pakistan, which is unable to fully wrest control of its own territory from Islamist extremist groups, maintains some one hundred nuclear weapons, is increasing its stocks of nuclear material, and faces a growing nuclear competition with India.

Many analysts worry about the South Asian situation. It is not clear that the US-Soviet experience easily translates to the India-Pakistan relationship. Those two countries have gone to war three times in the past seventy years, not counting the 1999 conflict along the Line of Control in Kashmir. India and Pakistan border one another; they are not separated by an ocean (or at least the Bering Strait). They do not have the developed command-and-control systems that Washington and Moscow had. And Pakistan's recent interest in developing tactical nuclear weapons raises troubling questions about the security of the weapons and their impact on crisis stability.

As China continues its strategic rise, Washington and Beijing face the challenge of managing their relationship in a manner that steers it away from dangerous confrontation. A confrontational Sino-American relationship could introduce a greater nuclear risk than has been the case in the western Pacific for the past sixty years.

With the exception of a few crisis periods during the Cold War, the risk of a nuclear weapon detonating by intent, miscalculation, or accident is greater today than at any time since the dawn of the nuclear age. That risk will grow if the number of nuclear-weapons states increases. Many

analysts fear, for example, that if Iran acquires a nuclear weapon, that will greatly increase the pressure on countries such as Saudi Arabia and Turkey to follow suit.

The risk of use of nuclear weapons may be small, but the consequences would be catastrophic. We will have to live with that risk, and nuclear deterrence will remain a key part of US security policy as long as nuclear weapons exist. Are we prepared, however, to live with that risk indefinitely?

The Advantages of a Non-Nuclear World

Set against the risks of a nuclear world, a world without nuclear weapons—and a world in which the United States has the most powerful conventional forces—could offer certain security advantages to the United States. The following discussion assumes—and this is a key assumption—that a mechanism could be developed and agreed upon, by which all nuclear weapons were reliably and verifiably eliminated.

In such a non-nuclear world, deterrence would continue to apply and continue to serve as a major element of US security policy. It would just work without nuclear weapons. Deterrence is a complex concept. As noted earlier, creating potential costs that will deter a potential adversary requires getting into that adversary's mind and understanding his motivations and what he values. Those things can then be held at risk.

Conventional weapons will not be able to replicate the effects of nuclear arms. Some thus argue, correctly, that conventional forces cannot have the deterrent value of nuclear forces. But that does not mean that conventional deterrence cannot be effective in posing significant risks and costs to a potential adversary.

US advances in intelligence, surveillance, and reconnaissance, plus the advent of extremely accurate conventional weapons, open the possibility of using conventional means to hold at risk and destroy targets that previously could only be threatened by nuclear weapons. In a

non-nuclear world, the United States would not be able to hold entire cities at risk of nuclear attack. But the US military has powerful conventional forces capable of striking deep into the territory of any adversary. What if the US Air Force directed ten B-2 bombers, each armed with fifteen two thousand-pound precision-guided conventional bombs, to attack one hundred fifty key buildings in an adversary's capital? The effects would not be nuclear, but they could well prove devastating. The threat of such a strike would certainly affect an opponent's calculation of the risks and potential costs of conflict (above and beyond the fear that the leadership itself could be specifically and directly targeted for attack).

Alternatively, one Trident guided-missile submarine could unleash up to one hundred fifty-four conventionally armed land-attack cruise missiles against an adversary's city; the effects would be smaller than the postulated B-2 attack, because the cruise missile warheads would not be as large as two-thousand-pound bombs. The threat nevertheless would get an adversary's attention and affect how an opponent weighed the advantages and disadvantages of going to war with the United States.

The above discussion focuses on deterrence by punishment or retaliation, i.e., imposing high costs on an aggressor. But deterrence can also work by denial—denying an adversary the gains he might hope to achieve by aggression. US conventional military forces have capabilities that, in most scenarios, could deny an adversary his desired potential gains by directly defeating the attack.

Several factors would benefit US security in a non-nuclear world. The first is the United States' favorable geography. Despite the problem of illegal immigration, America enjoys peaceful borders with Canada and Mexico. Canada is an ally and fellow NATO member, and the three countries' economies are tightly interwoven by the North American Free Trade Agreement. It is virtually inconceivable that Canada or Mexico would present a military threat to the United States.

To the east and west, the broad expanses of the Atlantic and Pacific oceans protect America, meaning that potential adversaries would have to

cross thousands of miles of open sea to invade or attack the United States. Neither Russia nor China—the two peer competitors that most closely rival American military power—have the sea-lift capabilities to deploy a sizable ground force invasion across an ocean, and they would have to fight their way through the world's most powerful conventional navy.

Beyond geography, a second major factor would benefit US security in a non-nuclear world: the sheer power and technological superiority of American conventional forces. The United States currently spends $640 billion per year on defense. By comparison, estimates are that China and Russia spend $188 billion and $88 billion per year, respectively. The United States accounts for over 36 percent of the global total defense expenditure of $1.75 trillion.[20]

A non-nuclear world, moreover, would free up substantial resources that the United States would otherwise have to devote to modernizing and maintaining nuclear forces, including the nuclear enterprise that supports the nuclear weapons themselves. For example, estimates project the cost of US nuclear forces running as high as $1 trillion over the next thirty years. Some of those costs would be necessary in a non-nuclear world (e.g., for long-range bombers, dismantlement of retired nuclear weapons, and perhaps for some reconstitution capability as a hedge against cheating). But a non-nuclear world would allow significant defense funding to be shifted to support conventional force requirements.

The US conventional advantage is particularly stark when it comes to power projection. Consider three elements: heavy bombers, aircraft carriers, and conventionally armed cruise missiles.

The US Air Force currently maintains twenty B-2, seventy-four B-52, and sixty B-1 bombers. The plan is to draw the B-52 force down to forty aircraft, which will leave a total of one hundred twenty long-range heavy

20. Sam Perlo-Freeman and Carina Solmirano, "Trends in World Military Expenditure, 2013," fact sheet, Stockholm International Peace Research Institute, April 2014, http://books.sipri.org/product_info?c_product_id=476.

bombers. The B-2, with the smallest payload of the three, can nevertheless carry fifty thousand pounds of ordnance. All three bomber types can be refueled in midair, which gives them the capability to fly anywhere in the world. (In the first Gulf War in 1991, B-52 bombers flew missions from Barksdale Air Force Base in Louisiana against targets in Iraq.) The Pentagon plans to purchase from eighty to one hundred Long-Range Strike Bombers, beginning in the 2020s, to replace older aircraft.

Only one other country in the world has comparable airplanes. Russia flies about seventy Tu-95 Bear-H and Tu-160 Blackjack bombers. The performance characteristics of the Bear and Blackjack do not match those of the B-52 and B-1, and Russia has nothing comparable to the B-2 stealth bomber.[21] US bomber crews, moreover, on average fly more than their Russian counterparts.

The United States Navy maintains ten nuclear-powered aircraft carriers, with an eleventh to be commissioned in 2016. At one hundred thousand tons displacement each, these are the largest naval vessels in the world, capable of carrying from seventy-five to ninety fixed-wing strike, fighter, and support aircraft and helicopters. US carriers operate globally, and four, five, or more may be at sea at any one time—the navy's normal operating tempo. The carriers can project power far inshore; they have aircraft that can refuel other planes in flight to extend their range and reach. Thus, US Navy F-18 fighter aircraft and other planes for more than a decade have regularly flown off of carriers in the north Arabian Sea to carry out missions over Afghanistan.

In addition to the ten large aircraft carriers, the US Navy has nine amphibious assault ships, which most other navies would categorize as aircraft carriers. These mostly carry helicopters for ferrying Marines ashore, but many also carry Harrier fighter aircraft and will be able to carry and operate the F-35B fighter, once that plane enters service. The

21. Military Factory, "Compare Aircraft Results," http://www.militaryfactory.com/aircraft/compare-aircraft-resultsasp?form=form&aircraft1=27&aircraft2=289&Submit=Compare+Aircraft.

new America-class amphibious assault ships are expected to be able to house twenty F-35Bs in addition to helicopters.

By contrast, the rest of the world's navies combined possess twenty fixed-wing or helicopter carriers. China and Russia each have one true aircraft carrier. Both are about two-thirds the size of US aircraft carriers and can carry a complement of only about fifty aircraft and helicopters. Furthermore, China and Russia lack a proven capability to conduct carrier-based air-to-air refueling, which limits the range of their aircraft.

Another key element of US power projection is its long-range conventionally armed cruise missiles, delivered by bombers and naval vessels. The US Navy has an inventory of about three thousand six hundred conventionally armed Tomahawk land-attack cruise missiles, which are deployed on surface ships, attack submarines, and four former ballistic-missile submarines that have been refitted so that each can carry one hundred fifty-four cruise missiles.[22] These missiles can reach far inshore, having ranges in excess of one thousand two hundred kilometers (about seven hundred forty-six miles). The navy used these weapons extensively in both Iraq conflicts, against Libya in 2011, and against Islamic State targets in 2014.

The US Air Force possesses a limited number of AGM-86 air-launched subsonic cruise missiles, which it deploys on its B-52 bombers. Each B-52 can carry up to twenty AGM-86 missiles.[23] The air force has said that the AGM-86 will remain in service until 2030, at which point the Pentagon hopes to replace it with a new air-launched cruise missile to be fitted to the planned Long-Range Strike Bomber.[24]

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22. Jeffrey Lewis, "When the Navy Declassifies . . ." *Arms Control Wonk* (blog), July 12, 2012, citing Department of the Navy Operations and Maintenance budget accounts' figures for FY2013.

23. US Air Force fact sheet, "AGM-86B/C/D Missiles," May 24, 2010, http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104612/agm-86bcd-missiles.aspx.

24. Tom Z. Collina, "No More Nuclear-Tipped Cruise Missiles," *Defense One,* October 31, 2013, http://www.defenseone.com/management/2013/10/no-more-nuclear-tipped-cruise-missiles/73010/.

A third factor that benefits US security is its extensive alliance system. NATO brings together the United States, Canada, and twenty-six European states. Washington has bilateral alliances with Japan, South Korea, Australia, New Zealand, the Philippines, Thailand, and states in Central and South America providing for collective defense.[25] These allies, plus other friendly states such as Singapore and Bahrain, provide basing facilities that allow the US military to deploy much of its conventional power forward in Europe, the Persian Gulf, and the western Pacific.

US allies also have significant military power of their own. Of the ten countries with the largest defense budgets in the world, six—Saudi Arabia, France, Great Britain, Germany, Japan, and South Korea—are American allies. Just those six allies plus the United States account for 54 percent of global defense spending.[26] Of the eleven non-US commissioned aircraft carriers—not including amphibious assault ships or helicopter carriers—six are operated by US allies.[27]

These are just some of the conventional advantages that the US military enjoys today and that it could maintain in a world without nuclear weapons. Geography is not going to change. In a world free of nuclear weapons, Washington would need to take care to maintain appropriate levels of defense spending, ensure cutting-edge research and development to sustain its technological advantages, and keep robust alliance relationships. With proper attention, in a nuclear-free world the United States should readily be able to ensure its security based on conventional forces alone.

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25. US Department of State, "U.S. Collective Defense Arrangements," http://www.state.gov/s/l/treaty/collectivedefense.

26. Perlo-Freeman and Solmirano, "Trends in World Military Expenditure, 2013."

27. Walter Hickey and Robert Johnson, "These are the 20 Aircraft Carriers in Service Today," *Business Insider,* August 9, 2012, http://www.businessinsider.com/the-20-in-service-aircraft-carriers-patrolling-the-world-today-2012-8?op=1.

The Risks of a Non-Nuclear World

A number of challenges have been voiced regarding the risks of such a non-nuclear world. The first centers on the fact that US military forces currently provide security to allies through extended deterrence, i.e., US nuclear weapons provide a nuclear umbrella over American allies. As the 2012 NATO "Deterrence and Defence Posture Review" put it, "The supreme guarantee of the security of the Allies is provided by the strategic nuclear forces of the Alliance, particularly those of the United States. . . ."[28] US nonstrategic nuclear weapons deployed in Europe also contribute to the extended deterrent, as does the capability to forward-deploy nonstrategic nuclear weapons into the western Pacific region if needed.

Would the United States still be able to provide extended deterrence to allies without nuclear weapons? Several points should be made. First, as noted earlier, even without nuclear arms, the US military would still have the capability to inflict severe punishment on an adversary, sufficiently severe that the adversary would see high risks and potential costs to aggression. US conventional forces, moreover, could contribute in major ways—in some cases, in decisive ways—to deterrence by denial and, if necessary, to actually winning a defensive battle against an attacker.

Second, the real threats facing American allies should be considered. Given Russia's 2014 aggression against Ukraine, NATO is reassessing how much effort it needs to devote to collective defense in accordance with Article 5 of the Washington Treaty (which provides that an attack against one will be considered an attack against all). Russia is modernizing its conventional forces, many of which are outdated. It could nevertheless muster superior conventional forces in certain subregions, such as opposite the Baltic members of NATO.

28. NATO, press release, "Deterrence and Defence Posture Review," May 20, 2012.

NATO's European members have a combined economy seven times the size of Russia's economy, so there is no reason why they should not be able to finance a military structure that could deter and, if necessary, defeat a Russian conventional attack—particularly since they would have the assistance of the US military. Some European members of the Alliance should, and may have to, increase their defense spending. But those increases would be relatively modest. NATO's European members should also spend their defense dollars more wisely and look for cost efficiencies so that they can purchase more conventional bang for the buck (or euro).

Many analysts see Asia as posing more difficult challenges, given the robust nature of the Chinese economy and its growing military, plus the unpredictable threat posed by North Korea. But four of the five American allies in the western Pacific region—Japan, Australia, New Zealand, and the Philippines—are island nations, which bestows a degree of protection. South Korea, which faces North Korea across a demilitarized zone, does not enjoy the same geographic advantage but has built a strong conventional military capable of defeating a conventional North Korean attack (with the help of US forces there). Taiwan poses a special case, lacking a formal US defense commitment but nevertheless of great interest to Washington, which supports peaceful, not forceful, reunification with the mainland. Being an island confers certain defensive advantages, particularly as long as China lacks major amphibious assault capabilities.

Some might argue that a US extended deterrent based solely on conventional forces could mean that American allies would face a greater degree of risk. Perhaps. But offsetting that would be the elimination of the risk of a nuclear conflict, with all of its catastrophic consequences for the United States and its allies.

Moreover, extended deterrence with nuclear weapons has been a difficult proposition ever since the concept was introduced. No potential aggressor could doubt that his nuclear attack on the United States would lead to a US nuclear response. Extended deterrence, however, poses a more daunting question: would an American president use nuclear

weapons to defend an ally if that raised the risk of a nuclear attack on the United States? As it was often phrased during the Cold War, would the president use nuclear weapons to defend West Germany and thus risk Chicago for Bonn?

US leaders, diplomats, and senior military officers have spent countless hours seeking to assure their allied counterparts that the answer to that question is an unequivocal yes. Furthermore, the US military has deployed nuclear weapons to forward locations, introduced "nuclear sharing" with NATO allies, and developed Alliance doctrine—all intended to support that answer. Some two hundred American nuclear bombs reportedly remain deployed in Europe precisely to make that point. Yet, despite the time, effort, and expense devoted to signaling potential adversaries and assuring allies that Washington would use nuclear weapons in the defense of allies, doubts have always lingered.

The nuclear element of extended deterrence has never been as solid as theorists or practitioners would like. In a non-nuclear world, however, allied leaders could have far greater confidence in an American president's commitment to use conventional forces in their defense and to punish the aggressor. Such use would not raise the risk of a nuclear attack on the US homeland; the threat to use conventional forces to defend an ally and punish an aggressor thus would carry greater credibility, with both the ally and the potential adversary.

A second serious challenge to a non-nuclear world is the following question: would the elimination of nuclear arms make the world "safe" for large-scale conventional war, such as the world wars of the twentieth century? In World War II, the atomic bombs dropped on Hiroshima and Nagasaki killed some two hundred thousand people; conventional bombs, tanks, artillery, rifles, bayonets, and other means killed more than fifty million. Without the deterrence generated by the fear of use of nuclear weapons, could such a conventional conflict again engulf the world?

A non-nuclear world might pose some risk. But two points should be made.

First, the world has changed considerably since the mid-twentieth century, with major powers becoming far more interconnected. If the countries of the world could negotiate a verifiable plan to reliably eliminate all nuclear weapons—a big if, which gets to the point of the feasibility of a non-nuclear world—that would presuppose a degree of progress in interstate relations. That might not end the risk of major conventional conflict, but it would certainly reduce it.

Second, the risk of a major conventional war in a non-nuclear world would have to be weighed against the risk of a catastrophic use of nuclear weapons that the world will continue to face with the continuing existence of nuclear arms. Where one comes out on this question depends on one's judgment of the balance of risks between a nuclear and a non-nuclear world, and reasonable people can come to different conclusions.

My own conclusion is that the growing risks of a nuclear world and the advantages of a non-nuclear world for the United States, given its geographic position, conventional forces, and alliance systems, combine to argue that a world without nuclear weapons would be in the security interest of the United States and its allies. It is thus in the US interest to seek to create the conditions for a world without nuclear arms.

Getting There Safely

The above arguments make the case for the desirability of a world without nuclear weapons. A related but separate question is the feasibility of the objective, i.e., whether nation-states, with their varied and often competing interests, could ever agree on a path to achieve a non-nuclear world. Reaching such an agreement would require resolving numerous hard questions, including the following:

- Ultimately, all nuclear-armed states would have to commit to reduce and eventually eliminate their nuclear arsenals. Many nuclear-weapons states have endorsed the objective—and the

United States, Great Britain, China, France, and Russia committed to the goal of nuclear disarmament in the Non-Proliferation Treaty—but actions suggest their endorsement is, at best, half-hearted. Moreover, not only the five UN Security Council permanent members, but all other nuclear-weapons states, including countries such as Pakistan and North Korea, would have to be prepared to eliminate their nuclear stockpiles.

- New and more intrusive monitoring measures would have to be devised as part of a verification regime that could give all parties confidence that any cheating would be quickly and unambiguously detected. Such verification steps would have to go far beyond those included in current agreements, such as the 2010 New Strategic Arms Reduction Treaty between the United States and Russia. The US government now uses a standard of "effective verification," that is, the ability to detect a militarily significant violation in time to take countermeasures so that US security would not be adversely affected. In an agreement limiting each side to one thousand five hundred fifty deployed strategic warheads, a bit of cheating by one side would not matter much to the overall strategic balance (though it would matter greatly in terms of the other side's confidence in the treaty). But in a world of zero nuclear arms, where a covert stockpile of ten weapons could prove a game-changer, a far more stringent verification standard would have to apply.
- Any arrangement that eliminated nuclear weapons would require a robust, almost automatic, enforcement mechanism to dissuade states from cheating by posing a rapid response with severe punishment for the cheating state. This could not be a threat to refer the offending party to the United Nations Security Council. The enforcement mechanism would need to impose swift and painful consequences. (An additional disincentive to cheating would be the possibility that states might reconstitute a nuclear weapons capability.)

- Finally, the world's nations could not move to eliminate all nuclear weapons without resolving or easing key territorial and other interstate disputes—or at least reaching a point where states conclude that nuclear weapons no longer provide a critical means for defending their key national interests.

These questions pose stiff challenges to the creation of a world without nuclear arms or even to the creation of the conditions for a world without nuclear arms. It might turn out that these challenges could not be overcome, in part because different states will make different calculations about their security interests. A non-nuclear world should look very attractive to the United States. Such a world may look different to Russia, which borders on NATO and a rising China, faces a difficult demographic situation, lags behind the West in high-tech conventional weaponry, and looks to face increasing difficulties in competing in the modern global economy.

All that said, the feasibility of the objective of a world without nuclear weapons is a different question than the desirability of such a world for the United States.

Conclusion

The United States and the world have lived with nuclear weapons for almost seventy years. Those weapons have been used in conflict only twice, at the dawn of the nuclear age. Nuclear deterrence was a key feature of the Cold War standoff between the United States and the Soviet Union and contributed to preventing a direct conflict between the two. Though the Cold War is over, nuclear weapons continue to play an important role in deterrence and an important, if somewhat declining, role in US national security.

While nuclear deterrence has apparently worked, it has to be said that the record is not wholly reassuring. At several points over the past

seven decades, miscalculation in a crisis, human error and/or computer or mechanical failure could have plunged the United States, the Soviet Union/Russia, and much of the rest of the world into a horror unlike anything seen in human history.

While the risk of a nuclear clash between Washington and Moscow has diminished to almost zero, the risk of the use of a nuclear weapon today is greater than it was during the Cold War. That risk will continue as long as nuclear weapons exist, and it will grow should the number of nuclear-weapons states increase further.

Compared to this world, a world without nuclear weapons offers definite security advantages for the United States. Blessed by a unique geographic setting, having built an unrivaled alliance system, and maintaining the world's most powerful and technologically advanced conventional forces, the United States is well-suited to defend itself and its allies in a non-nuclear world. Such a world would pose some risks, to be sure, but those risks would be outweighed by the lifting of the risks posed by nuclear arms.

Many see the goal of creating the conditions for a world without nuclear weapons as idealistic. Realists, however, can also see the advantages of such an objective. Creating the conditions for a nuclear-free world would require Herculean efforts, unprecedented international cooperation, and significant changes in the current international system. In the end, the objective might prove unattainable. But even if it were possible to move only partway toward that goal, a well-designed nuclear arms reductions plan would leave the United States and the world in a more secure position than at present. The difficulty of the objective should not mean that it is not worth an attempt.