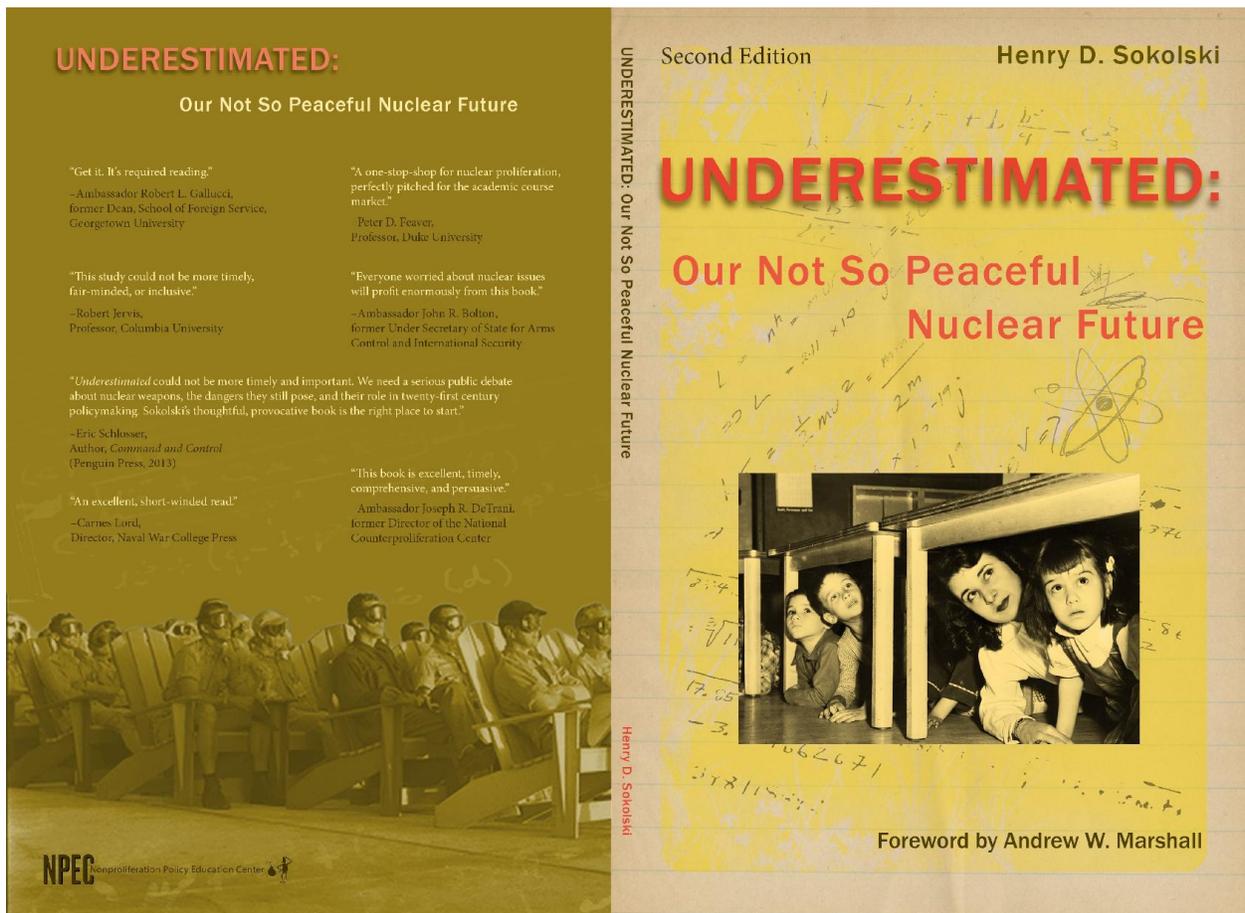


# Lecture 11: Thinking about the Next Arms Race

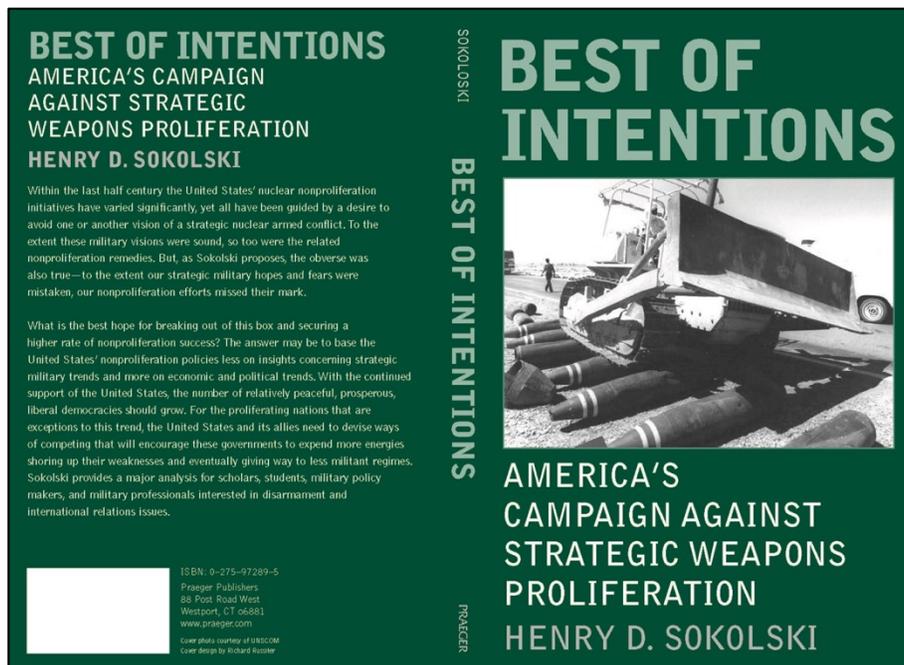
## QUESTIONS TO BE ADDRESSED:

- I. Where are we now and where are we headed with regard to nuclear weapons proliferation?
- II. What do we think about nuclear weapons and their proliferation?
- III. What might help?



*Underestimated: Our Not So Peaceful Nuclear Future*, is the second book I have written. Both, along with the textbook I am currently writing, are part of a larger effort to make nuclear policy a more serious field. My first book, *Best of Intentions: America's Campaign against Strategic Weapons Proliferation*, published in 2001, was a critical history of nonproliferation. I wrote it because I was teaching a course on the topic and couldn't find any history that tried to evaluate how well our past policies had performed. It was embarrassing. Every other policy field—including diplomatic history, economics, military science, even political science—all had critical histories that evaluated the merits of various actors and efforts on history, but there was nothing like that on nuclear controls and nonproliferation.

Instead, there were descriptions about how a treaty, like the NPT, was negotiated or how a control initiative, like the Baruch Plan, was formulated, or how a program, like Eisenhower's Atoms for Peace was implemented. What I couldn't find is any assessment of how sound these initiatives were or how well they performed. This didn't just make teaching the course dull, it didn't seem right. Topics that are not the subject of any critical history, after all, can't be a very serious topics and yet it is difficult to think of anything more important than preventing nuclear proliferation and wars .



Reflecting on this, I set out to be the first to write such a critical history of nonproliferation, thinking that I couldn't help but write the best one as none had yet been written. As soon as I

started writing, though, I discovered why nobody had ever bothered: How do you write a history about things that didn't happen? After all, nonproliferation is supposed to prevent countries from getting nuclear weapons. OK, but how would you ever be able to rate the quality of efforts to do this, if the successes were defined by something not happening? It seemed any critical arms control or nonproliferation history was doomed to be a speculation on a speculation.

Initially, I was stuck. But, then, I hit upon a fix. Instead of detailing what did or didn't happen because of one or another nuclear control initiative, I decided to assess how sound their premises or intentions were. Each initiative propounded a vision of what the next nuclear war. If you look at what each thought that war would look like, in almost every case, they didn't quite get things right. Yet, if you get your problem wrong and you try to solve it, your solution could either be irrelevant or actually aggravate the real problem.

A good example, which I focus on in the book, is Eisenhower's Atoms for Peace Program. What this initiative's authors worried about was the Russians knocking out 100 of America's largest cities. Because the Atoms for Peace Program was so focused on this massive and unlikely event, it overlooked what could happen if the Russians used a relative handful of nuclear weapons to destroy America's 15 U.S. strategic bomber bases. Also, they couldn't quite get their heads around what would happen if just one weapon was used accidentally or illicitly and how that might prompt a major exchange between the United States and Russia.

As a result, Atoms for Peace ignored preventing small nuclear diversions and focused instead on how to prevent diversions of scores of weapons' worth of nuclear materials. Towards this end, it tried to goad Moscow into competing in sharing "peaceful" nuclear reactors internationally in hopes these reactors' fueling requirements would draw down Russian military fissile stockpiles to levels that would make it impossible for it to "knockout" America's 100 largest cities. All of this was very sophisticated but misguided. In the end, the Atoms for Peace Program spread plutonium making technology and materials to would-be bomb makers much sooner than otherwise would have been the case.

In any case, *Best of Intentions* was a critical look backwards. The focus of this lecture is my latest book, *Underestimated: Our Not so Peaceful Nuclear Future*. It's different. It analyzes trends to project what the future might be. Again, in teaching, I found it was easy to find articles on specific current nuclear crises in places like Iran, North Korea, India, Pakistan. In each case, though, these pieces would talk about what was happening and what should we do next

but there was no serious attempt to generalize to get a bigger picture of what's was going on and what might unfold in the future.

There weren't any analyses of past trends to understand the future. This seemed odd. Any dignified economist, political scientist, diplomatic historian, or military scientist knows such analysis is essential to their field's credibility. So once again, I thought, "Well since nobody's written one for nuclear matters, I should, and being first, I can hardly fail."

My approach was simple, I tried to project how bad things could get. My aim here was neither to predict nor to be proven right, but rather to make reasonable warnings, which, if heeded, would assure that my worst fears would never be realized. John F. Kennedy predicted in 1963 that by 1970 there would be 10 to 25 countries that would have nuclear weapons.<sup>1</sup> And every speaker who raises this historical point quickly points out, "Well, that didn't happen." It's as if they wanted to show that he had made a mistake; that they were smarter than him. I think all of this gets it wrong. Kennedy wasn't trying to predict so much as to warn, and he was saying the worst would occur *unless* the United States and other countries tackled limited nuclear weapons, which fortunately, in the early 1960s started to happen. The United States and Russia negotiated a limited test ban treaty that most of the world join on to and, in 1968, the world's nations completed negotiation of the NPT. Of course, Kennedy's worst nuclear fears were never realized but for this he hardly should be faulted. Again, his game was to warn, not predict.

## **I. Where are we now and where are we headed with regard to nuclear weapons proliferation?**

This seemed to be the correct goal. So, I began *Underestimated* and did my best to paint as black a picture as I could. To do this, I looked back 50 years, which, at the time, took me back to the Cuban Missile Crisis — perhaps the darkest moment in which the United States nearly came to nuclear blows with Russia. From 1962, I tracked five nuclear trends: Nuclear weapons deployments, the production and stockpiling of nuclear explosive material, the spread of nuclear reactor and fissile production technologies, the spread of nuclear weapons-capable delivery systems, and the evolution of policies regarding the use of nuclear weapons.

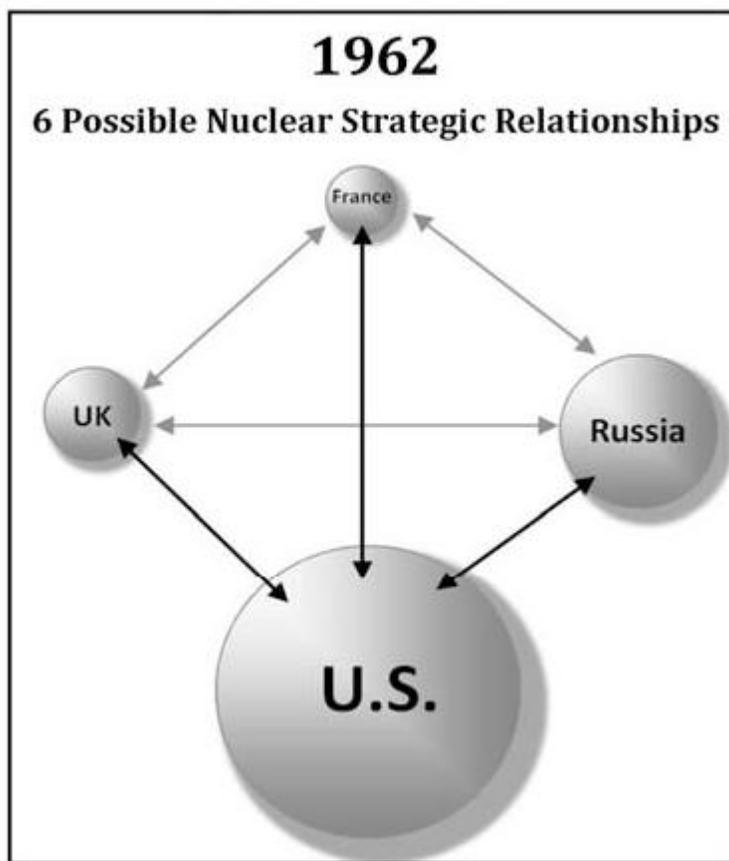
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1. John F. Kennedy, News Conference at the State Department Auditorium, Washington D.C., March 21, 1963, transcript available at <https://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/Press-Conferences/News-Conference-52.aspx>.

Two of these nuclear trends are of particular interest. The first is what I describe as nuclear “compaction.” The other is what arms control experts in the 1960s referred to as “Damoclean Overhang.”

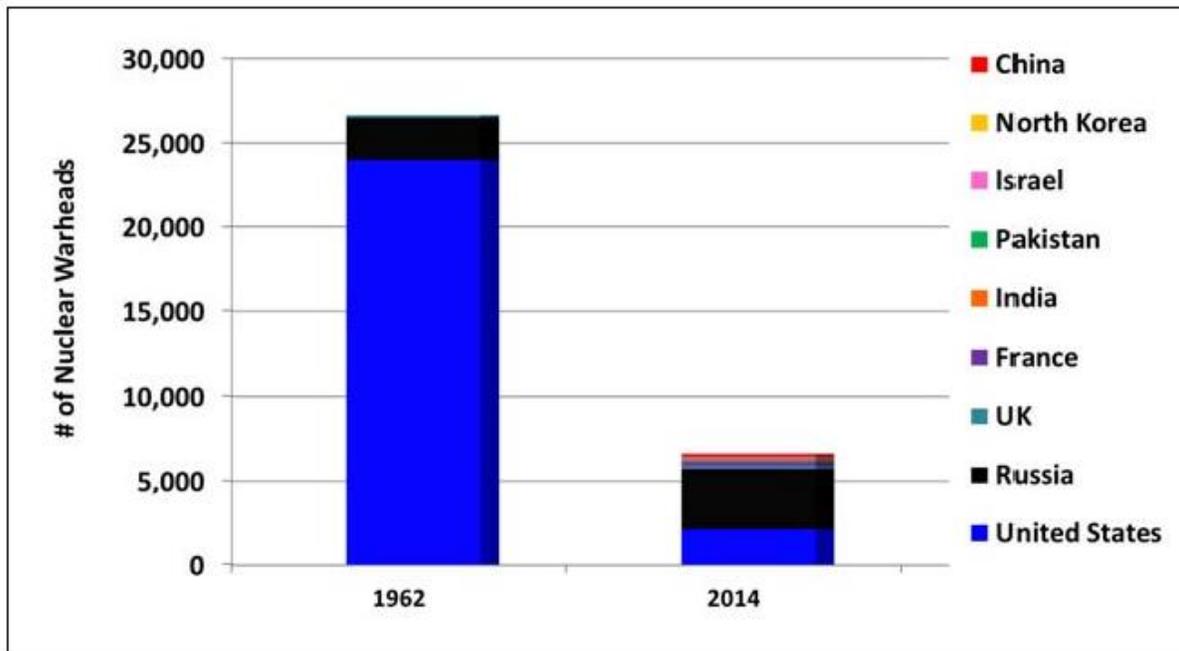
Together, these trends describe a problem where an increasing number of countries have nuclear weapons or are able to ramp up from zero (or whatever they currently have) to much larger numbers quicker than ever before.

## Four Nuclear Weapons States in 1962



In 1962 the United States had 24,000 nuclear weapons operationally deployed. The UK had 50. Russia had 2,500. France did not really have an operational force until a few years later. In 1962, they were the North Korea of the 2003: They didn't really have much of an arsenal.

## From U.S. Strategic Dominance to a Compressed Nuclear Crowd



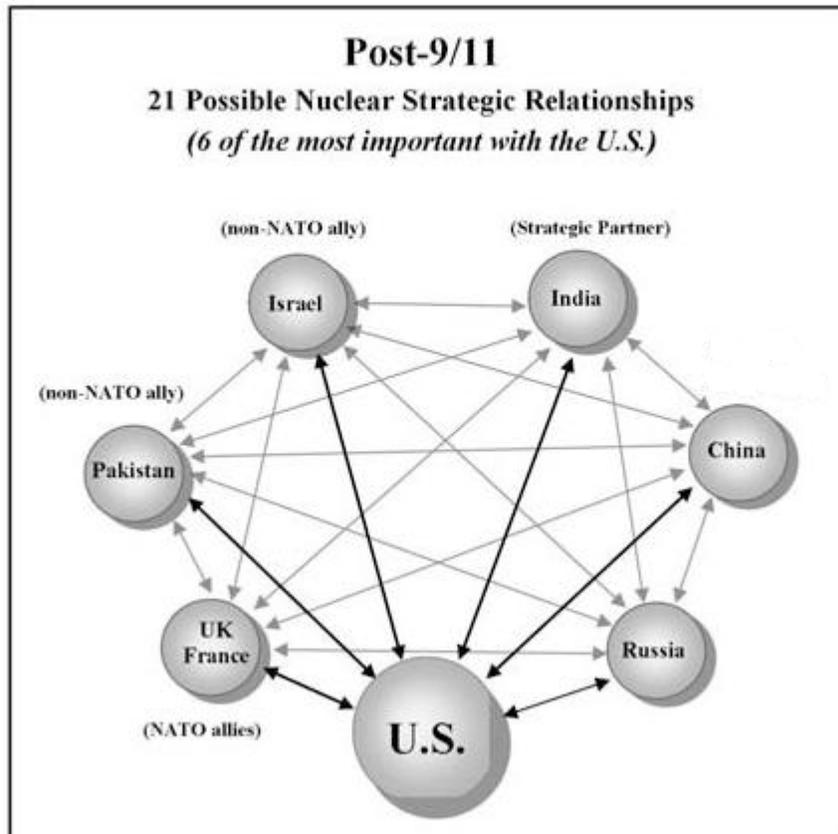
These differences are portrayed above in a chart. It's worth understanding the difference between the smallest operational force, which was Great Britain (with about 50), and the largest which was the United States (with about 24,000). Roughly, that is a thousand-fold difference, or three orders of magnitude. When you get to 2020, the picture is quite different. The largest deployed operational force is Russia with roughly 2,000. The United States slightly less than 2,000.

At the low end is North Korea. It is unclear how many operational nuclear weapons it had but it is estimated to have enough nuclear material to make nearly 100 warheads.<sup>2</sup> Israel, India, and Pakistan are each deploying from 100 to 200 weapons. The difference between these low numbers and the largest arsenals isn't a 1,000-fold difference; it is a 10-fold difference, a

2. See SIPRI, "Nuclear weapon modernization continues but the outlook for arms control is bleak: New SIPRI Yearbook out now," June 15, 2020, available at <https://sipri.org/media/press-release/2020/nuclear-weapon-modernization-continues-outlook-arms-control-bleak-new-sipri-yearbook-out-now> and *Arms Control Today*, "Nuclear Weapons: Who Has What at a Glance," July 2019, available at <https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat>.

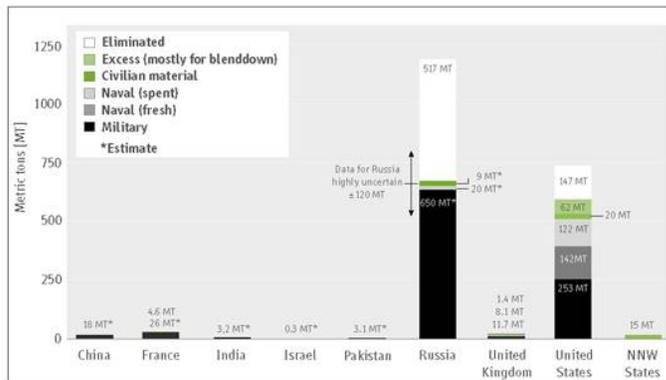
difference of one order of magnitude. Since 1962, then, you have had this compression between the largest and the smallest arsenals and a doubling of the number of nuclear armed states from four in 1962 to nine today.

## Proliferation Present: An Official View



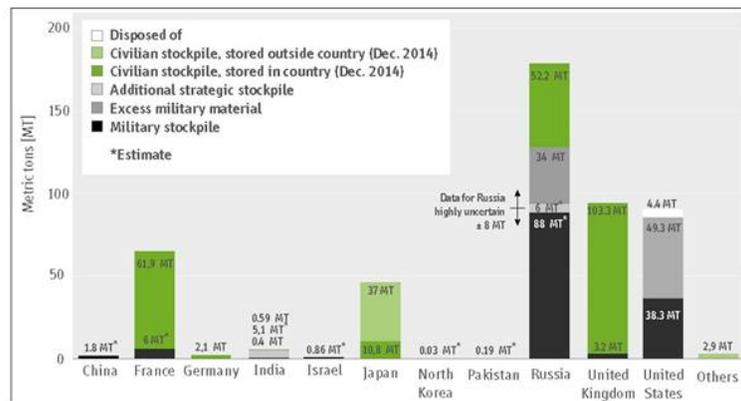
In and of itself, the doubling of nuclear armed states is not a particularly worrisome phenomenon. You could even rationalize it as being acceptable. In the early 2000s, some at the State Department argued that since the United States had a military capable of invading and occupying small countries far better than anyone else, relations between the nuclear powers was still pretty stable. Essentially, the whole world, it was argued, including other nuclear armed states, revolved around the United States. In this world, the UK and France were roughly viewed as one NATO, nuclear armed state and everybody else was either a NATO ally, a non-NATO ally, or a strategic partner. Of course, China and Russia are no longer strategic partners or even stakeholders, but they are not quite yet avowed U.S. enemies either. In any case, it is still a world that the United States and others can live in.

However, when you look at this compaction phenomena and cast it in the light of two other developments—what countries are stockpiling in the way of nuclear explosive uranium and plutonium, and what their current and planned capacity is to produce these materials—things look very different and not so benign. In 1962, there was hardly any surplus uranium and plutonium. Nearly every gram was used almost immediately to make nuclear warheads or to fuel naval reactors. There was no surplus. That, however, is not the case today.



**National Stockpiles of Highly-Enriched Uranium**

## Existing Fissile Stockpiles: Grist for Nuclear Ramp-ups and Breakouts

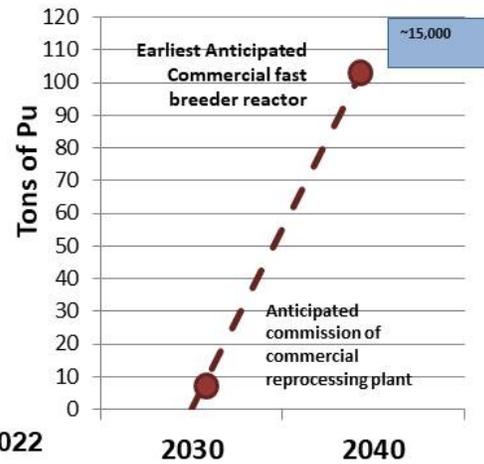
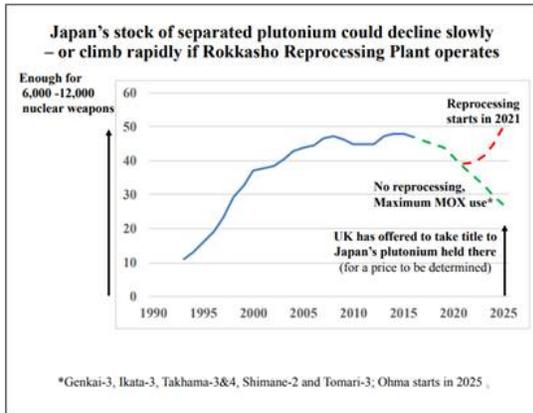


**National Stockpiles of Separated Plutonium**

The international Panel on Fissile Materials, a respected open source on fissile stockpiles, produced the charts above. China, is thought to have enough surplus weapons uranium and weapons explosive plutonium to fashion 500-1000 additional nuclear weapons. Japan has 10 tons of nuclear weapons explosive plutonium on its soil — enough to make 2,000 nuclear weapons. India has roughly 1,000 pounds worth of nuclear weapons explosive plutonium. The United Kingdom and France, meanwhile, have a few thousand bombs' worth. Finally, the United States and Russia have tens of thousands of bombs worth of surplus nuclear weapons

explosive plutonium and uranium that they can relatively quickly refashion into nuclear weapons (i.e., in 12 to 36 months).

## E. Asian Plutonium Production Potential: 1000s of Bombs Per Year



Rokkasho Uranium Enrichment Plant

Japan by 2022 could produce up to ~6,400 kg HEU/year or **more than 500 bombs worth per year**

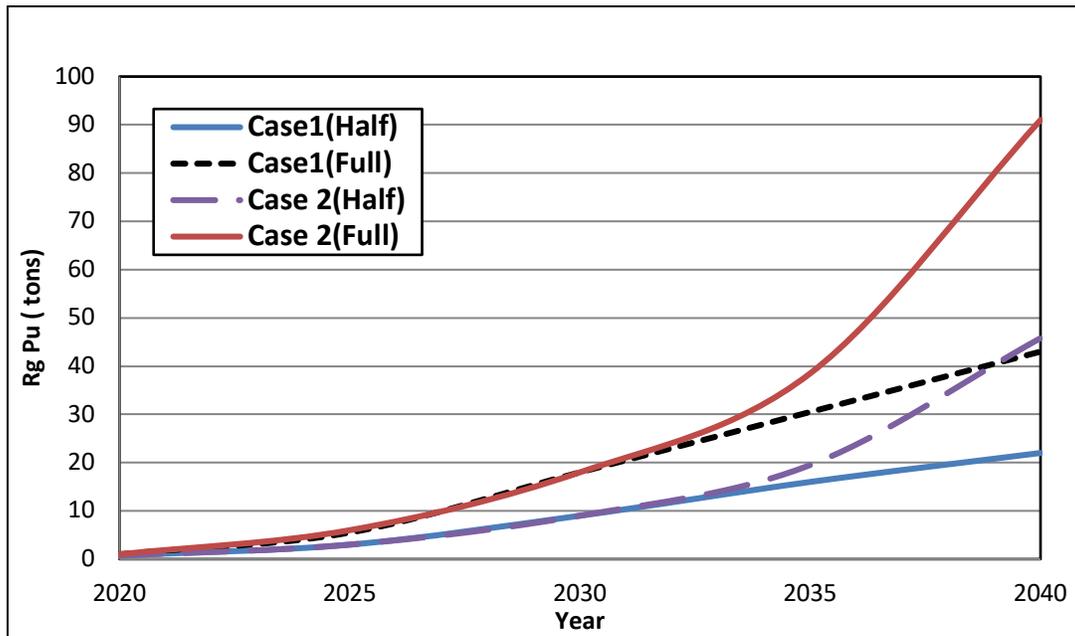


ROK pyro-reprocessing plant

Capacity to produce additional explosive plutonium and uranium is another worry. Japan plans to operate a large, commercial nuclear spent fuel reprocessing plant at Rokkasho late in 2021. It is designed to chemically strip out 8,000 kilograms or eight tons of nuclear weapons explosive plutonium (or 1,600 bombs' worth) a year. That is enough to make as many weapons annually as the entire deployed nuclear arsenal of the United States. Unfortunately, Japan does not have the ability to use up this material as reactor fuel for some time. Once this plant is brought on line, Japan's stockpile of nuclear explosive plutonium will only grow. At any time, Tokyo could choose to use its surplus to make thousands of nuclear weapons. That plus Japan's existing 10-ton plutonium stockpile constitutes a Damoclesian Overhang — a nuclear sword that hangs by a thread and that can fall at any moment.

This brings us to China. Beijing wants to buy a close copy of the Rokkasho plant from France. If they proceed with their plans, the Chinese will operate this imported reprocessing plant with

two other domestic ones. The first of these has been operating at full capacity since 2017 and produces a half ton (500 kilograms) of plutonium a year. The second is expected to come on line in 2025 and will produce two tones (2,000 kilograms) of plutonium a year. Below are high and low projections of what these Chinese reprocessing plants will produce



**Projections of cumulative plutonium separated from PWR spent fuels from 2020 to 2040**

Between 2020 and 2030, these plants are expected to produce between 10 and 20 tons of nuclear explosive plutonium. Even under the most optimistic scenarios for the use of the material in China’s fast reactors, there is likely to be a surplus of between 1,000 to 4,000 bombs’ worth of plutonium by 2030 that could be used for military purposes.

Then, there is enrichment. China plans to expand its uranium enrichment capacity to fuel its expanding power reactor fleet. It’s unclear how much surplus capacity it will have. Nonetheless, if China only exploited its enrichment plants at a single, spare enrichment complex (Plant 814), it would be able to produce and put aside up to 118 tons of weapons-grade uranium — conservatively, enough to make nearly 6,000 nuclear weapons— by the end of this decade.

During this same period, the Japanese will have enough capacity on line to make roughly 200 weapons per year. India, meanwhile, has enrichment, reprocessing, and breeder reactor plants free of international inspections that will enable it to make a significantly larger arsenal if it chooses to. It should be noted that none of this build up makes any economic sense. The use of plutonium based fuels for nuclear power loses more money compared to simply using less dangerous low enriched uranium. The world's supply of enrichment capacity is about 50% higher than demands are likely to be for some years. All of this suggests that the peaceful buildup of reprocessing and enrichment plants may be anything but peaceful.

When you combine the compaction of each nuclear state's relative number of weapons in their arsenals with current surpluses, the world no longer seems to be all that peaceful. Essentially, countries that don't have nuclear weapons (Japan) could get hundreds of them relatively quickly and those that do but have reduced their operational arsenals (the U.S., Russia, the UK and France) or have relatively few (China and India) could build hundreds or thousands relatively quickly.

I wrote all of this up as the central chapter two of *Underestimated*, "Where We're Headed." Aside from two limited brushes with recognition (testimony before The Commission of the U.S. Strategic Posture and a shoutout from Donald Rumsfeld at a large luncheon), though, I'd have to say that my arguments in the book's central chapter didn't get that much play. This baffled me. At the time, the hot topic was whether or not we should go to zero nuclear weapons. I thought, well gee, wouldn't people be interested in making sure that these weapons didn't spread. I was mistaken. My research got some play but not so much. Recognizing this, I did what any good academic does, I put the book project aside.

## **II. What do we think about nuclear weapons and their proliferation?**

Then, I got a phone call from my alma mater, the University of Chicago. The head of the Political Science department, John Mearsheimer, wanted me to come and give a talk about something that I was writing, preferably a book chapter. Initially, I didn't know what I might talk about, but then it occurred to me that to get greater insight into why nobody was thinking very much about what I thought about nuclear weapons, their proliferation, and possible use, perhaps I should examine what everyone else thought about these matters.

I tried to read everything I could on the main schools of thought and I discovered something that was quite odd. It didn't matter what school you looked at—the school backing the elimination of nuclear weapons that was opposed to nuclear energy proliferation, hawkish supporters of nuclear arms who wanted to enhance or maintain nuclear forces and opposed weapons spreading to adversaries but allowed it for friends, or academics who think nuclear proliferation is either stabilizing or inconsequential -- they each insisted that the best future possible could be achieved if you just followed their advice.

That seemed pretty cavalier. These experts were all saying that they had the last word on what to do. Yet, how many actual data points do we have on the use of nuclear weapons? The answer is two, Hiroshima and Nagasaki. No matter how sophisticated your regression analysis might be, if that's all you've got to work with, then you are not going to get very far convincing anybody of anything about the future.

For this reason alone, it would be a mistake to place one's full faith in any one of these school's recommendations. Yet, it still is useful to examine what each argues for two reasons. First, each school gets something right but, second, they all also have failings. If you want to figure out what makes sense, you'll want to know what those are as well.

The first school is the zero crowd. As I mentioned before, this group wants to get rid of nuclear weapons and opposes nuclear weapons proliferation. This is roughly the "official" view of most governments. Now, what this school gets profoundly right is the political power of the number zero when it comes to nuclear weapons. Critics of the zero crowd get things wrong when they object going to zero nuclear weapons. Although nuclear disarmament may not happen very soon or maybe ever, it is a powerful idea. If you put all of the leaders of countries that have nuclear weapons in a room, locked the doors and told them that they would not be released until they all agreed on a number of nuclear weapons you could live with, they probably would hit upon the number zero pretty quickly.

This doesn't speak to whether they would actually disarm or whether they would agree on how to do so, but it does tell you that zero politically is a very powerful number. Certainly, if you listen to most of the world's leaders, including most of our presidents, they all have given lip service to this. There's a simple reason why. We all know how we got into this game. First, we and our allies in WWII were afraid that the Nazis would get the bomb. Then the Russians were afraid we'd have the monopoly, then the British and French didn't want to be left behind, and then, it just kept going.

What we don't know is how this story ends but there is more than an inkling that it could end badly—think *Mad Max*—and so the power of zero. The other thing they do reasonably right is explain the advantages of having a world without nuclear weapons and even how to maintain zero once you get there so there is no backtracking. What they don't do very well is explain the risks of transitioning from several hundred nuclear weapons down to zero might be. At that point, you have to worry about the leader of some nuclear armed state saying, "Why don't I get a thousand, then I could be top dog." The problem of transitioning down, though, is something that they don't discuss.

Perhaps, even more worrisome is their disjointed discussion of nuclear deterrence. There are a few people in the zero crowd that argue that nuclear weapons are useless for military purposes, but most of the people in this school take a great deal of joy in insisting that nuclear weapons are only useful for deterring other countries from using their nuclear weapons. The reason they like arguing this is that it highlights in their minds just how absurd these weapons are. After all, why would you spend millions or billions of dollars to get a weapon if you were never going to use it and it's only function was to prevent someone else from using their own nuclear arms? Initially, acquiring nuclear weapons for these purposes seems silly—something four-year-olds might do—that is until you think about it: If it's really true that you can deter someone else from using nuclear weapons against you by getting them yourself, wouldn't that be a pretty compelling argument for getting them? Again, the answer is obvious. When I raise this last point with folks that make the argument that nuclear weapons are only good for deterring, they almost immediately change the subject.

This then brings us to the next school, the hawkish supporters of nuclear weapons. Their key argument is that nuclear weapons deter and keep the peace. They argue that if we fail to maintain or enhance our own nuclear weapons force, then our security allies, like Japan, Turkey, and South Korea, would be sorely tempted to pursue nuclear weapons of their own. This, in turn, would not only lead to further proliferation, but increase the prospects for use. There's something to this. Although it's difficult to prove that nuclear weapons have deterred every single claimed act of past threatened aggression, it is pretty improbable that it had no effect. U.S. nuclear weapons probably deterred China from invading Taiwan. They very well may have helped us prevent the Soviets from invading Berlin. One could go on and on. The point is that all you need is to have deterred one past threatened act of aggression to confirm the hawkish point.

In addition, the hawkish supporters of nuclear weapons make useful points explaining alliance security relations. Right now, there's a debate in South Korea about whether Seoul should get

nuclear weapons. Why? Well, South Korea has been rattled by North Korean provocations and Mr. Trump's ruminations about pulling U.S. troops from the Republic of Korea. South Korean editorial writers note that the United States did not do anything to support its friends in Syria nor did it do much to push back against Russia's invasions of Ukraine. They say, "Perhaps we're next." This South Korean monologue makes sense if you subscribe to the hawkish supporters of nuclear weapons' arguments.

So far, so good, but there are problems. As I've already noted, it's impossible to prove a negative. As much as one might be inclined to believe that nuclear weapons helped prevent past threatened acts of aggression, it's ultimately impossible to prove. There are alternative arguments to why the West won the Cold War. One alternative explanation is that it was because it had effective alliances. Others argue that the United States didn't need nuclear weapons to win WWII because the Soviet Union was going to come in on the allied side, so we were going to win anyway. Who is right and who is wrong? Ultimately, it is impossible to know.

There's a much bigger problem though, and that's unbounded character of the Hawkish nuclear weapons supporters' arguments. If nuclear weapons deterred conflict throughout the Cold War when we had many, many more nuclear weapons, then wouldn't it follow that, if we had more now, then we could deter more as well? Isn't that the argument today about making sure that the United States doesn't reduce its nuclear arms too far downward and should consider perhaps getting more? And, then, there's the matter of quality. If more nuclear weapons deter more, wouldn't it follow that better nuclear weapons would deter better? Isn't this what's behind our current policy of modernizing our nuclear arsenal? Finally, if nuclear weapons help us deter aggression against us, then shouldn't our closest allies (Israel, India, the UK, France, etc.) get them as well? And if they got them, wouldn't it strengthen deterrence further and be natural for their adversaries to get them as well?

At this point more deters more, better deters better, and more in more hands deters more still. Yet, any thinking person listening to this could get a little nervous. It's like saying everyone should carry a concealed pistol. Yet, most of us feel secure enough not to arm ourselves and do not yet live (or want to live) in such a world, which might also increase the risk of use.

Finally, hawkish supporters of nuclear weapons tend to denigrate or downplay the risk of nuclear accidents, illicit use, seizure or nuclear terrorism. They say, "We've done pretty well so far; and on this front, with a modicum of effort, it should be pretty much as it has always been." Maybe in the short or mid-term, but in the long run that sounds like a bet against the house.

Eric Schlosser wrote a best seller called *Command and Control* on some close calls. If you read it, you won't walk away thinking that an accident might never occur.

Supporters of nuclear weapons generally downplay these risks while the zero crowd hypes them. Former president Barack Obama claimed the most immediate and extreme threat that we face was nuclear terrorism.<sup>3</sup> Yet, I was serving on a commission where we all had clearances and the question was asked: do we have any operational or actionable specific intelligence on nuclear terrorism? The answer was no. At the time, roughly ten percent of our intelligence budget (of more than \$80 billion) was being spent trying to find such information. A lot of terrorists may talk about using nuclear weapons, but actually getting them is not so easy. Also, as a Senior Fellow in the Arms Control Association pointed out, wouldn't it be much more extreme or awful if there was a nuclear exchange between states than if we just lost a city to a nuclear terrorist? So nuclear terrorism is a threat, but it may not be as immediate or as extreme as portrayed.

This brings us to the radical academic skeptics school, my favorite, who denigrate the threat of nuclear terrorism and other forms of popular conventional wisdom regarding nuclear weapons. They write as old Sophists did. Sophists make strong arguments weak and weak arguments strong. What these academic skeptics do is take the conventional wisdom on nuclear deterrence, nuclear terrorism, nuclear proliferation, and all other topics related to these matters and do their best argue the reverse. As a result, they frequently come up with some pretty sensible analysis. They rightly question how useful nuclear weapons are in deterring aggression. They also usefully challenge our policies, such as they are, in Iran and how we went about things in the case of Iraq.

That said, on certain points they're either silent or go too far. They say almost nothing about the risks of going from zero nuclear weapons to one. Most in this school argues that when countries get nuclear weapons, it's a good thing. Kenneth Waltz wrote an essay in *Foreign Affairs* right before he died saying if Iran got the bomb, that would be good because it would deter the United States, Israel, and everyone else, and support peace in the Gulf.<sup>4</sup> What he didn't consider is what might happen on the way to Iran getting its first bomb. It might get bombed. We've seen this already in the Middle East. Israel bombed suspect nuclear reactors in

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3. "Remarks by President Barack Obama," Hradcany Square, Prague, Czech Republic, April 5, 2009, available at [http://www.whitehouse.gov/the\\_press\\_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered](http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered).

4. See Kenneth Waltz, "Why Iran Should Get the Bomb," *Foreign Affairs*, Vol. 25, July-August 2013, available at <https://www.foreignaffairs.com/articles/iran/2012-06-15/why-iran-should-get-bomb>.

Syria and Iraq. United States and the the British planes bombed suspect nuclear facilities in Iraq. Iraq has bombed the Bushehr reactor in Iran. Iran bombed the Osirak reactor in Iraq. The Russians may have encouraged the Egyptians in 1967 to knock out Dimona. Iraq fired a scud at Dimona in the first Gulf War. None of these attacks were peaceful. All were acts of war. Some were preemptive. All suggest the risky side of any country transitioning from zero to their first nuclear weapon. Academic nuclear skeptics, though, don't focus on these risks. They mistakenly assume nuclear weapons acquisition is relatively easy and that robust deterrence is nearly automatic once a single nuclear weapon is acquired.

Some academic nuclear skeptics, like John Mueller, though, deemphasize how much nuclear weapons deter. From the reasonable proposition that the deterrence value of nuclear weapons might have been exaggerated these skeptics contend that nuclear arms have not been a major force in history. For anyone that has lived through the Berlin, Cuban, or Taiwan nuclear crises, that is difficult to believe. Similarly, these skeptics contend that the further spread of nuclear weapons will be of little or no consequence to maintaining peace. Today, the Saudis, Japanese and South Koreans, though, might disagree.

Another one of the academic skeptics' weaker arguments is that nonproliferation causes wars. John Mueller writes that the Iraq war was caused by people agitating for nonproliferation. That's not quite how I remember it when I worked in the Pentagon in 1990. I was called in more than once by my superiors about how many bombs Saddam might get. But I never thought the war was about nonproliferation so much as nonproliferation was part of a larger argument for sending troops to the region. Certainly, the causes of that war had very little actually to do with nonproliferation. First it had something to do with keeping oil flowing from the region. Second, there were arguments about preventing states from invading other states, full stop. And the second Gulf war had a great deal to do with finishing that first war. In any case, it seems a stretch to me that the international nuclear rules were and are tough enough to prompt wars. They are referred to by Bill Perry as a reason why Clinton considered waging a war with North Korea but, then, they never waged that war. Some argue that it is why some in the Pentagon think about bombing Iran. Others, still in the Pentagon, considered bombing Syria. But none of these plans ultimately were implemented. I think that is telling.

Yet, another argument Mueller makes is that nonproliferation is preventing the world from enjoying the benefits of civilian nuclear power. This, again, assumes that nonproliferation rules are tough enough to block profitable trade in civilian technologies, and that the economic benefits of building new nuclear power plants are clearly positive. Yet, both propositions are rebuttable.

So which single school should policy makers pursue? The short answer is none. What then, is the proper mix?

Most people want fewer nuclear weapons in as few hands as possible, but they are wary of disarming unilaterally. They reasonably want their elected officials to pay close attention at all times to what the other nuclear armed states are doing to make sure if we come down, others do as well. They certainly don't want the United States to get caught out by another nation getting ahead of us as we attempt to come down. You would think this is common sense, but as we have seen by reviewing the literature, it's not yet a school of thought. Nor is it a course of action when you talk to political practitioners because, for them, most key political questions turn on the binary of whether you are for or against something. So our policies do not obey common sense as much as they should.

### **III. What might help?**

Between trying to deter aggression by military means alone and eliminating weapons entirely is the reality of continued military competitions and diplomacy. Recently, we have lost the plot on how to integrate the two. We need to get back to working this.

First as the world's finances, trade, and military power gravitate towards East Asia, the focus of our military competitions and arms control and nonproliferation efforts need to shift towards Asia as well. Since 1941, they have centered on Europe. We need to worry about the Koreas, Japan, India, and Pakistan, but most of all, we need to engage China.

Second, I think we've spent a lot of time worrying about the spread of nuclear warheads and the numbers in Russia and the United States. But we need to start focusing our military and diplomatic efforts to shaping the numbers and qualities of missile delivery systems. A key reason why is because the accuracy of missiles today is so great that we can do missions conventionally that used to be only possible with nuclear weapons.

Also, it is almost inconceivable now that any state would launch a first-strike against a large country without missiles. Ronald Reagan may have talked about eliminating nuclear weapons, but he also talked about eliminating what he referred to as "nuclear missiles." I'm not sure exactly what that meant, but I worked in the Senate on the ratification of the Intermediate Nuclear Forces (INF) Treaty and my guess is that it had to do with the missiles that were

ground-based, long-range, nuclear capable (large payload) missiles. It was these missiles that were critical to carry out any first-strikes in Europe.

There are Russians who think likewise. The Chinese, who now have the most dual-capable missile systems, do not want to talk about missile limits. When I talked to the Chinese in my travels to Beijing, they said they couldn't yet talk about nuclear reductions. When I asked why, they said, "Well, because you have the most nuclear weapons and you have to reduce yours with Russia first." When I said, "Well, okay then let's talk about missiles; you have the most missiles," they went silent. This suggests more conversations on missiles are needed.

Third, we need to tighten existing limits on "peaceful" nuclear technology and fissile material production. There's no economic case yet for reprocessing or plutonium-based reactor fuels. Commercial reprocessing should be banned. There is such a large surplus of commercial uranium enrichment capacity, further enrichment capacity should be capped to what demand requires. This effectively would mean placing a moratorium on expanding beyond current capacity. Other civilian nuclear exports should be tied to such limits.

Fourth, we need to change our general approach to preventing proliferation. Right now, we wait till we have proof that someone is getting the bomb. And by the time we get that proof, it's too late to do anything besides something dramatic like a military action or some concessionary diplomacy. Soft diplomacy actually works in very many cases if you start early. We need to start thinking about that and thinking about overall competitive strategies to get to places that we'd like to be and avoid places that we don't want to be instead of waiting for something to become headline news.

Finally, a word for international law. Since the Second World War, international law has been viewed by hard-headed security officials as being a weapon against the United States. As a result, we're not really working international law to our advantage as we could and should. Elihu Root was the Secretary of War at the turn of the century. He was awarded the Nobel Peace Prize, helped create the Permanent Court of International Justice, and founded The American Society of International Law. Why? Because, as he once explained, it was foolish to fight for what you could get everybody to agree to. What you want to do is come up with rules that apply to everyone, including yourself, but only promote and agree to rules that you can live with. I think we need to get back to that old idea as soon as possible.

Now, you can say all of this is nice, but it looks too difficult. That may be. Still, I am pretty sure it is a lot less difficult than eliminating nuclear weapons or trying to deter aggression with nuclear

weapons alone. But, as I've argued, what might help may be too hard to achieve. If it is, then the negative trends I have warned about may be less of a warning than a prediction.