Matthew Fuhrmann

When Preventive War Threats Work for Nuclear Nonproliferation

On June 7, 1981, eight Israeli F-16 jets dropped bombs on an Iraqi nuclear reactor commonly known as *Osiraq*. The strike eliminated Iraq's most critical nuclear facility before it was completed, thereby eroding Saddam Hussein's capacity to make nuclear bombs. The Osiraq raid may be the most well-known preventive attack in the name of nonproliferation, but it is hardly the only time that countries have targeted nuclear materials or infrastructure militarily.

During World War II, the allies launched a series of attacks in German-occupied Norway to erode Nazi Germany's capacity to produce heavy water. Israel dropped bombs on Egypt's main nuclear complex during the 1967 Six Day War. During the Iran-Iraq War (1980-1988), both sides bombed nuclear sites in the other country. The United States heavily targeted the Iraqi nuclear complex during the 1991 Persian Gulf War. Most recently, Israel carried out a surprise attack against Syria in 2007, destroying a nuclear reactor that was being built with North Korean assistance. On other occasions, countries seriously considered launching preventive attacks but ultimately refrained from doing so. The United States, for instance, came to the brink of executing strikes against China in the 1960s and North Korea in the 1990s.[1]

These episodes provide a sober reminder to any country that might contemplate building nuclear weapons: attempts to build bombs might provoke a preventive

Matthew Fuhrmann is a professor of political science at Texas A&M University. This article was made possible in part by a grant from Carnegie Corporation of New York, and stems from the "Strategic Stability and the Diffusion of Nuclear Technology" project, on which the author worked while he was an Andrew Carnegie Fellow (2016–2018). The statements made and views expressed are solely the responsibility of the author. You can reach him via email at mfuhrmann@tamu.edu or follow him on twitter @mcfuhrmann.

The Washington Quarterly • 41:3 pp. 111–135
https://doi.org/10.1080/0163660X.2018.1519367

military response. Indeed, there is growing evidence in scholarship that the prospect of preventive war can limit the spread of nuclear weapons.[2] U.S. officials in the Donald J. Trump administration seem confident that military threats can prevent or rollback nuclear proliferation. Trump appears to believe that his threats to attack North Korea made Pyongyang willing to negotiate and potentially denuclearize, culminating in the historic Singapore Summit on June 12, 2018.

Prior to that, on May 8, 2018, Trump announced that the United States was withdrawing from a nonproliferation deal with Iran known as the Joint Comprehensive Plan of Action (JCPOA)—an agreement that he called "one of the worst deals I have ever witnessed."[3] A couple of weeks after Trump's JCPOA decision, Secretary of State Mike Pompeo articulated 12 far-reaching demands, including that Tehran stop enriching uranium and never reprocess plutonium. Pompeo's comments raised the specter of an attack, although he did not make an explicit military threat: if Iran continues its nuclear program, he said, "we will respond."[4] Moreover, Trump's current national security advisor, John Bolton, has been a vocal advocate of preventive military action against Iran for several years.[5]

Are preventive war threats an effective tool of nonproliferation? If so, under what conditions? Military threats can work, but three challenges may undermine their effectiveness. First, it is often difficult to locate and destroy nuclear facilities on an adversary's territory. Second, military attacks can increase the target's resolve to build nuclear weapons. Third, executing preventive strikes can generate substantial political blowback for the attacker. These factors may combine to make preventive attack threats non-credible, even in situations where success seems likely. The cases of Iran and North Korea, in particular, present U.S. policymakers with major challenges. Officials who use preventive war threats in pursuit of ambitious aims, such as ending all of an adversary's enrichment and reprocessing activities, are likely to be disappointed. Moreover, turning up the heat militarily can backfire by catalyzing the very outcomes that the attacker hopes to avoid.

Military threats can work, but three challenges may undermine their effectiveness.

This essay unpacks these claims in six parts. First, drawing on the fundamentals of deterrence theory, it reviews the conditions that are necessary for military threats to work generally. Second, based on this broad framework, the essay assesses the conditions under which preventive war threats might stop nuclear proliferation. Third, it describes the three challenges that potential attackers face when it comes to preventive attack threat-making. Fourth, it identifies when these threats are most likely to succeed. The fifth section applies insights from the analysis to the contemporary cases of Iran and North Korea, and the final section concludes.

When Do Military Threats Work?

There are two general strategies of influence that countries can pursue when they issue military threats: punishment and denial. Punishment strategies attempt to alter an adversary's behavior by increasing the costs of threat noncompliance. For example, in August 2012, Barack Obama threatened to intervene militarily in Syria's civil war if Bashar al Assad used chemical weapons. "That's a red line for us," the president said, "there would be enormous consequences if we start seeing movement on the chemical weapons front or the use of chemical weapons."[6] Denial strategies, by contrast, seek to alter the probability of success —not the costs of defiance. A country might, for instance, heavily mine its own side of a contested border to convince an adversary that a land invasion would be unsuccessful.

Leaders would like for their threats to succeed. Yet they often do not. Obama's "red line" threat against Syria, for instance, was a clear failure: Syria used chemical weapons one year later, despite Obama's warning. Why do threats sometimes succeed, but fail on other occasions? Three main factors influence the success of military threats: the stakes, the costs of threat implementation, and the threatener's ability to impose its will militarily.[7]

Threats are more likely to work, all else equal, when the issue at stake is critical to the threat-maker's national security. Defending its borders is clearly an essential objective for any country. Threats designed to deter invasions, then, are more likely to work than those over important but less vital issues, like a foreign regime's troubling human rights record. The stakes for the target matter, too. Countries are more likely to defy threats when complying would require sacrificing a critical objective. Consider George W. Bush's threat to Saddam Hussein in March 2003: "Saddam Hussein and his sons must leave Iraq within 48 hours. Their refusal to do so will result in military conflict, commenced at a time of our choosing."[8] It is not surprising that Saddam failed to comply with this demand, even though doing so meant war, given that remaining in power was arguably his most central aim.

The costs of carrying out the threat—for the threat-maker and the target—are a second key factor in the success of military demands. The target's likelihood of capitulating increases along with the costs of resistance. Threats can work even against a highly resolved target if the costs of noncompliance are high. Take, for instance, a threat to use nuclear weapons. A nuclear attack would be catastrophic for the target, increasing the odds that it will comply with a threat-maker's demand when faced with the prospect of nuclear escalation. This is one reason that wars against nuclear powers are rare: potential attackers fear that if they push a nuclear power's back against the wall, it may launch a nuclear attack out of desperation.

When it comes to the threatener's costs of implementing a threat, the relationship is reversed: the likelihood of success declines as the costs increase. When a threat would be extraordinarily costly for the threatener to carry out, the target may dismiss it as non-credible. This is one reason nuclear weapons have little utility as a tool of coercive diplomacy. Launching a nuclear attack to coerce a state over a non-existential matter—for example, wresting away disputed islands—would result in serious political blowback for the attacker and shatter the long-standing taboo against nuclear use.[9] Targets therefore generally do not take these kinds of threats seriously, even though they would be horrifyingly costly for them were they to be implemented.

In some situations, the threat-maker can simply use its military capabilities to get its way if the target fails to comply. Denial strategies, in particular, depend on the capacity to threaten the target with failure. This underscores the third factor that shapes success: the threat-maker's ability to impose its will militarily. Threats are more likely to work if the target believes that the threat-maker would be able to forcibly impose its desired outcome.

Halting Nuclear Proliferation with Military Threats

There are two ways that countries might use military threats to forestall the spread of nuclear weapons. The first option follows the logic of punishment: a country could threaten to inflict pain militarily on a state that races toward a nuclear bomb. The goal here is to deter the potential proliferator from engaging in sensitive nuclear activities by making those behaviors more costly—not to make bomb construction physically more difficult. The second possibility, which is based on a denial strategy, is for a state to signal that it will destroy a proliferator's nuclear facilities if it continues on a path to a bomb. The objective here is to influence the potential proliferator's capacity to build nuclear weapons rather than to alter its demand for an arsenal.

My focus here is primarily on deterring nuclear proliferation by denial.

My focus here is primarily on deterring nuclear proliferation by denial, since this is the strategy that is most relevant for contemporary policy discussions. When U.S. officials raise the prospect of military action against countries such as Iran and North Korea, their central focus is on eliminating sensitive nuclear sites. It is important to acknowledge, however, that countries may pursue both strategies simultaneously. The U.S.-led bombing campaign against Iraq in December 1998, codenamed Operation Desert Fox, underscores that the line between denial and punishment can be blurry. In retaliation for Saddam Hussein's refusal to cooperate with the UN

inspections regime instituted after the Persian Gulf War, the United States and the United Kingdom carried out airstrikes against Iraqi targets. One of the operation's goals was to erode Iraq's WMD capabilities; Washington also wanted to punish the Iraqi dictator and those in his inner circle: the target list included Saddam's palace in Jabal Makhul and the barracks of the Republican Guard, the arm of the military most loyal to the regime.[10]

Threats to destroy nuclear infrastructure may be explicit. In 1963, for example, Egyptian leader Gamal Abdel Nasser told U.S. officials that he would launch a "protective war" if definitive evidence emerged that Israel was building nuclear bombs.[11] Four years later, during the crisis that preceded the Six Day War, Egypt sent two MiG-21 fighters past Israel's most sensitive nuclear plant at Dimona in an apparent show of force.[12] More often than not, however, these threats are implicit. After the Osiraq raid, Israel leader Menachim Begin declared that no adversary would be permitted to acquire nuclear weapons, establishing what would later become known as the *Begin Doctrine*.[13] This doctrine sent a signal to countries from Libya to Pakistan: if you seek nuclear weapons, the same thing will happen to you. Israel did not have to spell this out to its adversaries by issuing verbal threats; they got the message. The United States also need not necessarily make explicit threats in order for its rivals to understand that attempting to develop nuclear weapons could prompt a preventive attack.

Three main conditions would increase the likelihood of nonproliferation success.

Can threats to attack nuclear facilities deter or rollback nuclear proliferation? The perceived effects of carrying out a preventive war threat are critical for understanding whether it will be seen as credible. Threats are more likely to be believable when they would be effective at an acceptable price for the attacker. Answering this question, therefore, requires some discussion of what would happen in the event that threats were implemented. Based on the general framework introduced earlier—which focused on stakes, the costs of threat implementation, and the threat-maker's ability to impose its will—we can identify three main conditions that would increase the likelihood of nonproliferation success.

I. The threat-maker has the capacity to erode the nuclear program.

The target must believe that the threat-maker could destroy its critical nuclear infrastructure in an attack. Denial-based threats work only if targets fear that they will be unable to maintain nuclear plants after making costly investments to build them. If countries believe that their most sensitive plants could withstand an attack, there is little reason for them to be deterred from seeking nuclear bombs.

Following the Osiraq attack, the Libyan leader Muammar Qaddafi sought to destroy Dimona.[14] The problem for Qaddafi, however, was that Libya probably lacked the necessary airpower and missiles to carry out such an operation. Therefore, Israel had little reason to worry about a Libyan attack against its nuclear infrastructure. A more powerful country, such as the Soviet Union, would have had a much better chance of succeeding. Qaddafi apparently understood this, as he asked the Soviets for help in executing his plan but was denied.[15]

2. The threat-maker's costs of attacking are low relative to the stakes.

The threat-maker's capacity to eliminate sensitive nuclear sites is necessary but not sufficient for success. The target must also perceive that the threat-maker has the requisite resolve to launch an attack. If such resolve is lacking, the target will likely dismiss a threat as non-credible. The Soviet Union had the capacity to eliminate Dimona in the 1980s, especially if it used a nuclear weapon, but it lacked the will to do so. There is therefore little reason to expect that a hypothetical Soviet attack on Dimona would have altered Israel's behavior.

Resolve in this context is partially a function of the price the threat-maker would likely pay for launching an attack. When the expected costs of striking are high, the target may calculate that the threat-maker will be less likely to strike, eroding the credibility of its threat. During the crisis over North Korea's nuclear program in 1993-1994, Bill Clinton asked General Gary Luck, who commanded U.S. forces in Korea, whether the United States would prevail in a war with North Korea. The general replied, "Yes, but at the cost of a million [civilians killed] and a trillion [dollars in damage to the South Korean economy]."[16] The high perceived costs of conflict may have weakened the credibility of an American preventive war threat to some degree.[17] Yet, high expected costs from attacking do not automatically render threats non-credible. Targets might fear that potential attackers will tolerate high costs if the stakes are exceedingly high. If the threat-maker believes that the target's acquisition of a nuclear arsenal poses an existential threat, for instance, preventive attacks might be seen as believable even in the face of high costs. Turning this logic on its head, threats can work if the potential attacker cares only mildly about stopping nuclear proliferation if the costs of attacking are small.

Economist Alexandre Debs and political scientist Nuno Monteiro make an argument along these lines in their recent book, *Nuclear Politics*.[18] They contend that preventive war threats are credible when the target's security benefits from proliferation would be large relative to the attacker's costs of war.[19] In that case, the attacker would be better off using military force to stop (or delay) nuclear proliferation. Anticipating this, the target may refrain from seeking nuclear weapons.[20] By contrast, proliferation can occur unimpeded when the

attacker's costs of war exceed the target's security benefits because a preventive war threat lacks credibility. According to their theory, the balance of conventional military capabilities between the potential attacker and the target plays a critical role in shaping the costs of preventive war (as well as the security benefits of proliferation). Preventive war threats, then, are most likely to work against relatively weak potential proliferators, based on their logic.[21]

3. The target's costs of conflict exceed its determination to proliferate.

The potential proliferator's incentives shape the likelihood of success as well. Preventive attack threats can be successful when the expected costs of conflict are larger for the target than its demand for a nuclear arsenal. In that case, pursuing nuclear weapons is simply not worth the risk of inviting an attack. However, if the potential proliferator's determination to build bombs increases, the target's expected costs of conflict must rise in order for threats to succeed.

The case of Syria underscores that threats can fail to deter nuclear development if states are determined to proliferate. Syria almost certainly recognized at least since 1981 that its pursuit of a nuclear weapons capability might trigger an Israeli preventive strike. The possibility of an Israeli attack may have kept Syria's nuclear ambitions at bay for many years. Yet Damascus ultimately pushed forward, building a nuclear reactor with North Korean assistance beginning in 2001.[22] Syria's determination to develop bomb-making potential apparently made it willing to accept the possibility of a costly Israeli military intervention.

Syria underscores that threats can fail to deter nuclear development if states are determined.

Challenges in Preventive Strike Threat-Making

There are situations in which the three conditions articulated above will hold, leading to success for the threat-maker. Yet, states hoping to use military threats to deter nuclear proliferation face three key challenges that can undermine their ability to meet the requisite conditions for success. In light of these challenges, preventive war threats may not be seen as credible even in situations that are seemingly ripe for success. A U.S. threat against a weak state with little ability to retaliate militarily, for instance, may be less effective than it initially appears.

Challenge #1: Locating and Destroying Facilities

Preventive attack threats will be more credible if the target believes that it will lose critical nuclear infrastructure if it resists the challenger's wishes. However,

eliminating nuclear capacity through the use of military force is a tricky enterprise.[23] The track record for identifying all of a country's sensitive nuclear plants is checkered at best, even for a country with robust intelligence capabilities. Proliferators can disperse or hide critical infrastructure, making it difficult for an adversary to obtain a comprehensive picture of its nuclear activities.[24]

Libya had a nuclear weapons program that started shortly after Qaddafi's rise to power in 1970 and persisted until 2003, when Tripoli struck a deal with the United States to abandon its program in exchange for an end to its international isolation. Tripoli obtained gas centrifuge technology from Pakistan beginning in the late 1990s, which was intended to produce weapons-grade highly enriched uranium. Remarkably, however, Libya's efforts seemed to have gone unnoticed in Israel. Amnon Sufrin, the head of the intelligence division at the Israeli Mossad, recalled being surprised when he learned about the 2003 deal from a radio broadcast. "We'd had absolutely no idea that such a program even existed," Sufrin said.[25] How could the Israelis miss this? Part of the answer is that Libya, concerned that it would suffer an Osiraq-style attack, took measures to conceal its nuclear activities. Libya made its nuclear program mobile in the 1990s, giving it the option to quickly move technology or materials from one site to another. In 2000, Libya installed centrifuge cascades at a site in Al Hashan. When security concerns arose two years later, the Libyans expeditiously disassembled the centrifuges and moved them into storage at another facility in Al Fallah.[26]

The United States has had its fair share of struggles on this front, too. Washington considered strikes against China's nuclear sites during the early 1960s to prevent a Chinese bomb. Yet, officials were not confident that they could identify all relevant nuclear sites—one reason the United States refrained from carrying out the proposed attack. As a formerly top-secret assessment prepared by Robert Johnson of the State Department's Policy Planning Council in April 1964 stated, "It is doubtful whether, even with completion of initial photographic coverage of the mainland, we will have anything like complete assurance that we will have identified all significant nuclear installations. Thus, even 'successful' action may not necessarily prevent the ChiComs [Chinese Communists] from detonating a nuclear device in the next few years."[27]

Technological advancements may have improved U.S. monitoring capabilities over time, but the same basic problem persisted over the ensuing decades. Iraq was able to conceal many of its nuclear activities from the United States prior to the 1991 Persian Gulf War. After the war, the *Gulf War Air Power Survey* concluded, "we now know that the Iraqis' program to amass enough enriched uranium to begin producing atomic bombs was more extensive, more redundant, further along, and considerably less vulnerable to air attack than was realized at the outset of Desert Storm."[28]

In some situations, a potential attacker may have a complete picture of its adversary's nuclear program. But this leads to a related point: even if nuclear facilities are identified, they may not be successfully destroyed. Countries can take defensive measures such as "hardening" their nuclear plants, dispersing key materials and components throughout the country, and surrounding key sites with air defense systems. These protective actions can stymie adversaries' efforts to eliminate key nuclear infrastructure militarily. One might naturally think of "success stories" like the Osiraq raid, but these are not necessarily representative cases.

For example, the 1942 British effort to destroy a heavy water production plant in German-occupied Norway, which was critical to Nazi Germany's nuclear program, was an operational failure (though the Allies had more success in later attempts). Similarly, Israeli historian Guy Laron writes that the bombs Israel dropped on Egypt's nuclear reactor at Inshas in 1967 "could not even scratch it."[29] Iranian jets dropped bombs on Osiraq in 1980 but failed to significantly damage it, necessitating Israel's follow-up operation a year later. The advent of precision-guided munitions and missiles that can penetrate far below the earth's surface undoubtedly makes it easier for the United States to destroy nuclear plants about which it knows. Yet, operational success might not be guaranteed even for Washington. Needless to say, the probability of success is even lower for countries that lack these advanced capabilities.

Challenge #2: Reconstitution and Accelerating Demand

Targets can reconstitute their nuclear programs following a successful attack. Once a country possesses the indigenous knowledge required to develop enrichment or reprocessing capabilities, they can rebuild nuclear sites in a few years.[30] A one-off attack, therefore, may be insufficient to lower the likelihood of proliferation in the medium-term, even if it delays progress in the short term. In military denial, when the attacker's aim is to erode the target's bomb-making capacity rather than decrease its demand for an arsenal, the risk of reconstitution is particularly acute. A potential attacker may calculate that a modest increase in a state's distance to a nuclear bomb is not worth the risks that using military force entails. The credibility of preventive attack threats will decline if targets sense that this is the case.

Successfully eroding a state's capacity may ultimately require sustained pressure, as the Iraqi counterproliferation experience illustrates.[31] Military force against Iraq eventually contributed to the termination of its nuclear weapons program. However, this happened only after four different countries (Iran, Israel, the United Kingdom, and the United States) bombed its nuclear infrastructure over two decades. Following the Persian Gulf War, the United States helped establish an unprecedented monitoring regime to inspect Iraqi nuclear facilities that was

backed by American military power. The long-term effort required to erode a state's nuclear capacity may be too much for many states to bear—and targets know this, which further weakens the threat's credibility.

Preventive strikes might accelerate the target's resolve to build nuclear bombs.

Looking beyond capacity-based considerations, preventive strikes might accelerate the target's resolve to build nuclear bombs.[32] History shows that states often launch nuclear weapons programs shortly after they are targeted in serious military disputes. Mao Zedong was determined to build an arsenal after being pushed around by the United States during the 1954–1955 crisis in the Taiwan Strait.[33] South Korea's nuclear weapons program followed numerous military provocations from North Korea, including an assassination attempt against President Park Chung Hee in January 1968. And Saddam Hussein redoubled his efforts to obtain an Iraqi bomb following Israel's bombing of Osiraq.[34]

Attacking a country's nuclear plants, then, may simply foment nuclear proliferation. Targeting nuclear programs militarily could increase the target's appetite for nuclear bombs in three main ways: First, a serious challenge to a country's national security may compel it to seek capabilities that lower the risk of suffering a similar fate in the future. Second, external attacks may provoke nationalistic fervor among the public, potentially making the domestic political environment more favorable for a proliferation decision. Third, an attack could cause the target to withdraw from international nonproliferation commitments, weakening external oversight over its nuclear program.[35]

Challenge #3: Normative and Political Blowback

One might think about the potential attacker's cost of launching preventive strikes in military terms—particularly the target's capacity to carry out counterattacks. Such consequences are undoubtedly important for understanding the credibility of preventive attack threats. Yet, there are significant non-military costs associated with preventive war that can also erode threat credibility. In particular, normative aversion to the use of military force to address non-imminent threats, both domestically and internationally, can increase the political and diplomatic costs of attacking.

Preventive war is widely viewed as illegal according to the United Nations Charter.[36] Legality aside, many citizens and elites view this form of conflict as morally repugnant. This view is exemplified in NSC 68, the historic 1950 government document that helped shape U.S. security policy during the Cold War: "It goes without saying that the idea of 'preventive' war—in the sense of a military

attack not provoked by a military attack upon us or our allies—is generally unacceptable to Americans."[37]

In addition to general restraints on preventive war, there are specific restrictions in international law on targeting nuclear infrastructure. Article 56 of Protocol I Additional to the Geneva Conventions (1977) states that "works or installations containing dangerous forces, [including] nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population."[38] Bombing nuclear sites, particularly reactors, could disperse radioactive materials, leading to large-scale environmental contamination. Indeed, an attack of this nature could replicate the consequences of the nuclear disasters in Chernobyl (1986) and Fukushima (2011).[39]

None of this makes preventive attacks against nuclear programs impossible. But it does increase the non-military costs of striking. There are signs that leaders worry about political blowback that might arise from taking out an adversary's nuclear program preventively. Shimon Peres, who later became Israeli prime minister, opposed the Osiraq raid in part because it would leave Israel "like a tree in the desert."[40] Peres' fear of international censure materialized to some degree. The UN Security Council passed a resolution on June 19, 1981, supported by the United States, which condemned Israel for its "clear violation of the Charter of the United Nations and the norms of international conduct."[41]

The potential for radioactive contamination, in particular, weighed on the minds of Israeli officials as they contemplated a strike against Iraq. After the attack, the Israelis justified bombing the reactor while it was still under construction by noting that further delay would have spread "radioactive lethal fallout over the city of Baghdad."[42] The same is true of the 2007 attack against Syria. Israeli intelligence officials told Prime Minister Ehud Olmert that if the reactor at al Kibar went "hot," a military strike could disperse radioactive materials into the Euphrates River.[43] Given this risk, Israel felt the need to strike quickly, before nuclear materials were introduced into the reactor. Elliott Abrahms, who was the U.S. deputy national security advisor at the time of the al Kibar raid, suggests that Syria's gambit was just a few months from being successful.[44] Had the reactor been operational, Israel may not have attacked. Causing an environmental disaster is not a form of direct retaliation from the target. It can nonetheless raise the costs of carrying out the threat for the attacker, weakening the threat's credibility.

Windows of Preventive Attack Threat Credibility

Overcoming the challenges described above—or at least convincing targets that they would not take the military option off the table—would help potential

attackers increase the credibility of their preventive strike threats. Two factors would help attackers in this regard.

The first is if the threat-maker is highly threatened by the target's acquisition of a nuclear arsenal.[45] There is naturally little reason to preventively attack a country, accepting all of the risks associated with such a ploy, if a state's opposition to proliferation is merely tepid. Yet as the perceived danger increases, so too does the threat-maker's willingness to take a calculated gamble, knowing that an attack may not ultimately succeed. In theory, preventive attacks could be credible in situations where the perceived proliferation threat is low—if the costs of attacking are also very small.[46] Yet for reasons articulated earlier, the costs are likely to be significant even if the target cannot do much to retaliate militarily. It is not clear, therefore, that preventive attack threats will be credible in practice if the threat posed by nuclear proliferation for the attacker is small.

Second, the threat-maker's credibility would be heightened if it sees nuclear proliferation as otherwise inevitable, meaning that the target will obtain a nuclear bomb if it fails to attack. In that case, a country is likely to perceive that carrying out a preventive attack would do no harm from a nonproliferation perspective. Accelerating a state's demand for an arsenal is relatively inconsequential if the attacker believes that the target is already bent on proliferating.

To illustrate, let's return to Israel's 2007 raid against Syria. Before it took action, Israel approached the United States about carrying out the strike. George W. Bush contemplated taking action. CIA Director Michael Hayden told Bush that he had "high confidence" that the Syrian plant was a nuclear reactor, but just "low confidence" of a Syrian nuclear weapons program.[47] This conclusion caused Bush not to strike. As he explained to Prime Minister Olmert, "I cannot justify an attack on a sovereign nation unless my intelligence agencies stand up and say it's a weapons program."[48] Israel, by contrast, apparently believed that Syria was racing to build nuclear weapons and would proliferate soon unless it took swift military action.

There are two windows during which preventive attack threats are most likely to be credible.

If a state is highly threatened by nuclear proliferation and sees this outcome as inevitable without military intervention, there are two windows—based on the suspected proliferator's technological progress—during which preventive attack threats are most likely to be credible.[49] The first is early on in a state's nuclear program, when it has a small number of nuclear plants. Ideally, from the standpoint of threat credibility, it would have just a single "chokepoint" that is under construction but not yet operational. When nuclear programs are in their infancy, an attacker can be more

confident that it can locate all relevant facilities (challenge #1). It is also easier to roll back nascent nuclear programs. Destroyed plants could still be rebuilt but, in the absence of a robust indigenous knowledge base, the target would be essentially starting from scratch. And there is no risk of radioactive contamination if plants have not yet reached criticality (challenge #3).

However, there is a problem with attacking states that have underdeveloped programs: preventive strike threats become more credible as proliferation appears to be inevitable, but a state's intentions are likely to be fluid early on. The best chance for success, then, is also the point where the potential attacker may have the most doubt about the necessity of a military strike.

This brings me to the second window where preventive war threats are likely to be credible: when the target is racing to build bombs and success appears imminent. In such a situation, military force may be seen as a tool of last resort. The threat-maker will no longer worry about causing nuclear proliferation (challenge #2) and the perceived necessity of the strike may reduce the normative and political costs of a preventive attack (challenge #3).

Lessons for Contemporary Nonproliferation Challenges

In both of the two most pressing nonproliferation-related challenges today—Iran and North Korea—U.S. officials have at least implicitly raised the possibility of military action to discourage proliferation. Are these threats likely to work?

North Korea

The North Korean case is unique because Pyongyang already has a nuclear arsenal.[50] This changes the dynamics considerably: North Korea could respond to a U.S. attack by carrying out nuclear strikes against South Korea, Japan, U.S. military bases in the Pacific, or even the American homeland. The possibility of a U.S. preventive attack nonetheless looms in the background. In August 2017, for example, Trump threatened to unleash "fire and fury like the world has never seen" on North Korea.[51]

There has been apparent progress on the North Korean nuclear front in recent months. As noted previously, Trump and Kim met in Singapore on June 12, 2018—the first time a sitting U.S. president met with a North Korean leader. The central U.S. goal of the Singapore summit was to work toward eliminating the threat posed by North Korea's nuclear program. After the meeting, the two leaders released a joint statement indicating that Pyongyang "commits to work towards complete denuclearization of the Korean Peninsula."[52] The next day, Trump seemed to declare victory, writing on Twitter, "everybody can now feel

much safer than the day I took office. There is no longer a Nuclear Threat from North Korea."[53]

The reality is more complicated than Trump's statement implies. The persistent U.S. demand has been for North Korea to accept complete, verifiable, and irreversible denuclearization. Pyongyang did not promise to do this, according to the joint statement. It did not even commit to disarm at all, just to "work towards" denuclearization of the entire peninsula (which includes South Korea). The United States made a similar promise when it ratified the Nuclear Nonproliferation Treaty (NPT). According to Article VI of the treaty, "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament."[54] This was hardly a firm guarantee to disarm, and neither was Pyongyang's similarly vague commitment in Singapore.

That said, Pyongyang has made some conciliatory moves. For example, it has not tested nuclear explosives or long-range missiles since November 28, 2017. In addition, Western media reports in July 2018 indicated that North Korea dismantled a rocket engine test stand.[55] Yet, actions such as this could be seen as token gestures since some outside experts believe that North Korea has already demonstrated the capability to hit the U.S. mainland in an attack.[56]

If Kim truly intends to disarm, he does not seem to be in a hurry. Although it is impossible to read Kim's mind, his government's behavior—which seems designed to appease Washington without making serious, irreversible moves toward nuclear disarmament—is consistent with the view that U.S. preventive war threats lack credibility. This would be an understandable conclusion in light of the preceding analysis.

In a case like this, the first challenge in preventive war threat-making—successfully locating and destroying all relevant infrastructure—is exceedingly salient. The credibility of the U.S. threat weakens dramatically if North Korea believes that at least one deliverable warhead could survive an American first strike. Pyongyang's nuclear infrastructure is currently vulnerable, but it is certainly possible that at least one weapon would survive given the countermeasures that North Korea has taken such as concealing some of its nuclear infrastructure, hardening critical targets, and making portions of the program mobile. Thus, U.S. officials would have to be willing to run inordinately high risks in order to authorize a preventive attack against North Korea. The fact that Pyongyang probably understands this weakens the credibility of the American preventive attack threat.

U.S. preventive war threats against North Korea seem to lack credibility.

The second challenge—reconstitution and acceleration of demand—is relevant in this case, too. North Korea is already a nuclear power, so Washington would not need to worry about causing nuclear proliferation by attacking. However, because Pyongyang possesses the knowledge necessary to make bombs and missiles, it could reconstitute its capabilities following an American military attack. Even in the best-case scenario where a U.S. attack completely wiped out North Korea's nuclear infrastructure, then, any gains for Washington could be temporary. One way the United States could address this problem is by toppling Kim's regime and occupying North Korea, à la Iraq in 2003.

But this brings me to the problem of blowback, the third challenge in preventive war threat-making. One might argue that Trump and his advisers are not too concerned about normative considerations. Yet bombing North Korea would still be politically costly for the United States, especially if it attempted to start a major war or overthrow Kim from power. For example, it would likely complicate the U.S. relationship with China, since Beijing would not like to see instability in its neighborhood. It is also not clear that the American public has an appetite for another potentially protracted military occupation.[57]

Meeting the basic requirements for successful threat-making is difficult in other ways as well. For example, the stakes seem to favor North Korea since many view its nuclear arsenal as critical for regime survival. One North Korean reportedly put it this way: "'if there is no nuclear, there is death."[58] It is far from obvious that the U.S. determination to reverse North Korean proliferation exceeds Pyongyang's resolve to keep its bombs, further weakening the perceived credibility of the American threat.

Iran

When it comes to Iran, the possibility of a U.S. military attack lingers in the wake of Trump's withdrawal from the JCPOA. On July 22, 2018, Trump sent a warning to Iranian president Hassan Rouhani via Twitter in all caps: "NEVER, EVER THREATEN THE UNITED STATES AGAIN OR YOU WILL SUFFER CONSEQUENCES THE LIKES OF WHICH FEW THROUGHOUT HISTORY HAVE EVER SUFFERED BEFORE."[59] A few days later, an Australian media outlet reported that the United States would launch strikes against Iran's nuclear facilities later in the summer. U.S. Secretary of Defense James Mattis denied the report, saying, "I'm confident that it's not something that's being considered right now."[60] The degree to which the United States is serious about attacking Iran remains unclear. Based on the preceding analysis, there is good news and bad news for U.S. officials who may be hoping to gain leverage over Iran by raising the possibility of a preventive strike.

Let's start with the bad news: Iran is well past the first window of threat credibility. The scope of Iran's program complicates efforts to successfully erode its

bomb-making capacity. The United States may have the military capabilities to destroy nuclear sites in Iran about which it knows, although the enrichment site at Fordo could be difficult to eliminate since it is buried more than 200 feet below a mountain.[61] Yet, the scale of the operation would be larger than the previous two Israeli preventive strikes, heightening the risk that something could go awry for U.S. forces. The advanced state of Iran's program also increases the odds that critical nuclear infrastructure or materials may exist in locations unknown to Washington or could be moved swiftly at the first whiff of an attack. Moreover, Iran's indigenous knowledge base would allow it to rebuild facilities that were destroyed in relatively short order, perhaps in two years.[62]

Michael Herzog, the former head of the Israeli Defense Force's Strategic Planning Division acknowledged the difficulties presented by the evolved state of Iran's nuclear program in April 2018: "[It] presents a far more significant challenge to the Begin Doctrine than the programs destroyed in Iraq and Syria. The Iranian project is not built around a single reactor, but rather combines the uranium and plutonium tracks within a broad framework of human capital, know-how, facilities, and infrastructures … "[63] The Iranians will be less worried about preventive strikes, making them potentially unwilling to cave in the face of U.S. demands, if they believe that an attack would not effectively erode their nuclear capacity.

The U.S. will struggle to make preventive strike threats against Tehran credible unless Iran is breaking out.

Military capacity aside, U.S. officials have other incentives to refrain from carrying out a preventive attack—as long as they perceive that Iran is not racing to build bombs. Doing so risks accelerating demand for a nuclear arsenal (challenge #2) and inviting substantial political blowback (challenge #3). Prior to the conclusion of the JCPOA, some U.S. officials felt that Tehran wanted to maintain the capacity to build nuclear bombs but was not racing to proliferate as quickly as possible. As a 2007 National Intelligence Estimate put it, "We judge with high confidence that in fall 2003, Tehran halted its nuclear weapons program; we also assess with moderate-to-high confidence that Tehran at a minimum is keeping open the option to develop nuclear weapons."[64]

The George W. Bush administration reportedly concluded that bombing Iran would be counterproductive, given that Tehran was presently not bent on obtaining an arsenal. As then-CIA Director Hayden put it, Bush's advisers believed that striking the Iranians "would drive them to do what we were trying to prevent."[65] Assuming that Iran recognizes this problem as well, the United States will struggle

to make preventive strike threats credible without clear evidence that Tehran is racing to build nuclear weapons.

Now for the good news: the second credibility window remains open. If Tehran races to build nuclear weapons, the likelihood of a preventive attack increases considerably. In that case, the latter two challenges would be at least partially surmounted: the United States could not contribute to nuclear proliferation by attacking and the international community would be more likely to support military action. The first challenge of finding all of the relevant facilities would still exist, but the perceived imminence of an Iranian bomb would make U.S. elites much more likely to roll the dice. It is therefore plausible that preventive war threats would deter Iranian nuclear breakout.

Donald Trump and some of his advisers may be disappointed by this "good" news. Tehran's mere possession of a latent nuclear capability—including the operation of a dual-use gas centrifuge program—appears to be unacceptable to the Trump administration. Secretary of State Pompeo made it clear in his May 21, 2018 speech at the Heritage Foundation that Iran should not be allowed to enrich uranium at all, even at the modest levels that were permitted under the JCPOA. "Iran must stop enrichment," he said, later adding, "our demands on Iran aren't unreasonable. Give up your program. End it."[66] Dangling the threat of military force to achieve sweeping aims, like forcing Iran to end all of its dual-use nuclear activities, is unlikely to work. The three challenges in preventive war threat-making would still apply. On top of this, meeting the basic conditions for successful preventive attack threat-making would become more difficult.

The second condition—that the costs of conflict for the attacker are low relative to the stakes—becomes much more problematic for Washington. It is clear that the United States opposes Iran's possession of a nuclear arsenal, but less obvious that it would incur potentially large costs to stop Iran from possessing technology that may not ultimately be used for nefarious purposes. The stakes for Iran, by contrast, remain high: Tehran has probably not decided what its ultimate nuclear future looks like, but it seems determined to have an enrichment program for prestige, domestic politics, and as a hedge in case its security environment deteriorates. For all of these reasons, Tehran might dismiss U.S. threats as non-credible in the absence of attempted nuclear breakout.

Trump may have a more modest aim: preventing Iran's enrichment capabilities from expanding. Iranian officials threatened to increase the country's uranium enrichment capacity in the wake of the U.S. withdrawal from the JCPOA, and U.S. officials may see preventive war threats as a way to stop this from happening.[67] Threats are more likely to work in this context compared to a situation in which the United States seeks to rollback existing capabilities, since expanding enrichment capacity could be seen as a sign of breakout. Yet, eliminating sensitive

technology—not merely preventing expansion—appears to be the Trump administration's central objective.

Israeli leader Benjamin Netanyahu seems to share Trump's view about Iran's nuclear program. Might he have better luck making ambitious threats credible? Probably not. Israeli threat perceptions—an Iranian bomb would probably be worse for Israel than the United States—combined with its past actions against Iraq and Syria help increase the likelihood that Iran will worry about an Israeli preventive strike. However, the first challenge in threat-making is more acute for Israel: it is less clear that it has the military capabilities to reliably eliminate all of Iran's nuclear sites.

Israel previously sought assistance from the United States to augment its capacity to carry out such an operation. It asked the Bush administration for flyover rights above Iraq, refueling equipment, and bunker-busting bombs that could destroy underground plants. The American response, according to one of Bush's top aides was: "hell no," particularly with respect to the flyover rights.[68] Toward the end of his presidency, however, Bush reportedly agreed to order GBU-28 Hard Target Penetrators for Israel. These weapons were secretly delivered to Israel during the Obama administration, along with aircrafts for midair refueling.[69] However, the United States has apparently declined to sell Israel its most powerful bunker-buster: the Massive Ordinance Penetrator (the GBU-57). This is reportedly "the only weapon that would have a chance of destroying [Fordo]."[70] Israel's inability to secure GBU-57s, as well as the means to reliably deliver them, exacerbates the first challenge in preventive war threat-making.

There are things the United States (or Israel) could do to increase the credibility of its threat.

There are things the United States (or Israel) could do to increase the credibility of its threat. First, Washington could signal that it sees an Iranian bomb as both immediate and inevitable in the absence of an attack. There is no publicly available evidence that this is true. However, if Iran thinks that Washington believes this, officials in Tehran might be more likely to worry about preventive strikes. This may have been part of Netanyahu's strategy in April when he claimed to present new evidence of a secret Iranian nuclear weapons program.[71] Second, the United States could convey to Iran that it is willing to run large risks to stop its enrichment program. It could, for example, carry out military exercises that simulate bombings of nuclear facilities or send fighter jets over potential Iranian targets such as the enrichment plant at Natanz. Third, Washington could provide Israel with Massive Ordinance Penetrators—and quietly make sure the

Iranians know that it has done so.[72] This would likely heighten Iran's fears of an Israeli preventive attack.

All of these measures, however, come with serious drawbacks. In an effort to make preventive strike threats more credible, the United States might inadvertently catalyze nuclear proliferation. The crisis that preceded the Six Day War offers a valuable lesson. In May 1967, Egypt deployed troops on the Sinai Peninsula and flew military aircraft over Dimona, as noted earlier. Israel was on the fence about its nuclear future in 1966–1967—weaponization was by no means guaranteed. As the Israeli scholar Avner Cohen put it, at that time "[Prime Minister Levi] Eshkol [was] reluctant to take the nuclear plunge, but he was apparently leaning to keep the option open yet not necessarily to go beyond it."[73] The May 1967 crisis changed Israel's nuclear posture. As a result of the emerging threat—especially the fear that the Egyptians were going to strike Dimona—Israel swiftly assembled nuclear warheads and likely had at least a few rudimentary weapons in its arsenal prior to carrying out the preemptive strikes against Egyptian forces on June 5. Egypt's actions therefore helped foment nuclear proliferation. This is ironic given that, according to some accounts, a key Egyptian war aim was to halt Israeli nuclear proliferation.[74]

If the United States and Israel are not careful, they could produce an outcome —an Iranian nuclear bomb—that is not preordained in the absence of military aggression. The Nobel Prize winning economist Thomas Schelling argued long ago that reassurance is an important part of deterrence.[75] The threat "one more step and I shoot," Schelling pointed out, will work only if the victim believes that shooting is not inevitable. Similarly, the prospect of a preventive attack can deter Iranian weaponization—but only if Tehran believes that an attack would not occur anyway.

When Preventive War Works

A critical problem for U.S. policymakers since the 1945 nuclear bombings of Hiroshima and Nagasaki is how to limit the international spread of nuclear weapons. Military threats represent one nonproliferation tool that officials have at their disposal. Leaders can threaten to attack countries that embark on a path toward nuclear weapons. But when are preventive strike threats effective?

The prospect of an attack against nuclear infrastructure can deter or rollback nuclear proliferation if three conditions are satisfied: (1) the threat-maker has the capacity to erode the nuclear program; (2) the threat-maker's costs of attacking are low relative to the stakes; and (3) the target's costs of conflict exceed its determination to proliferate. One might expect that a country such as the

United States would have little trouble meeting these conditions, given its preponderance of military capabilities. However, even powerful countries face challenges when it comes to making preventive attack threats credible. The preceding analysis focused on three such challenges. First, targets may have confidence that their nuclear facilities cannot be reliably identified and destroyed. Second, military attacks can harden the target's resolve to build nuclear weapons. Third, there are considerable political costs that attackers would incur for carrying out preventive strike threats. These challenges complicate a state's ability to gain leverage at the bargaining table by raising the threat of preventive attacks—especially in the absence of definitive evidence that a proliferator is racing to build bombs. It is much more difficult to make these threats credible than one might intuitively expect.

It is much more difficult to make these threats credible than one might intuitively expect.

For better or worse, military threats are likely to remain an essential tool for limiting the international spread of nuclear weapons. Yet, it is important for U.S. officials to recognize the tool's limitations and pursue a diversified portfolio of nonproliferation strategies. Arms control agreements, in particular, should not be cast aside entirely, as the JCPOA was. Unfortunately, at least some Trump administration officials—especially John Bolton—seem determined to do so. As the journalist Fred Kaplan wrote recently, Bolton "has never read an arms-control treaty that he liked."[76] This view is misguided. Agreements such as the NPT, which serves as the bedrock of the nonproliferation regime, have helped advance American interests. Indeed, according to a recent statistical analysis, the NPT has restrained states from proliferating that might have otherwise developed nuclear arsenals.[77] No arms control treaty is infallible, but international nonproliferation agreements can raise the barriers to proliferation, thereby making it less likely.

This analysis leaves a key question unanswered: will the United States or Israel attack countries in the name of nonproliferation? Because the future is unknowable, a confident answer to this question is impossible. However, whether this happens depends heavily on leaders' risk tolerance. Preventive strike threats lack credibility in part because using military force to stop nuclear proliferation is unlikely to work in many situations. Carrying out this policy, then, would be ill advised—particularly in the cases of Iran and North Korea. Yet there is a chance, however small it might be, that preventive strikes might end these proliferation problems. Leaders in Washington or Jerusalem may ultimately be willing to gamble.

Notes

1. For a review of relevant cases, see Matthew Fuhrmann and Sarah E. Kreps, "Targeting Nuclear Programs in War and Peace," *Journal of Conflict Resolution* 54, no. 6 (2010): 831–859; and Matthew Fuhrmann, "Preventive War and the Spread of Nuclear Programs," in Henry Sokolski, ed., *Moving Beyond Pretense: Nuclear Power and Nonproliferation* (Carlisle, PA: Strategic Studies Institute and U.S. Army War College Press, 2014), 91–116. On Israel's bombing of the Egyptian site in 1967, see Guy Laron, "The Six Day War and the Nuclear Coup That Never Was," *War on the Rocks,* June 29, 2017, https://warontherocks.com/2017/06/the-six-day-war-and-the-nuclear-coup-that-never-was/.
2. See especially Alexandre Debs and Nuno Monteiro, *Nuclear Politics: The Strategic Causes of Proliferation* (New York: Cambridge University Press, 2017). Debs and Monteiro (p. 53) refer to preventive war threats as a state's "most effective policy tool" for deterring proliferation, though they acknowledge that it is not the only one. For other research on nuclear proliferation and preventive war, see, for example: William Spaniel, "Arms Negotiations, War Exhaustion, and the Credibility of Preventive War," *International Interactions* 41, no. 5 (2015): 832–856; Muhammet A. Bas and Andrew J. Coe, "A Dynamic Theory of Nuclear Proliferation and Preventive War," *International Organization* 70, no. 4 (2016): 655–685; and Rachel Elizabeth Whitlark, "Nuclear Beliefs: A Leader-Focused Theory of Counter-Proliferation," *Security Studies* 26, no. 4 (2017): 545–574.
3. Steve Holland and Arshad Mohammed, "Trump Has All But Decided to Withdraw from Iran Nuclear Deal: Sources," Reuters, May 2, 2018, https://www.reuters.com/article/us-iran-nuclear-usa/trump-has-all-but-decided-to-withdraw-from-iran-nuclear-deal-sources-idUSKBN1I331R.
4. Lesley Wroughton and Parisa Hefezi, "U.S. Toughens Stance on Iran, Lists Sweeping Demands," Reuters, May 21, 2018, https://www.reuters.com/article/us-iran-nuclear-usa/pompeo-says-u-s-to-impose-strongest-sanctions-on-iran-idUSKCN1IM1DE.
5. John Bolton, "Time for an Israeli Strike?" *Washington Post,* July 2, 2009, http://www.washingtonpost.com/wp-dyn/content/article/2009/07/01/AR2009070103020.html. Some scholars have also argued that a military attack against Iran is the "least bad" option. See Matthew Kroenig, "Time to Attack Iran: Why a Strike Is the Least Bad Option," *Foreign Affairs* 91, no. 1 (2012): 76–80.
6. Barack Obama, "Remarks to White House Press Corps," (Washington D.C., August 20, 2012) The White House, https://obamawhitehouse.archives.gov/the-press-office/2012/08/20/remarks-president-white-house-press-corps.
7. This discussion draws on Todd S. Sechser and Matthew Fuhrmann, *Nuclear Weapons and Coercive Diplomacy* (New York: Cambridge University Press, 2017), 27–34.
8. George W. Bush, "Saddam Hussein and His Sons Must Leave," *New York Times,* March 13, 2003, https://www.nytimes.com/2003/03/18/us/threats-responses-bush-s-speech-iraq-saddam-hussein-his-sons-must-leave.html.
9. Sechser and Fuhrmann, *Nuclear Weapons and Coercive Diplomacy*, 45–58.
10. Shyam Ghatia and Daniel McGrory, *Brighter than the Baghdad Sun: Saddam Hussein's Nuclear Threat to the United States* (Washington, DC: Regnery Publishing, 2000), 299.
11. Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998), 249.
12. Avher Cohen, "Israel's Secret Plan to Nuke the Egyptian Desert," *Politico,* June 5, 2017, https://www.politico.com/magazine/story/2017/06/05/israels-secret-plan-to-nuke-the-egyptian-desert-215228.

13. Begin's post-attack remarks are quoted in David K. Shipler, "Prime Minister Begin Defends Raid on Iraqi Nuclear Reactor; Pledges to Thwart a New 'Holocaust,'" *New York Times*, June 10, 1981, https://www.nytimes.com/1981/06/10/world/prime-minister-begin-defends-raid-iraqi-nuclear-reactor-pledges-thwart-new.html.
14. Bennett Ramberg, "Nuclear Plants – Military Hostages?" *Bulletin of the Atomic Scientists* 42, no. 3 (1986): 17.
15. Isabella Ginor and Gideon Remez, *Foxbats over Dimona: The Soviets' Nuclear Gamble in the Six-Day War* (New Haven, CT: Yale University Press, 2008), 121.
16. Joel S. Wit, Daniel B. Poneman, and Robert L. Gallucci, *Going Critical: The First North Korean Nuclear Crisis* (Washington, DC: Brookings Institution Press, 2004), 181.
17. This logic has also been applied to U.S. preventive war threats against the Soviet Union in the aftermath of World War II. See Spaniel, "Arms Negotiations, War Exhaustion, and the Credibility of Preventive War."
18. Debs and Monteiro, *Nuclear Politics*. See also Alexandre Debs and Nuno Monteiro, "Known Unknowns: Power Shifts, Uncertainty, and War," *International Organization* 68, no. 1 (2014): 1–31.
19. Debs and Monteiro, *Nuclear Politics*, 44.
20. Debs and Monteiro also argue, however, that some states may launch a covert nuclear weapons program, hoping to escape international detection. These states, they contend, are ultimately likely to suffer preventive attacks since concealing nuclear technology is difficult. Debs and Monteiro, *Nuclear Politics*, 44.
21. Ibid, 45. Debs and Monteiro also argue that the expected effectiveness of an attack, emphasized in the first point above, influences threat credibility. Debs and Monteiro, "Known Unknowns": 8.
22. For further details on North Korea's nuclear assistance to Syria, see "Background Briefing with Senior U.S. Officials on Syria's Covert Nuclear Reactor and North Korea's Involvement," April 24, 2008, https://fas.org/irp/news/2008/04/odni042408.pdf.
23. Other analyses make this point, sometimes in the context of discussions about a possible preventive strike against Iranian nuclear facilities. See, for example, Sarah E. Kreps and Matthew Fuhrmann, "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" *Journal of Strategic Studies* 34, no. 2 (2011): 161–187; Kenneth M. Pollack, *Unthinkable: Iran, the Bomb, and American Strategy* (New York, Simon and Schuster, 2013), 233–235; and Alexandre Debs and Nuno Monteiro, "The Flawed Logic of Striking Iran," *Foreign Affairs*, January 17, 2012.
24. Vipin Narang, "Strategies of Proliferation: How States Pursue the Bomb," *International Security* 41, no. 3: 130.
25. Quoted in Amos Harel and Aluf Benn, "No Longer a Secret: How Israel Destroyed Syria's Nuclear Reactor," *Haaretz*, May 23, 2018, https://www.haaretz.com/world-news/MAGAZINE-no-longer-a-secret-how-israel-destroyed-syria-s-nuclear-reactor-1.5914407.
26. Malfrid Braut-Hegghammer, *Unclear Physics: Why Iraq and Libya Failed to Build Nuclear Weapons* (Ithaca, NY: Cornell University Press, 2016), 202, 207.
27. U.S. Department of State, Policy Planning Council, "An Exploration of the Possible Bases for Action against the Chinese Communist Nuclear Facilities," April 14, 1964: 3–4, https://nsarchive2.gwu.edu/nukevault/ebb488/docs/Doc%2016%204-22-64%20R%20Johnson%20bases%20for%20direct%20action.pdf.
28. Quoted in Kreps and Fuhrmann, "Attacking the Atom": 178.
29. Laron, "The Six Day War and the Nuclear Coup That Never Was."

30. Critics of preventive strikes often make this point. See, for example, Colin Kahl, "Not Time to Attack Iran," *Foreign Affairs* 91, no. 2 (2012), https://www.foreignaffairs.com/articles/iran/2012-01-17/not-time-attack-iran.
31. On this point, also see Kahl, "Not Time to Attack Iran."
32. See Dan Reiter, "Preventive Attacks against Nuclear Programs and the 'Success' at Osiraq," *Nonproliferation* Review 12, no. 2 (2005): 355–371; Malfrid Braut-Hegghammer, "Revisiting Osiraq: Preventive Attacks and Nuclear Proliferation Risks," *International Security* 36, no. 1 (2011): 101–132; Pollack, *Unthinkable*, 200–202; and Debs and Monteiro, "The Flawed Logic of Striking Iran."
33. For a discussion of the factors that motivated China to build nuclear weapons, see John Lewis and Xue Litai, *China Builds the Bomb* (Palo Alto, CA: Stanford University Press, 1988).
34. Braut-Hegghammer, "Revisiting Osiraq."
35. On these points, see William Broad, "How to Help Iran Build a Bomb," *New York Times*, September 28, 2012, https://www.nytimes.com/2012/09/30/sunday-review/how-to-help-iran-build-a-bomb.html.
36. See, for example, Michael Blake, "Does International Law Make a Moral Difference? The Case of Preventive War," in *Deen K. Chatterjee, ed., The Ethics of Preventive War* (New York: Cambridge University Press, 2013), 67.
37. Quoted in Peter Beinart, "How America Shed the Taboo against Preventive War," *The Atlantic*, April 21, 2017, https://www.theatlantic.com/international/archive/2017/04/north-korea-preventive-war/523833/. This essay makes the case that normative restrictions against preventive war have declined over time.
38. Jozef Goldblat, *Arms Control: The New Guide to Negotiations and Agreements* (Thousand Oaks, CA: Sage, 2002), 164–165. See also Fuhrmann and Kreps, "Targeting Nuclear Programs in War and Peace": 838.
39. See, for example, Bennett Ramberg, "North Korea's Other Nuclear Threat: Why We Have More to Fear Than Just Bombs," *Foreign Affairs*, August 28, 2017, https://www.foreignaffairs.com/articles/north-korea/2017-08-28/north-koreas-other-nuclear-threat.
40. Quoted in Amos Perlmutter, Michael I. Handel, and Uri Bar-Joseph, *Two Minutes over Baghdad* (New York: Routledge, 2003), 69.
41. United Nations Security Council Resolution 487 (June 19, 1981), http://unscr.com/en/resolutions/487.
42. Jeffrey T. Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran and North Korea* (New York: W.W. Norton, 2007), 322.
43. Amos Harel, "17 Tons of Explosives," *Haaretz*, September 20, 2012, https://www.haaretz.com/new-yorker-outs-syria-reactor-strike-1.5159340.
44. Elliott Abrams, "Bombing the Syrian Reactor: The Untold Story," *Commentary*, February 1, 2013, https://www.commentarymagazine.com/articles/bombing-the-syrian-reactor-the-untold-story/.
45. This is a point of emphasis in Fuhrmann and Kreps, "Targeting Nuclear Programs in War and Peace." See also Debs and Monteiro, *Nuclear Politics*.
46. See Debs and Monteiro, *Nuclear Politics* and Bas and Coe, "A Dynamic Theory of Nuclear Proliferation and Preventive War."
47. George W. Bush, *Decision Points* (New York: Crown Publishers, 2010), 421.
48. Ibid.

49. Bas and Coe similarly argue that a potential proliferator's technological progress shapes the likelihood of preventive attacks against nuclear programs. Their theory, by contrast, focuses on one of the two windows emphasized here: "preventive attack should occur if and only if the program in question is estimated to be nearing success." See Bas and Coe, "A Dynamic Theory of Nuclear Proliferation and Preventive War": 669. See also Fuhrmann and Kreps, "Targeting Nuclear Programs in War and Peace": 843.
50. Consideration of preventive strikes against nuclear powers is not unprecedented. The United States contemplated preventive war with the Soviet Union after Moscow's first nuclear test in 1949. In addition, the Soviet Union thought seriously about taking out Chinese nuclear plants during the serious border crisis along the Ussiri River in 1969, five years after China joined the nuclear club.
51. Peter Baker and Choe Sang-Hun, "Trump Threatens 'Fire and Fury' against North Korea If It Endangers U.S." *New York Times*, August 8, 2017, https://www.nytimes.com/2017/08/08/world/asia/north-korea-un-sanctions-nuclear-missile-united-nations.html.
52. "Joint Statement of President Donald J. Trump of the United States of America and Chairman Kim Jong Un of the Democratic People's Republic of Korea at the Singapore Summit," Reuters, June 12, 2018, https://www.reuters.com/article/us-northkorea-usa-agreement-text/trump-and-kims-joint-statement-idUSKBN1J80IU.
53. Donald J. Trump, "Just landed – a long trip, but everybody can now feel much safer than the day I took office. There is no longer a Nuclear Threat from North Korea. Meeting with Kim Jong Un was an interesting and very positive experience. North Korea has great potential for the future," Twitter, June 13, 2018, 2:56 a.m., https://twitter.com/realdonaldtrump/status/1006837823469735936?lang=en.
54. The full text of the treaty is available at http://www.un.org/en/conf/npt/2005/npttreaty.html.
55. Ankit Panda, "US Intelligence: North Korean Engine Dismantlement at Sohae Reversible 'Within Months,'" *The Diplomat*, July 25, 2018, https://thediplomat.com/2018/07/us-intelligence-north-korean-engine-dismantlement-at-sohae-reversible-within-months/.
56. See, for example, Jeffrey Lewis, "Let's Face It: North Korean Nuclear Weapons Can Hit the U.S.," *New York Times*, August 3, 2017, https://www.nytimes.com/2017/08/03/opinion/north-korea-nukes.html.
57. Prior research shows that war exhaustion can undermine the credibility of preventive war threats. See Spaniel, "Arms Negotiations, War Exhaustion, and the Credibility of Preventive War."
58. Quoted in "North Korea's Ruling Party Informs Officials Kim Regime Will Not Give up Nukes," *Radio Free Asia*, July 25, 2018, https://www.rfa.org/english/news/korea/nukes-07252018142754.html.
59. Donald J. Trump, "To Iranian President Rouhani: NEVER, EVER THREATEN THE UNITED STATES AGAIN OR YOU WILL SUFFER CONSEQUENCES THE LIKES OF WHICH FEW THROUGHOUT HISTORY HAVE EVER SUFFERED BEFORE. WE ARE NO LONGER A COUNTRY THAT WILL STAND FOR YOUR DEMENTED WORDS OF VIOLENCE & DEATH. BE CAUTIOUS!" Twitter, July 22, 2018, 8:24 p.m, https://twitter.com/realdonaldtrump/status/1021234525626609666.
60. Phil Stewart, "U.S. Not Pursuing Regime Change, Collapse in Iran: Mattis," Reuters, July 27, 2018, https://www.reuters.com/article/us-usa-iran/u-s-not-pursuing-regime-change-collapse-in-iran-mattis-idUSKBN1KH247.

61. Thom Shanker and David E. Sanger, "No Bunker-Buster Bomb in Israel's Weapons Deal with U.S.," *New York Times,* April 22, 2013, https://www.nytimes.com/2013/04/23/world/middleeast/israel-hagel-iran.html.
62. Pollack, *Unthinkable*, 239.
63. Michael Herzog, "Israel's 2007 Strike on Syrian Nuclear Reactor: Lessons Learned for Iran," *Washington Institute,* April 25, 2018, http://www.washingtoninstitute.org/policy-analysis/view/israels-2007-strike-on-syrian-nuclear-reactor-lessons-learned-for-iran.
64. Office of the Director of National Intelligence, "Iran: Nuclear Intentions and Capabilities," November 2007. The key judgments from this estimate are available here: https://www.dni.gov/files/documents/Newsroom/Press%20Releases/2007%20Press%20Releases/20071203_release.pdf.
65. Quoted in Broad, "How to Help Iran Build a Bomb." See also Pollack, *Unthinkable*, 202.
66. Pompeo's full remarks are available at https://www.heritage.org/defense/event/after-the-deal-new-iran-strategy.
67. Carol Morello, "Iran Plans New Uranium Enrichment," *Washington Post,* June 5, 2018.
68. David E. Sanger, "U.S. Rejected Aid for Israeli Raid on Iranian Nuclear Site," *New York Times,* January 10, 2009, https://www.nytimes.com/2009/01/11/washington/11iran.html.
69. Eli Lake, "Obama Arms Israel," *Newsweek,* September 25, 2011, https://www.newsweek.com/obama-arms-israel-67479.
70. Shanker and Sanger, "No Bunker-Buster Bomb."
71. Stephen Farrell and Lesley Wroughton, "Israel Says Iran Lied on Nuclear Arms, Pressures U.S. to Scrap Deal," Reuters, April 30, 2018, https://www.reuters.com/article/us-israel-iran-netanyahu/netanyahu-iran-lied-about-not-pursuing-nuclear-weapons-idUSKBN1I11CJ.
72. Two members of Congress have advocated for this policy. See Grace Meng and Lee Zeldin, "It's Time to Give Israel the Means to Take out Iranian Nukes," *New York Post,* May 17, 2015, https://nypost.com/2015/05/17/its-time-to-give-israel-the-means-to-take-out-iranian-nukes/.
73. Avner Cohen, "Crossing the Threshold: The Untold Nuclear Dimension of the 1967 Arab-Israeli War and Its Contemporary Lessons," *Arms Control Today* 37, no. 5 (2007): 12–16.
74. Ginor and Remez, *Foxbats over Dimona.*
75. Thomas Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966), 74.
76. Fred Kaplan, "It's Time to Panic Now," *Slate,* March 22, 2018, https://slate.com/news-and-politics/2018/03/john-bolton-named-national-security-advisor-its-time-to-panic-now.html.
77. Matthew Fuhrmann and Yonatan Lupu, "Do Arms Control Treaties Work? Assessing the Effectiveness of the Nuclear Nonproliferation Treaty," *International Studies Quarterly* 60, no. 3 (2016): 530–539.