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5 The effectiveness and legitimacy of the use of force to prevent nuclear proliferation

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Introduction

This chapter examines instances in which states have used military force for the purpose of preventing or delaying an adversary's acquisition of nuclear weapons. Military strikes on nuclear facilities are rare, but assertions of the willingness to resort to force as a means of preventing nuclear proliferation have become more common in recent years. The threat and use of preventive force is not a relic of the presidency of George W. Bush. Although Barack Obama promised more energetic diplomacy to deal with potential nuclear threats, he has not repudiated his predecessor's "doctrine of preemption." Nor is such thinking a component of policy in the United States alone. The concept of using military force to prevent the emergence of nuclear threats gained popularity in capitals around the world as proliferation and terrorism threats intensified after the end of the Cold War and normative constraints on military intervention were loosened. Military strikes on nuclear facilities will remain a tempting option as long as states seek to acquire nuclear weapons and efforts short of military force fail to prevent their spread.

If the use of preventive force is a growing trend, it would be useful to know whether it is in fact an effective means of preventing the proliferation of nuclear weapons. What can be learned from past cases? What are the barriers to effective military prevention? Under what conditions has the use of force been successful in preventing proliferation? How is the policy perceived by neutral governments and what is the relationship between the perceived legitimacy of military action and its political effectiveness? Answers to these questions are particularly pertinent today for policy makers considering their options with respect to Iran's nuclear program and North Korea's continued intransigence. They will remain relevant as proliferation concerns grow in an era of global nuclear energy expansion.

To attempt to answer these questions, I examine nine cases in which force was used to attempt to destroy an adversary's nuclear facilities.[1] I find that in eight of nine instances, the attacker's political objectives were not

achieved. The cases demonstrate that attackers encounter numerous obstacles to success, including inadequate intelligence for destroying all key facilities, the inability to deprive the targeted state of the knowledge base upon which its program was built, intensification of nuclear ambition and the reconstitution of less vulnerable facilities in the targeted state, escalating costs of containing proliferation, timing difficulties, and conflicting strategic impulses that have at times led to incoherent policies. Favourable circumstances for effective preventive strikes are rare. Limited aims and strong international support appear to be necessary for successful prevention. Past cases suggest that the use of force has generally been an ineffective means of preventing nuclear proliferation. Although not examined here, these same issues would arise with the use of force against other proliferation threats such as long-range missiles, or chemical or biological weapons.

Because international support appears to be a critical enabler of successful prevention, I examine the conditions under which the use of force is seen as a legitimate response to a proliferation threat. Factors that lend legitimacy to the use of force in cases of humanitarian intervention – the imminence of a threat, the necessity of using force to alleviate the danger, and the proportionality of the military response – are very difficult to apply in proliferation cases, where the impetus to act is a set of secret activities. A proliferation threat is not likely to be judged unambiguously imminent, and the perceived legitimacy of preventive force may only be possible to judge in the aftermath of an operation. I argue that the fiasco of the 2003 US-led war in Iraq has raised the bar for claims that force is necessary to prevent proliferation. Such claims are now met with great scrutiny by the Security Council and international community. At the same time, the UN Security Council is also more difficult to ignore, particularly in cases that demand large-scale force.

I confine my analysis to cases of nuclear proliferation. Nuclear weapons present a qualitatively different order of danger than chemical weapons or ballistic missiles and arguably merit special consideration. Although the lethality of biological weapons could be comparable to nuclear weapons, their development is extremely difficult to distinguish from legitimate activity and can be carried out on a scale that is not easily susceptible to disruption by means of military intervention. A nuclear program offers, at least at first blush, a more feasible set of military targets. Finally, information that is reliable, comprehensive, and available to the public on all attempted attacks on chemical, missile, and biological weapons facilities is difficult to assemble. Incomplete data would likely skew the analysis further toward the conclusion that military force is an ineffective tool for preventing proliferation.

In what follows, I first review briefly the logic of preventive force. Second, I describe how the use of force to prevent proliferation has evolved since World War II, shaped by the changes in threats, norms, doctrines, and capabilities that emerged after the Cold War and 11 September 2001. Third, I examine the cases in which force was used to intentionally delay or prevent an adversary from acquiring a nuclear weapons capability. In the fourth section, drawing lessons from the cases, I describe a number of obstacles to effective, long-term proliferation prevention, and also identify conditions that enable more favourable outcomes. Fifth, I consider the legality and legitimacy of the use of preventive force. In the final sections, I offer observations on how lessons from past interventions will inform future trends in the use of preventive force and draw practical implications for policy makers. I suggest establishing agreed upon standards for identifying when proliferation is an imminent threat to international peace and security. Such standards could facilitate more timely International Atomic Energy Agency (IAEA) access and if necessary, Security Council enforcement action. I also urge strengthening international mechanisms for sharing proliferation intelligence.

What preventive force is – and what it is not

Discussions of preventive force have suffered from persistent and significant confusion over basic definitions. The preventive use of force entails initiating an attack to address a potential threat *before* it materializes.[2] Advocates of using force preventively apply a "better-now-than-later" logic to nascent developments of strategic importance – trends that could shift the balance of power unfavourably in relation to a potential adversary.

Several distinctions should be kept in mind when thinking about the history, and future, of prevention as a military strategy. First, there is a difference, as many analysts have pointed out, between a preemptive attack and the use of preventive force (Freedman 2003; Keller and Mitchell 2006: 5). Preemption is the act of landing an initial blow when an attack by one's adversary is imminent. The Israeli initiation of war in response to Egyptian and Syrian mobilizations in June 1967 is an oft-cited and rare case of preemptive attack (Reiter 1995). US strategy documents have blurred the distinction between preemption and prevention. The 2002 US *National Security Strategy* stated the United States would "act preemptively" to "forestall or prevent" hostile acts by adversaries (United States 2002a: 15). The warning that the United States would act preemptively to address the threat of weapons of mass destruction, "even if uncertainty remains as to the time and place of the enemy's attack," was a misnomer for a policy to use preventive force (United States 2002a: 15). The distinction is significant, particularly in a proliferation context, because the imminence of danger is a key consideration governing the legality and legitimacy of the use of force, as discussed below.

Second, the scope and context of preventive military operations can vary tremendously. With respect to attacks on nuclear facilities, there have been instances of full-scale war aimed explicitly at removing the political regime behind the suspected nuclear program (e.g., the declared purpose

of the US attack on Iraq in 2003), and cases of limited strikes on a single target (e.g., the Israeli attacks on Iraq in 1981 and on Syria in 2007). Attacks on nuclear facilities have been launched as part of intra-war operations (e.g., during World War II, the Iran-Iraq war, and the 1991 Gulf war). In other cases, attacks on nuclear facilities have occurred during periods otherwise devoid of any military crisis between the parties involved (again, the 2007 attack on Syria and the 1981 attack on Iraq are examples).

Third, most preventive actions in international relations, and most efforts to prevent nuclear proliferation, do not involve the use of force. Preventing a potential threat from growing larger is clearly a desirable goal. Nuclear weapons are dangerous, particularly in the hands of an adversary; states have developed a variety of means, both coercive and cooperative, to reduce that danger. The regulatory machinery of the non-proliferation regime contributes daily to preventing proliferation.[3] It is only where that machinery is weakened or failing in the face of a state determined to acquire weapons that the resort to preventive force becomes a serious consideration.

Finally, it bears noting in the pages of a volume on coercive arms control that although the *threat* of preventive attack could be considered part of a coercive strategy to dissuade an adversary from pursuing nuclear weapons or to compel the abandonment of a nuclear program, the *act* of preventive attack is not usually coercive in the strict sense of the word. Coercion aims to influence the decisions of an adversary: coercive threats are issued to induce the target state to change its own behaviour by ceasing or reversing objectionable activities. A preventive attack by contrast is meant to destroy capabilities in-the-making, removing the threat they pose with "brute force," to borrow Schelling's term.[4] The use of military force to destroy an adversary's nuclear facilities is generally an indication that coercion has failed.

The evolution of the use of force as a non-proliferation strategy

When the United States declared in 2002 that it would use military force to "forestall or prevent" hostile acts such as efforts by adversaries to acquire weapons of mass destruction, it was extending and formalizing as policy a body of thought with a long lineage (United States 2002a: 15).[5] It was also articulating a concept that, in response to post-Cold War, post 9/11 security challenges, was making its way into national security policy discussions in capitals around the world. In the United States, preventive force rhetoric was accompanied by a loosening of international norms and by a growing capability to bring military force to bear with great speed and accuracy almost anywhere on the planet.

Prevention and proliferation during the Cold War

The United States considered launching preventive attacks several times during the Cold War. Within months of the bombings of Hiroshima and Nagasaki, General Leslie Groves, who oversaw the Manhattan Project, wrote:

> [If] we were ruthlessly realistic, we would not permit any foreign power with which we are not firmly aligned, and in which we do not have absolute confidence, to make or possess atomic weapons. If such a country started to make atomic weapons we would destroy its capacity to make them before it had progressed enough to threaten us.[6]

Early in the Cold War, the US Air Force was a locus of preventive war thinking, though Truman was publicly dismissive of the idea (Trachtenberg 1991: 105–106). The Eisenhower administration studied the idea of preventive strikes on the Soviet Union to restore US nuclear primacy (Trachtenberg 1991: 139–141). During John F. Kennedy's presidency, a major intelligence effort was undertaken to assess the viability of using force to stop China's pursuit of nuclear weapons. The decision to forego an attack was taken by the Johnson administration (Burr and Richelson 2000/01). The United States imposed a naval blockade on Cuba during the Cuban missile crisis and carefully considered the possibility of using military force to destroy the missile threat there before it was operational (Kennedy 1971; May and Zelikow 1997).

In each of these cases, the use of force was rejected on grounds of both morality and prudence. Preventive attack was viewed as immoral because the level of destruction the USA would inflict seemed disproportionate to the threat. In 1950, President Truman dismissed the head of the Air War College, General Orville Anderson, for his public advocacy of preventive war against the Soviet Union to preserve the US nuclear monopoly, and publicly rebuked an Air Force secretary for his remarks on the topic. Truman wrote in his memoirs that he had always been opposed "even to the thought of such a war," adding, "you don't prevent anything by war except peace" (cited in Schlesinger 2004: 22).[7] Preventive war was considered as an option in NSC-68, the 1950 US Cold War strategy document, but was judged to be "morally corrosive" (National Security Council 1950). When asked about the possibility of a preventive attack on the Soviet Union, Eisenhower responded that there were "all sorts of reasons, moral and political and everything else against this theory," adding that it was "completely unthinkable" (quoted in Holloway 2006: 38). Kennedy likened the idea of a preventive "sneak attack" on the missile sites in Cuba to "a Pearl Harbor in reverse" (cited in Schlesinger 2004: 22).

Behind these expressions of moral abhorrence, however, were also calculations of risks and benefits. Trachtenberg suggests that the primary reason that the United States did not take advantage of its "wasting asset"

of nuclear superiority was that it did not have sufficient military forces to win a protracted conventional war with the Soviet Union, which, it was believed, would have been the result of a preventive strike on Soviet nuclear sites (see Trachtenberg 1991: 107–108).[8] The idea of preventing China from acquiring nuclear weapons was rejected because, among other reasons, President Johnson and his advisors judged that a nuclear China would not have the drastic strategic consequences that were initially feared: using force was seen as unnecessary. Moreover, after China's October 1964 atomic test, an attack was considered too risky. US confidence in delivering a decisive blow to the program was especially undermined by the disconcerting post-test discovery that, contrary to intelligence predictions, China had tested a uranium-fuelled bomb rather than one made from plutonium (Burr and Richardson 2000/01: 86–96).

Preventive war was a consistent strand of strategic thinking in the United States during the Cold War, but it was never an idea that gained serious support from the president. But Israel was an early and explicit adherent of preventive force both during and after the Cold War. Israel launched the 1956 Sinai Campaign against Egypt with the goal of preventing Egypt from absorbing a large shipment of arms from the Soviet Union. And, defending the 1981 attack on Iraq's nuclear facilities, Prime Minister Menachem Begin explained that "we chose this moment: now, not later, because later may be too late. ... We shall not allow any enemy to develop weapons of mass destruction turned against us" (see Spector and Cohen 2008).[9]

New threats, new norms, new doctrines, new capabilities

With the end of the Cold War, new global dangers came into sharper focus. These included not only inter-state war but also civil war, human rights abuses, genocide, poverty, disease, and environmental degradation; the proliferation of nuclear, biological, and chemical weapons; and, particularly after 9/11, the global reach of terrorist organizations.[10] The possibility of connections between "rogue" or failing states, nuclear, biological, and chemical weapons and terrorists became, and remains, a particular worry. Nuclear dangers threatened on many fronts. Dozens of countries had (and have) stockpiles of weapon-useable plutonium or highly enriched uranium and at many sites these materials were woefully insecure. In the early 1990s, poor security for nuclear materials gave rise to a fear of not only proliferation to new states, but also the theft and use of nuclear weapons by a terrorist organization.[11] A black market network with Pakistan as its hub transferred critical technologies to new nuclear aspirants in Iran, North Korea, Libya, and perhaps elsewhere (see International Institute for Strategic Studies 2007; Frantz and Collins 2007). Arms reduction negotiations between the United States and Russia stagnated – a consequence of neglect by the United States. And tensions mounted

between nuclear weapon states and non-nuclear weapon states over the implementation of respective obligations under the nuclear Non-proliferation Treaty. Confidence in the international rules and practices that constituted the non-proliferation regime eroded among both nuclear "haves" and "have nots" (see, for example, Cirincione *et al.* 2005: 15–22).

These new and emerging nuclear threats were accompanied by an evolution of norms surrounding the use of force for preventive purposes. Famine in Somalia, genocide in Rwanda, and massive human rights abuses in a disintegrating Yugoslavia led to reconsideration of sovereignty norms and of conditions other than self-defense under which military intervention might be justified.[12] This reconsideration was put into practice with the intervention in Kosovo in 1999, when NATO forces conducted an air war, widely supported on humanitarian grounds, without Security Council authorization and in the face of strong Russian objections. United Nations Secretary General Kofi Annan observed that a "developing international norm in favour of intervention to protect civilians from wholesale slaughter will no doubt continue to pose profound challenges," acknowledging the evolution that was underway.[13] The moral imperative to protect individuals from harm in cases of genocide opened the door to calls for preventive measures to stop proliferation or possible terrorist activity. If intervention should be contemplated to prevent humanitarian catastrophe, then, by the same logic, why would it not be considered to prevent the possible use of nuclear weapons or mass-casualty terrorism? A "responsibility to protect" engendered a "duty to prevent."[14]

To grapple with the emerging threat of nuclear proliferation, President Bill Clinton launched a counter-proliferation initiative that contained some of the seeds from which the Bush administration's military prevention policy grew, though Clinton emphasized a much broader suite – diplomatic, economic, and military – of preventive tools. The initiative included planning within the US defense department for the use of conventional force for preventive purposes against nuclear facilities and other sites where chemical or biological weapons were suspected to be under development.[15] Intense concern over the possibility that North Korea might be on the cusp of separating plutonium from its spent nuclear fuel in 1994 sparked discussions at the highest level in Washington of the option of a military strike on the reactor at Yongbyon (Carter and Perry 1999: 130–133; Wit *et al.* 2004: 102–104 and 210–211). In the hardest proliferation cases, some analysts and policy makers believed the diplomatic efforts to block the path to nuclear capability were insufficient and bound to fail. Exasperation with Iraq's oscillation between partial cooperation and overt intimidation of international inspectors in the years after 1991 led the US Congress to advocate and the Clinton administration ultimately to accept in 1998 the goal of "regime change" as a means of solving the proliferation problem in that country.[16] A large number of the targets hit during the 1998 "Operation Desert Fox" bombing of Iraq were intended to undermine the stability of the Iraqi regime itself.

After the attack on the United States from al-Qaeda on 11 September 2001, support for preventive measures, including the use of force, for addressing terrorist and nuclear threats gained vocal support in capitals around the world.[17] British Prime Minister Tony Blair suggested in early 2004 that Britain "surely had a duty and a right to prevent the threat [of weapons of mass destruction] from materializing" (quoted in Nichols 2008: 82). France also incorporated preventive concepts into its national security strategy. In a speech on France's nuclear doctrine, President Chirac explained that:

> [In] the face of new threats, France has always first chosen the road of prevention. It remains, in all its forms, the very basis of our defense policy.... To be heard, one must also, when necessary, be able to use force. We must therefore have an important capacity to intervene beyond our frontiers with conventional means to uphold and complete this strategy.
>
> (Yost 2006: 706)

Vladimir Putin told journalists in 2003 that Russia "retains the right to launch a preemptive strike, if this practice continues to be used around the world" (Lambroschini 2003).

The most dramatic assertion of a preventive force doctrine after 11 September 2001 came from the United States. Three aspects of US policy took on greater prominence in this period, though none originated entirely with the Bush administration. First, an emphasis on preventive force eclipsed the United States' traditional reliance on deterrence. As the 2002 US National Security Strategy warned: "We must be prepared to stop rogue states and their terrorist clients before they are able to threaten or use weapons of mass destruction." And elsewhere in the same document: "The greater the threat, the greater is the risk of inaction – and the more compelling the case for taking anticipatory action to defend ourselves" (United States 2002a). The rationale for the shift was understandable in reaction to a perceived danger from terrorists who might derive political benefits from a high-consequence attack and who would not likely alter their plans in the face of retaliatory threats, even if the threatened actions were operationally credible (which in itself would be unlikely). The declaratory policy of preemption was intended to dissuade so-called rogue states from attempting to develop capabilities that might threaten the United States. If dissuasion failed, preventive strikes were deemed preferable to deterrent threats (Holloway 2006: 48–51 and Nichols 2008: 57–62).

Second, the US security policies in the post 9/11 period were supported by a dramatically improved conventional strike capability. During the Cold War, for the United States to consider a strike against Chinese or Soviet nuclear weapons or an adversary's nuclear facilities meant contemplating the use of nuclear weapons to make certain the destruction of the targets. Precision-guided munitions changed the calculation.[18] The development of "global strike" capabilities – the ability to apply highly destructive conventional force at any location on the planet with great accuracy within minutes of a strike order – had been a major focus of the US defense effort with particular significance for unfriendly states hoping to develop nuclear weapons. As the Bush administration prepared for war in Iraq in 2003, 90 percent of the US tactical aircraft were capable of precision strikes, compared with just 10 percent during the 1991 war in Iraq; 75 percent of all US explosives dropped in the opening months of the 2003 war were precision guided (O'Hanlon 2003).

Third, the expectation of what military force could accomplish broadened as the United States took aim at not merely threatening capabilities, but at the leaders and regimes that sought to acquire them. "Regime change" itself was not a new idea. Indeed, the entire Cold War had been waged to bring about a change in the nature of the Soviet regime, and the United States engaged in regime-changing assassination attempts and coup-engineering against Soviet allies as part of its doctrine of containment. But the explicit emphasis on toppling governments with military force before they could pose an imminent threat to the United States represented a departure from past policy. President Bush's 2002 identification of an "axis of evil" was accompanied by a pledge that "the United States of America will not permit the world's most dangerous regimes to threaten us with the world's most destructive weapons" (White House 2002a).[19] John Bolton, then the administration's undersecretary of state for arms control and international security explained the rationale, with reference to Saddam Hussein's Iraq:

> We have also learned that what we need to fear most in WMD proliferation are not pieces of metal and stocks of supplies, but intellectual capital. It is the capability and knowledge to create successful nuclear, chemical, biological and missile programs that is the hardest to cultivate but once gained, the more real danger. Coupled with money, like seeds and water, intellectual capital is what Saddam was preserving for the WMD-filled future he sought. Eliminating his regime, and redirecting his WMD scientists and technicians, also eliminated that future.
>
> (Bolton 2004)

The 2003 US invasion of Iraq was of course the test case for the regime-change-by-force-approach to counter-proliferation policy.[20] Despite the many indications of the United States' failures in Iraq, the 2006 US National Security Strategy document left "preemption" and regime change tenets of the 2002 policy unchanged (United States 2006). The policy has not been explicitly rejected by the administration of Barack Obama, though the

emphasis on diplomatic engagement and reliance on international institutions were hallmarks of the early days of the Obama presidency.[21]

Cases of military operations to prevent proliferation

What can be learned about the efficacy and legitimacy of preventive force from past cases where it has been used to delay or remove nuclear weapons threats? There are several cases from which to draw useful lessons. I define preventive force broadly as any use of military force intended to prevent or delay a state's acquisition of nuclear capability. This definition captures a range of cases, including the use of airstrikes or limited force to destroy particular facilities (e.g., Iraq 1981, Syria 2007), and the initiation of full-scale war to remove the threat of a suspected program (e.g., Iraq in 2003). This definition also captures cases in which war was initiated for other purposes but included operations to deny or prevent the acquisition of nuclear weapons (e.g., Iraq 1991, Iran–Iraq war). Below I describe briefly each of nine cases[22] (listed in Table 5.1) that fit within this definition and I offer a judgment of whether the operational goals of the attack were accomplished – that is, whether the attack in question inflicted the intended damage. An assessment of the political or strategic outcome is in the next section.

The first time that military force was used to prevent nuclear weapons development occurred during World War II. Allied forces attacked the German heavy-water production facility at Vemork in southern Norway on two separate occasions in 1942 and 1943. In the second attempt, a team of British and Norwegian saboteurs successfully blew up the cascade of electrolytic cells releasing the contents (Rhodes 1986: 455–457). The plant was repaired but after additional, albeit mostly unsuccessful, allied aerial bombing raids, Germany decided to transfer the facility and the remaining heavy water it had produced to Germany. In 1944, allied forces sank the ferry

Table 5.1 Cases and tactical assessments

Year	*Attacker*	*Target*	*Target(s) destroyed?*
1942–44	Allied forces	German heavy-water production	Yes
1980	Iran	Iraqi reactor at Osiraq	No
1981	Israel	Iraqi reactor at Osiraq	Yes
1984–87	Iraq	Iranian reactors at Bushehr	Yes
1991	US and allied forces	Iraqi nuclear program	No
1993	US forces	Iraqi nuclear facilities at al-Zaafraniya	Yes
1998	US and UK forces	Iraqi WMD infrastructure	Yes
2003	US and allied forces	Iraqi nuclear program and regime	No
2007	Israel	Syrian reactor at al-Kibar	Yes

carrying the heavy water on Lake Tinsjoe, en route to Germany, ending the heavy-water production project (Rhodes 1986: 512–517). Overall, the World War II allied operations against known German nuclear facilities were successful.

Iraq's nuclear facilities were attacked numerous times over a long history of nuclear pursuit. Iran and Israel each targeted the 40 megawatt light-water reactor under construction at the al-Tuwaitha Nuclear Center near Baghdad, named Osiraq by the French who assisted with the project. Iraq was building the reactor ostensibly for research purposes and it was nearing completion in early 1981. In September 1980, just two weeks after the start of the Iran-Iraq war, Iranian pilots attempted to bomb the site but inflicted only light damage (Perlmutter *et al.* 2003: 64–66; Grant 2002). Although the operation was a tactical failure, it reportedly provoked Baghdad to declare that Iran "should not fear the Iraqi nuclear reactor, which is not intended to be used against Iran, but against the Zionist entity" (quoted in Grant 2002: 75). Israel undertook a raid in June 1981, sending F-15 and F-16 jets to bomb the reactor before it was loaded with fuel. The operation destroyed the reactor and has been held up as a model of successful preventive force to stop or blunt nuclear weapons development.[23]

Between 1984 and 1987, during the Iran-Iraq war, Iraq targeted the Iranian reactor site at Bushehr on several occasions. In the mid-1970s, Iran began construction on two 1,300 megawatt pressurized water reactors with West German assistance, as part of an ambitious plan for nuclear energy development (Nuclear Threat Initiative n.d.). Germany estimated that construction was 90 percent complete on one of the reactors and 50 percent on the other when construction was halted after the Iranian revolution in 1979. Iraq launched bombing raids against Bushehr in March 1984, February 1985, March 1985, July 1986, and twice in November 1987. The war itself and attacks on the site led Germany to refuse Iran's requests, beginning in 1982, to resume work on completing the reactors. The 1987 attacks destroyed the core areas of both reactors, a success that contributed to years of delay in the completion of Bushehr (Koch and Wolf 1998).

In the 1991 Gulf War, military action was again taken against known Iraqi nuclear installations. Although the objective in 1991 was to evict Iraq from Kuwait, the United States designated Iraqi nuclear facilities as top-priority targets during its air campaign in the initial weeks of the Gulf War. US bombing focused primarily on two sites, al-Tuwaitha, and the uranium mining operations at al-Qaim (Keaney 1993: 29; "Al-Tuwaitha Nuclear Center" n.d.). According the US Air Force's assessment of the operation, the air strikes "amounted to bombing fixed structures from which the real objects of the attacks had almost certainly been removed. ... Coalition bombing failed to achieve the desired effectiveness against the Iraqi nuclear program" (Watts and Keaney 1993: 88). In January 1993, in response to Iraqi noncooperation with international inspectors, the

United States struck again, firing more than 40 cruise missiles at a facility at al-Zafaraniyah, successfully destroying the electromagnetic isotope separation equipment (for uranium enrichment) at that site.[24] This attack was an operational success, but the full extent of the Iraqi program was still not known and elements remained concealed until the defection of Hussein Kamel, who in August 1995 revealed important details about Iraqi weapons development to the United Nations Special Commission (UNSCOM) (Duelfer 2009: 107–116). In December 1998, as punishment for Iraq's failure to comply with inspection requests the United States and Britain launched Operation Desert Fox, striking a number of dual-use facilities, and missile component production plants, some which may have been connected to the Iraqi nuclear program (Conversino 2005).

In the months leading up to the March 2003 invasion of Iraq, the United States expressed deep concern about resumed Iraqi nuclear, chemical, and biological weapons programs, and justified "Operation Iraqi Freedom" on the grounds that Iraq posed a "grave and gathering danger" (White House 2002c). The war in Iraq was intended as a transformative demonstration of President Bush's 2002 National Security Strategy: "Facing clear evidence of peril, we cannot wait for the final proof – the smoking gun – that could come in the form of a mushroom cloud" (White House 2002b). The United States succeeded in toppling Saddam Hussein's regime, but no evidence of an Iraq nuclear program was discovered (Priest and Pincus 2004). Whatever else one wishes to say about the Iraq fiasco, it missed the mark as a proliferation prevention effort. Indeed, there was no mark to hit.

Syria was the target of the most recent case of a military strike on what is believed to have been a nuclear facility. US intelligence agencies revealed that Israel's September 2007 bombing of the "al-Kibar" site in Syria destroyed a plutonium-producing reactor that was nearing completion.[25] Israel did not comment on the objective of its raid. Syria denied a reactor ever existed, excavated and removed all the debris from the site, and covered over the site where the attack occurred. The IAEA visited the site in January 2008 and found particles of chemically processed uranium there (Heinrich 2008). Syria has not provided an adequate explanation of this finding and repeatedly refused IAEA requests to conduct further inspections (International Energy Agency 2009). Assuming US intelligence reports were correct, the al-Kibar strike was an operational success.

This review of cases suggests that although the record of hitting and destroying intended targets is not perfect, such strikes have succeeded in narrow operational terms more often than they have failed.[26]

Is the use of force an effective means of preventing proliferation?

The more important question is whether attempts to destroy or delay nuclear weapons programs have had the intended effect of preventing or

significantly delaying the acquisition of nuclear capabilities in the countries targeted. None of the targeted states in the cases above ever developed a nuclear weapons capability (though Iran may be a work in progress). But a closer look at the consequences of the use of force in these cases calls into question a simple cause and effect relationship. Was the use of force, with the benefit of hindsight, an effective means of accomplishing the attacker's political goals in light of the alternatives? How significant were the damaged facilities to the targeted state's pursuit of a weapons capability? How did the attack affect the target state's intention to acquire a nuclear weapons capability? What were the costs of the attack (diplomatic, economic, and military) to the attacking state? What were the indirect costs or unintended consequences of the attack? Below I examine the political and strategic consequences of using force as means of preventing proliferation, identifying obstacles to and conditions for the successful delay or denial of nuclear progress.

Obstacles and unintended consequences

Despite the operational successes described above, the evidence suggests that numerous obstacles thwart attackers from achieving favourable, long-term political results. The effectiveness of preventive force is blunted by: inadequate intelligence; a surviving nuclear knowledge base within the targeted state; the possible dispersal of weapons-relevant know-how, equipment, and material to new states; the potentially high costs of the attack to the attacker; the hardening of nuclear ambitions and facilities within the targeted state; the inherent problem of optimizing the timing of an attack; and the contradictions between a strategy of "regime change" and coercive diplomacy. In sum, because of these obstacles and unintended consequences, the circumstances are rare for the successful application of force to prevent an adversary from acquiring nuclear weapons.

Failure to eliminate key targets due to inadequate intelligence

One measure of strategic success is whether the attack destroyed key "chokepoint" facilities that contain technology or materials that are difficult to produce or to acquire from others, thereby imposing major obstacles to reconstituting the program.[27] Uranium enrichment facilities, plutonium-producing reactors, reprocessing plants, and storage sites containing key materials are examples of high-value targets. A review of the cases reveals that not only are most operational failures due – at least in part – to inadequate intelligence, but that even in cases where the intended targets are destroyed, key facilities have often escaped notice due to incomplete intelligence.

Germany's heavy-water production was an important element of the nuclear program, since the effort to build a reactor was dependent on

it. However, Germany's stockpiles of uranium ore, its uranium pile at Haigerloch, and other experimental reactor facilities were only discovered as the European war was drawing to a close. They were dismantled by intelligence operatives, without resistance, in April 1945.[28] In 1981, the Osiraq reactor was a central element of Iraq's nuclear program and its destruction was a significant blow. But Israel apparently did not know about and did not destroy a radio-chemical laboratory for research on reprocessing or a fuel fabrication plant capable of producing natural uranium targets. Unsafeguarded uranium targets produced in the fabrication plant were subsequently irradiated in a Russian-supplied research reactor to produce plutonium (Albright and Hamza 1998). Although Iraq eventually destroyed the Bushehr reactors in 1987, Iraq left untouched sites that were arguably more significant from a proliferation perspective. Notably, Iran opened a research center at Isfahan with Chinese help in 1984, which included a laboratory for uranium conversion. The Tehran Nuclear Research Center also made important advances during the Iran–Iraq war with Pakistani help: the IAEA later revealed that in 1987–88, for example, Iran successfully simulated the separation of plutonium at the Tehran research center.[29]

Intelligence failures surrounding US efforts to destroy Iraqi nuclear sites have been well documented.[30] In 1991, US military planners believed they knew the location of Iraq's nuclear facilities but they did not. According to Thomas Keaney, who co-authored the US Air Force's post-1991 assessment:

> Coalition intelligence information had underestimated both the size of the program and the Iraqi determination to protect it. Whereas coalition planners began the war certain of only two sites, post-war analysis by United Nations inspectors revealed sixteen main nuclear facilities and another five nuclear-related sites.
>
> (Keaney 1993: 29)[31]

On the eve of the US invasion of Iraq in 2003, the US intelligence community committed the opposite error: rather than fail to identify important sites as they had in 1991, they identified, falsely, evidence of an active nuclear weapons program that no longer existed. The 2003 war succeeded in toppling the Iraqi regime as a first step toward disarmament, but no active "chokepoint" facilities were found in the war's aftermath.

Imperviousness of nuclear knowledge to use of force

Even if a preventive attack successfully destroys the infrastructure, equipment, and stocks of a nascent nuclear weapons program, the individual scientists and engineers working on the effort will have the know-how to recreate what was lost. Iraq's destruction of Bushehr in Iran in 1987 did nothing to blunt the growth of the science and technology base supporting

a growing nuclear program in that country. In the mid-1980s, before Bushehr was destroyed, Iran had begun discussions with Pakistan to establish a significant uranium enrichment capability (International Institute for Strategic Studies 2011a: 48; Koch and Wolf 1998; Cordesman and Al-Rodhan 2006: 10–11, 24–31). These efforts were not abandoned in the aftermath of Iraq's successful bombing. Following the 1991 Gulf war, the scientific community in Iraq was Saddam Hussein's "most valuable remaining nuclear weapons asset" (Albright and Hamza 1998). Mahdi Obeidi, who directed Iraq's centrifuge enrichment effort, wrote that "the dangerous knowledge of hundreds of scientists and the blueprints and prototype parts for the centrifuge," remained in Iraq after UNSCOM inspectors left in 1998 (Obeidi 2004, see also Obeidi and Pitzer 2004). Fear that scientists could have reconstituted Iraq's nuclear weapons program after 1998 was an important factor underlying the conclusion that the removal of Saddam Hussein and the Baathist regime was a necessary condition for permanently disarming Iraq, as John Bolton argued from within the Bush administration (Bolton 2004).

Dispersal of knowledge and technology in aftermath of attack

Although a forced regime change ends the immediate proliferation threat emanating from the targeted state, it does not necessarily prevent scientists who worked on the program from sharing what they know with others in other states. German scientists after World War II were recruited to or collaborated with the early Soviet, French, and Brazilian bomb-making programs (and a variety of missile programs as well) (Oleynikov 2000; Krasno 1994).[32] In the chaos following the invasion of Iraq in 2003, the United States lost track of a number of key individuals who were probably looking for new employment and a safe haven. Mahdi Obeidi wrote in 2004 that Iraqi scientists could "sell their knowledge to the highest bidder.... Hundreds of my former staff members and fellow scientists possess knowledge that could be useful to a rogue nation eager for a covert nuclear weapons program" (Obeidi 2004). The illicit movement of technology or even material is also a problem in the aftermath of an attack. Failure to secure former nuclear sites in Iraq after the 2003 invasion led to extensive looting of proliferation-sensitive equipment and possibly documents and blueprints. In 2005, the IAEA reported to the UN Security Council on "widespread and apparently systematic dismantlement that has taken place at sites previously relevant to Iraq's nuclear program." The losses, according to the IAEA, raised proliferation concerns (Glanz and Broad 2005). Although, hypothetically, the problem of preventing theft and smuggling of sensitive technology and materials in the aftermath of an attack can be managed with international assistance in post-attack operations, the Iraq case suggests forced regime change could create new proliferation challenges if facilities and borders are not adequately

secured during and after active conflict. In addition, the act of preventive attack could have polarizing regional political effects, forging new alliances and opening channels of clandestine nuclear support that otherwise would have been closed.[33]

Costs

The economic, diplomatic, and military costs of preventive attack on nuclear facilities depend upon the nature of the operation, the response of the target state, and the degree of international support for the action. The assessment of costs must be carried out in the light of alternative courses of action and the expected or actual consequences of the attack. For cases in which strikes on nuclear facilities occurred as part of a wider war, where proliferation-prevention was not the primary war objective (e.g., allied attacks on Germany's heavy-water plant, the Iranian strike at Osiraq, the Iraqi bombing of Bushehr, and the US strikes on al-Tuwaitha and al-Qais in 1991), the marginal cost of counter-proliferation operations was minimal.

In cases of limited preventive strikes on nuclear facilities (e.g., Israel's 1981 attack on Osiraq, US attacks on Iraqi facilities in 1993 and 1998, and Israel's 2007 strike at Syria), costs to the attacker were more burdensome, but not overwhelming. In 1981, Israel's attack on Iraq was met with widespread international condemnation. The Reagan administration, in its first year in office, was forced to recalibrate its approach to the Middle East in the aftermath of the attack and US–Israeli relations were temporarily strained. Israel also experienced greater tension in its relationship with Egypt. The possibility of expanded civil nuclear ties between the United States and Israel and Egypt respectively were scrapped (Feldman 1982: 127–141). The US use of force in 1993 and 1998 was controversial, particularly for the Arab public, and carried diplomatic costs for the United States in the Arab world. The operations had a complex effect on IAEA and UNSCOM inspections, inducing both an enforced cooperation and more elaborate deception (Duelfer 2009: 75–180; Blix 2004: 20–40; Butler 1999). The most immediate and anticipated result of the 1998 Desert Fox episode was the expulsion of United Nations inspectors from Iraq. The costly consequences of ending Saddam Hussein's cat and mouse games with international inspectors would be felt most acutely in 2003, when Iraqi opacity was the central issue (Duelfer 2009: 212–214; Pollack 2004). In the case of Syria in 2007, there were remarkably no discernable costs to Israel in the immediate aftermath of the raid. This was in part due to the unusual post-attack management of information regarding what transpired. One additional cost was associated with all four cases: the causes and consequences of the attacks shook international confidence in non-proliferation norms and took an intangible toll on the stability of the non-proliferation regime.

The cost of proliferation-prevention by means of a militarily imposed regime-change, as attempted in Iraq in 2003, has been unsurprisingly very

high.[34] The legacy of the United States' intervention in Iraq includes: widespread uncertainty over the stability of regional political and security relationships; the rise of an increasingly assertive Iran and the weakening of Arab governments allied with the United States; an overstretched and under-manned US military; the validation of asymmetric strategies of warfare against the United States; a diminution of US credibility toward friends and foes alike; and a deep skepticism on the part of the American public toward the commitment of US military forces overseas (Miller, S. 2006: 29–33). Of course, on top of these consequences are the deaths and shattered lives of thousands of American and allied families and hundreds of thousands of Iraqis in the course of the US invasion and the civil war that erupted in the aftermath.

Hardening nuclear ambitions – and targets

The measure of success of any use of force to prevent proliferation is in the amount of time that nuclear weapons capability is forestalled compared to what other steps short of force might have accomplished. If the use of force convinces leaders in the targeted state that acquiring nuclear weapons is too costly, or if an attack produces a setback in progress of several years or more, then military action could be a sensible choice. But even when imposing a delay, the use of preventive force has, in key cases, resulted perversely in a hardening of nuclear ambitions and the dispersal and fortification of relevant facilities. By robbing Iraq in 1981 of the plutonium path to a bomb and forcing a switch to the more difficult task of enriching uranium, the strike on Osiraq has been widely interpreted as successfully causing substantial delays and insurmountable challenges for Iraq's pursuit of nuclear weapons.[35] Revelations from Iraqi scientists and other recent analysis, however, cast doubt on this conclusion and suggest that the strike at Osiraq had several unintended and adverse consequences (See, for example, Braut-Hegghammer 2011; Reiter 2005: 361–364; and Betts 2006: 22–25). According to Iraqi physicist Jafar Dhia Jafar, the military objectives of the Iraqi nuclear program were adopted "as a reaction to the bombing" in 1981 (Stone 2005: 2158–2159). While this may be an overstatement, following the Israeli attack, Saddam Hussein is reported to have increased the Iraqi nuclear program from a $400 million operation of some 400 scientists, to a $10 billion effort involving 7,000 scientists (cited in Reiter 2005: 362). The program was also completely hidden from IAEA inspectors. Facilities were made less vulnerable to attack through dispersion and physical reinforcement. In sum, in the aftermath of the Israeli attack, although the plutonium path to the bomb was blocked, Iraqi nuclear ambitions were not diminished but enhanced, investment increased dramatically, strategies for producing fissile materials diversified, deception became more elaborate, and the subsequent use of force, in 1991, was less effective as a result.

The threat of war following the Iraq's 1990 invasion of Kuwait provoked a "crash program" inside Iraq to produce enough material for a bomb by the spring of 1991 (see, for example, Albright and Kelley 1995: 53). The ensuing Gulf War enabled the insertion of an effective monitoring and verification regime in the 1990s, but this result was accompanied by the emergence of an unintended and undesirable dualism in Iraq's security strategy. Saddam Hussein eventually cooperated with UN inspections, but at the same time, he deliberately attempted to create continuing ambiguity over Iraqi intentions and capabilities as a deterrent hedge. According to the report of the Iraq Survey Group in 2004, which offered an in-depth analysis of the Iraqi regime's strategic intent, "the UN's inconclusive assessment of Iraq's possession of WMD, in Saddam's view, gave pause to Iran" (CIA 2004: 26).

Although less is known about the development of Iran's nuclear capability after the 1979 revolution, the attacks on Bushehr during the Iran–Iraq war may have had a similar proliferation-enhancing effect on thinking within Iran. Though Iran's nuclear ambitions were attenuated immediately after the revolution, in the mid-1980s, Iran procured labs for uranium conversion and, most importantly, signed a nuclear cooperation agreement with Pakistan in 1986 and began receiving centrifuge enrichment technology and weapons designs through the Khan network in 1987 (Samore 2005: 11; Frantz and Collins 2007: 156–161). If the protracted war with Iraq convinced Iranian leaders of their need of a deterrent, the attacks on Osiraq taught them to pursue their work in secret and dispersed facilities. Though the evidence is circumstantial, attacks on Bushehr may have contributed to the Iranian determination to explore a nuclear weapons capability.

Finally, even full-scale war aimed at changing the regime in power does not guarantee that nuclear ambitions will disappear, because interest in nuclear weapons is driven in part by the external threats with which state leaders must contend regardless of domestic politics, regime type, or even revolution. German interest in exploring nuclear weapons development, albeit jointly with France and Italy, re-emerged in the mid-1950s (Strauss 1989: 313–315). Iran's interest in nuclear weapons apparently spanned pre- and post-revolutionary eras (International Institute for Strategic Studies 2011b; Cordesman 1999: 366; Fitzpatrick 2006; Institute for Science and International Security 2009). It is not difficult to imagine why a future Iraqi government might consider the risks and benefits of exploring nuclear weapons research (Cigar 2010).

Problem of timing

There are both operational and political problems associated with the timing of preventive strikes on nuclear facilities. The optimal time of attack is elusive. Early forceful intervention may have the advantage of a smaller set of targets and greater chances of successful surprise for unilateral or allied military strikes. But organized international support for military action is more difficult absent an imminent threat. Moreover, there is likely to be a lower payoff in terms of the delay of capability development in the targeted state, since the earlier the strike the less technical progress there is to reverse. Iraq's bombing of Bushehr, for example, would seem to have had very little impact on the development of Iran's proliferation potential, since Iran's unfinished light-water reactors, built by outside contractors, probably contributed little of value to Iran's exploration or pursuit of a nuclear weapons capability.

Attacking a more mature program has a different set of problems. High-value targets may be more plentiful but will likely also be dispersed and perhaps defended. And destroying the necessary facilities and material to impose a long-term setback is uncertain. In Iran, for example, setting aside the intelligence problem of finding and destroying key secret military sites if they exist (for example, centrifuge enrichment plants), there are likely to be legal yet hidden centrifuge manufacturing sites and stockpiles of centrifuge parts that would enable rapid reconstitution of the Iranian program after an attack.[36] These are the problems now facing Israel and the United States in particular as they consider options for dealing with Iran's nuclear challenge.

Incompatibility of coercive diplomacy and preventive war strategies

Many of the challenges associated with the use of limited force described above could lead one to conclude that when confronted with a determined nuclear weapons aspirant, the only permanent solution is bringing about the collapse of the offending regime, if necessary with military force. This was precisely the judgment the United States reached in relation to Iraq in the late 1990s as UNSCOM inspections ended and sanctions effectively collapsed. The United States translated this judgment into action in 2003 (Duelfer 2009: xii). The pursuit of "regime change" was also the explicit US strategy toward Iran for much of the period following the 1979 revolution. It bears noting that insofar as the pursuit of nuclear weapons is driven by a concern with external threats to a nation's security, there is no reason to believe that a change in that nation's regime would necessarily result in a change in policy toward nuclear weapons.

The drift toward or adoption of a policy of regime change, however, introduces a variety of problems for the management of non-proliferation efforts. First, the threat of regime change strengthens the hand of nuclear weapons advocates within the ruling circle of the target regime, who will claim that a credible deterrent is the ultimate insurance policy against regime-threatening pressures.[37] Second, once officials begin talking about regime overthrow, effective coercive diplomacy with lesser aims toward the state in question becomes far more difficult to carry out. Coercion relies on the threat to impose high costs on the offending state to compel it to

cease undesirable behaviour or activities. But successful coercion also requires a credible assurance that the pain will cease when the behaviour changes. The policy of regime change robs coercive diplomacy of credibility on rewarding cooperative behaviour. Once regime change was articulated as the US intention toward Iraq, Saddam Hussein became convinced that continued inspections offered no path toward a viable resolution of the disarmament process and lifting of sanctions. Tariq Aziz reportedly said in 1998 that he did not believe the United States would accept a resolution of the crisis over Iraqi disarmament obligations (Blix 2004: 36). "We can have sanctions with inspectors, or sanctions without inspectors" (Duelfer 2009: 154).

The United States is currently encountering a similar problem with the credibility of its assurances toward Iran. Although President Obama's overtures have been explicit in their conveyance of respect not only for the people of Iran, but also for the leaders of the Islamic Republic of Iran – signalling acceptance for the revolutionary regime itself – Iranians remain sceptical that an era of US efforts aimed at the overthrow or transformation of their regime is over.[38]

Enablers of success and positive spillovers

Of the nine cases examined in this paper, only one – Israel's strike on Syria in September 2007 – can be assessed (preliminarily) as a strategic success. A second case, the 1991 Gulf War, failed to disarm Iraq directly, but set in motion processes that led to the cessation of Iraqi chemical, biological, and nuclear weapons programs. What were the conditions that enabled these outcomes? Are there other desirable indirect non-proliferation effects of the use of preventive force?

Limited aims and neutral or supportive international perceptions

An assessment of the consequences of the 2007 attack on Syria is necessarily preliminary, as many questions about Syria's activities remain unanswered. It is possible that the Israeli strike, like other cases, failed to destroy other key facilities in a nascent Syrian nuclear program due to inadequate intelligence. The discovery of a reactor raised questions about how Syria intended to fuel it. If Syria intended to produce a weapon, it is unclear how it planned to separate the plutonium the reactor would have produced ("Analysts mull North Korea's link to Syrian nuclear site" 2008). It is at least plausible that Syria has additional important facilities that Israel did not destroy. At the time of this writing, the IAEA has not been granted access to inspect additional sites in Syria or to return to the site of the attack for a second visit. It is not possible to know at this time how the attack affected the intensity of Syria's ambition to acquire nuclear weapons.

The constellation of factors contributing to the apparent success of Israel's attack is unique but important to understand. First, the strategic objective was limited to denying Syria's progress toward the acquisition of a nuclear weapon. Israel did not aim its blow at the Syrian regime. Indeed, there was apparently much consideration given to the management of relations with Syria both before and after the attack. Israel initiated secret talks with Syria on a possible deal over the Golan Heights prior to the attack. Afterwards, the enforced silence over the object of the strike minimized the provocation of Syria with public embarrassment. Second, Israel had high confidence in its intelligence. According to one Israeli source, the United States demanded proof of Syria's activities at the reactor site before it would sanction the raid and Israel provided the necessary proof by sending intelligence operatives to the site in August 2007 to collect evidence in preparation for the strike (Bergman 2008: 360). Third, the military operation was relatively simple: Israel enjoyed the advantage of surprise; the target was close to Israeli territory and no special over-flight or refuelling arrangements were necessary; the site was not defended with significant anti-aircraft batteries; and the target set was a single site and a key facility. Fourth, the strike was apparently timed to destroy a nearly complete reactor with its pressure vessel in place (though exactly how close the reactor was to being fuelled is not known). Finally, limited aims, operational confidence, and shrewd diplomatic management kept the costs to Israel low. Syria did not respond militarily. Indeed, Israeli-Syrian talks over a deal on the Golan Heights resumed within a few months. Although Israel did not attempt to organize international support for its action except via secret discussions with the United States, and although Israel made no attempt to justify its attack in the aftermath, there was almost no public condemnation of the action. The diplomatic response at the spring 2008 NPT Preparatory Committee meeting was muted (Meier 2008).[39] The only immediate and open protest of the attack was voiced by North Korea.[40]

The secrecy surrounding the target of the Israeli raid made all of the above circumstances even more unique. Had the alleged reactor been an open, legal facility, Israel would have shouldered a heavy burden to justify its action in the face of near certain regional and international indignation. Widespread uncertainty about the nature of the intended target (at least until April 2008 when the United States revealed the evidence for its own reasons) also shielded Syria from a public outcry over a new case of illicit proliferation. It is improbable that such a conspiracy of silence between attacker and attacked will be soon repeated.

Beyond the Syrian case, the other attempts at forceful prevention of proliferation fell short of their strategic goals. Nonetheless, the use of force against Iraq in the 1990s, although not decisive on its own, did play a key role in facilitating the Iraqi disarmament by the United Nations. The 1991 war did not disarm Iraq, but the use of force helped to usher in the

intrusive international inspections that eventually uncovered and forced the abandonment of Iraq's illegal weapons programs. The key to success in this process was sustained international support, expressed in a series of Security Council resolutions prior to and following the war. (The subsequent uses of force in 1993 and 1998 frayed the consensus behind the Iraqi disarmament regime.) Consider the contrast in outcomes of Israel's 1981 attack on Iraq and the US-led war one decade later. Israel's strike on Osiraq was met with international condemnation and neglect of inflamed Iraqi ambitions;[41] Operation Desert Storm was followed by UN Security Council Resolution 687, which called for, and resulted in, Iraq's disarmament under UN oversight.[42] The contrast demonstrates the importance of broad international support and Security Council action for the effective enforcement of disarmament obligations.

Non-proliferation spillovers?

Hypothetically, preventive attacks could also have unintended or indirect positive non-proliferation effects of two types. First, attacks by one state may have a relaxing effect on the nuclear ambitions of the targeted state's other adversaries. The Israeli attack on Osiraq, for example, may have contributed to the pause in nuclear weapons-relevant activity in Iran for a brief period (Samore 2005: 11–12). If these effects were real, they were likely to have been short-lived, since the attack on Osiraq resulted in a redoubling of Iraq's nuclear efforts at a time when it was also at war with Iran, plausibly feeding Tehran's post-revolution perception that a nuclear weapons effort might be necessary.

Second, preventive attacks could have a demonstration effect in other potential target states, convincing leaders that the proliferation game is not worth the candle. Libya's disclosure of its clandestine nuclear program has been frequently cited as an example of a positive spillover of the Bush administration's "pre-emption" doctrine and the attack on Iraq.[43] As President Bush stated during his 2004 reelection campaign, "Libya was a threat. Libya is now peacefully dismantling its weapons programs. Libya understood that America and others will enforce [the Bush] doctrine" (cited in Jentleson and Whytock 2005: 48). Although Libya's motives have been hotly debated, fear of a preventive strike may have contributed to Libya's decision to admit to its proliferation activities.[44] But other factors were also significant, and perhaps more prominent than the implicit threat of attack. Libya had been weakened by sanctions and wished to come out of isolation from Europe and the West; giving up the program was a prerequisite for normalization of relations. The program had itself been costly and had moved slowly. These economic and security considerations predated the run-up to the US invasion of Iraq (Indyk 2004). As the nuclear program came to be viewed increasingly as a risk and security liability, the United States offered a diplomatic solution.[45] Indeed, US actions

toward Iraq may have cut both ways in the Libyan decision making. In the lead-up to the Iraq war, Libyan decision makers would have been understandably concerned with the prospects of an attack on Libyan facilities triggered by either stonewalling or admitting to a program. The key to success in this case was not greater coercive pressure, but rather reassurance from the United States that its goal was a change in Libyan policy, not a change in the Libyan regime (Jentleson and Whytock 2005: 76). While the Iraq war may have demonstrated to Qaddaffi the perils of defying the United States over issues of proliferation and terrorism, the demonstration was neither necessary nor sufficient to clinch Libyan cooperation.

The overthrow of Qaddaffi's regime by Libyan rebels suggested a countervailing lesson that North Korea quickly articulated. As rebels gained momentum in Libya with NATO support, a North Korean statement read:

> "Libya's nuclear dismantlement" much touted by the U.S. in the past turned out to be a mode of aggression whereby the latter coaxed the former with such sweet words as "guarantee of security" and "improvement of relations" to disarm itself and then swallowed it up by force.[46]

While there may be positive non-proliferation spillover effects from the use of preventive force, negative spillovers are also possible.

Legality and legitimacy

Because international support is a crucial enabler of effective intervention, questions of the legality and legitimacy of the use of force are paramount. The advantages to acting within the law are numerous. As was made clear by the case of Iraq in the 1990s, internationally sanctioned action is much more likely to succeed at sustaining the political support necessary for monitoring and verifying disarmament steps in the aftermath of an attack. For example, the cooperation of scientists in the target country is likely to be harder to obtain after an attack by a single state or so-called "coalition of the willing." Knowledgeable interlocutors within the targeted nuclear establishment would find it far less dangerous and less morally objectionable to turn over information on past or ongoing activities to legitimate international authorities than they would to their attackers. Regardless of the advantages, Security Council authorization of the use of force for the purpose of preventing proliferation – the only legal path to preventive attack – has never been granted.[47] The difficulty of obtaining authorization for the use of preventive force in proliferation cases has given rise to a debate over when an action might be accepted as legitimate even if it is not legal. Although the threat of proliferation is widely recognized as requiring preventive action including the use of force under extreme circumstances, there are sharp disagreements among legal scholars and

governments over *when* military force is legitimate, under what conditions, and who should decide. Legal scholars have proposed several criteria – including severity of threat, military necessity, and proportionality – to assess the legitimacy of the use of preventive force. But both policy makers and scholars have reacted with considerable scepticism to post-hoc claims of legitimacy of preventive military action.

The relevance – and defects – of international law and institutions

The UN Security Council is both an indispensable and defective enabler of effective preventive military intervention. The use of force is permitted under the UN charter only in cases of self defense or when specifically authorized by the UN Security Council. But barriers to prompt Security Council action in the face of a potential proliferation threat are numerous. The Security Council is constituted by design to block rather than facilitate the use of force, negotiation among the permanent five Security Council members is politically fraught and time consuming, and each of the permanent five are capable of pursuing their respective interests outside of constraints of the Security Council (Doyle 2008: 32). Rapid response to evident threats to peace and security eluded the Council in the face of genocides-in-progress in Bosnia and Rwanda; prompt authorization of preventive force in response to an inherently uncertain proliferation risk is unlikely, even under the most conducive circumstances.

Some scholars and high US officials have dismissed entirely the relevance of legal procedure in responding to urgent proliferation risks. In an era of massively destructive threats, they argue, states will pursue their interests. The configuration of global power, with the United States unrivalled at the top, should determine the rules of international relations, not the other way around (Glennon 2003 and Arend 2003). President Bush declared in 2003 that the Security Council's failure to act in response to the Iraqi threat would relegate it to the status of an "ineffective, irrelevant debating society" (Reynolds and Richter 2003).[48] As the US operation in Iraq unfolded, Michael Glennon wrote that shifts in international power, culture, and security interests had made the United Nations Security Council an arcane relic of another era: "'Lawful' and 'unlawful' have ceased to be meaningful terms as applied to the use of force" (Glennon 2003: 24). New institutions reflecting new political realities would eventually replace the UN Security Council. In the meantime, as Glennon put it, "the United States did indeed have all the authority it needed to attack Iraq – not because the Security Council authorized it, but because there was no international law forbidding it. It was therefore impossible to act unlawfully" (Glennon 2003: 24).

But the Bush administration, contrary to its own rhetoric, did not completely dismiss international law and the Security Council. Rather, it

attempted to argue that the use of preventive force was legal as a form of anticipatory self defense. The UN Charter grants an inherent right to self defense "if an armed attack occurs." Bush administration officials claimed this exception could and should be extended to include cases of imminent attack (see the discussion in Dinstein 2005: 182–187 and Guiora 2008). The common standard for imminence comes from the *Caroline* case on the basis of which preemptive attack is justified when the initiating state has "no choice of means" and "no moment for deliberation."[49] Officials and scholars, arguing in support of the US doctrine of prevention, attempted to claim that the concept of imminence should be understood not merely in temporal terms, but also tied to the probability and magnitude of possible harm (Yoo 2003; see also Soafer 2003). Probable attack of high consequence at some point in the future – and here the development of nuclear capability is a particular concern – should be treated as imminent, making the use of preventive force legal as self defense, at the time of the initiating state's choosing and without international authorization. According to John Yoo, then the deputy assistant attorney general of the United States, in the face of new threats, "the United States and its allies may well have to rely exclusively upon their right to anticipatory self-defense to use force ... [and] the international legal system will have to adapt" (Yoo 2003: 575).

But the international legal system has not adapted. The Bush administration's claims were challenged by legal scholars and governments who objected to stretching the concept of imminence beyond any notion of time and objected further to the United States' claim that it alone would decide when and where a particular threat warrants a forceful response (see Franck 2006; Koh 2008; and Reisman and Armstrong 2006). As Thomas Franck argued:

> [Without] some jurying or adjudicative process, the right of preventive action would otherwise become an unbridled license for all states to practice aggression. That would be irreconcilable with the purposes of the Charter and there is no evidence whatsoever that the community of states is ready for such a change in the norms of the system.
>
> (Franck 2006: 104)

Political realities also reinforced the continuing, if sometimes confounding, relevance of international law and institutions. The United States was overextended in the aftermath of the 2003 war, unable to make either allies or adversaries carry out its wishes. Washington's dilemmas were exacerbated by the attempt to bypass international institutions before and after the attack. The United States effectively failed to marginalize the United Nations or to transform states' understanding of law and practice. The concept of anticipatory self-defense remains controversial. Security Council authorization remains the only legal means of using preventive force in response to

proliferation or any other threat short of an imminent attack. And the Security Council remains a deeply imperfect vehicle for mounting a rapid, forceful response to prevent the spread of nuclear weapons.

Unlawful but legitimate?

Legality and legitimacy are overlapping but distinct bases for military action.[50] Legitimate action is action that is perceived by others as appropriate – action that *ought* to be supported on moral or procedural grounds even if it diverges from the letter of the law. What are the criteria for measuring the legitimacy of military action in proliferation cases? The legitimacy of military force in such cases derives from the degree of acceptance of the substantive norm to be defended (i.e., non-proliferation), from the extent to which accepted procedures are adhered to, and from shared assessments of "just war" criteria (i.e., the imminence of the threat, and the necessity and proportionality of the response).[51] The legitimacy of military action matters for both moral and practical reasons and offers political benefits that could affect the extent to which the intervening states achieve their goals. In theory, if the perception of legitimacy is broadly shared, international support will be sufficient to help to bring about effective results even when an action is not authorized by the Security Council.

The legitimacy of the non-proliferation norm is widely accepted, and the perceived threats arising from proliferation are generally shared. The prohibition on the spread of nuclear weapons is a foundation of the NPT and non-proliferation regime and the perception that nuclear proliferation undermines peace and security is reflected in a number of Security Council statements and resolutions. In January 1992, the UN Security Council issued a presidential statement declaring: "The proliferation of all weapons of mass destruction constitutes a threat to international peace and security." Emerging from the Cold War and the experience of the 1991 Gulf War, the Security Council committed itself to "take appropriate measures in the case of any violations [of a state's obligations under the NPT] notified to them by the IAEA."[52] In 2004, with resolution 1540, the UN Security Council further codified the notion that proliferation posed a threat to peace and security and affirmed its resolve "to take appropriate and effective action" in cases of proliferation.[53]

Lending a measure of legitimacy to Bush administration threat perceptions, the report of the UN High Level Panel on Threats, Challenges, and Change (2004: 64) recognized that:

> [The] international community does have to be concerned about nightmare scenarios combining terrorists, weapons of mass destruction and irresponsible States, and much more besides, which may conceivably justify the use of force, not just reactively but preventively and before a latent threat becomes imminent.

But the High Level Panel did not recognize a right for states to resort to force unilaterally at the time of their choosing. In September 2009, Security Council resolution 1887 reinforced both the non-proliferation norm and the prohibition on unilateral action. The resolution states "that a situation of non-compliance with non-proliferation obligations shall be brought to the attention of the Security Council ... and *emphasizes* the Security Council's primary responsibility in addressing such threats."[54]

Rules and procedures for referring violations to the Security Council bolster the legitimacy of the non-proliferation norm. The NPT provides a framework for distinguishing between prohibited and permissible behaviour and requires all states to subject their nuclear activities to IAEA safeguards. Attacks on a state's declared nuclear facilities, in the absence of reported violations of non-proliferation commitments, are almost certain to be widely perceived as illegitimate. Referral of the violation to the Security Council begins to establish a legitimate case for military action if the crisis cannot be resolved by other means.

But if states generally accept the non-proliferation norm, and recognize the dangers of proliferation, their assessments of the threat posed by specific cases have differed widely – even in cases of recalcitrant proliferators. National judgments of the imminence of a threat and the necessity of military action are likely to be based on intelligence estimates, filtered through both internal and international political lenses. In recent proliferation cases, states have presented and manipulated intelligence of variable quality, uncertainties have loomed large, and conclusions have been contested. The United States was not able to convince Russia, China, or France that military action was needed in Iraq in 2003. Iran and North Korea have provoked numerous and concerted rounds of diplomacy, but there has never been widespread enthusiasm for the use of force in either of these cases.

Legitimacy depends not only upon when force is used, but also on how much is used in proportion to the danger at hand. Incentives to scale up the military force derive from uncertainty about the location of key facilities in a target state; the dispersal, defense, and hardening of targets; and the political commitment of the targeted government to acquiring a nuclear weapon. But governments and publics will judge the large-scale uses of force involving the loss of life of noncombatants and the destruction of non-military targets as disproportionate, especially in cases in which the imminence of the danger is ambiguous.

Moreover, in proliferation cases, judgments of imminence, necessity, and proportionality are difficult if not impossible to make based solely on evidence available *ex ante*. For this reason, some experts have argued that legitimacy can only be determined in the aftermath of a successful attack (see, for example, Feinstein and Slaughter 2004). As the United States began its Iraq operation in March 2003, Anne Marie Slaughter wrote:

> [By] giving up on the Security Council, the Bush administration has started on a course that could be called "illegal but legitimate," a course that could end up, paradoxically, winning United Nations approval for a military campaign in Iraq – though only after an invasion.
>
> (Slaughter 2003)

Nonetheless, this consequence-based argument for legitimacy in proliferation cases is highly problematic. Those arguing for post-hoc legitimation have drawn upon the justifications marshalled for humanitarian intervention in the 1990s.[55] But unlike the early stages of genocide, when the magnitude of impending harm is evident in advance and intervention is needed to stop the killing from spreading, proliferation dangers are much more difficult to identify in advance and force may be neither necessary nor sufficient to reduce them (Falk 2005: 42–44). In sum, even though the non-proliferation norm enjoys broad support, states have been reluctant to confer legitimacy on military action to prevent proliferation on the basis of a *potentiality* and without strong indicators of present danger.

Lessons and trends

Past cases suggest numerous lessons for effectively preventing proliferation with military force. The challenges stem from several sources. Inadequate intelligence may reduce the probability that an attack will result in an insurmountable or long-term setback for the targeted state. Military attack is unlikely to significantly affect the indigenous know-how needed to reconstitute that which was destroyed, and key scientists, managers, or decision makers may be induced to transfer knowledge, technology, or material to other states as a result of attack. A state's ambition to develop a nuclear deterrent may be strengthened by the experience of absorbing an attack, and if an illicit program continues or is reconstituted, it is likely to be more dispersed, better concealed, and more fortified than prior to attack. Using force can be costly to the attacker. Costs depend on the scope of the attack, the response of the targeted state, and the extent of international support for the use of force. The optimal time of attack for achieving operational and strategic goals is very difficult to determine. Coercive non-proliferation policies are difficult to sustain once the path of preventive attack is chosen, since assurances that the targeted state's efforts at compliance will be reciprocated will lack credibility.

An attacking state can improve its chances of success by limiting its goals (i.e., a very short target list, aimed at raising the political cost of nuclear pursuit and not at forcing a collapse of the entire regime) and by organizing broad international support for its actions. In no small measure, because international cooperation in the disarmament process

has played such a central role in past cases, strategic success appears to depend upon the legality or legitimacy of the action.

Even the Bush administration absorbed these lessons toward the end of its term in office. Recent advances in the Iranian nuclear program have generated much public and governmental discussion of the desirability of preventive strikes. But the United States did not attack Iran under President Bush and denied essential assistance to Israel to enable that country to attack (Sanger 2009). The United States refrained from striking Iran despite evidence of past Iranian weapons-related experiments, major Iranian progress toward mastering centrifuge enrichment, powerful advocates for military action in high US government positions, a recently demonstrated willingness to use force in neighbouring Iraq and a declared policy of regime change toward the Islamic Republic. Although operational reasons were no doubt predominant in arriving at the decision not to strike (see, for example, Albright *et al.* 2008), the shadow of Iraq loomed over that decision. Absent any international support and concerted Security Council action, the prospects are slim that the use of force will cause Iran to give up its suspected pursuit of a nuclear weapons capability, or even to significantly delay its progress beyond a relatively short period.

Assuming these lessons have been absorbed to a degree by policy makers who might contemplate attacking the nuclear assets of another state, one could expect the following trends are likely.

First, regardless of the difficulty in arriving at a consensus among the Security Council's permanent members, the Security Council will not be easily ignored or skirted by those leaders contemplating the use of force to destroy a suspected nuclear weapons program. Moreover, the gap between what is legal and what will be viewed as legitimate has narrowed. The claim that an attack on suspected nuclear sites is "legitimate, if not legal" will be far more difficult to defend in the future. If the scope of nuclear infrastructure is large, partially secret, and geographically dispersed, then the costs and uncertainties associated with the aftermath of unilateral action are likely to be viewed as too great. Regional powers, such as Israel, that perceive great peril from a burgeoning nuclear program in a neighbouring state, may resort to preventive force without seeking UN authorization with the expectation that other powers will by necessity assume some of the costs of managing the messy aftermath. But global powers are likely to urge restraint upon regional allies who propose military plans to destroy nuclear facilities in neighbouring states.

Second, for better or worse, states will be more sceptical of claims of an imminent danger from proliferation. The credibility of the United States was severely damaged by the many failures in Iraq, and future US intelligence alleging a proliferation threat, if not corroborated or demonstrated, will not by itself convince other Security Council members to support the use of force. The perception of legitimacy surrounding the use of force

will depend on the presentation of clear evidence of a severe and imminent threat requiring military action. If before Iraq the bar to Security Council authorization was high, it is higher still today.

Finally, if proliferation presents a threat requiring forceful action, the process of acquiring Security Council authorization will continue to be slow, too often politicized, and inherently problematic. The norms governing the use of force in proliferation cases must be judged unsettled at present: the Bush administration's doctrine of preventive attack has not been explicitly repudiated by President Obama, nor have other states with similar policies voiced a change of heart. No consensus has yet emerged on the legal questions surrounding the doctrine. Although Israel did not seek Security Council approval for its 2007 attack on Syria, neither did it claim the existence of a Syrian proliferation threat before or after it attacked. The future, like the past, will be one in which states muddle through with inadequate institutions and difficult to enforce rules that will nonetheless have a significant political impact on decisions about the use of force.

Practical implications

Coercive non-proliferation measures must ultimately be backed by a credible threat of imposing unacceptable costs on those contemplating illicit activity. Military intervention is an important means of inflicting such costs. Given that legitimate or quasi-legitimate military action is difficult to organize, barriers to Security Council authorization are high, and unilateral attack is rarely effective over the long-term, how can the threat of force be made more credible? What steps are needed to do so?

The threat and use of force will be most effective when it is authorized by the UN Security Council. A number of steps could facilitate more timely Security Council enforcement action on non-proliferation violations. First, the UN Secretary General should commission a panel of experts to establish operational standards for judging when, in principle, a state's noncompliance with safeguards agreements or other proliferation concerns constitutes an imminent threat to peace and security. The Secretary General should present the conclusions of this expert panel to the Security Council with the recommendation that the standards be employed in Security Council decisions about enforcement actions. Such standards would not provide automaticity in deliberations over formal authorization of the use of force, but they would help guide Security Council members' assessments of the urgency and severity of the threat. Second, the same standards should be formally adopted by the IAEA Board of Governors, and the IAEA Director General should use the standards to trigger a call for special inspections when recalcitrant states refuse to allow routine inspections or clear up alleged safeguards violations.

Third, assessing future threats in practice will require closer intelligence cooperation than in the past. Security Council members must have a sufficient level of shared confidence in the evidence of a proliferation threat. To build confidence, IAEA member states should strengthen information sharing with the IAEA on illicit trafficking and dual-use trade, and the United States should help to establish new mechanisms of information sharing, for example, through the Proliferation Security Initiative.

Until such steps are taken, and because the preventive use of force is inherently problematic, all states concerned about proliferation should help to strengthen measures for controlling the supply of sensitive nuclear technologies and safeguarding against their illicit use so that the use of force is not needed. If international constraints on proliferation are strong, situations in which the use of force is tempting will be even rarer than they have been in the past. Many steps would enhance the effectiveness of the non-proliferation regime and make the threat or use of force unnecessary, including: tightening export and transhipment rules covering trade in sensitive nuclear technologies; bolstering intelligence and law enforcement cooperation focused on disrupting illicit trade in sensitive nuclear technologies; strengthening the IAEA and particularly its capacity for detecting covert activity; and promoting the highest standards of transparency for the development and operation of civil nuclear energy programs.

With respect to the small number of non-proliferation "hard cases" – states such as Iran today, where there is evidence of possible intent to acquire nuclear weapons and where the commitment to maintaining worrisome elements of a nuclear program is strong – past experience would suggest that intensive engagement is preferable to isolation. States should apply persistent, focused pressure, combined with a credible promise that the pressure will end once the troublesome behaviour changes. Even when a suspected proliferator is uncooperative, each round of discussion, each minor concession gained, each inspection, at a minimum, sheds light on the activities of concern and may serve to delay or ultimately prevent a decision by that state to acquire nuclear weapons. The United States and others concerned with non-proliferation should focus on changing the policies of the government in question and not on changing the government itself.

Finally, restricting the supply of nuclear technologies will only be truly effective in a world in which the demand for nuclear weapons is flat or diminishing. The nuclear weapon states have a particular responsibility in demonstrating the diminishing political and military utility of nuclear weapons by bringing the Comprehensive Test Ban Treaty into force, negotiating a ban on the production of fissile materials for military purposes, and reducing and eventually eliminating their arsenals as required under the NPT. The spread of nuclear weapons can be further slowed or reversed by reducing their perceived usefulness as symbols of power or

anchors of national security. The only way of bringing states outside of the NPT more firmly into the non-proliferation regime is to engage in intensive efforts to resolve the regional disputes that underlie their security concerns.

Clearly, none of these suggestions is within easy reach. As long as states continue to pursue the acquisition of nuclear weapons, the unilateral use of force to prevent proliferation will remain a strong temptation for those who are threatened. In light of this strategy's limited effectiveness, decision makers in states threatened by nuclear proliferation would do better to consider alternative means of improving their security. It is only through new and deeper forms of international cooperation that states can meet the challenges posed by the proliferation of nuclear weapons.

Notes

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1 The cases are: the 1942–44 Allied forces operations against the German nuclear efforts, the 1980 Iranian bombing raid on the Iraqi Osiraq reactor, the 1981 Israeli attack on the Iraqi reactor at Osiraq, the cluster of attacks by Iraq on Iranian Bushehr nuclear reactors under construction, the 1991 US and allied forces attack on sites of the Iraqi nuclear program during "Desert Storm," the 1993 strikes on Iraqi nuclear facilities, the 1998 "Desert Fox" operation in which US and UK forces struck Iraqi WMD infrastructure, the 2003 US war on Iraq and its suspected clandestine nuclear activities, and the 2007 Israeli bombing of the alleged Syrian al-Kibar reactor.

2 For an overview of the concept of preventive war and a review of recent analyses, see Levy 2008.

3 On the success of the non-proliferation regime, see Walsh 2005.

4 On brute force vs. coercion, see Schelling 1966: 2–6.

5 The roots of the US national security strategy under George W. Bush are uncovered by Trachtenberg 2007. For a review of cases in which force was used to prevent proliferation, see Reiter 2006 and Ramberg 2006.

6 Groves wrote this in a memo on the effects of atomic weapons on the US army in January 1946. Quoted in Trachtenberg 1991: 100.

7 Thomas M. Nichols suggests that "an unprovoked war was culturally unacceptable to American leaders." See Nichols 2008: 6.

8 The assessment in NSC-68 concludes that a preventive nuclear attack "would not force or induce the Kremlin to capitulate and that the Kremlin would still be able to use the forces under its control to dominate most or all of Eurasia. This would probably mean a long and difficult struggle."

9 The full text of Begin's post-Osiraq press conference can be found online at Israel Ministry of Foreign Affairs (1981).

10 These threats were examined by UN Secretary General's High Level Panel on Threats, Challenges, and Change (2004).

11 For an early assessment of the security of nuclear materials in the Russia and the former Soviet states, see Allison *et al.* 1996: 20–73. For a recent assessment of progress to secure nuclear materials worldwide, see Bunn 2010.

12 For a summary of the discussions surrounding changes in sovereignty norms, see Kaysen and Reed 1993.

13 Kofi Annan summarized his speech to the UN General Assembly in "Two Concepts of Sovereignty" (1999).

14 *A Responsibility to Protect* was the title and central message of the report of the International Commission on Intervention and State Sovereignty, published and delivered to the UN Secretary General in 2001; available at www.iciss.ca/report-en.asp. Anne Marie Slaughter and Lee Feinstein extended the logic of justified norms of humanitarian intervention to proliferation prevention in "A Duty to Prevent." See Feinstein and Slaughter 2004. The post-Cold War path from humanitarian intervention to preventive war is traced by Nichols 2008: 14–39.

15 Ashton B. Carter and William J. Perry, principal architects of the counter-proliferation initiative, describe its development and call for the additional "specialized attack and intelligence capabilities" to counter threats from nuclear, biological, and chemical threats. See Carter and Perry 1999: 135–138.

16 The articulation of this policy was coupled with President Clinton's signing of the Iraq Liberation Act, just prior to the December 1998 airstrikes on Iraq. See Kenneth Katzman (2004).

17 Not all states were enthusiastic supporters of the emerging US doctrine. The heads of state at a non-aligned movement conference, for example, "rejected the use, or the threat of the use of armed forces against any NAM country under the pretext of combating terrorism." Final Document, *XIII Conference of Heads of State or Government of the Non Aligned Movement*, Kuala Lumpur, 24–25 February 2003, para. 119. Online. Available: www.nam.gov.za/media/030227e.htm. The European Union (2003: 9) formulation of its security strategy also reflected tepid support for the US preventive force doctrine. Though it spoke of a need for "preventive engagement" the emphasis was clearly on "international organisations, regimes and treaties to be effective in confronting threats to international peace and security."

18 Although conventional strike capabilities improved dramatically, this did not stop groups within the Bush administration from advocating for the development of new nuclear missions as well, such as the use of nuclear weapons to destroy hardened and deeply buried targets associated with nuclear, chemical, or biological weapons or their development: US Department of Defense (2001).

19 The Bush Administration's *National Strategy to Combat Weapons of Mass Destruction* (United States 2002b: 1), reiterated the assertion made earlier by the president.

20 Critiques of the regime change strategy are numerous. For a sample of mainstream arguments, see Litwak 2003, Perkovich 2003, and Haass 2005.

21 Numerous high officials in the Obama administration have expressed support for preventive force doctrine. For example, Secretary of State Hillary Clinton has frequently emphasized that "no option is off the table," with respect to Iran. *Reuters* (2009). James Steinberg, who until mid-2011 was deputy secretary of state, and Ivo Daalder, now US ambassador to NATO, wrote in 2006: circumstances will undoubtedly arise in the future in which policymakers will want to have the option of using force preventively – be it to kill terrorists, prevent weapons proliferation, halt genocide, stop the spread of deadly diseases, or deal with other kinds of danger. The proper task, then, is not to bury the concept, but to make it a more limited and a more legitimate tool for addressing evolving security threats" (Steinberg and Daalder 2005). Anne Marie Slaughter, author of an important brief in *Foreign Affairs* on the use of force against recalcitrant proliferators, "Duty to Prevent," was until early 2011 the director of policy planning in the US Department of State.

22 This list of cases borrows liberally from Reiter 2006, but differs in four respects. First, I include only cases of nuclear prevention. I exclude the case of the US attack on the Sudanese chemical plant in 1998, as well as the war in Afghanistan in which suspected chemical and biological weapons facilities were targeted by Coalition forces. Second, I include only attacks *intended* to disable nuclear-related activity. I exclude the case of the US attack on Japan, since the United States was not aware of a Japanese nuclear program during the Tokyo bombings and the damage to it was inadvertent. By the same criterion, I exclude what Reiter coded as an Iraqi attack on Dimona with scuds in 1991. Although Dimona may have been a target of Iraqi scuds in 1991, the intent was not to disable the Israeli reactor or deny Israel its nuclear capability, but rather to provoke Israeli retaliation and cause the withdrawal of Arab states from the US-led coalition against Iraq. Third, I include only uses of military force against countries where illicit nuclear proliferation is suspected. I exclude acts of sabotage in third counties such as the Israeli operation in France to disrupt progress on equipment bound eventually for Iraq. Fourth, I include the new case of Israel's attack on Syria in September 2007.

23 Assessments of the Israeli attack on Osiraq include Braut-Hegghammer 2011, Tamsett 2004, Reiter 2005, Feldman 1982, and Federation of American Scientists, "Osiraq/Tammuz I," www.fas.org/nuke/guide/iraq/facility/osiraq.htm.

24 See "Zafaraniya," under Iraqi Special Weapons Facilities at www.globalsecurity.org: www.globalsecurity.org/wmd/world/iraq/zaafaraniyah.htm.

25 For a summary of the evidence, see Albright and Brannan 2008.

26 I treat Iraq's attacks on the Iranian reactors at Bushehr during the Iran-Iraq war as a single case, when in fact there were six separate bombing raids carried out over a period of nearly four years. Were those attacks to be counted individually, the ratio of operational successes would decrease substantially.

27 This method of assessment is developed and employed by Kreps and Fuhrmann 2011.

28 Germany's nuclear program was unsuccessful for a variety of reasons, including a lack of confidence among key decision makers in the likelihood of timely military development, low investment in human and scientific resources, trauma to the physics community from Nazi assault, and technical shortcomings, such as the failure to correctly calculate the critical mass necessary to produce an explosion, and the failure of all attempts to achieve a chain reaction. The destruction of heavy-water production facilities, against the backdrop of these other challenges, was a minor contribution to the failure of the program. For an account of the operations that led to the discovery of Germany's uranium pile and stockpile of ore, see Richelson 2006: 51–61.

29 The IAEA finding is cited in Cordesman and Al-Rodhan 2006: 11.

30 Analysis of intelligence failures in the first Gulf war can be found in *Gulf War Air Power Survey, Vol. II*. The failures of 2003 are documented in "Chapter One Case Study: Iraq" in the *Report of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction* (United States 2005).

31 Note that Keany's count of facilities was offered in 1993, before the revelations that came after Hussein Kamel's 1995 defection.

32 On German–French collaboration in the mid-1950s, see Paul 2000: 39–41.

33 For a theory of strategically motivated proliferation, see Kroenig 2009.

34 Unsurprising because costs and consequences were foreseen by many prior to the war. See Kaysen *et al.* 2002. For a sample of economic and strategic overviews, see Stiglitz and Bilmes 2008 and Miller 2006.

35 In 1991, then secretary of defense Richard Cheney personally thanked the Israeli Air Force commander in charge of the Osiraq raid for his service "which made our job much easier in Desert Storm." See Tamsett 2004: 78.

36 For an excellent analysis of the feasibility of military strikes on Iranian nuclear facilities, see Albright *et al.* 2008.

37 On the domestic politics of nuclear weapons decisions, see Solingen 2010 and Cirincione 2007: 63–70.

38 Iran's supreme leader, Ayatollah Khamenei, responded skeptically to President Obama's 2009 Nowruz greetings: "They chant the slogan of change but no change is seen in practice ... If you are right that change has come, where is that change? What is the sign of that change? Make it clear for us what has changed." See "Iran's Supreme Leader Rebuffs Obama Message" (2009).

39 Arguably, the fact that NTP states parties were not able or willing to respond to an attack by a non-state party on a state party was in itself damaging to the regime.

40 For an analysis of the aftermath of the attack, see Spector and Cohen 2008.

41 Although many governments secretly cheered the blow to Iraq's nuclear effort, these cheers were kept private due to Israel's perceived violation of international law, the destabilizing precedent it might have set, and the political complications that resulted from the violation. See Feldman 1982.

42 The international consensus behind the call for Iraqi disarmament was at least to a degree a byproduct of the response to the Iraqi invasion of Kuwait. Had Saddam Hussein not invaded Kuwait, the disarmament regime that took hold in Iraq might not have been viewed as necessary or legitimate.

43 Fear of attack is cited as a Libyan motivation by, for example, Joseph 2009: 39–40 and Miller 2006. The debate on Iraq's motives for declaring and ending its nuclear activities is documented and assessed by Jentleson and Whytock 2005.

44 Muammar Qaddaffi was reported to have told Italian Prime Minister Silvio Berlusconi he would do whatever the United States wished to avoid an attack. Qaddaffi also reportedly told US congressional delegations in January and March 2004 that he did not want to be subjected to US military efforts like those underway in Iraq. See Joseph 2009: 40.

45 These factors are detailed in Jentleson and Whytock 2005 and in Braut-Hegghammer 2008.

46 The statement is quoted by Jeffry Lewis on the ArmsControlWonk Blog, 22 March 2011. Online. Available: http://lewis.armscontrolwonk.com/archive/3723/libyas-lessons-for-north-korea. See also McDonald 2011.

47 The Bush administration argued that UN Security Council Resolution 1441, which found Iraq in material breach of previous Security Council resolutions requiring it to disarm, provided the necessary authority for initiating force in 2003. This claim was never accepted by France, Russia, or China and was widely rejected by legal scholars. See the Bush administration's legal case in Yoo 2003.

48 Not long after Bush made these remarks, Vice President Dick Cheney suggested that "the United Nations up until now has proven incapable of dealing with the threat that Saddam Hussein represents, incapable of enforcing its own resolutions, incapable of meeting the challenge we face in the 21st century of rogue states armed with deadly weapons, possibly sharing them with terrorists." Interview with Vice-President Dick Cheney, NBC, "Meet the Press," Transcript for 16 March 2003. Online. Available: www.mtholyoke.edu/acad/intrel/bush/cheneymeetthepress.htm.

49 Doyle provides helpful background on the case in Doyle 2008: 11–16.

50 For a discussions of the relationship between law and legitimacy and of role of legitimacy more generally in international relations, see Clark 2005, Hurd 2007, and Armstrong and Farrell 2005.

51 The UN High Level Panel alluded to these legitimacy criteria in its report. See *A More Secure World*, p. 67. See also the discussions of legitimacy and preventive

force in Armstrong and Farrell 2005, Doyle 2008: 57–59, Falk 2005, Franck 2006, Holloway 2006: 51–54, and Mueller *et al.* 2006: 86–89.

52 United Nations Security Council, "Note by the President of the Security Council" S/23500, 31 January 1992.

53 United National Security Council Resolution 1540, S/RES/1540, 28 April 2004.

54 United Nations Security Council Resolution 1887, S/RES/1887, 24 September 2009, emphasis in the original.

55 Feinstein and Slaughter introduce their argument for a "duty to prevent" proliferation, as a "corollary" to the "responsibility to protect" as advanced by the 2001 International Commission on Intervention and State Sovereignty. See Feinstein and Slaughter 2004: 137.

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6 The role of sanctions in non-proliferation

Michael Brzoska

Introduction

When a government intends to shape the behavior of others, it has a wide range of instruments available, ranging from voicing discontent to using force. Almost every kind of measure beyond mere words and short of actual war has been called "sanctions": an action aimed at harming a "target" whose behavior is to be changed. Since harming and supporting a target can both be seen as inducement strategies, "positive sanctions" are often discussed alongside "negative" ones. Although there is some logic to this argument, the following discussion focuses on harmful measures, which are overwhelmingly more common.

In fact, non-proliferation has become a major objective of the sanction policies of the USA and several other actors in international politics. The US government, in particular, has a wide range of sanctions at its disposal, including those that have the purpose of preventing and punishing proliferation. The use of sanctions as a non-proliferation tool has spread considerably since its first explicit use after India's 1974 nuclear test. But it has spread slowly and unevenly, driven largely by US government actions and specific events.

In contrast to some of the other measures discussed in this volume, sanctions are not a new tool introduced recently as an alternative to negotiated arms control. They have existed for much longer. Multilateral sanctions are also an integral, though largely implicit, element of the existing non-proliferation regimes for nuclear, biological and chemical weapons. The United Nations (UN) Security Council is arbiter of final resort for violations of all three regimes. While only the Chemical Weapons Convention explicitly mentions the possibility of sanctions as a possible measure to "redress a situation and to ensure compliance" (Article 12), both the Biological and Toxin Weapons Convention and the Comprehensive Nuclear Test Ban Treaty contain references to the Security Council for cases of non-compliance. Furthermore, as a result of its prerogative under Chapter VII of the UN Charter to determine when a threat or breach of international peace and security has occurred, the Security Council has recourse,