Nuclear Weapons and Non-proliferation: Is Restraint Sustainable?

Andrew O'Neil

Predictions of nuclear proliferation since the 1950s have proven to be almost wholly unreliable. Not only has the widely held expectation that the international system would be populated by a 'nuclear-armed crowd' failed to come to pass, the degree of restraint exercised by nuclear-capable states has undermined one of the most powerful tenets of realist international relations theory—that states in an anarchic international system will inevitably opt for the most powerful military capabilities they are able to acquire. A range of factors account for proliferation restraint, including the norms promoted by the non-proliferation regime, the role of extended deterrence, and a genuine moral aversion to nuclear weapons on the part of national leaders. One of the key policy related questions of our time is whether this restraint is sustainable in the twenty-first century. This article challenges some of the alarmist predictions about proliferation and argues that the disincentives for states acquiring nuclear weapons will remain robust in spite of the dramatic expansion of nuclear energy worldwide and the difficulties confronting the non-proliferation regime.

The passage of UN Security Council Resolution 1887 in September 2009 was the latest measure in a series of initiatives to promote the objective of nuclear disarmament internationally.[1] The resolution's commitment to "creating the conditions for a world without nuclear weapons" echoed similar calls by President Barack Obama in his April Prague speech for the role of nuclear weapons to be reduced in national strategies[2] and British Prime Minister Gordon Brown's pledge to put his country "at the forefront of an international campaign to accelerate multilateral nuclear disarmament".[3] Chinese, French, and Russian leaders have been less fulsome than their US and UK counterparts in endorsing progress on nuclear disarmament, but they have nevertheless reaffirmed their commitment to the general goal of a nuclear weapons free world. While much of this rhetoric is designed to shore up the coherence of the Non-Proliferation Treaty in the context of serious proliferation challenges from Iran and North Korea, it would be inaccurate to portray renewed interest in disarmament among the permanent

[1] For details, see United Nations Security Council, *Resolution 1887 (2009) Adopted by the Security Council at its 6191st Meeting, on 24 September 2009*, <http://www.iaea.org/NewsCenter/News/PDF/N0952374.pdf> [Accessed 8 October 2009].
[2] 'Remarks by President Barack Obama, Hradcany Square, Prague, 5 April 2009', <http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered/> [Accessed 5 October 2009].
[3] Philip Webster and Tony Halpin, 'Gordon Brown Offers to Cut Britain's Nuclear Arsenal', *The Times*, 18 March 2009.

five as mere political window dressing. There are unprecedented endeavours on the part of leading lobby groups and think tanks worldwide to craft realistic strategies for nuclear disarmament and these are beginning to have some influence in the policy world. Reports that President Obama has ordered the Pentagon to explore avenues in the draft Nuclear Posture Review to constrain America's options for employing nuclear weapons in the broader context of deeper cuts to US forces indicate that the world's most advanced nuclear weapons state is paying more than lip service to disarmament.[4]

Yet, in spite of these developments, nuclear weapons continue to play a central role in international relations. Since they were first (and last) used in anger in 1945, they have shaped key aspects of the strategic behaviour of states and helped transform the international system. Having experienced two disastrous global conflagrations within the space of two decades in the first half of the twentieth century, the international system has not experienced world wars and intra-regional conflicts over the past six decades. While claims that fear of nuclear weapons being used have prevented global war should be treated with some caution, there can be little doubt that nuclear weapons have significantly tempered risk taking by the major powers since 1945. Despite this, however, there is widespread apprehension today about the prospect of further nuclear proliferation internationally. In recent years, the heady optimism of the post-cold war period—when many international relations experts argued that the depreciation of nuclear weapons in international politics was a near-certainty with the demise of East-West rivalry—has been supplanted by a realisation that nuclear weapons still remain prized strategic assets for many states.[5]

Attempts to predict nuclear proliferation over the past six decades have been notoriously inaccurate.[6] From the Soviet Union's first nuclear test in 1949 to the advanced nature of Iraq's nuclear weapons program prior to the first Gulf War in 1991, nuclear proliferation has a habit of catching observers, including many intelligence agencies, by surprise. Equally striking has been the failure of observers to anticipate *non*-proliferation in the international system. Consistent predictions since the 1950s of cascading nuclear

[4] Thom Shanker and Mark Landler, 'Pentagon Checks Arsenal in Race for Nuclear Treaty', *The New York Times*, 8 September 2009.

[5] For examples of the early post-cold war optimism regarding the future of nuclear weapons, see Patrick Garrity, 'The Depreciation of Nuclear Weapons in International Politics: Possibilities, Limits, Uncertainties', *The Journal of Strategic Studies*, vol. 14, no. 4 (1991), pp. 463-514; and David Fischer, *Stopping the Spread of Nuclear Weapons: The Past and the Prospects* (London: Routledge, 1992).

[6] Very few individuals have made successful predictions about the future of nuclear weapons. The most striking exception is H. G. Wells who, in a remarkable book—*The world set free*, published in 1914—forecast the advent and use of atomic weapons. Leo Szilard, the father of the first nuclear chain reaction in 1933, subsequently cited the influence of Wells' book on his research. See Richard Rhodes, *The Making of the Atomic Bomb* (New York: Simon and Schuster, 1986), pp. 13-28.

proliferation have simply failed to materialise. As Jacques Hymans points out, a mere one-fifth of the countries that could have manufactured nuclear weapons by now have in fact done so: the pace of proliferation since the 1950s has remained essentially unaltered.[7] Yet, the consistency of dire predictions about nuclear proliferation remain remarkably persistent and are today shared across the political spectrum—from radical advocates of complete nuclear disarmament through to proponents of nuclear deterrence. Acknowledging historical precedent, it seems, does not come easily to those who are in the business of examining nuclear weapons.

There are few grounds for believing that contemporary endeavours to predict nuclear proliferation will fare any better than those of the past few decades. This article tackles the more modest task of analysing whether restraints to further nuclear proliferation internationally are sustainable over the next three to four decades.[8] I argue that these restraints are more robust and enduring than is generally acknowledged in the literature. The assessments contained in the analysis are the product of a "probability-based, rather than predictive approach", a method adopted by the most comprehensive and persuasive strategic futures report of recent times.[9] The assessments underpinning the article's analysis are based on what I regard as the most probable outcomes, which in turn are drawn from linear trends and historical precedent. However, the analysis also takes into account "lower probability alternatives" and "the potential for major discontinuities" in the form of strategic shocks.[10] The central theme of the article is that, rather than speculating about what future proliferation dynamics might look like in the international system, a much more fruitful avenue of inquiry is whether the proliferation restraint characteristic of the nuclear age will remain a hallmark of international relations in the first half of the twenty-first century.

Two main claims underpin this article's analysis. The first is that nuclear weapons will still be with us by the mid part of the twenty-first century. Notwithstanding the renewed flurry of intellectual activity in government, academia, and think tanks on the subject of nuclear disarmament, there is

[7] Jacques Hymans, 'Theories of Nuclear Proliferation: The State of the Field', *The Nonproliferation Review*, vol. 13, no. 3 (2006), p. 456.
[8] The analysis is focused on states, rather than non-state actors. This is not to discount the possibility that nuclear weapons will proliferate to terrorist groups, but it should be emphasised that the prospects of this occurring are fairly low given the enormous challenges associated with acquiring sufficient weapons grade material to fabricate even the most basic fission device. The other alternative is that a state transfers an intact warhead to an individual group. Why a state would decide to transfer the crown jewels of its military arsenal to an entity over which it had minimal control remains unclear, although countries 'contracting out' nuclear strikes to terrorist entities is something that cannot be ruled out. For recent discussion on the link between weapons of mass destruction and terrorism, see Daniel Byman, 'Do Counterproliferation and Counterterrorism Go Together?', *Political Science Quarterly*, vol. 122, no. 1 (2007), pp. 25-46.
[9] UK Development, Concepts and Doctrine Centre, *The DCDC Global Strategic Trends Programme: 2007-2036*, 3rd edition (London: Ministry of Defence, 2007), p. vi.
[10] Ibid., p. xii.

little prospect that the declared nuclear powers or those suspected of possessing covert arsenals will divest themselves completely of their nuclear weapons capabilities before 2050. The last sixty-four years of the nuclear age have witnessed the steady evolution in the sophistication of nuclear weapons systems such that they have been increasingly integrated into the military planning of nuclear weapons states. But, more importantly, it has also witnessed a reinforcement of the view among policy makers in declared states that nuclear weapons are a necessary instrument of power in an uncertain world—an existential security blanket of sorts. While such a perspective can easily be dismissed as outmoded strategic dogma, it nevertheless retains a powerful currency among policy makers in nuclear weapons states.[11] Decommissioning and destroying nuclear weapons is a challenging, but technically feasible, assignment. Changing the mindsets of those whose support is necessary to embark on this step is much harder.

The second claim is that the pace of nuclear weapons proliferation over the next twenty to thirty years will not be dramatically different to that experienced in the historical period since the entry into force of the Non-Proliferation Treaty (NPT) in 1970. The relatively slow pace of nuclear proliferation since 1945 underscores the dual point that acquiring nuclear weapons remains a daunting technological challenge for all but a handful of non-nuclear states in the international system, and that the overwhelming majority of these latter countries remain highly ambivalent about the merits of acquiring an operational nuclear force. This will in all likelihood obtain, in spite of potentially quite radical shifts in global security dynamics, bearing in mind the radical shifts that have occurred over the past sixty-four years.

A range of disincentives will continue to play an important role in dissuading nuclear-capable countries from crossing the threshold to acquisition. Even in the event of the NPT being weakened further or collapsing entirely—a scenario many analysts see as extremely plausible without progress in implementing key articles of the treaty—the costs associated with acquiring nuclear weapons will continue to discourage states from acquiring the bomb. In short, disincentives to proliferation will remain, irrespective of the formal status of international non-proliferation architecture.

The Nuclear Revolution, Proliferation and the Search for Order

When the first of two atomic weapons was detonated over Japan in August 1945, the world entered a fundamentally new era. From the outset, it was evident that nuclear weapons, due to their unrivalled destructive power, would confer upon their possessors an unprecedented military deterrent

[11] For discussion of this point in relation to the United Kingdom, see Nick Ritchie, 'Deterrence Dogma? Challenging the Relevance of British Nuclear Weapons', *International Affairs*, vol. 85, no. 1 (2009), pp. 81-98.

capability and a major claim to enhanced influence in the international system.[12] The death and misery wrought in Hiroshima and Nagasaki were by no means unique in the context of the Second World War: the net destructive impact of the various conventional and incendiary bombing campaigns far exceeded that of the atomic bombings. What *was* special about these new weapons was the speed with which they engulfed their targets and the destructive power contained within single warheads that could effectively destroy entire cities. The insidious inter-generational effects of radiation sickness also gave nuclear weapons a frightening edge over their conventional counterparts. Notwithstanding revolutionary advances in military technology since 1945, in the early twenty-first century nuclear weapons remain the only proven weapons of mass destruction in the international system.[13]

Endeavours to control the spread of nuclear weapons began almost as soon as they had been used. Drawing on the path-breaking Acheson-Lilienthal report prepared for the Truman administration, the United States proposed in the 1946 Baruch Plan presented to the United Nations that control over the nuclear fuel cycle be internationalised. This proposal was quickly rebuffed by the Soviet Union which, despite its rhetoric in favour of nuclear disarmament, had serious concerns about on-site verification and was itself working assiduously towards acquiring an operational nuclear force.[14] Even if the Soviet Union had accepted the Baruch Plan, there remain doubts about whether Washington would have followed through in implementing it. The Truman administration was divided on the issue of international control of atomic energy and US efforts to formulate a specific proposal, after having earlier committed in-principle to one, were half-hearted.[15] In any event, America's atomic monopoly was short lived, and by 1949 the Soviet Union had successfully detonated its first nuclear device. The United Kingdom followed in 1952, with France (1960) and China (1964) rounding off the five states recognised as "declared nuclear powers" under the NPT.[16]

The 1950s was, arguably, the most unstable decade of the nuclear age; it was certainly the period during which fear of nuclear war was most acute. Both superpowers embarked on massive nuclear testing programs that

[12] Michael Mandelbaum, *The Nuclear Revolution: International Politics Before and After Hiroshima* (New York: Cambridge University Press, 1981).
[13] Max Boot, *War Made New: Technology, Warfare, and the Course of History from 1500 to Today* (New York: Gotham Books, 2006).
[14] On the trajectory of the USSR's weapons program, see David Holloway, *Stalin and the Bomb: The Soviet Union and Nuclear Energy, 1939-1956* (New Haven: Yale University Press, 1994).
[15] For discussion, see Barton Bernstein, 'The Quest for Security: American Foreign Policy and International Control of Atomic Energy, 1942-1946', *The Journal of American History*, vol. 60, no. 4 (1974), pp. 1003-44.
[16] Under article 9 of the Non-Proliferation Treaty (NPT), "a nuclear weapon state is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967". For a copy of the NPT, see <http://www.un.org/events/npt2005/npttreaty.html> [Accessed October 2009].

marked the transition to the thermonuclear age where destructive power was measured in megatons rather than kilotons. The quantum leap engendered by the arrival of thermonuclear weapons provided confirmation, if any was needed, that victory in total war was rapidly becoming a relic of the first half of the twentieth century. It also challenged the very idea that major war involving a nuclear exchange would serve any rational instrumental purpose. The deep-seated intellectual ferment in the US strategic community at this time testified to the revolutionary implications of nuclear weapons for warfare in the modern age.[17] This was also a time when cold war tensions were especially intense. Ironically, as fears of a "nuclear Pearl Harbor" took hold in the United States, American planners undertook a series of in-depth studies examining the feasibility and consequences of a US first strike against Soviet nuclear assets.[18] While ideas of preventive war aimed at destroying the Soviet Union's developing nuclear forces enjoyed currency among some senior levels of the US military, they were rejected by the Eisenhower administration as it reaffirmed and expanded the Truman administration's strategy of containing Soviet power.[19]

During the 1950s it became apparent that nuclear warheads launched on ballistic missiles made it possible to destroy an enemy's state infrastructure and society without first having to destroy the latter's military forces. In the nuclear age, civilians rather than soldiers would bear the brunt of major war. The inherent policy dilemma seemed obvious: what policy aims could possibly vindicate using a weapon that had the capacity to obliterate another country's state and society? The underlying logic of the nuclear revolution was that the ability of one superpower to deter the use of nuclear weapons by the other was essentially predicated on conveying a credible intent that they themselves would respond to a nuclear attack by using nuclear weapons. Deterrence had of course existed in the pre-nuclear era,[20] but in the nuclear age it acquired unprecedented strategic significance. The leading strategist of his generation, Bernard Brodie, recognised this clearly: "Deterrence now means something as a strategic policy only when we are fairly confident that the retaliatory instrument upon which it relies will not be called upon to function at all".[21]

Greatly sobered by the near miss of the Cuban Missile Crisis in 1962, Washington and Moscow sought to develop a durable deterrent relationship

[17] See Marc Trachtenberg, 'Strategic Thought in America, 1952-1966', *Political Science Quarterly*, vol. 104, no. 22 (1989), pp. 301-34.
[18] Stephen Miller, 'The Utility of Nuclear Weapons and the Strategy of No-first Use', Paper presented to Pugwash Meeting no. 279, London, 15-17 November 2002, <http://www.pugwash.org/reports/nw/miller.htm> [Accessed October 2009].
[19] For background, see Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd edition (Houndmills: Palgrave Macmillan, 2003), pp. 117-30.
[20] On this, see George Quester, *Deterrence Before Hiroshima: The Airpower Background of Modern Strategy* (New York: John Wiley & Sons, 1966).
[21] Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959), pp. 272-3.

throughout the 1960s based in large part on the technological reality of mutual assured destruction. Once both sides had gained a secure second-strike capability during the 1960s in the form of mobile, and increasingly invulnerable, submarine based nuclear forces, any strategic advantage that could be gained from a first strike was gradually neutralised. It was around this time that both superpowers turned their attention towards addressing the rise of new nuclear states. Widely held predictions in the 1960s and 1970s converged on the assumption that dozens of nuclear weapons states would inevitably result from the spread of uranium enrichment and plutonium generating technologies across the international system. While his 1963 prognosis that fifteen to twenty nuclear powers would emerge by the 1970s subsequently proved to be well off the mark, at the time President Kennedy's deep pessimism was the norm rather than the exception.[22] Successive US National Intelligence Estimates (NIE) identified more than a dozen "countries of proliferation concern" (including Australia, Japan, Sweden, and West Germany), with the 1966 NIE warning that proliferation would accelerate if the United States and the Soviet Union were "not prepared to give non-proliferation priority over other policy objectives".[23]

The entry of Britain and France into the nuclear club was of concern to the Soviet Union in particular, but it was China's nuclear test in 1964 that really served to focus the minds of policy makers in Washington and Moscow. While both superpowers subsequently flirted with the option of launching preventive strikes against China's embryonic capability,[24] a shared concern that other states were also on the cusp of going nuclear resulted in a joint US-Soviet draft non-proliferation treaty being submitted to the United Nations in 1967. With minor amendments, the draft was endorsed and the NPT was opened for signature in 1968. Washington and Moscow regarded such a treaty as necessary to provide a firmer legal and normative foundation for existing initiatives to promote non-proliferation, including International Atomic Energy Agency (IAEA) safeguards and the 1963 Partial Test Ban Treaty.[25] The entry into force of the NPT in 1970 constituted the centrepiece of the international non-proliferation regime and was supplemented by a range of multilateral nuclear export control measures developed during the 1970s and 1980s. Many countries, especially nuclear-capable states, remained uneasy about acceding to a treaty that seriously inhibited their latitude to acquire

[22] 'Press Conference, March 21 1963', *Public Papers of the Presidents: John F. Kennedy, 1963* (Washington DC: US Government Printing Office, 1964), p. 280.
[23] Peter Lavoy, 'Predicting Nuclear Proliferation: A Declassified Documentary Record', *Strategic Insights*, vol. 3, no. 1 (2004), <http://www.ccc.nps.navy.mil/si/2004/jan/lavoyJan04.asp> [Accessed 5 March 2009].
[24] See Jeffrey Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran to North Korea* (New York: W. W. Norton & Company, 2006), pp. 154-6; Lyle Goldstein, 'Do Nascent WMD Arsenals Deter? The Sino-Soviet Crisis of 1969', *Political Science Quarterly*, vol. 118, no. 1 (2003), pp. 62-5.
[25] See the collection of essays in Frank Barnaby (ed.), *Preventing the Spread of Nuclear Weapons: Pugwash Monograph 1* (London: Souvenir Press, 1969).

nuclear weapons. In a number of cases, it was only after concerted pressure from Washington, coupled with reassurances about extended deterrence guarantees, that these states decided to come on board.[26] Non-members of superpower alliances in the developing world were harder to convince, and remained cynical about what they saw as the establishment of a 'nuclear condominium' on the part of the five 'legitimate' nuclear powers under the NPT and the potential denial of civilian nuclear technology by nuclear suppliers in the developed world. Despite these misgivings over the structural inequities of the NPT, and notwithstanding the widely canvassed imperfections of the non-proliferation regime more generally, it remains the single most popular treaty in the international system with over 190 member states. What is less clear is the extent to which the NPT has been a direct cause of proliferation restraint internationally over the past four decades.

Explaining Proliferation Restraint

The reasons why individual states decide to manufacture nuclear weapons for the purpose of integrating them into national military capabilities has been well documented. The pursuit of prestige and status, the quest for international recognition, and the influence of key domestic constituencies have all featured as explanations in the literature. Traditionally, however, insecurity has been privileged over other variables in explaining the causes of nuclear proliferation.[27] This tends to reflect the historical dominance of realist international relations theory, which attaches primacy to what it sees as the fixation of states with protecting their own security against external threats. Conventional realist analysis predicts that 'nuclear-ready' states will acquire nuclear weapons in the context of a negative external security environment. Other factors may contribute to the decision, but for realists, ultimately, adverse external security circumstances remain the independent variable that determines whether proliferation takes place.

Notwithstanding revolutionary advances in conventional warfare, nuclear weapons still exercise a powerful attraction for states. Surprisingly, this remains the case for the world's most militarily advanced country (in conventional terms), the United States. Although Barack Obama has broadly endorsed nuclear disarmament as a global policy objective, he has yet to formally commit the United States to eliminating its nuclear arsenal at any future point. Some have argued that Obama's landmark speech in Prague in April 2009 promoted the prospects for global nuclear

[26] For discussion, see Francis Gavin, 'Blasts from the Past: Proliferation Lessons from the 1960s', *International Security*, vol. 29, no. 3 (2004/05), pp. 116-7.
[27] On this point, see Richard Betts, 'Paranoids, Pygmies, Pariahs and Nonproliferation', *Foreign Policy*, vol. 26 (1977), pp. 57-83; Stephen Meyer, *The Dynamics of Nuclear Proliferation* (Chicago: University of Chicago Press, 1984); Benjamin Frankel, 'The Brooding Shadow: Systemic Incentives and Nuclear Weapons Proliferation', *Security Studies*, vol. 2, no. 3/4 (1993), pp. 37-65; and Zanvyl Krieger and Ariel Roth, 'Nuclear Weapons in Neo-realist Theory', *International Studies Review*, vol. 9, no. 3 (2007), pp. 369-84.

disarmament, but it is important to note that Obama carefully—and quite explicitly—stated that the United States had no intention of disarming its nuclear forces "as long as these weapons exist".[28] Less than one year earlier (although admittedly under a different administration), the current Defence Secretary, Robert Gates, emphasised the existential importance of maintaining nuclear forces and their role in "hedging against uncertainty". According to Gates:

> Our nuclear arsenal is vital [because] we simply cannot predict the future. Who can tell what the world will look like in 10 to 20 years? As someone who spent most of his career in the intelligence business, I can assure you that our track record for guesswork hasn't been all that great. We have to know our limitations. We have to acknowledge that the fundamental nature of man [sic] hasn't changed and their adversaries and other nations will always seek whatever advantages they can find. Knowing that, we have to be prepared for contingencies we haven't even considered.[29]

Such logic is evident in the public pronouncements of the other four declared nuclear weapons states, including the smallest of the five, the United Kingdom. In announcing his government's decision to renew the United Kingdom's Trident nuclear submarine system in late 2006—in the context of widespread calls for Britain to relinquish its nuclear deterrent—Tony Blair observed that:

> There are perfectly respectable arguments against the judgment we have made. I both understand them and appreciate their force. It is just that, in the final analysis, the risk of giving up something that has been one of the mainstays of our security since the [Second World] War, and moreover doing so when the one certain thing about our world today is its uncertainty, is not a risk I feel we can responsibly take.[30]

While Gordon Brown has demonstrated a more robust philosophical commitment to nuclear disarmament than his predecessor, he has been cautious in framing the United Kingdom's position in terms of it *retaining* nuclear weapons, not dispensing with them:

> We are committed to retaining the minimum force necessary to maintain effective deterrence. For future submarines our latest assessment is that we can meet this requirement with 12—not 16—missile tubes as are on current submarines. In Britain our operationally available warheads now number fewer than 160 and the government keeps this number under constant review. If it is possible to reduce the number of United Kingdom

[28] 'Remarks by President Barack Obama, Hradcany Square, Prague, 5 April 2009'.
[29] Robert Gates, 'Nuclear Weapons and Deterrence in the 21st Century', speech to the Carnegie Endowment for International Peace, 28 October 2008, Federal News Service Transcript, pp. 4-5.<http://carnegieendowment.org/files/1028_transcrip_gates_checked.pdf> [Accessed 1 November 2009].
[30] 'Blair's Trident Statement in Full', BBC News Online, <http://news.bbc.co.uk/2/hi/uk_news/politics/6207584.stm> [Accessed 26 March 2009].

> warheads further, consistent with our national deterrence and with the progress of multilateral discussions, Britain will be ready to do so.[31]

Given the highly conditional nature of these views on nuclear disarmament by the leadership of the most conventionally advanced militaries in the world, it is little wonder that states with limited conventional force capabilities feel attracted to nuclear weapons. This perception is magnified for those countries that have tense relations with stronger conventional military powers like the United States. North Korea and Iran are not seeking to emulate or match America's nuclear capability; they see nuclear weapons as a key strategic equaliser against conventional military threats from the United States.[32] Determined proliferators will devote massive resources to nuclear programs and risk international opprobrium in acquiring nuclear weapons. International pressure can raise some of the costs for individual states intent on procuring nuclear weapons, but very rarely does it dissuade countries that have already decided to go nuclear. India, Israel, North Korea, and Pakistan have each demonstrated a willingness to absorb considerable international censure in pursuit of nuclear weapons.

However, one of the more curious features of international relations since the dawn of the nuclear age has been that only a handful of countries have decided to acquire nuclear weapons, despite many dozens more having the technological ability to do so. The fact that so few states have gone nuclear undermines one of the most common intuitive assumptions put forward by policy practitioners and international relations analysts: that countries will invariably seek the strongest military capability they are able to acquire. More than half a century after the explosion of the world's first atomic device, a mere eight states have demonstrated their possession of nuclear weapons through testing (the United States, Russia, the United Kingdom, France, China, India, Pakistan, and North Korea), one is strongly suspected of maintaining a secret operational force (Israel), one has developed and subsequently destroyed several nuclear weapons (South Africa), and one other is suspected of covertly undertaking a nuclear weapons development program (Iran). Although some other countries are routinely identified as 'proliferation risks' (e.g. Egypt, Japan, Turkey), there is no indication that any of these states are seriously considering embarking on a nuclear weapons program. In many ways, such a situation is remarkable when one considers that the NPT does not expressly prohibit member states from enriching uranium or manufacturing plutonium, the only avenues to indigenously producing fissile material. An intriguing puzzle of the nuclear age is why

[31] 'UK Prime Minister Brown Speech on Nuclear Energy and Proliferation, 17 March 2009', *Acronym Institute Disarmament Documentation*, <http://www.acronym.org.uk/docs/0903/doc08.htm> [Accessed 8 October 2009].

[32] For discussion of the drivers of both states' programs and their likely future trajectory, see Jonathan Pollack, 'North Korea's Nuclear Weapons Program to 2015: Three Scenarios', *Asia Policy*, vol. 3 (2007), pp. 105-23; and Mark Fitzpatrick, 'Assessing Iran's Nuclear Programme' *Survival*, vol. 48, no. 3 (2006), pp. 5-26.

states that possess all the technological means to go nuclear decide not to go down this path.

Perceptions of the external security environment is the most obvious variable that accounts for proliferation restraint. All states, by their very nature, regard their external security environment as *potentially* threatening even if they do not necessarily confront such threats today. But while insecurity can be a powerful factor in driving states' nuclear weapons programs forward, the flip side is that a dearth of serious external threats can be a major factor in promoting nuclear restraint in individual countries. For Argentina and Brazil, two countries widely touted as potential nuclear weapons states in the 1970s, agreement to inject their relationship with greater transparency and settle key political disputes during the 1980s had the effect of dampening the demand for nuclear weapons oriented research and development in Buenos Aires and Brasilia.[33] In those countries that perceive ongoing security threats, strategic reassurances received from major powers can serve to encourage proliferation restraint. Since 1945, many nuclear-capable states have been reassured by being members of multilateral or bilateral alliances that involve a major power (usually the United States) extending a nuclear deterrent guarantee to allies. During the cold war, the NATO alliance played a key role in reassuring Western European member states that were capable of manufacturing nuclear weapons (Italy, West Germany), as well as nuclear-capable neutral states (Sweden, Switzerland) that a countervailing American nuclear deterrent against the Soviet Union applied across the European theatre. Washington's careful attention to consulting fellow NATO members on nuclear issues through the alliance's Nuclear Planning Group helped foster confidence in the credibility of US nuclear guarantees.[34]

As important as the security dimension undoubtedly is, no single variable can adequately explain non-proliferation among nuclear-capable states.[35] A number of international and domestic level factors have contributed to nuclear restraint. The first of these is the increasing ambit of global arms control since the advent of the NPT. Although caution is warranted in assuming (as many are wont to) a causal relationship between the advent of the non-proliferation regime and proliferation restraint among nuclear-capable states, at the very least the regime has constituted an obstacle to further proliferation. While the implementation of the NPT, nuclear safeguards, and nuclear export controls has been somewhat patchy, the fact

[33] Mitchell Reiss, *Bridled Ambition: Why Countries Constrain their Nuclear Capabilities* (Washington DC: Woodrow Wilson Centre Press, 1995), pp. 45-88.
[34] Martin Smith, 'To Neither Use Them Nor Lose Them: NATO and Nuclear Weapons Since the Cold War', *Contemporary Security Policy*, vol. 25, no. 3 (2004), pp. 524-7.
[35] See Mitchell Reiss, *Without the Bomb: The Politics of Nuclear Nonproliferation* (New York: Columbia University Press, 1988); Scott Sagan, 'Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb', *International Security*, vol. 21, no. 3 (1996/97), pp. 54-86; and T. V. Paul, *Power Versus Prudence: Why Nations Forgo Nuclear Weapons* (Montreal: McGill-Queen's University Press, 2000).

that the non-proliferation regime enjoys wide declaratory support among states has had the effect of increasing the normative costs for would-be nuclear proliferators.[36] The economic and reputational costs for Iran in not acceding to international requests to suspend its uranium enrichment program have been significant, and it is important to remember that, since the end of the cold war, the international community has responded to nuclear tests by *non*-NPT parties, India, Pakistan, and North Korea, with UN endorsed sanctions. Moreover, despite the fraught nature of UN multilateral diplomacy, no state that decides to go nuclear can be absolutely certain that it will not be subject to a tough response from the Security Council, including possible military action under chapter 7 of the UN charter. It is also important to distinguish between the norm of nuclear non-use and the norm of non-proliferation. Unlike the norm of non-proliferation, which has been disregarded by several countries since the early 1970s, all states have exhibited a commitment to the norm of non-use since 1945.[37] That said, violation of a norm does not invalidate its potency among those who adhere to it—and this remains the case with non-proliferation in international relations. As Harald Muller points out, for all its faults and imperfections, the non-proliferation regime has played an important role in inculcating genuine anti-nuclear norms among policy makers and other domestic actors within nuclear-capable states.[38] Japan is often cited as an exemplar, but the influence of these norms has also played an important role in reinforcing non-proliferation commitments in nuclear-capable Australia, Germany, and Sweden.[39]

The second factor promoting nuclear restraint are the costs and challenges associated with acquiring an operational nuclear force. While nuclear weapons are regarded as a key force equaliser against conventionally stronger adversaries, they are expensive to achieve, maintain, and upgrade if a state seeks to retain a secure second strike capability over time. A cash-

[36] On this point, see Maria Rost Rublee, *Nonproliferation Norms: Why States Choose Nuclear Restraint* (Athens and London: University of Georgia Press, 2009).
[37] Nina Tannenwald, 'Stigmatizing the Bomb: Origins of the Nuclear Taboo', *International Security*, vol. 29, no. 4 (2005), pp. 5-49.
[38] Harald Muller, 'Maintaining Non-nuclear Weapon Status', in Regina Cowen Karp (ed.), *Security with Nuclear Weapons? Different Perspectives on National Security* (Oxford: Oxford University Press, 1991), pp. 301-39.
[39] For analysis of the relationship between a commitment to non-proliferation as a foreign policy goal and nuclear restraint in all four countries, see Kurt Campbell and Tsuyoshi Sunohara, 'Japan: Thinking the Unthinkable', in Kurt Campbell, Robert Einhorn, and Mitchell Reiss (eds), *The Nuclear Tipping Point: Why States Reconsider their Nuclear Choices* (Washington DC: Brookings Institution, 2004), pp. 218-53; Rod Lyon, 'Australia: Back to the Future', in Muthiah Alagappa (ed.), *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia* (Stanford: Stanford University Press, 2008), pp. 429-50; Harald Muller, 'The Non-Proliferation Treaty and the German Choice Not to Proliferate', in David Carlton (ed.), *Controlling the International Transfer of Weaponry and Related Technology* (Aldershot: Dartmouth Publishing, 1995), pp. 173-86; and Wilhelm Agrell, 'The Bomb That Never Was: The Rise and Fall of the Swedish Nuclear Weapons Programme', in Nils Petter Gleditsch and Olav Njolstad (eds), *Arms Races: Technological and Political Dynamics* (Oslo: PRIO, 1990), pp. 154-74.

strapped state like North Korea is in no position to acquire the most reliable second-strike platform—a submarine-based strategic force—as part of its arsenal. However, even the relatively modest goal of protecting its small nuclear arsenal from a disarming first-strike while ensuring that it is in a position to employ these weapons during a crisis or conflict requires serious infrastructure investment. There is also the challenge of integrating nuclear forces into existing military force structure. Questions about secure command and control are critical for all nuclear powers, but they are particularly important for new nuclear weapons states with no first-hand experience in coordinating nuclear forces in peacetime or during crisis situations.[40] In addition, the issue of nuclear weapons doctrine poses a particular conundrum for new nuclear powers. Under what specific circumstances, if any, would decision makers authorise the employment of nuclear weapons? Is a pre-emptive strike against an adversary's conventional or nuclear forces an option? Would targets be solely military in nature, or would they also encompass population centres? These are just some of the questions that would need to be answered before the deployment of an operational nuclear force. Finally, any state considering acquiring nuclear weapons would have to weigh up the high probability that they themselves would immediately become a nuclear target, possibly even before they had deployed an operational force.

The third factor contributing to nuclear restraint has been the role of domestic pressures in nuclear-capable countries. As Etel Solingen has demonstrated, a strong emphasis on integration into the global economy by leaders and ruling coalitions in Japan, South Korea, and Taiwan has had the effect of reducing proliferation pressures in these three Northeast Asian states. This is in stark contrast to the Middle East, where proliferation pressures remain more buoyant and where leaders tend "to rely on inward-looking self-sufficiency and an emphasis on domestic markets and nationalist values for their political survival".[41] For others, the national identity conceptions of leaders themselves provide the key to understanding proliferation restraint. Hymans argues that nuclear capable states that have crossed the threshold to acquisition have been led by elites with intense feelings of nationalistic pride and fear of external actors:

> for oppositional nationalist leaders, the decision to acquire nuclear weapons is not only a means to the end of getting them; it is also an end in itself, a

[40] Command and control challenges still exist for the United States, the world's oldest nuclear power, so it is not too difficult to imagine the magnitude of the challenge confronting newly minted nuclear weapons states. See Robert Critchlow, 'Nuclear Command and Control: Current Programs and Issues', *Congressional Research Service Report*, RL33408, May 2006.
[41] Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East* (Princeton: Princeton University Press, 2007), p. 5.

> matter of self expression … oppositional nationalists push for the bomb, while others do not.[42]

From this perspective, the slower than expected pace of nuclear proliferation is explained by the fact that oppositional nationalists in nuclear capable states have been few and far between.

Is Restraint Sustainable?

The historical tendency among proliferation analysts has always been towards pessimistic assessments of nuclear futures. It is striking that many of the same assumptions about the inevitability of nuclear proliferation made in the 1960s and 1970s still enjoy widespread currency today. As Potter and Mukhatzhanova have recently noted, "It is difficult to find [an analyst] who predicts the future without reference to metaphors such as proliferation chains, cascades, dominoes, waves, avalanches, and tipping points".[43] Recently, this sense of dread has been reflected in the arguments of nuclear disarmament advocates, most notably those in the United States. According to its proponents, nuclear disarmament has never been more urgent because the world "is on the precipice of a new and dangerous nuclear era".[44] The world, from this vantage point, is "on the verge of entering an age of more nuclear weapon states".[45] While there may well be a balance today between the nuclear powers, "present levels of nuclear weapons is not safe in a world when 20 to 30 nations acquire nuclear arsenals".[46]

The view that the international system is on the cusp of an escalation in proliferation has been accentuated by two contemporary developments. The first is the so-called global 'nuclear renaissance', which has seen states in the developed and developing worlds approve the significant expansion of their civilian nuclear energy sectors to fuel economic growth and offset the long term impacts of climate change. One study has cited an expected doubling or tripling of global nuclear energy capacity by 2050, and identifies more than thirty states that have plans to construct nuclear power plants for the first time.[47] There is growing concern that these countries will abjure the construction of (expensive) proliferation-resistant reactors in favour of reactors that are able to serve a dual civilian-military purpose. An additional anxiety is that states such as China and India, which are embarking on a

[42] Jacques Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions, and Foreign Policy* (Cambridge: Cambridge University Press, 2006), p. 13.
[43] William Potter and Gaukhar Mukhatzhanova, 'Divining Nuclear Intentions', *International Security*, vol. 33, no. 1 (2008), p. 159.
[44] George Shultz, William Perry, Henry Kissinger, and Sam Nunn, 'A World Free of Nuclear Weapons', *The Wall Street Journal*, 4 January 2007.
[45] Ivo Daalder and Jan Lodal, 'The Logic of Zero: Toward a World Without Nuclear Weapons', *Foreign Affairs*, vol. 87, no. 6 (2008), p. 81.
[46] Sidney Drell and James Goodby, 'The Reality: A Goal of a World Without Nuclear Weapons is Essential', *The Washington Quarterly*, vol. 31, no. 3 (2008), p. 30.
[47] Sharon Squassoni, 'Nuclear Renaissance: Is It Coming? Should It?', *Carnegie Endowment for International Peace Policy Brief*, no. 69 (October 2008), p. 1.

massive expansion of their civil nuclear sectors, will struggle to institute appropriate nuclear security measures to prevent the leakage of material and expertise from their borders.[48]

The second development has been the increasingly fragile state of the international non-proliferation regime. As William Walker has eloquently argued, the regime was founded in the late 1960s "on two interlinked systems: a managed system of deterrence and a managed system of abstinence". Under this binary system, "the possession of nuclear weapons by the acknowledged nuclear weapon states was a temporary trust, and a trust which could not be extended to other states".[49] The underlying quid pro quo of the NPT is that, in exchange for horizontal proliferation restraint on the part of the non-nuclear weapon member states, the five nuclear weapon states under the treaty will embark on a process of nuclear disarmament, in addition to sharing civilian nuclear technology with member countries. This structural compact has been subjected to severe buffeting since the end of the cold war which in turn has been exacerbated by the emergence of three new nuclear weapons states—India, Pakistan, and North Korea. There is an understandable suspicion among many non-nuclear weapons states that declared enthusiasm for nuclear disarmament on the part of the nuclear powers is confected to offset criticism ahead of each NPT review conference that article 6 of the treaty is not being implemented. The abject failure of the 2005 review conference to agree on whether the treaty had been implemented in the preceding five years provoked a severe legitimacy crisis in the non-proliferation regime; so much so that some fear the implosion of the NPT, and possibly the regime as a whole, if the 2010 review conference fails to deliver a consensus document.[50]

Will the proliferation restraint evident over the past half century be replicated in a world where nuclear power is expanding and the non-proliferation regime is in danger of being gradually eroded? The answer to this question is not as clear cut as we might think. Some caution is warranted in assuming that an expanding nuclear power sector will necessarily lead to more nuclear weapon states. There have been well over one thousand nuclear reactors operating across more than several continents over several decades since the 1940s, and only nine states have acquired nuclear

[48] The International Atomic Energy Agency (IAEA) has accorded particular priority to assisting China and India—the two countries with the world's most ambitious civil nuclear energy plans in the twenty-first century—improve their nuclear security and safety methods. See 'India Lobbies on Nuclear Safety', BBC News Online, 18 July 2008, <http://news.bbc.co.uk/2/hi/south_asia/7513085.stm> [Accessed 6 November 2008]; and IAEA News Centre, 'IAEA to Assist China and Qatar on Nuclear Security', 26 June 2007, <http://www.iaea.org/NewsCenter/News/2007/china_qatar.html> [Accessed 6 November 2008].

[49] William Walker, 'Nuclear Enlightenment and Counter-enlightenment', *International Affairs*, vol. 83, no. 3 (2007), p. 436.

[50] See, for example, Jean du Preez, 'Avoiding a Perfect Storm: Recharting the NPT Review Process', *Arms Control Today*, October 2008, <http://www.armscontrol.org/act/2008_10/duPreez> [Accessed 17 February 2009].

weapons. Moreover, the post-1945 period has shown that global proliferation dynamics have remained essentially disconnected from the civil nuclear industry. Every nuclear weapons program since and including the Manhattan Project has been the product of dedicated military reactors, rather than an offshoot of civilian programs. As Chaim Braun points out, "All fissile materials for nuclear weapons development have been produced in special-purpose dedicated production reactors, not in commercial reactors".[51]

The non-proliferation regime certainly confronts some serious challenges in preserving its current membership base in the years ahead. Yet, the NPT's imminent demise has been exaggerated and its resilience under-estimated for a number of years.[52] Furthermore, the idea that its continuing fragility will trigger further nuclear proliferation internationally bears close examination. Writing in 1965, Hedley Bull observed that "countries which have the capacity to acquire nuclear weapons tend to develop the will".[53] The fact that Bull's argument was not borne out by subsequent events following the NPT's entry into force in 1970 has had the effect of strengthening the claims of supporters of the treaty that it has served a prophylactic function in preventing the evolutionary path of proliferation from taking its 'natural' course. Yet, as noted earlier in this article, determined proliferators will do whatever it takes to obtain nuclear weapons. The norms embodied in the NPT and the non-proliferation regime have no real influence over the decision making of elites in hard core cases such as North Korea and Iran. Also, as the period since the end of the cold war has shown, there is no obvious correlation—much less a causal relationship—between the sort of shape the NPT is in and proliferation trends internationally. India and Pakistan decided to test nuclear devices in 1998, a mere three years after the NPT had been extended indefinitely. North Korea formally withdrew from the NPT in early 2003, less than three years after the successful 2000 NPT Review Conference at which the nuclear weapons states reaffirmed their rhetorical commitment to nuclear disarmament. Similarly, revelations in 2002 that Iran had failed to declare to the IAEA two nuclear facilities under construction occurred two years after the landmark 2000 NPT Review Conference.

Although expansion of the world's nuclear industry may make it harder to achieve nuclear security with respect to fissile material, and while a weakened NPT could have the effect of diluting the norm of non-proliferation internationally, to assume this will lead to more states acquiring nuclear weapons is to overlook the considerable barriers to nuclear proliferation in

[51] Chaim Braun, 'The Nuclear Energy Market and the Nonproliferation Regime', *The Nonproliferation Review*, vol. 13, no. 3 (2006), p. 637.
[52] The author counts himself among those who have fallen in to this trap. See Andrew O'Neil, 'Nuclear Proliferation and Global Security: Laying the Groundwork for a New Policy Agenda', *Comparative Strategy*, vol. 24, no. 4 (2005), pp. 343-60.
[53] Hedley Bull, *The Control of the Arms Race: Disarmament and Arms Control in the Missile Age*, 2nd edition (New York: Frederick A. Praeger, 1965), p. 152.

the international system. As outlined in the previous section, there are enormous (and, for many states, prohibitive) economic costs associated with acquiring nuclear weapons. For a state, acquiring an operational nuclear force is not just a question of fabricating reliable warheads that will detonate at the point they are intended to, possibly without being tested first. Possessing delivery systems that permit a state to launch its weapons even if that state has been subject to a first strike is also integral to having a credible nuclear force with an effective deterrent capability. Overlaying all of this is the supporting architecture that is required to have effective command and control of a nuclear inventory. This is immensely expensive in the short term and involves significant long term investment. In short, the material costs of acquiring an operational force will constitute a major barrier for the overwhelming majority of nuclear-capable states.

These material costs are the visible price that states pay in acquiring nuclear weapons, but there are others. That becoming a nuclear weapons state entails accepting a range of new burdens, in addition to material costs, may sound somewhat counter-intuitive. However, for all but the most sociopathic of political leaders, there is an awesome responsibility that comes with having control over nuclear weapons. Not surprisingly, this is something many leaders are not particularly keen to embrace or bequeath to their successors. Decisions about whether, and under what particular circumstances, nuclear weapons would be employed are fraught with moral and ethical questions. And the risk of a nuclear strike on home territory in a crisis resulting by dint of the target country possessing nuclear weapons is a possibility that elites in every new nuclear weapons state have to factor in to their decision making.

If the aim is to promote nuclear restraint in the international system, the key as Kurt Campbell notes is to prevent the "erosion of disincentives" to proliferation.[54] In surveying the years ahead, policymakers and analysts could do worse than focus on the ingredients that have fostered nuclear restraint over the past few decades. Extended deterrence guarantees (particularly in the US alliance system), the norms promoted by the non-proliferation regime, a genuine moral aversion to nuclear weapons on the part of political (and military) leaders, ambivalence over the contribution nuclear weapons can make to national security, and greater interdependence and transparency among states in the international system have all contributed to containing proliferation pressures.

There are, of course, the inevitable 'unknowns' that render any future-oriented discussion of nuclear proliferation problematic. How states seek to adapt to evolving power balances in different regions across the international system will influence the role they see (or do not see) for nuclear weapons in

[54] Kurt Campbell, 'Reconsidering a Nuclear Future: Why Countries Might Cross Over to the Other Side', in Campbell, Einhorn, and Reiss (eds), *The Nuclear Tipping Point*, p. 19.

their national strategies.[55] This is especially pertinent in a region like Northeast Asia, which is adapting to hosting a new nuclear power (North Korea), but it is also becoming apparent in the Middle East where states are beginning to adjust to the prospect of a nuclear-armed Iran within the next decade. Finally, it is conceivable that a major strategic shock, or series of shocks, could provoke a major discontinuity in relation to how states perceive nuclear weapons. The accidental or deliberate use of nuclear weapons would undoubtedly elicit widespread revulsion internationally. However, whether it would provide the necessary spark to move towards disarmament or have the opposite effect of igniting the accelerated spread of nuclear weapons is an open question.[56] Any demonstration of the impact of nuclear weapons would underscore their awful and indiscriminate mass destructive effects. In a perverse way, this could act as a generational 'refresher' for those who have little or no appreciation of their physical effects. In these circumstances, it is not hard to imagine widespread shock being translated into a genuine global push for nuclear disarmament. Equally, however, the lessons of the post-1945 period may be instructive. The use of nuclear weapons did initially result in efforts to put the nuclear genie back in the bottle with proposals to internationalise control over atomic energy. These were, however, short-lived and the world experienced an unprecedented nuclear arms race for much of the post-war period that raised the prospect of global catastrophe surpassing both world wars of the twentieth century.

Conclusions

Nuclear weapons will be with us for some time to come. The sorts of nuclear challenges that faced the international community in the post-1945 era seem strangely familiar in the early part of the twenty-first century. Can we limit the spread of weapons relevant technologies and know-how resulting from the expansion of nuclear energy programs worldwide? Is non-proliferation the most effective strategy for managing nuclear weapons? Is nuclear disarmament possible, or even desirable? The fact that clear-cut answers to these questions remain elusive should tell us something about the high degree of historical continuity that has characterised the role of nuclear weapons in the international system. While the last sixty-four years of the nuclear age have hardly been happy times, they could have been a lot worse. Nuclear weapons have proliferated to be sure, but there are only a small number of fingers on the trigger today, certainly many less than anticipated in the early decades after 1945. It beggars belief to assume, as some do, that this has simply been the result of good luck. The next few

[55] Stephen Rosen, 'After Proliferation: What To Do If More States Go Nuclear', *Foreign Affairs*, vol. 85, no. 5 (2006), pp. 9-14.
[56] For an interesting discussion on this point, see George Quester, *Nuclear First Strike: Consequences of a Broken Taboo* (Baltimore: Johns Hopkins University Press, 2006), pp. 67-70.

decades of the twenty-first century will provide a critical test of the extent to which it has also been a product of good political judgement.

Andrew O'Neil will take up the position of Professor of International Relations and Director of the Griffith Asia Institute at Griffith University from January 2010. Between 2000 and 2009, he worked at Flinders University, and between 1998 and 2000 he worked as a strategic analyst with Australia's Defence Intelligence Organisation. He is currently a chief investigator on the Australian Research Council Project 'Australia's Nuclear Choices'. aoneil2009@gmail.com.