

North Korea Defied the Theoretical Odds: What Can We Learn from its Successful Nuclearization?

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How well do the existing theories about nuclear proliferation predict North Korea's successful nuclearization?

According to most theories of nuclear proliferation, North Korea did not stand much of a chance of successfully acquiring nuclear weapons. As an economically backward, neopatrimonial regime subject to the threat of preventive strikes and war, North Korea should have failed. Few theories gave it a sporting chance of successfully nuclearizing. Yet here we are, staring down an intercontinental ballistic missile (ICBM)-sized barrel at the world's 10th nuclear weapons power.¹ 2017 was a banner year for the North Korean nuclear weapons program, as Kim Jong Un sprinted to develop a range of missile capabilities — including a credible ICBM capability — and a thermonuclear weapon. A program that was once derided as a joke, especially after its first purported nuclear test in 2006, is now anything but that. Why did academic theories of nuclear proliferation so seriously underestimate North Korea, and how should we adjust our theories to better account for future nuclear proliferators, so that we do not repeat that mistake?

Understanding why academic theories failed to forecast North Korea's acquisition of nuclear weapons is important for reasons of both policy and scholarship. From a policy perspective, theories of proliferation ideally would help governments forecast the most probable future proliferators, such that decision-makers could design effective policy interventions ahead of time, either to help forestall acquisition or prepare for its consequences. The fact that academic theories generally failed to predict North Korean acquisition calls into question whether they can reliably serve this sort of role. From a more parochial scholarly perspective, identifying why academic theories failed to forecast North Korean acquisition of nuclear technology is important, particularly in the context of the recent “renaissance” of nuclear security studies.² Given the large sums of money and human effort that have gone into studying nuclear proliferation in the last decade, the academic community needs to be clear and accountable in identifying not only our advances, but also our failures and blind spots.

We begin this article by tracing North Korea's nuclear program through time, discussing the

various moments when it began, halted, and could have been potentially stopped, and then, finally, taking a look at its final sprint to the nuclear weapons finish line. We then take stock of how various theories of nuclear proliferation fared in predicting North Korea's success in acquiring nuclear weapons. Few fare well, particularly those theories that focused on North Korea's security environment, access to technology and foreign supplies, and regime type. Theories examining North Korea's orientation toward the international economy and the United States fare better, but even these do not provide full explanations for North Korean behavior. Next, we discuss how to move forward as a research program, given that nuclear proliferation is both a rare event and not a fully predictable process. This is not a call to abandon current theories of proliferation by any means, but is instead intended as a wake-up call — academic theories underestimated North Korea, and they therefore need to be adjusted to take into account what we have learned from this failure. Specifically, we argue that academic theories should reconsider the role of threats of military force, economic development, foreign technological support, and regime type, and place greater emphasis on the ability of proliferators to prevent or withstand the pressure of coercive nonproliferation measures.

We conclude with a discussion of the implications of our findings for nonproliferation policy, arguing that the North Korea case underlines the limits of export control policies and unilateral sanctions, the importance of timely policy intervention and inducements, and the vulnerability of nonproliferation bargains to domestic political dynamics.

A Brief History of North Korea's Nuclear Weapons Program

The Early Years:

January 1960 – January 1992

North Korea's efforts to acquire nuclear weapons began in the early 1960s, when it requested Soviet

¹ Although there are only nine nuclear-armed states today, North Korea is the tenth to acquire. South Africa acquired nuclear weapons in the late 1970s and gave them up in the early 1990s.

² See Stephen Walt, “A Renaissance in Nuclear Security Studies?” *Foreign Policy*, Jan. 21, 2010, <http://foreignpolicy.com/2010/01/21/a-renaissance-in-nuclear-security-studies>; and Scott Sagan, “Two Renaissances in Nuclear Security Studies,” *H-Diplo/ISSF Forum on “What We Talk About When We Talk About Nuclear Weapons,”* June 14, 2014, <https://networks.h-net.org/node/28443/discussions/31776/h-diploissf-forum-%E2%80%9Cwhat-we-talk-about-when-we-talk-about-nuclear>.

and Chinese help with developing a nuclear weapons program. Both declined, but Moscow agreed to train North Korean nuclear scientists and help Pyongyang develop a peaceful nuclear program. After China tested its first nuclear device in October 1964, North Korea approached Beijing with another request for aid in nuclear weapons development, which was again refused. Over the next decade and a half, North Korea continued unsuccessfully to seek nuclear assistance from abroad, including from East Germany, Czechoslovakia, and, again, from the Soviet Union and China. By the end of the 1970s, North Korea decided to pursue a program on its own, with Kim Il Sung ordering the development of a gas-graphite reactor at Yongbyon, which could be used to produce plutonium for nuclear weapons.³ North Korea deliberately chose a reactor design that used natural uranium and did not require heavy water, thus minimizing dependence on external supplies.⁴ Indeed, in describing North Korea's program more than a decade later, a U.S. official observed, "Of all the nuclear weapons programs in the Third World, this is the most indigenous."⁵

By the mid-1980s, the reactor at Yongbyon was complete. Meanwhile, the United States and Soviet Union began to take notice of North Korea's suspicious nuclear activities. In 1985, at Washington's urging, Moscow convinced North Korea to sign the Nuclear Non-Proliferation Treaty (NPT) in exchange for a Soviet agreement to provide power reactors.⁶ In September 1986, a Central Intelligence Agency (CIA) report concluded that, "whether [or not] the current nuclear developments in North Korea reflect a nuclear weapons program, they represent a considerable developing capability." However, the same report noted, "If North Korea intends to

pursue a nuclear weapons program, it has made its job much more difficult by signing the NPT."⁷ By 1988, despite having signed the NPT, North Korea still had not reached a safeguards agreement with the International Atomic Energy Agency (IAEA). Meanwhile, signs emerged that Pyongyang might be building a reprocessing facility, which could be used to extract plutonium from spent reactor fuel. This combination of red flags led the CIA to observe that "close scrutiny of the North's nuclear effort is in order," even though it admitted, "we have no evidence that North Korea is pursuing a nuclear weapon option."⁸ The following year, after a *Washington Post* story drew attention to North Korea's reprocessing facility and potential nuclear weapons program, North Korea publicly denied that it was seeking nuclear weapons.⁹ Around this time, the U.S. government concluded that North Korea was indeed pursuing nuclear weapons.¹⁰ That conclusion was bolstered by evidence that North Korea was testing sophisticated conventional explosives at Yongbyon, indicating that Pyongyang could be developing an implosion-type nuclear weapon.¹¹

Over the next two years, North Korea's sense of insecurity sharpened, as its Soviet ally collapsed and both Russia and China sought to improve relations with Seoul. Meanwhile, the United States and Russia worked to convince North Korea to accept IAEA safeguards. But Pyongyang demanded the removal of U.S. nuclear weapons from the peninsula along with a negative security assurance as a precondition for accepting any such safeguards.¹² When the IAEA Board passed a resolution in September 1991 calling on North Korea to implement a safeguards agreement, a North Korean official suggested his government would only do so if the U.S. "nuclear threat" dissipated

3 Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East* (Princeton, NJ: Princeton University Press, 2007), 127-128.

4 Jeffrey Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran and North Korea* (New York: W.W. Norton & Co., 2007), 333; Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington: Woodrow Wilson Center Press, 1995), 234.

5 Don Oberdorfer, "N. Korea Seen Closer to A-Bomb; U.S. Officials Say Weapon Capability May Come in Months," *Washington Post*, Feb. 23, 1992, A1.

6 Joel S. Wit, Daniel B. Poneman, and Robert L. Gallucci, *Going Critical: The First North Korean Nuclear Crisis* (Washington: Brookings Institution Press, 2004), 3. Also see Jonathan Pollack, *No Exit: North Korea, Nuclear Weapons, and International Security* (Abingdon: Routledge, 2011), 94.

7 Central Intelligence Agency (CIA), "North Korea: Potential for Nuclear Weapon Development," Sept. 1986, in "North Korea and Nuclear Weapons: The Declassified U.S. Record," ed. Robert Wampler, *National Security Archive* (hereafter NSA), *Electronic Briefing Book (EBB)* no. 87, doc. 7.

8 CIA, "North Korea's Expanding Nuclear Efforts," May 3, 1988, in "North Korea and Nuclear Weapons: The Declassified U.S. Record," ed. Robert Wampler, NSA, EBB no. 87, doc. 10.

9 Foreign Broadcast Information Service (FBIS)/CIA, "Trends," Aug. 9, 1989, in "North Korea and Nuclear Weapons: The Declassified U.S. Record," ed. Robert Wampler, NSA, EBB no. 87, doc. 14. Also see Don Oberdorfer, "North Koreans Pursue Nuclear Arms; U.S. Team Briefs South Korea on New Satellite Intelligence," *Washington Post*, July 29, 1989, A9.

10 William Drennan, "Nuclear Weapons and North Korea: Who's Coercing Whom?," in *The United States and Coercive Diplomacy*, eds. Robert Art and Patrick Cronin (Washington: United States Institute of Peace, 2003), 164-5.

11 Wit, Poneman, and Gallucci, *Going Critical*, 6.

12 Reiss, *Ambition*, 230-237.

and “if the pressure put upon us is removed.”¹³

A few weeks later, as part of an initiative to cut the U.S. nuclear arsenal globally as the Cold War wound down, President George H. W. Bush announced that U.S. tactical nuclear weapons would be withdrawn from foreign bases. This led the North Korean government to announce, “If the United States really withdraws its nuclear weapons from South Korea, the way of our signing the nuclear safeguards accord will be opened.”¹⁴ U.S. government officials around this time also were considering an initiative whereby both South and North Korea would be asked to commit to not reprocess spent nuclear fuel, which would help address proliferation risks but would go beyond North Korea’s obligations under the NPT.¹⁵ U.S. nonproliferation efforts finally bore fruit in late 1991, when North Korea agreed to accept IAEA safeguards and reached an agreement with Seoul under which the two countries pledged not to develop nuclear weapons.¹⁶ The leaders of North and South Korea also agreed to a nonaggression pact.¹⁷ The nuclear agreement, formally concluded in January 1992, additionally required the two Koreas to refrain from enrichment, reprocessing, and hosting nuclear weapons, to be verified by bilateral inspections.¹⁸ In the same month, as a gesture of good will toward Pyongyang, Washington and Seoul announced that they would cancel their joint military exercises for the year, leading North Korea to finally sign an IAEA safeguards agreement.¹⁹

The First North Korean Nuclear Crisis: February 1992 – May 1994

The momentum toward nonproliferation and improved relations on the Korean Peninsula did not last long. In February of 1992, as North Korea

stalled on ratifying the safeguards agreement, U.S. officials warned that Pyongyang might only be a few months away from a rudimentary weapons capability.²⁰ Meanwhile, U.S. intelligence suggested that North Korea was continuing construction on its reprocessing facility, hardening it against potential attack, and perhaps removing equipment prior to inspections.²¹ In the spring of 1992, North Korea finally ratified the safeguards agreement, submitted its declaration of nuclear activities to the IAEA, and allowed inspections, but this only roused further concerns. Inspectors uncovered several inconsistencies in the North Korean declaration, found evidence that equipment had been removed from the reprocessing plant (which North Korea had previously denied existed), and were refused access to several undeclared sites suspected of storing nuclear waste. IAEA analysts also determined that North Korea had likely produced more than the small amounts of plutonium to which it had admitted.²² Over the course of that summer, the United States, Russia, China, and Europe all pressured North Korea to comply more fully with the IAEA. Meanwhile, China restored diplomatic relations with South Korea and Russia began to loosen ties with Pyongyang.²³ As an October 1992 U.S. Defense Department memo observed, “What is becoming clear is that North Korean non-cooperation is more evident as IAEA becomes more aggressive in its inspections.”²⁴

In early 1993, with the Clinton administration now in office, the United States and South Korea announced that they would hold their annual military exercise — which had been canceled the year before — making reference to North Korea’s lack of full compliance with the IAEA and North Korea’s failure to agree to a bilateral inspection regime with South Korea. For its part, the

13 Don Oberdorfer, “North Korea Balks at Nuclear Accord; Government Cites Outside ‘Pressure,’ Says Signing is Still Possible,” *Washington Post*, Sept. 17, 1991, A10.

14 T.R. Reid, “West [Europeans], Asians, Welcome Bush’s Arms Initiative; Changes Could Reduce Pressure on Leaders in South Korea, Japan,” *Washington Post*, Sept. 29, 1991, A33.

15 NSA, EBB 610, doc. 2.

16 Robert Carlin, “North Korea,” in *Nuclear Proliferation After the Cold War*, ed. Mitchell Reiss and Robert Litwak (Washington: Woodrow Wilson Center Press, 1994), 137-8; and Reiss, *Ambition*, 238-9.

17 Wit, Poneman, and Gallucci, *Going Critical*, 10.

18 “Joint Declaration of South and North Korea on the Denuclearization of the Korean Peninsula,” Jan. 20, 1992, <http://www.nti.org/learn/treaties-and-regimes/joint-declaration-south-and-north-korea-denuclearization-korean-peninsula>. An agreement on inspections was never reached.

19 Drennan, “Nuclear Weapons,” 165; and Carlin, “North Korea,” 139.

20 Don Oberdorfer, “N. Korea Seen Closer to A-Bomb; U.S. Officials Say Weapon Capability May Come in Months,” *Washington Post*, Feb. 23, 1992, A1.

21 Richelson, *Spying*, 519.

22 Richelson, *Spying*, 517-518.

23 Reiss, *Ambition*, 241-3.

24 Memorandum, William T. Pendley to the Undersecretary of Defense for Policy, “Subject: North Korea Nuclear Issue — Where Are We Now?” Oct. 27, 1992, in “Engaging North Korea: Evidence from the Bush I Administration,” ed. Robert Wampler, NSA, EBB no. 610, doc. 11.

IAEA demanded that North Korea allow special inspections of its suspected nuclear waste storage sites, giving Pyongyang 30 days before it would refer the issue to the United Nations Security Council (UNSC).²⁵ In March, as the military exercise began, North Korea declared it would withdraw from the NPT in 90 days, leading the IAEA Board of Governors to turn over the issue to the UNSC. After China signaled it would not support sanctions against North Korea, the United States again turned to diplomacy, offering to hold talks with Pyongyang on a range of issues — including military exercises, security assurances, and nuclear inspections — if it would be accommodating on the nonproliferation

With North Korea warning that the peninsula was “on the brink of war,” China again signaled opposition to U.N. sanctions.

issue.²⁶ Although China opposed North Korea’s acquisition of nuclear weapons, it feared that strong sanctions might cause the regime to collapse, leading to a refugee crisis on its borders.²⁷ Over the summer of 1993, talks with the United States led North Korea to suspend its NPT withdrawal. The United States agreed to help North Korea acquire light-water power reactors in exchange for North Korea’s cooperation with inspections.²⁸ By the end of the year, however, North Korea was again dragging its feet on inspections, seeking a broader grand bargain with the United States as its price for cooperation.²⁹ At the same time, U.S. officials

concluded that North Korea may have already acquired enough plutonium for a nuclear device,³⁰ causing the United States to try to line up support for sanctions at the United Nations, an effort again obstructed by China.³¹

After North Korea agreed to allow new IAEA inspections in March 1994, the United States and South Korea announced that they would suspend their joint military exercises and hold additional talks with Pyongyang.³² But North Korea blocked inspectors from visiting parts of its reprocessing facility at Yongbyon, leading the IAEA to pull out its team.³³ This, in turn, led Washington to cancel scheduled talks with North Korea, announce that it would indeed hold its military exercise with South Korea, and begin reinforcing its military posture in the region, including moving Patriot missile batteries to South Korea.³⁴ With North Korea warning that the peninsula was “on the brink of war,” China again signaled opposition to U.N. sanctions.³⁵ Soon thereafter, Secretary of Defense William Perry publicly stated that a military strike was a possibility if diplomacy and sanctions failed.³⁶ After another U.S. negotiation attempt failed,

North Korea began unloading spent fuel rods from its Yongbyon reactor, laying the groundwork for the separation of additional plutonium. In June, IAEA director Hans Blix declared that the agency had permanently lost the capability to verify whether North Korea had diverted nuclear materials for use in a weapons program. As tensions continued to rise, the United States proposed an arms embargo against North Korea at the United Nations, while both South and North Korea prepared for possible military conflict.³⁷

25 Reiss, *Ambition*, 247-250.

26 Reiss, *Ambition*, 250-253.

27 Wit, Poneman, and Gallucci, *Going Critical*, 31.

28 Drennan, "Nuclear Weapons," 169.

29 Reiss, *Ambition*, 256-7; and Drennan, "Nuclear Weapons," 170-1.

30 Richelson, *Spying*, 522-3.

31 Julia Preston, "China Breaks Ranks on N. Korean Nuclear Plants; Beijing Refuses to Join U.S., Others in Security Council in Pressuring for Inspections," *Washington Post*, Feb. 10, 1994, A24.

32 Thomas Lippmann and T.R. Reid, "N. Korea Nuclear Inspection Begins; U.S. Agrees to Suspend War Games with South Korea to Ease Tensions," *Washington Post*, March 4, 1994, A1.

33 Drennan, "Nuclear Weapons," 172; and Reiss, *Ambition*, 265-6.

34 Drennan, "Nuclear Weapons," 173; and Reiss, *Ambition*, 266.

35 T.R. Reid, "North Korea Warns of 'Brink of War'; Christopher: Sanctions Will Be Considered if Impasse on A-Sites Continues," *Washington Post*, March 23, 1994, A23.

36 Don Phillips, "Sanctions a First Step, U.S. Warns North Korea," *Washington Post*, April 4, 1994, A1.

37 Drennan, "Nuclear Weapons," 173-5; and Reiss, *Ambition*, 268-271.

The Agreed Framework and its Demise: June 1994 – March 2003

The North Korean nuclear crisis was only defused when former President Jimmy Carter traveled to North Korea in June and met with Kim Il Sung. Carter identified a potential bargain that would involve the United States agreeing to hold high-level talks with Pyongyang in exchange for a North Korean commitment to allow IAEA inspections, to not refuel its reactor, and to refrain from further reprocessing of spent fuel.³⁸ A few weeks later, Kim Il Sung died and was succeeded by his son, Kim Jong Il, who finished the nuclear negotiations his father had started.³⁹ In October 1994, after several months of negotiations, the United States and North Korea concluded the Agreed Framework. The deal required Pyongyang to freeze operation of its nuclear facilities at Yongbyon, agree to inspections, remain in the NPT, move toward implementation of the 1992 denuclearization pact with South Korea, and not reprocess any more spent fuel. In exchange, Washington agreed to provide North Korea with heavy oil, to help it acquire two light-water power reactors, and to move toward broader improvements in relations, including increased diplomatic contacts, removal of sanctions, a negative security assurance, and, ultimately, normalization of relations.⁴⁰

By the late 1990s, however, the Agreed Framework had run into difficulties. Partly due to congressional opposition, the United States was behind in delivering the promised benefits to North Korea.⁴¹ In particular, the United States was late in starting construction on the light-water reactors and had been repeatedly late in providing oil. It also had lifted few sanctions and had maintained North Korea on the list of state sponsors of terror.

Meanwhile, there were no substantial moves toward normalization.⁴² Then, in 1998, the United States detected the construction of a large underground complex in North Korea, which officials worried might be a covert nuclear site.⁴³ That same year, North Korea tested a new medium-range ballistic missile, the Taepodong-1, firing it over Japan and into the sea.⁴⁴ The test was especially concerning because it indicated that North Korea would soon have the ability to target all of Japan.⁴⁵ Washington responded by threatening to scuttle the Agreed Framework, leading North Korea to allow an inspection of the underground site in question. Although no evidence of nuclear activity was found, U.S. intelligence soon began to notice indications that North Korea was procuring components for an enrichment program, possibly with aid from Pakistan.⁴⁶ Indeed, around this time, North Korea began receiving assistance in enrichment from the AQ Khan network.⁴⁷

Despite these challenges, a few signs of cooperation emerged at the tail end of the Clinton administration. Clinton put Perry in charge of coordinating North Korea policy, who worked toward renewed cooperation.⁴⁸ Instead of confronting North Korea over its rudimentary enrichment program and threatening to pull out of the Agreed Framework, the Clinton administration decided to pursue additional negotiated agreements. After all, North Korea had technically been complying with its obligations under the Agreed Framework, which focused on its plutonium program — a far bigger proliferation threat than its nascent enrichment program at the time.⁴⁹ In late 1999, Pyongyang agreed to a missile test moratorium in exchange for the easing of U.S. economic sanctions,⁵⁰ and in late 2000, the United States and Pyongyang held a series of high-level meetings, including a trip by

38 Reiss, *Ambition*, 272.

39 Pollack, *No Exit*, 117.

40 International Atomic Energy Agency, "Agreed Framework of 21 October 1994 Between the United States of America and the Democratic People's Republic of Korea," in "North Korea and Nuclear Weapons: The Declassified U.S. Record," ed. Robert Wampler, *NSA, EBB* no. 87, doc. 17. Also see Pollack, *No Exit*, 114.

41 Siegfried Hecker, "Lessons Learned from the North Korean Nuclear Crises," *Daedalus* 139, no. 1 (2010): 49.

42 See Maria Ryan, "Why the US's 1994 Deal with North Korea Failed — and What Trump Can Learn From It," *The Conversation*, July 19, 2017, <https://theconversation.com/why-the-uss-1994-deal-with-north-korea-failed-and-what-trump-can-learn-from-it-80578>.

43 Richelson, *Spying*, 527.

44 Robert D. Walpole, National Officer for Strategic and Nuclear Programs, "North Korea's Taepo Dong Launch and Some Implications on the Ballistic Missile Threat to the United States," Dec. 8, 1998, in "North Korea and Nuclear Weapons: The Declassified U.S. Record," ed. Robert Wampler, *NSA, EBB* no. 87, doc. 19.

45 Sheryl WuDunn, "North Korea Fires Missile Over Japanese Territory," *New York Times*, Sept. 1, 1998, A6.

46 Richelson, *Spying*, 528-530

47 Pollack, *No Exit*, 135.

48 Pollack, *No Exit*, 128.

49 See Jeffrey Lewis, "Revisiting the Agreed Framework," *38 North*, May 15, 2015, <http://www.38north.org/2015/05/jlewis051415>.

50 David Sanger, "Clinton is Ready to Scrap Some North Korea Sanctions," *New York Times*, Sept. 14, 1999, A14.



Secretary of State Madeleine Albright to North Korea to discuss the missile issue.⁵¹ In December 2000, with his administration's time running short, Clinton decided to pause the negotiations, putting the ball in the court of the incoming George W. Bush administration.⁵²

The Bush administration, opposed to a policy of accommodation toward North Korea, initially halted negotiations and insisted on harsher terms, including broader inspection rights and limits on North Korea's conventional force posture.⁵³ In October 2002, after the 9/11 attacks and North Korea's inclusion in the Bush administration's "Axis of Evil," the United States accused North Korea of running a secret uranium enrichment program. Recriminations and threats between the two sides soon caused the Agreed Framework to break down, leading North Korea to kick out inspectors, withdraw from the NPT, and restart nuclear activities at Yongbyon.⁵⁴ The Bush administration,

for its part, cut off oil shipments and suspended construction on light-water reactors in North Korea.⁵⁵ North Korean officials began citing U.S. military actions in Yugoslavia, Afghanistan, and Iraq as justifying their need to develop nuclear weapons. Indeed, there are indications that Kim Jong Il was seriously concerned about the prospect of U.S. military action in 2003.⁵⁶

Why did the Agreed Framework break down? It seems reasonable to conclude that both sides bear some of the fault. Although North Korea clearly violated at least the spirit of the agreement by starting a secret enrichment program, it is also clear that the United States was not following through on its own obligations. The key problem, as Siegfried Hecker points out, was that "Washington saw the Agreed Framework primarily as a nonproliferation agreement," while North Korea "viewed the political provisions of the Agreed Framework, which called for both sides to move toward full normalization

51 Hecker, "Lessons Learned," 49-50; and Pollack, *No Exit*, 128-129.

52 David Sanger, "Clinton Scraps North Korea Trip, Saying Time's Short for Deal," *New York Times*, Dec. 29, 2000, A11.

53 Michael Gordon, "U.S. Toughens Terms for North Korea Talks," *New York Times*, July 3, 2011, A9.

54 Richelson, *Spying*, 530-532; Hecker, "Lessons Learned," 50; and Pollack, *No Exit*, 139.

55 Gary Clyde Hufbauer, Jeffrey Schott, Kimberly Ann Elliott, and Barbara Oegg, "Case 50-1 and 93-1," Peterson Institute for International Analysis, May 1, 2008, <https://piie.com/commentary/speeches-papers/case-50-1-and-93-1>.

56 Pollack, *No Exit*, 141-142.

of political and economic relations, to be the heart of the pact.”⁵⁷ This fundamental asymmetry in how the Agreed Framework was understood may help explain both the failure of the United States to pursue broader improvements in relations in a timely fashion, as well as the North Korean decision to pursue an enrichment capability when the Agreed Framework was not playing out as it had envisioned. It also suggests that a desire for improved relations with Washington has been an important motivation for North Korean decision-makers, which perhaps implies that “carrots” are as or more important than “sticks,” in dealing with Pyongyang, a point we return to below.

Crossing the Finish Line: April 2003 – December 2017

Despite withdrawing from the NPT, North Korea continued to seek economic, diplomatic, and security benefits in exchange for limiting its program, threatening to test a nuclear device or export nuclear materials if its demands were not met.⁵⁸ While the Bush administration would not agree to these demands, it did begin negotiations with Pyongyang in the context of the Six-Party Talks, beginning in August 2003 and continuing until 2009. These talks were organized and hosted by China and also included South Korea, Japan, and Russia.⁵⁹ At the end of 2004, the IAEA director concluded that North Korea likely possessed enough plutonium for four to six bombs.⁶⁰ The following year, U.S. intelligence detected the construction of a tunnel that could be used for a nuclear test, while Pyongyang continued to demand concessions from the United States, including the provision of power reactors, which had been promised in the Agreed Framework.⁶¹ In September 2005, during the fourth round of the Six-

Party Talks, North Korea committed in principle to denuclearization in exchange for political and economic concessions.⁶² Nevertheless, despite this progress, the United States imposed sanctions on entities involved in North Korean weapons of mass destruction (WMD) programs and levied an array of financial sanctions intended to cut down on Pyongyang’s illicit economic activities.⁶³

In July of 2006, with the Six-Party Talks on hold due to North Korean opposition to America’s sanctions policy, Pyongyang tested six missiles, leading the UNSC to impose sanctions banning missile-related trade with North Korea.⁶⁴ In early October, North Korea warned it would soon conduct its first nuclear test, citing U.S. hostility and sanctions as justification.⁶⁵ A few days later, despite international warnings, North Korea conducted its first nuclear test, although the low yield suggests the device did not work as intended, measuring less than one kiloton.⁶⁶ The UNSC responded by imposing new sanctions on North Korea, covering trade in armaments and luxury goods, although provisions allowing for the inspection of North Korean cargo were weakened by Russian and Chinese opposition.⁶⁷ Soon thereafter, at Chinese prodding, Pyongyang announced it would return to the negotiating table.⁶⁸

In February 2007, an agreement was reached by the six negotiating parties, which called on North Korea to freeze its plutonium program and accept inspections at Yongbyon in exchange for the lifting of certain U.S. sanctions, the provision of fuel oil, economic aid, Washington taking North Korea off its list of state sponsors of terrorism, and movement toward normalization of relations with the United States.⁶⁹ After North Korea began to receive sanctions relief, it started to implement its side of the deal in the summer of 2007. The following summer, the Bush administration further eased

57 Hecker, "Lessons Learned," 49.

58 Richelson, *Spying*, 532.

59 Pollack, *No Exit*, 144.

60 David Sanger and William Broad, "North Korea Said to Expand Arms Program," *New York Times*, Dec. 6, 2004, A6.

61 Richelson, *Spying*, 536-7.

62 Hecker, "Lessons Learned," 50.

63 Hufbauer et al., "Case 50-1 and 93-1."

64 Hufbauer et al., "Case 50-1 and 93-1."

65 David Sanger, "North Koreans Say They Plan a Nuclear Test," *New York Times*, Oct. 4, 2006, A1.

66 Richelson, *Spying*, 558; Hufbauer et al., "Case 50-1 and 93-1"; and Mary Beth Nitkin, "North Korea's Nuclear Weapons: Technical Issues," *Congressional Research Service*, April 3, 2013, 15.

67 Hufbauer et al., "Case 50-1 and 93-1."

68 Joseph Kahn and Helene Cooper, "North Korea Will Resume Nuclear Talks," *New York Times*, Nov. 1, 2006, A1.

69 U.S. Department of State, "North Korea — Denuclearization Action Plan," Feb. 13, 2007, <https://2001-2009.state.gov/r/pa/prs/ps/2007/february/80479.htm>.

sanctions, but stalled on removing North Korea's designation as a state sponsor of terrorism.⁷⁰ In September, North Korea blocked IAEA inspectors from monitoring Yongbyon, displeased that the United States had not yet delivered some of the promised benefits.⁷¹ After a deal was struck on verification measures the following month in exchange for North Korea's removal from the state-sponsor-of-terrorism list, Pyongyang backtracked on the agreement, leading the United States to suspend the provision of fuel.⁷²

Tensions continued after the Obama administration entered the White House in 2009, with North Korea testing a Taepodong-2 missile in April of that year, which led the UNSC to tighten the enforcement of missile sanctions. North Korea responded by escalating the situation further, kicking out inspectors, pulling out of negotiations, and warning it would resume its nuclear program.⁷³ On May 25, 2009, North Korea conducted its second nuclear test, with a yield estimated between two and eight kilotons, leading the UNSC to pass additional sanctions, including a wider arms embargo and tighter financial restrictions.⁷⁴ The following year, Pyongyang revealed a centrifuge enrichment plant at Yongbyon, which could allow it to produce highly-enriched uranium for nuclear weapons.⁷⁵ North Korea also committed two armed provocations in 2010, sinking a South Korean vessel and shelling the South Korean island of Yeonpyeong.⁷⁶

For the duration of its time in office, the Obama administration adopted a policy of "strategic patience" toward Pyongyang, increasing the diplomatic and economic pressure on North Korea in an effort to convince the regime to return to

the negotiating table while hoping for a change in regime orientation. After Kim Jong Un succeeded his father in December 2011, the United States and North Korea reached the short-lived Leap Day Agreement in February 2012, whereby North Korea temporarily limited its nuclear and missile programs in exchange for economic aid, a deal that Pyongyang soon violated. From this point onward, North Korea declined to seriously negotiate, focusing instead on building up its nuclear and missile capabilities.⁷⁷ This uncompromising North Korean posture has continued under the Trump administration, which has adopted a strategy of both sanctions and threats of preventive military force.⁷⁸

Between 2010 and 2017, North Korea conducted four nuclear tests (one in 2013, two in 2016, and one in 2017). The most recent test, in September 2017, is estimated to have well exceeded 100 kilotons in yield, suggesting North Korea has developed a thermonuclear or boosted fission device.⁷⁹ During the same period, North Korea conducted more than 80 missile tests, including several that demonstrate the country's ICBM capability, putting the U.S. homeland within striking distance.⁸⁰ In 2017, the Defense Intelligence Agency estimated that North Korea may possess as many as 60 nuclear weapons.⁸¹ North Korea achieved this impressive progress in its nuclear and missile programs despite steadily increasing international sanctions pressure, including six rounds of U.N. sanctions and gradually escalating U.S. sanctions.⁸² The most recent U.N. sanctions, passed in August and September 2017, prohibited the import of North Korean coal, iron, lead, seafood, and textiles, and limited North Korea's ability to buy oil and refined

70 Arms Control Association, "Chronology of U.S.-North Korean Nuclear and Missile Diplomacy," Jan. 2018, <https://www.armscontrol.org/factsheets/dprkchron#2007>.

71 Steven Lee Myers and Elaine Sciolino, "North Koreans Bar Inspectors at Nuclear Site," *New York Times*, Sept. 24, 2008, <http://www.nytimes.com/2008/09/25/world/asia/25korea.html>.

72 Arms Control Association, "Chronology."

73 Hufbauer et al., "Case 50-1 and 93-1."

74 Arms Control Association, "Chronology of U.S.-North Korean and Missile Diplomacy," January 2018, <https://www.armscontrol.org/factsheets/dprkchron>.

75 Emma Chanlett-Avery, Ian E. Rinehart, and Mary Beth D. Nikitin, "North Korea: U.S. Relations, Nuclear Diplomacy, and Internal Situation," *Congressional Research Service*, Jan. 15, 2016, 12.

76 Arms Control Association, "Chronology."

77 Chanlett-Avery et al., "North Korea," 6-7.

78 See, for example, Steve Holland and Idrees Ali, "Trump: Military Option for North Korea Not Preferred, But Would be 'Devastating,'" *Reuters*, Sept. 25, 2017, <https://www.reuters.com/article/us-northkorea-missiles/trump-military-option-for-north-korea-not-preferred-but-would-be-devastating-idUSKCN1C026A>

79 Arms Control Association, "Chronology."

80 See the CNS North Korea Missile Test Database, <http://www.nti.org/analysis/articles/cns-north-korea-missile-test-database>.

81 Joby Warrick, Ellen Nakashima, and Anna Fifeld, "North Korea Now Making Missile-Ready Nuclear Weapons," *Washington Post*, Aug. 8, 2017, https://www.washingtonpost.com/world/national-security/north-korea-now-making-missile-ready-nuclear-weapons-us-analysts-say/2017/08/08/e14b882a-7b6b-11e7-9d08-b79f191668ed_story.html?utm_term=.d073bd77edf8.

82 Arms Control Association, "Chronology."

petroleum.⁸³ Yet these stronger measures have almost certainly come too late — no country has ever given up an indigenously developed nuclear arsenal of this size and sophistication.

How Did Academic Theories Perform?

Why North Korea pursued nuclear weapons is hardly a puzzle. The country finds itself in one of the most dangerous security environments in the world, facing a conventionally superior, nuclear-armed American-South Korean alliance on its borders. Since the end of the Korean War, which ended in armistice and not a peace agreement, both the North and the South have openly called for reunification. The pursuit of nuclear weapons — if it were successful — would provide North Korea with, at the very least, invasion insurance. This is not to say that there are not reinforcing domestic political motivations. Nuclear weapons have become a symbol of the Kim regime's legitimacy and power. North Korea's nuclear program also makes it far more relevant in global affairs than it otherwise would be, giving it a kind of status. But the primary motivation is security, to deter against a conventional invasion by the United States and efforts by South Korea to reunify the Korean Peninsula on Western terms.⁸⁴

It is somewhat surprising, then, that North Korea's pursuit of nuclear weapons only popped onto the radar screen of the United States intelligence community in the late 1980s. In 1982, a CIA report analyzing the next decade of nuclear proliferation concluded that, despite interest in reactors, "we have no basis for believing that the North Koreans have either the facilities or materials necessary to develop and test nuclear weapons."⁸⁵ By the mid-1980s, however, North Korea's development of a nuclear reactor started raising concern that Pyongyang might be pursuing nuclear weapons, though the intelligence community still doubted that North Korea would risk nuclear pursuit given its vulnerability and the prospect of reactive South

Korean proliferation.⁸⁶ Twenty years later, North Korea would test its first fission device. Thirty years later, North Korea would undeniably become the world's 10th nuclear weapons power.

Few theories of nuclear proliferation, if any, gave North Korea a chance of reaching that milestone. Below, we catalog how academic theories fare in predicting North Korea's chances of successfully acquiring nuclear weapons. To be clear, we focus on theories that purport to explain the acquisition of nuclear weapons (or lack thereof), as opposed to the related literature on why states pursue nuclear weapons. Moreover, we limit our discussion to theories that are intended to apply generally to all countries, as well as theories that are intended to apply to specifically to countries like North Korea. In other words, these are fair tests of the theories under consideration; we are applying the theories to a case in which they are intended to apply.

Realist theories on nuclear proliferation assume that states acquire nuclear weapons for security purposes. Indeed, quantitative studies have found that states in enduring rivalries and with more military disputes are more likely to acquire nuclear weapons.⁸⁷ In their most extreme form, realist theories argue that if a state has a strong enough security imperative, nothing can stop them from acquiring the bomb. According to Kenneth Waltz, for example, "no country has been able to prevent other countries from going nuclear if they were determined to do so."⁸⁸ Yet there is something fundamentally unsatisfying about this argument, since it is impossible to measure a state's level of determination with any degree of certainty, thus rendering the theory tautological. If a state does acquire nuclear capabilities, it was really determined; if it does not, it must not have been very motivated. Moreover, there are many countries in highly threatening security environments that have pursued and not acquired the bomb, including South Korea, Taiwan, West Germany, Iraq, and Iran.

The most complete realist model for what states might successfully acquire nuclear weapons is

83 Arms Control Association, "UN Security Council Resolutions on North Korea," Jan. 2018, accessed Jan. 29, 2018, <https://www.armscontrol.org/factsheets/UN-Security-Council-Resolutions-on-North-Korea#res2375>.

84 On North Korean motives, see Scott D. Sagan, "Why do States Build Nuclear Weapons?: Three Models in Search of a Bomb," *International Security* 21, no. 3 (Winter 1996-1997): 85; Pollack, *No Exit*, chapters 2-3; Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East* (Princeton, NJ: Princeton University Press, 2007), 118-140; and Victor Cha, "What Do They Really Want? Obama's North Korea Conundrum," *Washington Quarterly* 32, No. 4 (2009): 119-138.

85 CIA, "A 10-year Projection of Possible Events of Nuclear Proliferation Concern," May 1983, 5, NSA, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB87/nk02.pdf>.

86 CIA, "North Korea: Potential for Nuclear Weapons Development," Sept. 1986, NSA, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB87/nk07.pdf>.

87 See Sonali Singh and Christopher Way, "The Correlates of Nuclear Proliferation," *Journal of Conflict Resolution* 48, no. 6 (2004): 859-885; and Dong-Joon Jo and Erik Gartzke, "Determinants of Nuclear Weapons Proliferation," *Journal of Conflict Resolution* 51, no. 1 (2007): 167-194.

88 Kenneth Waltz, "More May Be Better," in *The Spread of Nuclear Weapons: A Debate Renewed*, by Scott Sagan and Kenneth Waltz (New York: W.W. Norton and Co., 2003), 38.

offered by Alexandre Debs and Nuno Monteiro.⁸⁹ They argue that states must have both a willingness and opportunity to proliferate — that means they need a security motivation to proliferate, but the breathing room to do so without facing preventive war (or the credible threat of war) from an adversary. States without reliable allies will, therefore, be more willing to pursue nuclear weapons. This is where Debs and Monteiro place North Korea. They write:

Taking stock, our strategic theory of proliferation accounts for North Korea's nuclearization. Pyongyang's security concerns vis-à-vis the South and the United States, combined with the absence of a reliable ally since at least the end of the Cold War, account for Korea's willingness to proliferate. Its ability to inflict high costs on its adversaries using conventional weaponry deterred counterproliferation military action, granting North Korea the opportunity to become, as of this date, the latest state to have built the bomb.⁹⁰

At first glance, this appears to be a compelling argument; North Korea was strongly motivated by its security predicament to pursue nuclear weapons and was able to do so because it could deter counterproliferation efforts with its conventional threat to Seoul.

Yet there are a couple problems with this argument. First, there are a variety of states with similar security motivations, but which failed to successfully acquire the bomb, for example Iran and Iraq. Both countries could hold valuable American allies or assets at risk conventionally, or even worse, with chemical weapons, if the United States attempted a preventive strike. Iraq and Iran (thus far) have failed to successfully acquire nuclear weapons, yet North Korea did. Second, when applied to North Korea, the argument relies on an almost circular claim that the U.S. was deterred from taking military action against North Korea because it never carried out a military attack. Yet the United States seriously considered ordering a military strike on the Yongbyon Reactor in 1994.⁹¹ As Van Jackson demonstrates, North Korea perceived this as a credible threat due to a combination of

factors, including U.S. military exercises with South Korea and the recent use of force in the Gulf War. Indeed, according to the testimony of defectors, Kim Jong Il (then head of North Korean military forces) “spent much of March 1993 in a military bunker, issuing commands to field units, a curious action if North Korea did not anticipate the possibility of conflict.”⁹² The threat of military force, combined with Carter's intervention and the subsequent offer of inducements, led to the Agreed Framework, which successfully froze North Korea's plutonium program. Certainly the potential for retaliation against Seoul induced caution in American decisionmakers, yet this is beside the point, since Debs and Monteiro's theory requires only that the proliferator perceive a credible threat of force. North Korea also likely perceived a credible threat of force in 2003, as noted above, but persisted with its nuclear program anyway. Even this more complete security model does not explain how North Korea defied the odds, when other similarly vulnerable states — all of whom had the ability to lash out conventionally or with chemical weapons — failed to acquire nuclear weapons. A strict test of the preventive war mechanism would underestimate North Korea's probability of acquiring nuclear weapons.

A second family of theories focuses on the ability of authoritarian states to successfully manage a nuclear weapons program. In short, none of these models gave North Korea a fighting chance of succeeding. The most prominent example of this theory is Jacques Hymans' work in *Achieving Nuclear Ambitions*.⁹³ Hymans argues that authoritarian regimes, especially neopatrimonial regimes — where networks based on personal ties make up the regime and its power base — are particularly bad at managing complex projects such as nuclear weapons programs that require cooperation and coordination between scientists, industrial and engineering organizations, and the military. Dictatorships are often too paranoid and incompetent to successfully manage such projects, according to Hymans.

North Korea is the poster boy for this theory. Hymans argues that North Korea “is the ideal-typical case of neopatrimonialism,” where top-down meddling in programs makes it ripe for spectacular failure in projects as complex as

89 Alexandre Debs and Nuno P. Monteiro, *Nuclear Politics: The Strategic Causes of Proliferation* (Cambridge: Cambridge University Press, 2016).

90 Debs and Monteiro, *Nuclear Politics*, 297.

91 Ashton B. Carter and William J. Perry, *Preventive Defense: A New Security Strategy for America* (Washington DC: Brookings Press, 1999), Ch. 4.

92 Van Jackson, *Rival Reputations: Coercion and Credibility in US-North Korea Relations* (Cambridge: Cambridge University Press, 2016), 159-160.

93 Jacques E.C. Hymans, *Achieving Nuclear Ambitions: Scientists, Politicians, and Proliferation* (Cambridge: Cambridge University Press, 2012).

Unfortunately, North Korea is clearly an outlier for his theory — the pathologies of the Kim regime may have stymied food production, but not the nuclear weapons program — which once again defied the theoretical odds.

nuclear weapons.⁹⁴ At the time his book was published, in 2012, Hymans denied that North Korea was actually a nuclear weapons power. He wrote that the October 2006 nuclear test “was an embarrassing technical failure”⁹⁵ and the second one in 2009 “was at best only the most minimal of successes.”⁹⁶ Hymans further argued that “it remains unclear if North Korea does or does not yet have an operational nuclear arsenal that it could use in battle.”⁹⁷ However, tests are only failures if nothing is learned from them. It is clear that North Korea learned a lot from each of these tests and, in its subsequent nuclear and missile tests, has demonstrated an ability to reach thermonuclear yields in the hundreds of kilotons. It also likely has the capacity to deliver its nuclear weapons to regional targets if not the continental United States.

Hymans’ theory predicts, at best, “the project’s snail’s pace of progress,” arguing that “it seems reasonable to assume that maintaining the snail’s pace would be the most North Korea could hope for. Moreover, Pyongyang has proved such an inveterate bluffer in the past that we should stop gasping in fear every time it threatens the world with yet another technological ‘breakthrough.’”⁹⁸ And yet, history has proven this argument wrong. The 2017 summer sprint in North Korea’s nuclear and missile program was a clear breakthrough — one cannot bluff intercontinental ranges and thermonuclear yields, which speak a universal language. To his admirable credit, however, Hymans develops a falsifiable and testable theory and is willing to make predictions based on it. Unfortunately, North Korea is clearly an outlier for his theory — the pathologies of the Kim regime may have stymied food production, but not the nuclear weapons program — which once again defied the theoretical odds.

A second theory in this family of models is Malfrid Braut-Hegghammer’s work on Iraq and Libya, which similarly focuses on authoritarian regimes’

inability to manage nuclear weapons programs.⁹⁹ However, Braut-Hegghammer’s argument focuses not on interference in such programs, but on neglect by weak states with personalist regimes, where power is primarily invested in the hands of one leader rather than a political party or other large group. According to her theory, the capacity of weak states is often restricted by constant efforts to prevent the next coup, which leads to the neglect of projects as complex as nuclear weapons. She argues that Saddam and Gaddafi “lacked the capability even to pay close attention to the performance of these programs because they had weakened their states to strengthen their own hold on power.”¹⁰⁰ Drawing on principal-agent theory, Braut-Hegghammer argues that, rather than meddling in their nuclear programs as Hymans suggests, Saddam and Gaddafi failed to monitor it closely enough, allowing scientists to run their own fiefdoms and sell snake oil to these leaders, which in turn resulted in both countries’ failure to successfully develop nuclear weapons. She writes:

weak states often lack the institutional resources to set up and operate nuclear weapons programs. This is particularly problematic in so-called personalist regimes, such as Iraq and Libya, whose leaders undermine formal state institutions and seek to govern through informal structures of patronage and control.¹⁰¹

Although the Kim dynasty is clearly dominated by one-man rule and invests a lot of energy in preventing coups,¹⁰² Braut-Hegghammer in fact argues that her theory does not apply to North Korea, which she classifies as a “strong state.”¹⁰³ This is debatable. Certainly, the North Korean *regime* is stronger than many observers believed, given that it has, for decades, defied predictions that it would collapse.¹⁰⁴ Yet if North Korea is truly a strong state, it is puzzling that it was not able

94 Hymans, *Achieving Nuclear Ambitions*, 253.

95 Hymans, *Achieving Nuclear Ambitions*, 251.

96 Hymans, *Achieving Nuclear Ambitions*, 252.

97 Hymans, *Achieving Nuclear Ambitions*, 252.

98 Hymans, *Achieving Nuclear Ambitions*, 254.

99 Malfrid Braut-Hegghammer, *Unclear Physics: Why Iraq and Libya Failed to Build Nuclear Weapons* (Ithaca: Cornell University Press, 2016).

100 Braut-Hegghammer, *Unclear Physics*, 1.

101 Braut-Hegghammer, *Unclear Physics*, 6.

102 See Daniel Byman and Jennifer Lind, “Pyongyang’s Survival Strategy: Tools of Authoritarian Control in North Korea,” *International Security* 35, no. 1 (2010): 66-68.

103 Braut-Hegghammer, *Unclear Physics*, 224.

104 See Byman and Lind, “Pyongyang’s Survival Strategy,” and Jong Kun Choi, “The Perils of Strategic Patience with North Korea,” *Washington Quarterly* 38, no. 4 (2015): 57-72.

to prevent hundreds of thousands (and perhaps millions) of its citizens from dying from famine in the 1990s.¹⁰⁵ As David Kang argued in 2012, the evidence suggests that “North Korea is both strong and weak,” and that the state has weakened further in recent decades, stating, “Largely as a result of weakened state control, the economy has experienced increases in commercialization and marketization in recent years.” This, in turn, has “shrived the central government’s control over the periphery.”¹⁰⁶ Yet, precisely as the North Korean state has weakened, it has made the most dramatic strides in its nuclear weapons program. At the very least, this trend would seem to contradict the pattern expected by Braut-Hegghammer’s theory.

The theories described above, which base predictions of the likelihood of acquisition on either security imperatives or regime type, in fact vastly underpredict North Korea’s probability of acquiring nuclear weapons. Similarly, supply-side or diffusion theories also fail at providing a satisfying explanation of North Korea’s nuclear accomplishments. For example, quantitative studies have found that wealthy (or at least moderately wealthy) countries are significantly more likely to acquire nuclear weapons,¹⁰⁷ yet North Korea acquired these weapons despite being one of the poorest countries in the world. Matthew Fuhrmann’s more nuanced supply-side argument focuses on foreign technical support, contending that North Korea “further underscore[s] the significance of the technical base resulting from atomic assistance,” with the North Koreans receiving Soviet assistance in the 1950s and 1960s.¹⁰⁸ The first problem with this argument is that while it might predict that North Korea would succeed, it should also predict that other countries in threatening security environments that received foreign assistance would acquire nuclear weapons, for example Germany, Japan, South Korea, and Egypt. The second issue is that North Korea did not in fact receive an especially large amount of foreign assistance. Indeed, according to the main

metric Fuhrmann uses to measure foreign support — the number of nuclear cooperation agreements — North Korea received far less foreign assistance than the aforementioned countries, and also received significantly less than countries like Ireland, Portugal, and Indonesia, as well as recent proliferators like India, Pakistan, Iran, and Iraq.

Matthew Kroenig’s supply-side theory emphasizes the role of sensitive nuclear assistance in facilitating nuclear acquisition, which he defines as the transfer of enrichment or reprocessing technology or bomb designs.¹⁰⁹ While North Korea did receive aid in uranium enrichment technology from the AQ Khan network, this does not explain North Korea’s initial acquisition of nuclear weapons, which relied on plutonium [not highly-enriched uranium] from an indigenously built reactor and reprocessing facility. Indeed, starting in the 1970s, Pyongyang had “minimal foreign assistance” to its nuclear program, using publicly available information to mimic the designs of British reactors and a Belgian reprocessing facility.¹¹⁰

A related theory by Michael Horowitz argues that the diffusion of 1950s-era military technology to a state like North Korea should not be surprising.¹¹¹ Horowitz writes: “How hard is it actually for a determined proliferator to acquire nuclear weapons? The answer? Not as hard as you might expect. And this becomes clearer when you think about the acquisition of nuclear weapons in the context of other military technologies.”¹¹² Horowitz himself admirably concedes, however, that the diffusion argument suffers the same problem as supply-side explanations: It overpredicts success. He goes on to point out that “simply importing ‘normal’ military technology diffusion models, while helping us understand North Korea, would probably overpredict proliferation in general, particularly in light of international efforts to make weapons acquisition harder. States such as Iraq and Libya tried but failed to acquire nuclear weapons.”¹¹³

It is not as if we, the authors of this article, were right about North Korea either. Co-author

105 Kang, “Normal,” 153-156.

106 David Kang, “They Think They’re Normal: Enduring Questions and New Research on North Korea — A Review Essay,” *International Security* 36, no. 3 (2011-2012): 145, 169.

107 For example, Singh and Way, “Nuclear Proliferation,” and Jo and Gartzke, “Weapons Proliferation.”

108 Matthew Fuhrmann, *Atomic Assistance: How “Atoms for Peace” Programs Cause Nuclear Insecurity* (Ithaca: Cornell University Press, 2012), 190.

109 Matthew Kroenig, *Exporting the Bomb: Technology Transfer and the Spread of Nuclear Weapons* (Ithaca: Cornell University Press, 2010).

110 See Siegfried Hecker, Sean Lee, and Chaim Braun, “North Korea’s Choice: Bombs Over Electricity,” *The Bridge* 40, no. 2 (2010): 6. Also see Pollack, *No Exit*, 94-95.

111 Michael C. Horowitz, *The Diffusion of Military Power* (Princeton: Princeton University Press, 2010); also see Michael C. Horowitz, “How Surprising is North Korea’s Nuclear Success? Picking Up Where Proliferation Theories Leave Off,” *War on the Rocks*, Sept. 6, 2017, <https://warontherocks.com/2017/09/how-surprising-is-north-koreas-nuclear-success-picking-up-where-proliferation-theories-leave-off>.

112 Horowitz, “How Surprising.”

113 Horowitz, “How Surprising.”

Vipin Narang, in his 2014 book on nuclear strategy, essentially punts on North Korea by claiming it was unclear what its nuclear strategy — if any — was at the time of writing.¹¹⁴ In his work on strategies of nuclear proliferation, Narang argues that North Korea's probability of success was heightened because it was able to avail itself of a “sheltered pursuit” strategy, enjoying protection first from the Soviet Union and then China. This in turn enabled Pyongyang to proliferate under the cover of its allies — developing the plutonium pathway to nuclear weapons — before shifting to a “hiding” strategy, exemplified when it cheated on the Agreed Framework to develop a secret uranium enrichment pathway.¹¹⁵ Here, Narang argues that it was the protection from China that helped stave off a United States attack, not just the threat North Korea posed to Seoul. But even this argument likely underpredicts North Korea's probability of success, because while sheltered pursuit can often succeed, North Korea's relationship with China has been peculiar in the post-Cold War era, forcing the Kim regime to at times pursue a hiding strategy. Hiding strategies are very risky if discovered, and North Korea's hidden program was discovered before it even tested its first fission device. What seems to have deterred the United States from attacking North Korea after the 2002 discovery of the hidden enrichment program was the fear that the North had reprocessed enough plutonium from its sheltered pursuit days for several nuclear bombs — not just the conventional threat to South Korea. Essentially, North Korea's hidden enrichment program was discovered too late to prevent it. While this framework gets some features of North Korea's behavior correct, the North Korean case is again unique and defies most theoretical predictions.

In general, academic theories of nuclear proliferation sorely missed the mark when it comes to North Korea. It is only one case, to be sure, but it is clearly an important one. However, this sober assessment is not meant to suggest that we should abandon our efforts to theorize about the causes and process of nuclear proliferation. Of the 30 or so states that have begun nuclear weapons programs, 10 succeeded in acquiring them. In other words, it is still a relatively uncommon event, and our theories are necessarily probabilistic. Nevertheless, it is notable how few theories gave North Korea a good

chance of acquiring the bomb.

So what can we learn from this outlier? It is important to note here that an outlier case does not disconfirm any theory. All of the theories discussed above make significant contributions toward explaining and predicting certain cases of nuclear proliferation. With that said, it is useful to examine what adjustments to our theories might be advisable based on the North Korean case. We believe the North Korean case illustrates several dynamics worth incorporating into academic theories of proliferation. First, it shows that the threat of preventive war, even when perceived as credible, has limits as a counterproliferation tool. At several points, North Korea viewed the threat of an American attack as credible, and yet it continued its nuclear program, or else only agreed to limits on that program after receiving significant inducements (in the case of the Agreed Framework). Second, it shows that states can still successfully play a cat-and-mouse game of plausible deniability with hidden programs — as South Africa and Pakistan once did with enrichment programs, and North Korea did with both its reactor and its uranium enrichment program. Third, states that can avail themselves of a “sheltered pursuit” strategy — finding a great power patron, although not necessarily an ally, that is willing to essentially underwrite its illicit behavior and protect it from coercive nonproliferation efforts, have a higher chance of succeeding. It is hard to imagine North Korea acquiring nuclear weapons absent Soviet and then Chinese shelter. While China does not relish a nuclear-armed North Korea, and has become increasingly more disturbed by North Korean behavior over time, it has, for the most part, not been willing to use intense pressure against North Korea over this issue. China fears a North Korean regime collapse that would result in large refugee inflows and the possible stationing of U.S. troops along its border following Korean reunification.¹¹⁶ The states that enjoy such shelter are few and far between, but there will undoubtedly be others. Fourth, even poor states with domestic political pathologies do not need substantial foreign assistance to successfully acquire nuclear weapons. While impoverished and/or authoritarian countries have acquired nuclear weapons before — India, Pakistan, and China, for instance — they all did so with substantially greater foreign support

114 Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton University Press, 2014).

115 Vipin Narang, “Strategies of Nuclear Proliferation: How States Pursue the Bomb,” *International Security* 41, no. 3 (Winter 2016-2017): 110-150.

116 On China's views on North Korea's nuclear program, see Kihyun Lee and Jangho Kim, “Cooperation and Limitations of China's Sanctions on North Korea: Perception, Interest and Institutional Environment,” *North Korean Review* 13, no. 1 (2017): 28-44; and Andrew Kydd, “Pulling the Plug: Can There Be a Deal with China on Korean Unification,” *Washington Quarterly* 38, no. 2 (2015): 63-77.

than North Korea received.

The point of this exercise is not to dismiss any theories of nuclear proliferation, but rather to take stock of how to adjust these theories in systematic ways to account for how North Korea succeeded, while fully conceding that the proliferation process is unpredictable and probabilistic and that outliers will always exist. It is a worthwhile endeavor to see how the academic community could have better predicted North Korean nuclearization — because there will likely be other proliferators like North Korea in the future. When taken in combination with Mark Bell's recent work showing that many of the quantitative correlates of nuclear proliferation are not reliable predictors,¹¹⁷ our examination of the North Korea case suggests that we, as scholars, should be more modest about our theories' predictive capacities.

Implications for Nonproliferation Policy

In addition to its implications for academic theory, North Korea's acquisition of a sophisticated nuclear weapons capability has important implications for nonproliferation policy. For one thing, the North Korea case demonstrates that supply-side measures like export controls are insufficient, even against countries with poor economies. Nuclear technology is 70 years old, and North Korea has demonstrated it is possible to construct the facilities needed to produce fissile material indigenously, based on open-source information. This is true not just for the gas centrifuge, as Kemp has demonstrated,¹¹⁸ but also for the plutonium path to the bomb that North Korea followed. Indeed, North Korea's focus on domestic development of nuclear weapons, consistent with its self-reliant, or *Juche*, philosophy, likely made it better able to adapt to technical challenges when compared to countries like Libya and Iraq, which relied more heavily on foreign imports. Moreover, the fact that North Korea indigenously developed a nuclear reactor and reprocessing facility in secret, rather than publicly constructing them under the guise of a nuclear energy program, allowed its nuclear program to make greater progress before the international community could react effectively.¹¹⁹

A second policy implication is that early detection and policy intervention are crucial if nonproliferation success is to be achieved. Compared to other proliferators, North Korea was relatively successful at concealing its nuclear capabilities and intentions. Partly for this reason, strong international pressure was only mobilized in the early 1990s, when North Korea was quite close to acquiring fissile material for nuclear weapons. Indeed, one could argue that even the Agreed Framework came too late, in that North Korea may have already obtained enough plutonium for a couple nuclear devices. The failure of early detection gave policymakers little margin for error, making it easier for North Korea to succeed in its nuclear quest.

Third, international sanctions have important limitations when dealing with extremely isolated countries like North Korea. Unilateral U.S. measures, or even joint measures with allies, only go so far when dealing with a country like North Korea, whose political and economic system is designed on the principle of self-reliance. This is consistent with research on nonproliferation by Etel Solingen and Nicholas Miller, whose theories predict North Korean resilience to economic and political pressure, although they focus on outcomes rather than the acquisition of nuclear weapons.¹²⁰ As an inward looking regime, Solingen correctly argues that "North Korea has defied political and economic sanctions from great powers and international institutions, allowing state agencies and industries responsible for productive and distributive functions to benefit from international closure."¹²¹ Relatively insulated from the international economy to begin with, North Korean leaders were willing to sacrifice the well-being of their population while the regime devoted extraordinary resources to its nuclear weapons program. Miller likewise argues that North Korea was relatively invulnerable to sanctions, although he attributes this primarily to Pyongyang's lack of dependence on the United States, the main enforcer of the nonproliferation regime. Miller's argument also identifies a scenario where sanctions might have worked against North Korea: namely if they had been multilateral and stronger in scope. However, U.N. nuclear sanctions were not even imposed until North Korea already acquired nuclear weapons in 2006. Moreover, despite its

117 Mark Bell, "Examining Explanations for Nuclear Proliferation," *International Studies Quarterly* 60, no. 3 (2015): 520-529.

118 R. Scott Kemp, "The Nonproliferation Emperor Has No Clothes," *International Security* 38, no. 4 (Spring 2014): 39-78.

119 On the effectiveness of a covert rather than overt proliferation strategy, see Nicholas L. Miller, "Why Nuclear Energy Programs Rarely Lead to Proliferation," *International Security* 42, no. 2 (2017): 40-77.

120 Solingen, *Nuclear Logics*; and Nicholas L. Miller, *Stopping the Bomb* (Ithaca: Cornell University Press, forthcoming). Solingen's primary dependent variable is the pursuit (rather than acquisition) of nuclear weapons. Miller's primary dependent variables are pursuit and the success or failure of U.S. sanctions.

121 Solingen, *Nuclear Logics*, 138.


recent cooperation at the United Nations, China has repeatedly dragged its feet on implementing sanctions over the years, dramatically increasing its trade with North Korea between 2006 and 2014.¹²² Akin to the notion of “sheltered pursuit,” sanctions face long odds of success if a proliferator is insulated from the international economy and if its primary ally refuses to implement sanctions until it’s too late and then violates the spirit of those sanctions.

Fourth, if export controls and sanctions are unlikely to succeed against isolated adversaries like North Korea, and if credible threats of force have been insufficient in the past, more attention should be given to inducements and diplomacy as possible solutions. Although it is politically challenging, both internationally and domestically, to be seen as “rewarding” proliferators by offering inducements, the history of the North Korea case shows that the greatest restraints on its nuclear program were in fact achieved when Washington offered substantial inducements, i.e., the 1994 Agreed Framework. Although North Korea violated the spirit of this agreement by starting a secret enrichment program, the United States also failed to fully live up to its end of the bargain by repeatedly delaying delivery of the promised inducements.

Fifth, and relatedly, the North Korea case highlights the fragility of nonproliferation bargains due to changes in the domestic and international political landscape, a dynamic that makes such bargains hard to reach in the first place. The Agreed Framework — the closest the international community came to preventing North Korea from acquiring a credible deterrent — ultimately was hampered by domestic opposition in the United States by Republicans, who opposed the agreement and later slowed its implementation.¹²³ This case has obvious parallels to the Iran deal, a nonproliferation bargain whose future is in jeopardy due to consistent Republican opposition, which, as in the case of North Korea, is inflamed by missile tests and extraneous bilateral issues. The fate of the Agreed Framework, along with the U.S. decisions to topple regimes in Iraq and Libya despite their WMD disarmament, raises real questions about the viability of nonproliferation deals with adversaries in the future. This leaves us, unfortunately, with an unhappy conclusion: The sort of diplomatic bargains that are needed to deal with proliferators like North Korea will be

increasingly difficult to reach and sustain.

Conclusion

The fact that academic theories mostly underestimated North Korea’s chance of successfully acquiring nuclear weapons gives us an opportunity to audit our theories and adjust them based on lessons from this important case. The biggest theoretical lessons from the North Korean example are the following: 1) that our theories may overestimate the power of preventive war threats in deterring states from pursuing nuclear weapons, 2) that determined leaders, even in dysfunctional authoritarian regimes, are not always doomed to fail in this pursuit, and 3) that even poor countries can succeed at acquiring nuclear weapons based on indigenously developed technology. The policy implications are equally grim. Given enough breathing room, even a poor state that wants nuclear weapons badly enough can acquire them, defying sanctions and threats of force — particularly if it has an ally to shelter it from a strong multilateral coalition. While offering inducements to adversary proliferators may stand a better chance of success, this is politically challenging for countries like the United States; moreover, the credibility of American diplomatic assurances is increasingly shaky. Given the various pathways to the bomb and the geopolitical fractures that proliferators can exploit, we should not assume that what has so far been a rare event — nuclear proliferation — will always continue to be so. 

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122 See Eleanor Albert, “The China-North Korea Relationship,” *Council on Foreign Relations*, Sept. 27, 2017, <https://www.cfr.org/backgrounders/china-north-korea-relationship>. Also see Lee and Kim, “China’s Sanctions.”

123 See, for example, Van Jackson, “Threat Consensus and Rapprochement Failure: Revisiting the Collapse of US-North Korea Relations,” *Foreign Policy Analysis*, forthcoming.

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