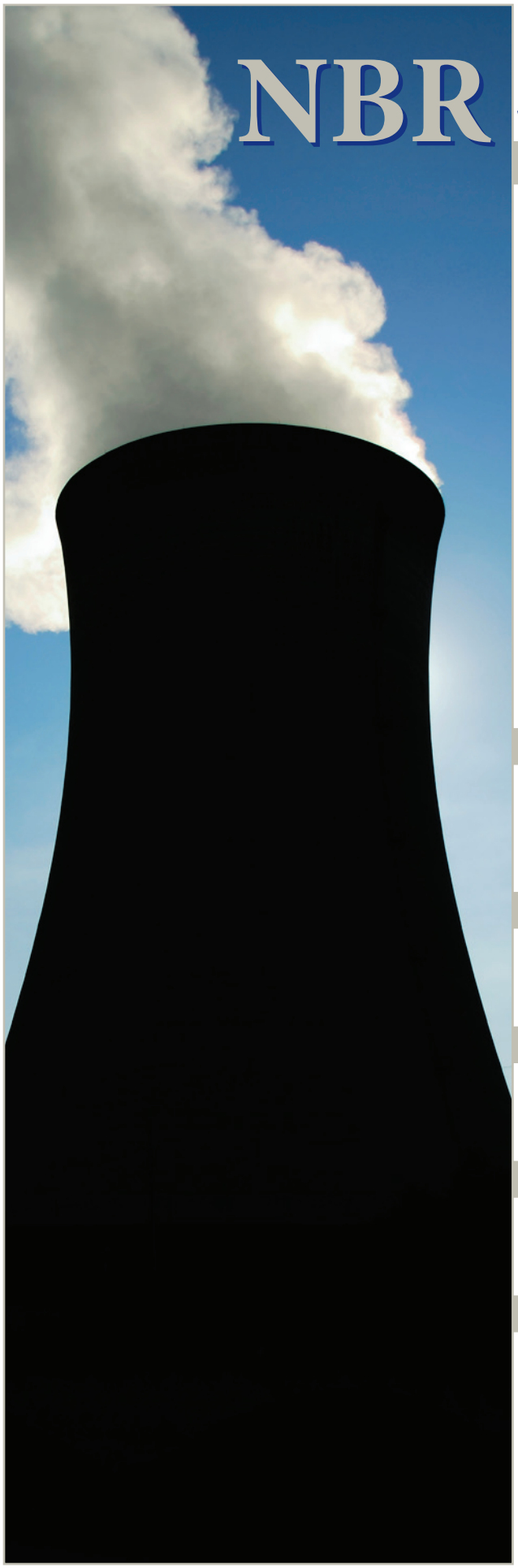

NBR SPECIAL REPORT
NO. 13 (MAY 2007)

North Korea and Iran: Nuclear Futures and Regional Responses

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North Korea's Nuclear Weapons Program to 2015

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North Korea's Nuclear Weapons

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Iran's Nuclear Trajectory to 2015

Deepa Ollapally and Kalsoom Lakhani
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Regional Security Implications of Iranian Nuclear Weapons

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Introduction

Tim Cook

International efforts to halt the nuclear weapons programs of North Korea and Iran have reached a critical juncture. Although there is still time to employ diplomacy and technology-denial tools to slow or halt the nuclear programs in these countries, nuclear advancements in each suggest that the window of opportunity may be closing if the international community hopes to mitigate the threats North Korea and Iran pose not only to security in Northeast and Southwest Asia but also to international security.

North Korea has tested a nuclear explosive device, demonstrating a definitive—albeit weak—nuclear capability. Iran continues to defy United Nations Security Council resolutions and International Atomic Energy Agency (IAEA) calls for the verifiable freeze of its uranium enrichment activities. Recent international pressure has done little to persuade either country to reverse its nuclear brinksmanship. The February 2007 agreement reached in Beijing at the six-party talks is tenuous at best, has already encountered roadblocks, and is likely to encounter more obstacles as the deal is implemented.[1] Tehran, meanwhile, has indicated that Iran will not comply with the latest Security Council sanctions resolution, which passed in March 2007 with unanimous consent. These recent efforts, although signaling greater international resolve to enforce compliance with treaty obligations (most notably the Treaty on Non-Proliferation of Nuclear Weapons, or NPT), continue the cycle of condemnation and defiance that have defined years of nuclear wrangling with these two countries. All the while, North Korea and Iran continue to enhance their nuclear programs.

Despite the renewed sense of urgency demonstrated by the international community to resolve the North Korean and Iranian crises, it is unclear if recent efforts will achieve the goals of dismantling North Korea's weapons program or preventing Iran from enriching enough uranium to acquire a weapons capability. North Korea has already proven the ability to cross the nuclear threshold and is currently estimated to have enough fissile material for four to thirteen warheads.[2] U.S. intelligence agencies estimate that Iran is on pace to have a similar capability by the early to middle part of the next decade.[3] What would be the regional security implications if, despite more concerted and forceful international efforts, North Korea were to maintain and expand its nuclear weapons capability and Iran were to demonstrate a capability of its own? Would other states in each region opt to develop nuclear weapons as a hedge, triggering a cascade of new nuclear weapons states?

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[1] For example, North Korea refused to honor its commitment to shut down the Yongbyon nuclear reactor unless all of the funds held in accounts at Macao's Banco Delta Asia were released to the account holders. See David E. Sanger, "North Korea Misses Important Deadline," *New York Times*, April 15, 2007.

[2] See Jonathan Pollack's essay in this report. For the full version, see Jonathan D. Pollack, "North Korea's Nuclear Weapons Program to 2015: Three Scenarios," *Asia Policy* 3 (January 2007): 105–23.

[3] Director of National Intelligence Michael McConnell, testimony before the Senate Committee on Armed Services, Washington, D.C., February 27, 2007.

The National Bureau of Asian Research organized a workshop in December 2006 entitled "Asian Proliferation 2015: North Korea, Iran, and Consequences for the Global Nonproliferation Regime" to answer these and related questions.[4] NBR proceeded from the assumption that by 2015 both North Korea and Iran would have demonstrated nuclear weapons capabilities (at the time the workshop was conceptualized, North Korea had yet to conduct its nuclear test). Participants evaluated the implications of such a scenario for regional security in Northeast and South/Southwest Asia, for the global nonproliferation regime, and for U.S. nonproliferation and security policies.

This special report features abridged versions of four papers presented at the workshop, two of which estimate the plausible technical nature of the nuclear programs in North Korea and Iran in 2015, and two of which evaluate conceivable regional responses to the more challenging security environments that nuclear weapons would create in each region.

Taken together, the workshop papers and the discussion that emerged produced three somewhat counter-intuitive findings and related policy implications in regard to North Korean and Iranian nuclear advances:

1. *Not Imminent, nor immediate:* Despite an actual nuclear test by North Korea and continued advances on uranium enrichment by Iran, the threats North Korea and Iran pose to regional and international security are not immediate, and the development of a usable weapons capability by each is not imminent.

   Policy implication: Diplomacy and efforts aimed at technology denial may still be effective in slowing or halting nuclear development in North Korea and Iran, especially since neither state currently possesses a credible nuclear weapons capability.

2. *Iran is a greater potential threat:* Although North Korea's nuclear program is technologically more advanced, Iran's program poses a greater threat to regional and international security.

   Policy implication: Successful development of a nuclear weapons capability by Iran, although still some years away, would severely alter the security calculus in Southwest Asia and would likely lead many states in the region to attempt to develop a nuclear option.

3. *Japan is the linchpin of security in Northeast Asia:* A nuclear arms race is unlikely in Northeast Asia as a direct result of North Korea's possession of nuclear weapons, but would be more likely if Japan opted to develop a nuclear deterrent of its own.

   Policy implication: As long as Japan feels its security concerns are properly addressed, it can live with a nuclear-armed North Korea without developing its own nuclear deterrent, which in turn would minimize the chance of a nuclear arms race in Northeast Asia.

This introductory essay examines each of these findings in greater detail.

Not Imminent, nor Immediate

It is logical to assume that by testing a nuclear device, Pyongyang has demonstrated a definitive weapons capability and that North Korea has overcome the most difficult technical hurdles toward possessing an operational nuclear arsenal. In theory, North Korea could

[4] The workshop took place on December 14, 2006, in Washington, D.C., with support from the U.S. Department of Energy's National Nuclear Security Administration.

detonate a nuclear device on enemy territory with little more than the push of a button. Yet, reality is more complicated. While it is true that North Korea has a weapons capability, Pyongyang's ability to deliver a bomb to a target is more limited, as is the amount of fissile material the country has to make subsequent nuclear warheads. This suggests that although Pyongyang continues to make progress toward a credible nuclear force, North Korea's nuclear capabilities must still overcome obstacles. Therefore, there is still time to prevent further—and more threatening—advancements.

As Siegfried Hecker and William Liou argue, the probable large size of each weapon in North Korea's inventory limits delivery options to aircraft, boat, or van.[5] For North Korea's nuclear weapons to present a more credible threat, the country's weapons developers need to miniaturize the warheads and mate them to a ballistic missile that could be launched from a silo, a transportable launcher within North Korea, or a submarine. North Korea has developed a number of missiles with varying ranges and payload capabilities, yet several studies suggest that these missiles are highly inaccurate and that North Korea does not yet have the technical capacity to miniaturize a warhead and mate it to a missile.[6] These constrained delivery options, when combined with the fact that North Korea likely only possesses four to thirteen nuclear warheads suggest that North Korea poses a limited direct threat to its neighbors or the United States.[7] Based on current capabilities and geopolitical realities, it is unlikely that North Korea would risk detonating a warhead for fear of the repercussions a retaliatory strike would inflict on the country and its leadership. Current international efforts, therefore, should continue to focus on limiting North Korea's access to technologies that would make its weapons capability more credible and threatening.

Iran's nuclear advances clearly lag behind those of North Korea. Most estimates suggest it will take until the early to middle part of next decade before Iran is in a position to demonstrate a nuclear weapons capability, assuming that no external factors such as a preventive strike on its nuclear facilities slow or halt its progress.[8] As Jon Wolfsthal demonstrates in this report, Iran has faced numerous technical difficulties in its uranium enrichment capabilities, such that its production of highly enriched uranium (HEU—uranium enriched to 93% or more of U–

[5] Siegfried S. Hecker and William Liou, "Dangerous Dealings: North Korea's Nuclear Capabilities and the Threat of Export to Iran," *Arms Control Today* 37, no. 2 (March 2007). Hecker and Liou posit that North Korea has six to eight bombs.

[6] Steven A. Hildreth, "North Korean Ballistic Missile Threat to the United States," CRS Report for Congress, January 3, 2007, 3, http://www.fas.org/sgp/crs/nuke/RS21473.pdf. Hildreth's report notes that Pyongyang has not tested a guidance system for its ballistic missiles. For other summaries of North Korea's ballistic missile capabilities, see Michael D. Swaine and Loren H. Runyon, "Ballistic Missile Development," in *Strategic Asia 2001–02: Power and Purpose*, ed. Ashley J. Tellis and Michael Wills (Seattle: The National Bureau of Asian Research, 2001), 299–360; and "North Korea's Ballistic Missile Programme," in *North Korea's Weapons Programmes: A Net Assessment* (London: The International Institute for Strategic Studies, 2004), http://www.iiss.org/publications/strategic-dossiers/north-korean-dossier/north-koreas-weapons-programmes-a-net-asses/north-koreas-ballistic-missile-programme.

[7] The four to thirteen number cited comes from Jonathan Pollack's essay in this report, which combines various estimates to produce a wider possible range than the six to eight range estimated by Hecker and Liou.

[8] Some experts suggest that the United States or Israel might conduct a limited strike on Iran's nuclear facilities in the last days of the George W. Bush administration in late 2008 or in January 2009. Gary Samore and Mitchell Reiss mentioned this possibility at the workshop. See their essays in "Nuclear Asia: U.S. Policy in an Age of Proliferation," *NBR Analysis* 18, no. 2 (March 2007).

235) for bombs may be constrained even after Iranian scientists are able to produce threshold amounts. The fact that Iran does not yet possess the fissile material needed for a warhead further minimizes the immediacy of Iran's threat, making discussion of miniaturization for placement on a ballistic missile irrelevant. Iran has a ballistic missile program and possesses some missiles that reportedly could carry a nuclear warhead, such as the Shahab–3, but the ability to carry a warhead is useless until Iran either develops warheads of its own or acquires a warhead from a state with nuclear weapons.[9] As long as Iran's nuclear capabilities are unable to mate with its missile capabilities, the utility of Iran's nuclear program for weapons purposes will be constrained. Thus, the international community should continue to focus its efforts on denying Iran access to dual-use technologies and other materials used to produce nuclear weapons.

The arguments above are not meant to downplay the possibility that North Korea and Iran could bring about mass destruction or use their weapons capabilities to hamstring future efforts to prevent the further spread of nuclear technologies. They do suggest, however, that there is time to ensure that the 2015 scenario of two new nuclear weapons states does not unfold.

Iran Is a Greater Potential Threat

While Iran is still many years from developing usable nuclear weapons, its possession of nuclear warheads would be more threatening to regional and international security than would North Korea's possession of the same capabilities. This is primarily due to Iran's greater regional influence, its less-isolated position economically and politically, and the constraints on U.S. influence in South/Southwest Asia.

Iran's influence in South and Southwest Asia makes it more difficult to garner support to punish Iran for its nuclear transgressions. Iran's oil and gas wealth, along with its majority Shia population and its support of groups such as Hamas and Hezbollah, give it greater reach in the region. Some experts consider Iran's support of Hezbollah to have been crucial to sustaining Hezbollah's shelling of Israel during the Lebanon conflict in 2006, and others are claiming that Iran has played a significant role in arming the insurgency in Iraq.[10] Arming nonstate actors such as Hamas and Hezbollah to fight proxy wars raises serious questions about Iran's potential willingness to transfer sensitive nuclear materials to nonstate actors that might consider using such materials in a weapon. Iran's oil and gas wealth also ensures its continued participation in international markets as states scour the globe to meet their energy needs. The sheer scale of Iran's resource wealth makes the country difficult to ignore.

"…there is time to ensure that the 2015 scenario of two new nuclear weapons states does not unfold."

[9] For more detailed information on Iran's ballistic missile capabilities, see Kenneth Katzman, "Iran: U.S. Concerns and Policy Responses," CRS Report for Congress, March 13, 2007, 20–21; and Andrew Feickert, "Iran's Ballistic Missile Capabilities," CRS Report for Congress, August 23, 2004.

[10] R. Nicholas Burns, "United States Policy toward Iran," testimony before the Senate Foreign Relations Committee, Washington, D.C., March 29, 2007; and Michael R. Gordon and Scott Shane, "The Struggle for Iraq: Behind U.S. Pressure on Iran, Long-Held Worry over a Deadly Device in Iraq," *New York Times*, March 27, 2007.

Furthermore, although the United States has troops on the ground in both Northeast and Southwest Asia,[11] support for the United States in Southwest Asia is much lower than in Northeast Asia.[12] Whereas U.S. alliance commitments, as Christopher Hughes argues in this report, dissuade states in Northeast Asia from pursuing nuclear options, there is no similar regional security structure in place in South and Southwest Asia. Moreover, U.S. support of Israel and the recent civilian nuclear cooperation agreement with India reduce U.S. credibility and influence in the region when it comes to nuclear issues.

Unlike Iran's influence in Southwest Asia, North Korea's influence in Northeast Asia is minimal. North Korea's relations with China have grown strained in recent years as China continues to liberalize its economy and engage with the world. North Korea remains poor, has few natural resources, and is effectively isolated and contained by the larger, more prosperous, and militarily capable states in the region. The Kaesong Special Economic Zone and the Mt. Kumgang tourist area have opened small pockets of North Korea to international markets, yet such ventures depend heavily on South Korean goodwill. Overall, North Korea appears to be in less of a position to destabilize regional security than Iran.

Japan as the Linchpin of Security

North Korea's nuclear test and Iran's nuclear advances have raised concerns that other states in each region may choose to develop nuclear weapons capabilities to deter Pyongyang and Tehran. Governments in Southwest Asia have begun the process of exploring nuclear energy development, perhaps with the intent of being able to suggest their ability in the future to turn a peaceful program into a weapons program if necessary. Saudi Arabia, in particular, views Iran as a strategic threat and would be loath to allow Iran to expand its influence to become a regional hegemon.[13] In Northeast Asia, states are more technologically advanced than in Southwest Asia and could conceivably develop a weapons capability on

[11] As of April 2007, the United States had 145,500 troops on the ground in Iraq. S Michael O'Hanlon and Jason Campbell, "Iraq Index: Tracking Variables of Reconstruction & Security in Post-Saddam Iraq," The Brookings Institution, April 9, 2007, 23, http://www3.brookings.edu/fp/saban/iraq/index.pdf. As of March 1, 2007, the United States had 24,845 troops on the ground in Afghanistan. See JoAnne O'Bryant and Michael Waterhouse, "U.S. Forces in Afghanistan," CRS Report for Congress, March 27, 2007, 1. In Northeast Asia, the United States has 38,660 military personnel stationed in Japan and 30,983 stationed in South Korea. See *The Military Balance 2006* (London: The International Institute for Strategic Studies, 2006), 42.

[12] A January 2007 BBC World Service poll of 26,000 people across 25 countries demonstrates that U.S. military operations in the Middle East are highly unpopular. The percentage of respondents that agreed that the U.S. military presence in the Middle East is a disruptive force was 85% in Egypt, 76% in Turkey, 66% in the United Arab Emirates, and 77% in Lebanon. In a separate poll among Iraqi citizens released in March 2007, 78% of Iraqis strongly or somewhat opposed the presence of coalition forces in Iraq. See O'Hanlon and Campbell, "Iraq Index," 45. Interestingly, a February 2006 poll conducted by the Cabinet Office of Japan on Japan's Self Defense Force found that 76.2% of respondents agreed that the best way to protect Japan's safety was to continue with the present arrangement of protecting peace with the U.S.-Japan Security Treaty and the Self Defense Force. Only 8.6% of respondents believed that Japan should quit its alliance with the United States and increase Japan's military power. See "Public Opinion Survey on the Self Defense Force," translated by the Maureen and Mike Mansfield Foundation, http://mansfieldfdn.org/polls/poll-06-20.htm.

[13] Hassan M. Fattah, "Arab Nations Plan to Start Joint Nuclear Energy Program," *New York Times*, December 11, 2006. Some participants at the workshop noted with interest that nuclear dominoes did not fall in Southwest Asia as a result of Israel's presumed nuclear weapons capability, but that the dominoes might fall because of Iran.

relatively short notice (e.g., Japan is believed to have the expertise and materials to develop a nuclear weapon within one year),[14] yet states in the region have eschewed exercising such an option in the immediate wake of North Korea's test: there was talk, but it soon faded. The fall of nuclear dominoes in either region would have widespread implications for regional and international security. States in Southwest Asia are, however, many years away from being able to demonstrate a minimal nuclear capacity, such as production of fissile material, suggesting that dominoes would be unlikely to fall for some time. Iran would clearly be the cause of such a chain reaction, especially since the region has lived with a presumed nuclear weapons capability in Israel for decades.

States in Northeast Asia have consciously held back on developing their own nuclear forces, which suggests that North Korea's test and possession of nuclear warheads does not change the security dilemma of its neighbors enough to immediately influence their behavior. In the aftermath of the test, rather, states have kept one eye on North Korea and the other eye squarely focused on Japan. If Japan went nuclear—and it no doubt could do so quickly—the dominoes would be more likely to fall in rapid succession, particularly since Japan's weapons would be immediately credible. Japan's neighbors are particularly wary about the fact that the completion of the Rokkasho reprocessing facility made Japan the only non-nuclear weapon state in the NPT that has the ability to operate the full nuclear fuel cycle.[15] To add to their concern, Japan's new Prime Minister Shinzo Abe has called for Japan to "normalize" and amend its constitution to allow its armed forces to acquire weapons systems that are not purely defensive in purpose.

Any talk or movement that involves increased assertiveness by Japan stirs fears in its neighbors. The standard scenario for the fall of nuclear dominoes in Asia is that Japan would develop its own weapons capability in response to North Korea, followed by South Korea pursuing an option of its own as a hedge against Japan and to a lesser extent North Korea. China would enhance its existing nuclear forces in response to Japan's moves, which would threaten Taiwan and lead Taipei to develop a nuclear option to deter Beijing.[16] If Japan holds back and believes that it can live with a weak, nuclear-armed North Korea without its own nuclear weapons, relying instead on the U.S. nuclear umbrella (and possible future ballistic missile defense systems), other states in the region are likely to reach a similar conclusion. Therefore, as long as Japan feels secure with its existing defense relationships and security environment, a nuclear arms race in Northeast Asia is unlikely.

[14] Kurt M. Campbell and Tsuyoshi Sunohara, "Japan: Thinking the Unthinkable," in *The Nuclear Tipping Point*, ed. Kurt M. Campbell, Robert J. Einhorn, and Mitchell B. Reiss (Washington, D.C.: The Brookings Institution Press, 2004), 243.

[15] Carla Anne Robbins and Gordon Fairclough, "Chain Reaction: North Korea Sparks Proliferation Fears throughout Asia; Historic Rivalries Exacerbate Nuclear Anxiety in Region; Taipei Frets about China; Japan's New Plutonium Plant," W*all Street Journal*, June 16, 2005, A1.

[16] Christopher W. Hughes, "North Korea's Nuclear Weapons: Implications for the Nuclear Ambitions of Japan, South Korea, and Taiwan," *Asia Policy* 3 (January 2007): 77.

Conclusion

North Korea and Iran clearly pose a threat to regional and international security with their nuclear advancements, yet there is still much that can be done to ensure that the nightmare 2015 scenario of two new nuclear weapons states, both of which have a history of regional belligerence and disregard for the international community, does not become a reality.

North Korea's Nuclear Weapons Program to 2015: Three Scenarios*

Jonathan D. Pollack

North Korea's October 9, 2006, test of a nuclear device marks a fundamental divide in the nearly two-decade effort to prevent the emergence of the Democratic People's Republic of Korea (DPRK) as a nuclear armed state. The test, although establishing a baseline, does not confirm a particular trajectory and raises numerous questions in regard to the future of North Korea's nuclear program. In light of the longer-term pattern of North Korean nuclear and missile development, what kinds of capabilities are imaginable? Does Kim Jung Il or anyone else in North Korea have a specific goal in mind for the nuclear program? Is such a goal realistic or achievable in light of the DPRK's economic, scientific, and technical circumstances?

North Korea's nuclear weapons development over the coming decade is likely to follow one of three paths: (1) pursuit of a symbolic nuclear capability, (2) pursuit of an operational nuclear deterrent, or (3) a deficient or failed effort to achieve an operational capability. These respective outcomes seem relatively straightforward, although it would be the height of conceit to specify how each "translates" in quantitative terms. The purpose of this essay is to identify some relevant signposts and possibilities that might indicate movement along one of these three paths, focusing primarily on North Korea's current and projected technical capabilities.

Fissile Material Production

Most of what the outside world knows about North Korea's nuclear weapons potential concerns the DPRK's inventory of fissile material.[1] The ancillary technology, materials, equipment, and know-how needed to build an operational nuclear force (i.e., warhead miniaturization, mating a warhead to a missile, and readying an alternative means of delivery, such as aircraft) represent equally or even more daunting technical and engineering challenges.[2] The ability to build nuclear warheads and integrate such capabilities with a delivery system, however, would indicate whether the DPRK either is advancing toward specific goals or will remain highly constrained in what it can achieve. In the event of scenario one, the characteristics of a North Korean nuclear weapon would matter far less. Development of a credible warhead,

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* The views in this paper are those of the author and should not be attributed to the U.S. Government, the Department of Defense, or the Naval War College.

[1] See, for example, David Albright and Paul Brannan, "The North Korean Plutonium Stock Mid-2006," Institute for Science and International Security, 2006, http://www.isis-online.org/publications/dprk/dprkplutonium.pdf.

[2] For a comprehensive overview, see *North Korea's Weapons Programmes: A Net Assessment*, International Institute for Strategic Studies, London, January 21, 2004, http://www.iiss.org/publications/strategic-dossiers/north-korean-dossier.

however, would be decisive in determining whether North Korea is on the path to scenario two. Failed efforts to achieve such a goal would indicate scenario three.

The DPRK's production of fissile material for weapons development appears entirely home-grown and self-sustaining. The prospects for denying North Korea technology relevant to such production therefore seem dubious. It is reasonable to assume that North Korea long ago stockpiled or developed the necessary technologies and materials for fissile material production, utilizing the spent fuel from its graphite-moderated reactor. Despite some claims that the DPRK might also be pursuing enrichment technology, it claims to "have mastered the entire plutonium production cycle."[3] It therefore seems highly likely that the DPRK will continue to rely on its plutonium option, since it possesses the requisite experience and know-how, a functioning technological and industrial infrastructure, and a proven weapons design. This bears in particular on warhead miniaturization, in view of the smaller size of plutonium-based weapons.

Assuming that North Korea is unable to increase its capacity to produce fissile material by completing construction on a 50 MW (e) reactor, reliance on the single operational reactor will impose inherent limitations on the scope of the program, although the consequences of a slow but steady production rate should not be minimized.

North Korea's extant 5 MW (e) reactor can produce approximately 5–7 kg of plutonium annually, or enough for approximately one additional weapon per year, assuming no major problems either in the operation of the reactor or in the reprocessing of spent fuel. Estimates for North Korea's plutonium inventory vary;[4] however, assuming no additional plutonium production capability between now and 2015 and steady state production at the Yongbyon facility, a "guesstimate" would be a maximal inventory of 14 to 23 weapons.

Assessments of the October 2006 Test

Two additional considerations directly affect judgments about the sufficiency of plutonium supply: how Pyongyang evaluated the results of the first test and whether North Korea deems a political deterrent sufficient for its strategic purposes. External analysts have offered a range of views on the technical results of the October 2006 test. There are no indications that North Korean officials judge the test either a political or a technical disappointment, but we should hardly expect otherwise. The predominant view outside of North Korea, however, is

[3] Siegfried S. Hecker, "Report on North Korean Nuclear Program," Stanford University, Center for International Security and Cooperation, November 15, 2006, 6. This trip report is based on the results of a late October to early November visit of Hecker and three other colleagues to the DPRK. Hecker, former director of the Los Alamos National Laboratory and a plutonium specialist, is the only foreign scientist known to have examined plutonium metal produced at the DPRK nuclear complex. Siegfried Hecker, "Visit to the Yongbyon Scientific Research Center in North Korea," testimony before the Senate Foreign Relations Committee, Washington, D.C., January 21, 2004, http://www.fas.org/irp/congress/2004_hr/012104hecker.pdf.

[4] For a higher-end estimate see Albright and Brannan, "The North Korean Plutonium Stock Mid-2006," Table 1–2. For a more conservative estimate, see Hecker, "Report on North Korean Nuclear Program," 8.

that the test (though not an outright failure) was far from a full success.[5] If the DPRK wanted principally to demonstrate the ability to conduct a nuclear detonation, then even a problematic test result would have been sufficient. If North Korean expectations were greater, however, then Pyongyang has incurred "the onus without the bonus."

Separate assessments of the test results, one undertaken by Richard Garwin and Frank von Hippel and another by Siegfried Hecker, suggest two possibilities: the test either involved a low yield based on a larger, simple device or was a far more sophisticated design geared to configuring the weapon for use on a Nodong medium-range missile. Though acknowledging that any judgment is speculative, Hecker considers the first hypothesis far more plausible.[6] He believes that there is only one proven means to ensure a practicable, reliable design for a warhead: North Korea would need to test and more than likely test on multiple occasions. This creates added political and resource dilemmas for the DPRK. If North Korea's goals are more ambitious (i.e., scenario two, not scenario one), Pyongyang would have little alternative but to test again, which could readily entail heightened penalties against North Korea, including those China might impose. The resource issue concerns what might be termed the nuclear credibility paradox. Further tests might move North Korea closer to the goal of an operational capability, but each additional test would also reduce the size of the DPRK's potential nuclear weapons inventory. In addition, it is always possible that a future test or tests would fail to achieve satisfactory results. As noted in another post-test assessment, "amidst Pyongyang's post-test bravado, the options to enhance its incomplete deterrent remain inauspicious."[7]

A decision to proceed with additional testing would constitute compelling evidence both that the DPRK deemed the first test results unsatisfactory and that Pyongyang's goals for its nuclear program are more ambitious than a one-time demonstration of strategic autonomy. To be sure, there is every reason to believe that North Korea will proceed with the refinement of its nuclear capabilities, even without further tests. Though still not having consented either to full disclosure of its weapons program or to binding limitations on its nuclear activities, North Korea would not, however, trigger the major international responses that would undoubtedly result from additional tests. Deterrence through uncertainty and ambiguity, though entailing major risks, would be a far less consequential outcome in strategic terms than vigorously pursuing a deployed nuclear force. In a technical and operational sense, however, development without additional testing can proceed only so far. Will Pyongyang ultimately be prepared to incur additional risks by further tests or will it remain content with a more ambiguous nuclear status? As Jungmin Kim and Peter Hayes argue, the DPRK might believe the half kiloton weapon provides "a measure of nuclear deterrence and compellance" but the other nuclear weapons

[5] Space constraints preclude more detailed discussion here. See Jungmin Kang and Peter Hayes, "Technical Analysis of the DPRK Nuclear Test," Nautilus Institute Policy Forum Online 06-89A, October 20, 2006, http://www.nautilus.org/fora/security/0689HayesKang.html; Richard Garwin and Frank N. von Hippel, "A Technical Analysis: Deconstructing North Korea's October 9 Nuclear Test," *Arms Control Today*, November 2006, 14–16; and Hecker, "Report on North Korean Nuclear Program," 2–4.

[6] Hecker, "Report on North Korean Nuclear Program," 3–4.

[7] "North Korea's Nuclear Test: Continuing Reverberations," International Institute for Strategic Studies, *IISS Strategic Comments* 12, no. 8, October 2006.

states will view the weapon as unstable, unreliable, and a relatively small nuclear device. [8] This suggests an uncertain and potentially unstable nuclear environment.

Delivery Capabilities

North Korea's ability to deliver a nuclear weapon also assumes intrinsic importance in any assessment of its nuclear weapons potential. Even in the event of a recessed deterrent, North Korea wants to demonstrate a capability for strategic reach, in particular the ability to target Japan and U.S. military facilities in Japan and beyond, beginning with Guam.

The pivotal issue is whether North Korea is undertaking major efforts to pair a nuclear warhead with extant or future ballistic missiles. There is the additional question of whether the DPRK deems the ability to reach the continental United States, Alaska, or Hawaii with a ballistic missile either feasible or necessary.

Siegfried Hecker's observation about the need for nuclear testing applies with equal relevance to ballistic missiles. Additional testing of missiles, especially multiple stage missiles, is essential to any North Korean plans to more fully operationalize its delivery capabilities, whether or not the missiles are armed with nuclear warheads.[9] The DPRK might, however, have an alternative and less obtrusive path to missile enhancement through its long-standing relationship with Iran. Such cooperation might enable Pyongyang to accelerate progress toward ultimately "mating" a Nodong missile with a nuclear warhead.

These judgments presuppose that the North will be able to develop a workable miniaturized warhead that could be placed atop such a missile, thereby putting Japan and U.S. forces at increased risk, and even potentially extending beyond Japan. Yet the outside world knows very little about the status of North Korea's R&D efforts. Based on the problematic results of the first nuclear test, this is a stage in nuclear weapons development that North Korea has yet to approach and (as Hecker also notes) would almost certainly require additional nuclear weapon tests: but this highlights yet again the potential implications of North Korea having definitively crossed the nuclear divide, without a clear sense of how the country proceeds from here. It is likely that the DPRK has only begun to ponder fully what an operational nuclear capability might entail. This is not intended to suggest that there is a single path to nuclear and missile advancement. Entirely possible, however, is that Pyongyang's weapons scientists and missile builders are only now beginning to come to grips both with the new realities that they face and with a still problematic path to becoming a more credible nuclear weapons state.

"North Korea's weapons are now a fact, not a bargaining chip."

Conclusion

North Korea's weapons are now a fact, not a bargaining chip. Nevertheless, Pyongyang still confronts major technical hurdles if it expects to proceed to an operational deterrent force. While North Korea's production of fissile material for weapons development is entirely

[8] Kang and Hayes, "Technical Analysis of the DPRK Nuclear Test."

[9] "North Korea's Missile Tests-Troubling Trajectories," The International Institute for Strategic Studies, *IISS Strategic Comments* 12, no. 6, July 2006.

homegrown, questions remain as to its ability to increase its current production capacity. Likewise, recent tests indicate that Pyongyang has not yet developed the expertise necessary to mate a nuclear warhead to a ballistic missile. Available evidence therefore suggests that the most likely future outcome for North Korea's nuclear weapons program would be a symbolic nuclear capability.

There are four immediate policy considerations that the international community would benefit from exploring:

- determining additional measures to discourage or impede North Korea's future weapons development, which in the near-term should focus on convincing North Korea to forego additional nuclear tests or further tests of ballistic missiles
- reiterating to Pyongyang that any transfer of nuclear materials, technologies, or completed weapons outside its borders would constitute a grave danger to the international community as a whole
- imposing additional costs on North Korea for any further nuclear tests
- fully weighing the trade-offs in pursuing partial steps to restrict nuclear weapons development versus pursuit of maximal policy goals

North Korea's Nuclear Weapons: Implications for the Nuclear Ambitions of Japan, South Korea, and Taiwan

Christopher W. Hughes

This article evaluates the nuclear intentions of Japan, South Korea, and Taiwan in the wake of North Korea's October 2006 nuclear test. These drivers are: (1) national security; (2) prestige, identity, and norms; (3) domestic political economy; and (4) technological capabilities. The main argument is that even in the event of an unstoppable North Korean nuclear program, none of these principal drivers are sufficient or confluent enough to shift Japan, South Korea, or Taiwan toward active nuclear weapons programs.

The analysis proceeds in three sections. The first summarizes the four main drivers or facilitators for and against nuclear proliferation. The second section examines individually the cases of Japan, South Korea, and Taiwan against each of these main drivers to reveal the degree of their respective interests in acquiring nuclear weapons. The last section summarizes the key findings and outlines policy implications for the United States in seeking to slow or halt the spread of nuclear weapons in Northeast Asia.

Types of Drivers

National security. National security is generally regarded as the primary driver of nuclear proliferation.[1] States faced with enhanced security dilemmas resulting from existential threats—whether in the form of new conventional or nuclear capabilities, or new offensive and defensive weapons systems which add strategic uncertainty—will search for a means to restore the balance of power.[2] Given their different levels of resource constraints, states may seek to counter conventional and nuclear threats through the acquisition of new conventional deterrent capabilities, defensive/denial deterrent capabilities such as missile defense, and, if these prove insufficient, the acquisition of nuclear weapons as the ultimate "cheap equalizer" to prevent coercion by other powers.

In turn, national security dilemmas as potential drivers of nuclear proliferation are heavily influenced by related alliance dilemmas and the concomitant presence or absence of security guarantees from more powerful states, whether conventional (e.g., forward-deployed trip-wire

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[1] John Herz, "Idealist Internationalism and the Security Dilemma," *World Politics* 2, no. 2 (January 1950): 157–80; Scott D. Sagan, "Why Do States Build Nuclear Weapons?: Three Models in Search of a Bomb," *International Security* 21, no. 3 (Winter 1996/1997): 57; and Mitchell B. Reiss, "Prospects for Nuclear Proliferation in Asia," in *Strategic Asia 2005–06: Military Modernization in an Era of Uncertainty*, ed. Ashley J. Tellis and Michael Wills (Washington, D.C.: National Bureau of Asian Research, 2005), 335.

[2] Victor D. Cha, "Nuclear Weapons, Missile Defense, and Stability: A Case for Sober 'Optimism,'" in *Asian Security Order: Instrumental and Normative Features*, ed. Muthiah Alagappa (Stanford: Stanford University Press, 2003), 464.

forces) or nuclear (e.g., extended nuclear deterrence, first-use policy, and use against non-nuclear weapon states).[3]

Prestige, identity, and norms. Issues of prestige, identity, and norms are often ascribed a position as secondary drivers for governing nuclear proliferation, but in certain cases approach the position of primary drivers. States may seek nuclear weapons to assert their identity—for domestic or international political consumption—as autonomous nations. They may seek to maintain or revitalize a "great power" reputation (e.g., France and the United Kingdom) or to assert their independence versus an international system, or even allies, which they see as suppressing their statehood and hypocritical in denying them their right to nuclear arms (possibly Iran).[4]

On the other hand, states may find questions of prestige and norms to be powerful restraining factors in nuclear proliferation. States may submit to domestically and internationally embedded norms against the acquisition of nuclear weapons and even feel they derive greater international prestige and moral authority from a non-nuclear stance.[5] On issues of national prestige and identity most states clearly experience conflicting pulls with regard to nuclear proliferation, and their normative stance may shift in relation to their external security environment.

Domestic economic pressures. The nuclear choices that states make can be governed to a high degree by domestic economic pressures. A nuclear program can be employed as a useful bargaining chip to extract economic security guarantees from other states or allies. State policymakers might also see utility in nuclear programs as a means to boost domestic technologies and nuclear energy industries and to protect the rent-seeking interests of sections of the military establishment and the military-industrial complex.[6] Those states with strong constituencies in favor of domestic economic liberalization will, however, have strong incentives to exercise nuclear restraint, knowing that a nuclear program may induce international economic isolation.[7] Moreover, for many states the economic stakes of going nuclear will be dictated by the degree to which the acquisition of nuclear weapons is likely to push the United States and other states to cut off vital nuclear fuel supplies.

Technological capacity. Finally, nuclear proliferation is governed by practical considerations of available technological capacity to master nuclear weapons technology. States may be able to access nuclear weaponry either through their indigenous technological capacity or through plugging into international networks of technologists (the latter of which is especially prevalent in the post–Cold War period). The lack of technological capability will mean that, even if tempted to go nuclear, states simply cannot do so.

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[3] For the relationship between the security dilemma and alliance dilemmas, see Glenn H. Snyder, "The Security Dilemma in Alliance Politics," *World Politics* 36, no. 4 (July 1984): 461–95.

[4] Cha, "Nuclear Weapons, Missile Defense, and Stability," 468.

[5] Sagan, "Why Do States Build Nuclear Weapons?" 75.

[6] Ibid., 63–64.

[7] Etel Solingen, "The Political Economy of Nuclear Restraint," *International Security* 19, no. 2 (Autumn 1994): 127.

The next section evaluates the nuclear intentions of Japan, South Korea, and Taiwan in relation to the four drivers of nuclear proliferation.

Country Analyses

Japan. The national security dilemmas vis-à-vis North Korea are not yet strong enough for Japan to acquire nuclear weapons. Japan still sees opportunities for diplomatic engagement and conventional deterrence, and—most crucially—Japan does not yet fear sufficiently the alliance dilemmas of U.S. entrapment or abandonment.

Prestige, identity, and norms are also not sufficient drivers for Japanese development of nuclear weapons. Although national prestige and identity create temptations for nuclear proliferation, in Japan these are also countered by domestic pressures for conformity with norms and regimes for nonproliferation.

Economically, Japan has only a minimal vested interest in nuclear weapons development, and the overall international economic costs militate against nuclear armament. This is particularly true since Japan would be cut off from supplies of nuclear materials and especially because the United States is almost certain to weigh in with restrictions on nuclear fuels for Japan's domestic nuclear energy industry.[8]

In terms of technical capacity, there can be little doubt that Japan has the prowess to produce nuclear weapons and would only need to provide sufficient resources and policy determination. However, this capacity would be slow in coming and would constitute a poor substitute for U.S. extended nuclear deterrence.

South Korea. National security considerations are clearly paramount for South Korea, although the majority of South Korean policymaking and public opinion does not appear to have swung decisively toward an adversarial view of North Korea. Indeed, much of Seoul has lived with the threat of devastation from North Korea's conventional weapons for many decades, and the city's population may not see the risks of nuclear attack as a threat qualitatively different enough to warrant South Korea's own nuclear weapons.

South Korean national prestige also does not appear to assume a primary or decisive role. South Korean nationalism is certainly promoting more self-reliant efforts in defense, which may create incentives for pushing forward basic nuclear weapons capabilities, but there appears to be no political consensus on South Korea's future strategic orientation. In the absence of a consensus on strategic change, South Korea's default position may remain the maintenance of close alliance ties with the United States and a non-nuclear stance.

Finally, despite having made impressive advances in nuclear technology and probable long-term ability to produce nuclear weapons, South Korea still lacks plutonium reprocessing and uranium enriching technology and is thus missing the basic materials for a nuclear option over the short term. Therefore, just as for Japan, South Korea would face exposure to nuclear blackmail if it were to shift away from the U.S. nuclear umbrella before producing its own

[8] Ishiba Shigeru, *Kokubo* [National Defense] (Tokyo: Shinshosha, 2005), 144–45. The author is indebted also to Mitchell Reiss for emphasizing Japan's vulnerability to U.S. pressure on its nuclear energy supplies. Author's conversation with Mitchell Reiss, Washington, D.C., December 2006.

deterrent. Moreover, South Korea might face serious economic disincentives in trade and investment from its neighbors if it were to seek nuclear weapons.

Taiwan. At present Taiwan appears to lack sufficient drivers for it to reconsider the nuclear option. The island's leaders clearly fear the build-up of China's military capabilities, and nuclear weapons might provide a cheap "equalizer" in the balance of power. Yet such a strategy carries the danger of exacerbating the security dilemma with China and the alliance dilemma of abandonment by the United States.

Taiwan's development of nuclear weapons might be driven by considerations of national prestige, identity, and norms, especially as a means to assert Taiwanese autonomy and eventually even independence. This impulse is countered, however, by the fact that the Democratic People's Party (DPP), which is most likely to advocate independence, has assumed a non-nuclear stance and that the Kuomintang (KMT) remains opposed to any policy that would force a conflict with China. Meanwhile, there is strong sentiment in Taiwan against both civilian nuclear energy and nuclear weapons.[9]

"The principal drivers of nuclear proliferation… suggest there is not yet a sufficient confluence of interests to tip Japan, South Korea, or Taiwan toward nuclear weapons."

Taiwan also faces considerable economic and technological hurdles to nuclearization. Democratization has ensured that there is declining budgetary freedom for the pursuit of a clandestine nuclear program. As such, any move to produce nuclear weapons might precipitate both U.S. and Japanese economic sanctions as well as the cut-off by the United States of nuclear fuels upon which Taiwan is entirely dependent and which provide 20% of its total energy.[10] Though possibly having the eventual technological capacity to produce nuclear weapons, Taiwan would first have to acquire reprocessing and enrichment facilities. The island's tight geographical confines also mean that Taiwan would need to face the technological challenges of developing a submarine-based deterrent to have a meaningful *force de frappe* against China.

Conclusion

The above analysis suggests that based on current trends there is no likely nuclear cascade in Northeast Asia. The principal drivers of nuclear proliferation observed from general theory suggest there is not yet a sufficient confluence of interests to tip Japan, South Korea, or Taiwan toward nuclear weapons. Instead, Japan and South Korea are likely to use the remaining diplomatic windows of opportunity, even if beginning to close rapidly, to seek to dissuade North Korea from the nuclear path. At the same time, their policymakers are likely to strengthen conventional hedges and push forward military modernization to deter North Korea. All three actors, though, are also likely to maintain their nuclear hedges and the necessary latent technological capabilities in order to exert leverage both on North Korea to moderate its security behavior and on the United States to ensure it re-adheres to its security commitments.

[9] Derek J. Mitchell, "Taiwan's Hsin Chu Program: Deterrence, Abandonment and Honor," in *The Nuclear Tipping Point*, 304–05.

[10] Mitchell, "Taiwan's Hsin Chu Program," 305.

This analysis draws four main policy implications:

- Washington still has the capacity to prevent further proliferation by revisiting U.S. policy toward the four principal nuclear drivers.
- Of benefit would be for the United States to move through diplomatic efforts and the upgrading of its alliances both to control security dilemmas involving North Korea and to reaffirm its extended nuclear guarantees. The United States would need, however, to assert deterrence more than pre-emption so as to avoid entrapment and alliance dilemmas.
- Also beneficial would be if the United States would show a re-adherence both to international and regional expectations for minimizing the role of nuclear weapons in regional security and to norms and regimes of nonproliferation.
- Furthermore, of benefit as well would be for the United States to continue to provide technological and economic incentives and disincentives to nuclear proliferation.

Iran's Nuclear Trajectory to 2015

Jon B. Wolfsthal

This essay analyzes the technical nature of Iran's nuclear program to 2015 and predicts the plausible development of Iran's nuclear capabilities over the long term. The essay begins by examining the technical pathways Iran could use to pursue a nuclear weapons capability. The second section addresses the political options open to Iran as its nuclear program unfolds: (1) maintaining the status quo, (2) withdrawing from the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and International Atomic Energy Agency (IAEA) inspections but maintaining a peaceful cover, or (3) going for broke by developing and demonstrating a full-scale nuclear weapons capability. The final section assesses these options and discusses policy implications.

Technical Pathways

Iran's nuclear program centers on its pursuit of two main technologies: uranium enrichment and plutonium production. Iran claims that its enrichment program is needed to fuel a planned 20,000 MW (e) constellation of electricity generating reactors. As justification for a heavy water reactor under construction that will be capable of producing significant quantities of plutonium, Tehran is citing the need to produce radioactive isotopes for medical, industrial, and agricultural uses. Regardless of Tehran's public justifications, the completion of either of these projects would give Iran the ability to produce weapons-grade nuclear materials. As such, these programs will be the pacing elements of Iran's nuclear ambitions. Iran is not likely to have completed any of its planned civilian nuclear reactors (other than the Russian-built Bushehr facility) by 2015.

How quickly Iran will master nuclear production remains unclear. The development of technology or engineering capabilities is rarely a straight line, and Iran continues to encounter significant problems in its uranium enrichment capabilities. Iran's plans to build and operate a 40 MW (e) heavy water reactor capable of producing significant amounts of nuclear isotopes, including weapons-grade plutonium, are less advanced than its uranium efforts and are unlikely to form a major part of its weapons capability by the year 2015.

Iran continues to pursue a centrifuge-based enrichment program, based on a basic Pakistani design known as the P–1, and has reportedly produced components for several thousand centrifuges of this design.[1] Tehran successfully operated a 164-unit cascade in early 2006 for a few weeks, producing small amounts of fissile material (gram quantities enriched to 3–4% U–235) and began operation of a second 164-unit cascade in the fall of 2006. Over the long-run, Iran has stated plans to install a uranium centrifuge complex containing up to 60,000 centrifuges.

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[1] Iran received blueprints and other information on the more advanced P–2 centrifuge, and questions about its pursuit of that technology persist. No conclusive evidence that Iran has been pursuing the P–2 in any comprehensive way, however, has materialized.

Iran has encountered serious problems, however, in its pursuit of a mature enrichment capability. Despite years of effort, Iranian scientists still have not perfected the production of high-quality centrifuge components or feedstock, nor the operation of centrifuges in interlinked cascades. Reports suggest that perhaps as many as one-half of its 164 units crashed during their three weeks of operation earlier in 2006. Serious quality control problems in the production and operation of centrifuges have delayed Iran's plans to move beyond basic research and development, and may not be resolved for some time (possibly several years, depending on the reliability of supply from outside sources).

In addition, Iran has yet to overcome basic problems in the production of uranium hexafluoride (UF6), the gaseous feedstock that is enriched in the cascades. Although Iran has reportedly produced tons of UF6, this supply is not of sufficiently high quality to allow for the reliable operation of centrifuges, or then to be immediately converted into material suitable for nuclear weapons. The country also is reported to have shortages of other industrial components required for reliable centrifuge operation. Until Iran can demonstrate that it can produce and reliably operate large numbers of centrifuges, it will be unable to produce significant amounts of nuclear materials for a robust program, be it a peaceful or weapons program. (See **Table 1**.)

Even with these constraints, however, Iran may well be able to demonstrate the ability to produce kilogram quantities of highly enriched uranium by 2015. Having successfully enriched small amounts of uranium to 3–4% U–235 earlier in 2006, Iran will continue to make progress in operating centrifuges and enriching uranium to higher and higher levels. All in all, these factors suggest that Iran's uranium production capabilities will be somewhat constrained, even after the country is able to produce threshold amounts of highly enriched uranium. In turn, this may limit Iran's options for using its advancing nuclear capabilities and delay its efforts to demonstrate a full-fledged nuclear weapons capability—if and when Tehran should make a decision to do so.

Political Options

Given the limits on Iran's technical development and the success its strategy has enjoyed to date, it is likely that Iran will seek to maintain the peaceful cover for its nuclear program as long as possible—even after having demonstrated itself as a nuclear-capable state. Iran would retain considerable flexibility to adjust its posture in response to internal or international events. In the broadest terms, as noted above, Tehran has three major political options as Iran pursues nuclear capabilities: (1) maintain the status quo, (2) withdraw from the NPT and IAEA

TABLE 1 Theoretical Operating Time to Produce 25kg of HEU

Facility	Low End	High End
1–164 unit cascade	2.4 years	1.8 years
1,000 machine pilot cascade	143 days	108 days
3,000 unit cascade	48 days	36 days
50,000 machine complex	3 days	2 days

NOTE: HEU (highly enriched uranium) is enriched to at least 93% U-235.

SOURCE: Gary Samore, ed., *Iran's Strategic Weapons Programmes: A Net Assessment*, (London: The International Institute for Strategic Studies, 2005), 55.

inspections but maintain a peaceful cover; or (3) go for broke by demonstrating a full-fledged nuclear weapons capability.

Status quo. Iran's current approach to mastering the nuclear fuel cycle is working. Tehran continues to defy the binding UN Security Council resolutions from December 2006 and March 2007 calling for Iran to suspend uranium enrichment activities. Tehran is making slow but steady progress on its uranium enrichment and plutonium production programs and maintains some basic level of political support in Russia and China (although the March 2007 resolution and the most recent spat with Russia over Bushehr demonstrate that this support is waning), as well as in the non-aligned movement. Assuming no major changes to the existing situation (e.g., a dramatic drop in oil prices or increases in supply that would reduce Iran's leverage on the international market) or a strategic surprise (e.g., an Israeli attack or discovery of a previously undisclosed and undeniably military Iranian nuclear facility), it is likely that Iran can continue to develop its R&D enrichment capability to the point of producing significant amounts of low enriched uranium and even limited quantities of HEU usable in nuclear weapons.

"…Iran's uranium production capabilities will be somewhat constrained, even after the country is able to produce threshold amounts of highly enriched uranium."

If able to maintain its current trajectory, Iran can be expected to have installed up to several thousand centrifuges at Natanz by 2015. Given a demonstrated capability to produce and install 70–100 units per month, Iran should be able to install approximately 1,000 units per year once it works out quality control issues. This is a conservative estimate, but one that appears reasonable given current challenges facing Iran's centrifuge program. In such a scenario, Iran would be able to produce enough nuclear material for a nuclear weapon every two to six months, assuming it has a reliable supply of UF6 feedstock and is able to operate its equipment with a low level of failures.

Withdraw but constrain. If the circumstances change and greater international pressure is brought to bear on Iran, Tehran retains the ability to create additional leverage by threatening or actually withdrawing from the NPT and refusing further inspections by the IAEA. Under this scenario, moreover, Tehran might well continue to claim its program is peaceful, providing unilateral assurances that Iran was not producing large amounts of HEU and forgoing the need to take steps that would be unambiguously military in nature (e.g., testing a nuclear device).

Threatening to withdraw from the NPT and the inspection regime might succeed in abating mounting pressure on Tehran without dramatically affecting the pace of its nuclear development. An actual decision to withdraw from the NPT and an end to IAEA safeguards would likely restrict Iran's ability to acquire legitimate nuclear equipment internationally and enhance corresponding efforts to block illegal transfers to Iran. At the same time, however, the cessation of IAEA safeguard activities in Iran would seriously diminish the outside world's knowledge of the country's nuclear activities and greatly impede efforts to track its nuclear progress. Tehran also could use Iran's withdrawal as a basis for increased negotiating leverage, offering a resumption of inspections if the circumstances were right and further impeding the ability of states to increase pressure on Iran's nuclear activities.

Demonstrate a military nuclear capability (go for broke). It is unlikely, but conceivable, that Iran's continued pursuit of nuclear technology could be met with a serious international response, including the possible threat of U.S. or internationally supported economic or military action. In such an event, Iran might seek to take the ultimate step of declaring or demonstrating a military nuclear capability. The consequences of such a declaration (rhetorical or physical) are impossible to predict at this stage. Just as North Korea's actual testing of a nuclear device has not led to the immediate crisis many had predicted, it is possible that a nuclear demonstration by Iran might not have dramatic immediate affect. It is just as likely, however, that other regional states would immediately alter their defense and military behavior—including the possible pursuit of nuclear capabilities. How Israel would respond, both directly to Iran and with regards to its own nuclear capabilities is also an open question.

Conclusion

Iran has successfully avoided provoking any tangible response from the international community over its nuclear activities. So long as this remains the case, it is likely that Iran will continue to develop its nuclear program under the guise of pursuing the peaceful application of nuclear energy. There is no technical reason that Iran would need to change its current mode of operation for the foreseeable future. As such, it is likely that Iran will remain within the NPT and allow the IAEA to conduct basic inspections at declared nuclear facilities. Developments could include uranium enrichment well beyond the 3–4% level required for use in civilian power reactors as well as production and reprocessing of plutonium-laden spent fuel in the Arak heavy water reactor.

All of these activities are permitted under the NPT and the IAEA, although a strong case could (and should) be made that states in violation of their IAEA commitments should not enjoy the full rights of other NPT members. That being said, Iran is very likely to continue operating under the protection of the IAEA unless Tehran sees an advantage in changing the current approach. This is true even if the IAEA board continues to deny some or all technical cooperation projects with Iran's nuclear establishment. The rhetorical and diplomatic benefits of remaining within the NPT and the IAEA's inspection system may prove very useful in moderating the efforts of the United States and others to sanction Iran.

This essay draws four main policy implications:

- Given the poor track record of U.S. intelligence predictions about Iran's nuclear timelines, it is difficult to know how long it will take Iran to acquire the means to produce nuclear weapons, and what its nuclear infrastructure will look like in the coming five to ten years.

- Iran can be expected to continue both its uranium enrichment and plutonium production efforts over the next ten years. Tehran's uranium centrifuge enrichment program is more advanced than its plutonium-based efforts and is more likely to yield "success" by 2015.

- Publicly reported numbers suggest that roughly half of Iranian produced centrifuges fail within the first few days or weeks of operation and, until these engineering and quality control problems can be overcome, Iran's ability to produce large amounts of enriched uranium will be hampered.

- Until Iranian scientists can master life-cycle operation of individual centrifuges and of interlinked "cascades" of such devices, it will be hard for Iran to produce significant amounts of highly enriched uranium. Iran may not be able to produce enough highly enriched uranium to produce nuclear weapons until the end of this decade or the middle of next.

Regional Security Implications of Iranian Nuclear Weapons

Deepa Ollapally and *Kalsoom Lakhani*

Although Iran has been internationally isolated in many respects, it has maintained relatively good ties with Turkey and India, an uneven relationship with Pakistan, and a competitive one with Saudi Arabia. Interestingly, Iran's relations with secular India have been less troublesome than with the three other Muslim states. To date, energy ties, common positions on the Palestinian question, and shared antipathy to U.S. interventionism have kept potentially explosive relations in check. A nuclear Iran would clearly complicate regional matters, exacerbating relations with all four countries in different ways.

This article considers the impact of Iran's nuclear weaponization on key states in South and Southwest Asia: India, Pakistan, Afghanistan, Saudi Arabia, and Turkey. The essay focuses primarily on four possible future scenarios for the region: (1) regional accommodation of Iran's nuclear program, (2) regional conflict and confrontation, (3) stability at a new equilibrium point, or (4) a wild-card outcome.

The impact of a nuclearized Iran will differ across states in South and Southwest Asia, but in large part will be dictated by both external geopolitics and domestic compulsions, and how Iran fits into the overall picture.

Scenario One: Regional Accommodation

If Iran's nuclear capabilities are largely symbolic and status oriented, the most likely outcome is regional accommodation of its nuclear program. There would be little or no backing for any U.S. military action against Tehran, apart from tepid support from NATO member Turkey.

This scenario would presuppose a democratic transition in Pakistan, which in the past has meant less hostile and a more evolved cooperative Indo-Pakistan relationship. A stable, Taliban-free Afghanistan will be critical for regional concerns to be assuaged. Both these conditions at the regional level are necessary for the implementation of the proposed Iran-Pakistan-India pipeline. The pipeline would create an enormous stake for India, Pakistan, and Iran to avoid any disruptions. Should this come to pass, a likely outcome would be "economic statecraft." The pipeline option is estimated to be four times cheaper for India than any other option, even with the payment of transit fees to Pakistan amounting to nearly one billion dollars annually. Indian leadership has placed "energy security" almost at the top of its national priorities, following only food security in importance.

If this pipeline were built, India and Pakistan would have reasons of national interest not to support any unilateral U.S. action against Iran. It would be difficult for Saudi Arabia to draw

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India or Pakistan (or Turkey) into an anti-Iran coalition. No regional state (except Turkey) would sign on to U.S.-led measures such as the Proliferation Security Initiative. Nuclear capabilities for Iran in this context are largely symbolic and status oriented, producing a generally benign regional outcome. The perception of a threat from nuclear Iran in South Asia would be low (save Saudi Arabia).

Scenario Two: Regional Confrontation

If U.S. withdrawal from Afghanistan leads to serious deterioration in the political and security environment of this neighboring state, Iranian involvement would increase, accentuating regional threat perceptions of a nuclear armed Iran, especially for Pakistan and Saudi Arabia.

In this situation, the United States withdraws from Afghanistan without creating well-developed political and security structures. Also likely is deepened and entrenched army control in Pakistan, with President Pervez Musharraf not having designed any credible exit strategy for himself or the military. Afghanistan becomes an increasingly contested terrain, with a violently resurgent Taliban and renewed support by the Pakistani military to ensure a pliable Kabul government. In this environment, a steep deterioration of Indo-Pakistani relations could be expected. Indo-Iranian relations in turn would become tighter, with non-Taliban elements in Afghanistan also aligning with Iran and India. The Saudi-Pakistani partnership would become stronger, as both countries would try to stem Iranian influence. The United States would likely align with Saudi Arabia and Pakistan, particularly with the army in power in Pakistan seen as adding geostrategic value for U.S. interests.

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Given the limited technical infrastructure of Saudi Arabia to support an indigenous weapons development program and Pakistan's limited financial resources, a Saudi-Pakistani relationship would be natural. It has been reported in the U.S. press that these two countries have already concluded a nuclear agreement calling for exchange of Pakistani weapons for cheap Saudi oil.[1] Iran is often seen by the Saudis as posing a threatening Shia wave, vying for dominance in the region. Saudi Arabia sent massive aid to Iraq in the war against Iran in the 1980s.

Afghanistan (especially with a fragmented Pashtun leadership) could revert to its historic rivalry with Pakistan. Kabul has yet to accept the Durand Line as Afghanistan's border with Pakistan, and one of Pakistan's abiding strategic objectives has been the emergence of a pliable government in Kabul. If Kabul becomes more hostile to Pakistan (as the latter is likely to more openly support its Taliban allies in the absence of the United States), cooperation with Iran and India becomes more logical. Given the new road links between Afghanistan and Iran, and the development of the port at Chabahar, landlocked Afghanistan would no longer be as dependent on the port of Karachi in Pakistan for transit and trade. Special concession by Iran

[1] Arnaud de Borchgrave, "Pakistan, Saudi Arabia in Secret Nuke Pact," *Washington Times*, October 22, 2003.

may be expected for India at Chabahar port which would make Indian trade with Afghanistan much more viable.[2]

India and Iran have no direct conflict of interests, and could see increasing convergence of interests, especially at the regional level. India may come to see a link with Iran as the centerpiece of economic integration of West, Central and South Asia. Indian domestic politics and the possibility of heightened vulnerability to Islam-based extremism would militate against India casting its lot fully with the United States, and India may retain Iran as a key friend in the Muslim world (it should be noted that India has the second largest Shia population in the world after Iran).

Indeed, by 2015 India may not need to balance its U.S. and Iran policies, believing it can have strong relations with both countries. The interests of critical U.S. corporate sectors in information technology and, more importantly, civil nuclear energy, should give India greater leverage over its U.S. policy. The U.S.-India nuclear deal and sales of nuclear reactors was held out in part to blunt Indian need for Iranian energy resources. But even under the best of circumstances, it has been estimated that nuclear energy would meet only 10–12% of India's estimated need of 20,000 megawatts by 2020. Currently, nuclear energy forms only 3% of Indian consumption.[3]

Scenario Three: Stability at a New Equilibrium Point

If the United States and Iran strike a grand bargain, such as Iran accepting a strict limit on its fissile material production in exchange for U.S. acceptance of Iran's current nuclear capabilities as well as further cooperation in a range of fields, reaching regional stability at a new equilibrium point may be possible.

In this scenario, pragmatic considerations would outweigh normative sentiments, and states would demonstrate a willingness to give up their maximalist preferences all around. Although the shift to a new modus operandi would be volatile, achieving stability at a new equilibrium point would be possible if necessary political will were to exist on all sides. The scenario assumes that Iran's pursuit of nuclear weapons is due to insecurity rather than regional hegemonic ambitions or religious ideology. Thus, the demonstration effect of the U.S. invasion of Iraq may have pushed Iran to try to achieve nuclear weapons status even more rapidly as a guarantee against military intervention by a unilateralist United States. A withdrawal or decrease in the U.S. military presence in Iraq would purchase greater security for Iran. U.S. inability to stabilize Iraq might create the possibility for cooperation with Iran to stabilize its neighbor. Moreover, it is increasingly clear that no good military options exist to disarm a nuclearized state, whether it is a close U.S. ally such as Pakistan or a pariah like North Korea or Iran. Thus, from both U.S. and Iranian perspectives, a détente could make sense.

States in the region and, most importantly, the United States and Iran, would have to settle for their second preference outcome. Tehran and Washington would strike a new grand

[2] C. Raja Mohan, "India's New Road to Afghanistan," *The Hindu*, September 7, 2003.

[3] Aziz Haniffa, "An Interview with Arjun Makhijani: Why India Should Choose Iran, Not the US," *The Rediff Interview*, December 28, 2005, http://in.rediff.com/news/2005/dec/28inter1.htm.

bargain in the nuclear arena, with Tehran accepting strict limits to Iran's fissile material production in exchange for Washington accepting Iran's current nuclear capability, along with further cooperation in a range of fields. This could be coupled with serious moves toward the stalled, but critical, Fissile Material Cut-Off Treaty and the Comprehensive Test Ban Treaty. The argument is that out of crisis comes opportunity.

Currently, India, Pakistan, and in particular Afghanistan are hemmed in by what are generally viewed as overly antagonistic U.S. policies toward Iran. Kabul cannot be expected to replicate the hostile policies of the United States since it would be completely contrary to ongoing developments in regions of Afghanistan bordering Iran, as well as to historic ties. Afghanistan's western province of Herat has had some notable successes since 2001 thanks to Iran, including 24-hour availability of electricity due to Iranian equipment (unlike even Kabul) and a 75-mile stretch of highway between the Iranian border and Herat. Iran is also considering building a railroad link and has recently pledged another $560 million in reconstruction aid.[4] These developments are occurring even as U.S. and NATO troops are physically present and intimately involved in Afghan foreign relations. It is unrealistic to expect that Iran's influence will somehow lessen over time, and U.S. commitment to Afghanistan is bound to weaken. It would be in the interest of the United States, therefore, to reach an accommodation with Iran to advance its twin foreign policy priorities: Afghanistan and Iraq.

Scenario Four: The Wild-Card Outcome

This is characterized by a "post-Iraq" isolation of the United States by other states, as well as a dominant domestic reaction in the United States against international interventionism. Public opinion, already low in the Middle East and South Asia, would be whipped up against the United States. For example, in 2005 only 23% of Pakistanis had a favorable opinion of the United States, and this could easily deteriorate further.[5] Global political leadership would be in disarray, and Iran would take an even more radical route—with the real possibility of extremist groups gaining access to Iranian nuclear capabilities. Contending regional blocs could appear and vie for predominance.

Highly possible is that Iran would become more successful in exporting its revolutionary religious ideology and would seek a regional alliance with Pakistan, Afghanistan, and key Central Asian states based on shared religious nationalism. Iran could be in a position both strategically and economically to underwrite such a regional grouping. (It is estimated that Iran could earn $11 billion annually over 30 years for sales from its South Pars fields).[6] Conversely, the drying up of economic and military largesse from the United States (and key multilateral agencies absent U.S. pressure) would make Iranian overtures particularly attractive to these states, especially cash-strapped Pakistan and Afghanistan. Under this scenario, Iran could gain strategic depth via Pakistan's Gwadar Port, which was built with huge Chinese assistance. Gwadar is in close proximity to the Strait of Hormuz in the Persian Gulf, through which two-

[4] Fisnik Abrashi, "Iran Strengthens Ties with Afghanistan," Associated Press, November 29, 2006.

[5] Pew Global Attitudes Project, June 23, 2005.

[6] "Persian Gulf Oil and Gas Exports Fact Sheet," Energy Information Administration Country Analysis Brief, September 2004, http://www.eia.doe.gov/emeu/cabs/pgulf.html.

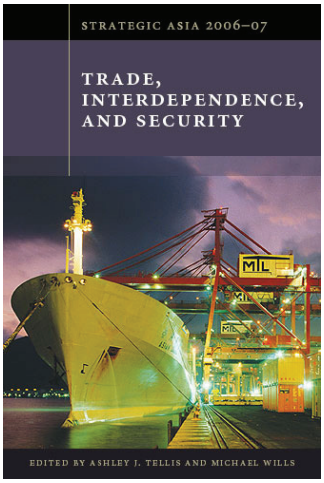
fifths of the world's traded oil passes. The port could become a staging spot for attacks to disrupt global oil supplies.

Conclusion

Current trends would indicate that scenario three—stability at a new equilibrium point—has the greatest likelihood of dominating choices made by states. Pragmatic considerations would dictate a course that converges toward a degree of predictability and stability. The process of reaching this new equilibrium point, however, will not be easy. It is clear that for India and Pakistan, the contours of the Afghan political experiment will be an important determinant of their ties with Iran. The role of the United States in this is inescapable.

This essay draws three main policy implications:

- If Iran's nuclear capabilities are largely symbolic and status oriented, the most likely outcome is regional accommodation of its nuclear program, with little or no backing for any U.S. military action against Tehran.
- If U.S. withdrawal from Southwest Asia leads to serious deterioration in the political and security environment of Iran's neighboring states, Iranian involvement in its neighbor's affairs will increase, accentuating regional threat perceptions of a nuclear armed Iran, especially for Pakistan and Saudi Arabia.
- If the United States and Iran are willing to accept their second preference outcomes and strike a grand bargain, such as Iranian acceptance of strict fissile material limits in exchange for U.S. acceptance of Iran's existing nuclear capabilities, regional stability could be reached at a new equilibrium point.



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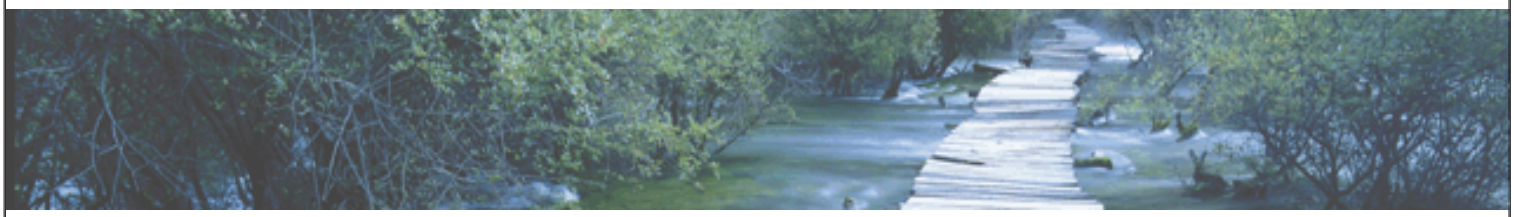

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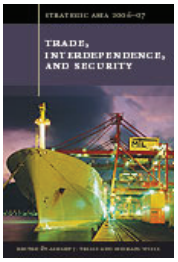

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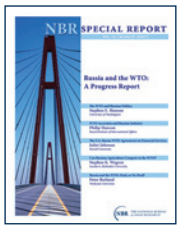

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