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North Korea's Nuclear Ex- ports: On What Terms?

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NORTH KOREA'S NUCLEAR EXPORTS: ON WHAT TERMS?

SUMMARY

Senior U.S. government officials maintain that North Korea is willing to sell its nuclear technology anywhere in the world for money. While the evidence is ambiguous, a careful examination suggests that many past transfers were actually done not for profit but in exchange for components or materials that benefited Pyongyang's own nuclear program. Barter appears to be an overlooked but important mode of exploiting nuclear black markets.

Future transactions may involve both forms of exchange: sales and barter. For Arab states striving to match Iran's nuclear capabilities, and possibly other countries as well, North Korea will be attractive as a seller of plutonium-related technology—even if the export of an actual reactor has become unlikely. Meanwhile, there is a “double coincidence of need” between North Korea and Iran that creates incentives for a swap. For the Iranians, North Korea is a potential source of uranium,

whereas for the North Koreans, Iran is a center of expertise in uranium enrichment.

The consequences of unchecked North Korean nuclear exports are dire, regardless of their exact form. No current strategy is adequate to stop them. Successful interdictions have involved a great deal of luck, and waiting for the North Korean regime to collapse has simply not worked. The United States' best strategy is to try to negotiate North Korea out of the nuclear black market entirely, although this approach hardly guarantees success either.

NORTH KOREA'S NUCLEAR EXPORTS: ON WHAT TERMS?

What are the limits of North Korea's ability and willingness to spread nuclear technology beyond its own borders? On October 3, 2006, the North Korean Ministry of Foreign Affairs issued a “solemn” declaration, pledging that Pyongyang would never use nuclear weapons first and would

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“strictly prohibit any threat of nuclear weapons and nuclear transfer.”¹ However, the North Koreans already stood accused of shipping containers of uranium hexafluoride (UF₆)—feed material for centrifuges—to A.Q. Khan in Pakistan, who reshipped them to Libya.² In April 2008, the intelligence community leveled an even stronger allegation: they claimed that North Korea had been involved in building a hidden nuclear reactor in Syria, an undertaking that dated back to 1997.³

These two cases may not be isolated incidents. A number of senior U.S. government officials have described North Korea’s nuclear exports as being potentially open-ended. Then-C.I.A. Director Michael Hayden even compared North Korean nuclear transfers to the smuggling conducted by Pakistan’s A.Q. Khan. According to Hayden, “North Korea asks only two things of its customers: first, can they pay, and second, can they keep a secret.”⁴ During a recent meeting in Seoul, White House National Security Staff Member Laura Holgate expressed concern about potential transfers of fissile material saying, “North Korea sells a lot of nuclear technology illegally to people who shouldn’t have it.”⁵ Earlier, national security adviser James Jones called nuclear exports, not Pyongyang’s own advances in nuclear weapons or missiles, “the imminent threat” from North Korea.⁶

Are these U.S. officials correct? Are Pyongyang’s sales of nuclear technology and materials truly similar to its wide-ranging exports of ballistic missiles and conventional weapons, or comparable to the activities of the Khan network in its heyday? And will they be equally far-reaching in the future? If everything is for sale, then the few known instances of nuclear exports could merely be the tip of the proverbial iceberg.

Information about North Korean nuclear exports is sparse, consisting mainly of statements by U.S. government officials, a few UN documents, and a variety of media reports. The basis of the North’s decision-making is largely opaque, and interviews have been of limited help in clarifying the picture, partly because visitors to Pyongyang have received conflicting messages. Some North Korean officials are said to have affirmed that they would never transfer nuclear weapons or “materials,” apparently meaning fissile material suitable for weapons. Others reportedly have indicated that if North Korea were threatened, it could provide weapons to terrorists.⁷

But there is a common thread: some of the interviews, much like the October 3, 2006 Foreign Ministry declaration, imply that nuclear transfer is a military action tantamount to the use of a weapon, and only to be contemplated in the most extreme circumstances. On the other hand, exports of valuable materials or technology for the production of fissile material or the construction of weapons do not seem to have been addressed at all.

Sifting through the available evidence, there appear to be three main possibilities. First, as senior U.S. officials believe, North Korea may be willing to sell nuclear technology as indiscriminately as it sells rocket-propelled grenades. As Defense Secretary Robert Gates put it, “Everything they make, they seem willing to sell.”⁸ According to this view, the regime’s finances are its paramount concern, and there is certainly evidence for such a claim. Earlier this year, Kim Jong Il is said to have told senior officials of the ruling Workers Party of Korea that he would “judge [their] loyalty” based on their ability to bring in hard currency.⁹

Second, North Korea may be more selective about nuclear technology transfers, seeing them as a means for advancing Pyongyang's own weapons program, and not for general revenue. Because of the central importance of nuclear technology to the regime, it would be exempt from commercial pressures. Rather than having the nuclear program support fund-raising, fund-raising would support the nuclear program. What initially appear to be exports, in this view, would actually be barter of sensitive components, materials, or training.

Third, and perhaps most compelling, the managers of North Korea's nuclear program may be following the historical trajectory of the A.Q. Khan network, which shifted from acquisition—including barter trades—to reselling sensitive technology for profit. By his own account, Khan initially acquired materials, equipment, and know-how for Pakistan's own purposes, including through swaps with China in particular.¹⁰ Later, when Pakistan's program had achieved maturity, Khan and his associates put their "supply chain" to work for the benefit of foreign customers (with the knowledge and approval of the Pakistani military, according to Khan). But in Pyongyang's case, the move from acquisition to reselling would be twofold, since the North Koreans were experienced with plutonium production by the early 1990s, but still seem to have some length to go before mastering uranium enrichment.¹¹ To all appearances, North Korea's second transition—from a buyer of uranium enrichment technology to a seller—has yet to occur.

None of these possibilities are reassuring, but they have different implications.

- If North Korea's current and future nuclear exports are driven primarily by financial considerations then Pyongyang could find a variety of customers, including those with limited nuclear technology. A new global nuclear black market could bloom, with potential customers from Myanmar to the Arab world.
- If North Korea's nuclear dealings exclusively serve its own strategic ambitions, then exports, to the extent that they occur, are likely to take the form of bartering with the most suitable partner for such an exchange—probably Iran. Swapping nuclear technology and materials would enhance both countries' ability to produce fissile material and ultimately nuclear weapons.
- If North Korea is halfway through the process of shifting from acquisition to sales, then both of the above scenarios could unfold at once: mature technologies associated with plutonium production could be marketed across the Middle East and beyond, while the North Koreans and Iranians collaborate in hopes of strengthening their own uranium enrichment capabilities.

Unfortunately, absent some far-reaching change in the North Korean leadership or its outlook, the worst of both worlds may be the most realistic scenario.

Cash and Carry

Accepting the first hypothesis—that North Korea is a promiscuous nuclear exporter—would require an

explanation of why there seem to have been so few transactions. Of the states that have bought ballistic missiles from North Korea, many have shown interest in nuclear weapons-related technology at one time or another, including Pakistan, Iran, Iraq, Egypt, Libya, and Syria. But only Pakistan and Syria are alleged to have received any nuclear technology or materials directly through the agency of North Korea.

One explanation is that heightened caution by buyers and seller alike may have led to fewer and better-hidden transfers. Another possibility is that North Korea has faced tougher competition in the nuclear black market than in the missile market. Uranium enrichment technologies, like the centrifuges once sold by A.Q. Khan, are harder to detect than a North Korean plutonium-production reactor and therefore more attractive to potential buyers. Khan's main customers were Iran, Libya, and North Korea itself; Iraq had its own enrichment program.

Another potential obstacle is securing financing. Even if we assume that life-cycle costs are similar for Pakistan-style uranium-enrichment centrifuges and a North Korea-style plutonium-production reactor, the payment plan is not the same. Because centrifuge operations can start with a small number of machines, Khan could sell his gear in small batches listed on a "menu." North Korean salesmen would be hard-pressed to replicate this strategy, since a small piece of a reactor would be useless by itself. The up-front costs of reactor construction can be daunting.

Either caution or cost might explain why Iran and Libya went with A.Q. Khan, but neither explains why Syria preferred to do business with Pyongyang's front operation, the Namchongang Trading Company. It is possible North Korea simply got there first. Some accounts claim that Khan met a senior Syrian official in Beirut in the mid-1990s.¹² But by then, the North Koreans were already a known quantity in Damascus. Their first missile deliveries reached Syria in March 1991, and their collaboration on missile development started around the same time. In Libya and Iran, by contrast, it was the Koreans who showed up late: a series of other suppliers, including A.Q. Khan, were already present by the late 1980s.

Khan's sales technique also seems to have inspired mistrust at times. It was apparently his style to make an initial approach through an unknown front man carrying a letter. When he tried this technique with Iraq in October 1990, it provoked suspicion of a sting operation.¹³ In a 2007 interview, Syrian President Bashar al-Asad claimed to have turned away a Khan envoy in 2001 for similar reasons—adding, of course, that Syria didn't want nuclear weapons to start with.¹⁴

A third reason why Syria may have preferred Namchongang as a supplier was its superior level of technical assistance. If Khan was turned away because his would-be customer lacked confidence that his technology would work, it would not have been the first and only time. Libya declined his initial advances in 1984 for this reason, only concluding an agreement after a series of meetings between 1989 and 1991.¹⁵

A fourth possible reason involves supply rather than demand. North Korea simply may not have had the resources and experienced personnel to pursue more than one or two reactor-building campaigns—at home or abroad—at any given time. The 1994 understanding with the United States, the Agreed Framework, shut

down North Korea's only operating reactor (at Yongbyon) and terminated construction of two larger reactors. These steps would have made the necessary personnel available for a commercial project overseas, launched in 1997. It still remains to be explained how Syria would have managed to afford the project, but some reports allege an Iranian role in financing it.¹⁶

Strategic Swaps

The second hypothesis, that North Korea is a nuclear-technology miser who gives only to get, is also problematic: Why, given North Korea's proclivity to acquire foreign exchange by any means necessary, from counterfeit cigarettes to systematic insurance fraud, would something as valuable as nuclear technology be exempt?

One important reason appears to be the scarcity of key materials, technology, and expertise. Building up Pyongyang's own nuclear program for the sake of national defense would have taken priority. In fact, many of the proceeds from weapons exports and the smuggling of contraband appear to have gone to acquire nuclear and dual-use technology from abroad. There is evidence to suggest a system of highly centralized control that could prevent nuclear sales from occurring in response to a blanket bureaucratic imperative to raise cash, if the top leadership so desired. According to a report by a panel of UN experts, the Second Economic Committee of the National Defense Commission "plays the largest and most prominent role in nuclear, other WMD and missile-related development programmes as well as in arranging and conducting arms-related exports."¹⁷ One report describes the chief overseer of the Second Economic Committee of the National Defense Commission, Jon Byong Ho, as having been responsible for dealings with A.Q. Khan.¹⁸ As chairman of the National Defense Commission, Kim Jong Il was presumably well aware of Jon's activities. According to a KGB analysis from 1990, Kim "personally" controlled the nuclear program.¹⁹

Although there are inevitably questions about the reliability of the evidence, some of the available information about past North Korean nuclear exports does fit well with this hypothesis. Especially in dealings with Pakistan, North Korea appears to have been engaged in barter trade. Despite denials by A.Q. Khan and other senior Pakistanis, the first swap between Pyongyang and Khan appears to have involved ballistic missiles from North Korea in exchange for Pakistani gas centrifuges used for enriching uranium. Starting around 1993, North Korea provided Nodong missiles to Khan Research Labs (KRL), followed by the transfer of a complete production line. Later, Khan shipped centrifuge components, drawings, and plans to North Korea. Some analysts have concluded that KRL ultimately was unable to pay for the missiles and had to fall back on centrifuge technology as an alternative form of payment starting in 1996.²⁰ Other accounts claim that the barter was lined up from the start, in 1992 or 1993.²¹

This exchange seems to have paved the way for the swapping of other pieces of nuclear technology between KRL and the Koreans. According to a written statement by Khan himself, he provided certain enrichment-related equipment and software to the North Koreans, who reciprocated by teaching Pakistani personnel

how to make Krytrons—fast switches used to trigger nuclear warheads.²²

It is less clear where North Korean shipments of UF₆ to Pakistan, destined for Libya in 2000 and 2001, fit into this picture. The North Koreans would have wanted UF₆ to feed their own centrifuges. However, as David Albright observes, Khan appears to have helped the North Koreans set up production of high-quality UF₆ in the first place; since he did not control Pakistan's own stocks, he would have needed another source in order to sell it to the Libyans.²³ North Korea's UF₆ shipments to Pakistan—totaling just 1.6 tons, but supposed to reach 20 tons—may have been the payment for Khan's assistance with the production line in the first place.

At first glance, the reactor deal with Syria does not appear to be a swap. According to CIA Director Hayden, the intelligence community considered whether the reactor in Syria was actually meant for North Korea's own use, but concluded it was meant for the Syrians.²⁴ Still, it is possible that any plutonium it produced would have been shared between the two countries.

Both Syria and North Korea seem to have been actively involved in acquiring components and materials for the reactor, which is suggestive of a joint undertaking. According to one report, Namchongang made a number of purchases for the reactor project, which helped to alert the intelligence community to its existence.²⁵ But the International Atomic Energy Agency later confronted Damascus with evidence that the Syrians themselves had been acquiring “large quantities of graphite and barium sulfate” that appeared to be materials for the reactor.²⁶ In October 2007, shortly after the destruction of the reactor by the Israeli Air Force, the remaining barium sulfate deliveries were cancelled.²⁷ Whatever the exact terms of the agreement, it was not simply Syrians paying and North Koreans delivering. Conceivably, Syria could have financed the reactor by providing the site (and some of the materials) in exchange for a share of the plutonium. North Korea might have sought such an arrangement if its leadership was having second thoughts about the Agreed Framework, but was not prepared to discard it outright.

A Two-way Street

Perhaps the single most convincing hypothesis is “both at once.” In the 1990s and early 2000s, North Korea appears to have been selling its plutonium-production technology to Syria and acquiring uranium-enrichment technology for itself, a process that involved a series of barter deals with Pakistan. Notably, while Namchongang Trading Company was acquiring components for the reactor in Syria, it was simultaneously acquiring centrifuge gear, apparently for use in North Korea.²⁸

There is evidence for a past transition from clandestine acquisition to sales. First, there are the organizational ties between domestic nuclear operations, imports, and exports. According to the UN committee that oversees North Korea sanctions, North Korea General Bureau of Atomic Energy Director Ri Je Son facilitates the operations of both Yongbyon and Namchongang Trading Company.²⁹ Family ties may also be at work; Yun Ho Jin, the director of Namchongang, is alleged to be the son-in-law of Jon Byong Ho, who

oversees the Second Economic Committee of the National Defense Commission, which oversees strategic imports and exports.³⁰

Second, there is the manner in which North Korea acquired its plutonium-production technology. In the 1960s, North Korea's nuclear program relied on Soviet assistance, which was crucial in training North Korean personnel, selecting the Yongbyon site, and supplying a variety of facilities, including a small research reactor and a radiochemical laboratory.³¹ But the story of Pyongyang's nuclear program in the 1970s and 1980s appears to be completely different. While unsuccessfully lobbying the Soviets and other Communist countries for further assistance and training,³² the North Koreans somehow managed to build a small gas-cooled, graphite-moderated reactor—a type previously made only by Britain and France—and to commence work on two larger reactors of the same kind. They also built a facility to convert uranium and prepare fuel for the reactor, and a full-scale reprocessing facility for separating plutonium from spent fuel.

To achieve these milestones, North Korea appears to have mastered exploitation of the nuclear black market. Hwang Jang Yop, the highest-ranking defector from North Korea, spoke vaguely of “several” efforts by North Korea to acquire “plutonium” from unspecified “foreign countries.”³³ It appears that many of the key technologies came from advanced capitalist countries. As in the case of Pakistan, Iraq, and other countries during the same period, some combination of industrial espionage, carelessness, and the willful evasion of export controls carried the day.

Japan seems to have played a particularly important role as a supplier. For example, the gas-graphite reactor at Yongbyon bears a strong resemblance to the Tokai Power Station, a similar but more powerful gas-graphite reactor built by the General Electric Corporation of Britain in Japan's Ibaraki Prefecture in the early 1960s.³⁴ Japanese firms were also the source of at least some of the equipment at the fuel-cycle facilities associated with the reactor. In mid-2007, IAEA inspectors spotted Japanese-made vacuum pumps at the Yongbyon reprocessing facility. Sold in 2003 to a Taiwanese firm, the pumps were subsequently delivered to Namchongang.³⁵

Although they were by no means the world's only offenders, Japanese corporations appear to have opened a virtual supermarket for nuclear proliferators in the 1980s, supplying Libya, Pakistan, and Iran with sensitive equipment.³⁶ Given the ability of other, more distant countries to acquire such equipment from Japan—in Libya's case, an entire uranium conversion facility—North Korea may not have had to look very far for a great deal of its nuclear technology.

Pyongyang's close ties to a segment of Japan's Korean population may have helped. The General Association of Korean Residents in Japan, better known as “Chosen Soren” or “Chongryon,” promotes North Korea's official ideology and is believed to supply Pyongyang with a substantial flow of cash remittances. One of its organs, the Korean Association of Science and Technology (KAST), is suspected of funneling sensitive technologies to North Korea. A series of police raids and arrests on Chosen Soren offices starting in 2005 reportedly found indications of assistance to North Korea in developing advanced weapons systems, including ballistic missiles. There is also suspicion that a senior figure in Japan's plutonium separation pro-

gram may have shared his expertise.³⁷

At some point, Chinese firms also appear to have become important sources for the North Korean nuclear program. Reports in late 2002 alleged that North Korea acquired 20 tons of tributyl phosphate from Chinese companies, meant to supply the reprocessing facility at Yongbyon.³⁸ In general, China has played a large role in transshipment of sensitive equipment and materials from third countries.³⁹

Third, there is a precedent. Although the timeline is longer, the transition from acquisition to sales in the reactor program parallels the trajectory of the North Korean ballistic missile program. Judging by the construction of the gas-graphite reactor at Yongbyon, which began in the late 1970s or early 1980s, North Korea's exploitation of the nuclear black market appears to have started in the 1970s. But only by 1997 did it begin exporting plutonium-production technology to Syria, whether for cash or through some other arrangement.

North Korea also began its missile program in earnest in the 1970s, relying initially on assistance from China, Egypt, and possibly Soviet experts to learn how to manufacture its own versions of Soviet-designed missiles.⁴⁰ Pyongyang began supplying missile technology to Iran and collaborating with Tehran in missile development and production in the mid-1980s. By the early 1990s, North Korea allegedly had supplied ballistic missiles to a long list of countries, including Iran, Syria, Egypt, Libya, and the United Arab Emirates. During the mid-to-late 1990s, its customer list allegedly expanded to Pakistan, Yemen, Vietnam, and perhaps others, including an abortive transaction with Iraq.⁴¹ As in the case of its reactor program, North Korea has continued to rely on foreign-made components and materials, even after becoming a supplier. The shipment of a missile production line to Libya, seized in transit by Indian authorities in June 1999, reportedly included a variety of Chinese and Japanese products such as a three-dimensional measuring device, a computer numerically controlled machine tool, and specialty steel.⁴²

What the Future Holds

As recently as April 2009, Secretary of State Hillary Clinton affirmed that “we do not have any evidence” of current North Korean nuclear export activity.⁴³ But it is unsafe to assume that North Korea has not and will not resume these activities, regardless of which explanation for past behavior one favors.

First, if North Korea is truly prepared to sell nuclear technology to all comers, it will probably find buyers, especially (but not exclusively) in the Middle East, assuming it has not already done so. As Iran continues to defy the international community by enriching uranium and starts operating the Bushehr power reactor—the first nuclear power reactor in the Middle East—its neighbors look on with envy and concern. A senior Egyptian diplomat has remarked that his country will not stand idly by as Iran goes nuclear: “If others are going to use these nuclear weapons to acquire status in the region of the Middle East—let me tell you, we are not going to accept to be second-class citizens in the region of the Middle East.”⁴⁴ Egypt is probably not the only Arab country with this view.

But matching Iran's capabilities will not be easy. The major industrial powers are unlikely to spread enrichment or reprocessing technology any further, A.Q. Khan is out of business, and the world's major intelligence agencies are watching for the appearance of new nuclear smugglers. So, just as in the case of ballistic missiles in previous decades, North Korea's help could prove invaluable to Arab states playing catch-up with Tehran and with each other. North Korea appears to be capable of producing about 300 tons of yellowcake a year and could sell uranium either in this form or some other chemical state, such as UF₆. It could provide help with reprocessing of spent reactor fuel to extract plutonium.⁴⁵ Selling a proven warhead design, as A.Q. Khan has done, is also possible. The chances of detection make another overseas reactor project less likely, but still possible.

Another source of concern from the "cash and carry" perspective is Myanmar. A frequently cited media report alleges that Namchongang has sold unspecified equipment to Myanmar that could be useful in a nuclear program.⁴⁶ But the most detailed evidence available suggests that missiles, not nuclear technology, are the current focus of the strategic trade between the two countries.⁴⁷ One report claims that missile-related transactions date back to 2006, even before the formal resumption of ties between Myanmar and North Korea.⁴⁸

In past cases, a certain period of time elapsed before North Korea moved from delivering missiles to delivering nuclear technology. In Pakistan's case, that gap appears to be roughly 1993 to 2000 (although it is not clear when the Krytron episode might have occurred). For Syria, the gap is roughly 1990 to 1997, with actual reactor construction starting in 2001. Measured against these precedents, it may be that the North Korean-Burmese relationship simply has not had sufficient time to "ripen."

At first blush, the "strategic swaps" hypothesis seems less alarming than "cash and carry," since it would involve fewer possible partners. The possibilities of barter are inherently fewer than those of purchase with money. But in other respects, swaps are more disturbing. First, barterers do not require moving large amounts of money around, making them harder to detect and disrupt. Second, there is already a logical scenario for an exchange between North Korea and Iran. North Korean scientists do not seem to have mastered the temperamental centrifuges supplied by A.Q. Khan. Iran has made considerable progress on this front, but now appears to be seeking new supplies of uranium. An exchange of North Korean uranium (or related technology) for Iranian assistance with centrifuges is entirely possible. Such an arrangement could remove key technology bottlenecks for both countries.

Some experts have already pointed out North Korea's commonality of interests with Iran. Mark Fitzpatrick has cautiously advanced the suggestion that Iran and North Korea "could be pooling scientific resources" related to enrichment, with Iran possibly seeking North Korean help in perfecting its uranium conversion techniques.⁴⁹ Sigfried Hecker and William Liou have made a similar observation, adding that North Korean expertise in mining and metallurgy could be attractive to the Iranians.⁵⁰ Hui Zhang has observed that Iran could "impart" its knowledge of centrifuge manufacturing and operations in an exchange with Pyongyang.⁵¹

Other arrangements are also possible. Should the Iranians decide to move further down the plutonium path,

they may be interested in North Korea's reprocessing technology and plutonium-based bomb design. Regardless of the specifics, some degree of connection between the nuclear programs may already exist. Iranian and North Korean representatives have signed a series of cultural and scientific exchange agreements whose contents have not been publicized.⁵² A report from July 2005 alleged that North Korean nuclear scientists were training Iranian counterparts.⁵³

The most ominous possibility is that both scenarios unfold at the same time, with North Korea selling uranium conversion, reprocessing, a weapons design, and perhaps even reactor technology to Arab countries in particular, while exchanging uranium supplies for Iran's help with enrichment technology. In fact, one reason for Iran to avoid a barter arrangement of this sort would be to prevent A.Q. Khan's enrichment technology from eventually reaching its Arab neighbors.

What can be done to prevent the "worst of both worlds" scenario—where North Korea plays an important role in the stealthy nuclearization of the Middle East and perhaps countries in other regions, the liberation of Iran from its limited uranium supplies, and Pyongyang's own attainment of the ability to enrich uranium on a large scale?

Washington's present approach is to expand and broaden support for a program of interdiction and financial sanctions. This strategy has benefits, but we should not expect too much from it. Interdictions appear to have had little effect on the overall pattern of North Korean arms exports, and cannot be relied upon to stop future nuclear trades. A particularly unsettling feature of past discoveries has been the role of luck. First was the diplomatic breakthrough with Libya in 2003 that doomed the A.Q. Khan network; the ensuing sequence of events unexpectedly revealed North Korea's UF₆ exports to Pakistan. Second was a chance Israeli intelligence coup in late 2006 that brought the Syrian reactor project to light. Equally timely discoveries cannot be assured in the future.

Another possibility is to wait for the Kim regime to collapse. This strategy has proved a thorough disappointment. Since the disintegration of the Soviet Union, North Korea's system has proven surprisingly resilient compared to other communist regimes. As in the case of interdiction, but only more so, to wait for sweeping change is to stake everything on a stroke of luck.

A final strategy for dealing with North Korean nuclear exports is diplomacy. During the Six Party Talks, Pyongyang was unwilling to address the export question, refusing to acknowledge the allegations of foreign intelligence agencies. The talks have broken down, but the North Koreans have recently signaled their willingness to return to the table.⁵⁴ A healthy pessimism is warranted; diplomacy with North Korea has been frustrating, and its success is no better assured than that of any other approach. Still, its chances are better if it is actually attempted. Should negotiations resume in the near future, the United States and its partners must decide whether to raise the export question early on, and what inducements it will take to get North Korea out of the nuclear trade once and for all.

- ¹ “DPRK Foreign Ministry Clarifies Stand on New Measure to Bolster War Deterrent,” Korean Central News Agency, October 3, 2006.
- ² Initially, North Korea was reported to have sent UF6 to Libya. See: David Sanger and William J. Broad, “Tests Said to Tie Deal on Uranium to North Korea,” *New York Times*, February 2, 2005; Dafna Linzer, “U.S. Misled Allies About Nuclear Export: North Korea Sent Material To Pakistan, Not to Libya,” *Washington Post*, March 20, 2005.
- ³ Office of the Director of National Intelligence, “Background Briefing with Senior U.S. Officials on Syria’s Covert Nuclear Reactor and North Korea’s Involvement,” April 24, 2008.
- ⁴ Michael Hayden, Remarks at the Los Angeles World Affairs Council, September 16, 2008.
- ⁵ Yoo Jee-ho, “U.S. official says N. Korean nuclear trade threatens global security,” Yonhap, August 30, 2010.
- ⁶ James Jones, Remarks at the Atlantic Council, May 27, 2009.
- ⁷ Sheena Chestnut, “Illicit Activity and Proliferation: North Korean Smuggling Networks,” *International Security*, Summer 2007, vol. 32, no. 1, pp. 80-111, at pp. 99-100.
- ⁸ Phil Stewart and Jack Kim, “US’s Gates says North Korea’s military ‘more lethal,’” Reuters, October 21, 2009.
- ⁹ “Kim Jong-il Restores Special Department to Swell Coffers,” *Chosun Ilbo*, June 22, 2010.
- ¹⁰ R. Jeffrey Smith and Joby Warrick, “A nuclear power’s act of proliferation,” *Washington Post*, November 13, 2009.
- ¹¹ David Albright and Paul Brannan, “Taking Stock: North Korea’s Uranium Enrichment Program,” Institute for Science and International Security, October 8, 2010. By comparison, Khan never controlled Pakistan’s plutonium-production technology; only its capability for uranium enrichment was in his hands.
- ¹² Peter Slevin, John Lancaster and Kamran Khan, “At Least 7 Nations Tied To Pakistani Nuclear Ring,” *Washington Post*, February 8, 2004. According to a former Israeli intelligence official, Moshe Ya’alon, Khan’s interactions with Syria had a dual purpose: “What we determined was that although Khan was intent on selling to Damascus, he was also keen to use Syria as a conduit to deliver nuclear assistance to Iran.” Quoted in Adrian Levy and Catherine Scott-Clark, *Deception: Pakistan, the United States, and the secret trade in nuclear weapons* (New York: Walker and Company, 2007), p. 256.
- ¹³ David Albright, *Peddling Peril: How the Secret Nuclear Trade Arms America’s Enemies* (New York: Free Press, 2010), pp. 82-87.
- ¹⁴ Christian Ultsch, “Assad: ‘Ohne die USA geht gar nichts,’” *Die Presse* (Vienna), December 18, 2007.
- ¹⁵ IAEA, “Implementation of the NPT Safeguards Agreement in the Socialist People’s Libyan Arab Jamahiriya,” GOV/2008/39, September 12, 2008, Annex, p. A5.
- ¹⁶ Erich Follath and Holger Stark, “The Story of ‘Operation Orchard,’” *Spiegel Online*, November 2, 2009; Michael Bar-Zohar and Nissim Mishal, “The long road to Syria,” *ynetnews.com*, August 26, 2010.
- ¹⁷ “Report to the Security Council from the Panel of Experts established Pursuant to Resolution 1874 (2009),” n.d., p. 20.
- ¹⁸ Kim Yong Hun, “North Korea Obtained HEU from Pakistan,” *DailyNK.com*, August 11, 2010.
- ¹⁹ Alexander Zhebin, “A Political History of Soviet-North Korean Nuclear Cooperation,” in James Clay Moltz and Alexandre Y. Mansourov, eds., *The North Korean Nuclear Program: Security, Strategy, and New Perspectives from Russia* (New York: Routledge, 2000), pp. 27-37, at p. 35. Kim has made at least one public reference to missile sales, mentioning Syria and Iran as customers during an appearance in August 2000. See: “Kim Jong-il’s Dialogue with South Korean Media Heads,” *Chosun Ilbo*, August 13, 2000 (FBIS translation).
- ²⁰ Sharon A. Squassoni, “Weapons of Mass Destruction: Trade Between North Korea and Pakistan,” Congressional Research Service, RL31900, October 11, 2006; Gordon Corera, *Shopping for Bombs* (New York: Oxford University Press, 2006), pp. 90; Levy and Scott-Clark, *Deception*, pp. 256-57.
- ²¹ Levy and Scott-Clark, *Deception*, pp. 245; Shyam Bhatia, *Goodbye Shahzadi: A Political Biography of Benazir Bhutto* (New Delhi: Lotus Collection—Roli Books, 2008), pp. 41-43.
- ²² R. Jeffrey Smith and Joby Warrick, “Pakistani scientist depicts more advanced nuclear program in North Korea,” *Washington Post*, December 28, 2009.
- ²³ Albright, *Peddling Peril*, pp. 163-65.
- ²⁴ Hayden, Remarks at the Los Angeles World Affairs Council.
- ²⁵ Robin Wright and Joby Warrick, “Purchases Linked N. Korean to Syria,” *Washington Post*, May 11, 2008.
- ²⁶ IAEA, “Implementation of the NPT Safeguards Agreement in the Syrian Arab Republic,” GOV/2009/36, June 5, 2009, p. 3.
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