International Missile Trade and the Two Koreas

Peter Hayes

Making and marketing ballistic missiles leads the global arms race. In the nuclear arsenals, developing, testing and deploying more accurate missiles has for many years been more important in increasing lethality and decreasing crisis stability than warhead development. In conventional military forces, missiles have played important roles in recent wars—especially the 1991 Gulf War—and are prestige-laden weapons sought by most militaries.

An increasing number of developing countries are missile-capable due to their independent development of a space booster rocket capability. Many others have a long-run missile option in train as a result of their burgeoning modernization and industrialization. The diffusion of rocket technology is unstoppable in this regard and the world will be forced to turn to combinations of incentives and sanctions to ensure that plowshares are not beaten into swords.

Divided Korea is a unique example of this set of issues. The situation in Korea (including Korean missile activities) are peculiarly influenced by the continuing division of the Korean nation. No other current or likely missile-making or -exporting state exhibits the same degree of political-military volatility or lethal competition. Conversely, the cultural similarities, common history, and geopolitical contiguity of the two Koreas highlight domestic political-economic and institutional factors that help to explain why the two Korea's missile strategies have diverged.

International Missile Trade and the Two Koreas

Peter Hayes

Making and marketing ballistic missiles leads the global arms race. In the nuclear arsenals, developing, testing and deploying more accurate missiles has for many years been more important in increasing lethality and decreasing crisis stability than warhead development. In conventional military forces, missiles have played important roles in recent wars—especially the 1991 Gulf War—and are prestige-laden weapons sought by most militaries.

An increasing number of developing countries are missile-capable due to their independent development of a space booster rocket capability. Many others have a long run missile option in train due to their burgeoning modernization and industrialization. The diffusion of rocket technology is unstoppable in this regard and the world will be forced to turn to combinations of incentives and sanctions to ensure that plowshares are not beaten into swords.[1]

Divided Korea is a unique example of this set of issues. The situation in Korea (including Korean missile activities) are peculiarly influenced by the continuing division of the Korean nation. No other current or likely missile-making or -exporting state exhibits the same

---

1 For an overview of these issues, see J. Nolan, *The Trappings of Power, Ballistic Missiles and the Third World* (Washington: Brookings Institution, 1990); and O. Wilkes, M. van Frank, and P. Hayes, *Chasing Gravity's Rainbow, US Ballistic Missile Testing and Kwajalein Atoll*, (Canberra: Centre for Strategic and Defence Studies, Australian National University, 1991).

degree of political-military volatility or lethal competition. Conversely, the cultural similarities, common history, and geopolitical contiguity of the two Koreas highlight domestic political-economic and institutional factors that help explain why the two Korea's missile strategies have diverged.

This study first examines the missile-related capabilities of both Koreas. It also emphasizes the role of imports or transfers from allies to endow them with initial capacities.

Three major conclusions arise from this study. First, the DPRK will continue to be a renegade supplier of missiles in the immediate and medium term. Second, the ROK is moving inexorably to obtain a missile or booster rocket capability in the medium term. Therefore, the ROK must join the Missile Technology Control Regime (MTCR). A reunited Korea would end the DPRK missile activities, but the fusion of DPRK with ROK capabilities would enhance the need to expand the MTCR to include the ROK. Finally, the Regime is inadequate to the task of curtailing either DPRK or ROK missile development activities and should be supplemented by other global or regional incentives to forego missile-related exports.

Definitions

In this study, "ballistic missile" is taken to mean a military weapon that uses a projectile to deliver a warhead to range of 50 or more kilometers. To be "ballistic," the missile must arrive by following "gravity's rainbow" rather than under its own power. Multiple rocket launchers are included; long range artillery pieces are not. One exception to the general rule followed in this study is the inclusion of cruise missiles (which are not ballistic).

A second important conceptual issue is "capability." Here, capability is defined to encompass the organizational, learning, and research and development techniques to design, manufacture, and deploy missiles, as well as such physical hardware that might be traded imported or exported. Thus, an important export (an example of which is given later in the DPRK-Egyptian transaction) is the ability to design and construct a missile manufacturing facility, as well as the missiles themselves. Relatedly, the capacity to train a

foreign entity in how to organize and indoctrinate its military to use a missile in military operations is also of great importance.

North Korean Missile Capabilities

Despite its technological backwardness, the North Korea (DPRK) has managed to produce a variety of missiles. It is capable of supplying materials for missile bodies, warheads, and propellants. It can manufacture and assemble effective short and intermediate range missile systems. These are their known missile production entities: Changgwang Credit Corporation, Lyongaksan Machineries and Equipment Export Corporation, Nodong 1 Scud Development Project, and the ordnance factory at Chongin.[2]

Its electronics capabilities are still primitive, in spite of its acquisition of a UN Development Program–supported integrated circuit factory known as the Pyongyang Semiconductor Manufacturing Factory (an obsolete facility obtained from India, the only supplier willing to circumvent COCOM controls, according to informed sources).[3] It has no ability to develop infrared seeker systems, although it must be producing an infrared system used on SA-7s made in the DPRK, whether by imitation or import-and-assembly. Its high-precision technological capabilities remain elementary.[4]

The DPRK missile program is also hampered by a lack of funds and by its poorly skilled work force. That it continues to commit so many valuable and scarce resources to such a large-scope and -scale missile program—especially when considered together with its nuclear research and development program—indicates its high priority in the eyes of the North Korean leadership. But neither Kim Il Sung's "on-the-spot" guidance nor his voluntarist ideology can

---

2 US State Department, Bureau of Politico-Military Affairs, "Imposition of Missile Proliferation Sanctions against North Korean and Syrian Entities," *Federal Register*, Vol. 57, No. 130, July 7, 1992, p. 29924; US Department of Commerce, Bureau of Export Administration, "Expansion of Foreign Policy Controls; Missile Technology Destinations," *Federal Register*, Vol. 57, No. 116, June 16, 1992, p. 26774.

3 Interview with UN Development Program official, Pyongyang, October 4, 1991.

4 *Korea Herald*, January 29, 1991.

overcome these absolute limitations. These constraints dictate that the DPRK can climb only to the obsolete rungs at the low end of the missile research and development ladder.

DPRK Surface-to-Surface Missiles

The DPRK missile program began with shorter-range ballistic weapons such as artillery shells and multiple rocket launchers, progressing onto longer-range and more potent SSMs and SAMs. The main precursor of the North Korean Scud-B program involved the first SSMs obtained following the 1967 DPRK-Soviet agreement to resume military aid.[5] The first FROG (free-rocket-over-ground) missiles were transferred about 1969–70 when Frog-3, Frog-5 and Frog-7A missiles came from the Soviet Union.

In the mid-1970s, the DPRK initiated a program to produce indigenously a local version of the Frog-7A. It remains unknown publicly whether North Korea ever actually produced any Frog missiles. The Soviets had supplied only high explosive warheads with the original Frog missiles. One American source contends that the North produced a chemical warhead for the Frog systems.[6]

One military analyst suggests that the DPRK effort to reverse-engineer the Frog-5 was a direct response to US forces deploying Lance missiles in the South or (more likely) the US transfer of Nike Hercules SAMs and Honest John SSMs to the ROK after 1976.[7] However, the Lance was first deployed (for a short period during exercises) to the ROK in 1971, well before the DPRK initiated its Frog program; and the United States transferred the Nike Hercules after 1976, after the DPRK began to develop its own Frogs. The Hawk was not transferred until 1979.[8]

---

5 G. Jacobs, "North Korea's Arms Industry, Development and Progress," *Asian Defence Journal*, March 1989, p. 31.

6 J. Bermudez and S. Carus, "The North Korean 'Scud B' Programme," *Jane's Soviet Intelligence Review*, April 1989, p. 177.

7 G. Jacobs, "North Korea's Arms Industry: Development and Progress," *Asian Defence Journal*, No. 3, 1989, p. 32.

8 See P. Hayes, *Pacific Powderkeg, American Nuclear Dilemmas in Korea*, (New York: Free Press, 1990). The Lance was not stationed in the ROK until February

SCUD-B: In February 1991 it was said that the DPRK had allegedly been producing about fifty Scud-B missiles per year since 1987.[9] A 1989 US study, however, estimated that the DPRK produces 88–110 Scud-B missiles per year.[10]

A South Korean source states that the DPRK imported Soviet-made Scud missiles from Egypt in 1983.[11] A US source puts the transfer much earlier—in 1976—at which time the North ended its program to upgrade the Frog-7A.[12] Sales to Iran also played an important role in financing the DPRK program (see below).

Beginning around 1984–87, the DPRK test-fired a variant of a North Korean–produced Scud-B missile.[13] As of mid-1992, all tests were over the Sea of Japan.[14]

Since 1987, a missile plant near Pyongyang has produced the operational version of the missile.[15] One report times the deployment of operational Scud-B missiles in the DPRK military as late 1988.[16] North Korea likely deploys the missiles in brigade-sized units of twelve to eighteen launchers.[17] It has been suggested that the DPRK used 156 heavy-duty logging trucks imported from Nissan as transporters for mobile Scuds.[18]

1987 and was withdrawn in late 1991 or early 1992.

9 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo*, February 8, 1991.

10 J. Bermudez and W.S. Carus, *Missile Development in the DPRK*, (mimeo), (New York and Washington: Woodmore, April 26, 1989), p. 17.

11 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo*, February 8, 1991, cited in JPRS-TND-91-008, May 31, 1991.

12 J. Bermudez and S. Carus, "The North Korean 'Scud B' Programme," p. 177.

13 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo.*

14 J. Bermudez, "New Developments in North Korean Missile Programme," *Jane's Soviet Intelligence Review,* August 1990, p. 345.

15 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo*, February 8, 1991.

16 J. Bermudez and W. S. Carus, *Missile Development in the DPRK*, p. 12.

17 US Defense Intelligence Agency, *North Korea: The Foundations for Military Power*, Washington, DC, October 1991, p. 62.

18 D. Sneider, "Japanese investigate use of trucks sold to North Korea," *Defence News*, June 15, 1988, p. 14.

As the Scud missile is not very accurate, the DPRK deployment has generated speculation as to its possible arming with nuclear or chemical warheads. American officials believe that it would take the DPRK many years to develop a miniaturized nuclear device that would fit on top of a Scud rather than onto a truck, railroad boxcar, or military transport plane.[19] In July 1991, the ROK Ministry of National Defense claimed that the North had already produced more than a thousand tons of chemical warheads for its Scud brigades.[20] This estimate may be hyperbole as the North is said to field only 54 surface-surface missile launchers[21] and, at its estimated annual output of fifty Scuds, has produced only about 250 Scud-Bs (including exports) since 1987.

In 1990, South Korean newspapers reported US media stories that two units of Scud-B missile launch pads were being built in the Demilitarized Zone itself. These sites were reportedly surrounded by SA-5 SAM launchers and radars. In February 1991, a South Korean government official stated that the DPRK had at least twelve launchers stationed 40–50 km north of the Demilitarized Zone.[22]

Modified SCUD: South Korean sources state that the DPRK began developing a modified version of the Scud in 1988 (This missile is sometimes referred to as the Scud-PIP or "product improved"). Major reasons for DPRK to develop the extended range Scud-B included: (1) a drive to earn foreign exchange (or to barter missiles for oil or rescheduled debt to oil suppliers such as Iran); (2) the inability of the DPRK-produced Scud-B to hit rear areas of the ROK and US bases in Japan as well as Japan itself; (3) a wish to offset ROK ballistic missiles acquired from the United States; (4) a desire to compensate for its abandonment in the late eighties by its major

---

19 B. Gertz, "North Korea fortifies air defenses," *Washington Times*, November 28, 1991.

20 Yonhap Radio (Seoul), "North Said to Possess 1,000 Tons of Warheads," July 15, 1991; FBIS-EAS-91-135, July 15, 1991, p. 23.

21 USDIA, *North Korea: The Foundations for Military Power*, p. 42.

22 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo.*

security patron, the former Soviet Union;[23] (5) the acquisition of political prestige among developing countries; (6) and a desire to achieve regional power status by virtue of its missile reach.

It is noteworthy that although the DPRK military receives a national budgetary allocation, it is largely self-funding. To this end, it controls a major portion of the North Korean industrial base, including exports such as Scud missiles. Thus, the missile export push from North Korea may relate as much to the DPRK military's desire to alleviate its own budgetary squeeze as to reducing the current account deficit of the whole DPRK.

Joseph Bermudez suggests that Egypt and the DPRK agreed in the mid-seventies to cooperate in upgrading the Scud-B after the Egyptian-Soviet security alliance ruptured in 1976.[24] However, technological deficiencies forced the partners to rely on the PRC to supply the requisite design expertise and a better gyroscope for the improved guidance system.[25] The PRC connection was reportedly canceled in 1978 after the fall of the Gang of Four. In the early eighties, Egypt and the DPRK are said to have exchanged information and technicians to permit the missile to be reverse-engineered and upgraded, leading to the transfer of a small number of Egyptian Scud-Bs to the DPRK in about 1981.[26] An unconfirmed report of 1988 stated that the DPRK helped Egypt's defense industry to build its own Scud-B production plant and sent technicians to Egypt to work on the project.[27] According to intelligence sources cited by Bermudez, the PRC also supplied rocket engine design, production,

---

23 "USSR offers latest MiGs to South Korea," *SUPAR Report* (Honolulu), report 11, July 1991, p. 77. In April 1991, for example, the former Soviet Union indicated unofficially that it would offer its state-of-the-art MiG-31 fighter aircraft to the DPRK's archenemy, the ROK.

24 North Korea supported Egypt in the 1973 war against Israel, reportedly fielding a squadron of MiG-21 fighter pilots.

25 J. Bermudez, "New Developments in North Korean Missile Programme," p. 343.

26 J. Bermudez and S. Carus, "The North Korean 'Scud B' Programme," p. 180. One source states that the two states contracted in 1984 for the DPRK to supply technical assistance to Egypt's program to develop the SA-2 or Morning Bird missile in Egypt.

27 *Flight International*, "Korea helps Egypt build Scud-B," July 16, 1988, p. 19.

metallurgical, and airframe technology to the DPRK-Egyptian project.[28]

In 1989, an Associated Press journalist suggested that the DPRK stepped into the breach after Egypt pulled out of a joint project with Argentina and Iraq to produce the Condor/Badr 2000 intermediate range missile. The article cited an Israeli military analyst as saying that the DPRK may be renewing old Soviet Scuds for Egypt, or upgrading them with improved components such as guidance systems.[29]

The North may also have attempted to obtain necessary technology for the program on the gray or black market. In 1984, for example, two persons were charged in New York with attempting to smuggle to the DPRK electronic components used in missile guidance and night vision systems.[30]

A Japanese source claims that the DPRK also tried, from 1986 to 1988, to acquire electronic equipment and information on cruise missile guidance systems from Japanese-Korean scientists, organizations, trading companies, and from Japanese researchers invited to visit the North. The report also cited an unconfirmed story attributed to a US official source that the DPRK had obtained the blueprint for part of the Nike SSM guidance system for 300 million yen.[31] Some analysts explain Japan's October 1988 expansion of its ban on missile system exports to cover missile-related components (including production machinery, rockets, guidance systems and propellants) as a response to these DPRK efforts.[32] The modified missile is said to be ready for manufacture and deployment sometime in 1992.[33]

---

28 J. Bermudez, "New Developments in North Korea Missile Programme," p. 344.

29 N. Tatro, "North Korean Missile Help Sought By Syria, Egypt," Associated Press, December 29, 1989.

30 J. Bermudez and S. Carus, "The North Korean 'Scud B' Programme," p. 177.

31 Soichiro Aso, "Monthly Discusses DPRK Nuclear Technology," *Shokun* (Tokyo), May 1990, p. 78-91, in FBIS-EAS-90-077, April 20, 1990, pp. 50–55.

32 J. Bermudez and W.S. Carus, *Missile Development in the DPRK*, p. 14.

33 J. Bermudez, "New Developments in North Korean Missile Programme," p. 345.

The South Korean press reported in 1991 that US intelligence sources had confirmed that the modified Scuds were loaded at a military test site north of Pyongyang in May 1990 and that the DPRK was preparing a test firing from a coastal region of North Hamkyong Province.[34]

In November 1990, the US media reported US intelligence leaks that the North was preparing a second test from near Nodong of the modified Scud after the first test ended in apparent failure in an explosion at a launch site near To Kol on the east coast. These articles also identified two nearby radar sites about 30 km from the launch site for missile test tracking. The US sources estimated the range of the missile to be 520–780 km depending on the size of its warhead.[35] In October 1991, the DPRK finally successfully test-fired the missile into the Sea of Japan.[36]

DPRK Cruise Missiles

The DPRK probably also fields twelve to fifteen SS-C-2b Samlet anti-ship cruise missiles (which arrived from the Soviet Union some time after 1967) as well as Chinese HY-2 Silkworm missile batteries.[37]

The US Defense Intelligence Agency states that the Samlet coastal defense missile has been observed in North Korea since September 1965.[38] The DPRK became capable of manufacturing the Samlet sometime between 1975 and 1985.[39]

---

34 "DPRK's Advanced Weapons Analyzed," *Hanguk Ilbo.*

35 B. Gertz, "North Korea set to test missiles," *Washington Times*, November 12, 1990, sec. A.

36 Associated Press (Seoul), "North Korea Successfully Test-Fires Mobile Scud Missile," October 4, 1991.

37 J. Bermudez and S. Carus, "The North Korean 'Scud B' Programme," p. 179.

38 US Defense Intelligence Agency, *North Korean Armed Forces Handbook*, DDI-2680-37-77, Washington, DC, July 1977, p. 3-3, released under a US Freedom of Information Act request.

39 USDIA, *North Korea: The Foundations for Military Power*, p. 35.

The DPRK Navy's missile attack boats were equipped by the Soviets with SS-N-2A/Styx antiship missiles after 1967 although there is no known local manufacture nor export of these missiles by the DPRK.[40]

There is no evidence that the DPRK has replicated that Chinese version of the Styx, the Silkworm.[41] Two US analysts have suggested, however, that the DPRK initially produced Silkworm components in the mid-seventies, but later produced entire systems including propulsion units and guidance systems (incorporating Chinese supplied parts) in the early eighties. However, the DPRK has served as a conduit for Chinese arms shipments to Iran and possibly Iraq. In 1986, Iran obtained the Silkworm, which it fired at ships anchored in Kuwaiti waters the following year. Under intense international pressure, the PRC agreed to halt the supply, but the Iranians continued to field the weapon.

North Korea's willingness to supply Iran enabled China to deny, in 1987 and 1988, that it was exporting Silkworms by claiming that third parties beyond its control were providing the missiles.[42] The Silkworms were shipped reportedly either by cargo vessel or via Iranian B-747 cargo planes flying from Pyongyang via the PRC directly to Iran, overflying Afghanistan or the former Soviet Union.[43] In December 1986, the Iranian Government obligingly rescheduled the entire DPRK debt for oil.

DPRK Surface-to-Air Missiles

The DPRK deploys a dense network of 54 surface-air missile sites. Excluding the SA-7, it has about 800 air defense missiles, including the SA-2, SA-3, SA-5; and more than 5,000 hand-held SA-7 surface-to-air missiles.[44]

---

40 G. Jacobs, "North Korea's Arms Industry, Development and Progress," *Asian Defence Journal*, March 1989, p. 31.

41 J. Bermudez and W. S. Carus, *Missile Development in the DPRK*, p. 7.

42 USDIA, *North Korea: The Foundations for Military Power*, p. 24.

43 J. Bermudez and W. S. Carus, *Missile Development in the DPRK*, p. 25.

44 USDIA, *North Korea: The Foundations for Military Power*, p. 42.

SA-2 Guideline SAM: North Korea may have acquired the SA-2 because it was frustrated by the increasing numbers of American U-2 high altitude overflights of the North flown from Japan and Taiwan.[45] North Korea is believed to have two types of this missile, the SA-2b and SA-2f.[46] The SA-2/Guideline missile provides medium-range, medium-altitude point defense for cities and airfields and a barrier defense along the Demilitarized Zone.[47] In the mid-eighties, the DPRK reportedly transferred this technology to Egypt to facilitate Egypt's variant of the SA-2, the Morning Bird missile.[48]

Joseph Bermudez suggests that the DPRK obtained technology from the PRC that enabled it indigenously to maintain, modify and upgrade its SA-2s. After the Soviets refused to deliver upgrades of the system, the DPRK asked China to supply its own reverse-engineered version of the SA-2. The Soviet refusal may have been the pivotal event that motivated the DPRK to establish an indigenous missile capability.

SA-3 GOA SAM: In the mid-eighties, DPRK-Soviet security relations improved. In 1985, the Soviet Union supplied the DPRK with the SA-3/GOA SAM (and associated launchers) which provides short-range defense for major cities against low-flying aircraft or helicopters.[49]

SA-5/GAMMON SAM: North Korea is said to have imported about thirty SA-5s and the related Tin Shield early warning–ground intercept radar from the former Soviet Union after 1987.[50] In 1987, the DPRK deployed the SA-5 missiles in the southern sector along with early warning radars.[51] In June 1988, a US account stated that a new batch of SA-5s was installed in April–May 1988 at four sites

---

45 J. Bermudez, *North Korean SAM Forces*, (mimeo) (New York: Merrick May 15, 1988), p. 1.

46 USDIA, *North Korean Armed Forces Handbook*, p. 2-67.

47 USDIA, *North Korea: The Foundations for Military Power*, p. 51.

48 J. Bermudez, *North Korean SAM Forces*, p. 3.

49 USDIA, *North Korea: The Foundations for Military Power*, p. 51.

50 J. Bermudez, *North Korean SAM Forces*, p. 4.

51 USDIA, *North Korea: The Foundations for Military Power*, p. 51.

about 60 km north of the Demilitarized Zone. An official noted that they could hit air traffic into Kimpo International Airport and that it was part of the war of nerves against the ROK during the Olympic Games.[52]

SA-7 SAM: The shoulder-fired SA-7 SAM is portable and is used to attack low-altitude, low-speed aircraft. A South Korean source states that the SA-7 was introduced from the Soviet Union in 1974.[53] South Korean authorities claim that the North has deployed twelve of these mobile units 40–50 km north of the Korean Demilitarized Zone while the Pentagon stated in 1990 that 54 SA-7 units exist. The SA-5 and SA-7 SAMs are deployed in fifty bases spread over North Korea and around key sites such as airports and military facilities. South Korean sources state that the DPRK has produced about one hundred SA-7 SAMs per year since 1979 at an ordnance factory in Chongin.[54]

South Korean Missile Capabilities

South Korea's capability to manufacture and export missiles derives primarily from its modification of missiles transferred by its security patron, the United States. Consequently, the ROK has not imported theater- or intermediate-range missiles to date nor developed self-reliant missile design and production capabilities.

Since the mid-seventies, however, the ROK has developed an indigenous missile production capability to manufacture indigenous rockets and parts or systems for exports. In the longer run (after 2000), South Korea is likely to become an active participant in the world aerospace and space industries. At that time, the ROK would be space booster rocket- and therefore ICBM-capable. To date,

---

52 P. Almond, "North Korea places missiles near DMZ," *Washington Times*, June 7, 1988.

53 *Hanguk Ilbo*, "North's Production, Export of Weapons Described," February 26, 1991, p. 15, cited in FBIS-EAS-91-041, March 1, 1991, p. 30.

54 *Hanguk Ilbo*, "DPRK's Advanced Weapons Analyzed."

South Korean Firms With Missile-Relevant Capabilities

Name	Activity
Doo Won Heavy Industrial Co.	Missile body
Sam Sun Industrial Co.	Kooryong multiple rocket tube
Daewoo Heavy Industries	Aircraft fuselage and parts
Tong Myung Heavy Industries Co.	Hydraulic system for Nike Hercules missile and launcher and multiple rocket launcher
Chun Ji Industrial Co.	Missile components
Hankuk Fiberglass Co.	Major missile products
Samsung Aerospace Industries	Rockets and propulsion systems

Source: Korean Defense Industry Association, *Korean Defense Business Directory*, Seoul, no date, circa 1991.

however, the ROK government has not committed itself to that goal. Nor has the ROK exported any missiles, and it has little to offer the international missile market in the short run.

ROK Acquisition and Modification of US Missiles

Since 1953, the United States has deployed a long list of ballistic and cruise missiles in the ROK. Until the mid-seventies, it retained sole control over weapons, crucial communications and intelligence assets, and major missile delivery systems. To compensate for his withdrawal of US troops, President Jimmy Carter authorized that US Nike Hercules and Hawk missiles left by departing US forces be transferred to ROK forces.

NIKE HERCULES Missile: The indigenous ROK missile research and development capability began with a US Military Aid and Advisory Group–supervised maintenance facility for US Hawk and Nike Hercules missiles, which commenced in 1972.[55] The ROK Army's missile maintenance depot was known as Project Silver River.[56]

---

55 US Senate, *US Troop Withdrawal from the Republic of Korea, A Report to the Committee on Foreign Relations by Senators Hubert H. Humphrey and John Glenn*, (Washington: 1978), US Government Printing Office, p. 53.

56 US Forces Korea, Eighth US Army, *1976 Annual Historical Report*, (Seoul:

These efforts were organized as the ROK Army Nike Hercules Cooperative Engineering Program and the ROK Army's Nike Hercules Improvement Program.

ROK personnel were trained in 1975 by the US military and Raytheon Corporation to operate and improve a ROK commercial missile maintenance operation established in late 1974. The techniques transferred to the South Koreans included electronics, conventional warheads, and conversion to surface-surface operation.[57] Training of ROK Army personnel in the Nike system began in January 1975. A core group of fifty-five ROK Army personnel was sent to Fort Bliss, Texas, and Redstone Arsenal, Alabama, where they learned the mechanics of the system. Another 106 South Korean maintenance personnel were trained at the Nike Hercules Training Center at Taegu in South Korea. South Korean troops augmenting US forces in Korea provided 703 less-highly trained personnel who were infused into the six US firing batteries. In May 1977, US Forces Korea was transferring Nike Hercules battalions to the ROK.[58]

On July 1, 1977, the Second Battalion of the US 44th Air Defense Artillery—then the largest Nike Hercules battalion in the world—was turned over to the ROK Army which redesignated it the 38th ADA (Air Defense Artillery) of the ROKAADCOM (Republic of Korea Army Air Defense Command). Even then, these weapons remained under US operational control due to the combined command arrangement implemented in 1978.[59]

In 1977 the ROKAADCOM had two air defense artillery brigades. The First Brigade was assigned two Basic Hawk battalions, a Nike

---

1977), p. vi, released under a US Freedom of Information Act.

57 J. Nolan, *Trappings of Power, Ballistic Missiles in the Third World* (Washington: *Brookings*, 1991), p. 50.

58 US House of Representatives, Committee on Armed Services, *Review of the Policy Decision to Withdraw United States Ground Forces from Korea* (Hearings), (Washington: US Government Printing Office, 1978), p. 35.

59 P. Roming, "Partners in Defense," 38th Air Defense Artillery Brigade, Republic of Korea Army Air Defense Command, Air Defense, July–September, 1977, pp. 7–8.

Hercules battalion, and a weapons battery. The Second Brigade had a Basic Hawk battalion, a weapons battery, and a newly transferred Nike Hercules battalion.[60] In 1978, the ROK military procured from US forces in Korea two additional Nike Hercules batteries.[61]

Upon receipt of the Nike Hercules, the South Korean military promptly test fired it in its surface-surface mode on September 26, 1978 in South Chungchong Province. Many accounts of this event have incorrectly characterized the activity as modifying the US missile. However, the Nike Hercules had been assigned a ground-to-ground mission ever since 1960. All that was required of the ROK military was to reset the target range, azimuth, and elevation in the target tracking radar, and dial the correct settings on the computer.[62] The whole operation was carried out by the ROK Agency for Defense Development.[63] In 1991, the ROK had 200 Nike Hercules missiles organized into two battalions at ten sites.[64]

KOORYONG Multiple Rocket Launcher: In the same year, the ROK Army advertised its development and successful testing of a domestically produced multiple rocket launcher, the 130-mm, 30 round Kooryong MRL manufactured by Daewoo Heavy Industries. The rocket propulsion system for the Kooryong MRL was developed by Samsung Aerospace Industries in December 1977 for the ROK Army.[65] As of mid-1992, Korean and American officials state that the

---

60 Ibid., p. 7.

61 US Department of Defense, "Report on Korea 1978," mimeo report to US Congress, 1978, p. 4, released under a US Freedom of Information Act request.

62 US Army, "Improved Nike Hercules in Surface-to-Surface Role," *Field Manual 44-95*, Figure 2-12.

63 Kim Ki-sok, "The Development Process of National Defense Science and Technology and Directions of Future Development," January 1989, pp. 36–51; in FBIS-EAS-89-056, March 24, 1989, p. 25; Ha Young-sun, "South Korea," in J. Katz, ed., *Arms Production in Developing Countries* (Lexington Books, 1984), p. 228.

64 International Institute for Strategic Studies, *The Military Balance, 1991–1992*, (London: Brasseys,1991), p. 169.

65 M. Banjamin, "South Korea's Aerospace Industry," *Asian Defence Journal*, December, 1990, p. 83.

ROK has not exported any Kooryong MRLs because its price is uncompetitive.

HAWK Missile: The US Army introduced the Hawk missile into South Korea in August 1960. The MIM-23B Improved Hawk has been deployed with the US Army since 1972. In 1977, forty ROK Army officers already experienced in basic Hawk operations, were sent to Fort Bliss, Texas, where they were trained in Improved Hawk maintenance.[66] In May 1977, many of the Hawk battalions had already been turned over to the ROK as part of the force compensation package associated with Carter's withdrawal policy.[67] In 1991, the ROK had 110 Hawk missiles organized into three battalions at 24 sites.[68]

HONEST JOHN Missile: When the Honest Johns were first transferred to the ROK military remains uncertain. In 1972, the ROK already had one Honest John missile battalion.[69] In 1976, the US Army had decided to deactivate its Honest Johns in the ROK, even before President Jimmy Carter's election.[70] Certainly, the Honest Johns had been transferred by the time the Pentagon audited the activity in September 1978.[71] In 1979, the last active US Honest John battalion retired from South Korea. Its equipment and missiles were

---

66 P. Roming, p. 8.

67 US House of Representatives, Committee on Armed Services, *Review of the Policy Decision to Withdraw United States Ground Forces from Korea*, p. 35.

68 IISS, *The Military Balance, 1991–1992*, p. 169.

69 W. Cunningham, *Arms Control in Northeast Asia*, a case study, Senior Seminar in Foreign Policy, Foreign Service Institute, US State Department, May 1972, p. 4, declassified under a US Freedom of Information Act request.

70 US Senate, Subcommittee of the Committee on Appropriations, *Military Construction Appropriations for Fiscal Year 1980* (Hearings), (Washington: US Government Printing Office, 1979), p. 181.

71 Defense Audit Service, "Summary Report on the Interservice Review of US Force Reductions in Korea," Report No. 953, Arlington, Virginia, September 29, 1978, p. 1, partly declassified under a US Freedom of Information Act request.

turned over to ROK Army forces.[72] In 1991, the ROK had twelve Honest John missiles organized into two battalions.[73]

LANCE: In 1973, shortly after the nuclear-capable Lance missile entered the US Army arsenal, the missile was included in US Forces Korea's operational planning and was briefly deployed to Korea during annual exercises. The US Army stationed its first battery of Lance missiles in the ROK on February 9, 1987. The battery became operational in early March.[74] Although the ROK Army requested the Lance from the United States during the Carter withdrawal program, this request was refused.[75] The last US Lance unit withdrew from the ROK in early 1992, probably as part of the US withdrawal of tactical nuclear weapons from Korea at that time. As far as is known, ROK forces played no direct role in Lance deployments in Korea.

HARPOON and HARM Missiles: In 1978, the ROK purchased Harpoon antiship missiles (and other air-to-air missiles).[76] The ROK program to develop a locally made fighter-bomber attempted to obtain US Harpoon antiship and the Harm high-speed anti-radiation missiles.[77] The ROK Navy is now armed with Harpoon, Standard, and Exocet missiles imported from foreign suppliers.

---

72 T. Cochran *et al.*, *Nuclear Weapons Databook, US Nuclear Forces and Capabilities*, Ballinger, Cambridge, Massachusetts, 1984, p. 283.

73 IISS, *The Military Balance, 1991–1992*, p. 169.

74 Commander, US Forces Korea, "Quarterly Report to SecDef," cable 050310Z to CINCPAC, March 1987, partly declassified under a US Freedom of Information Act request.

75 US Senate, *US Troop Withdrawal from the Republic of Korea, A Report to the Committee on Foreign Relations by Senators Hubert H. Humphrey and John Glenn*, (Washington: US Government Printing Office, 1978), p. 46.

76 US Department of Defense, "Report on Korea 1978," p. 4.

77 These firms are Samsung Aerospace Industries (capacities include jet rocket propulsion systems; jet engine assembly); Daewoo Heavy Industries Aerospace Production Division/Daewoo Sikorsky (inhouse design facility equipped with Apollo DN-3000 and IBM-4341-P-12 CAD/CAM and 5-axis numerical control machines; a 3,000-ton (the world's strongest) aluminum extrusion machine; nose cones; composite structures; fuselage fabrication; nacelle/thrust reversers); and Korean Air's Aerospace Division (fuel tanks; jet engine maintenance and modification; jet and helicopter assembly); Sammi Augusta; and Hyundai (avionics). "FX Fighter Program to Set Stage for Air Force Modernization Plan,"

ATLAS CENTAUR IRBM: Although Carter reversed his withdrawal policy in 1978, the ROK military continued to seek additional ballistic missile capability. In 1979, for example, it tried to acquire the US Atlas Centraur IRBM. It remains unclear whether the missile software, designs, and hardware that the ROK bought were actually transferred or blocked by the State Department under pressure from the US Congress. The sale reportedly included nose cone materials, alloys, guidance systems, specifications, engineering drawings, instructions, and assembly equipment.[78]

PATRIOT Missile: After the Gulf War, the ROK expressed interest in acquiring the Patriot SAM, and the Patriot was deployed briefly to the South during US-ROK exercises in 1992.[79] However, the fact that the Patriot is a point-defense weapon of little use in defending large areas, and has almost no time to react to a DPRK Scud attack, led the ROK government not to seek the Patriot after all.[80] Relatedly, the ROK government registered as an ally interested in participating in joint research with the US Strategic Defence Initiative Organization but no concrete capability is believed to have come of this connection.

Indigenous ROK Missile Research and Development Capabilities

Under President Park Chung Hee, the ROK began to gather the requisite resources to design and develop its own missiles. Indeed, a CINCPAC study team noted in May 1971 that the Research Agency for Defense Science (established in August 1970 to increase defense industrial self sufficiency) was allocating scarce personnel and laboratory resources to "relatively sophisticated areas such as guided (missile) weapons and laser application"—even before basic production engineering functions had been addressed.[81] The

---

Aviation Week and Space Technology, June 12, 1989, p. 195.

78 See Representative A. Beilenson, letter to US Secretary of State, August 20, 1979, released under US Freedom of Information Act request to author.

79 S. Rosenfeld, "Korean Gamble," *Washington Post*, December 20, 1991.

80 D. Sanger, "Jittery Asia Has Visions of a Nuclear North Korea," *New York Times*, April 7, 1991, sec. E.

81 CINCPAC Study Team, *An Evaluation of Possible US Support to Republic of*

Agency's staff included Ku Sang Hae, a doctoral graduate of the University of Saskatchewan and specialist in the field of rocket engineering.

In December 1975 the ROK government purchased the Lockheed Aircraft Corporation's complete facilities for manufacturing solid-fueled rocket motors. Most of the production equipment of the now-defunct Lockheed Propulsion Company (then near Redlands, California) was shipped to South Korea in 1978. The ROK paid two million dollars for the equipment, which produces motors for only two purposes; either for propelling military missiles and rockets; or for space launch rockets. Lockheed had tried unsuccessfully for more than a year and a half to obtain US government approval for the sale and to set up a training program to teach ROK personnel how to manufacture solid rocket propellant, the same kind used in Minuteman and Polaris missiles. Lockheed later dropped the plan to provide training and technology transfer to the ROK and sold its plant to the Berkeley-based Pacific International Corporation which managed to obtain a US Commerce Department licence to export the equipment.[82]

The ROK continued its own ballistic missile research and development program until about 1980 when it was discontinued for lack of finance and due to US pressure.[83]

ROK SAM and SSMs: The ROK missile program revived in 1990 when the Agency for Defense Development initiated a program that would indigenously manufacture a SAM to replace the existing Nike Hercules SAMs, and an SSM to replace the US-supplied Honest John and US-controlled Lance missiles in South Korea. The SAM project entails fabricating a version of the French defense firm Thomson-CSF's Crotale SAM. The Crotale is a SAM designed for antiaircraft defense of armored formations and surface vessels.[84]

Korea Research, Development, Test and Evaluation Activities, Honolulu, May 25, 1971, p. 16.

82 *DMS Market Intelligence Report*, "South Korea Summary," Greenwich, Connecticut, 1978, p. 12.

83 Interview, former US ambassador to South Korea.

84 Jane's, *Missiles*, DMS Market Intelligence Report, Alexandria, Virginia, 1989;

The ROK version reportedly will use ducted motors to propel and maneuver the rocket. Goldstar Precision is developing a semi-active homing head and an infrared proximity fuse. Live tests were planned for late 1991. Daewoo Heavy Industries Aerospace Product Division is also involved in developing the missile.[85] Samsung Aerospace Industries signed a contract in November 1989 with Thompson-CSF to build the SAM system under licence. Samsung has two facilities located at Changwon, and a third being built at Sachon.[86] Samsung was to deliver operational missiles in early 1992.[87]

The ROK is also developing a group of SSMs with ranges from 100–900 km. Samsung is heading a consortium of companies to produce the SSMs. The ROK may be developing penetration warheads for these missiles.[88]

Role of Agency for Defense Development: The ROK Agency for Defence Development is crucial to both these efforts, providing funds, managing research and development programs, and integrating systems developed under contract by different private firms (as with the Kooryong MRL mentioned earlier). This mix of public and private enterprise in the South contrasts with the North Korean model of military-owned and -managed missile enterprises.

Aerospace Sector

In the 1990s, the ROK military pushed for greater autonomy and self reliance from its US counterpart.[89] But just as one has to walk before running, so it helps to fly before going ballistic. The growth of its aerospace industry will endow the ROK with a variety of missile-relevant capabilities. South Korea aims to have a $10 billion annual aerospace industry by 2000. The program began in 1978 when ROK

France, international section, p. 2.

85 M. Banjamin, p. 83.

86 Ibid., p. 84.

87 E. Dantes, "Missile Threat," *Asian Defence Journal*, December 1990, p. 50.

88 Ibid.

89 J. Morrocco, "South Korea Drives Toward Greater Military Autonomy," *Aviation Week and Space Technology*, June 12, 1989, p. 177.

President Park Chung Hee promulgated the Aerospace Industry Development Act.[90]

In April 1990, former President Roh Tae Woo created a new aerospace committee and drafted an Integrated Aerospace Industry Governing Law.[91] This law created new offset guidelines to increase the level of technology transfer and buy-back provisions under licensed production agreements. It also created a cooperative framework between government, private industry, universities, and research institutes backed by a special governmental committee.[92]

As of 1990, the ROK had 17 aerospace enterprises of which five have invested major resources in aircraft projects that include missile-relevant technologies.[93] In addition, another eight firms, with ties to 100-odd lesser and local aerospace firms, are responsible for airframes, engines, avionics, airframe accessories, and parts production.[94]

In addition to these specific manufacturing capabilities, the aerospace sector has also established research and development capabilities that could be drawn on in a ROK missile/booster rocket program. These include: Daewoo's research and development center at Taejon (established in 1988), the government-funded Korea Aerospace Institute (October 1989), and the Korea Aerospace Research Institute (1989).[95]

Although missiles are not part of this aerospace program, it inexorably endows the ROK with the technological basis to make its own booster rockets and ballistic missiles. The pace of this accretion, however, is greatly retarded by the 90-percent-plus shortage of scientists and engineers needed to fulfil existing plans and priorities

---

90 M. Banjamin, p. 82.

91 Ibid.

92 "Korean Aerospace Firms Seek Greater Role in World Market," *Aviation Week and Space Technology*, June 12, 1989, p. 203.

93 M. Banjamin, pp. 83–84; *Aviation Week and Space Technology*, "Daewoo Expands Machining Base to Increase Production Capacity," June 12, 1989, p. 219.

94 M. Banjamin, p. 80.

95 Ibid., p. 82.

of the aerospace sector, let alone missile or booster rocket ventures.[96] Thus, the ROK's major capabilities to enter the missile market will likely emerge from dual capable technologies acquired directly from its endeavors in space—the subject of the next section.

ROK Space Systems

South Korea's aerospace aspirations are not limited to aircraft and rockets, but also extend into space. This section describes the evolution of a ROK space strategy, and the current status of ROK satellite and booster rocket programs.

Space Strategy: In 1989, the ROK government announced that it would fund scientific research into system and structural rocket design, solid and liquid propellants, as well as ignition, guidance and control technologies.[97] On February 16, 1990, the ROK Minister of Science and Technology, Yi Sang-hui, announced that an earth observation satellite built with Korean technology will be launched in 1993. The $116 million project includes joint development by 1996 of a rocket with foreign suppliers. It would be used to launch a 200–400 kg Korean satellite into 500-km orbital altitude by 1999. (The Koreans plan to use the US Pegasus launch system that fires the rocket from atop a plane flying at a 12-km altitude, thereby obviating the need for a launch site).[98]

The project is intended to enable South Korea to obtain observation equipment and computer technologies to analyze information gathered in space. The project is to be coordinated by the Korea Research Institute of Aerospace (KRIA, set up in October 1989) on behalf of the Korea Advanced Institute of Science and Technology, the Agency for Defense Development, universities, and industry. The KRIA declared that it intended to pursue joint research with agencies

---

96 Ibid., p. 82.

97 Yonhap Radio (Seoul), "Cabinet Ordered to Develop Science, Technology," December 12, 1989, cited in FBIS-EAS-89-238, December 13, 1989, p. 34.

98 Yonhap Radio (Seoul), "Observation Satellite to Upgrade Technology," February 16, 1990, cited in FBIS-EAS-90-034, February 20, 1990, p. 44.

in the United States, Japan, and France to achieve its objectives.[99] The following November, the ROK military called for domestic development of its own military spy satellite to compile various data on North Korea.[100]

In spite of these developments, the ROK still lacks the basic technological infrastructure, legal framework, and commitment of governmental resources needed to enter space. A national space strategy has yet to emerge to overcome the various obstacles facing the ROK in this regard. One ROK official emphasized that the first generation of satellites will be an ad hoc, commercial endeavor, not a national space strategy. Nonetheless, the ROK launched its first scientific satellite, KITSAT-1, in July 1992; and plans a second in 1993.[101]

Korea Telecom is taking the lead in funding and managing the satellite program, in large part because it is self-financing out of revenues and financially healthy. Korea Telecom already has a strong research and development capability to support the program. Nonetheless, as of late 1991, it had committed less than one million dollars—what one official termed a minuscule "piggyback" program on the basic space mission.[102]

In sum, South Korea wants to obtain, import, and manufacture missiles for at least five reasons: (1) to deter North Korean missile and conventional military attack on the ROK, (2) to attack North Korean cities and important military targets in wartime, (3) to flex its muscles at a regional level, especially toward Japan, (4) to counter putative political-diplomatic prestige accruing to the DPRK by virtue of its missile capabilities and trade, and (5) to advance its aerospace industry for long-run economic advantage. In the future, the private structure of the South Korean defense industry may also facilitate

---

99 Ibid.

100 "Government Team Studies Unification in Germany," *Korea Times*, November 9, 1990, cited in FBIS-EAS-90-218, November 9, 1990, p. 31.

101 Interview with a Korea Telecom official, Seoul, October 14, 1992.

102 Ibid.; Australian Space Office, Department of Industry, Technology and Commerce, "Pacific Rim Developments towards Business in Space," a paper to Space Commerce 92, Montreux, Switzerland, March 1992, p. 6.

"marginal" missile exports in the gray market in the search for private profit by spreading investment costs over larger production runs.

In early 1992, the ROK had not committed itself formally to observing the norms and practices established by the MTCR. Conversely, it has not acted in ways contrary to the regime either. ROK and US officials are optimistic that the ROK will maintain its conservative stance in this regard.

Korean Missile Transactions

I have alluded already to the multiple motivations that underlie the drive exhibited by the DPRK and the ROK to acquire domestic missile development and manufacturing capabilities. The rest of this essay focuses on missile exports and potential associated with these capabilities. It is divided into two parts. The first describes the missile exports of the North and its motivations for becoming a major missile supplier. The second reviews the various sets of disincentives to missile exports that confront both the ROK and the DPRK, although with very different outcomes in each case. The greater attention given to the DPRK's missile trade than to that of the ROK is inevitable. As the ROK has not exported missiles, there is little to analyze.

Unfortunately, information on the security perspectives and process of policy formation of the DPRK security elite is less available and less reliable than that for the ROK. This section on the DPRK's motivation is therefore based on secondary and even tertiary accounts and sources sometimes marred by disinformation and partisan bias. The reader is cautioned that major portions of the following account of the DPRK's missile exports cannot be confirmed.

DPRK Missile Import Motivations

The DPRK has imported missiles for four major reasons: (1) to obtain military deterrence, (2) to prepare for war, (3) to realize regional power aspirations, and (4) to obtain profits and prestige accrued by reexporting missiles. Each of these import motivations is treated in turn.

Military Deterrence: The DPRK ballistic missile program deters three kinds of military threats. First, the northern security elite wants to deter a US-ROK combined missile attack. Second, the DPRK leadership develops missiles to enable it to deter a US-ROK nuclear or chemical attack by threatening to fire a chemical or (in the future) nuclear warhead. Third, Pyongyang may seek to offset the deterioration of its conventional military power relative to that of the ROK and US-ROK combined forces on the peninsula by deploying weapons of mass destruction.

Warfighting: In wartime, the DPRK could use its missiles in a variety of missions. First, the DPRK could emulate the Iraqi strategy of firing missiles to wage psychological warfare against urban populations, thereby creating massive refugee flows and complicating US-ROK military movements and logistic support. Second, missiles are useful (if accurate enough) to attack high value, large and vulnerable targets (such as cities, large military bases, airfields, troop concentrations, or industrial facilities including nuclear power plants). The poor accuracy of its theater missiles, however, means that the DPRK cannot credibly threaten most ROK and US military targets such as hardened artillery emplacements, command posts, ammunition or nuclear weapon storage sites, etc.

Regional Power Projection: Undoubtedly, an ability to fire missiles at US bases in Japan (and possibly Russia in the future) is an important goal of the North Korean leadership. The DPRK's extended-range Scud-B missile reportedly can already reach western Japan. In November 1991, Japanese Vice Defense Minister Akira Hiyoshi described the DPRK missile (combined with the DPRK's potential nuclear capability) as Japan's top security threat—a statement that would confirm and enhance the importance of this capability in the minds of most North Koreans who harbor bitter memories of Japanese colonialism and active support for the UN Command during the Korean War.[103]

---

103 Reuters, "N. Korea is Japan's Biggest Threat—Japan Official," November 21, 1991.

DPRK Missile Export Motivations

Like its imports, the DPRK's missile exports are also driven by multiple motivations. These include: (1) offsetting the cost of missile and other military imports, (2) earning scarce foreign exchange with which to import other items essential to regime survival (especially oil and food), (3) developing a network of political-military relations with which to countervail ROK diplomatic and mercantile triumphs, especially in the Middle East, and (4) responding to internal political-bureaucratic factors, especially the need of the DPRK military to finance itself.

DPRK Missile Export Policy

North Korea rejects criticism of its missile exports as "preposterous fictions" fabricated by the United States, calling the latter the "caudillo of the merchants of weapons of mass destruction." [104] It even denies outright that it exports any missiles.

"Essentially," an official statement asserts, "our country, proceeding from its peace-loving foreign policy, values friendship and unity with other countries and *has not sold any types of weapons.*" [105]

In reality, the DPRK has extensive capabilities to transfer missile production and organizational techniques as well as missile hardware (production technology or actual missile parts or systems). It has already engaged in both types of exports.

The organizations most likely to export missiles are the Weapons Bureau of the Korean People's Army which researches and develops weapons and administers the supply of weapons for each service; and the Military Munitions Production Bureau, which controls the production plans and production of munitions for each service.[106]

---

104 *Pyongyang Korean Central Broadcasting Network*, "US Reports of Missile, Technology Sales Denied," January 24, 1992, cited in FBIS-EAS-92-016, January 24, 1992, p. 21.

105 Ibid., my emphasis.

106 Kim Wom-pong, "North Korean Armed Forces, North Korean Military Officers and Organizations and Systems," *Gunji Kenkyu* (Tokyo), March 1986, cited in JPRS-KAR-86-018, May 14, 1986, pp. 60, 64.

The rest of this section reviews the DPRK's export activities relating to China, Iraq, Syria, Iran and Libya. Most of this activity occurred during the eighties and represented a major national effort by the DPRK.

DPRK-China Connection: In March 1977, Secretary of the Korean Worker's Party Kang Song-san visited the PRC's Lop Nur nuclear test site and reportedly attended a reception hosted by the 7th Machine Industry Ministry, the agency that developed China's ballistic missiles.[107] This substance of the DPRK-PRC missile technology connection remains wholly speculative, however.[108] As noted earlier, the DPRK has imported Chinese missiles to sustain its own missile deployments and development programs, and has also acted as an intermediary for Chinese missile exports to the Middle East. Beyond that, little is known.

DPRK-Iraq Connection: In February 1991, the US State Department expressed concern at reports that the DPRK had sold more than one hundred Scud missiles to Iraq in 1988.[109] Pyongyang immediately denounced the US statement as a "cock and bull story" and claimed that the United States had fabricated "a fiction about 'supply of missiles' " to denigrate the DPRK's opposition to the Gulf War.[110]

As of late September 1991, almost none of the 60,000 pages of documents seized from Iraq by the UN inspectors had been translated although many of them reportedly describe the missile supplier network.[111] When this task is complete, more information may emerge as to the DPRK-Iraqi missile connection.

---

107 This ministry was renamed Ministry of Space Industry in 1982 and combined into the Ministry of Aerospace in about 1989.

108 J. Bermudez, "North Korea's Nuclear Programme," p. 408.

109 Yonhap Radio (Seoul), "Information Provided on DPRK Scud Missiles," February 2, 1991, cited in JPRS-TND-91-003, February 25, 1991, p. 7.

110 *KCNA* (Pyongyang), "US 'Disinformation' Over SCUDs 'Intentional'," February 2, 1991, cited in FBIS-EAS-91-023, February 4, 1991, p. 10.

111 G. Millhollin, "Hunting for Saddam's bomb," *The Age* (Melbourne), March 21, 1992, sec. E.

DPRK-Syria Connection: The Syrians reportedly sought Scud missiles from the DPRK when the Soviet Union failed to provide long-range missiles with which to strike Israel after the 1982 Lebanon war but restricted supply in 1983 to the SA-5.[112] About 24 missiles and 20 launchers were reported to have been delivered to the Syrian port of Latakia in early March 1991 after the North Korean vessel *al-Yarmouk* sailed around the Cape of Good Horn to avoid transiting the Gulf where it would have had to reveal its cargo.[113]

DPRK-Iran SCUD Transfer: During the Iran-Iraq war, the DPRK was a major arms supplier to Iran. The DPRK provided Iran with 90–100 Scud-B tactical ballistic missiles as well as AT-3 Sagger ATGMs, and SA-7 SAMs.[114] Iran used these missiles in the "war of the cities" in February–April 1988, firing approximately 77 SCUD-B missiles at Iraqi cities. The DPRK may have also assisted Iran to establish a Scud-B manufacturing facility of its own.[115] Chung-in Moon has suggested that this episode marked the DPRK's metamorphosis from "a vanguard of radical ideology to a profit-seeking entrepreneur." [116]

In February 1992, US sources stated that a North Korean freighter was allegedly heading for Syria with an estimated US$100 million of missiles and other cargo in a second attempt to deliver the shipment.[117] The *Dae Hung Ho* eluded US surveillance in the Gulf region by hugging the Iranian coast and docked in Iran in early March.[118] It remains unclear if the United States lost track of the vessel, ac-

---

112 J. Bermudez, "Syria's Acquisition of North Korean 'SCUDs'," *Jane's Intelligence Review*, June 1991, p. 249.

113 Ibid.

114 J. Bermudez, "North Korea's Nuclear Programme," p. 410; and G. Jacobs, "North Korea's Arms Industry, Development and Progress," *Asian Defence Journal*, March 1989, p. 35.

115 J. Bermudez, "New Developments in North Korea Missile Programme," p. 345.

116 Chung-in Moon, "Between Ideology and Interest," in Jae Kyu Park, Byung Chul Koh, Tae-Hwan Kwak, *edited*, *The Foreign Relations of North Korea: New Perspectives*, Westview Press, Colorado, 1987, pp. 383, 406–7.

117 "Scud Move," *The Age* (Melbourne), March 7, 1992.

118 T. Walker, "N Korea ship docks in Iran," *The Age*, March 12, 1992.

cepted that the ship was not carrying Scud-B missiles, or concluded that it lacked authority to intercept the vessel.[119]

DPRK-Libyan Connection: In the first week of June 1991, a ROK military source suggested that Libya had agreed to finance the development of a Scud missile with a 1,000 km range. A few days later, however, the ROK Ministry of National Defense denied that it ever suggested that Libya had such an arrangement with the DPRK and stated categorically that: "The South Korean government has no knowledge of any military cooperation between Pyongyang and Tripoli." [120] In September 1991, an Egyptian paper reported again that Libya had contracted with the DPRK to purchase missiles along with 300 Scuds to be provided to Iran and 20 Scuds to Syria.[121]

Disincentives to DPRK and ROK Missile Exports

The DPRK is evidently an imprudent and reckless exporter of missile technology and weapons. It has not hesitated to supply missiles to states at war. Nor has it balked at selling missiles in conflict-ridden regions that were made more unstable by the diffusion of missiles. In contrast, the ROK has refrained from missile exports. It is useful to examine the factors that explain why the two Koreas have behaved so differently with respect to missile exports.

DPRK Disincentives

The DPRK has not halted its marketing of missiles despite at least seven disincentives that might be expected to persuade it to do so. These include:

Security Allies: The DPRK's allies have not constrained the DPRK in this regard. China used the DPRK for its own missile exports and refused to stop Pyongyang from exporting Chinese-supplied mis-

---

119 *The People's Korea* (Tokyo), "Why US Failed to Intercept Ship," March 28, 1992.

120 "Ministry Denies DPRK-Libya Scud Contract," Yonhap Radio, June 7, 1991, in FBIS-EAS-91-111, June 10, 1991, p. 17.

121 KBS 1 Radio Network (Seoul), "North Allegedly Sold SCUDs to Iran, Syria," September 21, 1991, cited in JPRS-TND-91-016, October 29, 1991, p. 19.

siles. The former Soviet Union had little power (and sometimes little motivation due to its conflict with the United States) to stop the DPRK from exporting missiles during the Cold War.

Ideological Barriers: The DPRK has not allowed ideology to interfere with its missile exports. This is hardly surprising as the DPRK is the only state committed to Kim Il Sungism and his *juche* philosophy.

Global Nonproliferation Regimes: The DPRK is still not fully committed to the global Nuclear Nonproliferation Treaty nor to the supplier consensus represented by the participants in the Missile Technology Control Regime.[122] The latter regime is led by its arch-enemy, the United States, a situation that does not encourage DPRK participation.[123] In April 1992, however, while denying that the DPRK exports SSMs, the DPRK Deputy Prime Minister and Foreign Minister Kim Yong Nam told a group of visiting Americans that Pyongyang might be willing to observe the guidelines of the Missile Technology Control Regime. "Other countries have associated themselves with it," he stated, "Why not us?"

External Sanctions: The DPRK is relatively invulnerable to the immediate effects of external political and economic sanctions. Being bankrupt, its economy exhibits low levels of external trade and financial flows. Being autarkic, it can continue to produce the minimal requirements for national survival and domestic political stability for years. Being repressive, it can ruthlessly and quickly dispose of emerging domestic unrest stimulated by economic shortages. Indeed, to the extent that sanctions could weaken the regime, they are not a credible threat. Pyongyang is acutely aware that Seoul does not want and cannot afford the DPRK to implode, imposing the costs of reunification on the South.

---

122 See my "Moving Target, Korea's Nuclear Potential," a working paper, Department of International Relations, Australian National University, Canberra, 1992, and my "The Republic of Korea and the Nuclear Issue," paper to Conference on the Security of the Korean Peninsula in the 1990s, Australian National University, Canberra, February, 1992.

123 S. Harrison et al., "Preliminary Report Carnegie Endowment Delegation Visit to Pyongyang, Democratic People's Republic of Korea," (mimeo), Washington, DC, May 1992, p. 5.

Domestic Public Opinion: Many political analysts deny that a domestic public opinion exists in the DPRK. They argue that the notion of a North Korean civil society that constrains the policies and actions of the leadership is a misnomer. Rather, the North Korean state pervades and dominates civil society to an extent unparalleled elsewhere in the world.

Moreover, the North Korean elite—totaling perhaps 10,000 people of whom a couple of thousand are really important cogs in Kim Il Sung's wheel—is divided and fragmented by a variety of control mechanisms. It is therefore incapable of opposing or even stalling the implementation of policies developed and dictated at the highest level of the extraordinarily centralized North Korean authority structure culminating in the two Kims, father and son.

Regional Arms Control: In the absence of a regional security and arms control framework that includes the DPRK and its adversaries, the DPRK has few nonmilitary means to reduce its perceived external security threats.

Rapprochement with the South: The DPRK has not shown itself to be enthusiastic about embracing the ROK in the short to medium term (before 2000). Indeed, the security elites who fought during the civil war of the two countries remain mortal enemies. The North let slip a series of opportunities in 1991–92 to accelerate the process of political-economic rapprochement with the South, including major trade and investment in the North led by the ROK and including Japan.

These seven possible disincentives, therefore, have failed to constrain the DPRK trade in missiles. What about the ROK?

ROK Disincentives

Three factors have dissuaded the ROK from entering the missile market to date. These are (1) the influence of the United States, (2) the ROK's desire to be perceived as a responsible member of the world community, and (3) the opportunity costs of a major missile program. The rest of this section analyses briefly each of these constraints.

Security Alliance: Until recently, the US-ROK security alliance has been the major disincentive to an active ROK missile program and

exports. Whenever the ROK probed US resolve that it should not become missile-capable, the United States used its dominant status in the alliance to impose discipline on Seoul. The existence of a hegemonic ally to the ROK compares with the lack of one in the DPRK alliance relationships.

Global Regimes: The ROK leadership values greatly its reputation as a peaceful trading state committed to giobal and regional communities. Its membership and implementation of its NPT obligations have been exemplary since the mid-seventies except for a few attempts to nibble at the margins by obtaining reprocessing technology.

The ROK will also observe the terms of the Missile Technology Control Regime when it comes to exporting any indigenously developed missiles or booster rockets. The major powers, however, cannot expect the ROK to forego eventual development of its own missiles and booster rockets.

Opportunity Costs: Given the US military presence in the South, the ROK military have not had to offset the DPRK missile capabilities with their own missiles. Rather, it has been able to rely on US-controlled missiles deployed in the ROK, or on US missiles transferred or sold to South Korea. The ROK military had—and still has—more important military priorities than investing resources in major missile programs.

This latter constraint will weaken as the ROK economy grows, and as civilian, dual-capable aerospace capabilities are nurtured and as the US commitment seems to decline.

Conclusion

The North and South Korean states have taken very different routes to obtaining and exporting ballistic missiles. These diverging strategies could be described as vertical and horizontal, respectively. Isolated and largely left to its own devices, the North Korean state spent the last two decades producing and profiting from its own military missiles. It launched a frontal assault to surmount the lower rungs of the missile ladder.

In contrast, the South Koreans benefited from a security patron who deployed advanced missiles in and around Korea, relieving the ROK of any urgent military imperative to offset the DPRK's missile capabilities. Consequently, the ROK chose to position itself in crucial industrial and commercial segments of high technology sectors, including space and aerospace industries. In the next decade, this strategy will enable the ROK to step sideways onto the missile ladder at a much higher level of capability than the DPRK. The Missile Technology Control Regime imposed by the major suppliers of missiles and booster rockets will have to accommodate in an indigenous ROK or unified Korean capability within a decade or less.

The motivations driving the DPRK to produce and export missiles are persistent. The incentives for the ROK to manufacture dual capable rocket technology and its disincentives to export missiles are equally enduring. It follows that integrating both Koreas into a global missile arms control regime will entail reduction in the basic insecurities that afflict the ROK and the DPRK. It will also require introducing missile-related issues into North-South arms control negotiations in Korea; regional security forums that address missile technology diffusion; and adjustments to the global MTCR that link regional missile control measures with global controls on missile research, development, testing, deployment, and trade.