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"South Korea Going Nuclear?": debates, driving forces, and prospects

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Abstract
The USA ended South Korea's clandestine quest for an independent nuclear weapons program in the 1970s, resulting in the socialization of nuclear taboo in the minds of South Koreans. Since then, intensifying nuclear threats from North Korea, uncertain US security commitments, and a shifting domestic environment have shattered the nuclear taboo, while consolidating the new political foundation for pro-nuke forces favoring the acquisition of nuclear bombs. This paper aims to elucidate the evolving nature of public debates on South Korea's nuclear path, unraveling internal and external forces propelling the quest for independent nuclear armament and analyzing its costs and consequences. Finally, the paper investigates the prospects for South Korea's nuclear future. The authors argue that South Korea will face daunting challenges in its quest for independent nuclear capabilities. Nuclear fragility and high human costs, adverse security consequences, unbearable backlash on the South Korean economy and its civilian nuclear industry, and profound damages on Seoul's international reputation, all indicate that the nuclear path will be a perilous one.

Keywords South Korea · Nuclear weapons development · North Korea · Tactical nuclear warheads · Nuclear sharing

1 Introduction

Project 890 was the code name for late-President Park Chung-hee's secret nuclear weapons development project in the 1970s. Acute military threats from North Korea, the eroding US security commitment, the withdrawal of the US Army 7th

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Infantry Division from South Korea, and the détente between China and the USA caused an acute sense of security crisis in Seoul. Park's response was military self-reliance through the promotion of the defense industry and nuclear weapons development. But fierce US opposition derailed his dream of going nuclear. He had to give up Project 890 in return for American security reassurance through the establishment of the ROK–US Combined Forces Command (CFC) and the cancelation of the planned withdrawal of American forces from South Korea (Hayes 2023; Hayes and Moon 2011a, b). Such an experience deeply implanted a "nuclear taboo" in the minds of South Koreans.

The nuclear taboo has recently been subject to new challenges. Intensifying nuclear threats from the North, the waning credibility of American security commitments and extended deterrence during the Trump administration, and a surge in public opinion favoring independent nuclear armament have all contributed to reshaping public debates on South Korea's nuclear path. A growing number of conservative politicians, pundits, and journalists in South Korea are now calling for independent nuclear weapons development, alarming the world.

The paper aims to examine the evolving nature of public debates on, and prospects for, South Korea's nuclear path. Section 2 explores South Korean domestic debates on how to cope with North Korean nuclear threats. Three perspectives—(1) alliance and extended deterrence, (2) relocation of American tactical nuclear weapons and the adoption of the NATO-style nuclear sharing, and (3) an independent nuclear armament—will be discussed. The paper will then analyze the forces driving pro-nuke movements by focusing on domestic pull and external push factors. Fourthly, the paper will investigate costs and consequences of South Korea going nuclear. Finally, the paper draws conclusions about South Korea's nuclear future.

2 Coping with North Korean nuclear threats: South Korean debates

2.1 Assessing North Korea's nuclear and missile threats

After more than 30 years of diplomatic negotiations, the North Korean nuclear quagmire is going from bad to worse (Jun 2023; Lee 2023a, b, c). North Korea claims to be the ninth nuclear weapons state in the world. Pyongyang has demonstrated that it has acquired a complete nuclear weapons cycle comprising nuclear facilities and materials, nuclear warheads, delivery vehicles, nuclear testing, and the upgrading of nuclear weapons through miniaturization and diversification (Hecker 2021). According to one estimate by Siegfried Hecker of Stanford University, by the end of 2020, the North had 25–48 kg of plutonium (PU) and 650–900 kg of highly enriched uranium (HEU). Most observers tend to agree with his estimate of the PU inventory, but the estimates of HEU vary. Whereas the Stockholm International Peace Research Institute (SIPRI) estimates that North Korea had acquired between 230 and 1180 kg of HEU by the beginning of 2021, the International Panel on Fissile Materials estimated it possessed between 400 and 1000 kg (Kristensen and Korda 2022). Estimates on the quantity of North Korea's nuclear bombs also vary among observers. Kristensen and Korda (2022) estimate that North Korea has 20–30 warheads

minimum and 44–55 maximum as of 2022. Estimates by the RAND Corporation and Asan Institute are much higher, ranging from 67 to 116 (Bennet et al. 2021).

Nuclear weapons, however, are not credible unless they are tested. North Korea has undertaken six rounds of nuclear testing since October 2006. The sixth nuclear test conducted on Sept. 3, 2017, is seen as the most significant, not only because of its explosive power (50–60 kilotons by a South Korean estimate, 48.1–108.3 kilotons by a Chinese estimate, and 160 kilotons by a Japanese estimate), but also because of its design characteristics, such as fission detonation, high-temperature fusion ignition, and the ensuing rapidly boosting fission–fusion reactions.

As for delivery vehicles, North Korea now possesses 20 types of short range [300–1000 km, Scud-B and C, KN-23 (Iskander), KN-24 (North Korean version of Army Tactical Missile Systems (ATACMS), KN-25 (mega-caliber multiple launchers)], middle range (1000–3000 km, Scud-ER, Nodong), and intermediate-range ballistic missiles (3000–5500 km, Musudan, Hwasung-12). North Korea has also developed intercontinental ballistic missiles (ICBMs) (Hwasong-13, 14, 15, 16, 17, 18) that can fly 5500–16,000 km. In addition, it has recently test fired submarine-launched ballistic missiles (SLBM, known as Bukguksong series with a range of 2000–3000 km), mega-caliber multiple rocket launchers, and new cruise missiles that can carry tactical nuclear warheads (Kim and Moon 2023). North Korea has successfully developed tactical nuclear weapons by mastering their miniaturization and standardization. The North has also achieved a variety of nuclear devices ranging from simple fission bombs to boosted fission and thermonuclear bombs.

In addition, North Korea has designated as core tasks of its defense industry hypersonic weapons development, production of super-sized nuclear warheads, enhancement of ICBM accuracy with the range of 15,000 km, development of solid fuel engines for underwater and ground ICBMs, possession of nuclear submarines and submarine-launched strategic weapons, and launching of military intelligence satellites. Failures in military intelligence satellite launching notwithstanding, North Korea has been making steady progress in other areas such as solid fuel engine and sea-based strategic weapons.

What alarms the South most are changes in North Korea's nuclear doctrines. Pyongyang has traditionally adhered to the nuclear doctrine of defensive deterrence to cope with American military hostility. But North Korea has recently been focusing on "nuclear war-fighting capability" to use tactical nuclear weapons preemptively. Article 6 of North Korean Nuclear Forces Policy Law, enacted on Sept. 8, 2022, stipulates that the North can preemptively use nuclear weapons against non-nuclear attacks. Pyongyang's threat of preemptive use of nuclear weapons in non-nuclear conflict can be seen as a deterrence strategy to offset its inferiority in conventional forces, in relation to the South Korea–USA alliance. Nevertheless, it poses direct and profound threats to the South because of the lowering of the nuclear threshold and the possibility of nuclear crisis instability (Kim and Moon 2023).

North Korean nuclear threats are no longer fictional, but real and present. How should South Korea cope with them? There are three contending perspectives in South Korea: conventional/extended deterrence and diplomacy; redeployment of American tactical nuclear weapons and NATO-style nuclear sharing; and independent acquisition of nuclear weapons.

2.2 Conventional and extended deterrence and diplomacy

The ROK–USA combined forces' conventional deterrence and American extended deterrence have been the backbone of the countervailing strategy to cope with North Korean nuclear threats. With regard to overall military might, South Korea has been inferior to the North in terms of quantity, but far superior in quality. Pyongyang maintains a large number of forces and weapons, but their quality is questionable, as evidenced by North Korea's failure to import any meaningfully sized shipments of advanced weapons from abroad. Owing to its economic wealth, however, Seoul has acquired cutting-edge foreign weapons on a massive scale. The South Korean defense industry is robust, and includes production of advanced army, navy, and air force weapons. The presence of the US Army Second Infantry Division, which is highly mechanized, and the US Seventh Air Force in South Korea, has also served as a linchpin for conventional deterrence against North Korea. In the case of North Korea's all-out attack, the USA is expected to mobilize massive force augmentation in a relatively short time, according to both old and new joint operation plans. Some experts even suggest that deadly use of conventional forces by the CFC would be sufficient to deter North Korea's nuclear threats. Seoul and Washington have undertaken regular joint military exercises and training for combat readiness, while deploying strategic assets (e.g., strategic bombers, ICBMs, nuclear submarines, aircraft carriers, and fifth-generation fighter jets) to South Korea (Cho and Shin 2022; Terrence Roehrig 2017).

Equally important is South Korea's adoption of the "three axes" system that is composed of kill chain, the Korean missile defense system (KMD), and massive punishment and retaliation (Ministry of National Defense 2023). The kill chain aims to destroy North Korea's nuclear and missile facilities preemptively when and if its offensive intention is detected. South Korea has acquired Hyunmoo-2 ballistic missiles, F-15 and F-35 stealth fighters, and reconnaissance and surveillance assets for this purpose. If the preemptive measures fail, the missile defense system is instantly activated to intercept incoming missiles. South Korea has invested heavily in developing the missile defense system by acquiring PAC II and III and Chungung 2 ground-to-air missile defense systems. The US Terminal High Altitude Area Defense (THAAD) system, which is deployed in Seongju, is also expected to play a role in intercepting incoming North Korean ballistic missiles. The massive punishment and retaliation measure is the last component of the KMD and involves second-strike capabilities. Seoul is planning to acquire the high powered Hyunmoo-5 ballistic missiles, a bunker bust that can penetrate 100 m deep and inflict substantial damages. Special forces that can penetrate and decapitate North Korea leadership have recently been re-enforced.

Proponents of the traditional deterrence approach argue that both the American conventional deterrence and nuclear umbrella are working well. As Terrence Roehrig (2017, 130) points out, the mere existence of US nuclear weapons is sufficient to deter potential aggressors, like North Korea. The USA possesses considerable nuclear assets that can be used against North Korea. Many ICBMs on the US mainland can aim at North Korea, in the case of a contingency, while a sizable fleet of strategic submarines deployed in the Indo-Pacific region can undertake

preemptive or second-strike attacks on North Korea when and if needed. The USA can also utilize its strategic bombers stationed in Guam to attack North Korea. This nuclear triad provides a credible and sufficient nuclear umbrella for South Korea (Roehrig 2017; O'Hanlon 2019; Cho and Shin 2022). Additionally, Seoul and Washington have been fostering closer consultation through the operation of the Extended Deterrence Strategy and Consultation Group (EDSCG).

What matters most is not South Korea's perception, but North Korea's perception and assessment of American nuclear capabilities, intention, and will. Pyongyang perceives that American extended deterrence is formidable and working well. North Korea's continual strengthening of its nuclear and missile capabilities is a counter-evidence to it. North Koreans have always thought that US military actions will inevitably take the form of a nuclear attack because the US cannot defeat North Korea by relying solely on conventional forces. For the North, American nuclear capabilities are quite threatening. As for American political will, however, the North seems perplexed. While divided democratic politics are likely to deter the USA from using nuclear weapons, American political leadership can use nuclear weapons if a large number of American casualties occur at the beginning of the war. In short, American conventional and extended nuclear deterrence is working against North Korea.

As Michael O'Hanlon of The Brookings Institution (2019) suggests, American deterrence still works, so the USA and its allies should focus on de-escalatory deterrence options, including crisis stability. Tension reduction and confidence-building measures are vital to crisis stability, which cannot be achieved without restoring preventive diplomacy. Since 1994, deterrence, dialog, and diplomacy have been simultaneously used to deal with North Korean nuclear threats (Kim and Moon 2023).

2.3 Redeployment of American tactical nuclear weapons and nuclear sharing

The traditional approach, based on conventional and extended deterrence, has been increasingly subject to criticism as North Korea strengthens its nuclear and missile capabilities. On September 8, 2022, Kim Jong Un introduced a new nuclear doctrine permitting both preemptive and second strikes as well as lowering the nuclear threshold that allows the use of tactical nuclear weapons. As the North succeeded in test launching the Hwasung-18 ICBM using solid fuel propellant, its ability to strike the US mainland has become more pronounced. Such developments sent shock waves through South Korea. The immediate response was that North Korean nuclear threats are real and imminent, and that conventional forces and loose US extended deterrence alone could not deal with nuclear threats from the North. Chung Mong-joon, founder of the Asan Institute, a conservative think tank, forcefully argued that "the ROK–US alliance failed to prevent the advent of a nuclear North Korea and the American nuclear umbrella is torn. We should fix the torn nuclear umbrella by re-deploying American tactical nuclear weapons" (Lee 2013; Kim 2023a, b, c, d). For Chung and many others, the logic of mutually assured destruction (MAD) is the only way to deal with the North Korean nuclear challenge, and American extended deterrence is no longer credible because the USA will not sacrifice Hawaii or Los

Angeles for Seoul. The fear of nuclear entrapment is bound to weaken American commitment to extended deterrence.[1]

Against this backdrop, some conservative politicians and pundits are now calling for the re-transfer of American tactical nuclear weapons (Kim 2017). The USA used to maintain 961 tactical nuclear weapons in South Korea (e.g., gravity bombs, nuclear artillery shells, atomic demolition munitions, short range surface to air missiles like Nikes) until they were withdrawn in 1991. Several conservative observers maintain that the only credible way to counter heightened DPRK nuclear threats is the physical presence of American tactical weapons on South Korean soil. Cho Kyung-tae, a senior member of the then-opposition Liberty Korea Party (LKP, presently the ruling People's Power Party, PPP), threatened that "if the US refuses to negotiate on the re-transfer, we should withdraw from the NPT and instantly enter the development of independent nuclear weapons" (Lee 2019a, b). Several others joined the move (Jung-kyu Hong 2016). An opposition Liberty Korea Party delegation, led by then-party leader Hong Jun-pyo visited Washington, D.C., in 2017 to lobby for redeployment. Like Cho, he threatened American congressional leaders and officials of the executive branch, saying that unless the USA redeploys tactical nuclear weapons to South Korea, his party will push for independent nuclear armament (Lee 2017). Hong's stance was driven by the fear of then-President Trump's potential withdrawal of American forces from South Korea. For Hong, the deployment of tactical nuclear weapons was essential to fill the vacuum that would be left by the reduction and withdrawal of American forces. Some in the delegation even advocated for the redeployment of tactical nuclear weapons as a bargaining chip, arguing that those tactical weapons, if re-deployed, could be used as leverage in denuclearization negotiations with North Korea (Cheon 2012).

What kind of tactical nuclear weapons would South Korea need? The most likely option would be land-based "tactical" weapons (B61 gravity bomb, 300–400 kilotons H-bomb) and a "bunker buster" 400 kilotons version, which would create a massive amount of radioactive dust downwind. Deployment of a US stealth bomber could be another option. The USA could also deploy sea-launched cruise missiles (SLCMs) on a ship stationed in South Korea and operating off the coast of Korea east or west. New ground-launched cruise missiles (GLCMs), which the USA has tested (2019), but not yet deployed anywhere, could be another possibility.

But the US government, including congressional leaders, has shown a cold response. For them, the American commitment to extended nuclear deterrence is firm, and the USA does not have any tactical weapons available for deployment in South Korea. From a strategic point of view, such redeployment is not desirable because it can destabilize, rather than stabilize, the Korean peninsula. Deploying tactical nuclear bombs to South Korea could tempt the DPRK to launch a preemptive strike rather than deter the use of nuclear weapons. This is because, unlike in the 1980s, Pyongyang now possesses proven strike capabilities. Furthermore, it can complicate missions of the ROK–US CFC by inviting hostile reactions from China and Russia (Hayes and Moon 2015, 403–404).

[1] This portion draws partly on Chung-in Moon (2021).

As the USA rejects the redeployment option, some conservatives in South Korea have shifted their attention to a NATO-style nuclear sharing arrangement. During the Cold War, the US and NATO members in Europe shared nuclear information and engaged in joint nuclear planning and implementation through mutual consultations. Such sharing was institutionalized through the establishment of the Nuclear Planning Group (NPG). There is also a division of labor in which five European countries, where the US military's tactical nukes are deployed, would use their own combat aircrafts to drop US gravity bombs. The "nuclear sharing" proposition became popular partly because of one paragraph in an article on the 2018 Nuclear Posture Review in the *Joint Force Quarterly* by the National Defense University: "The US strategy strongly considers a potentially controversial new concept involving custodial sharing of non-strategic nuclear capabilities during times of crisis with select Asia-Pacific partners, specifically Japan and the ROK" (Cort et al. 2019, 78). In addition, American experts such as former Deputy Assistant Secretary of Defense Brad Robert (2020), Heginbotham and Samuels (2021), and Lind and Press (2023) have further fueled South Korea's debate on nuclear sharing.

Won Yu-cheol of the then-opposition LKP organized a "Nuclear Forum focusing on the NATO model." On November 12, 2019, the forum convened a public session on "How to implement the ROK–US nuclear sharing" and called for the deployment of American tactical nuclear weapons to South Korea and their sharing within the framework of the ROK–USA. Combined Forces Command. The forum also demanded the routine stationing of American nuclear-powered submarines. More importantly, National Assemblyman Won, who once served as chair of the Defense Committee of the National Assembly, urged the Moon Jae-in government to place "nuclear sharing" on the agenda at the 2019 ROK–US Security Consultative Meeting (Rhyu 2019). Another senior ranking LKP lawmaker, Chung Jin-suk, even proposed the active deployment of American submarines with nuclear weapons capability in the region that would be placed under the joint operation of Japan, South Korea, and the USA (Lee 2019a, b). Hong Jun-pyo lent his support to the idea by stating that "if a NATO-style nuclear sharing policy is introduced, the North Korean nuclear program will be under control, and we will be freed from being slaves to North Korea's nuclear threats" (Hwang 2020).

Strictly speaking, however, American nuclear bombs cannot be "shared" (Kim 2012). The right to decide whether nuclear weapons are used lies entirely with the US president; tactical nukes in Europe will not work unless the codes are entered in Washington. Moreover, achieving NATO-style coordination of nuclear policies would require the US Senate to ratify a "program of cooperation" according to a 1958 amendment to the Atomic Energy Act (McMahon Act). The chances of the Senate ratifying such a program with South Korea are effectively nil. As Byun and Lee (2021) argue in their *Washington Quarterly* article, the "prospect of rapid nuclear retaliation at the outset of hostilities by devolving nuclear assets and responsibilities to allied territory—fits awkwardly with the core military missions of the US and its East Asian allies", as well as "triggering serious political risks such as stoking incentives for aggression on the part of regional adversaries and exacerbating strategic discord within the US-led alliance system" (Byun and Lee 2021, 75).

Neither the relocation of American tactical weapons nor NATO-style nuclear sharing have proven feasible and desirable. Facing staunch American opposition, hardline conservatives in South Korea have begun to advocate for independent nuclear armament.

2.4 Independent nuclear path

The South Korean government has long adhered to an anti-nuke posture since the late 1970s by complying with the NPT regime, the ROK–US Atomic Energy Cooperation Accord, and the Declaration on the Denuclearization of the Korean Peninsula (1991). But soaring skepticism of American extended deterrence, amidst intensifying nuclear threats from North Korea and failure to secure American assurance regarding the redeployment of its tactical nuclear weapons or nuclear sharing, have led some conservative politicians and opinion leaders to openly advocate for South Korea's independent acquisition of nuclear weapons (Cheong 2023a; Mackenzie 2023; Einhorn and Kim 2016).

Such moves have revealed two contrasting trends (Moon and Jeong 2021). One is the consummate school that seeks nuclear armament regardless of the American stance by emphasizing "nuclear sovereignty" and the logic of "nuclear for nuclear." Acquisition of the nuclear weapons is the only way to cope with the DPRK's nuclear threats and to survive Northeast Asia's harsh strategic reality. Its proponents regard the possession of nuclear weapons as an end in itself (Kim 2011; Chung 2016; Kwon 2017; Cheong 2023a). The other is the instrumentalist position that attempts to utilize the independent nuclear path as a bargaining chip to secure American nuclear commitment. If nuclear deterrence is credibly secured by an American nuclear umbrella, either through the re-deployment of its tactical nuclear weapons or a NATO-style nuclear sharing, there is no need for independent nuclear armament. If not, these instrumentalists argue, South Korea should go nuclear independently (Lee 2019a, b; Yang 2020). The instrumentalist school remains a majority, but recently the consummate school has been gaining public support.

Both schools share several rationales. First, North Korean nuclear threat is real and existential. Kim Jong-un's deployment of tactical nuclear weapons along the front line and his intention to use them preemptively indicate that South Korea, rather than the USA, has become the primary target. The only way to deal with such threats is a balance of nuclear terror through the acquisition of its own nuclear weapons (Woo-Tak Lee 2023a, b, c). Article 10 of the NPT allows for withdrawal if a member faces "extraordinary events" that "have jeopardized the supreme interests of its country." Thus, facing North Korea's imminent nuclear threats, South Korea should be willing to withdraw from NPT to guard its own destiny. Peaceful coexistence with a nuclear North Korea being impossible, the only way for peace on the Korean Peninsula is through strong military capabilities with nuclear weapons (Maeng 2023).

Second, proponents of both schools argue that a negotiated settlement of the North Korean nuclear problem through dialog and diplomacy, is inconceivable (Lee 2023a, b, c). Negotiations with North Korea all failed because of its

persistent patterns of cheating and deception. Kim Jong Un will never give up his nuclear bombs, not only because of regime security, but also because of Pyongyang's long-cherished plan to unify Korea on its own terms (Park 2020; Lee 2023a, b, c). If there is no chance for the North to give up its bombs, it is logical for the South to acquire nukes. Seoul's position of strength through nuclear armament can make North Korea fearful of the South and change its military behavior. Ironically, they call it a "peaceful coexistence" with the North through nuclear weapons.

Third, skepticism of the American nuclear commitment has fueled the pro-nuclear movement. As Won Yu-cheol, one of the staunchest advocates of nuclear weapons development, pointed out, "we cannot borrow an umbrella from a neighbor every time it rains. We need to have a raincoat and wear it ourselves" (requoted from Sokolski 2016, 88). Another advocate, Kim Dae-jung, a leading columnist of *Chosun Ilbo*, raises a more substantive question (2023). He contends that tactical nuclear weapons deployment and NATO-style nuclear sharing all fall short in times of crisis, as the control over nuclear weapons usage lies exclusively and completely with the American president. More importantly, American domestic political paralysis and unpredictability of American presidential prerogatives, as evidenced by President Trump, have considerably contributed to motivating conservatives in South Korea to deliberate on the independent nuclear option.

Finally, there is wishful thinking that South Korea can follow the Israeli path. Being a democracy, South Korea can persuade the USA and international society to allow its nuclear armament through active lobbying. Even if South Korea fails to persuade them, international pressures, such as sanctions, will not be great enough to undermine its prosperity. The USA is its staunch ally, and other key members of the UN Security Council, such as France and the UK, share common values with South Korea. They will mitigate such pressures in the case of South Korea going nuclear. In the worst case, India and Pakistan have survived the backlash of their nuclear armament. The logic goes, if they can survive it, then why not South Korea? Such wishful, but false anticipation has served as a catalyst for the independent nuclear armament school (Mackenzie 2023).

3 Driving forces of independent nuclear armament: domestic pull and external push factors

What factors are driving the pro-nuke forces in South Korea? A dynamic interplay of domestic factors and external changes are at work. Internally, cracks in the nuclear taboo, public opinion favoring independent nuclear development, and technological competence have served as crucial pull factors. Externally, worsening nuclear threats from North Korea, the US–China strategic rivalry and uncertainty over American leadership, permissive signals from US pundits, and the Ukrainian war have pushed some conservative hardliners in South Korea to deliberate on the independent nuclear path.

3.1 Domestic pull factors: cracks on nuclear taboo, favorable public opinion, and technological competence

Since the days of Park Chung-hee's aborted attempt to nuclearize South Korea in the late 1970s, public debates on independent nuclear armament were long considered a taboo. On January 11, 2023, however, the taboo was abruptly shaken. President Yoon Suk-yeol made stunning remarks at the joint reporting session of the Ministries of Foreign Affairs and National Defense. He stated: "If the problem becomes more serious, South Korea could have tactical nuclear weapons or secure its own nuclear weapons." He added that "if things turn out this way, we will be able to acquire [them] quickly thanks to our science and technology capabilities." Although he later reversed his position by publicly stating that the Republic of Korea will abide by the NPT and the ROK–US Atomic Energy Cooperation Accord, pro-nuke forces began to capitalize on his remarks.

Several members of the ruling PPT either organized or sponsored public sessions in support of nuclear armament at the National Assembly. This represents a sharp departure from the past, when the public focus was by and large on the redeployment of tactical nuclear weapons or NATO-style nuclear sharing, not on acquiring nuclear bombs independently. Some pundits also started to organize public debates. For example, Cheong Seong-jang, a North Korean expert at Sejong Institute, launched the public forum on "Self-Strengthening through Nuclear Weapons (Haek Jagang 核自强)", joined by retired generals, journalists, and scholars. The Northeast Asian Security Forum led by Choi Ji-young, who is associated with the ruling party, has also been active in promoting independent nuclear armament. Even government agencies are known to have been patronizing such public fora and their events.

Even before Yoon's remarks, conservative media such as *Chosun Ilbo*, the *Joongang Ilbo, Maekyung* (the Korea Daily Economy), and *Hankyung* (the Korea Economy Daily) have been promoting the independent nuclear path. Of these, *Chosun Ilbo* has been most vocal. Kim Dae-jung, its editorial advisor, has long been an outspoken advocate. Its chief editorial writer, Yang Sang-hoon, is critical of the American nuclear umbrella and, has stressed the urgency of nuclear weapons development. *Chosun Ilbo* openly underscored the independent nuclear armament through its own editorials and a series of op-ed pieces, which have contributed to shaking the long-standing nuclear taboo (Citizen's Coalition for Democratic Media 2023).

Cracks in the nuclear taboo coincided with soaring public opinion favoring the nuclear path. South Korea's public opinion on the nuclear issue has varied according to Pyongyang's behavior (Moon 2021). Its nuclear tests and ballistic missile test launches aggravated public opinion, whereas improved inter-Korean relations entailed an anti-nuke attitude. Genron NPO, a Japanese opinion survey organization, has been conducting annual polls regarding Japanese and South Korean public attitudes on nuclear armament (Genron NPO 2017). According to its 2016 survey, 59% of South Korean respondents supported independent nuclear armament, while 36% opposed. But in 2017, when the DPRK undertook its sixth nuclear test and 15 ballistic missile test launches, those who favored "South Korea going nuclear" rose to 67.2%, whereas the figure for opposition dwindled from 36 to 26.7%.

However, the 2018 survey revealed quite different results. In 2018, two Korean summits and the first historic DPRK–US summit took place, and consequently military tension on the Korean Peninsula was significantly reduced. The public responded as such. Those who favored nuclear armament dropped from 67.2% in 2017 to 43.3% in 2018, almost a 25% drop. Meanwhile, those who opposed nuclear armament rose from 26.7% in 2017 to 50.3% in 2018. As inter-Korean relations stalled following the failure of the Hanoi summit in February 2019, those who supported nuclear armament increased to 59.6% in 2019 and 56.5% in 2020, respectively. On average, those who support acquiring nuclear weapons reached the upper 50%, whereas those who opposed it averaged around 35%.

As inter-Korean relations have worsened since 2021, with North Korea's frequent ballistic missile test launches, public attitudes changed accordingly. A survey conducted in December 1–4, 2021, by the Chicago Council on Global Affairs shows that 71% of South Korean respondents supported South Korea going nuclear (Dalton et al. 2022). Another survey by the Asan Institute on March 10, 2022, revealed that 70% of respondents favored South Korea's independent nuclear armament (Asan Public Opinion Survey Report 2022). A survey conducted by the Chey Institute for Advanced Studies and Gallop Korea on February 17, 2023, revealed other interesting results. In that survey, 76.6% of respondents answered that it is necessary for South Korea to go nuclear, and 77.6% believed that North Korea's denuclearization was impossible. In the same survey, 51.3% responded that the USA is not likely to use its nuclear deterrent force in the case of contingency on the Korean peninsula (Noh 2023). This general trend in public opinion since 2021 has helped boost pro-nuke forces in South Korea.

The nuclear taboo worked in the past, thanks to international safeguard regulations that strictly prohibit reprocessing of spent fuels and enrichment of weapons-grade uranium. Seoul has faithfully complied with them. But on April 28, 2023, President Yoon made another statement at the Harvard Kennedy School that "If committed, South Korea has technological infrastructure for nuclear armament in less than one year." His remarks sparked domestic debates on South Korea's technological capabilities to produce weapons (Lim 2023). Yoon's position reflected the view of Seo Kyun-ryul, a professor emeritus of nuclear engineering at the Seoul National University who has been arguing that South Korea has technical and financial capabilities to produce nuclear weapons in 1 year. He asserted that South Korea has already acquired technology for production of fissile materials through uranium enrichment and separation of plutonium, while achieving cutting-edge technology for high explosives, detonation, and guidance system. For him, "nuclear weapons development in South Korea is not a matter of technology and economy. If the state makes the decision, and politicians provide a political shield, mass production of nuclear weapons will not be difficult" (SPN Editorial 2017).

Seo's projection is not groundless. In 2016, Charles Ferguson, then-president of the Federation of American Scientists, estimated that South Korea has up to 4,330 bombs' worth of plutonium at the Wolsong nuclear reactor site, assuming a conservative estimate of about 6 kg of plutonium for a first-generation fission device

(Ferguson 2016, 70).[2] Hecker, a renowned nuclear scientist and former head of the Los Alamos Laboratory, also concurs that South Korea can produce nuclear bombs in a relatively short period. But nuclear weaponization requires a full set of nuclear facilities, weapons-grade fissile materials, verification through nuclear testing, and a full range of delivery vehicles. The process to develop these is costly and time-consuming. He also questions which provinces would allow underground nuclear testing sites (Hecker 2021). Moreover, there are several barriers. South Korea has not fully acquired technology for reprocessing and uranium enrichment. Research on nuclear detonation devices and the production of nuclear warheads has been suspended for more than 40 years. Despite having a rich human resource pool related to the peaceful use of nuclear energy, South Korea lacks qualified researchers in the field of nuclear weapons development after the Agency for Defense Development (ADD) disbanded its nuclear weapons research unit in the late 1970s. Thus, developing nuclear weapons will be quite a daunting challenge. This prudent assessment notwithstanding, conservative politicians and pundits are jumping on this nuclear optimism and pushing for the independent nuclear path. Some pundits have even urged the South Korean government to embark on the second Manhattan project for nuclear weapons development (Kim 2023a, b, c, d).

3.2 External push factors: worsening North Korean nuclear threats, mixed signals from the USA, and the Ukraine Crisis

Weakening of the nuclear taboo, favorable public opinion, and rediscovery of technological competence has created internal pulling effects on the topic of nuclear weapons development in South Korea. But external factors have equally contributed to pushing the nuclear move.

The most pressing external factor pushing South Korea to go consider going nuclear is the change of Pyongyang's nuclear doctrine and the subsequently mounting nuclear threats. The North is no longer adhering to the "no first use" doctrine. Repelling an attack through preemptive moves, which is labeled as "second mission," has become extremely worrisome (Acton and Panda 2022). Equally critical is the lowering of the nuclear threshold by emphasizing the use of tactical nuclear weapons. Pyongyang claims that it has acquired tactical nuclear weapons and deployed them to the front line. In the past, the North used to designate the US mainland, Hawaii, and Guam as its primary targets. But now South Korea and American military bases there have emerged as major targets. North Korea has also been increasing the frequency and intensity of test launches for short-range cruise and ballistic missiles that can carry tactical nuclear weapons to the South. Such moves have justified the conservatives' quest for independent nuclear weapons development.

Mixed signals from Washington have also encouraged pro-nuke forces in South Korea. During his presidential campaign in 2016, former US President Donald

[2] An irony is that Ferguson gave the figures to warn South Korea's moves toward nuclear armament, but conservative hardliners interpreted them in an opposite way for their own political purposes.

Trump suggested the possibility of allowing Japan and South Korea to go nuclear. And his transactional handling of the alliance after inauguration heightened concerns in Seoul that he could withdraw American forces any time. The nuclear option was raised as a fallback strategy in the absence of American conventional and nuclear deterrence (Bae 2019a, b). Some South Koreans are concerned about the possible election of Donald Trump in 2024. If he gets reelected, the same situation could recur. Seoul should prepare for such a contingency by seeking the independent nuclear path.

Permissive attitudes by Washington pundits have also facilitated the nuclear drive in South Korea. Most notable is Elbridge Colby who argued as early as in 2014 that the US should choose "geopolitics over nonproliferation." For him, the main goal of US foreign policy should not be nonproliferation but "protecting Americans' security, liberty and prosperity through moral means." The USA should allow South Korea to develop nuclear weapons not only because of dwindling US nuclear deterrence, but also because of the need to cope with nuclear North Korea as well as nuclear China and Russia (Colby 2014). Lind and Press (2023) go further, arguing that South Korea developing nuclear capabilities would be legal under the NPT as the "threat from North Korea easily clears the bar for Seoul's legal withdrawal from the treaty". They also contend that it is a "choice for South Korea to make as a sovereign, law-abiding state—ideally in consultation with Washington" (Lind and Press 2023, 9).

Max Boot, a senior fellow at the Council on Foreign Relations, echoes a similar appeal in a 2023 *Washington Post* column. According to him, South Korea has every right to fear for its security, given North Korea's alarming nuclear developments, Ukraine's invasion by a nuclear-armed Russia, and the potential election of a Trump-like America-first president who will hesitate in defending a distant ally at the expense of American casualties. He then suggests that "ultimately, it should be South Korea's call. Washington should refrain from applying heavy-handed pressure and respect whatever decision its democratic ally makes" (Boot 2023). Doug Bandow (2022) of the Cato Institute makes a more controversial argument: "Washington should contemplate the currently unthinkable, a South Korean nuclear armament" to avoid risking national destruction in the pursuit of protecting South Korea. These tolerant tones from Washington sound like voices of blessing for South Korean pronuke forces.

Russian invasion of Ukraine has been another catalyst. Those who favor independent nuclear armament maintain that if Ukraine did not give up its nuclear weapons after signing the Budapest MOU in 1994, Russia would have never invaded Ukraine. Oh Se-hoon, Mayor of Seoul Metropolitan City and potential 2027 presidential candidate for the PPP, argues that "Russia freely violates Ukraine's airspace, flying bombers and firing missiles but Ukraine barely attacks Russian territory because of the psychological inferiority to a nuclear state" (Shin 2023a). Such a sentiment is widely shared among conservatives in South Korea. Furthermore, the Ukraine crisis has reminded them of the limits to American extended deterrence, because the US and European countries could not fully engage in Ukraine in fear of Russian nuclear retaliation. The same dilemma could happen in Korea given that the North has successfully developed such retaliatory capabilities against the Americans. North Korea

must have learned a valuable lesson from the Ukraine tragedy, too: that it should not give up its nuclear weapons. As with Russia, it is now more prone to use tactical nuclear weapons when its sovereignty and regime security are critically threatened. The butterfly effect of the Ukraine crisis is paradoxically hardening the position of pro-nuke forces in South Korea.

3.3 Dark side of the independent nuclear path: consequences and implications

These rationales and driving forces notwithstanding, going nuclear is a perilous odyssey full of obstacles and uncertainties. The NPT regime and the ROK–US Atomic Energy Cooperation Accord pose immediate and fundamental legal and institutional impediments. Major powers, such as the USA, China, Russia, Japan, and EU, will strongly oppose South Korea going nuclear to uphold the NPT regime, as well as to mitigate strategic instability in Korea and Northeast Asia. Progressive parties, pacifist NGOs, environmental groups, and a large segment of South Korean civil society will engage in extensive anti-nuke campaigns in cooperation with transnational organizations. South Korea will eventually encounter its disastrous dark side in the process of acquiring nuclear weapons (Hayes and Moon 2015, 395–403).

The most worrisome potential outcome stems from nuclear fragility and related human costs. Mutually assured destruction (MAD) and the logic of nuclear deterrence makes planned nuclear attacks inconceivable, but the chance for accidental nuclear escalation is very high, given the uncertainty of the nuclear arms races. Bruce Blair (1985) demonstrated in his book, *Strategic Command and Control: Redefining Nuclear Threats,* that nuclear forces are amazingly fragile because if the nuclear command system is attacked, control is lost, and no matter who "wins" the war, the winner will also lose the war due to the inevitable loss of its own and adversarial control, given that even an incapacitated enemy is likely to retaliate in kind, and even a few nuclear weapons coming back will be a very bad day for a state. Yet, states and nuclear weapons intellectuals took solace in the "survivability" myth that ignored Blair's warning on nuclear fragility. Even Press (2019), who is supportive of South Korea's independent nuclear path, aptly raises this issue. As the inter-Korean nuclear arms race intensifies, the structure of nuclear fragility will be amplified. It is certain that when and if South Korea goes nuclear, the North will double-down on proliferation and deception.[3] Nuclear escalation and accidental nuclear clashes could become a horrifying new reality.

The human costs of nuclear clashes will be unbearably high in the Korean context. Lisowski and von Hippel (2023) identify six impacts of nuclear weapons use that would result in unimaginable death and destruction. Human casualties can come from various sources: thermal fluence (heat) from nuclear blasts; firestorms; physical damage caused by blast overpressure; prompt radiation from nuclear detonation itself; fallout radiation; and radiation-induced cancer deaths. The level of casualties would vary by the number of nuclear bombs used. Jeffrey Lewis (2017)

[3] We thank Peter Hayes for his suggestions on nuclear fragility.

estimated two million deaths, mostly Koreans and some Americans, and Japanese. But the exact numbers would be impossible to track. Zagurek Jr. (2017) also shows similar figures. According to calculations using the Nuclear Bomb Effects Computer, if nuclear detonations happened over Seoul and Tokyo with North Korea's current estimated weapons, it could result in as many as 2.1 million fatalities and 7.7 million injuries. The human cost would be staggering even without nukes: back in 1994, when Clinton was contemplating preemptive strikes on North Korea, the commander of US forces in South Korea estimated over a million deaths in and around the Korean Peninsula in the first 60 days of the war (Feffer 2017).

Contrary to expectations of the pro-nuke forces, independent nuclear weapons development will result in severe adverse security consequences. If both South and North Korea nuclearize, their relationship would be characterized by escalation imperatives that would make the peninsula highly unstable, with potentially catastrophic consequences. Far from reinforcing South Korea's already overwhelming offensive military capabilities, nukes would undermine deterrence based on conventional forces, and even reduce the South's ability to use its conventional forces in response to a North Korean attack. Both Koreas would be faced with a nuclear-armed adversary with a mutual incentive to strike first. Each would therefore remain in a state of constant nuclear alert in case the other side intended to attack immediately. This state of constant fear would drive both states to invest in surveillance technologies and increase mutual distrust (Hayes and Moon 2015, 397, 402). The new nuclear path will only justify North Korea's nuclear status and diminish the opposition from China and Russia to the North's nuclear armament.

Equally troublesome is a nuclear domino effect in Northeast Asia. South Korea's nuclear armament will instantly force China and Russia to strengthen their nuclear capabilities to counter it. Also, some ultra-rightists in Japan will relish the prospect that Seoul might make such a move so that they can justify Japanese nuclear weapons. They have been advocating Japan's nuclear latency after China undertook its first nuclear testing in October 1964. Japan has nuclear materials (47.8 tons of plutonium and 1.5 tons of enriched uranium as of 2016), technological competence, and financial capabilities. Once the political decision is made, with the support of national consensus, Japan could go nuclear relatively easily. Japan has always been worried about the advent of a nuclear Korea armed with nationalism (Moon 2021). New nuclear threats coming from China, Russia, and even Japan, in addition to those from North Korea, will drive Seoul's defense planners to face an unprecedentedly harsh security reality.

South Korea's venture into nuclear weapons could also rupture the ROK-US alliance. Its advocates argue that the USA would not strongly oppose such a program because it will entail some positive effects of countering China, but that is a serious misunderstanding. Nonproliferation advocates have much more sway in Washington than supporters of the ROK–US alliance, and very few believe that a nuclear-armed South Korea would be as pliable toward the USA as it has been in the past. Given that American hegemony in the region has been backed by its nuclear supremacy, it is very unlikely that the USA would allow Japan and South Korea to go nuclear. When Seoul's efforts to acquire nuclear weapons are disclosed, those who are in Washington, especially Republicans, would easily find a reason

to withdraw US troops and end the alliance as Trump tried. The Democratic Party, meanwhile, would be unlikely to tolerate South Korean proliferation because of its traditional nonproliferation policy line (Dalton and Jackson 2023). Simply put, the USA, regardless of party line, does not want to see a nuclear South Korea. That's why Washington has persistently refused to allow Seoul to reprocess spent fuel or to enrich uranium despite the latter's strong diplomatic appeal and lobbying. As Chairman Ernest Moniz of the Nuclear Threat Initiative, who served as Secretary of Energy during the Obama administration, warns, "a nuclear South Korea is a dangerous miscalculation" (Moniz 2023).

Therefore, the naïve expectation that South Korean nuclear armament would strengthen its alliance with the USA is a fantasy. It will lead to a rift in the South Korea–US alliance and the deterioration of the Northeast Asia security environment, culminating in a nightmare security scenario (Moon 2023; Kim 2023a, b, c, d). Klingner (2023) and several other prominent Washington pundits have expressed their concerns about its negative impacts on the ROK–US alliance.

Some experts claim that economic impacts emanating from South Korea going nuclear will be manageable for two reasons (Cheong 2023a). One is that the USA and like-minded countries such as the UK and France, will help mitigate tough UN sanctions against South Korea. The other is that Israel, India, and Pakistan have survived even after they have acquired nuclear weapons. This is wishful thinking. At the initial phase of secret nuclear weapons development, South Korean allies and friends might show tolerant attitudes, while trying to dissuade South Korea. As Seoul moves deeply into nuclear weapons development, however, they will find it difficult to veto sanctions resolutions, even though they are proposed by China and Russia, because of the mandate to sustain the existing NPT regime. Initial sanctions will be imposed on technology related to nuclear and ballistic missile development. But if South Korea undertakes nuclear testing and ballistic missile test launches, heavier sanctions will be imposed on energy, manufactured goods, and the banking and financial sector. South Korea will be hard hit far beyond the magnitude comparable with Israel, India, and Pakistan. At the time of nuclear weapons development, these countries pursued an import substitution industrialization, and their economies were relatively insulated from external shocks. But today's South Korea is an entirely different story. Its economic success came from an export-led growth strategy, and its dependence on the external sector is huge. As of 2022, the ratio of imports and exports to GDP was 102%, and it imported oil and gas 100% from abroad. Thus, UN sanctions can deal a catastrophic blow to the South Korean economy.

South Korea will also be subject to various individual sanctions. The USA can invoke the Glenn Amendment and other executive order and legislative measures to block Seoul's nuclear venture. US unilateral banking and financial sanction measures, if taken, will paralyze the South Korean economy by banning foreign banking and financial transactions and discouraging direct investments from abroad. And it is very likely that Japan and the European Union will follow America's lead. China is most likely to undertake tougher unilateral sanction measures against South Korea. China accounts for 20% of South Korea's total trade, and its sanctions could devastate its economy, as demonstrated by the experience of THAAD deployment and

related China sanctions in 2016–2017. A study shows that the tourist sector alone lost $19.2 billion for 34 months from July 2016 to April 2019 when China imposed a ban on group tours to South Korea. If other sectors are included, damages could be substantial (Cho 2020). South Korea's window of vulnerability is wide open to sanctions, and the economic costs of an independent nuclear path will be astronomical.

After giving up its nuclear weapons development project in the 1970s, South Korea emerged as one of the most successful countries in the peaceful use of atomic energy. The civilian nuclear industry accounts for 30% of domestic energy needs and its share is projected to increase under the Yoon government. Exports of nuclear reactors have also been impressive. But clandestine nuclear weapons development, if disclosed, will not only cripple it, but also bring about a crushing blow to exports of nuclear reactors. From the beginning, South Korea's civilian nuclear energy industry has been heavily dependent on US Article 123 of the US Atomic Energy Act of 1954, which prohibits South Korea from using any nuclear materials, equipment, or technology received from the USA in military applications, including the development of nuclear weapons. If Seoul violates those rules or the IAEA's safeguard clause, it will have to immediately return all those materials and equipment to the USA. The Nuclear Suppliers Group (NSG) will stop supplying the requisite raw materials to South Korea, and enrichment services by foreign countries will also be terminated (Moon 2023). This can lead to a shutdown of domestic reactors as well as the suspension of even medical services such as X-ray, CT, and MRI.

The Yoon Seok-youl government has been working very hard to promote export of nuclear reactors to Saudi Arabia, Egypt, Poland, and other Eastern European countries. If South Korea shows any signs of secretly developing nuclear bombs, there will be no buyers (Hecker 2023a, b). The USA can easily block the export of many South Korean nuclear technologies and eventually reactors. Albeit contentious, they are based on US technologies licensed to South Korea. And the USA has political power and influence to block South Korean sales of nuclear reactors. If South Korea withdraws from the NPT and breaks the nuclear accord with the USA, the domestic nuclear industry and export business will be ruined. The international community will not tolerate South Korea's deviant behavior either, and such wishful thinking that Seoul can fix the problem through diplomatic appeal, lobbying, and even cheating will not work (Klingner 2023).

Finally, the nuclear path will seriously damage Seoul's international image. If it were to become the first democratic state to withdraw from the NPT, it would forfeit the moral superiority over North Korea it has enjoyed internationally since the Joint Declaration on Denuclearization in 1991 and would also likely face the stigma of being a rogue state undermining the international nonproliferation regime. Its dream of becoming a global pivot state will be shattered (Moon 2023). Such a move will not only destroy the hard-built credibility of its allies and friends such as the USA, France, and the UK, but also draw heavy criticism from China and Russia for violating international nuclear norms. South Korea will also be shunned by the international community, including the International Atomic Energy Agency (IAEA), the Nuclear Suppliers Group and the Missile Technology Control Regime (Hecker 2023a, b; Shin 2023a, b; Han 2022).

4 Conclusion

The costs of the independent nuclear armament appear much higher than its presumed benefits. Nevertheless, the nuclear taboo has been compromised, and pro-nuke forces have been beating the drum of the perilous nuclear path. The Yoon government has been sandwiched between American pressure for non-proliferation and its domestic supporters' nuclear ambition.

The Washington Declaration, which was adopted in April 2023, offered a very attractive exit from the horn of a dilemma. In the declaration, Presidents Biden and Yoon agreed to strengthen the nuclear extended deterrence by enhancing information-sharing and joint planning of nuclear weapons strategy through the establishment of the Nuclear Consultative Group (NCG). The USA has committed to more frequent deployment of American ballistic missile nuclear submarines to South Korea. Although there is no such thing as nuclear sharing and the declaration stops short of NATO's Nuclear Planning Group (NPG), South Korea will have a more institutionalized way of reflecting its voice in US nuclear decisions, while enhancing a higher degree of transparency in US nuclear strategy. Graham Allison (2023) praised the Washington Declaration as "one of the greatest achievements of US national security strategy," It establishes a win–win solution, prevention of nuclear proliferation for the USA, and alliance cohesion and strengthened extended deterrence for South Korea.

It is not the end game, however. As Klingner (2023) warns, "the South Korean hawks won't be satisfied until they have a large number of nuclear inventory." Indeed, the success of the Washington Declaration has muted pro-nuke voices, but they have cautiously started to deliberate on a hedging strategy focusing on increased nuclear latency (Cheong 2023b). This involves the preparation of nuclear weapons production capacity without necessarily violating the NPT. In the case of contingency, South Korea can then develop nukes in a short time period, like Japan (Williams and Link 2023). Reprocessing and uranium enrichment processes are essential for nuclear latency. Thus, the hawks will accelerate their lobbying efforts to amend the ROK–US Atomic Energy Cooperation Accord that would allow full-fuel cycle and enrichment for South Korea. Continuing North Korean nuclear threats, a dubious American security commitment, and strategic instability in Northeast Asia will make it harder to put the pro-nuke genies back into the bottle.

But South Korea's independent nuclear quest will be perilous. Nuclear fragility and high human costs, adverse security consequences, unbearable backlash on the South Korean economy and its civilian nuclear industry, and profound damages to Seoul's international reputation all indicate that the nuclear path is neither feasible nor desirable. We need to take a more innovative approach. Root causes of the Korean security problem should be addressed. Departing from the tit-for-tat hostile confrontation, dialog and negotiation should be revived for a diplomatic resolution to the North Korean nuclear quagmire. Past failure should not block efforts to resuscitate diplomatic reengagement. The North Korean nuclear issue cannot be resolved in separation from path-breaking discourses on the overall

security dynamics in Northeast Asia. A new institutional arrangement, such as a Northeast Asia Security Summit, as an upgraded form of the Six Party Talks, should be devised to address and resolve the Korean security problem. It may sound far-fetched, but now is the time for such a security summit to explore the possibility of a Northeast Asian Nuclear Weapons Free Zone.

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