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Sanctions for nuclear inhibition: Comparing sanctions conditions between Iran and North Korea

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When do sanctions succeed in nuclear inhibition? Is there a generalizable framework to estimate sanction effectiveness against nuclear aspirants? Instead of relying on partial equilibrium analysis, we conceptualize sanctions as three sequential phases—imposition of economic pain, conversation to political pressure, and creation (or failure thereof) of zone of possible agreement (ZOPA). The effectiveness of each phase is subject to phase-specific contextual variables, an aggregation of which helps measure individual sanction's effectiveness, conduct cross-case comparison, and estimate one's replicability in other cases. To illustrate its analytical utility, we analyze the divergent sanction outcomes between Iran in 2012–2015 and North Korea in 2013–2017. Iran was economically more vulnerable and politically less resilient, and its bargaining position was closer to a ZOPA than North Korea was. Our analysis questions the utility of economic sanctions against North Korea and helps expand the discussion away from the policy obsession with the role of China. Theoretically, it rectifies an imbalance against qualitative and holistic approach in the sanction literature and contributes to discussions about nuclear inhibition strategies.

Keywords: *economic sanction, nuclear proliferation, North Korea, Iran, US foreign policy.*

When do sanctions succeed in nuclear inhibition? Designed to raise economic cost of continuing a nuclear program, sanctions have been widely employed as an inhibition strategy against nuclear aspirants (Solingen 2012; Miller 2014). Contrary to its prominence and frequency in nonproliferation strategy, however, the literature surprisingly lacks in-depth discussions on basic questions about how and when sanctions are effective in stopping nuclear programs. Why do similarly designed sanctions yield divergent results across proliferation cases? How do we

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measure replicability of sanction success to other nuclear aspirants? Is there a generalizable analytical framework to estimate sanction effectiveness?

To capture the relationship between sanctions and nonproliferation in a systematic and organized manner, we put forward a *sequential model* that conceptualizes three distinct phases with which a sanction compels nuclear rollback. The model sets off with the phase of imposing economic pain, followed by its conversion to political coercive pressure, and ends with creation (or a failure thereof) of zone of possible agreement (ZOPA). The effectiveness of each phase is subject to phase-specific contextual variables, which depending on their values magnify or dampen the operation of each phase, and therefore the sanction effectiveness overall.

By extensively consulting the existing literature, we identify a series of factors relevant to sanction effectiveness and organize them according to the three phases. First, the severity of economic pain is a function of comprehensiveness of sanction, the target's dependence on trade, and participation of major trading partners. Economic disruption is not an end in itself, however, but a means to pressure the target regime. The second phase, therefore, is defined by how well economic pain gets converted into political coercive pressure onto the target regime. Here, the speed and magnitude of such conversion are determined by three variables—the size of winning coalition, institutional mechanisms for leadership change, and strategic orientation of patron states. Last, whether political pressure is sufficient to create ZOPA hinges on the existing cost of striking a bargain for both sender and target states. We posit two such factors—the level of nuclear technology and the availability of passive economic carrots—to analyze the final phase of economic sanction. The sequential model captures sanction initiation to outcome, systematically maps and organizes widely acknowledged relevant conditions, and therefore helps identify points of the sanction operation that are particularly conducive or detrimental to sanction effectiveness.

Using the sequential model, we conduct an in-depth cross case study on sanction conditions between the Islamic Republic of Iran in 2012–2015 and the Democratic People's Republic of Korea (DPRK or North Korea) in 2013–2017. The two share a number of features, many of which have been pinpointed to be statistically significant to sanction effectiveness, such as the coverage and severity of sanction (Dashti-Gibson, Davis, and Radcliff 1997; Hufbauer et al. 2007), a level of trade dependence, the nature of sender-target relations (Bonetti 1998; Drezner 1999), the target's regime type (Allen 2008), and the nature of compel-

lence demand (Solingen 2012). Indeed, the design and rationale of the sanctions on Pyongyang has been frequently referenced to the success of the Iran model, defined as maximal use of economic sticks to induce denuclearization. Yet, the contrast in outcomes could not be starker. In the case of the former, the 2012 sanction played a pivotal role in "reducing the risk of destabilizing nuclear competition" (Statement from Nuclear Nonproliferation Specialists 2015) by forging the final Joint Comprehensive Plan of Action with Tehran in July 2015.[1] On the other hand, a vicious and unending circle has been evident in the North Korean case whereby a nuclear test is followed by corresponding sanction, and responded to with yet another test. For the reasons discussed later, we are also skeptical that sanctions have been key to Pyongyang's latest apparent willingness to negotiate denuclearization with Washington.

In accounting for the diametrically opposite outcome, the conventional wisdom put heavy responsibility on China's strategic reluctance to ratchet up and implement the sanctions (Haggard 2016). Implicitly assumed here is that China's participation would have caused severe economic pain to Pyongyang comparable to that in Tehran, which then could have induced the abandonment of its nuclear program. However, an in-depth qualitative examination under the sequential model shows that China's reluctance was only a part of sanction ineffectiveness. Three non-China factors are highlighted: Pyongyang's political institutions are more insulated and resilient against economic hardship; North Korea's fully developed nuclear program requires greater concessions from the United States; and lifting sanctions does not promise immediate and attractive economic benefits to Pyongyang the way it did to Tehran. Overall, Pyongyang fared worse on all three phases, and our analysis forwards pessimistic viewpoints on the utility of economic sanction for nuclear inhibition in North Korea.

The first section reviews the relevant literature and theorizes the sequential model by explicating each of the three phases in sanction operation. Next, we examine how Iran and North Korea fared in each phase by systematically comparing the relevant factors in order. The last section concludes with policy implications.

How Sanctions (Are Supposed to) Operate

The sanction literature is voluminous, initiated with an inquiry about overall utility of sanctions (Pape 1997; Drezner 2003; Hufbauer et al. 2007) and proliferated with a long and rich list of conditions germane to

sanction performances (Drezner 2011; Bapat et al. 2013). The latter category—motivated by the question of why some sanctions perform better than others—is more relevant in explaining the divergent outcomes than the former, which addresses how sanctions as a whole fare against other nuclear reversal tools such as international treaty, diplomacy, coercion, alliances and security guarantee, sabotage, and even threats of military strike (Gavin 2015, 11).

Although the vast literature left us with plentiful variables to work with, these individual variables identified by static, large-*N*, and partial equilibrium analysis—a dominant form of studying sanctions—are of limited analytical utility in scrutinizing *individual* sanctions compared to the *universe* of sanction cases. This is because how individual sanctions perform is likely to be a product of multiple factors that simultaneously operate and interact, which the controlled statistical analysis on the universe of sanction cases is necessarily and intendedly not equipped to make sense of. Similarly, two or more sanctions may differ in their performances not by a single factor, but out of competing forces from multiple factors.

As a consequence, the controlled nature and different model specifications of these theoretical endeavors make it analytically challenging to pick relevant conditions and compare the two nuclear sanction cases in any theoretically rigorous manner. To overcome these challenges, we selectively employ ideas from the existing literature and deductively construct a model that conceptualizes an operation of economic sanction in its entirety. Combining and organizing different variables under a single framework offers several analytical advantages. First of all, it helps us to track what went right and wrong and at which points. Second, it gives a comprehensive set of relevant criteria to assess the effectiveness of sanctions, which again is likely a product of multiple factors. Last, the framework allows systematic estimates of the replicability of one sanction's success on other cases by exposing the similarities and differences in sanction conditions across two or more cases.

Setting Up the Sequential Model

A sanction against a nuclear state is implemented because states could not find a mutually acceptable arrangement regarding the target's nuclear program. The sanction, in turn, reveals the resolve of the sender (sanctioning) state to dismantle and the target (sanctioned) state to preserve the nuclear program under dispute. Under the new information,

both actors adjust their behaviors accordingly, determining the sanction's outcome. The sanction succeeds if the target complies with the sender's demands for nuclear rollback. It fails if the sanction has little to no coercive effect in deterring the target's nuclear aspirations. A negotiated deal is possible if, under the new informational setting, both target and sender decide to strike a bargain. For a sanction to work, therefore, it has to change the target's calculus and shift its perception about the value of its nuclear program. This section explains the three sequential phases by which this change occurs (or not) and posits variables relevant to the operation of each phase, with which target states' vulnerability to sanction is determined.

First Phase—Imposition of Economic Cost

While sanctions can take different forms (Kirshner 1997), ultimately they are designed to begin by inflicting economic pain on a target state. They do so by disrupting its aid, finance, trade, or asset linkages to foreign economic entities. In an increasingly globalized arena of economic activities, cutting ties to international economic opportunities can potentially inflict highly significant hardship on the target state. A sanction is likely to be more powerful with the increasing cost it could impose on the target (Bapat et al. 2013).

In essence, the target's economic vulnerability is a function of three economic structural variables. First, *the comprehensiveness of the sanction* regime matters (Dashti-Gibson, Davis, and Radcliff 1997). The level of sanctions widely differs, ranging from relatively minor bans—such as those on specific items of traded commodities or travel bans on designated individuals—to more ambitious and comprehensive bans such as embargoes on a target state's overall trade or prohibition of a target's financial transactions with the rest of the world. Economic suffering increases as the economic sanction measures become more comprehensive.

Second, a target's economic vulnerability increases with *its dependence on trade* (Dashti-Gibson, Davis, and Radcliff 1997). Banning trade on self-sufficient economies will not do much damage, while for a country whose welfare and prosperity come from international trade, sanctions will have a greater effect.

Third, a target's level of economic suffering is subject to *the level of participation of its major trading partners* (McLean and Whang 2010). In essence, the more participation the sanction mobilizes, the more eco-

nomic pain it can exact. The long-term sustainability of sanctions is not a constant but a variable, as some sender states themselves may find the trade ban too costly to enforce (Bapat and Kwon 2015) or the divergent strategic priorities among a target's major trading partners may undermine the cohesiveness of the sanction regime.

Second Phase—Conversion into Political Coercive Pressure

Resilience against sanctions is not only a function of the magnitude of economic pain (Renwick 1981). Indeed, the determination of whether to capitulate to economic sanctions is essentially a political and not an economic decision. For instance, although economic sanctions halved Iraq's economy in the 1990s, it nevertheless failed to change Saddam Hussein's behavior (Drezner 2011). Domestic institutional and international strategic environments are what translate the economic impact into political coercive pressure and hence determine the target state's political resilience against sanctions (Blanchard and Ripsman 1999). Whether this institutional transmission belt dampens or magnifies the effectiveness of sanction statecraft is subject to three noneconomic variables.

The first factor is *the size of the winning coalition,* defined as "a set of people who control enough other instruments of power to keep the leader in office" (Bueno de Mesquita 2005, 8). The size affects both the chance of the sanction hitting the welfare of the regime's winning coalition and the costs to counter the impact. Accordingly, an equal amount of economic pain does not necessarily become an equal amount of political pressure—regimes with large winning coalition are likely to face greater political pressure as the sanction subjects them to greater prospects of their key supporters being harmed by the sanction and increases resources required to satisfy the material welfare of their principal supporters. In contrast, small-sized winning coalitions are likely to suffer less and require less resources to maintain their material welfare, and hence likely feel less coherent political pressure (Lektzian and Souva 2007).

The second factor is *an institutional arrangement for leadership change*. If the leadership is selected competitively on a regular basis (e.g., by election, party conference, etc.), the leadership will be more conscious of the economic welfare of its winning coalition. In the absence of such a mechanism, the threshold for a regime change is higher

and the target state's leadership will remain more insulated from sanction-inflicted economic pain.

The third factor is *the strategic orientation of the target's patron states*, through which the target state can judge the likely duration and severity of sanctions. This informs the target's decision whether to endure or submit to the sanction. Any belief, reasonable or blind, that the participants have divergent strategic priorities or that some are against regime-threatening sanctions will lead to an expectation that the multilateral sanction cannot go on indefinitely and likely to end up being short-term discomfort and not long-term agony. The resulting perception of the fragility of a sanction encourages the target leadership to endure the economic pain.

Third Phase—Creation of Zone of Possible Agreement (ZOPA)

Where a sanction ends up depends not only on how much pressure the sanction can exert on the target's economy and the regime, but also on the cost of the concessions that at least one of the actors needs to make in order to reach ZOPA (Sebenius and Singh 2012–2013). For instance, if the sender and target are disagreeing on a relatively minor issue, the required economic pain does not need to be large to coerce the target's compliance with the sender's demands. If the range of disagreement is large, however, even a highly effective sanction may not be sufficient to induce a change in the target state's nuclear behavior (Morgan and Schwebach 1997; Drury and Li 2006).

Two factors determine the cost of the concessions necessary to create a ZOPA. One is *the level of nuclear program development* (Volpe 2017). In short, the more developed the program, the costlier it is for the target state to comply with the sender's demand for nuclear rollback. Nuclear rollback nullifies the target's technological, financial, and political capital thus far invested in the development program. The target state with a more advanced nuclear program will, therefore, be more reluctant to agree to the nuclear rollback for it entails greater opportunity costs, and political and strategic risks.

It also depends on *the amount of "passive carrots"* available for a sender state to employ. *Passive carrots* refer to a set of economic benefits that the sender state can provide without resorting to additional resources. In most cases, this means a simple removal of existing sanction measures, such as releasing frozen foreign assets or lifting a ban on

trade and financial transactions. If these passive carrots are sufficient for the target state to anticipate a chance of economic recovery and revival, then the chance for a negotiated deal increases as it will entail little cost for the sender to bear, while the target receives immediate and tangible economic benefits through resumed access to international trade and finance.

When the target state has reasons not to view the nuclear rollback as viable or attractive, the sender states may consider the option of offering "active carrots," or additional economic benefits in the form of economic aid, loans, investments, or even security assistance or guarantees. However, while this expands the scope for reaching ZOPA with the target state, the provision of active carrots is a costlier and usually more controversial option for the sender. Overall, the number of passive carrots a sender state possesses through sanction lifting also affects the degree of incompatibility between the states during the nuclear negotiation.

Table 1 How Economic Sanctions Work

	First phase	Second phase	Third phase
Phase	Imposition of economic pain	Conversion to political coercive pressure	Creation of zone of possible agreement (ZOPA)
Variables	(1) Comprehensiveness of sanction (2) Target's dependence on trade (3) Participation of major trading partners	(1) Size of winning coalition (2) Institutional mechanism for regime change (3) Strategic orientation of patron states	(1) Level of nuclear technology (2) Availability of passive economic carrots

Table 1 summarizes our framework, denoting the three phases and the determinants for the success of each phase. In short, a sanction is likely to work more effectively in favor of a sender's demands if it can inflict greater economic pain (first phase), which gets converted more completely as political coercive pressure (second phase), and the bargaining conditions between sender and target states are more compatible (third phase). Accordingly, sanction is more likely to compel nuclear inhibition based on the more economic pain it can exact, the more political challenges economic pain presents to the leadership, and when the price of striking a bargain is lower for sender and target states. Conversely, a sanction is less likely to succeed if the opposite conditions hold. In

other words, the target will stand firm on its nuclear program if it finds the economic pain caused by the sanction to be bearable, evadable, and/or a short-term prospect; its own political institutions are resilient and insulated against economic hardship; and the bargaining objectives are too wide to be reconciled by the sanction.

Comparing Sanction Effectiveness between Iran and North Korea

Based on the framework set up above, this section conducts a theoretically informed qualitative assessment of the relevant conditions surrounding the sanctions on Tehran and Pyongyang. Doing so allows us to explain the success of the Iran sanctions in an organized way and to evaluate the replicability of their success in North Korea. Despite many apparent similarities, the evidence overall strongly suggests that North Korea fares far worse on all relevant variables, casting deep doubts on the Iran sanction's replicability in North Korea.

First Phase: Imposition of Economic Cost

The evidence suggests that though the two nations are quite comparable in terms of the comprehensiveness of the sanction regime and the level of trade dependence, Tehran faced much more stringent and determined participation in the sanction by its major trading partners. This alignment of major powers' strategic objectives was further enhanced by the exogenous shock of the shale oil revolution, which made sanctions more endurable for oil-importing sender states but more painful for oil-dependent Iran.

Sanction Comprehensiveness: The 2012 Iran and 2016 North Korea sanctions are defined by two similarly stringent sets of sanction provisions. One is an embargo on the target's major export item. In the case of Iran, this item was crude oil, which made up 85 percent of its foreign exchange, 60 percent of government revenue, and 90 percent of export revenue (Farzanegan 2011). Via a series of sanctions in 2012, major oil importers joined in the previously implemented US sanction on Iran oil, with the EU immediately halting its 600,000 barrels per day of oil import entirely, which Japan and Korea also agreed to rapidly reduce (Katzman 2016). With their participation, the sanction on Iran oil was elevated from a mere US diplomatic statement to a truly substantive coercive measure.

Similarly, North Korea's mineral export, chiefly consisting of coal and iron ore, was put under stringent sanction measures with the UNSC 2270 of March and UNSC 2321 of November in 2016. In 2015, their export value reportedly represented 47 percent of its $2.7 billion in total exports and 51 percent of its $2.5 billion exports to China, its largest trading partner (KOTRA 2016). Sanction comprehensiveness was further enhanced by mandatory cargo inspections in and out of North Korea. Apparently defiant of sanctions, Pyongyang conducted further missile and nuclear tests in July and September 2017, after which UNSC 2371, 2375, and 2397 were consequently imposed. Since UNSC 2321, the UN multilateral sanctions have not targeted just the regime but expanded their scope to include the market economy by cutting crude and refined oil supply by 90 percent, now banning over 90 percent of North Korea's official exports consisting of coal, textiles, iron, and other items and requiring North Korean workers' expulsion within the next twenty-four months (Haggard 2016; Byrne 2017; Macdonald 2017).

Another sanction measure that added a true sense of comprehensiveness was the erection of secondary sanctions, by which both Iran and North Korea were effectively blocked from conducting financial transactions with dollar-based international banking systems. In particular, by targeting financial institutions that are suspected of transacting with the target, the secondary sanctions put enormous constraints on the two states' ability to find any willing international financial intermediaries. For instance, this proved highly damaging for Iran when sanctions included maritime insurance for shipping oil and petrochemicals. EU-headquartered maritime insurers covered at least 90 percent of Iran's oil tanker trade and there were no immediately available alternative providers for oil shipping insurance (*Economist* 2012). North Korea was put under secondary sanctions through Executive Order 13722 in March 15, 2016, under President Barack Obama, and another in September 21, 2017, under President Donald Trump, which expanded the target to any individuals, banks, or companies that finance trade with North Korea.

Trade Dependence: Due to the lack of data reliability, any estimate on Iran or North Korea's trade dependence should be taken with great caution. The available estimates, however, indicate that in both countries, trade accounts for about 50 percent of their total GDP. One may note that oil revenue makes up by far the largest source of government income and therefore have always been central to the functioning of Iran's political economy. In North Korea, the estimate of trade/GDP was as low as 15 percent in the late 1990s, but rose to around 46.2 percent (Kim 2017).[2] The increase occurred as a result of the complete break-

down of the public distribution system (PDS) in the late 1990s, and the resulting inflow of foreign aid and the expansion of trade with China and South Korea (Haggard and Noland 2010; Choi 2012).

Participation of Major Trading Partners: Although the form of an optimal sanction was made obvious by Iran's well-known overreliance on oil, mobilization of multilateral support for banning Iranian oil presented huge policy challenges. Simply put, in the eyes of many interested outside parties, Iran's oil was too strategically valuable, economically critical, and commercially tempting to be removed from the supply chain—in 2011 Iran was producing around 2.5 million barrels per day, representing about 4 percent of the global supply. Its removal was expected to precipitate a sharp strain on the already tight global oil supply in 2011.

Indeed, the prospect of a high cost borne by importers created an initial skepticism about the 2012 sanction regime's sustainability. For instance, Ali Moruri, the vice chair of the Majlis' Energy Commission, declared that "the possibility of the elimination of Iran's oil does not exist because the world needs Iran's oil and Iran's oil cannot be ignored" (Maloney 2015, 356). Khamenei similarly argued that "continuing these sanctions for a long time is not in the interest of western countries" (Maloney 2014b). Analysts agreed—coupled with a decades-long history of Iran enduring economic sanctions, the political and economic environment appeared to favor Iran rather than the sanction regime (Takeyh and Maloney 2011).

However, initiatives for additional sanction measures gained momentum beginning in the late 2000s. First, following the revelation of a secret uranium enrichment facility near Qom and a report that Iran began enriching to 20 percent U-235 in the Natanz and Fordow plants in 2010–2011, there was a renewed sense of urgency regarding the nuclear threat, particularly among the European Union. Second, the escalating nuclear tension was coupled with President Mahmoud Ahmadinejad's disturbing and unacceptable rhetoric, such as his infamous Holocaust denial and his remark that "Israel must be wiped off the map of the world" (CNN 2005), all of which further tarnished Iran's already bad international image. From the point of view of sanctions, the perception shift was a bit of unforeseen "luck" as the heightened political anxiety helped to initiate and mobilize multilateral efforts in ratcheting up sanctions against Iran.

Third, and perhaps more significantly, a shale oil revolution had transformed the political economy of sanctions by lowering the cost of sanctions borne by oil-importing sender states. Almost by sheer seren-

dipity, a rapid increase in shale oil production roughly coincided with the timing of the January 2012 economic sanctions, moving from about 0.63 million barrels per day in January 2010 to 2.01 million barrels per day in June 2012. By the time of the July 2014 agreement, the volume stood at 3.91 million barrels per day (Energy Information Agency [EIA] 2015). This volume of an additional 2 to 3 million barrels per day roughly equaled the amount of supply loss from Iran, which meant that the West now could "put the squeeze on Iran without disrupting the global market or jacking up the price" (Philips 2013).

Overall, the strategic objectives of Iran's trading partners became more or less aligned toward strict enforcement of sanctions, forged upon the shared growing concern and mistrust about Iran's nuclear program and new shale oil dynamics that canceled out the effects of the loss of Iranian oil supply to the market. Eventually, the multilateral sanctions severely hampered the Iranian economy. Iran's oil exports came down by 1 million barrels per day, leading a fall in its oil and gas export by 47 percent from $118 billion in the 2011–2012 fiscal year to $63 billion just a year later, and then dropped even further to $56 billion the next year (EIA 2015). With the underperformance of its dominant industry, Iran's GDP was contracted by 6 to 9 percent in 2012, its inflation reached 35 to 40 percent in 2013, and its currency, the rial, depreciated by more than 50 percent in 2013 (*Economist* 2016; Kwon 2016).

In contrast, the strategic priorities diverge widely among major trading partners with North Korea. The United States, South Korea, and Japan support sanctions, have instituted their own economic punishment, and closely cooperate on the North Korean nuclear issue. On the other hand, China's commitment to sanctions is widely known to be indeterminate at best, an inevitable reality born out of China's complex strategic priority toward the Kim regime. It is true that Xi Jinping repeatedly showed his displeasure with the Pyongyang-sanctioned nuclear provocations, a trend that accelerated after North Korea's purge of two top party officials in charge of the bilateral party relations, Jang Song-Taek in 2013 and Zhou Yongkang in 2014 (Lee and Kim 2015). Furthermore, to the surprise of many, China cooperated with the United States in drafting a series of increasingly harsher sanction regimes starting with UNSC 2270 and 2321 in 2016 and UNSC 2371, 2375, and 2397 in 2017, which reportedly have tightened trade control.

A dominant view, however, holds that as onerous as North Korea is, Beijing is sharply opposed to further destabilization of Pyongyang for the strategic interest of keeping its buffer state secure and preventing a refugee crisis in the unwanted event of a sudden regime collapse. This

opposition was particularly strong when a regime change was openly discussed in Washington and Seoul. Furthermore, the Sino-DPRK alliance carries diplomatic value in the management of Beijing-Washington relations. For instance, Xi Jinping received Ri Su-Yong, a vice chairman of the Korean Workers' Party, in the midst of sanctions implementation in June 2016, following rising tensions with the United States in the South China Sea, signifying a possible departure from the sanctions regime should it find other US policies in the region to be hostile and unacceptable. Beijing's stance has been invariably affected by other complicating issues such as the intensely controversial deployment of Terminal High Altitude Area Defense (THAAD) in 2016 and deteriorating trade tension with Washington in 2018.

The strategic complexity accounts for a series of sanction-evading measures as well as Pyongyang's active search for alternative trade and financial arrangements. Against the mandate to inspect all cargo going in and out of North Korea, for example, trucks still passed through the bridges on the Sino-DPRK border without inspection (Perlez 2016). Illegal smuggling is rampant, a well-known combined product of determined smugglers, corrupt officials, and the sheer difficulty of sanction enforcement with limited resources along this long, porous border. Previous sanctions have been reported to have deepened, not stifled, Sino-DPRK trade and commercial ties through an inadvertent improvement in private procurement networks (Park 2014).

The incentives and resources to circumvent sanctions are prevalent and plentiful in Sino-DPRK economic relations. This has been, in an almost literal sense, fatal to the 2016 sanction regimes. Thanks to geographical proximity and historical ties, China forms by far North Korea's largest economic partner. This trade dependence intensified during the 2000s, and approximately 90 percent of North Korea's exports are destined for China. Unfortunately, China's full commitment has been an elusive prospect under the current strategic landscape, severely undermining the credibility and sustainability of the 2016 sanctions.

Second Phase: Conversion to Political Pressure

Even if Pyongyang goes through suffering as equally painful as Tehran did, it does not guarantee a comparable nuclear deal. This is because whether economic pain becomes a political reality is ultimately contingent upon the target state's political will and its institutional ability to endure economic hardship. The comparative analysis of political setting

shows that Pyongyang can endure sanctions more resiliently than Tehran could. The Kim regime relies on a smaller winning coalition, while a legitimate route for regime change is virtually nonexistent and China is strategically, though reluctantly, inclined to preserve rather than destabilize the Kim regime. None of these factors existed in relation to the sanctions against Iran, which compelled the Iranian leadership to consider and act to promptly relieve the economic suffering.

Size of Winning Coalition Plus Institutional Mechanism for Regime Change: Iran's regime proved to be rather politically vulnerable to economic sufferings following the January 2012 sanctions, which hit Iran's economy hard at an unprecedented level. Gauging Iran's winning coalition size is challenging due to "a strange combination of remarkable competitive election and harsh repression" (Plattner and Diamond 2000). On balance, although the Iranian public does not form a credible winning coalition the same way that a fully democratic society allows, their power to elect the president, members of Majlis, and the Assembly of Experts on a regular and fairly competitive basis makes them relevant in the making of Iranian domestic and foreign policy. As a seasoned observer of Iranian politics notes,

> When visualizing how decisions are made in Tehran, I picture fifteen bearded men sitting around a long table, with Khamenei seated at the head . . . the election of a more moderate president could change the make-up of who sits at that table . . . you could have five or six people advocating less strident domestic and foreign policies. Their impact won't be enormous, but it would not be negligible. (Sadjadpour 2009)

Accordingly, it is hard not to emphasize the significance of two elections held after the 2012 sanctions. The first was the presidential election of 2013, when reformist politician Hassan Rouhani was elected to be the new president, a result that reflected growing frustration with Iran's economic underperformance and the public's desire to ease the sanctions and speed the overall recovery of Iran's economy. The election result sent a credible signal to outside nations about Iran's desire to reopen and expedite the nuclear negotiation. Soon after the election, the interim agreement materialized in November 2013.

Following this were two national elections—for the Majlis and the Assembly of Experts—scheduled in 2016. The upcoming elections effectively served as a deadline for Iranian negotiators (Zarif 2015), before which Rouhani's administration had to present tangible results in support of the ongoing nuclear negotiation. Combined with an in-

creasingly crippled economy, the election schedules made the political necessity to strike a deal more urgent in Tehran than in Washington (Nader 2014). In short, the 2016 elections had an effect of tying the hands of the Iranian negotiators—without securing an acceptable deal with the United States, Rouhani's domestic standing would have weakened, while paving the way for hard liners' comeback to the Iranian political landscape (Adebahr 2014).

The contrast is nothing but stark in North Korea. Given the notorious opacity of its domestic politics, the size and composition of the winning coalition is anyone's guess. And yet, given the absence of any regularized and competitive leadership selection process, there is broad consensus that the winning coalition is limited to a small number of elites, with estimates ranging from several thousand to the Pyongyang population of four to five million (Byman and Lind 2010; Bueno de Mesquita and Smith 2011; Kang 2011–2012). While members of the Korean Workers' Party, military officers, and bureaucrats typically form the central pillars of the winning coalition, the number of those in the winning coalition appears to be shrinking even further, driven by the marginalization of the military. Recent developments such as Kim Jong-un's repeated purges of military generals since 2011, the reinstatement of the Korean Workers' Party in the Seventh Party Congress, and the creation of a new organ, the State Affairs Commission, all appear to support this hypothesis. On the other hand, the ordinary populace lacks any legitimate channels to express social and economic grievances. Furthermore, hereditary succession is the de facto rule for leadership changes in North Korea. The power and wealth of the country are passed down through generations, while its social hierarchy and ideological indoctrination continually inhibit popular capacity to organize systematic resistance against poverty and repression.

Since Kim's political survival primarily hinges on the welfare of his small winning coalition, if a sanction dries up the resources for distribution, Kim's rational course of action is to marshal and allocate the remaining resources to the ruling elites at the expense and impoverishment of the general public. For instance, the dead and other victims of the infamous 1990s famine were disproportionately concentrated in the poorest provinces, such as North Hamgyong, and in the weakest and most politically vulnerable populations. Insofar as the regime's political survival is concerned, the mass suffering was a necessary price to preserve precious resources for the winning coalition. Sanctions that target the elites themselves, such as blacklisting individuals or banning the import of luxury goods, are unlikely to succeed because the political

fate of these elites is, in effect, already tied to the fate of Kim Jong-un. Indeed, if the leader can give privileges to the members of his winning coalition in times of severe economic hardship, it might even enhance the dependence of these select groups of people on Kim's personal leadership (Byman and Lind 2010).

Overall, despite their oft-assumed shared authoritarian nature, Tehran and Pyongyang politics operate in vastly different ways. Tehran politics have been shown to be considerably responsive to sanction-originated economic hardships, as the political success of President Rouhani and the reformist faction was predicated upon winning the support of those voters who were "far more focused on their day-to-day economic needs . . . and (not) united behind the government's nuclear ambition" (Sadjadpour 2006). No comparable accountability exists in Pyongyang. Kim's political survival requires fewer resources. The absence of institutional mechanisms to challenge, let alone change, the leadership means there is no political deadline to meet as far as nuclear negotiation is concerned. Political sensitivity is evidently much higher in Tehran politics than in Pyongyang.

Strategic Orientation of Patron States: It is very likely that Iran viewed the strategic orientation of major powers as unfavorable. Indeed, no sustained support, either explicit or implicit, was available during the period of economic sanction. China, despite seeing Iran as an attractive oil-rich partner in light of the rising oil price, soaring domestic demand, and strategic vulnerability to access to oil, decided not to purchase Iran's oil fields or to increase its oil import volume, all of which were opportunities created by the sanction. At the end, China's interest in Iran was more limited, geographically distant, and commercial in nature, while China's top policy agenda always and still resides in its bilateral relationship with the United States. The exploitation of commercial opportunities in Iran was simply deemed not worth the cost of probable deterioration in US-China relations (Downs and Maloney 2011).

Similarly, the proclivity of Russia's foreign policy, potentially friendly, was also against wrecking the nuclear deal. Initially, many raised the possibility of strategic alignment between Iran and Russia, who once declared the sanction "unacceptable" and that Iran "has the right to peaceful use of atomic energy, including enrichment operations" (*RT* 2013). The concern intensified with their shared foreign policy objectives in Syria and its sharp tension over the Ukraine crisis with the United States. At the end, however, Russia recognized the danger of Iran's nuclear threat to the region and a lack of alternative solution to the

problem, while its economic stakes in the trade with Iran were meager and the regime stability of the theocratic state were not a game changer for Russia's core foreign policy objectives (Maloney 2014a). Investing its own diplomatic capital to support the unpopular and dangerous Iran regime did not warrant all political backlash it would additionally create against Moscow.

The absence of major stakeholders friendly to Iran favored an emergence of an active "honest broker," a role assumed by the European Union. The EU is a bloc friendly to the United States but also with a rich history of interaction with Iran. The European public was also indifferent and far from hostile in comparison to the United States, which in turn created room for diplomatic flexibility during the negotiations (Adebahr 2015). The sustained presence of an "honest broker" may not have predetermined success of the nuclear negotiations, but was highly facilitative of it (Sherman 2015).

In contrast, none of the international strategic environment variables favored the sanction regime against Pyongyang. The central factor is the strategic orientation of China. China is a major stakeholder in North Korea's regime, to whom China allegedly gives priority in the prevention of economic collapse over Pyongyang's nuclear proliferation program. The aforementioned halfhearted enforcement of sanctions already raised suspicion that "China will squeeze for a little bit, but not too hard" (Morello and Mufson 2016). The two Xi-Kim summits in March and May 2018 strongly suggest that China's commitment to the sanction is by no means assured but ambiguous. From Pyongyang's perspective, the sanction regime, absent any credible honest broker and filled with major stakeholders with divergent strategic objectives, reinforces doubts about the sanction's long-term sustainability and room for diplomatic maneuvering to minimize the sanction's adverse consequences.

Between Tehran and Pyongyang, the international settings are not alike. The absence of any sympathetic patrons left little room for Tehran to exploit against the sanction's sustainability. In contrast, Pyongyang is well aware of China's strategic inclination to preserve rather than destabilize the Kim regime. This creates room for sanction fragility in the medium term, and naturally one rational course of available action is to continue its nuclear program, wait for the sanctions to break down, and enjoy a better bargaining position in the future.

Third Phase: Creation of Zone of Possible Agreement

The last phase concerns whether ZOPA now exists after calculating the impact of sanctions. From the target state's point of view, the cost of withstanding the sanctions must be balanced by the cost of making concessions. The sender states similarly must consider the cost of striking a bargain. Unfortunately, the comparison of the two factors—the level of nuclear development and the economic carrots available—again lends support for pessimistic assessment on the replicability of the Iran deal in North Korea. North Korea's nuclear program is much more advanced than Iran's, so a rollback represents a larger concession for Pyongyang. On the other hand, the sanctions removal alone is unlikely to be as powerful a carrot to induce denuclearization as was the case with Iran. This greater degree of incompatibility makes ZOPA harder to reach under the current conditions of US–North Korea relations.

Level of Nuclear Development: First, in terms of nuclear development, the difference in the level of nuclear weaponization is nothing less than staggering. On the one hand, despite the development of extensive nuclear fuel cycles in the 2000s, Iran still fell short of enriching uranium to weapons grade amid the nuclear negotiations. Although the shortening "breakout time" for Iran to produce a nuclear weapon created a sense of urgency for the US negotiators, what needed to be done to credibly dismantle its weaponization program nevertheless did not require unmanageably extensive rollbacks. In other words, the zone of a mutually agreeable solution was not far from the realities on the ground.

This is not the case in North Korea. While the details and history of its nuclear development and international responses are well documented and need no repetition here, what distinguishes North Korea from Iran is that since withdrawing itself from the Nuclear Non-Proliferation Treaty (NPT) in 2003, Pyongyang has gone well past the stage of enriching uranium and plutonium to weapons grade and has already conducted six nuclear tests. Its missile programs also have achieved significant progress in increasing the ranges of ICBMs and diversifying the launching methods by continuing SLBM tests.

Though the exact level of its nuclear and missile technology is a topic of ongoing controversy, for the purposes of this article, it is sufficient to say that unlike Iran, North Korea is estimated to have produced enough fissile material to build thirty to sixty nuclear weapons and has assembled ten to twenty already (Kristensen and Norris 2018). In terms of bargaining prospects, what Pyongyang has developed is far above

where the United States wants its nuclear program to be—"comprehensive, verifiable, irreversible dismantlement (CVID)." This increased distance introduces a great deal of complication and challenges for a negotiated settlement to be reached. Indeed, the history of the North Korea nuclear program had been a much fiercer and ultimately unsuccessful struggle to decide how far, at what speed, and under which conditions North Korea should dismantle its nuclear capabilities.

Amount of Passive Economic Carrots: The United States possessed enough "passive carrots" to lure Iran to the negotiation table and ultimately to acceptance of a nuclear rollback. These passive carrots were the combined product of the historical legacy of Iran's extensive linkage to international finance during the Shah period and the inseparable ties of its oil industries to the global economy. Accordingly, the removal of these sanctions could deliver immediate and substantial monetary and trade benefits. For instance, approximately $120 billion worth of Iran's foreign assets were held frozen under the sanctions (Katzman 2016). In addition, sanctions on Iranian oil exports are estimated to have cost $160 billion in oil revenue since 2012 (Katzman 2016), while its oil fields were becoming increasingly obsolete and its industry was reported to have needed around $150 to $400 billion in investments in order to modernize its oil installations (Erdbrink 2016; Katzman 2016).

These trade opportunities and financial resources were immediately collectible following the removal of sanctions and were vital for Iran's economic recovery. Such a financial situation meant that the United States' lifting of sanctions alone could be a workable and meaningful carrot for Iran. Indeed, Foreign Minister Zarif remarked in 2014, "All that the United States needs to do is to get an agreement that can lead to the removal of sanctions. There is nothing else that we're asking the US to do. We are not asking for security guarantees, we are not asking for any money, we are not asking the United States to do anything—simply to remove the sanctions" (Zarif 2014).

From the US perspective, simple removal of the sanctions is a *passive carrot*, meaning that the United States does not need to spend any of its own resources. One should note, however, that a decision may entail reputation cost against the credibility of future US foreign policy, and therefore cannot be assumed to be entirely costless. Still, the sanctions' vitality in Iran's economic recovery and the relatively inexpensive nature of removing it make them quite compatible, or at least worthy of serious negotiation in search of mutually acceptable terms.

In contrast, both North Korea's economic realities and its strategic concerns indicate that the amount of passive carrots the United States

possesses is unlikely to meet Pyongyang's expected return for giving up or even halting its nuclear program (Haggard 2016). The North Korean economy lacks adequate infrastructure to quickly recover and was never quite prosperous even prior to the sanctions. The acceptance of passive carrots accordingly does not quite promise tangible economic benefits at all, while rolling back its nuclear program represents an immediate loss of security. Cognizant of the limitations, the previous nuclear negotiations involved provision of active carrots such as aid, infrastructure building, or even security assurance in return for implementation of counterproliferation measures. However, along with Pyongyang's continuing nuclear program, these policies became increasingly controversial as well as politically costly among sender states such as the United States, South Korea, and Japan. Consequently, the lack of cheap carrots and the aversion to use of active carrots further shrank the bargaining space in the negotiation with Pyongyang.

The Way Forward

Evidence is clear and indisputable—the Iran sanctions operated under unusually favorable conditions, defined by Iran's economic vulnerability that was further exacerbated by unforeseen flooding of shale oil into the global oil supply chain, its institutional exposure to general economic pain, and the relatively low cost of concessions required for both Iran and the United States to strike a bargain. What is more striking is the sanction outcome. The Joint Comprehensive Plan of Action mandates a significant rollback to Iran's nuclear program but not a CVID. Accordingly, Tehran maintains a stockpile of low-enriched uranium (under 3.67 percent), and most measures run for only ten to fifteen years. Applied to the sanction conditions against North Korea and the current nuclear inhibition strategy, a major takeaway from Iran's experience, therefore, is that economic sanctions alone are unlikely to induce a CVID in North Korea. The highly intrusive sanction measures were constantly impaired by China's questionable commitment to strangulation of its treaty ally. Moreover, Pyongyang is institutionally more insulated from economic isolation and impoverishment—its small-sized winning coalition dictates that as long as the Kim regime can sufficiently distribute private goods, the core of the regime can stay stable and intact. Last, Pyongyang's more advanced nuclear program and the needs for active carrots from the United States require larger concessions from both parties, complicating further the task of reaching ZOPA.

Despite these wide-ranging differences, a belief in the replicability of sanction success in North Korea was still plentiful in policy circles in Washington. Kurt Campbell, a former assistant secretary of state for East Asian and Pacific affairs, for instance, noted that "some senior US officials" are calling for secondary sanctions like the one that "successfully brought to bear on Iran" against Chinese banks doing business with North Korea (*Time* 2017). Just days before imposing the latest secondary sanctions in September 2017, Steven Mnuchin, the Treasury secretary, said, "These sanctions work. They worked with Iran. . . . And in North Korea, economic warfare works" (CNBC 2017), highly indicative of the motivation to ban financial transaction with Pyongyang.

The sequential model put strong doubt over the wisdom behind such a belief. In fact, an immediate implication of this analysis is that sanctions are unlikely to succeed in CVID because conditions that made the Iran nuclear deal possible are distinctly lacking in North Korea. Too often ostensible similarities across cases of different time and region create a false sense of one case's replicability in the other. Applying a one-size-fits-all approach by the international community, usually a product of a lack of appreciation for contextual differences across cases, is a common practice. Such a myth has long persisted in Washington, Seoul, and Tokyo. The sequential model addressed this flawed view by identifying points of the divergence and, by extension, deconstructed the false belief in the Iran sanction success replicability.

With such a viewpoint, we are skeptical that sanctions were behind Kim Jong-un's recent apparent willingness to negotiate "denuclearization." First of all, only with UNSC 2375 and 2397 have UN sanctions finally acquired any real potential to hurt the North Korean economy more so than they did in Iran. However, key moments in 2018, such as Kim's New Year's speech in January and his meeting with the South Korean delegation in Pyongyang in March, during which for the first time he indicated willingness to relinquish nuclear weapons, came after only three and six months, respectively, after UNSC 2375. The short time makes it unreasonable to assume that the sanctions forced Kim to make such a shift.

Alternatively, others posit that the crippling prospect of sanctions drove the change. This is based on two highly demanding assumptions—China's faithful implementation of sanctions for a sustained period and the regime's institutional vulnerability from general economic hardship. Neither is easily achievable in practice. The former assumes China's willingness to accept the strangulating consequences of sanctions that potentially jeopardize its historical interests not to trigger a

regime collapse. Furthermore, seeing sanctions as a defining and durable feature of Beijing's policy to Pyongyang is too simplistic, missing the multidimensional pillars that form complex calculus and perceptions in the bilateral relations. The Kim-Xi summits in March and May 2018 were instructive and signified a historical and ideological solidarity that the two could return, celebrate, and rejuvenate.

The latter is also problematic. Though Kim Jong-un's legitimacy arguably hinges more on economic performance today than before, we remain skeptical that economic pain would easily translate into regime-threatening political pressure. In addition to the aforementioned factors, North Korea critically lacks experiences of political protest, let alone mobilization. It is one thing to feel upset about deteriorating economic conditions, but quite another to organize a sizeable and sustained political protest under regimes like North Korea. Relying on economic pains to compel fundamental political concessions under these circumstances appears to be a distant prospect and wishful thinking at best.

Second, it is growingly evident that Pyongyang sees the negotiations primarily as a security deal with the United States more so than an opportunity to lift economic sanctions. South Korea's Moon Jae-in administration sensed Pyongyang's urge for a security deal and sought a mediation between Pyongyang and Washington. According to an internal source, for instance, a critical moment occurred on December 19, 2017, when Moon Jae-in revealed that he "made . . . suggestions [to postpone the joint military drills] to the US and the US is currently reviewing it" (Engel and Werner 2017), despite knowing the presentation of a new sanction resolution a few days later in the UN. Arguably, this averted Pyongyang's usual follow-up provocations and instead maintained the momentum toward a conciliatory New Year's speech on January 1, 2018. Concrete steps in security issues were likely what prompted Kim's shift to dialogue, not a hint to remove the sanctions.

Furthermore, Pyongyang's demands for "phased" and "synchronized" denuclearization reiterate its long-standing call for a security-to-security exchange whose history dates to well before the latest implementation of sanctions (Haggard 2016, 957–958). What Pyongyang seeks to negotiate represents a continuation of the pre-2016 sanction bargaining process, not a fresh start compelled by the latest sanction measures. Sanctions may have added further rationale for negotiation, but examination of circumstantial evidence strongly suggests that the fundamental driver was and remains Pyongyang's search for security. This is where the Moon administration has sought to create a new ZOPA whereby an ending of the armistice and possibility of a peace treaty

were put at the beginning of negotiations, a feature exogenous to the sanction regime.

It is important to emphasize that we are not denying the utility of sanctions entirely. They can serve other valuable functions such as punishing proliferation behavior, enhancing a bargaining position vis-à-vis proliferators, or stemming other potential proliferation temptation. What we do argue, however, is that sanctions alone will not be sufficient to compel denuclearization in North Korea. Even in Iran, where sanctions were particularly effective, lifting them was exchanged for a significant nuclear rollback, but not CVID. This therefore suggests that Seoul and Washington need to be prepared for more complex and arduous conditions than what Tehran and Washington had to endure before the 2015 nuclear deal. A process of such negotiation will not always be popular in many policy circles in Washington and Seoul. If the Iran deal in 2015 has any lessons for North Korea, however, it is that compromises and risks made the negotiations successful in finding a mutually acceptable agreement.

Notes

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1. On May 9, 2018, President Trump withdrew the United States from the Joint Comprehensive Plan of Action. The decision lies outside the scope of our article since the focus is on why the United States and Iran were able to reach a nuclear deal in 2015, but not how to keep an agreement after circumstances have seemingly changed. Furthermore, this can be conceptualized as a new round of bargaining where political and economic conditions differ from the one of 2012–2015.

2. We note that there are several estimates for North Korea's trade dependence. We chose estimates by Kim (2017) for two reasons. First, they are the most up-to-date data gathered through one of the most thorough and rigorous processes. See Kim (2017, 161–173) for the methodology. Second, his estimate represents a higher end for Pyongyang's trade dependence, presenting the hardest case to our analysis. If North Korea's economic vulnerability is comparable to the one of Iran under the roughly equal level of trade dependence, our sequential model must be able to show

what other factors contributed to the failure of nuclear inhibition. If we use low estimates instead, a story can potentially become rather simplistic. An isolated economy makes sanctions difficult to succeed.

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