



Journal of Education & Humanities Research (JEHR)
Institute of Education & Research (IER), University of Balochistan, Quetta-Pakistan

Volume: 17, Issue-I, 2024; ISSN:2415-2366 (Print) 2710-2971 (Online)

Email: jehr@um.uob.edu.pk

URL: <http://web.uob.edu.pk/uob/Journals/jehr/jehr.php>

“Circle of escalation:

What explains North Korea’s selective response to military exercises?”

Galebinge: Graduate Student of Institution of Political Science, Ruprecht Karl University of Heidelberg, Germany

Kamran Taj: China Study Centre

Received: April 10, 2024

Accepted: May 02, 2024

Published: **June 30, 2024**

KEY WORDS

North Korea missile
crisis, US-ROK
joint military
exercises,
Qualitative
comparative
analysis.

ABSTRACT

After brief ease of tension between the United States and North Korea in 2018, situation on the Korean Peninsula deteriorated again in 2022 as both the number and intensity of US-South Korea joint military exercises (JMEs) and North Korean missile launches increased. While existing literature mainly applies quantitative methods to investigate the relationship between JMEs and North Korean behavior, this study applies qualitative comparative analysis (QCA) approach which aims to test the mixed motives instead of a single cause of the situation of the Korean Peninsula. This is done through a comparison of 26 US-South Korea joint military exercises between 2012 and 2022 using fuzzy-set qualitative comparative analysis (fs/QCA). The result demonstrates that the regime’s internal incentive to promote its missile program is the key explanatory condition. However, when combined with high level of threat and/or the absence of recent international sanctions, the causal paths do not correlate strongly with the outcome. This result shows the instability and unpredictability of the North Korean regime.

Introduction

After the Deterrence Strategy Committee Tabletop Exercise held in February 2023, the South Korea and US plan another joint military exercise (JME) Freedom Shield from March 13 to March 23, 2023. Although high tension has consistently characterized the situation on the Korean Peninsula, joint military exercises are frequently cited as a particular factor contributing to escalation. Some argue that JMEs do not deter North Korea but provoke retaliatory rhetoric and actions, demonstrating that North Korea views JMEs as a severe threat to its security. North Korea has the ability to react to a joint military exercise (JME) by issuing warnings or threats, and it can also take actions such as conducting missile or nuclear tests. North Korea does not respond in a common way to all joint military exercises and this paper aims to explore under what condition North Korea will respond in the most provocative way — by conducting missile tests.

This paper aims to test the mixed motives instead of single cause of the situation of the Korean Peninsula. I examine whether or which combinations of conditions are necessary or sufficient leading to missile provocations of North Korea. This is done through a comparison of 26 US-South Korea joint military exercises between 2012 and 2022 using fuzzy-set qualitative comparative analysis (fs/QCA). The result demonstrates that the *regime's internal incentive* to promote its missile program is the key explanatory condition. However, when combined with *high level of threat* and/or the *absence of recent international sanctions*, the causal paths do not correlate strongly with the outcome. This result shows the instability and unpredictability of the North Korean regime.

The following discussion begins with existing literature on the security dilemma on the Korean Peninsula and provides background information on the North Korean missile crisis and US-South Korean JMEs. The second part identifies three explanatory conditions for North Korean missile tests. Then I explain the method applied in this paper and the calibration of the outcome and the conditions. The last part discusses the findings and limitations.

Prior research

Research by Cha, Young, and Lim shows that annual US-South Korean military exercises do not provoke North Korea. They gathered and compared data on the relationship between US-South Korean military exercises and North Korean provocations. The state of diplomatic relations between the US and North Korea in the period before military exercises (defined as 4-8 weeks prior) serves as a more reliable indicator of whether North Korea will engage in provocations during or after the exercises. (Cha et al., 2016). While military exercises are not a game changer according to their research, small-scale provocations during the exercise period have grown in intensity as the duration of US-South Korean military exercises grew longer. Vito D'Orazio argues that US-South Korean JMEs do not trigger a systematic escalation in conflictual rhetoric or behavior. This is largely because North Korean rhetoric and behavior are routinely aggressive and militaristic, therefore making the response to JMEs difficult to distinguish from normalcy. The author does not identify differences in response for JMEs of higher or lower intensity (D'Orazio, 2012). Research by Bernhardt and Sukin demonstrates however that North Korea responds methodically and logically to both

the timing and severity of joint military exercises (JMEs). Their findings indicate a correlation between the intensity of North Korean reactions and the level of threat posed by joint military exercises (JMEs). Specifically, North Korea shows heightened responses to field exercises, those involving combat maneuvers, and exercises with larger personnel involvement. (Bernhardt & Sukin, 2021). This shows that the North Korean government views JMEs as legitimate threats which require reciprocal demonstration of resolve.

Existing literature has mainly applied quantitative methods and statistical tests to measure the association between JMEs and North Korean behavior. Qualitative comparative analysis allows us to analyze causal combinations to form a more comprehensive model of North Korean response pattern. Researches on the relationship between US-South Korean JMEs and North Korean provocations done by Bernhardt and Sukin and Cha, Lee, and Lim focus on the time period before 2016. This paper expands to include the years 2017 to 2022. This time period contains two significant transitions. One is the de-escalation of the situation on the Korean Peninsula in 2018. North Korea halted a year of missile tests and US-South Korean joint military exercises were suspended or postponed. The other is the deterioration of the situation in 2022. North Korea conducted an unprecedented number of intensive missile launches in 2022, and South Korea and the US resumed large-scale joint military exercises.

North Korea Missile Crisis

The Democratic People's Republic of Korea (North Korea) has advanced its ballistic missile capabilities and currently possesses a range of missile types. These

include short-range, medium-range, intermediate-range, and intercontinental-range ballistic missiles, as well as submarine-launched ballistic missiles, which it has tested extensively. Despite the prohibitions on nuclear and weapon proliferation set forth by United Nations Security Council Resolutions, North Korea has conducted numerous ballistic missile tests over the past decade. Since Kim Jong-un assumed power, the number of missile launches increased from 2 times in 2012 to 21 times in 2017.

Following the successful flight test of the Hwasong-15 in November 2017, an intercontinental ballistic missile (ICBM) that North Korea claims is capable of delivering a nuclear weapon anywhere in the United States, Kim Jong-un proposed halting nuclear tests and intercontinental ballistic missile launches. In 2018, missile tests came to a halt, only to resume in May 2019. Throughout 2022, Kim Jong-un's regime launched over 90 ballistic and other missiles, marking a substantial increase compared to previous years. Under Kim Jong-un's leadership, there has been not only a rise in the frequency of missile tests but also a diversification in their locations. Prior to 2017, North Korea largely ceased using its original missile testing facility, the Tonghae Satellite Launching Ground, which was primarily dedicated to developmental and design verification tests. Instead, the regime has transitioned space launches to the Sohae Satellite Launch Center and developmental missile tests to Wonsan, as documented by the CNS Missile and SLV Launch Databases. Recent launches of the extend-range Scud and Nodong missiles have frequently taken the form of operational testing at the training grounds of the relevant military units, as opposed to being purely developmental (Cotton, 2017).

US-South Korea Joint Military Exercise

Joint military exercises between the US and South Korea are a consequence of the North-South confrontation on the Korean peninsula during the Cold War. The earliest JMEs can be traced back to the *Focus Lens* exercise organized by the United Nations Command in South Korea in 1954. As the cornerstone of military cooperation between South Korea and the US under the alliance framework, the JMEs are important references for the stability of the situation on the peninsula. For both countries, in addition to testing and improving the operational capabilities of their militaries, the joint military exercises also serve the function of sending specific signals of resolve.

But not all exercises convey the same information or have the same effects. Before 2019, South Korea and the US staged the *Key Resolve* and *Foal Eagle* joint military exercises in the spring and the *Ulchi Freedom Guardian* exercises in the summer. *Key Resolve*, which began in 2007, is a command post exercise based on computer simulation. *Foal Eagle*, which began in 1961, is a field training exercise that involves combat troops and equipment. *Ulchi Freedom Guardian* began in 2008 and consists of counterterrorism and disaster relief exercises, computer-simulated drills, and large-scale operational exercises with national participation. Compared to the large-scale tactical field training of the *Foal Eagle*, *Ulchi Freedom Guardian* focused more on the defensive purpose of the joint military exercises. They were replaced by the *Ulchi Freedom Shield* and *Dong Maeng* exercises since 2019. These exercises exhibit differences in their scale, geographic location, spontaneity, and the nature of activities involved. (Bernhardt & Sukin, 2021, 861)"

While South Korea benefits from the reassurance provided by the joint military exercises, these exercises can also be the source of tensions with North Korea. According to the logic of the security dilemma, defensive JMEs aimed at enhancing South Korea's security might be viewed as offensive and threatening to North Korea. When perceived as under threat, North Korea has chosen an asymmetric confrontation path of nuclear missile development due to the lack of economic and conventional military power. As a result, both sides are convinced that their security can only be guaranteed by possessing sufficient military capabilities to destroy the other side. However, this logic of thinking has resulted in repeated failures in efforts to denuclearize and stabilize the Korean peninsula.

In the face of JMEs, Additionally, North Korea seeks to convey dissatisfaction through warning signals. Typically, states employ threatening rhetoric or military actions, such as troop movements or missile tests, to deter adversaries from organizing further joint military exercises in the future. For North Korea, it's crucial to react swiftly and prominently to signal its determination and the possible consequences of escalation (Bernhardt, 2020). From the post-Cold War period to the second half of 2017, North Korea has consistently responded to the US-South Korean joint military exercises in an aggressive manner by continuously enhancing its nuclear missile capabilities. North Korea's attitude changed briefly when, on April 20, 2018, Kim Jong-un announced that North Korea would not conduct any further nuclear tests or ICBM launches and would abandon the Punggye-ri nuclear test site.

Explanatory Conditions for Missile Provocation

In light of existing research, this study identifies three explanatory conditions for North Korean missile provocations. Each condition can affect the regime's behavior individually or combine to produce the final outcome.

Level of threat

Military exercises can be distinguished by their form and mission. Military exercises can primarily involve simulated activities at the command level, without the utilization of significant equipment like armored vehicles or combat aircraft in field operations. These are referred to as command post exercises. On the other hand, exercises that entail the deployment of personnel and equipment either on or beyond a military base are termed as field training exercises. Certain exercises aim to train forces for combat operations, encompassing activities such as infantry and armor operations, artillery operations, amphibious landings, airborne operations, air defense, combat engineering, and counterinsurgency operations. Conversely, other exercises focus on preparing for non-combat scenarios, including humanitarian crises, natural disasters, and peacekeeping missions (Bernhardt, 2020).

Military exercises with varying characteristics present different levels of threat. Specifically, exercises involving field maneuvers are more menacing compared to those focused solely on command post activities. Second, Exercises featuring larger numbers of personnel, advanced equipment, or aircraft carriers pose a greater threat compared to those with fewer personnel and less sophisticated equipment. Third, recurring JMEs are perceived as being more

threatening than one-time activities. Because periodic JMEs help to foster confidence and signify partnership as well as resolve. Moreover, repeated practice of a particular maneuver enhances the ability to execute it in an actual combat situation. Historically recurring exercises have been used as covers for surprise attacks. In addition, anticipated recurring exercises may elicit stronger reactions, as they are expected and may prompt pre-planned responses. JMEs that represent a greater threat should elicit a stronger response from North Korea.

North Korean national missile program

Examining open-source evidence about North Korea's missile tests helps researchers to determine the purpose of each launch. For instance, If North Korea conducts a missile test solely at a site designated for developmental tests, it's highly probable that the missile is still in the developmental phase. This suggests that the launch is premeditated as part of the missile program (Cotton, 2017). Tests conducted at different locations indicate that North Korea is pursuing objectives beyond mere assessment of missile functionality, such as signaling confrontation and determination. Between January 2012 and December 2022, a total of 198 launches were carried out from 41 missile facilities across North Korea.

International Sanctions

In previous research on the relationship between US-South Korean JMEs and North Korean provocations, United Nations imposed economic sanctions are usually taken into consideration as a controlled variable. This indicates that international sanctions could correlate with JMEs and relate to North Korean behavior. It is possible that North Korean activities or

the timing of provocations are affected by international pressure imposed on North Korea.

Since 2006, The United Nations Security Council has adopted 11 resolutions imposing sanctions on North Korea for its development of nuclear weapons and associated activities. These sanctions prohibit the trade of weapons and military equipment, freeze the assets of individuals involved in the nuclear program, and limit scientific cooperation. (Nishizawa et al., 2022). Although UN Security Council resolutions have not succeeded in denuclearizing North Korea, they still exert significant pressure on the regime, particularly in the immediate aftermath of their adoption.

Methodology

Qualitative Comparative Analysis (QCA) is a method used to identify combinations of conditions that are necessary and/or sufficient for a particular outcome. This approach enables researchers to blend quantitative and qualitative methodologies, facilitating analysis across a moderate number of cases (Ide & Mello, 2022). Fuzzy-set logic, a form of Qualitative Comparative Analysis (QCA), operates on the premise that conditions and outcomes may not strictly be present or absent (represented by 1 or 0), but can possess partial membership (e.g., 0, 0.5, 1). Fs/QCA permits finer distinctions between cases, enabling more precise analysis (Binder, 2015).

The outcome and explanatory conditions have to be translated into fuzzy-set member scores. For the outcome condition (North Korea missile test) the membership score is dichotomous. A score of 1 is assigned to cases in which a missile test is observed as a response, otherwise, the

outcomes receive 0. For explanatory condition *level of threat*, cases are categorized in a qualitative manner based on the above-mentioned characteristics of JMEs. A three-value fuzzy-set (0, 0.5, 1) scheme is assigned. US-South Korean JMEs that meet all three above criteria will be considered as having a high level of threat and assigned a score of 1. JMEs that meet two of the three criteria will be assigned a score of 0.5 and other cases will be coded as having a low threat level of 0. For explanatory condition *North Korean national incentive*, a score of 1 is assigned when the North Korean regime has the incentive to promote its missile development regardless of external stimulation. When the regime demonstrates a shift in strategic planning which favors diplomatic instead of military means, the condition receives a member score of 0. International sanction is also a dichotomous variable that is either present (1) or absent (0).

Empirical Analysis

In the year 2012, the US and South Korea conducted three major military exercises. Key Resolve is a simulated military exercise concentrating on crisis management, incorporating a peninsula-wide computer simulation to enhance the operational capabilities, coordination, and implementation of deploying US reinforcement forces by the combined force. During Key Resolve 2012, approximately 2,000 US soldiers and 10,000 South Korean soldiers took part in the exercise, which lasted from February 27 to March 9 (Ham, 2013). The US and ROK militaries conducted Foal Eagle exercises concurrently with Key Resolve exercises from March 1 to April 30. Foal Eagle 2012 involved approximately 11,000 US soldiers and 200,000 ROK soldiers. The US and ROK

militaries conducted Ulchi Freedom Guardian exercises in August to enhance joint planning, military intelligence, logistics, and command and control capabilities (Turnipseed, 2012). Contrastingly, the Foal Eagle exercise boasted the largest number of personnel and included live-fire drills. Hence, it is rated a 1 due to being deemed the most significant threat level to North Korea. The computer-simulated command-post exercise Key Resolve and the defensive-oriented Ulchi Freedom Guardian are given a score of 0.5 instead of 0 due to their status as major recurring exercises.

During the period from March to April in 2013, approximately 10,000 US soldiers joined forces with a combined total of 210,000 ROK soldiers in the Foal Eagle exercises. Concurrently, Key Resolve exercises took place for ten days in March, involving around 3,500 US soldiers and 10,000 ROK soldiers. In August, Ulchi-Freedom Guardian conducted computerized command-and-control exercises, with participation from approximately 30,000 U.S. soldiers and 50,000 ROK soldiers (Ham, 2013). Like in 2012, Foal Eagle remained the most extensive and protracted military exercise of the year, earning a score of 1, while the other two exercises were rated at 0.5. In 2014, the US and ROK militaries persisted in conducting Key Resolve exercises. The Foal Eagle exercise in 2014 included approximately 7,500 US soldiers and a combined total of 200,000 ROK soldiers. The Ulchi Freedom Guardian exercises of 2014 saw participation from over 30,000 U.S. soldiers and 50,000 ROK soldiers (Ramirez, 2014). Years 2015, 2016, and 2017 consist of the same JMEs with similar scales and intensities.

In the year 2018, *Foal Eagle* and *Key Resolve* exercises were postponed due to the Olympic Games and were resumed on April

1 at a scale similar to that of the previous years. During 2019, the US and South Korea launched Dong Maeng, a novel seven-day computer-simulated command post exercise. It can be seen as a scaled-down iteration of Key Resolve, which typically spanned two weeks. The revamped JME now prioritizes the strategic, operational, and tactical dimensions of military operations in the Korean Peninsula, with a key goal of upholding the combat readiness and solidarity of the US-ROK alliance. At the same time, the Foal Eagle and Key Resolve series of exercises were suspended (*South Korea-US Kick off Combined Exercise Dong Maeng*, 2019). The inaugural Dong Maeng exercise took place between March 4th and 12th, 2019, followed by the second iteration occurring from August 5th to 20th of the same year. Given their limited scale and focus on simulated scenarios, the Dong Maeng exercises are rated at a score of 0.

Commencing on August 18, 2020, the computer-simulated Combined Command Post Training (CCPT) marked the inaugural significant exercise between the US and ROK that year. This exercise replaced their traditional springtime annual exercise, which was canceled due to COVID-19. The pandemic prevented American troops necessary for the program from coming to South Korea due to related movement restrictions, and canceled programs such as nighttime training and Full Operational Capability test (Oh, 2020). The Combined Command Post Training was held again in March 2021 which involves a "minimum level of troops" compared with previous springtime exercises (Oh, 2021). No outdoor drills took place. Both CCPT exercises were heavily affected by the COVID-19 pandemic and had low levels of intensity and threat, both are assigned a score of 0 concerning the *level of threat*.

In August 2022, the US and South Korea conducted the biggest combined military exercise in years under the codename *Ulchi Freedom Shield*. The exercise, spanning from August 22 to September 2, comprised field exercises incorporating aircraft, warships, tanks, and tens of thousands of troops. These exercises simulated joint attacks, front-line reinforcement of arms and fuel, and the removal of weapons of mass destruction. Additionally, the allies trained for drone attacks and other emerging developments in warfare witnessed during Russia's conflict with Ukraine. They also practiced coordinated military-civilian responses to attacks on seaports, airports, and major industrial facilities, including semiconductor factories (*The U.S. and South Korea Are Staging Their Biggest Military Drills in Years*, 2022). On October 31, 2022, the joint air training *Vigilant Storm* was launched, which is also the largest air drill in years. Hundreds of warplanes from both sides staged mock attacks 24 hours a day and about 240 warplanes conducted about 1,600 sorties (Chiacu et al., 2022). North Korea reacted strongly against these two exercises held in 2022 and condemns the joint drills as a rehearsal for invasion and proof of hostile policies by Washington and Seoul. *Ulchi Freedom Shield* and *Vigilant Storm* have a high level of threat for North Korea, and therefore are assigned a score of 1.

After the death of Kim Jong Il in December 2011, the successor Kim Jong-un was facing a harsh domestic and international environment. Internationally, the US and South Korea exerted high pressure in an attempt to shape the regime transition process. North Korea's nuclear capability was still in its initial stages and lacks sufficient military deterrence to ensure the regime's survival. Domestically, the

economy was suffering from a downturn due to international sanctions and setbacks in economic reforms. The young dictator was under enormous pressure to consolidate his regime. Against this background, in March 2013, the Workers Party put forward a new strategic plan of "economic construction and nuclear force building", which was implemented until April 2018. Compared with the previous policy, the new approach placed greater emphasis on the economy, focusing on nuclear missile development but reducing spending on defense other than nuclear missile development. Kim Jong-un remarked that "the new parallel course will not increase defense costs, but will increase defense power (nuclear weapons capability) at a fraction of the cost, so that the main focus will be on economic construction" and that "all efforts will be concentrated on achieving a fundamental shift in economic construction." At the Seventh Congress of the Workers Party in 2016, North Korea's overall national budget increased by 5.6 percent, with investments in the construction and education sectors increasing by 13.7 percent and 8.1 percent, and aquaculture by 6.9 percent, but the military sector instead declined by 0.1 percent.

At the same time, North Korea has significantly increased the frequency of nuclear missile tests and accelerated the development of its nuclear weapons. In the six years since assuming power, Kim Jong-un's regime has carried out four nuclear tests. He claims to have "reliably weaponized its nuclear weapons through subcritical nuclear bomb test explosions, underground nuclear bomb test explosions, miniaturization and lightweighting of nuclear weapons, and the development of mega-nuclear weapons and means of delivery." Although these statements are exaggerations, the number of nuclear weapons continues to climb, and long-range

missiles are close to having the capability to threaten the US mainland with attack. These claims and actions reflect the ambitious plan of Kim Jong-un and that he would promote the weapon program regardless of external pressure.

North Korea's "parallel course" did lead to some breakthroughs for the country. From 2012 to 2016 was one of the fastest and smoothest periods of economic growth in the post-Cold War era. In the long term, however, the "parallel course" is contradictory. After 2017 North Korea's average annual trade volume fell by 70 percent in a normal year. According to the Central Bank of Korea, North Korea's economic growth rate in 2017 and 2018 was -3.5 percent and -4.1 percent, the lowest in 20 years. Under such pressure, the nuclear and missile program was forced to a halt.

In summary, there is an inherent contradiction in North Korea's national strategy. Kim Jong-un's regime's overemphasis on security priority and independence has severely affected its economy and livelihood, which in turn exacerbated security concerns and prompted it to invest more resources in the defense sector.

The state of the economy is also related to international trade and restrictions. North Korea's foreign trade gradually increased at the turn of the century, reaching record highs of \$3.22 billion in exports and \$4.45 billion in imports in 2013 and 2014. In subsequent years, its exports and imports have declined, especially after the successive harsh international sanctions in 2016 and 2017. From 2010 to 2015, North Korea was subject to two international sanctions, including UN Security Council Resolution 2087 of January 22, 2013, which imposed a travel ban and assets freeze on four individuals and six entities. Resolution

2094 of 7 March 2013 added eight nuclear, chemical, and biological weapons items and three luxury goods to the embargo list. As of 2015, international sanctions against North Korea remain limited to weapons-related items and luxury goods and have not yet included North Korea's main imports and exports.

As a result of international sanctions, North Korea's trade with other countries was forced to shift to China. From 2016 to 2019, the international community imposed six more sanctions on North Korea. During this period, the structure of North Korea's exports changed mainly in the form of a significant reduction in traditional export products - mineral products and fiber products. North Korea's economy was hit hard in 2020 by international sanctions and the Covid-19 pandemic, which cut off foreign trade almost completely.

Since 2012, the United Nations Security Council has passed seven significant sanctions resolutions targeting North Korea in reaction to the nation's nuclear and missile endeavors. Resolutions 2087 and 2094 were passed in the year 2013, resolutions 2270 and 2321 in the year 2016, and resolutions 2371, 2375, and 2397 in the year 2017. Although the resolutions were extended each year, for the sake of discussion in this paper, only the years in which new UNSC sanctions were imposed are given a score of 1. Years without new UNSC sanctions are given a score of 0 under the explanatory condition of international pressure and sanctions.

Data

The James Martin Center for Nonproliferation Studies (CNS) North Korea Missile Test Database records flight tests of all missiles launched by North Korea (*The CNS North Korea Missile Test*

Database, 2023). This data is used to determine whether North Korea responded to the JMEs with missile provocations.

Cases			Level of threat	Explanatory Conditions	UN Sanctions	Missile Provocation	Outcomes
10/31/2022 - 11/04/2022	Joint Air Training	Vigilant Storm	0.5	1	0	1	There have been no fewer than 23 missile launches, encompassing both ballistic and surface-to-air missiles, and ICBM
08/22/2022 - 09/02/2022	Military Exercise	Ulchi Freedom Shield	1	1	0	1	SLBM-Navalized KN-23 (simulated launching drill of ballistic missile)
03/08/2021 - 03/18/2021	Military Exercise	Combined Command Post Training	0	0	0	1	SRBM-KN-23 (first test in a year)
08/18/2020 - 08/28/2020	Military Exercise	Combined Command Post Training	0	0	0	0	
08/05/2019 - 08/20/2019	Military Exercise	Dong Maeng exercise	0	0	0	1	SRBM-KN-23; KN-24; KN-25
03/04/2019 - 03/12/2019	Military Exercise	Dong Maeng exercise	0	0	0	0	
04/01/2018 - 04/26/2018	Military Exercise	Foal Eagle Exercise	1	0	0	0	
04/27/2018 - 05/03/2018	Military Exercise	Key Resolve Exercise	0.5	0	0	0	
08/21/2017 - 08/31/2017	Military Exercise	Ulchi-Freedom Guardian Exercises	0.5	1	1	1	SRBM-Scud-B MaRV; IRBM-Hwasong -12

03/01/2017 - 04/30/2017	Military Exercise	Foal Eagle Exercises	1	1	1	1	IRBM-Hwasong -12 (Failed)
03/08/2017 - 03/23/2017	Military Exercise	Key Resolve Exercises	0.5	1	1	1	MRBM-ER Scud (North Korea was practicing overwhelming THAAD)
08/22/2016 - 09/02/2016	Military Exercise	Ulchi-Freedom Guardian Exercises	0.5	1	1	1	SLBM-Pukguksong-1; MRBM-ER Scud (simultaneous test of 3 missiles)
03/07/2016 - 04/30/2016	Military Exercise	Foal Eagle Exercises	1	1	1	1	IRBM-Musudan (Failed); SLBM-Pukguksong-1 (first successful SLBM)
03/07/2016 - 03/18/2016	Military Exercise	Key Resolve Exercises	0.5	1	1	1	SRBM-Scud-C; MRBM-Nodong
08/17/2015 - 08/28/2015	Military Exercise	Ulchi-Freedom Guardian Exercises	0.5	1	0	0	
03/02/2015 - 04/24/2015	Military Exercise	Foal Eagle Exercises	1	1	0	1	SRBM-KN-02
03/02/2015 - 03/13/2015	Military Exercise	Key Resolve Exercises	0.5	1	0	1	SRBM-Scud-C
08/18/2014 - 08/29/2014	Military Exercise	Ulchi-Freedom Guardian Exercises	0.5	1	0	1	SRBM-KN-02
02/24/2014 - 04/18/2014	Military Exercise	Foal Eagle Exercises	1	1	0	1	SRBM-Scud-C
02/24/2014 - 03/06/2014	Military Exercise	Key Resolve Exercises	0.5	1	0	1	Kim Jong Un's first test as leader of North Korea
08/19/2013 - 08/30/2013	Military Exercise	Ulchi-Freedom Guardian Exercises	0.5	1	1	0	

Corresponding Author Email: kamrancasvab@yahoo.com

03/11/2013 03/21/2013	Military Exercises	Key Resolve Exercises	0.5	1	1	0
03/01/2013 04/30/2013	Military Exercises	Foal Eagle Exercises	1	1	1	0
08/13/2012 08/30/2012	Military Exercises	Ulchi-Freedom Guardian Exercises	0.5	1	0	0
03/01/2012 04/30/2012	Military Exercises	Foal Eagle Exercises	1	1	0	0
02/27/2012 03/09/2012	Military Exercises	Key Resolve Exercises	0.5	0	0	0

Table I: Fuzzy-set membership scores for 26 US-ROK JMEs between 2012 and 2022

Results

In order to explain when North Korea took strong reactions to respond to US-South Korea joint military exercises fs/QCA is applied to the membership scores of 26 cases between 2012 and 2022. This was done using the software program fs/QCA 4.0. The program identifies conditions or combinations of conditions that are necessary or sufficient for the outcome.

The test for necessary conditions indicates that none of the three explanatory conditions were necessary for the missile response from North Korea (Table II). The threshold for the consistency of necessary condition is 0.9 (Skaaning, 2011). The condition North Korea's strategic planning reached the consistency of 0.87, which is the closest to necessary condition. With the exception of this condition variable, the other 2 variables fall short of the necessary condition criterion, thus requiring an analysis of combinations of conditions.

Conditions tested:	Consistency	Coverage
--------------------	-------------	----------

Level of threat	0.60	0.60
Regime's strategic planning	0.87	0.68
UN Sanction	0.40	0.67

Table II: Fs/QCA results: Analysis of Necessary Conditions

In fuzzy-set notation, the asterisk (*) stands for the logical operator, which put together independent explanatory variables to form a new combined condition, and the absence of a condition is indicated by the tilde (~). Of the four combinations of condition, three of them have a similar degree of consistency: high level of threat posed by US-ROK military exercises combined with the North Korean regime's intention to further its missile program (0.69); regime's intention combined with the absence of UN sanctions (0.70); and the combination of all three explanatory conditions (0.71). However, all four causal paths do not meet the threshold for necessary or sufficient conditions for the outcome of conducting missile tests as a response to joint military exercises.

Combination	Consistency	Coverage	Combined
Level of threat*Regime's strategic planning	0.69	0.60	0.53
Regime's strategic planning*~UN Sanctions	0.70	0.47	0.49
Level of threat*~UN Sanctions	0.56	0.33	0.17
Level of	0.71	0.33	0.43

threat*Regime's strategic planning*~UN Sanctions			
--	--	--	--

Table III: Fs/QCA results: Causal paths leading to DPRK missile provocations

Discussion and limitation

According to the result generated by fs/QCA, the explanatory capability of both a single condition and a combination of conditions is limited. This is partly because the calibration of fuzzy-set member scores is relatively rough and general. To improve the model, the multivalued scheme should be assigned to all three explanatory conditions instead of dichotomous indicators. In addition, it is difficult to incorporate elements of North Korea's domestic politics into the combination due to the lack of information. The result also suggests that the provocative behavior of North Korea is more dependent on the regime's incentive than on external stimuli, such as military exercises. In other words, joint military exercises held by the US and South Korea are not the source but the reflection of escalation.

Qualitative comparative analysis will be more effective when more explanatory conditions are to be analyzed or subdividing the current conditions. Based on the findings of this paper the North Korean regime acts on its own rather than responding to the international society, conditions such as economic limitations due to natural disasters and (international and unilateral) sanctions are potential explanations.

References

Bernhardt, J. (2020). *The Causes and Consequences of Joint Military Exercises*.

Bernhardt, J., & Sukin, L. (2021). Joint Military Exercises and Crisis Dynamics on the Korean Peninsula. *Journal of Conflict Resolution*, 65(5), 855–888.

Binder, M. (2015). Paths to intervention: What explains the UN's selective response to humanitarian crises? *Journal of Peace Research*, 52(6), 712-726.

CFC Announces Start of Key Resolve 2015 > United States Forces Korea > Press Releases. (2015, February 24). U.S. Forces Korea. Retrieved March 28, 2023, from <https://www.usfk.mil/Media/Press-Products/Press-Releases/Article/587998/cfc-announces-start-of-key-resolve-2015/>

CFC begins Ulchi Freedom Guardian 2014 > United States Forces Korea > U.S. and the ROK conduct combined air training. (2014, August 18). U.S. Forces Korea. Retrieved March 28, 2023, from <https://www.usfk.mil/Media/Press-Products/Press-Releases/Article/588367/cfc-begins-ulchi-freedom-guardian-2014/>

Cha, V., Lee, N. Y., & Lim, A. (2016, August 18). DPRK provocations and U.S.-ROK Military Exercises, 2005 to 2016. *CSIS Beyond Parallel*.

Chiacu, D., Brunnstrom, D., Webber, C., & Bell, A. (2022, October 31). *North Korea demands the U.S., South Korea halt joint military drills*. Reuters. Retrieved March 29, 2023, from <https://www.reuters.com/world/north-korea-calls-united-states-south-korea-stop-joint-military-exercises-2022-10-31/>

The CNS North Korea Missile Test Database. (2023, April 28). Nuclear Threat Initiative. Retrieved June 29, 2023, from <https://www.nti.org/analysis/articles/cns-north-korea-missile-test-database/>

Cotton, S. (2017, April 24). *Understanding North Korea's Missile Tests*. Nuclear Threat Initiative. Retrieved March 22, 2023, from

- <https://www.nti.org/analysis/articles/understanding-north-koreas-missile-tests/>
- Cronk, T. M. (2017, March 3). *U.S., South Korea Launch Annual Foal Eagle Exercise*. Department of Defense. Retrieved March 29, 2023, from <https://www.defense.gov/News/Article/Article/1102331/us-south-korea-launch-annual-foal-eagle-exercise/>
- D'Orazio, V. (2012). War Games: North Korea's Reaction to US and South Korean Military Exercises. *Journal of East Asian Studies*, 12(2), 275-294.
- Ham, W. T. (2012, March 22). *Eighth Army maintains readiness with Key Resolve, Foal Eagle*. U.S Army. Retrieved March 25, 2023, from <https://www.army.mil/article/75355/>
- Ham, W. T. (2013, August 19). *Eighth Army trains for task force mission during Ulchi Freedom Guardian*. U.S. Army. Retrieved March 28, 2023, from https://www.army.mil/article/109510/Eighth_Army_trains_for_task_force_mission_during_Ulchi_Freedom_Guardian/
- Ide, T., & Mello, P. A. (2022, March). QCA in International Relations: A Review of Strengths, Pitfalls, and Empirical Applications. *International Studies Review*, 24(1). <https://doi.org/10.1093/isr/viac008>
- Key Resolve/Foal Eagle Exercise 2014 > United States Forces Korea > U.S. and the ROK conduct combined air training*. (2014, February 10). U.S. Forces Korea. Retrieved March 28, 2023, from <https://www.usfk.mil/Media/Press-Products/Press-Releases/Article/588373/key-resolvefoal-eagle-exercise-2014/>
- Kuo, R., & Blankenship, B. D. (2022). Deterrence and Restraint: Do Joint Military Exercises Escalate Conflict? *Journal of Conflict Resolution*, 66(1), 3-31. <https://doi.org/10.1177/00220027211023147>
- .Li, S., & Li, Q. (2021, September). Changes in DPRK's Foreign Trade in the Context of International Sanctions and Future Prospects. *Journal of Yanbian University*, 54(5), 14-22.
- Nishizawa, L., Duan, A., & Albert, E. (2022, July 27). *What to Know About Sanctions on North Korea*. Council on Foreign Relations. Retrieved March 25, 2023, from <https://www.cfr.org/backgrounder/north-korea-sanctions-un-nuclear-weapons>
- North Korea Missile Overview*. (2020, December 16). Nuclear Threat Initiative. Retrieved March 22, 2023, from <https://www.nti.org/analysis/articles/north-korea-missile/>
- Oh, S. (2020, August 28). *S. Korea, U.S. set to wrap up summertime combined exercise*. Yonhap News Agency. Retrieved March 29, 2023, from <https://en.yna.co.kr/view/AEN20200827008500325?section=national/defense>
- Oh, S. (2021, March 8). *(LEAD) S. Korea, U.S. kick off scaled-back combined exercise*. Yonhap News Agency. Retrieved March 29, 2023, from <https://en.yna.co.kr/view/AEN20210308000451325?section=news>
- Ramirez, C. H. (2014, August 23). *Ulchi Freedom Guardian: Operations floor ensures success*. AF.mil. Retrieved March 29, 2023, from <https://www.af.mil/News/Article-Display/Article/494632/ulchi-freedom-guardian-operations-floor-ensures-success/>
- Sang-Hun, C. (2023, March 19). Tracking North Korea's Missile Launches. *The New York Times*. Retrieved March 22, 2023, from <https://www.nytimes.com/article/north-korea-missile-launches.html>
- Skaaning, S.-E. (2011). Assessing the Robustness of Crisp-set and Fuzzy-set QCA Results. *Sociological Methods & Research*, 40(2), 391-408.
- South Korea and US to end two large-scale war games*. (2019, March 4). BBC. Retrieved March 29, 2023, from

- <https://www.bbc.com/news/world-asia-47431309>
- South Korea-US kick off combined exercise Dong Maeng. (2019, March 5). The Korea Herald. Retrieved March 29, 2023, from <https://www.koreaherald.com/view.php?ud=20190304000744>
- Turnipseed, C. J. (2012, September 10). *Army units from across U.S. take part in Ulchi Freedom Guardian 2012*. U.S. Army. Retrieved March 28, 2023, from http://www.army.mil/article/86885/Army_units_from_across_U_S_take_part_in_Ulchi_Freedom_Guardian_2012/
- Tuygan, A. (2019, March 2). *The Hanoi Summit*. Edam. Retrieved June 29, 2023, from <https://edam.org.tr/en/the-hanoi-summit/>
- The U.S. and South Korea are staging their biggest military drills in years*. (2022, August 22). NPR. Retrieved March 29, 2023, from <https://www.npr.org/2022/08/22/1118734871/the-u-s-and-south-korea-are-staging-their-biggest-military-drills-in-years>
- U.S., South Korean Defense Chiefs Agree to Resume Combined Exercises*. (2018, March 20). Department of Defense. Retrieved March 29, 2023, from <https://www.defense.gov/News/News-Stories/Article/Article/1470037/us-south-korean-defense-chiefs-agree-to-resume-combined-exercises/>