In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Political Science
The University of British Columbia
Vancouver, Canada

Date 11 October 2000
ABSTRACT

This thesis examines the development and deployment of ballistic missiles and Theater Missile Defense (TMD) systems in Northeast Asia. It argues that the current arms dynamic in Northeast Asia constitutes a new type of arms competition, which has significant implications for regional security and for the study of arms races.

This thesis makes clear that the highly sophisticated anti-missile systems currently under development will eventually be deployed in Northeast Asia. Such deployments will increase political and military tensions in the region. Moreover, the introduction of TMD systems is likely to spark the development and deployment of more missiles, along with countermeasures and multiple warheads, potentially transforming the regional arms competition into an arms race.

This thesis also argues that the current literature on arms races cannot fully grasp the situation in Northeast Asia. Ballistic missiles have undoubtedly been the most destabilizing weapons deployed in Northeast Asia in the 1990s. However, measuring arms competition solely in terms of military expenditure does not capture the importance of these destabilizing weapons. Moreover, the literature on arms races, which has traditionally defined arms competitions as an offensive-versus-offensive dynamic, is blind to the current defensive dimension of the Northeast Asian arms competition.
CHAPTER FOUR : A New Type of Arms Competition ........................................... 58
  • Ballistic Missiles and Missile Defense : Destabilizing Weapons ............ 58
  • A New Type of Arms Competition ............................................................ 58
  • Consequences for Regional Security in Northeast Asia ....................... 63

CHAPTER FIVE : Conclusion : Implications for the Study of Arms Races .......... 68

Bibliography ........................................................................................................ 72
LIST OF TABLES

Table 1: Military Expenditures in Northeast Asia, 1989-1998 ........................................ 32

Table 2: Rates of Increase in Military Expenditures in Northeast Asia, 1989-1998 ................. 32

Table 3: Chinese Ballistic Missile Capabilities in the 1980s .............................................. 35

Table 4: North Korean Ballistic Missile Capabilities in the 1980s ....................................... 36

Table 5: South Korean and Taiwanese Ballistic Missile Capabilities in the 1980s .................. 38

Table 6: Chinese Ballistic Missile Deployments in the 1990s ............................................ 41

Table 7: North Korean Ballistic Missile Deployments in the 1990s .................................... 43
ACKNOWLEDGEMENTS

This thesis would not have been possible without the precious comments and support I received from Brian L. Job and Michael D. Wallace. Not only did they share their knowledge and interest for international relations, but they always pushed me to do my best. I am thankful for their useful suggestions on this thesis and for the wonderful opportunities they opened for me this year.

I am also grateful to my parents for their unbounded love and support. No words can describe the importance of their encouragement, particularly throughout this difficult year. Many thanks are also due to my closest friends, who always found ways to get me back on track during the tough times.

I would also like to thank André Donneur, Charles-Philippe David, and Dan O'Meara of the Université du Québec à Montréal, who have fueled my passion for international relations and security studies. Finally, last but not least, I am also indebted to Jacques Provost of the Collège Édouard-Montpetit, who first sparked my interest for political science and forever changed my life.
TO THE MEMORY OF MY FATHER

Merci pour tout, et encore plus.
CHAPTER ONE

INTRODUCTION

At the dawn of the twenty-first century, Northeast Asia presents an interesting challenge for students of international relations. Characterized by political tensions and territorial disputes, Northeast Asia breaks sharply with the image of regional integration witnessed in Europe and South America. The 1997 Asian financial crisis, which painfully struck in Japan and South Korea, but only mildly in China, revealed the low levels of regional interdependence and the inefficacy of regional institutions. Moreover, the region’s military expenditures and arms procurements have steadily increased in the 1990s, despite the temporary set back of 1997.

Beyond Modernization

At first glance, these procurements could be attributed to simple military modernization programs. But the situation in Northeast Asia is far from simple modernization. These countries have indeed acquired modern conventional armament to rejuvenate their armed forces, but the larger part of their military expenditures has been directed towards indigenous programs to develop new capabilities. Ballistic missiles were

---

1 This thesis acknowledges the primary political and military role played by the United States and the secondary role played by Russia in the region, but has chosen to define Northeast Asia as the geographical region encompassing China, Japan, North Korea, South Korea and Taiwan. Focusing on these five states will allow a better examination of the arms dynamic in the region.

undoubtedly atop the list of significant military developments in Northeast Asia during the 1990s. North Korea developed medium-range ballistic missiles (MRBM), while China significantly increased its short-range capabilities and improved the accuracy of its ballistic missile arsenal. These actions had a ripple effect on the rest of the region, increasing tensions and fueling the development of anti-ballistic missile systems.

Of course, there is a considerable distinction between the possession of a weapon system and its actual military use. But given the particularities of the region, ballistic missiles have become the most serious threat to the stability and security of Northeast Asia. Rather than developing ballistic missiles for the sole purpose of increasing their deterrence capabilities, China and North Korea have used their arsenals to intimidate their neighbors. In July 1995, China test-fired 6 DF-15 (Dong Feng) short-range ballistic missiles (SRBM) off the shores of Taiwan, to demonstrate their discontent over President Lee Teng-hui’s visit to the United States a month earlier. In March 1996, China test-fired 4 more DF-15 SRBMs off the shores of Taiwan, in an obvious attempt to intimidate the Taiwanese population during the presidential elections. Finally, in August 1998, North Korea test-fired a Taepo-Dong MRBM over northern Japan.

---

3 Ballistic missiles are generally classified into four categories. Generally, a short-range ballistic missile (SRBM) is understood to have a range of 150-799 km; a medium-range ballistic missile (MRBM) a range of 800-2,399 km; an intermediate-range ballistic missile (IRBM) a range of 2,400-5,499 km; and an intercontinental ballistic missile (ICBM) a range greater than 5,500 km. This classification is the most widely used, but can still vary from source to source. For example, the U.S. Department of Defense defines SRBMs as missiles with ranges of less than 1,100 km; MRBMs as missiles with ranges of 1,100-2,750 km; and IRBMs as missiles with ranges of 2,750-5,500 km. This paper will use the first (most common) classification.


However, ballistic missiles remain, first and foremost, military weapons. They have the capacity to deliver explosive conventional or unconventional warheads at various ranges. If accurate enough, they can be used as first-strike weapons against major cities, or even military bases, airfields and ports. Even with conventional warheads, large quantities of ballistic missiles can inflict significant damage to their target. This destructiveness is multiplied by many orders of magnitude if the missiles carry nuclear or chemical weapons. The use of ballistic missiles in war dates back to the German V-2 rocket attacks against Britain during the late stages of World War II. Since then, SRBMs have been used in three inter-state conflicts (Yom Kippur in 1973, Iran-Iraq in 1980-88, and Gulf War 1991) and two civil wars (Afghanistan in 1988-91, and Yemen in 1994). The devastating potential of ballistic missiles was revealed during the Iran-Iraq war, during which both countries exchanged SRMBs equipped with chemical warheads. Thus, ballistic missile proliferation is an important source of concern, particularly within regional rivalries.

**Ballistic Missiles and Deterrence**

Ballistic missile technology was quickly developed by the major powers after it had been introduced on the military scene in 1994. After the Cuban Missile Crisis of 1962, it became clear that ballistic missiles were the cornerstone of the superpowers’ deterrence strategies during the Cold War. Opposing each other’s offensive arsenals while insuring their second-strike capabilities, the United States and the Soviet Union engaged in what has been labeled a mutual assured destruction strategy (MAD).

---

The strategy of opposing offensive weapons to an adversary’s offensive weapons was reproduced as ballistic missile technology spread beyond the two superpowers. Ballistic missiles have played an important role in many deterrence strategies, although non-superpowers never achieved the assured second-strike capability that was the core of the MAD doctrine. For example, Egypt and Syria have acquired ballistic missiles in an attempt to counter Israel’s conventional qualitative edge as well as its ballistic missile and nuclear weapons arsenal. More recently, India and Pakistan have deployed nuclear-capable ballistic missiles and are developing deterrence strategies based on those missiles. Thus, states facing a ballistic missile threat usually follow the traditional logic of deterrence and deploy their own ballistic missile arsenal.

**A Defensive Response**

The present situation in Northeast Asia is different, however, and does not follow the traditional logic of deterrence. Instead of following China and North Korea on the path of missile developments, Japan, South Korea and Taiwan have chosen to rely on defensive weapons and develop missile defense systems, while benefiting from the United States’ nuclear umbrella.

The attempt to oppose defensive forces against offensive threats is not new. From the Great Wall of China to the fortresses of the Middle Ages and the trenches of the Great War, many defensive initiatives have been adopted and designed to counter offensive forces. However, these endeavors were pursued with the use of existing weapons and technologies. For example, the French Maginot Line of the early 1940s relied on defensive
fortifications and canons rather than new technology to defend against a potential German invasion. In contrast, Northeast Asia is currently witnessing a unique phenomenon. Japan and the United States, and to a lesser degree South Korea and Taiwan, are developing or searching to acquire new defensive weapon systems. Anti-missile systems, referred to as Theater Missile Defense (TMD), are under development in the United States and could eventually be deployed to counter the perceived threat posed by the ballistic missiles already deployed by China and North Korea.

While the technical feasibility of TMD systems remains questionable, China and North Korea have indicated that they would increase their ballistic missiles arsenals in order to overwhelm potential TMD systems. Moreover, China has already increased its number of SRBMs in response to Taiwan’s acquisition of U.S. Patriot anti-missile systems (PAC-2) in 1994. Thus, Northeast Asia is faced with a particularly worrisome arms competition, which could potentially grow into an arms race and seriously undermine the stability and security of the region.

**Ballistic Missiles versus Missile Defense: A New Arms Competition?**

This thesis will focus on the development and deployment of ballistic missiles and TMD systems, and argue that the current arms dynamic in Northeast Asia constitutes a new type of arms competition. It will be argued that the upper-tier TMD systems currently under development will eventually be deployed to defend U.S. military bases and allies in Northeast Asia. Such deployments will have significant consequences for the security and stability of Northeast Asia. By increasing political and military tensions, the arms
competition could increase the risk of conflict and trigger an arms race opposing ballistic missiles to TMD systems. The current situation in Northeast Asia will also have implications for the study of arms competitions.

The second chapter will examine the literature on arms races. It will underline some weaknesses of this literature, notably its traditional definition of arms competitions in terms of an offensive-versus-offensive competition measured by the rapid increase of military expenditures. The third chapter will describe the situation in Northeast Asia. It will focus on the ballistic missile deployments in China and North Korea, the lower-tier TMD deployments in Japan, South Korea and Taiwan, and the ongoing upper-tier TMD development programs. The fourth chapter will argue that Northeast Asia is witnessing a new kind of arms competition (defensive-versus-offensive), which will have particular consequences for the security of Northeast Asia. Finally, the fifth chapter will outline the implications of this new type of arms competition for the study of arms races.
Defining Arms Races

Military competition is not a new phenomenon; it has been around for centuries. But the industrial revolution of the 19th century fundamentally changed the nature of arms dynamics. At the turn of the 20th century, states had the ability to devote their industrial infrastructures to arms production. Mechanized assembly lines could produce large quantities of weapons in a short periods of time, thus allowing for rapid military buildups, while the drive for technological innovations, notably in metallurgy and chemistry, qualitatively improved the lethality of armaments. Until then, states had limited ways to increase their national military power, but the technological innovations of the industrial era allowed states to drastically improve their military capabilities.

The rapid accumulation of military capabilities in the second half of the 19th century gave rise to the analogy of arms racing. Like sprinters running as fast as they can, arms racing states are seen as producing as many weapons as they can. Of course, like many analogies, the arms race analogy is imperfect. As Grant T. Hammond correctly points out, "arms races have no prearranged beginning or ending, no specified duration, no agreements on the rules of competition, the length of the course, the price for victory, not the cost of

defeat". Nevertheless, arms races show a clear adversarial relationship between two or more states. Lewis Fry Richardson's groundbreaking analysis of arms races introduced a two-actor model, in which a state increases its level of armament in relation to its adversary's increases and its own economic capacities, has served as the basis for most of the arms races literature.

Identifying what constitutes an arms race is a difficult task. However, one of the clearest definitions of arms race is offered by Colin S. Gray. He described four conditions necessary for an arms buildup to qualify as an arms race. According to Gray, there must be "two or more parties perceiving themselves to be in an adversary relationship, who are increasing or improving their armaments at a rapid rate and structuring their respective military postures with general attention to the past, current, and anticipated military and political behavior" (Italics by author). Thus, simultaneous and abnormally rapid rates of military growth, by two or more opposing states, constitutes an arms race. States are generally expected to maintain a certain level of armament and to have different degrees of adversarial relationships with each other. But a rapid increase in the quantity or quality of the military arsenal of two or more states, specifically designed to counter or balance each other's military capabilities, qualifies as an arms race.

---

Arms Races and Arms Competitions

However, not all arms buildups are arms races. To distinguish among patterns of arms acquisitions, Barry Buzan and Eric Herring describe the four levels of what they call the arms dynamic.\(^\text{12}\) Besides build-down (dismantling) and maintenance (replacing), Buzan and Herring's framework distinguishes between arms competition and arms racing. They reserve the term "arms race" for the most extreme manifestations of the arms dynamics: "when actors are going flat out or almost flat out in major competitive investments in military capability."\(^\text{13}\) However, this rather loose terminology of going "flat out" is problematic. It emphasizes the arbitrary perception of the pace of arms acquisitions rather than its concrete measurement.

Many authors have suggested thresholds to distinguish arms races and arms competitions. For example, Hammond believes that a consistent annual increase of at least 8 percent in the military budget constitutes an arms race.\(^\text{14}\) This criteria, however, is just as arbitrary as the idea of going "flat out."\(^\text{15}\) A clearer and simpler way of identifying arms races is offered by Michael Dean Horn.\(^\text{16}\) His classification is based on two criteria. First, for the arms dynamic between two or more states to be considered an arms race, the time period must show a rate of accumulation of military capabilities significantly above the baseline average. Secondly, the second half of this period must show a greater rate of accumulation of military capabilities.

---

\(^\text{13}\) Ibid, p. 80.
\(^\text{14}\) Hammond (1993), op. cit., p. 31.
increase than the first. In other words, to be considered an arms race, the military growth rates of two or more adversary states must be rapid from the start, and speeding up in the second half of the time period, otherwise it should be considered an arms competition.\textsuperscript{17}

Thus, arms racing is the expression of intense military and political tensions between two or more states. In contrast, arms competitions are less extreme and more common than arms races. In a competition, states justify their arms buildups in relation to each other, but these buildups are not rapid enough to constitute an arms race. To make another analogy, an arms race would be a sprint and an arms competition a marathon. In both cases, the goal is the same (presumably to increase national security), and states are running against each other, but the pace is significantly different. For example, the naval arms dynamic between Great Britain and Germany during the first decade of the 20\textsuperscript{th} century was clearly an arms race. Germany, which did not have a navy until 1890, rapidly increased its battleship and cruiser production in an attempt to catch up to the British navy, which countered by deploying \textit{Dreadnought} warships.\textsuperscript{18} On the other hand, the India-Pakistan arms dynamic has proceeded at a much slower pace, thus constituted an arms competition rather than a race.\textsuperscript{19}

\textsuperscript{17} For example, there would be an arms race between state A and state B if:
\[ r_{A1} < r_{A2} \quad \text{and} \quad r_{B1} < r_{B2} \]
where 1 and 2 are two halves of a time period and all the growth rates (r) are higher than average.

\textsuperscript{18} Hammond (1993), op. cit., pp. 113-120.

\textsuperscript{19} Buzan and Herring (1998), op. cit., p. 80.
Offensive and Defensive Weapons

Throughout history, men have searched for better ways to attack and defend themselves. Although problematic in some cases (i.e. air-to-air missiles), distinguishing between offensive and defensive weapons can contribute to the study of arms dynamics. Traditionally, weapons designed to facilitate territorial conquests have been labeled as "offensive weapons", and those designed to deny conquest have been defined as "defensive weapons". However, this rather narrow view of offensive and defensive weapons does not reflect the "potential spiral dynamics" present in arms competitions with a relatively low risk of territorial conquest. Instead, offensive weapons should be defined as those weapons which can potentially be used to attack an adversary and cause destruction, while defensive weapons should be defined as the systems designed to defend a state against offensive weapons.

Third Party Involvement

While the arms race literature accepts the possibility that states or groups of states can compete against each other, it does not account for the role of third parties. The Cold War arms dynamic, opposing the Eastern and Western blocs as a whole, did not require a conceptual distinction between arms producer and non-producer countries because each bloc was only exporting and importing military technology to and from its members. In the late 20th century, however, the situation requires this distinction. With the disappearance of

---


the overshadowing superpower rivalry, foreign arms transfers have become an important characteristic of many regional arms competitions, notably in the Middle East and East Asia.

In an attempt to reflect this situation, Buzan and Herring develop a spectrum of arms producing states ranging from a non-producer status to a full-producer status. They also introduce the notion of "secondary arms dynamics", involving part-producers or even non-producers, but they seem to ignore the role of third parties. They do not incorporate these concepts into their arms dynamics framework. In fact, the role of third party suppliers has generally been overlooked by the literature on arms races.

The indirect participation of third party suppliers changes the nature of a regional arms competition. In an arms competition opposing two full-producer states, the state with the most effective military-industrial complex and the best domestic technology is likely to gain either a qualitative or quantitative advantage over the other. Thus, the competition will depend on domestic factors, such as economic strength and technological know-how.

However, this simple dyadic model no longer grasps the arms dynamic if one of the regional competitors has access to a third party’s military technology via weapons sales or military assistance. Such arms acquisitions can bolster a state’s military capabilities despite its economic or technological weaknesses. China for example, which lacks the capacity to

---

22 Ibid, p. 43.
domestically produce sophisticated modern weapons, acquired several types of weapons from Russia in the 1990s, notably S-300 surface-to-air missiles and Su-27s attack aircraft.\textsuperscript{24} By doing so, China increased its military capabilities at a much faster rate than its national military-industrial complex would have allowed.

The influence of third parties can also take the form of extended deterrence. By positioning troops on the territory of its allies, or by offering a retaliation guarantee (i.e. U.S. nuclear umbrella), a third party can change the balance of power between competing states. Arms transfers also allow third party suppliers to exercise their political influence over the importing countries. Foreign arms sales, particularly if they involve sophisticated weapons, are likely to be tied with political considerations on the part of the supplier, and to the maintenance of an implicit (or explicit) military alliance. Thus, third party suppliers can play an important role in a regional arms competition, by deciding (or not) to transfer weapons to one of the competing states or by including their allies under an extended deterrence umbrella.

\textit{Dimensions of Arms Races}

There are many dimensions to arms races and arms competitions. However, three dimensions are clearly more important than others. At the root of state military competitiveness lie national security concerns, domestic considerations, and technological innovations.

\textsuperscript{24} You Ji, \textit{The Armed Forces of China} (St. Leonards, Australia: Allen & Unwin, 1999), p. 68.
The Action-Reaction Dimension

The classical view of arms races, mirroring the metaphor of a race, explains the phenomenon in terms of an action-reaction dynamic. Based on the security dilemma\(^\text{25}\), states will develop their military capabilities in order to either increase their national security status or to increase their political weight against the interests of other states.\(^\text{26}\) This tit-for-tat dimension of arms racing gives primary importance to the perception of insecurity that surrounds a rival state's arms acquisitions. A state’s new weapons deployment can be interpreted as a threat to the national security of another state. In an action-reaction fashion, such an external event would trigger a similar national response (i.e. deploy similar weapons) because state A would not let its rival, state B, gain a significant military advantage. For example, the action-reaction spiral was partially at play during the Anglo-German naval arms race of the early 20th century.\(^\text{27}\) The action-reaction dimension was also visible in the East-West rivalry of the Cold War.\(^\text{28}\)

According to Buzan and Herring, three variables are particularly important within the action-reaction dynamic.\(^\text{29}\) First, the magnitude of the triggering action will influence the reaction. Similarly, introducing new military technologies is often more destabilizing than adding to existing capabilities. Some weapon systems are more destabilizing than

\(^{25}\) The security dilemma posits that an increase in the military strength of a potentially hostile state will trigger the suspicions of other states and cause them to react by increasing their own military power. See for example: George W. Rathjens, "The Dynamics of the Arms Race", In Herbert York, ed., Arms Control (San Francisco: Freeman, 1973), pp. 177-187.

\(^{26}\) Buzan and Herring (1998), op. cit., p. 83.


others. For example, the deployment of ballistic missiles (even with conventional warheads) would undoubtedly raise more concerns than the incremental deployment of main battle tanks or fighter aircraft. Secondly, the timing of the triggering action within the political climate of the adversary states will determine the speed of the reaction and the subsequent interactions. For instance, the Indian nuclear tests for May 1998 triggered a prompt Pakistani response because of the tensed political confrontation between Islamabad and New Delhi. Finally, the awareness of the arms dynamic will determine if states move closer to an understanding or further apart. In other words, rival states, conscious of the extent to which their actions trigger reactions and impact each other's security concerns, can either tone-down their actions or accelerate their responses and trigger an arms race.

By their very nature, arms races and arms competitions imply a certain degree of action-reaction. However, the action-reaction dimension is not sufficient to adequately explain arms racing behaviors. Moreover, the three variables described by Buzan and Herring are difficult to measure in practice, and the action-reaction dimension says little about the motives behind the actions. Furthermore, the action-reaction dimension does not account for domestic and technological factors, which often play a significant role in the arms dynamic. Thus, the action-reaction dimension is important to identify the underlying national security concerns at play within arms competitions, but is not sufficient in itself to explain competitive arms processes.

---

The Domestic Dimension

The domestic dimension focuses on the forces at work within the state to understand arms racing behaviors. According to this view, arms acquisitions become institutionalized and politicized within each country. Although external security concerns remain a factor, the driving force behind the arms process is internal.

A variety of domestic factors can drive the arms acquisition processes that result in this form of arms competition. A state may engage in an arms acquisitions and increase its military capabilities to bolster its national prestige, to strengthen national unity, or to tighten the regime’s control over its population. For instance, many analysts have identified strong domestic elements at work in India’s decision to test nuclear weapons in May 1998, notably the government’s desire to increase national pride and unity.31

The economic weight of the military-industrial complex, combined with the political mechanisms at work within democratic states, can also play a significant role in a country’s drive for new military capabilities. The defense industry gets "absorbed into the budgetary and electoral processes of the [democratic] state", pushing it further down the path of weapons development.32 In other words, producing weapons creates jobs, and creating jobs is an important duty for any democratic government, especially if it means getting more votes.

Most of the literature on the domestic dimension of arms races focuses on the Cold War superpowers and runs the risk of over-generalization. For example, it is uncertain that a military-industrial complex in another state can have as much influence over domestic politics as that of the United States. The domestic dimension might also be difficult to measure in non-democratic states. The level of secrecy surrounding such regimes makes it extremely difficult to obtain reliable information on its domestic political dynamic. For instance, it is very difficult to obtain a clear picture of the domestic forces at play within North Korea. Nevertheless, it is important to examine the internal factors that can influence a state's arms dynamic.

*The "Technological Imperative" Dimension*

Another important dimension of arms races is technology. Most of the literature considers research and development (R&D) as part of the military-industrial complex and does not examine it as a dimension in itself. However, the drive for military technology has been an important factor in many arms races. The Anglo-German naval arms race prior to World War I, for example, witnessed the deployment of the *Dreadnought* warships. Similarly, the Cold War rivalry pushed the United States and the Soviet Union to race for sophisticated technology, notably for submarines and ballistic missiles. At the dawn of the 21st century, with the computerization and high-sophistication of the military, commonly referred to as the "Revolution in Military Affairs" (RMA), technology clearly stands on its own as a dimension of the arms dynamic.
According to the technological imperative model, technology constantly drives military innovations and influences (some say determines) a state’s behavior.\textsuperscript{33} States can never be certain that their existing weapons will remain effective in the future, and they always fear that an adversary will be the first to develop a new technology, so they consciously engage in military R&D to gain or maintain a technological edge over other states. As Matthew Evangelista points out, the military technologists often lead the way, pushing the technology forward and seeking political support later.\textsuperscript{34} An example of the technology driving a military innovation is the development of the B-2 long-range stealth bomber by the United States in the 1990s. When Lockheed-Martin got the contract to produce the F-117 stealth aircraft, Northrop-Grumman, the other company hoping to get the F-117 contract, re-oriented its research towards longer-range stealth bombers and later obtained the governmental support that led to the development of the B-2 bomber.

However, the technological dimension shares similar shortcomings as the domestic dimension. First, the risk of over-generalizing from the superpower rivalry of the Cold War is considerable. For example, most Third World states do not have either the economic capabilities or political will to engage themselves in a quest for highly sophisticated weapons. Secondly, this dimension assumes that states will give a tremendous importance to technology. While it is certainly the case in many countries, some states still give more importance to quantity rather than quality. Nevertheless, whether technology itself drives

\textsuperscript{33} Merritt Roe Smith and Leo Marx, eds., \textit{Does Technology Drive History? The Dilemma of Technological Determinism} (Cambridge, MA: MIT Press, 1994).

competitive arms processes is less relevant than the pace of military innovations. The rapid introduction of new military technologies can surely constitute an aggravating factor and step up arms competitions, perhaps even transform them into arms races.

**The Danger of Arms Racing**

Rivalries between states and arms competitions are common, but they are rarely pushed to the level of an arms race. Similarly, military tensions and low-level skirmishes are common, but all-out interstate wars are not. This has led many scholars to look at a possible linkage between arms races and the outbreak of war. Many arguments have been presented to suggest that arms competitions increase the risk of war between rival states.\(^{35}\) Some other scholars remain skeptical and do not see arms racing as a potential direct cause of conflict.\(^{36}\) But Susan G. Sample’s research has clearly shown that no matter what method one uses to measure arms races or conflict, "the relationship between arming and the escalation of disputes into war is positive and significant".\(^{37}\) In other words, the risk of escalation into war is higher when states are engaged in an arms race.

Similarly, arms competitions, which reflect the adversarial relationships between states or groups of states, also pose a risk of escalation into war. Those rivalries which witness frequent but limited use of military force for the purpose of intimidation have often

---

been labeled "enduring rivalries". But long-standing rivalries can also have long periods of relative dormancy (i.e. China-Taiwan). To reflect this possibility, Wallace and Job suggest using the term "enduring rivalry" to identify political and military rivalries with a history of periodic manifestations of threats, in which at least one party is dissatisfied with the status quo and could consider the use of force to challenge the status quo. Rivalries are dangerous because they foster tensions and antagonisms between adversary states. Adding more or better weapons to a rivalry would be like pouring oil on a fire. A military buildup on the part of one state would accentuate the insecurity of its rival and trigger a similar response, which would further increase tensions between the enduring rivals. Thus, arms competitions within enduring rivalries significantly increase the risk of conflict.

Assessing Arms Races

Measuring arms races is a difficult task. Most studies of arms races have used fiscal data to measure the degree of military competition between two or more states. Other, more recent studies, have introduced weapons-based indices to compensate for the weaknesses of fiscal indices. Both have their strengths and weaknesses, and will need to be combined to accurately represent the situation between arms competing states.

Fiscal Indices

Measuring the rate of increase in military expenditures or measuring the percentage of the Gross National Product (GNP) attributed to the defense sector has often been presented as ways to detect the presence of an arms race. However, comparing military expenditures helps to measure a state's defense effort rather than its actual military capabilities. Fiscal indices can serve as a partial indicator, but are not sufficient to fully grasp the complexity of arms competitions.

First, the reliability of fiscal data is questionable. Despite the fact that most countries publish their defense budget annually, several significant defense-related activities remain outside the official figures. For example, in the United States, the maintenance and development of nuclear weapons is part of the Department of Energy's budget and several space-related programs are either classified or part of NASA's budget. Moreover, finding clear and reliable fiscal data from autocratic or totalitarian regimes is nothing short of utopian. Hence, available fiscal data is not accurate enough to give anything more than a simple estimation of the real defense-related expenditures.

Secondly, the questionable validity of fiscal indices is an even more important problem than the reliability issue. As Job, Wallace et al. indicate, "an assumed connection between expenditures and military strength is only plausible in the context of military

technology that is relatively static and uniform over the set of states to be examined".\textsuperscript{44} However, when there is a technological gap between rival states, fiscal indices are not valid. Looking solely at the defense budget does not allow the distinction between military buildups and high maintenance costs, nor between different generations of weapons. For instance, states with weaponry dating back to the 1960s and 1970s will undoubtedly spend a large portion of their defense budget on maintenance. Moreover, developing different types of armament incurs different costs. For instance, the cost of producing one aircraft carrier far exceeds the cost one hundred attack aircraft, but fiscal indices are unable to make this kind of distinction. Even if a conventional attack aircraft would cost the same as a stealth aircraft, the important technological dimension of this particular type of weapon would not appear in the budget. Thus, fiscal data is blind to the different levels of technology between states.

Thirdly, fiscal indices assume a certain balance between the levels of production of the rival states. As mentioned earlier, this is simply not the case for many arms competitions. Two rival states will not necessarily focus their arms productions in the same area. For instance, one state could focus on improving its aircraft capabilities while the other expands its naval forces. Even if both states focus on the same area, they might produce different weapons. For example, one country could expand its amphibious forces while the other seeks to develop submarines. Moreover, developing a weapon system from scratch is much more costly than purchasing it from an exporting state after its production.

Many partial-producer states, particularly since the end of the Cold War, have acquired weapon components, or sometimes entire weapon-systems, from other countries. By doing so, it reduces their R&D spending and their cost of production. Furthermore, fiscal indices are unable to account for the influence of third parties within an arms competition. The deployment of foreign troops, the production costs of transferred weapons and the costs of extended deterrence might be reflected in the third party’s budget, but would certainly not be captured by the fiscal data of the competing states. Thus, fiscal data can identify the area in which states focus most of their resources, but cannot compare their levels of production, distinguish between different costs of production, or grasp the influence of third parties.

Finally, fiscal indices are unable to distinguish between offensive and defensive weapons. Even with data suggesting that two competing states are increasing their military expenditure, fiscal indices are not able to identify the type of weapons being pursued by each country. For instance, there is an obvious difference between a state increasing its defense budget to develop its radar capabilities and another state developing ballistic missiles or even nuclear weapons. Hence, fiscal data is unable to examine the balance between offensive and defensive weapon-systems.

**Weapons-Based Indices**

To escape from the important weaknesses of fiscal based indices, scholars are beginning to develop non-fiscal indices. Moving from fiscal data to weapons-based indices would account for the force structure (offense-defense) of the states under study, the
variations in technology, and to a certain degree, the pattern of political tensions between rival states.\textsuperscript{45}

Within any regional rivalry, the deployment of certain weapons can increase tensions and insecurity. These weapons are often at the core of arms competitions. In contrast, other weapons acquisitions can be perceived as stabilizing if they help maintain a certain equilibrium between rival military forces. By developing weapons-based indices, scholars hope to get a clearer measurement of the pace of acquisition and deployment of potentially destabilizing weapons.\textsuperscript{46} Meconis and Wallace give five criteria for identifying destabilizing arms acquisitions.\textsuperscript{47} First, the acquisition has to be quantitatively large compared to the existing force of the state or its rival. Secondly, the acquisition must represent a significant qualitative improvement in this weapon category. Thirdly, the acquisition must be rapid on the time scale of the rivalry. Fourthly, the weapons acquired must allow little or no effective countermeasure. Finally, the acquisition reduces the warning time. Thus, weapons-based indices are designed to identify the weapons that are particularly important and potentially destabilizing within a specific arms competition.

But weapons-based indices also have their problems. First, they are difficult to construct. Different countries produce different weapons. Even if these weapon systems are comparable, it remains difficult, although possible, for weapons-based indices to account for those qualitative differences. For example, weapons-based indices would consider

\textsuperscript{45} Job et al. (2000), op. cit., p. 19.
\textsuperscript{46} Meconis and Wallace (2000), op. cit., pp. 31-48.
\textsuperscript{47} Ibid, pp. 31-48.
Russian made Su-27s and U.S. made F-16s as modern aircraft without distinguishing the fact that the F-16s have a larger combat radius.\textsuperscript{48} Weapons-based indices are also blind to the level of training, which can be radically different between states. Secondly, the availability of the data might, in some cases, cause some difficulties. Despite the presence of several sources to find such data, most precise information remains classified, leaving scholars with nothing more than their best guesses. For example, the number of SRBMs remaining in Iraq’s arsenal a decade after the Gulf War remains unclear. Finally, states with different military doctrines and different levels of technology might deploy dissimilar forces. In these cases, weapons-based indices run the risk of comparing apples and oranges.\textsuperscript{49}

\textit{Regional Arms Competitions}

As mentioned earlier, most of the literature on arms races focuses on the international level, particularly on the Cold War superpower rivalry. As a result, arms competitions between regional rivals have often been overlooked. There were regional arms competitions during the Cold War (i.e. in the Middle East and in South Asia), but they were mostly analyzed in relations to the superpowers and not in terms of regional balance of power. However, particularly since the end of the Cold War, many states are looking for power and influence over their geographical neighbors rather than an international presence. Thus, regional rivalries and arms competitions can have a dynamic of their own.

\textsuperscript{48} See for example: the Federation of American Scientists’ web site, at \url{www.fas.org}  
\textsuperscript{49} Job et al. (2000), op. cit., p. 19.
First, the regional political climate, along with the balance of power, needs to be examined in order to determine which states or group of states are opposing each other, and which rivalries could potentially escalate to war. Different regional dyads have different levels of tensions or dormancy, which can be hard to evaluate. Hence, a close examination of regional geostrategic issues is required, with particular attention given to potential situations of extended deterrence and security guarantees.

Secondly, the level of technology developed by each state must be carefully analyzed. Regional arms dynamics often witness a wide range of technological capabilities which are often difficult to analyze. For example, some states could be producing indigenous weapons while their neighbors could be relying on foreign arms transfers. Some states can also benefit from their privileged relationship with a third party supplier (i.e. Israel and Taiwan with the United States).

Finally, although many sectors of the armed forces are involved in competitive arms processes, regional arms competitions tend to focus on the weapons perceived as the most destabilizing. Hence, identifying such weapons, and distinguishing between offensive and defensive weapons, is crucial for the understanding of a regional arms competition.
CHAPTER THREE

ARMS COMPETITION IN NORTHEAST ASIA: BALLISTIC MISSILES AND TMD

Geostrategic Situation in Northeast Asia

Northeast Asia is a region filled with political and military tensions. For the past fifty years, two major regional rivalries have emerged. At the turn of the 1950s, the Korean War drastically changed the North-South relations on the Korean Peninsula, and Chiang Kai-shek’s retreat to Formosa during the Chinese Revolution paved the way for the Cross-Strait rivalry. Meanwhile, states have steadily increased their military expenditures and improved their armed forces.

The Korean Peninsula

The first regional rivalry, between North and South Korea, dates back to the end of the Korean War of 1950-53. During the Cold War, the Korean Peninsula was an area of great uncertainty and insecurity, as the South constantly worried about a possible re-invasion from the North. The risk of invasion from the North apparently decreased in the 1990s, as a consequence of the country’s crumbling economy. The floods of 1995 and severe famine of 1996 further exhausted Pyongyang’s capabilities.50

---

Despite North Korea's internal problems, tensions on the Korean Peninsula remained high after the Cold War. North Korea's withdrawal from the Nonproliferation Treaty and apparent attempt to develop nuclear weapons in the early 1990s, combined with its extensive ballistic missiles program have renewed concerns over the Stalinist state. After the 1998 Taepo-Dong test, it became clear that North Korea's growing ballistic missile capabilities were a source of deep concern for Japan, South Korea and the United States. \(^{51}\)

The diplomatic dynamic, however, seems to be shifting. The North Korean issues used to be handled in bilateral relations with the United States. For example, the perceived threat of North Korean nuclear proliferation led to the 1994 Framework Agreement and the threat of ballistic missile proliferation resulted in the 1999 Berlin Agreement, both negotiated by the United States. More recently, however, North Korea has moved towards a *rapprochement* with South Korea. The recent Korean Summit is likely to improve North-South relations, but does very little to reduce the threat that North Korean ballistic missiles still pose to the rest of Northeast Asia. Further North-South discussions would, of course, have positive consequences, but the Korean Peninsula will continue to be an important source of regional tensions as long as security issues remain outside these discussions, and as long as other Northeast Asian states remain skeptical of North Korea's nuclear and ballistic missile intentions.

---

The Cross-Strait Rivalry

The second long-lasting rivalry in Northeast Asia opposes China and Taiwan. Since the end of the Chinese civil war in 1949, Beijing has constrained Taiwan to remain in an ambiguous status quo situation, disallowing any political gesture that would be perceived as a move toward independence. The end of the superpower rivalry of the Cold War and the rise of democracy in Taiwan have intensified the cross-Strait political and military competition.

Although the military competition between the two rivals has many facets, the most obvious relates to ballistic missiles. For instance, Taiwan’s acquisition of lower-tier TMD systems (PAC-2) is a direct response to China’s SRBM deployments (DF-11s and DF-15s). There is no doubt that this regional rivalry constitutes an extremely serious source of concern for the entire region. In fact, it is one of the few remaining places in the world where a military confrontation has the potential to pull in other great powers.\(^{52}\)

Tensions across the Taiwan Strait were at their highest during the 1995-96 missile crisis, when China conducted several rounds of military exercises, including the test-firing of SRBMs near the Taiwanese shores. This military demonstration was a clear sign of irritation over Taiwan’s President Lee Teng-hui’s visit to the United States in 1995, as well as an attempt to influence the 1996 presidential elections in Taiwan.\(^{53}\) The situation

---

\(^{52}\) Wallace and Job (1997), op. cit., p. 7.

\(^{53}\) Job et al. (2000), op. cit., p. 5.
stabilized itself somewhat in 1997, after the United States promised it would not encourage Taiwanese independence. However, tensions increased again in July 1999, after President Lee’s comment that cross-Strait relations "should be conducted on a special state-to-state basis".\textsuperscript{54} In February 2000, Beijing released a White Paper making explicitly clear the conditions under which China would be compelled to invade Taiwan.\textsuperscript{55} Finally, China’s skepticism towards Chen Shui-bian, the new Taiwanese President elected in March 2000, is likely to maintain a significant degree of tensions across the Taiwan Strait.

\textit{Other Growing Rivalries}

Aside from the two major regional rivalries, Northeast Asia is also fostering other rivalries. For instance, China remains skeptical about Japan’s military intentions. Remembering the Japanese imperial aspirations of the Second World War, China sees Japan’s growing military potential with a worried eye. This rivalry is likely to intensify if Japan deploys sea-based TMD system currently under development in collaboration with the United States.\textsuperscript{56} Not only will such a system increase the level of U.S.-Japan military and technological cooperation, but it will also constitute a nation-wide missile-defense system for Japan. In short, China and Japan, at least according to the Chinese perspective, are engaged in a regional rivalry.

Finally, diplomatic relations between the United States and China are starting to show signs of an emerging rivalry for influence in Northeast Asia. While economically

\begin{footnotes}
\item[54] Ibid, p. 5.
\end{footnotes}
engaging China, the United States continues to play a key military role in the sensitive areas around China, notably on the Korean Peninsula and in the South China Sea. The main trend is towards engagement, but several factors could impede that process. The United States' relationship with Taiwan and its drive to develop TMD and NMD is likely to exacerbate political and military tensions between Beijing and Washington. Other factors, such as the accidental bombing of the Chinese embassy in Belgrade in 1999, and further weapons transfers to Taiwan, could also increase tensions between China and the United States.

Steady Growth of Military Expenditures

The economic crisis of 1997, which affected most Asian countries, did not reduce the general military trend that Northeast Asia had been witnessing since the end of the Cold War. In contrast to other regions, Northeast Asia has witnessed a steady growth of military expenditures in the 1990s. In fact, Northeast Asian states seem "committed to boosting their military capabilities".

---

59 Huxley and Willett (1999), op. cit., p. 11.
Table 1: Military Expenditures in Northeast Asia, 1989-1998 *

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>9,900</td>
<td>10,800</td>
<td>11,400</td>
<td>13,800</td>
<td>12,700</td>
<td>12,200</td>
<td>12,500</td>
<td>13,700</td>
<td>14,900</td>
<td>16,900</td>
</tr>
<tr>
<td>Japan</td>
<td>47,409</td>
<td>46,984</td>
<td>47,676</td>
<td>48,819</td>
<td>49,377</td>
<td>49,632</td>
<td>50,112</td>
<td>51,095</td>
<td>51,320</td>
<td>51,285</td>
</tr>
<tr>
<td>North Korea</td>
<td>1,871</td>
<td>1,988</td>
<td>2,058</td>
<td>2,112</td>
<td>2,162</td>
<td>2,220</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>South Korea</td>
<td>11,253</td>
<td>11,666</td>
<td>12,638</td>
<td>13,130</td>
<td>13,002</td>
<td>13,625</td>
<td>14,424</td>
<td>15,481</td>
<td>15,564</td>
<td>15,042</td>
</tr>
<tr>
<td>Taiwan</td>
<td>8,886</td>
<td>9,584</td>
<td>9,952</td>
<td>10,023</td>
<td>10,324</td>
<td>9,996</td>
<td>9,858</td>
<td>10,163</td>
<td>10,471</td>
<td>10,620</td>
</tr>
</tbody>
</table>

Source: SIPRI Yearbook 1999

* Figures are in million $US at constant 1995 prices and exchange rates.

The rate of increase in military expenditures in Northeast Asia during the 1990s has been significant and has led many observers to describe it as an arms race. However, a closer examination using Horn’s criteria suggests that the situation in Northeast Asia constitutes an arms competition rather than an arms race.

Table 2: Rates of Increase in Military Expenditures in Northeast Asia, 1989-1998

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>+ 28 %</td>
<td>+ 39 %</td>
</tr>
<tr>
<td>Japan</td>
<td>+ 4 %</td>
<td>+ 3 %</td>
</tr>
<tr>
<td>North Korea</td>
<td>+ 2 %</td>
<td>n.a.</td>
</tr>
<tr>
<td>South Korea</td>
<td>+ 16 %</td>
<td>+ 10 %</td>
</tr>
<tr>
<td>Taiwan</td>
<td>+ 16 %</td>
<td>+ 6 %</td>
</tr>
</tbody>
</table>

Source: Modified from SIPRI Yearbook 1999

When dividing the time period in two halves, it becomes clear that China is the only Northeast Asian state meeting Horn’s criteria. The other four states in the region do not

---

60 See for example: Bracken (1999), op. cit.
meet Horn's criteria. The rates of increase in military expenditures in Japan and North Korea are clearly not rapid enough to be considered above baseline average (first criterion), and that of South Korea and Taiwan are slowing down in the second half of the time period (second criterion). Hence, based on Horn's criteria, Northeast Asia has not witnessed an arms race during the 1990s. However, the region has witnessed significant political and military tensions, and most arms acquisitions are justified by the defense posture of each state in relations to their regional adversaries. Thus, arms competition seems to be the most appropriate term to characterize the situation in Northeast Asia.

Some critics might argue that Northeast Asian states are simply modernizing their armed forces. In fact, a large part of their military expenditure is undeniably directed towards the upgrading and replacement of their military equipment. But states are also developing "new capabilities which go far beyond simple modernization". During the last decade, Northeast Asian states have particularly improved their naval and air force capabilities. But the most destabilizing military development in Northeast Asia has undeniably been in the area of ballistic missiles. In fact, ballistic missiles are at the core of the Northeast Asian arms competition. As China and North Korea improved their ballistic missile arsenal by developing new capabilities, such as longer-range missiles and better guidance systems, and deploying more SRBMs and MRBMs, they increased regional tensions and stepped up the arms competition spiral.

---

61 Huxley and Willet (1999), op. cit., p. 11.
62 See for example: Meconis and Wallace (2000), op. cit.
Ballistic Missiles during the Cold War

With the notable exception of China, there were few ballistic missile developments in Northeast Asia during the Cold War, as most countries in the region focused on the development of their conventional forces. However, China developed a significant MRBM and IRBM arsenal, while North Korea gradually developed and deployed SRBMs. To a lesser degree, South Korea and Taiwan also developed ballistic missile technology during the Cold War era.

China

In the 1960s, as China’s focused on its adversarial relationship with the United States, it benefited from Soviet technological help and arms transfers. China was the first Asian state to introduce ballistic missiles to the region in 1966 when it deployed the DF-2, a MRBM with a range of 1,250 km and a payload of 1,500 kg. This missile was little more than a slightly modified version of the Soviet SS-3 missile. The Soviet Union also helped China to develop its DF-3 missile, China’s first IRBM, with a range of 2,800 km and a payload of 2,150 kg, which was deployed in 1971.63

The political éloignement between Beijing and Moscow at the turn of the 1970s and Mao’s emphasis on manpower rather than technology, slowed down the Chinese ballistic missile programs. No new missiles were deployed until the turn of the 1980s, when China introduced another IRBM, the DF-4 missile, with a range of 4,800 km and a payload of 2,200 kg. At the same time, the PRC introduced its first ICBM, the DF-5 missile, with a

---

63 For more details, see the Federation of American Scientists’ web site, at www.fas.org
range of 13,000 km and a payload of 3,200 kg. Finally, in the mid-1980s, after years of development, China deployed its first submarine-launched ballistic missile (SLBM), the J-1 (Julang-1), with a range of 1,700 km but a payload of only 600 kg.\textsuperscript{64}

Table 3: Chinese Ballistic Missile Capabilities in the 1980s

<table>
<thead>
<tr>
<th>Designation</th>
<th>Year Deployed</th>
<th>Number Deployed</th>
<th>Range (km)</th>
<th>Payload (kg)</th>
<th>CEP (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF-2</td>
<td>1966</td>
<td>50</td>
<td>1,250</td>
<td>1,500</td>
<td>2,000</td>
</tr>
<tr>
<td>DF-3</td>
<td>1971</td>
<td>60</td>
<td>2,800</td>
<td>2,150</td>
<td>1,000</td>
</tr>
<tr>
<td>DF-4</td>
<td>1980</td>
<td>4</td>
<td>4,800</td>
<td>2,200</td>
<td>1,400</td>
</tr>
<tr>
<td>DF-5</td>
<td>1981</td>
<td>2</td>
<td>13,000</td>
<td>3,200</td>
<td>1,000</td>
</tr>
<tr>
<td>J-1</td>
<td>1986</td>
<td>12</td>
<td>1,700</td>
<td>600</td>
<td>300</td>
</tr>
</tbody>
</table>

Sources: Modified from the Bulletin of Atomic Scientists; the Federation of American Scientists; and the University of Lancaster's Center for Defense and International Security Studies-CDISS.

Although China possessed the largest ballistic missiles arsenal in Northeast Asia, deploying just over 120 missiles, the Chinese arsenal had many shortcomings. First, the inaccuracy of the PRC's missiles was a significant problem during the Cold War period. In fact, only the J-1 SLBM had a CEP (circular error probability) of less than a thousand meters.\textsuperscript{65} This constituted a particular problem for the DF-2 MRBM, which could have hit anywhere within two kilometers of its target. Secondly, China's IRBM and ICBM capabilities were extremely limited, deploying only four DF-4 IRBMs and two DF-5 ICBMs. Finally, China deployed its only submarine capable of launching the J-1 SLBMs in

\textsuperscript{64} For more details, see the Federation of American Scientists at \url{www.fas.org}, or the University of Lancaster's Center for Defense and International Security Studies database, at \url{www.cdiss.org}

\textsuperscript{65} The CEP is the area within which a ballistic missile lands at least 50 percent of the time. In other words, if ten missiles with a CEP of 1,000 meters were launched at a target, a minimum of five missiles would be expected to land within one kilometer of their target.
1988, but the multiple problems of that submarine have cast doubts over its degree of maintenance, its reliability and its actual capacity to launch missiles.\textsuperscript{66}

\textit{North Korea}

The North Korean ballistic missile programs started in the aftermath of the Korean War and benefited from Soviet cooperation as a counterweight to the American presence in South Korea. However, the Soviet technological cooperation did not last and relations between Pyongyang and Moscow soured in the late 1960s. As a result, North Korea developed closer ties with China, which eventually included collaboration of missile development programs, notably on the DF-61 SRBM program (which was later abandoned). The missile cooperation with China did not produce any significant result, and at the turn of the 1980s, North Korea engaged in the indigenous development of ballistic missiles.\textsuperscript{67}

\begin{center}
\begin{tabular}{|c|c|c|c|c|c|}
\hline
Designation & Year Deployed & Number Deployed & Range (km) & Payload (kg) & CEP (meters) \\
\hline
Scud-B & 1981 & <20 & 300 & 1,000 & 500 \\
Scud-C & 1984 & <100 & 500 & 1,000 & 500 \\
\hline
\end{tabular}
\end{center}

\textbf{Table 4 : North Korean Ballistic Missile Capabilities in the 1980s}

Sources: Modified from the Federation of American Scientists; and the University of Lancaster’s Center for Defense and International Security Studies-CDISS.

\textsuperscript{66} For more details, see the Federation of American Scientists’ web site, at www.fas.org
\textsuperscript{67} For a detailed history of the North Korean ballistic missile programs, see Joseph S. Bermudez Jr., \textit{A History of Ballistic Missile Development in the DPRK} (Monterey: Center for Nonproliferation Studies, Occasional Paper No. 2, November 1999).
In 1981, the North Korean program produced its first ballistic missile. The Scud-B SRBM (also designated Hwasong-5) was probably an exact copy of the Soviet R-17E. It had a range of 300 km and a payload of 1,000 kg. Produced primarily for exportation, it was only deployed in limited number. The second North Korean SRBM, the Scud-C (also designated Hwasong-6) was produced and deployed in larger numbers in the mid-1980s. With a range of 500 km, a payload of about 800 kg and a CEP of less than 100 meters, the Scud-C was (and remains) the bulk of the North Korean ballistic missile arsenal. However, despite the fact that Scuds SRBMs could target Seoul and part of South Korea, North Korea's ballistic missile capabilities remained very limited during the Cold War period.

_South Korea and Taiwan_

During the 1970s, both South Korea and Taiwan considered developing ballistic missiles. However, political pressures from the United States prevented South Korea and Taiwan from formally deploying ballistic missiles on their territory. Nevertheless, South Korea and Taiwan were allowed to maintain research programs and perhaps to produce missiles without deployment, under the condition that they respect a certain maximum range. For political reasons with regards to China, the United States did not allow South Korea to develop ballistic missiles with a range exceeding 180 km, preventing it from reaching Chinese territory over the Yalu River. Similarly, Taiwan could not develop ballistic missiles with a range greater than the 130 km separating the island from the mainland.

---

68 For more details, see the Federation of American Scientists’ web site, at www.fas.org
Table 5: South Korean and Taiwanese Ballistic Missile Capabilities in the 1980s

<table>
<thead>
<tr>
<th>Country</th>
<th>Designation</th>
<th>Year Developed</th>
<th>Range (km)</th>
<th>Payload (kg)</th>
<th>CEP (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>Hyonmu</td>
<td>1978</td>
<td>180</td>
<td>300</td>
<td>Unknown</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Ching Feng</td>
<td>1979</td>
<td>130</td>
<td>400</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Sources: Modified from the Federation of American Scientists; and the University of Lancaster’s Center for Defense and International Security Studies-CDISS.

At the turn of the 1980s, South Korea and Taiwan had the capability to produce and deploy SRBMs. In 1978, South Korea was able to reach Pyongyang with its NHK-1 (White Bear) missile, but reportedly refrained from deployment under U.S. pressures. In the 1980s, the program was renamed Hyonmu (NHK-2). One missile was successfully test-fired in 1987 and the Hyonmu SRBM, with an official range of 180 km, was reportedly produced and deployed in small numbers in the late 1980s.69 Similarly, in 1979, Taiwan started limited production of its Ching Feng (Green Bee) SRBM, with an official range of 130 km,70 but stopped production in 1988. In short, the ballistic missiles programs of South Korea and Taiwan designed to serve as deterrent tools in specific circumstances. Their production or deployment remained discrete and only played a secondary role in the region.

70 Generally, a missile with a range under 150 km is simply considered a heavy piece of artillery for battlefield use. However, given the U.S. political pressures surrounding Ching Feng program and the imposition of a maximum range, most experts consider it a SRBM with an unofficial range of up to 300 km. See for example: the Federation of American Scientists’ web site, at www.fas.org.
Ballistic Missiles during the 1990s

During the 1990s, China and North Korea qualitatively and quantitatively improved their ballistic missile arsenals. Both countries developed new missile capabilities and increased the number of their deployed missiles, thus increasing the insecurity of their neighbors.

China

After the end of the Cold War, China focused its political and military attention to its immediate region and started a modernization program in all aspects of its armed forces. The PRC took all 50 DF-2 SRBMs, along with 20 DF-3 IRBMs, out of service in the early 1990s. But, along with the military modernization program, China increased its missile arsenal and developed new ballistic missiles, specifically designed to target Taiwan and other regional rivals.

At the turn of the 1990s, China increased its deployment of IRBMs and ICBMs. It deployed 16 new DF-4 IRBMs and 18 new DF-5 ICBMs. It also doubled the number of J-1 SLBMs.\(^\text{71}\) Moreover, China deployed its newest DF-21 MRBM, with a range of 1,800 km and a payload of 600 kg. With a CEP of 300 to 400 km, the DF-21 also has a better accuracy than the previous generations of Chinese missiles. Finally, and most importantly, China started to deploy large numbers of SRBMs targeted specifically at Taiwan. Since

\(^{71}\) But, as mentioned earlier, China possesses only one submarine capable of launching the J-1 missiles, but its reliability is doubtful. In other words, the increase in the number of J-1 missiles does not increase China's SLBM capabilities since the submarine cannot carry more than 12 missiles and might not even be able to launch them.
1995, China reportedly deployed more than 40 DF-11 SRBMs (also known as M-11) and more than 200 DF-15 SRBMs (also known as M-9), with respective ranges of 300 km and 600 km, payloads of 500 kg, and significantly improved accuracy.\textsuperscript{72}

The missile deployments are perhaps the most visible, but Chinese efforts have also focused on improving guidance systems and developing solid-fuel technology and multiple warheads capabilities.\textsuperscript{73} The accuracy improvements were particularly visible during the DF-15 tests of 1995 and 1996. Paul Bracken describes the "learning curve" of China's missile program as follows:

The 1995 tests were not a success. Of six missiles fired, one had to be destroyed over China because of a guidance malfunction. Two others hit the far outer edge of a predesignated target zone. Intelligence reports suggest that for the three missiles that landed inside the target zone, accuracy was poor. [...] When another test was conducted in March 1996, matters changed considerably. Four missiles were launched at two target areas [...] This time all four missiles landed with near pinpoint accuracy.\textsuperscript{74}

These qualitative improvements are believed to be linked to the increasing military cooperation with between Beijing and Moscow. China's yearly military imports from Russia have grown over the billion $US mark since 1997.\textsuperscript{75} Although most of these arms transfers are not related to ballistic missile technology, some indicators show that China is benefiting from Russian technological expertise. For example, the United States got word


\textsuperscript{73} Bulletin of Atomic Scientists' web site, "China Nuclear Forces", at \url{www.bullatomsci.org/issues/nuknotes/mj99nukenote.html}

\textsuperscript{74} Bracken (1999), op. cit., p. 56.

\textsuperscript{75} Huxley and Willett (1999), op. cit., p. 33.
that Russia was about to sell some SS-18 ICBMs to China in 1995 and successfully pressured the Russian government to stop the trade.\textsuperscript{76} However, Russia and China signed a five-year agreement in 1998 on "further cooperation in arms research, development and production", which probably includes ballistic missile technology.\textsuperscript{77}

### Table 6: Chinese Ballistic Missile Deployments in the 1990s

<table>
<thead>
<tr>
<th>Designation</th>
<th>New Deployment</th>
<th>Total Number Deployed</th>
<th>Range (km)</th>
<th>Payload (kg)</th>
<th>CEP (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF-3</td>
<td>-20</td>
<td>40</td>
<td>2,800</td>
<td>2,150</td>
<td>1,000</td>
</tr>
<tr>
<td>DF-4</td>
<td>16</td>
<td>20</td>
<td>4,800</td>
<td>2,200</td>
<td>1,400</td>
</tr>
<tr>
<td>DF-5</td>
<td>18</td>
<td>20</td>
<td>13,000</td>
<td>3,200</td>
<td>1,000</td>
</tr>
<tr>
<td>DF-11</td>
<td>40+</td>
<td>40+</td>
<td>300</td>
<td>500</td>
<td>200</td>
</tr>
<tr>
<td>DF-15</td>
<td>200+</td>
<td>200+</td>
<td>600</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td>DF-21</td>
<td>48</td>
<td>48</td>
<td>1,800</td>
<td>600</td>
<td>300</td>
</tr>
<tr>
<td>J-1</td>
<td>12</td>
<td>24</td>
<td>1,700</td>
<td>600</td>
<td>300</td>
</tr>
</tbody>
</table>

Sources: Modified from the Bulletin of Atomic Scientists; the Federation of American Scientists; the University of Lancaster's Center for Defense and International Security Studies-CDISS, and The Military Balance 1999-2000, from the International Institute for Strategic Studies-IISS.

This Russian-Chinese military cooperation, "involving perhaps thousands of Russian scientists, engineers and technicians working in the People's Republic"\textsuperscript{78} could greatly assist China in developing new longer-range ballistic missile capabilities. This might particularly be the case for China's new DF-31 ICBM, as it wishes to incorporate technology from the Topol-M, the newest Russian ICBM. Thus, China's SRBM and MRBM arsenal has greatly improved during the 1990s and is likely to become even more

\textsuperscript{76} Ibid, p. 34.
\textsuperscript{77} Ibid, p. 34.
\textsuperscript{78} Ibid, pp. 34-35.
worrisome for its neighbors in the next decade, as China further improves the accuracy of its missiles.

North Korea

In the 1990s, North Korea accelerated its production of Scud missiles and engaged in the development of longer range ballistic missiles. In the aftermath of the Gulf War, where North Korea witnessed the apparent success of Patriot anti-missile systems shooting down Iraqi Scuds, the DPRK engaged in the full-scale production of the Scud-C SRBMs. North Korea reportedly produced an average of four or five Scud-C missiles per month during the decade, for a total of about 1,000 missiles. An estimated 300 to 500 of those missiles were exported abroad, 25 were used for testing, and approximately 300 to 600 were deployed. This increased production and deployment is possibly an attempt to overwhelm potential anti-missile defenses such as the Patriot systems used in the Gulf War.

North Korea also developed longer-range ballistic missiles. The first of these was the No-Dong MRBM test-fired in 1993. With a range of 1,300 km and a payload of 1,200 kg, the No-Dong allows North Korea to target all of South Korea as well as a few major cities in Japan. It is also the first North Korean ballistic missile capable of delivering a nuclear warhead. Production and deployment of the No-Dong missile reportedly began in 1995. It is estimated that North Korea produced approximately 75 to 150 No-Dong MRBMs in the 1990s. An estimated 24 to 50 of these missiles were exported abroad.

79 Bermudez Jr. (1999), op. cit., p. 16.
(notably to Iran and Pakistan), 5 were used in testing, and approximately 50 to 100 were deployed.\(^{80}\)

**Table 7: North Korean Ballistic Missile Deployments in the 1990s**

<table>
<thead>
<tr>
<th>Designation</th>
<th>New Deployment</th>
<th>Total Number Deployed</th>
<th>Range (km)</th>
<th>Payload (kg)</th>
<th>CEP (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scud-C</td>
<td>300 to 600</td>
<td>300 to 600</td>
<td>500</td>
<td>1,000</td>
<td>500</td>
</tr>
<tr>
<td>No-Dong</td>
<td>50 to 100</td>
<td>50 to 100</td>
<td>1,300</td>
<td>1,200</td>
<td>Unknown</td>
</tr>
<tr>
<td>Taepo-Dong(^*)</td>
<td>Tested</td>
<td>0</td>
<td>2,000</td>
<td>1,000</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Sources: Modified from the Bulletin of Atomic Scientists; the Federation of American Scientists; the University of Lancaster’s Center for Defense and International Security Studies-CDISS; and Joseph S. Bermudez Jr. (1999).

* The status of the Taepo-Dong missile remains unclear. North Korea might be producing it for deployment, for export abroad, or as part of its Taepo-Dong-2 research program (which would be a three-stage missile).

Finally, the newest North Korean missile, the Taepo-Dong MRBM was spectacularly test-fired on August 31\(^{st}\) 1998. This surprise test not only flew over northern Japan, but it demonstrated that North Korea could master three-stage technology, satellite-launching capabilities, and eventually ICBM capabilities.\(^{81}\) It remains to be seen if North Korea will deploy the Taepo-Dong or continue the development of longer-range missiles. If deployed, the Taepo-Dong would have an estimated range of 2,000 km and a payload of 1,000 kg. It would be capable of carrying a nuclear warhead to a sufficient distance to reach all of Japan’s territory as well as the U.S. military bases in Northeast Asia.\(^{82}\) Thus, North Korea seems capable of continuing its ballistic missile programs and eventually developing longer-range missiles.

\(^{80}\) Ibid, p. 23.
\(^{81}\) Ibid, p. 31.
\(^{82}\) Ibid, pp. 29-31; and Federation of American Scientists.
However, in the last months, Pyongyang has shown its willingness to negotiate the halt of its missile programs. In September 1999, in an agreement with the United States, North Korea agreed not to test anymore missiles in exchange for the lifting of the U.S. economic sanctions. More recently, in July 2000, during the visit of the Russian President Vladimir Putin in North Korea, the DPRK offered to cease its ballistic missile research in exchange for space technology. These events, combined with the positive aftermath of the June 2000 Korean Summit between the leaders of the North and South, show that arms control negotiations with regards to the DPRK's ballistic missiles might be possible in the near future. Meanwhile, the North Korean arsenal is still perceived as a threat for the American military bases and allies in Northeast Asia.

**Theater Missile Defense (TMD)**

Certain technical considerations need to be explained before discussing the TMD developments in Northeast Asia. A distinction must be made between upper-tier and lower-tier TMD systems. Upper-tier systems are designed to intercept ballistic missiles at an altitude of at least 40 km. Some upper-tier systems can also be exoatmospheric, which means that they can hit a target at more than 100 km of altitude. Lower-tier systems, on the other hand, are designed to intercept ballistic missiles at an altitude of less than 40 km. Lower-tier TMD systems, also called low velocity systems, have a relatively short range.

---

83 NAPSNet Special Report, "Berlin: What have we learned and where do we go from here?", *Nautilus Institute Policy Forum #99-07* (September 17, 1999).
84 NAPSNet Daily Report, "Russia-DRPK Missile Talk", *Nautilus Institute* (July 20, 2000).
and interceptors that do not exceed a speed of 3 km/s. However, the upper-tier TMD systems currently under development, also called high velocity systems, will have a longer range and interceptors capable of reaching a maximum speed of 5 km/s. In short, lower-tier TMD systems are too slow to intercept anything but SRBMs, and upper-tier TMD systems are being designed to shoot down MRBMs and IRBMs, and would not have sufficient speed to intercept an ICBM traveling at its average speed of 7 km/s.\footnote{Intercepting ICBMs would be the purpose of Strategic Missile Defense systems, such as the current National Missile Defense system (NMD) currently under development in the United States.}

The idea of missile defense is not new. The concept of strategic missile defense dates back to the late 1960s, but was officially put aside with the signing of the 1972 ABM Treaty by the United States and the Soviet Union. Both superpowers agreed that the stability of their arms competition (i.e. their assured second strike capabilities) required mutual vulnerability to ballistic missiles. Hence, because overconfidence in an anti-missile system could have led to more aggressive behaviors, or to a preemptive strike from its rival, both superpowers agreed not to further challenge each other by developing anti-missile systems. However, the idea resurfaced in the 1980s with the Strategic Defense Initiative (SDI) put forth by U.S. President Ronald Reagan. During the 1990s, the remnants of the SDI concept and the apparent success of the Patriot anti-missile system during the 1991 Gulf War paved the way towards the development of TMD in Northeast Asia and National Missile Defense in the United States.

\footnote{For more technical information, see for example: the U.S. Ballistic Missile Defense Organization's web site, at \texttt{www.acp.osd.mil/bmdo/bmdolink}}
Lower-tier TMD systems (Patriot Advance Capability—PAC-2) are already deployed in Japan, South Korea and Taiwan, and are reportedly able to defend a small area against SRBMs launched from China or North Korea.\(^\text{87}\) In the mid-1990s, as a direct response to the Chinese build-up of DF-11 and DF-15 missiles, Taiwan acquired and deployed 3 PAC-2 systems and 200 interceptors.\(^\text{88}\) Likewise, around the same time, Japan acquired and deployed about 30 PAC-2 systems while South Korea deployed a small number of PAC-2 systems. In 1999, Taiwan also ordered 6 PAC-3 systems, the newest generation of Patriot missiles, still under development in the United States.

However, these deployments of anti-missile systems in Japan, South Korea and Taiwan do not significantly increase their capabilities to defend their territories against ballistic missiles. Taiwan’s defensive capabilities are slightly increased by the deployment of Patriot systems, but its 3 PAC-2 launchers could be easily overwhelmed by large quantities of Chinese SRBMs. Similarly, South Korea’s PAC-2 deployments increase its defensive capabilities against North Korean Scuds, but do very little to defend the northern path of the country (including Seoul), which is within reach of the DPRK’s heavy artillery. Finally, lower-tier TMD deployments do not increase Japan’s capabilities because they cannot intercept the MRBMs and IRBMs that China or North Korea would have to launch in order to reach Japan’s territory.

\(^{87}\) The capacity of Patriot systems to intercept SRBMs remains contested and controversial. See for example: the Federation of American Scientists subsection of missile defense, at \url{www.fas.org/spp/starwars/docops/operate.htm}

\(^{88}\) See for example the Monterey Institute for International Studies’ Center for Nonproliferation Studies’ website, at \url{www.cns.miis.edu}
The Race for Upper-Tier TMD

The United States has been interested in developing upper-tier TMD systems since the early 1990s, but until the North Korean Taepo-Dong test of August 1998, U.S. allies in Northeast Asia remained skeptical about the merits of such systems. However, since then, the development of these systems has received considerably more attention in the region. Two upper-tier systems are currently under development.

The first upper-tier system currently under development is the Theater High Altitude Air Defense system (THAAD). This land-based system, currently developed by the U.S. Army, is designed to intercept ballistic missiles at an altitude of 40 to 150 km, with an interceptor velocity of 2.5 km/s.\(^{89}\) The system is designed to defend areas "several hundred kilometers in diameter".\(^{90}\) THAAD is the most mature upper-tier TMD system. The two latest flight tests were successful, but the THAAD system has failed several of the previous tests and its feasibility remains doubtful for the foreseeable future.\(^{91}\)

The second upper-tier TMD system currently under development is the sea-based Navy Theater Wide system (NTW). At the moment, this system is being developed by the United States, but Japan, which is studying its TMD options, is likely to collaborate with

\(^{89}\) Wilkening (2000), op. cit., p. 47.
\(^{90}\) Ibid, p. 47.
\(^{91}\) Ibid, p. 47.
the U.S. for the development of NTW systems. Launched vertically from Aegis cruisers and destroyers, the NTW exoatmospheric interceptors would reportedly have a maximum speed of 5 km/s. Combined with advanced radar technology and infra-red tracking sensors, NTW systems would allow a single ship to defend an area of up to 2,000 km in diameter against MRBMs and IRBMs. Because of the attractiveness of a sea-based missile defense system, and also because Japan and the United States already deploy Aegis destroyers (and cruisers in case of the U.S.), the NTW system seems to be the most promising upper-tier TMD idea. However, it remains in the preliminary stages of development and has not been tested yet.

Japan’s interest for upper-tier missile defense systems, specifically for the NTW system, has grown steadily since the test firing of a North Korean No-Dong in 1993, and particularly since the Taepo-Dong test of August 1998. Japan’s geographic position vis-à-vis both North Korea and China, makes it the "text-book example of the possible utility of sea-based defenses". Moreover, Japan already possesses certain components of an effective TMD structure, such as Airborne Warning and Control Systems (AWACS) and Aegis destroyers. Hence, Japan could decide to collaborate with the United States for the development of the NTW upper-tier TMD systems.

94 Stocker (1999), op. cit., p. 61.
95 Ibid, p. 79.
Contrary to Japan, South Korea remains uncommitted to the idea of upper-tier TMD. Due to its geographical location, South Korea's most important missile threat comes from Pyongyang's Scud-C SRBMs and not from MRBMs or IRBMs. Thus, South Korea has little military need for upper-tier TMD systems. Seoul is likely to be more interested in acquiring more lower-tier systems, such as PAC-2 or PAC-3, rather than upper-tier systems. In fact, the South Korean government has expressed "decided disinterest in participating in the US-led TMD initiative in the region". This kind of statement is politically motivated, as South Korea tries to strengthen its diplomatic and economic relations with China. The recent improvement in North-South relations might also motivate Seoul’s disinterest in upper-tier TMD systems. However, when upper-tier TMD systems will be introduced to Northeast Asia in the next decade, Seoul will likely have no choice but to accept either a THAAD deployment on its territory or de facto inclusion under a NTW area of coverage, if the United States deploys such systems to protect their military bases in South Korea.

But the most controversial upper-tier TMD deployment would undoubtedly be on Taiwan. The Taiwanese government actively supports any kind of system that could enhance Taiwan's defensive stance against Mainland China. For instance, Taipei has already expressed an interest in acquiring Aegis destroyers from the United States, thus signaling its clear interest in sea-based upper-tier TMD systems. However, the inclusion of Taiwan under the protective radius of sea-based upper-tier TMD systems would not require any new arms transfers to Taiwan. Indeed, positioning one or two American (or

---

96 NAPSNet Special Report (September 17, 1999), op. cit.
even Japanese) Aegis destroyers equipped with NTW systems in the Taiwan Strait would implicitly put Taiwan under a TMD umbrella.

The Idea of Boost-Phase Missile Defense

The idea of boost-phase interceptors has been presented as another way to defend U.S. military bases and allies in Northeast Asia against potential ballistic missiles launches, and could potentially be developed instead of, or to complement, upper-tier TMD systems. Such a defense would target ballistic missiles in their booster stage (while they are still gaining altitude), rather than their warheads. Boost-phase interceptors would have several advantages. As Dean A. Wilkening points out:

Boost-phase ballistic missile defence is attractive because rocket boosters are easy to detect and track; they are more vulnerable and, hence, easier to destroy than warheads; determining that the defence has destroyed a booster is easier than it is for a warhead; and the entire payload (warhead and penetration aids) can be destroyed in a single shot. Moreover, if intercepted several seconds before the booster burns out, the debris will fall short of the target area, potentially avoiding collateral damage to friendly territory. [...] Finally, countermeasures against boost-phase defence, such as fast-burn boosters and booster decoys, are difficult to build.\(^98\)

However, boost-phase missile defense would rely on airborne interceptors and highly sophisticated airborne laser systems, which do not exist yet and would be very costly to develop and maintain.\(^99\) Such systems might also require space-based lasers, which are currently prohibited by international treaties such as the 1967 Outer Space Treaty signed and ratified by over 90 countries and the 1972 ABM Treaty between the United States and the Soviet Union. Most importantly, boost-phase interceptors would also race against time.

\(^99\) Ibid, p. 65.
SRBMs and MRBMs have booster times ranging between 70 and 150 seconds, depending on their range and design. Hence, for a boost-phase defense system to be successful, it would have to detect the launch, identify the target as threatening, accurately track its position and heading, and launch the interceptors in about half that time. Thus, these technological requirements seriously impede the feasibility of boost-phase missile defense systems.

*The Feasibility Debate*

Proponents of TMD deployment in Northeast Asia not only downplay the political and military impact it would have on regional stability, but seem overwhelmingly confident that TMD systems will actually work. However, given the multiple technological and strategic challenges, it is hard to believe that any anti-missile system would ever offer one hundred percent protection against any kind of ballistic missiles. Even if hundreds of TMD systems are deployed on a particular territory or on surface ships, several "hit-to-kill" interceptors might be required to increase the odds of shooting down a single incoming ballistic missile.

The first, and most significant difficulty that any TMD system will have to confront, is the short time of reaction. Interceptors must be fired a very short time after the ballistic missile's launch time or they will likely miss their target. In fact, a Chinese SRBM or a North Korean MRBM would only take a few minutes to reach Taiwan or Japan. In such

---

100 Ibid, p. 61.
circumstances, time is a luxury TMD systems do not have. The interceptors would not get second chances.

Another important difficulty of TMD systems is the risk of leaking (letting some missiles pass through the TMD shield). The supporters of TMD argue that a "layered approach" (combining upper-tier and lower-tier TMD over the same territory) would eliminate most of the risk of leaking.\textsuperscript{102} However, a single successful intercept will require the flawless interaction of all the components of a TMD system. Everything from the launch-detection satellites, speed and trajectory calculations, radars and guidance systems, to the interceptors themselves, would have to work perfectly against each ballistic missile launched. This feasibility of this system of systems has yet to be demonstrated and is unlikely to ever be guaranteed.

Even assuming that TMD systems can work, quantity is another significant challenge for any kind of defense system. In fact, flooding a TMD system with more ballistic missiles than it can handle will likely be the strategy of choice against TMD. This is clearly the strategy adopted by China against Taiwan' PAC-2 systems. As a result, Taiwan's TMD systems are now defending against over 200 Chinese SRBMs (DF-11s and DF-15s), each capable of delivering a conventional or small nuclear warhead anywhere in Taiwan.

\textsuperscript{102} See for example: Stocker (1999), p. 57.
Finally, while increasing their ballistic missile arsenals to overwhelm TMD systems, states can also develop counter-measures to increase the chance of survival of their warheads. For instance, states can increase the speed of their ballistic missiles, design them to spiral in a path difficult for the defender to hit, or equip their missiles with decoys to distract potential interceptors.\textsuperscript{103} Such counter-measures would require research and effort, but would undoubtedly be cheaper than the costs of developing upper-tier TMD.\textsuperscript{104} Thus, in light of all these difficulties, the feasibility of TMD systems is doubtful.

\textit{TMD Politics}

Traditionally, deterrence refers to the "measures taken to generate a credible prospect of punishment for an action, or denial of its objectives, or of costs exceeding its benefits".\textsuperscript{105} Following this line of thought, the United States and the Soviet Union engaged in a tit-for-tat ballistic missiles and nuclear weapons race during the Cold War. It was believed that deterrence by mutual vulnerability would keep this offense-versus-offense standoff stable and prevent a war.\textsuperscript{106} According to this logic, Japan, South Korea and Taiwan, which all have sufficient technological know-how, should develop ballistic missiles to respond to China and North Korea with a deterrent force of their own. Instead, they have chosen to acquire lower-tier TMD and develop upper-tier technology, while remaining under the U.S. nuclear umbrella.

\textsuperscript{103} Bracken (1998), op. cit., pp. 85-93.
\textsuperscript{104} Ibid, pp. 85-93.
The development of missile-defense systems is also a political issue in the United States. In fact, the two major political parties in the United States clearly indicate a desire to move towards the deployment of TMD systems (upper-tier or boost-phase) to defend U.S. troops abroad and NMD systems to defend the U.S. territory. As a result, South Korea and Japan may have no choice but to accept the deployment of TMD systems to protect U.S. military bases on their territory.

*The Ripple Effect of TMD in the Region*

The development and eventual deployment of upper-tier TMD in Northeast Asia will undoubtedly have consequences on the whole region. The introduction of such systems will jeopardize the deterrence capabilities of North Korea and China, which have both indicated their strong disagreement with the TMD initiative. Most importantly, such deployments could transform the current arms competition into a ballistic missiles and TMD arms race.

Although TMD does not affect the DPRK-ROK balance of power, North Korea believes that the deployment of upper-tier TMD in Northeast Asia would have a negative impact on regional diplomatic and military relations, triggering the development of more missiles and counter-measures.\(^{107}\) North Korea claims that TMD is an American "ploy to take a military upper hand in the region and use it to attack the North".\(^{108}\) As a result, North Korean relations with Japan and South Korea, already tense since August 1998, could

---


deteriorate if TMD systems are deployed. For instance, North Korea might break away from the 1994 Agreed Framework and restart its nuclear weapons program. It could also be tempted to break away from the 1999 Berlin Agreement and resume development of longer-range ballistic missiles. Thus, despite its limited resources, North Korea appears committed to maintaining its deterrence and intimidation capabilities, two elements it feels would be threatened by the deployment of upper-tier TMD systems in Northeast Asia.

China has been extremely vocal about its opposition to the deployment of TMD systems in the region. Chinese concerns over TMD focus on four aspects. First, Beijing sees the future deployment of upper-tier TMD systems as an attempt by the United States to strengthen its military position in Northeast Asia and to contain China by tightening its military relations with South Korea, Japan and Taiwan. Because China possesses only a small number of ICBMs, its deterrence strategy against the United States relies mostly on targeting U.S. allies in Northeast Asia. Hence, Beijing worries that the deployment of upper-tier TMD systems in Northeast Asia, combined with the deployment of NMD systems in the United States, would "erode the credibility and effectiveness of [China's] nuclear forces and undermine their contribution to deterrence".  

Secondly, China is deeply worried by the possibility that Taiwan be included under a layered anti-missile defense (upper-tier and lower-tier TMD). China's worst fear is that an explicit deployment of upper-tier TMD systems to defend Taiwan's territory, either a

---

ground-based system such as THAAD or a sea-based system such as NTW, would create an incentive for Taiwanese independence. These fears have apparently intensified since the election of Chen Shui-bian as Taiwanese President in March 2000. In short, the possible inclusion of Taiwan under the TMD initiative is a key issue for Beijing and could have serious repercussions on China's regional military posture. The deployment of lower-tier TMD systems in Taiwan has already triggered massive Chinese SRBM deployments targeted at Taiwan. The deployment of upper-tier TMD systems to defend Taiwan against Chinese MRBMs would undeniably generate more tensions within an already worrisome regional rivalry.

Thirdly, China worries that upper-tier TMD research and development might give Japan an incentive for re-militarization. China is particularly concerned by the growing technological and military rapprochement between Japan and the United States. This potential collaboration could reach beyond the scope of anti-missile research and notably include C³I systems (Command, Control, Communication and Intelligence). Thus, Beijing fears that a Japanese upper-tier TMD deployment and an improvement of its C³I capabilities could serve as an impetus to build a "conventional" military force with greater power projection capabilities. Japan already possesses a sophisticated space program. Because the technology required to launch a satellite is very similar to that of ballistic missiles, Japan could easily develop its own ballistic missile arsenal. Similarly, Japan could

---

modify its coastal defense and air defense forces into a power-projection mode, even without the benefits of the U.S.-Japan TMD cooperation. However, Japan's military posture is limited by its constitution and by the nature of its alliance with the United States, two important elements which are likely to preclude a Japanese remilitarization. Nevertheless, the Chinese argument shows Beijing's fear of regional containment.

Finally, China has repeatedly indicated that U.S.-China, China-Japan, and U.S.-North Korea relations would be negatively affected by the deployment of upper-tier TMD systems in Northeast Asia. China believes that the deployment of upper-tier TMD in Northeast Asia and NMD in the United States would violate the 1972 ABM Treaty, signed by the United States and the Soviet Union, and derail thirty years of international arms control and disarmament efforts. As a result, China could abandon its commitment to the Comprehensive Nuclear Test Ban Treaty (CTBT) in order to develop new warheads and new delivery systems such as MIRV technology (Multiple Independently-targeted Re-entry Vehicles), which would probably require new rounds of nuclear testing.

---

112 China also fears a potential agreement between the United States and Russia, which would allow the U.S. to amend the ABM Treaty (and deploy upper-tier TMD and NMD systems) and Russia to amend the START Treaties (and deploy limited MIRVs on their newest Topol-M ICBMs).

113 Christensen, (1999), op. cit., p. 79.
CHAPTER FOUR

NORTHEAST ASIA : A NEW TYPE OF ARMS COMPETITION

Ballistic Missiles and Missile Defense : Destabilizing Weapons

At the dawn of the 21st century, the most destabilizing military issue facing Northeast Asia revolves around ballistic missiles. North Korea's development of longer-range missiles and the massive Chinese deployment of SRBMs specifically targeted at Taiwan have triggered a response that could further destabilize the region. States continue to perfect every aspect of their armed forces and often compete in other areas, such as naval or air power. But the current competition between ballistic missiles and TMD is the primary arms competition in Northeast Asia.

A New Type of Arms Competition

The arms competition in Northeast reveals particular characteristics. The region is still witnessing political and military tensions, which have been oscillating between high and extreme degrees for more than a half century. The situation is such that every Northeast Asian state has at least one regional rival. Moreover, the Northeast Asian arms competition seems to be driven primarily by political concerns rather than military needs, and opposes two distinct generations of weapons. Ballistic missile technology, although complex, remains rather low-tech compared to the TMD systems that are currently under
development. Hence, Northeast Asia is currently witnessing a unique form of arms competition. Six particular elements need to be underlined in order to characterize this new type of arms competition.

**Political Impulse**

Military logic, or at least classical deterrence theory, prescribes answering an offensive threat with offensive weapons, hence a ballistic missile threat by deploying ballistic missiles. This tit-for-tat logic, however, does not characterize the arms competition in Northeast Asia. Instead, military competitiveness seems to be politically driven.

North Korea perceives itself to be surrounded and threatened by three nuclear powers (Russia, China and the United States). Consequently, the rationale behind North Korea's missile programs could be to target American bases and allies indirectly involved in the North-South rivalry. However, DPRK missile deployments mostly ensure Pyongyang that the world, or at least the region, will care about the small Stalinist country. Although this attention might have negative impacts for North Korea (i.e. American economic sanctions since 1994), it can also lead to diplomatic rapprochements with major powers (i.e. official visits from Chinese President Jiang Zemin and Russian President Vladimir Putin in 2000).

---

114 Ballistic missile technology dates back to the German V-2 rockets launched against Great Britain in 1944. The technology of a basic one-stage is well-known and there are currently 30 countries deploying SRBMs or longer-range missiles. On the other hand, most of the technology required for the development of upper-tier TMD systems and boost-phase interceptors does not exist and will be considerably more sophisticated than the technology used in ballistic missiles (i.e. satellite-based sensors, laser systems, etc.). For more details, see Wilkening (2000), op. cit.
The cross-Strait dispute has been fueling China’s drive to develop and deploy SRBMs since the end of the Cold War. Beijing’s obsession with the perceived threat of Taiwanese nationalism undeniably triggered the DF-15 and DF-11 programs during the early 1990s and their massive deployment since 1994-95. Moreover, the decision to increase the number of deployed SRBMs in recent years can be directly linked to Taiwan’s Patriot missiles (PAC-2) acquisitions. Furthermore, China’s political rhetoric towards the renegade province continues to drive the Beijing-Taipei arms competition.

Finally, the decision to answer the ballistic missile threat by developing highly sophisticated and unproved anti-missile systems follows politics rather than deterrence theory. As mentioned earlier, Japan, South Korea and Taiwan have sufficient technological capabilities to develop their own ballistic missiles and even nuclear weapons. They could easily follow classical military strategy and build their own deterrent force. However, due to the nature of their relations with the United States (extended deterrence and nuclear umbrella), the ballistic missile option has been either blocked (Japan) or tightly restricted (South Korea and Taiwan). Thus, the development of upper-tier TMD systems in the region can be linked to the domestic political context within the United States and to the nature of its diplomatic relations with Japan, South Korea, and Taiwan.

Against Traditional Deterrence Theory

By developing highly sophisticated anti-missile systems rather than their own missile arsenal, states facing ballistic missiles threats are going against the traditional logic of deterrence based on mutual vulnerability. The development and eventual deployment of
this defensive technology increases the insecurity of China and North Korea, and will likely trigger more missile deployments in an attempt to overwhelm eventual TMD systems with more missiles than they can handle. Thus, the development of TMD systems risk stepping up the arms competition in Northeast Asia and might trigger a ballistic missile versus TMD arms race.

Beyond Fiscal Indices

Looking solely at the levels of military expenditures is not sufficient to understand this new kind of arms competition. As mentioned earlier, fiscal indices face serious reliability and validity issues. This is particularly the case in Northeast Asia because of the difficulty to accurately measure the military expenditures of China and North Korea. Even assuming that fiscal estimates are accurate, it is impossible to determine the exact amount spent on ballistic missile or anti-missile programs.

Moreover, as Charles A. Meconis and Michael D. Wallace explain, the development of modern weapons requires massive investments well in advance of the expected improvement in capabilities.\(^{115}\) This is particularly the case in the Northeast Asian arms competition. The United States and Japan are spending large amounts to develop TMD systems, but have not yet deployed any upper-tier TMD system. On the other hand, China is spending a significant amount to develop SRBMs and continues to increase its number of deployed missiles. Hence, a simple comparison of military expenditures would not allow this important distinction.

Uneven Levels of Technology

Traditionally arms races have had similar technologic bases. Arms competitions were focused around the quantitative and qualitative development of the same category of arms. In contrast, the current arms competition in Northeast Asia is opposing two distinct generations of weapons. Instead of balancing the ballistic missile deployments by China and North Korea with the same type of armament, Japan, South Korea and Taiwan are responding by developing highly sophisticated anti-missile systems. Hence, the presence of uneven levels of technology within the Northeast Asian arms competition is a new phenomenon.

Offensive versus Defensive Systems

The traditional methods of measuring arms competitions would also fail to appreciate the offense-defense dimension of the arms competition in Northeast Asia. Despite some gray areas, notably that the technological knowledge required to build hit-to-kill interceptors could also be applied to enhance ballistic missile capabilities, the gap between purely offensive ballistic missiles and defensive anti-missiles cannot be ignored. China and North Korea are developing and deploying purely offensive weapons (ballistic missiles), while Japan, South Korea and Taiwan are likely to deploy the defensive systems (upper-tier TMD or boost-phase interceptors) currently under development in the United States. Hence, Northeast Asia is witnessing an offensive-versus-defensive arms competition rather than a traditional offensive-versus-offensive competition.
Third Party Influence

The Northeast Asian arms competition reverts another new characteristic. As mentioned previously, the literature on arms races ignores third party influence. Extra-regional suppliers play a significant role in the Northeast Asian arms competition. The fact that Japan, South Korea, and to a certain extent Taiwan, are United States allies undeniably influence the security balance in the region. Not only do the United States act as a third party supplier, but it also provides extended deterrence coverage for its allies in Northeast Asia. Moreover, the prospect of greater military and technological cooperation between the United States and Japan has to be taken into account when assessing Japan’s actions in the Northeast Asian regional arms competition. Similarly, China’s increasing military relations with Russia also has to be examined.

Consequences for Regional Security in Northeast Asia

The ongoing arms competition in Northeast Asia is not without consequences for the security and stability of the region. The development and deployment of more ballistic missiles in China and North Korea during the 1990s already increased regional tensions. Still, the development of upper-tier TMD systems, which would offer national missile shields for Japan, South Korea and probably Taiwan, will have a significant impact on the regional balance of power, and is likely to further increase political and military tensions in Northeast Asia.

Despite the fact that the actual feasibility of missile defense remains questionable, the possibility that it will spark a new round of regional tensions is real. China is already
increasing the number of SRBMs targeting Taiwan and will undoubtedly increase that number even more if TMD systems are deployed.\textsuperscript{116} As a result, tensions in Northeast Asia are likely to rise significantly after the introduction of upper-tier TMD systems in the region, particularly if such systems defend Taiwan.

Moreover, the pace of the regional arms competition is likely to increase during the next decade. China is worried that the introduction of upper-tier TMD systems would decrease its regional deterrence capabilities by denying the credibility of its ballistic missile arsenal, particularly vis-à-vis Taiwan.\textsuperscript{117} Because it only deploys 20 ICBMs capable of reaching the United States, China’s strategic deterrent relies mostly on targeting American bases and allies in Northeast Asia. Hence, the deployment of lower-tier and upper-tier TMD systems in Northeast Asia, combined with the deployment of NMD systems in the United States, would considerably increase China’s perception of insecurity.

Greater insecurity leads to greater risks of conflict. If a state feels insecure and sees its deterrent capabilities decrease, it is likely to act nervously and overemphasize the threat in periods of crises. In such situations, strategic calculations might prescribe a first-strike or a preemptive attack in order to regain an edge over its potential adversaries. This obviously generates a tense climate.

\textsuperscript{116} Speed, (1999), op. cit., p. 21.
\textsuperscript{117} Cambone, (1997), op. cit., p. 72.
Besides the deployment of TMD systems and more ballistic missiles, the Northeast Asian arms competition is likely to witness the development of TMD countermeasures. This is the next logical step in an attempt to overwhelm missile defense systems. The technological requirements for TMD countermeasures are relatively inexpensive and easy to develop. As a result, China and North Korea have been developing ways to avoid TMD hit-to-kill interceptors. The most worrisome countermeasure, however, would be the development of multiple warheads (MIRVs). China has already indicated its desire to develop MIRV technology. Such a development would undoubtedly increase political and military tensions in the region. Hence, the ongoing arms competition could easily turn into an arms race, involving the deployment of TMD systems and further deployments of ballistic missiles and countermeasures.

These rising tensions will handicap regional and international diplomatic relations. China's relations with the United States and Japan are already difficult, but they become even more difficult if Taiwan is included under the area of coverage of upper-tier TMD systems. Antagonisms between regional rivals, particularly with China, would likely increase and spark further weapons procurements. In this new kind of spiraling arms competition, the linkage between political and military issues will become particularly important. Each state's perception of insecurity might trigger preemptive strikes and create self-fulfilling prophecies of danger.  

Moreover, countries deploying layered TMD systems might get an inflated sense of security. For instance, Japan might use its TMD technological know-how to enhance its military capabilities. But the most worrisome possibility for regional security would be a unilateral declaration of independence or a clear move towards official sovereignty on the part of a TMD-defended Taiwan. Such an event would be likely to trigger a Chinese military response against Taiwan, which in turn would draw the United States, and possibly Japan, into a major regional conflict.

Arms competitions between regional rivals undoubtedly increase the risk of conflict. This danger of escalation is amplified by the growing insecurities resulting from the technological gap of the current arms competition. In that regard, two sub-regions will remain serious sources of concern for regional security in Northeast Asia.

The China-Taiwan rivalry will likely remain the most tensed relationship in the region. As mentioned earlier, China has already fired ballistic missiles near the Taiwanese coast twice to intimidate the population and restrain the independence movement in Taiwan. This volatile situation will only become more worrisome as China will deploy larger numbers of SRBMs, possibly equipped with multiple warheads, and Taiwan either deploys TMD systems or is unofficially included under an American sea-based upper-tier TMD system. Thus, relations along the Taiwan Strait will be an even more significant source of concern for the security of Northeast Asia.
The Korean Peninsula will also remain a source of tension in the region. North Korea’s past efforts to develop nuclear weapons and ballistic missiles, combined with the regime’s ideological isolation and economic difficulties, raise tensions and increase the risk of military miscalculation. Despite the Pyongyang’s agreement to halt missile testing and the recent Korean Summit, Japan and the United States remain skeptical towards North Korea’s true intentions. A North Korean decision to resume missile testing in response to the deployment of TMD systems in the region would have a serious ripple effect throughout Northeast Asia. If South Korea and Japan remain insecure towards North Korea after they deploy TMD, they could easily decide to build ballistic missiles, and that would be extremely worrisome for China and step up the regional arms competition spiral. Thus, the Korean Peninsula will remain an important source of concern in Northeast Asia.

CHAPTER FIVE

CONCLUSION AND IMPLICATIONS FOR THE STUDY OF ARMS RACES

This thesis focused on the ballistic missiles and anti-missile systems competition in Northeast Asia. It was argued that the current arms dynamic in Northeast Asia constitutes a new type of arms competition. As China and North Korea continued to improve and increase their SRBMs and MRBMs, Japan, South Korea and Taiwan have chosen the path of anti-missile defense rather than the traditional logic of deterrence. In light of the strong political impulse fueling their development, it is clear that sophisticated TMD systems (either upper-tier or boost-phase systems) will eventually be introduced in the region. Such deployments will have a ripple effect throughout Northeast Asia and increase the political and military tensions in the region.

Despite the questionable feasibility of upper-tier or boost-phase TMD systems, the danger that such deployments will increase tensions within the arms competition, and even spark an arms race in Northeast Asia, is real. The first logical step for China and North Korea is to overwhelm potential TMD systems with more missiles than they can handle. This strategy is already implemented. In response to the deployment of lower-tier TMD on Taiwan, China has already increased its SRBM arsenal targeting the island. Hence, China could easily deploy more missiles if upper-tier TMD systems are deployed in the region.
Besides triggering larger deployments of ballistic missiles, the eventual introduction of upper-tier TMD will spark the development of countermeasures. In this next round of offensive-versus-defensive arms competition, China and, to a lesser degree North Korea, will develop and deploy all sorts of decoys, to overwhelm and confuse TMD hit-to-kill interceptors. Moreover, China has already indicated its intentions to develop the technology for multiple warheads (MIRVs), undoubtedly the most worrisome countermeasure.

In such a context, regional stability and security will largely depend on the diplomatic relations between the regional actors, particularly across the Taiwan Strait and on the Korean Peninsula. Political and military relations with the United States and, to a lesser degree, Russia, will also play an important role for the future of Northeast Asia. The short term key issue will undoubtedly be whether or not Taiwan is included, explicitly or implicitly, under an upper-tier of boost-phase TMD umbrella. If that is the case, new rounds of Chinese SRBM deployments are likely to increase regional tensions and the risk of conflict. The long term issue, however, will be whether Northeast Asia can redefine the concepts of stability and deterrence in the new era of ballistic missile defense.

*Implications for the Study of Arms Races*

The new characteristics of the Northeast Asian arms competition will force scholars to break away from the traditional models of arms races. Instead of theorizing about global arms races, students of international relations will have to focus more on regional rivalries and arms competitions. Similarly, rather than thinking in terms of general military rivalries,
analysts will have to examine weapons-specific arms competitions, such as the Northeast Asian ballistic missiles versus TMD competition.

Moreover, the outright reliance on military expenditures and other fiscal indices will become secondary to the development of weapon-based indices to measure the degree of arms competition between states. Such methods are insufficient to comprehend the arms competition in Northeast Asia. Notwithstanding their questionable reliability and validity, fiscal indices are blind to the offensive-defensive dimension and the uneven levels of technology, two important dimensions of the Northeast Asian arms competition.

The offensive-versus-defensive dimension is a significantly new aspect of arms competitions and will require further analyses. The impact of defensive weapons deployment remains understudied, particularly when that deployment is designed to counter an adversary’s offensive weapons buildup. Rethinking the concept of deterrence based on mutual vulnerability will also be required, in order to better understand the consequences of this new kind of arms competition. The notion of arms race stability, which usually prescribes a certain balance between two offensive arsenals, will also need to be reconsidered.

The influence of third parties in the arms dynamic is also a significant feature of the Northeast Asian arms competition that should generate more research. The fact that Japan, South Korea, and to a certain extent Taiwan, are American allies undoubtedly affects the political and military dynamic in the region. Without the United States’ pressures, South
Korea and Taiwan would have developed longer-range ballistic missiles, and the latter might even have developed nuclear weapons. Similarly, the United States is the driving force behind the development and eventual deployment of upper-tier TMD systems in Northeast Asia. Thus, Northeast Asia has shown the colossal influence a third party supplier can have within a regional arms competition.

Finally, this new type of arms competition certainly shows the importance technology will have in the arms competitions of the 21st century. Of course, previous arms competitions have featured important technological innovations. Developing better weapons has always been the priority of any state involved in competitive arms processes. But this new type of arms competition will require the complete technological integration of military capabilities. Highly sophisticated radar systems, missile-launch-detection satellites, anti-missile systems, and every branch of the military will require greater integration, something that will be closely linked to advancements in military technology. Hence, the current arms competition in Northeast Asia requires further analysis in order to grasp the significance of its implications for regional security and for the study of arms races.

*   *   *
BIBLIOGRAPHY


Smith, Merritt Roe, and Marx, Leo, eds., *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, MA: MIT Press, 1994).


