



CONVENTIONAL BALANCE AND DETERRENCE ON THE
KOREAN PENINSULA

Par Dylan MOTIN

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We wish you a pleasant reading.

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CONCERNING THIS ARTICLE

This study assesses the North Korean conventional military power. The 'Attrition-FEBA Expansion Model' is used for creating a dynamic analysis of the military balance on the Korean Peninsula. The model requires several inputs to be elaborated: geography, military capabilities of both sides, the effect of air power, probable exchange rate, attrition rates, and advance rate. Results show that the actual North Korean military strength is probably smaller than what is usually believed. The main conclusion is that deterrence is strong, since North Korea is outgunned and cannot triumph over the Combined Forces Command even under the most heroic assumptions.

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1) Introduction

The recent inter-Korean “Panmunjom Declaration for Peace, Prosperity and Unification of the Korean Peninsula” and the Singapore Summit between US President Donald J. Trump and North Korean Supreme Leader Kim Jong-un have led to hope that the DPRK’s nuclear threat may be receding. The North Koreans and the Americans seem to agree that the DPRK should, in the mid-term, get rid of its nuclear arsenal. Although a failure of the discussions about denuclearization is more than likely, it is interesting to rethink the future of the conventional military balance on the Korean Peninsula if the nuclear factor is no longer prevalent.

Mainstream analysis of the conventional balance on the Korean Peninsula tend to focus on ‘bean-counting’ for describing the military capabilities of both sides. They count soldiers, tanks, artillery pieces, aircraft, and other major items for determining where the strongest side stands. They then add qualitative variables—such as training, technological sophistication, and logistics—for knowing who would possibly prevail in an armed conflict¹. But this study will rely on methods developed for campaign analysis for creating an accurate assessment of the current balance.

If a conflict was to happen, the North Koreans would have few other options than a *blitzkrieg* strategy. If they are stuck into a long war against South Korea, which is more populous and far richer, the North would surely lose. The longer the war, the more the United States would be able to pour troops onto the peninsula. Time also carries another danger: the DPRK is very short of petroleum, oil, and lubricants (POL) —all necessary components of modern warfare. It may run out of stocks after as few as 30 days of operations².

Two main strategies could be envisioned for the North Koreans. According to the first one, they would concentrate all their means on Seoul, seize it and stop there. Following the second one, they would try to bypass Seoul and effectuate deep penetrations into the South’s rear for securing it and impeding the arrival of US reinforcements³. This study will

¹ For example in David Blair, “North Korea vs South Korea: How the Countries’ Armed Forces Compare,” *The Telegraph*, 15 September 2015, <http://www.telegraph.co.uk/news/worldnews/asia/northkorea/11603665/North-Korea-v-South-Korea-How-the-countries-armed-forces-compare.html> , accessed 01/02/2018; Niall McCarthy, “How North and South Korea’s Armed Forces Compare,” *Forbes*, 11 April 2017, <https://www.forbes.com/sites/niallmccarthy/2017/04/11/how-north-and-south-koreas-armed-forces-compare-infographic/#44ec58de828b> , accessed 01/02/2018

² Jae-Jung Suh, “*Blitzkrieg* or *Sitzkrieg*? Assessing a Second Korean War,” *Pacific Review*, Vol 11, Issue 2, 1999, pp. 151-176

³ Edward B. Atkeson, “The North Korean Military Threat in Perspective,” *The Land Warfare Papers*, Issue 21, 1995

only be concerned with the possibility for North Korean troops to reach Seoul. Knowing whether the Korean People's Army (KPA) can effectively hold Seoul after seizing it or invade the whole of Korea is not the main concern here. It is assumed that the Combined Forces Command's (CFC) strategy will consist in holding the so-called 'Hollingsworth Line' located north of Seoul and along the DMZ for halting the North Korean offensive. The Hollingsworth Line has been erected because of the impossibility for the CFC to trade space for time since it has to defend Seoul at any cost. The Alpha defense line, the most forward defensive preparation, runs three to eight kilometers south of the DMZ⁴.

The unfolding of a Second Korean War would look like a modern reiteration of Soviet Cold War strategy: "From the onset of a conflict, the KPA will attempt to assume command of the battlefield by relentlessly overpowering ROKA defenses through a combination of frontal assaults by tank and mobile artillery units, a heavy concentration of artillery bombardments, and close air support of ground forces coupled with the interdiction of South Korean supply lines. In launching its assault, the KPA would likely utilize operational principles similar to those of the Soviet armed forces, which place a high premium on the offense and strategic surprise, in addition to favorable force ratios in key breakthrough sectors. Recent reorganizational moves within the KPA have resulted in the forward deployment of up to 65 percent of its ground forces along the DMZ, with an emphasis on building up new armored corps along the DMZ, believed to be modeled very closely on the Soviet Operational Maneuver Groups"⁵.

The roots that gave birth to the concept of *blitzkrieg* go way back in history. The idea of independent cavalry attacks supported by organic artillery is at least as old as the Napoleonic Wars⁶. During World War I, the Germans formed 'stormtrooper' units tasked with penetrating enemy trenches, bypassing defensive strongpoints and attacking valuable targets in the rear⁷. The idea of a breakthrough operation followed by deep strikes into the defender's rear by an all-mechanized force was first conceptualized in the 1920s by the British thinkers Fuller and Liddell Hart and then put into practice by the Germans, who coined the appellation of *blitzkrieg*⁸.

⁴ Chung Min Lee, "Holding the 'Hollingsworth Line': Conventional Deterrence and Defense in the Korean Peninsula," 1988. In Harold C. Hinton (ed.), *The US-Korean Security Relationship: Prospects and Challenges for the 1990s*, New York, NY: Pergamon-Brassey's for the Institute for Foreign Policy Analysis, pp. 55-81

⁵ *Ibid*, p. 58

⁶ Robert B. Bruce, Iain Dickie, Kevin Kiley, Michael F. Pavkovic, and Frederick C. Schneid, *Fighting Techniques of the Napoleonic Age 1792 - 1815: Equipment, Combat Skills, and Tactics*, New York, NY: St. Martin's Press, 2008

⁷ Patrick T. Stackpole, "German Tactics in the 'Michael' Offensive: March 1918," Master diss., US Army Command and General Staff College, 1993

⁸ Jeffrey Record, "Armored Advance Rates: A Historical Inquiry," *Military Review*, Vol 53, Issue 9, 1973, pp. 63-72

The breakthrough battle is the nexus of armored warfare and armored warfare itself has been the nexus of conventional wars since World War II⁹. That is why this study will be centered on an analysis of a potential breakthrough battle in the hypothesis of a Second Korean War. It is so necessary to create a sound estimation of the military balance on the Korean Peninsula.

Many methodologies are available for evaluating the military balance¹⁰. The most obvious of them is the aforementioned bean-counting of soldiers, tanks, tubes, aircraft, etc. A more evolved version of bean-counting is the counting of army formations such as divisions or brigades¹¹. Another approach is to proceed to weighted static counts; the quality of the weapon systems, and not only their quantity, can also enter into account. The most popular method during the 1980s was the Armored Division Equivalent (ADE) methodology. A Weapon Effectiveness Index (WEI) is produced for each weapon. These WEIs are then multiplied by their quantity per unit for producing a Weighted Unit Value (WUV). Since the WUV of a standard US armored division represents 1 ADE, it is then possible to give to different units from different countries an ADE score¹². An American defense contractor developed its own methodology called TASCFORM; it deals more specifically with the technological differences between weapon systems for the sake of producing more precise assessments¹³.

Along with these methodologies for assessing static military balance, other methodologies have surfaced. They are called 'dynamic' because they aim at predicting the outcome of a conflict by establishing mathematical relations between several inputs. The military uses very complex classified computerized models. Nevertheless open sources models do exist. Among some well-known are found the 'Attrition-FEBA Expansion Model' devised by Richard Kugler¹⁴, the 'Adaptive Dynamic Model' devised by

⁹ Barry R. Posen and the MIT DACS Conventional Forces Working Group, *Breakthroughs: Armored Offensives in Western Europe 1944*, Boston, MA: Massachusetts Institute of Technology, 2009; Edward N. Luttwak, "The Operational Level of War," *International Security*, Vol 5, Issue 3, 1980, pp. 61-79; John J. Mearsheimer, "Why the Soviets Can't Win Quickly in Central Europe," *International Security*, Vol 7, Issue 1, 1982, pp. 3-39; John J. Mearsheimer, *Conventional Deterrence*, Ithaca, NY: Cornell University Press, 1983

¹⁰ Laurinda L. Rohn, *Conventional Forces in Europe: A New Approach to the Balance, Stability, and Arms Control*, Santa Monica, CA: RAND Corporation, 1990

¹¹ For example done in Richard Burt, "New Study Raises US Estimate of North Korean Army Strength," *New York Times*, 4 January 1979

¹² William P. Mako, *US Ground Forces and the Defense of Central Europe*, Washington, DC: The Brookings Institution, 1983

¹³ The Analytic Sciences Corporation, *The TASCFORM Methodology: A Technique for Assessing Comparative Force Modernization*, Arlington, VA: TASC, 1984

¹⁴ Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks*, Ithaca, NY: Cornell University Press, 1991

Joshua Epstein¹⁵, and the 'Quantified Judgment Model' devised by Trevor Dupuy¹⁶. All of these three models have strengths and weaknesses. However, it should be noted that they can fare as well or even better than more evolved classified models¹⁷.

This study uses the Attrition-FEBA Expansion Model. It is a suitable model here since it allows putting in very conservative or even pessimistic inputs for the CFC so the results can be more robust. For using this model, it is necessary to assign values for six parameters: the relative military capabilities of both sides; the effect of tactical air forces on the ground battle; the force-to-space ratios of both sides; the attrition rates of both forces; the casualty exchange rate; the advance rate of the attacker¹⁸.

Remembering that war tends to be avoided when a *blitzkrieg* strategy does not seem to be a plausible option¹⁹, the results of this study will help to answer two sets of questions:

1. Firstly, does the South have enough military power to deter the North from giving an invasion a try? Can the North effectuate a *blitzkrieg* within a reasonable framework in terms of time and casualties?
2. Secondly, what is the future of the military balance on the Korean peninsula? Can the South enjoy a 'peace dividend' and reduce its forces? From a North Korean perspective, is the KPA's current force posture optimal?

2) Model's parameters

a. The problem of geography

The Korean Peninsula is covered at 70 % by mountains and hills. The Eastern part of South Korea is especially ill-suited for the movement of massive armored forces. The few practicable roads there are very tortuous. The terrain near the DMZ favors the CFC and is

¹⁵ Joshua M. Epstein, *The Calculus of Conventional War: Dynamic Analysis without Lanchester Theory*, Washington, DC: The Brookings Institution, 1985

¹⁶ Trevor N. Dupuy, *Understanding War: History and Theory of Combat*, New York, NY: Paragon House, 1987

¹⁷ Michael O'Hanlon, "Estimating Casualties in a War to Overthrow Saddam," *Orbis*, Vol 47, Issue 1, 2003, pp. 21-40

¹⁸ Barry R. Posen, "Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment," *International Security*, Vol 9, Issue 3, 1984, pp. 47-88

¹⁹ Dylan Motin, "Military Capability and Willingness in Russia's Decision of Attacking Afghanistan, Georgia, and Ukraine," MA diss., Kangwon National University, 2018; *op.cit.* Jae-Jung Suh, 1999; *op.cit.* John J. Mearsheimer, 1983

very problematic for the North²⁰. Whatever the North Korean objectives are, for attaining victory and defeating South Korea, the KPA would certainly focus on seizing Seoul and its suburbs, which are the political, economic, and demographical heart of the South²¹. Since safeguarding Seoul is an imperative need, the CFC has no other choice than adopting a forward defense strategy²².

The inter-Korean border represents around 250 kilometers of front. Naturally, the KPA will try to break through in the “small number of areas where the terrain and the road net are particularly suitable for armored warfare”²³. O’Hanlon estimates that there could be up to six potential invasion roads for North Korea²⁴. Masaki and Chung opt for two 50 kilometers-wide corridors in the West—Munsan and Cheorwon—and one 10 kilometers-wide corridor on the East Coast²⁵. However, the two western corridors largely overlap, making it hard to distinguish between them. It sounds better to count them as a single 100 kilometers-wide corridor.

These corridors are however still problematic for an armored attacker. In the West, the Imjin River is a serious obstacle to overcome. Alongside natural obstacles and man-made defensive preparations, the dense urban network of South Korea is also a great impediment to an advancing armored thrust²⁶. Historical data tends to show that an attacker’s advance rate in urban area is cut by one-half to one-third compared to nonurban area²⁷. Such a terrain is perfect for creating devastating ‘kill zones’ where the defenders can trounce the advancing North Koreans.

Korean geography would expose the KPA to a particularly severe ‘crossing the T’ problem²⁸. The roads leading to the South are scarce and surrounded by hills or mountains. This would create serious headaches for North Korean Reception, Staging, Onward Movement, and Integration (RSOI) operations. Even if the North had a large numerical superiority,

²⁰ C. P. Cameron, “Dearly Bought Ridges, Steep Access Valleys, and Staging Grounds: The Military Geology of the Eastern DMZ, Central Korean Peninsula,” 1998. In James R. Underwood and Peter L. Guth (eds.), *Military Geology in War and Peace*, Boulder, CO: Geological Society of America, pp. 83-98

²¹ Yongwoo Kwon and Jaeduk Lee, *The Geography of Korea*, Suwon, KR: National Geographic Information Institute, 2010

²² *Op.cit.* Edward B. Atkeson

²³ *Op.cit.* Barry R. Posen, 1984, p. 49

²⁴ Michael O’Hanlon, “Stopping a North Korean Invasion: Why Defending South Korea Is Easier than the Pentagon Thinks,” *International Security*, Vol 22, Issue 4, 1998, pp. 135-170

²⁵ Jonghyuk Chung, “‘Who Needs MacArthur?’: Analyzing South Korea’s Counterinvasion Capability against North Korea,” MS diss., Massachusetts Institute of Technology, 2011; Stuart K. Masaki, “The Korean Question: Assessing the Military Balance,” *Security Studies*, Vol 4, Issue 2, 1994, pp. 365-425

²⁶ Paul Bracken, “Urban Sprawl and NATO Defense,” *Survival*, Vol 18, Issue 6, 1976, pp. 254-260

²⁷ Christopher A. Lawrence, *War by Numbers: Understanding Conventional Combat*, Lincoln, NE: Potomac Books, 2017

²⁸ *Op.cit.* John J. Mearsheimer, 1982

there would be simply no space for all of the advancing units to assemble into combat formation and assault CFC's positions. Only the first-echelon units would directly attack the defenders, while the others would have to wait in march formation behind until there is enough room to deploy. Many would probably be unable to assemble into combat formation and would have to attack in march formation, a less than ideal option. For example, even if 10 North Korean divisions attack one single South Korean division, the South would in fact be confronted by only two of them at one time, in a sequential battle. As the KPA's divisions are depleted by combat attrition, they would have to withdraw, so the divisions of the next echelon waiting behind can assemble into combat formation and attack. One may remember that during their successful crossing of the Ardennes in May 1940, the German columns created a gigantic traffic jam dozens of kilometers long, considerably impeding their movements.

The roads leading to the South would then be totally congested by waiting vehicles but also by disabled ones. It is obvious that resupplying such a massive force in the midst of heavy fighting and under air strikes with only a few roads practicable will be a daunting task—especially for an army whose skills in term of logistics are in severe doubt²⁹. During the last phase of World War II, 43.2 % of German tank losses were due to terrain, mechanical problems, lack of POL, of spare parts, of recovery means, and self-destruction of the vehicle by the crew. Allegedly 25 to 40 % of Allied tank losses were due to the same non-enemy causes. Terrain and logistics issues are so hardly trivial³⁰. Paradoxically, “the North might even achieve larger gains with infantry forces in mountainous regions than with armor in more trafficable terrain”³¹.

Since “there is a limit to how much force can be concentrated in a given space”³², it is necessary to know how many forces per kilometers can be deployed by both the defender and the attacker—the force-to-space ratio. History shows that a defender with a good force-to-space ratio can stop a far larger enemy force. Operation Goodwood in 1944 is a typical case; even if the British had amassed a formidable force, they were unable to break through the packed German defenders³³. Consequently, if an advantageous force ratio is of course desirable, it is not an absolute precondition for holding the frontline. For example, in 1973, an Israeli armored brigade held 20 kilometers of front outnumbered

²⁹ *Op.cit.* Michael O'Hanlon, 1998

³⁰ Alvin D. Coox and Louis Van Loan Naisawald, *Survey of Allied Tank Casualties in World War II*, Washington, DC: Operations Research Office, Johns Hopkins University, 1951

³¹ Nick Beldecos and Eric Heginbotham, “The Conventional Military Balance in Korea,” *Breakthroughs*, Vol 4, Issue 1, 1995, p. 3

³² *Op.cit.* Barry R. Posen, 1991, p. 77

³³ *Op.cit.* Barry R. Posen and the MIT DACS Conventional Forces Working Group

4:1 for 60 hours with no reserve and little air support³⁴.

Mearsheimer considers that one division is suited for holding 21 to 45 kilometers of front³⁵. Allen estimates that a Soviet motor rifle division needs at least 7.5 kilometers to deploy, a number which is in line with the expectations of the Soviet planners³⁶. A US heavy division would need at least 14 kilometers. Cold War planning for these shoulder space constraints was based on the notion that a US division would occupy 25 kilometers in defense and 20 in attack while a Soviet division would occupy 20 kilometers in defense and 15 in attack. Posen goes for one division per 25 kilometers for the defender—he is followed in this way by O'Hanlon—and estimates that an attacker willing to break through the FEBA (Forward Edge of the Battle Area) could muster two divisions per 25 kilometers³⁷. These numbers are also in line with Hart who considers that 600 men per kilometer was a reasonable ratio³⁸. This study will adopt Posen's assumptions³⁹.

b. Relative military capabilities

This study will run its model following two scenarios: one where only the standing KPA troops attack the South and one where the North's military reserves are also mobilized. This second scenario assumes that the DPRK has been able to evade detection while mobilizing its reserve of 40 infantry divisions and 18 infantry brigades and readying all of its troops for the attack⁴⁰. It is of course a heroic assumption, since it looks almost impossible to achieve such a miracle with present-day detection capabilities. In 1968, 1979, and 1981, partial Soviet mobilizations were all noticed by NATO. The problem is generally not the initial detection but the political decisions of the defending side's leaders⁴¹. South Korea has however experienced intelligence failure recently, although on a far smaller scale⁴². One may consider that the North Korean surprise attack of June 1950 is also a case

³⁴ *Op.cit.* Barry R. Posen, 1984

³⁵ *Op.cit.* John J. Mearsheimer, 1982

³⁶ Patrick Allen, *Situational Force Scoring: Accounting for Combined Arms Effects in Aggregate Combat Models*, Santa Monica, CA: RAND Corporation, 1992

³⁷ *Op.cit.* Barry R. Posen, 1984; *op.cit.* Michael O'Hanlon, 1998

³⁸ B. H. Liddell Hart, "The Ratio of Troops to Space," *RUSI Journal*, Vol 105, Issue 618, 1960, pp. 201-212

³⁹ However, Allen notices rightly that terrain type constrains concentration of troops and that a mountain environment would allow in average only 40% of the possible concentration in a mixed terrain environment. If this coefficient, probably more realistic, was used there, it would disadvantage North Korea still more

⁴⁰ The first echelons with the heavier units would nevertheless be the more decisive: *op.cit.* Edward B. Atkeson

⁴¹ Richard K. Betts, *Surprise Attacks*, Washington, DC: The Brookings Institution, 1982

⁴² Joo Hyeon Lee and Kyu Young Lee, "A Case Study on the Korean Intelligence Failure: Focused on the Case of the Second Battle of Yeonpyeong," *IAS Research Series*, Issue 10, 2011

of intelligence failure.

O'Hanlon assumes that "an attack preceded by only several hours or at most a day of clear warning seems the more likely scenario"⁴³ and that North Korea will at first attack with only its forward deployed troops near the DMZ without more ample preparations. For Atkeson, the CFC can expect a warning time of between 24 to 72 hours⁴⁴. For Suh, strategic warning time will range from a few hours to no more than 18 hours, since most of the KPA troops are deployed very close to the border⁴⁵. Indeed, 70% of the KPA's ground forces are located less than 145 kilometers from the DMZ, organized in several echelons. This number has dramatically increased since the 1980s⁴⁶. It is assumed here that the CFC did not detect the incoming attack and did not mobilize at first. Lee estimates that full South Korean mobilization would be accomplished in 72 hours⁴⁷. In this analysis, South Korean reserves (24 infantry divisions) will so be available on the fourth day of the war. For the sake of conservatism, no US reinforcements will be added for the 10 days of conflict modeled here.

All KPA and CFC units are modeled according to their respective table of organization and equipment (TOE) and are considered as fully manned⁴⁸. The Combat Potential Scores (CPS) methodology developed by Raymond will be used for assessing both sides' combat power⁴⁹. The CPS score of a US armored division is used as a base for determining the number of Armored Division Equivalents (ADE) the KPA and the CFC possess. Accordingly, the CFC possesses 11.7 ADE while the KPA musters 15.1 ADE without reserves and 21.7 ADE when reserves are included. US forces represent almost 5 % of the CFC force and a little less than 0.6 ADE.

While South Korean and American TOE have evolved since the end of the Cold War, the North Korean TOE did not change significantly since 1991⁵⁰. US forces' CPS was calculated

⁴³ *Op.cit.* Michael O'Hanlon, 1998, p. 136

⁴⁴ *Op.cit.* Edward B. Atkeson

⁴⁵ Jae-Jung Suh, *Power, Interest, and Identity in Military Alliances*, New York, NY: Palgrave Macmillan, 2007

⁴⁶ Bruce E. Bechtol, "Understanding the North Korean Military Threat to the Security of the Korean Peninsula and Northeast Asia: Declined or Evolved?" *Korea Observer*, Vol 40, Issue 1, 2009, pp. 115-154. However this forward posture can also be read under a less aggressive light. During the Cold War, the Warsaw Pact armies adopted the same strategy of staying as close as possible of NATO's troops and population centers. Indeed, 'hugging' the enemy renders the use of nuclear weapons more complicated: *op.cit.* Jae-Jung Suh, 2007

⁴⁷ *Op.cit.* Chung Min Lee

⁴⁸ The International Institute for Strategic Studies, *The Military Balance 2018*, Abingdon-on-Thames, UK: Routledge, 2018

⁴⁹ Allen D. Raymond, *Assessing Combat Power: A Methodology for Tactical Battle Staffs*, Fort Leavenworth, KS: US Army Command and Staff College, 1991

⁵⁰ James M. Minnich, *North Korean Tactics*, Fort Leavenworth, KS: United States Army Command and Staff College, 2001; Marine Corps Intelligence Activity, *North Korea Country Handbook*, Quantico, VA: Department of Defense Intelligence Production Program, 1997

according to Kilpatrick and Maneuver Center of Excellence⁵¹. As an expedient for the lack of recent open literature data and for adding this modernization effort to the score of the CFC, South Korean forces' CPS has been multiplied by 1.10. This study assumes, very favorably for the DPRK, that all of its tanks are at least equivalent to the T-62 while in reality it has masses of older tanks. North Korea has been introducing, at a slow rate, more modern Pokpung tanks. These tanks are considered to be roughly equal to the T-72 but it seems that only one division has been reequipped with Pokpung⁵². Moreover, all North Korean regular infantry divisions are assumed to be truck-mobile.

c. Tactical air power

For making a more accurate estimation of the outcome of a Second Korean War, it is necessary to take into account the effect that both sides' tactical air forces would have on the ground battle.

Korean People's Army Air Force's (KPAAF) fleet, through numerous—545 combat-capable planes—is mostly antiquated. The bulk of its force is made of MiG-15, MiG-17 and MiG-21 fighters⁵³. Those planes were already outclassed at the time of the Vietnam War. They are of no value against a modern air force. Moreover, the wear and tear and the likely lack of spare parts for planes which left factory in the 1950s and 1960s make dubious that they are all fitted to fly. Only the few MiG-29 fighters North Korea possesses have some value, if they were to be correctly modernized and handled. Moreover, at the onset of any conflict, cruise missiles would rain on the North's airfields. It is so hard to see how the KPAAF's aircraft could survive the initial onslaught, CFC's fighters, evade its air defenses and then provide valuable air support to the troops racing toward the South. The weaknesses of the KPAAF compared to the CFC air forces have been demonstrated at length by Chung, He, and Suh⁵⁴. Atkeson estimates that the KPAAF could have totally disappeared after as short as two or three days of war⁵⁵. However, Atkeson's study is

⁵¹ Leah Kilpatrick, "Cavalry Brigade Combat Team Assumes New Design, Transition nearly Complete," *US Army*, 17 February 2016, https://www.army.mil/article/162519/Cavalry_Brigade_Combat_Team_assumes_new_design_transition_nearly_complete, accessed 05/08/2018; Maneuver Center of Excellence, *Supplemental Manual 3-90: Force Structure Reference Data*, Fort Benning, GA: US Army Maneuver Center of Excellence, 2015

⁵² Joseph S. Bermudez Jr, "P'okpoong: The KPA's New Main Battle Tank," *KPA Journal*, Vol 1, Issue 4, 2010, pp. 6-11

⁵³ *Op.cit.* The International Institute for Strategic Studies

⁵⁴ *Op.cit.* Jae-Jung Suh, 1999; *op.cit.* Jonghyuk Chung; Ray C. He, "Stopping a North Korean Invasion: Why South Korea Can Be Defended despite US Troops Being Occupied by Deployments in Iraq," Unpublished manuscript, 2007, <http://web.mit.edu/rayhe/www/dprk-invasion.pdf>

⁵⁵ *Op.cit.* Edward B. Atkeson

dated; since the CFC's forces have kept modernizing while the KPAAF has stalled, things are probably even worse for the North nowadays.

For estimating the effect of CFC's tactical air forces, this study has to determine four variables: the number of available aircraft for ground attack, the number of aircraft's sortie per day, the daily attrition of the force, the number of kill per sortie, and finally the CPS loss inflicted during each sortie.

North Korean aircraft and ballistic missiles pose no great threat to the CFC's air bases. During the first stage of a conflict, the North would have very few means for seriously impeding CFC's air operations⁵⁶. The DPRK would need to expand the equivalent of 40 to 100 missiles of the precision of a Scud-B for destroying a single air force facility while the South has more than 100 airfields⁵⁷. However, for the sake of conservatism, this study assumes that 10% of the CFC's combat-capable aircraft have been knocked out at the outbreak of the war. Therefore, 604 aircraft are deemed to be available for air support out of 671 (587 South Korean and 84 US) combat-capable planes⁵⁸.

O'Hanlon assumes conservatively that the CFC manages one sortie per aircraft per day and one kill per sortie⁵⁹. This study's estimated air attrition is .05 of the force lost per day. Attrition here would be overwhelmingly caused by North Korea's air defense and not by its decrepit air force. This is equivalent to the attrition found during World War II and Korean War heavy fighting days⁶⁰.

Chung assumes that the South Korean air force has as 'average target' a 152mm towed howitzer⁶¹. The 152mm towed howitzer is actually a very common tube in the KPA, which possesses at least 2,000 of them, and one of its core assets for an invasion of the South. This study will so follow him in assuming that every loss inflicted by a CFC aircraft is a loss of the equivalent of the Individual System Value of a 152mm howitzer (3.30).

⁵⁶ *Op.cit.* Jae-Jung Suh, 1999

⁵⁷ Jae-Jung Suh, "Assessing the Military Balance in Korea," *Asian Perspective*, Vol 28, Issue 4, 2004, pp. 63-88

⁵⁸ Helicopters are excluded from this account since they are already included in the CPS methodology used for scoring ground forces. T-50, T-50B, and TA-50 training aircraft are included, since they are combat-capable aircraft: *op.cit.* The International Institute for Strategic Studies. US aircraft included in the total are those from the Kunsan and Osan ABs. The United States should be able to pour in at least 318 fighters from Japan, Hawaii, Alaska, and carriers during the first week of a conflict: *op.cit.* Dylan Motin. However, for giving better odds to the North, this study does not take them into account

⁵⁹ *Op.cit.* Michael O'Hanlon, 1998

⁶⁰ *Op.cit.* Barry R. Posen, 1984

⁶¹ *Op.cit.* Jonghyuk Chung

d. Exchange rate, attrition rates, and advance rate

d.1. Exchange rate

An exchange rate has to be defined. This rate determines how much a North Korean attacker has to 'pay' for eliminating a CFC defender. It is widely believed that defensive warfare is more powerful than offensive warfare, since the attacker is the one who has to move in the open and go through the defender's lines⁶². In his study concerning the NATO-Warsaw Pact balance in Central Europe, Posen collected data of historical and notional exchange rates which range from 3:1 to 6:1 in favor of NATO and Israel when they fight as defenders⁶³. The battlefields of Italy in 1944 saw an attacker-defender exchange ratio of 3.5:1 while both forces were of comparable quality⁶⁴. In 1951, Chinese troops attacking UN defense lines had to suffer 10 losses for each UN soldier neutralized⁶⁵. The Gulf War had the attacking Iraqi troops suffering on average 31 losses for each Allied soldier neutralized⁶⁶.

The use of a 3:1 exchange rate is appropriate since the North Koreans would be on the offensive for penetrating well-prepared South Korean defenses⁶⁷. One could even argue that a 3:1 exchange rate is actually quite conservative and favorable to the DPRK. Indeed, the superiority of the South in terms of logistics, training, and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) coupled with a terrain which benefits the defender could easily justify a higher exchange rate for the North. The terrain had been prepared with "network of tank ditches, underground facilities, minefields and frontwide Concertina-wired fences, [...] pre-chambered concrete slabs, bridges, and boulder-strewn fields that could be detonated to block the enemy advance route"⁶⁸. Even a hasty defense is believed to increase the defender's combat power by a factor of around 1.25. Moreover, prepared defenses that are able to reduce the attacker's original speed of one third will increase attacker's casualties by 60 %⁶⁹.

O'Hanlon actually suggests a 10:1 exchange rate for the DPRK, 5:1 being already for him

⁶² *Op.cit.* Christopher A. Lawrence

⁶³ *Op.cit.* Barry R. Posen, 1984

⁶⁴ R. Ernest Dupuy and Trevor N. Dupuy, *The Encyclopedia of Military History*, New York, NY: Harper & Row, 1970. Cited in *op.cit.* Nick Beldecos and Eric Heginbotham

⁶⁵ *Op.cit.* Nick Beldecos and Eric Heginbotham

⁶⁶ *Ibid*

⁶⁷ This exchange rate must not be confused with the so-called '3:1 rule', which will be discussed in the results part

⁶⁸ *Op.cit.* Jonghyuk Chung, p. 27

⁶⁹ Waldo D. Freeman Jr, "NATO Central Region Forward Defense: Correcting the Strategy/Force Mismatch," *National Security Affairs Issue Paper*, Vol 81, Issue 3, 1981, pp. 11-12

a conservative assumption⁷⁰. The importance—one may say the dominance—of the human factor should always be kept in mind: in 1987-1988 in Angola, South Africa had an impressively favorable exchange rate of 17:1 although it fought outnumbered and outgunned on a hostile terrain⁷¹.

d.2. Attrition rates

Attrition is one of the parameters of the Kugler-Posen model. It will be defined here as the percentage of the force lost because of combat attrition for each day of fighting. Once the attrition rate of the defender has been made explicit, the attrition rate of the attacker can be expressed by an arithmetical relation—the exchange rate.

Historically, US and Israeli forces suffered 2 % attrition when defending. It was estimated during the Cold War that NATO could suffer in the worst case up to 3.5 % attrition per day⁷². During the Second World War, when the Germans defended Normandy against the Allies, they suffered on average 3 % attrition per day⁷³. The US Army Command and General Staff College on its part estimates that a defender would lose 3.5% of its divisional troops on the first day of fighting and then 1.9 % per day for the following days⁷⁴. US divisions defending the Busan Perimeter in September 1950 suffered up to no more than 1.5 % attrition per day while holding out against North Korean offensives⁷⁵.

Accordingly, the attrition rate of a competent defender seems to be close to 2 or 3 % per day of battle. Although 2 % may be more realistic, this study will assume for the sake of conservatism that CFC's divisions present in the breakthrough sectors would suffer 3 % attrition per day. With an exchange rate of 3:1, North Korea would logically suffer 9 % attrition per day. 9 % of attrition looks quite a daring number. However, historically, intense armored battles saw 10 % or even more attrition per day⁷⁶.

The divisions which are not engaged on the most active parts of the front, the breakthrough sectors, would also suffer some attrition from limited engagements, commando operations, artillery fire, etc. 'Pinning attacks' for diverting enemy's forces from the main battlefields may also occur. The lack of pinning attacks is one of the reasons

⁷⁰ *Op.cit.* Michael O'Hanlon, 1998

⁷¹ *Op.cit.* Christopher A. Lawrence

⁷² *Op.cit.* Barry R. Posen, 1984

⁷³ *Op.cit.* Barry R. Posen and the MIT DACS Conventional Forces Working Group

⁷⁴ Command and General Staff College, *ST 101-6 G-4 Battle Book*, Fort Leavenworth, KS: US Army Command and General Staff College, 1991

⁷⁵ Robert J. Best, *A Study of Battle Casualties among Equivalent Opposing Forces: Korea, September 1950*, Chevy Chase, MD: Operations Research Office, 1952

⁷⁶ *Op.cit.* Barry R. Posen, 1984

of the German failure in the Bulge⁷⁷. A 1 % rate of attrition per day is assumed for both sides' non-breakthrough sector troops⁷⁸.

d.3. Advance rate

Another necessary parameter is the advance rate. It indicates the pace of progression of the North Korean divisions in the model. First of all, it is to be remembered that “modern mechanized armies have frequently found forward movement against determined defenders to be very difficult”⁷⁹.

Posen estimates that in a war in Central Europe, the Warsaw Pact would advance from 2—according to NATO’s hopes—to 5 kilometers—according to the Pact’s hopes—per day. But he also notices that 2 km per day is already a quite pessimistic view. During the Second World War, the Allies sometimes failed to progress more than 1 km per day even when they had full air superiority and they outnumbered the Germans 5:1⁸⁰. This is for example visible during the 1944 British-led Operation Goodwood where the British advanced 8 km the first day but only 1 km per day the next two days⁸¹.

Indeed, advance rates vary widely following the context. During Operation Zitadelle, the Germans advanced almost 11 km per day the first three days for an average of 6.4 km/day for the first week while the Americans advanced 8.1 km per day during Operation Cobra, but with a far more favorable force ratio⁸². In the 1940 Battle of France, the Germans progressed almost 20 km per day but when they encountered stiff resistance for crossing the Meuse and seizing Sedan, the advance was reduced to around 7 km per day. In El Alamein, Montgomery advanced only 2.4 km per day despite air superiority and a 3:1 advantage in troops and hardware⁸³. From June 25 to the end of July 1950, North Korean troops progressed on average of 11.3 km per day against a weak and crumbling South Korean resistance⁸⁴. During their October 1950 counteroffensive toward the North, the UN forces gained 18 km per day against the collapsing Korean People’s Army⁸⁵. Record thus logically states that sustained advance rates of 7 km per day or more seem to occur

⁷⁷ *Op.cit.* Barry R. Posen and the MIT DACS Conventional Forces Working Group

⁷⁸ *Op.cit.* Barry R. Posen, 1984; *op.cit.* Command and General Staff College

⁷⁹ *Op.cit.* Barry R. Posen, 1984, p. 56

⁸⁰ *Op.cit.* Barry R. Posen, 1991

⁸¹ *Op.cit.* Barry R. Posen and the MIT DACS Conventional Forces Working Group

⁸² Niklas Zetterling and Anders Frankson, *Kursk 1943: A Statistical Analysis*, Abingdon-on-Thames, UK: Routledge, 2004

⁸³ *Op.cit.* Jeffrey Record

⁸⁴ Marshall Andrews, *Rates of Advance in Land Attack against Unprepared Forces*, Bethesda, MD: Operations Research Office, 1960. Cited in Robert L. Helmbold, *A Compilation of Data on Rates of Advance in Land Combat Operations*, Bethesda, MD: US Army Concepts Analysis Agency, 1990

⁸⁵ *Op.cit.* Jonghyuk Chung

only in the face of a weak, disorganized or even inexistent resistance⁸⁶.

O'Hanlon assumes that the North Koreans could gain up to 4 or 5 km per day—this already being pessimistic—in a potential invasion of the South⁸⁷. This study will so follow him and grant to the North Korean troops a very favorable advance rate of 4 km per day. Such an advance rate is very optimistic for the KPA. History shows that it is extremely hard to progress into well-defended mountainous area. In this regard, the example of the Battle of Chuncheon at the opening of the Korean War is telling. The kind of terrain which dominates most of the peninsula would turn any armored conflict into a 'king of the mountain'-like war⁸⁸. It should also be noted that advance rates tend to be somewhat higher during summer than during winter⁸⁹.

The Kugler-Posen model naturally expects the length of the FEBA to expand as the attacker advances. The flanks of the expanding salients in the breakthrough sectors have to be populated by both the attacker and the defender. The defender has to keep the attacker from progressing more by expanding the salient and the attacker has to keep the defender from using the undefended flanks for counterattacking the rear of its spearheads. Since the attacker is expected to gain 4 km per day on two axes, the FEBA would expand 12 km per day, requiring each side to devote almost one ADE for populating the new sections of the FEBA. The eastern flank of the East Coast corridor is of course to be excluded, since it is made by the sea. If the defender is unable to maintain the force-to-space ratio, it may suffer a catastrophic breakthrough of its lines. If it is the attacker which is unable to do so, its offensive may be thwarted.

3) Results

a. Model's results

This campaign analysis only covers the few first days of a conflict. As already mentioned, because of the lack of available war supplies, any conflict has to be short for the North Koreans⁹⁰. The North does not have the industrial and economic might to withstand an attrition war with South Korea and the United States. Contrary to the first Korean War, a

⁸⁶ *Op.cit.* Jeffrey Record; see also *op.cit.* Christopher A. Lawrence

⁸⁷ *Op.cit.* Michael O'Hanlon, 1998

⁸⁸ *Op.cit.* C. P. Cameron

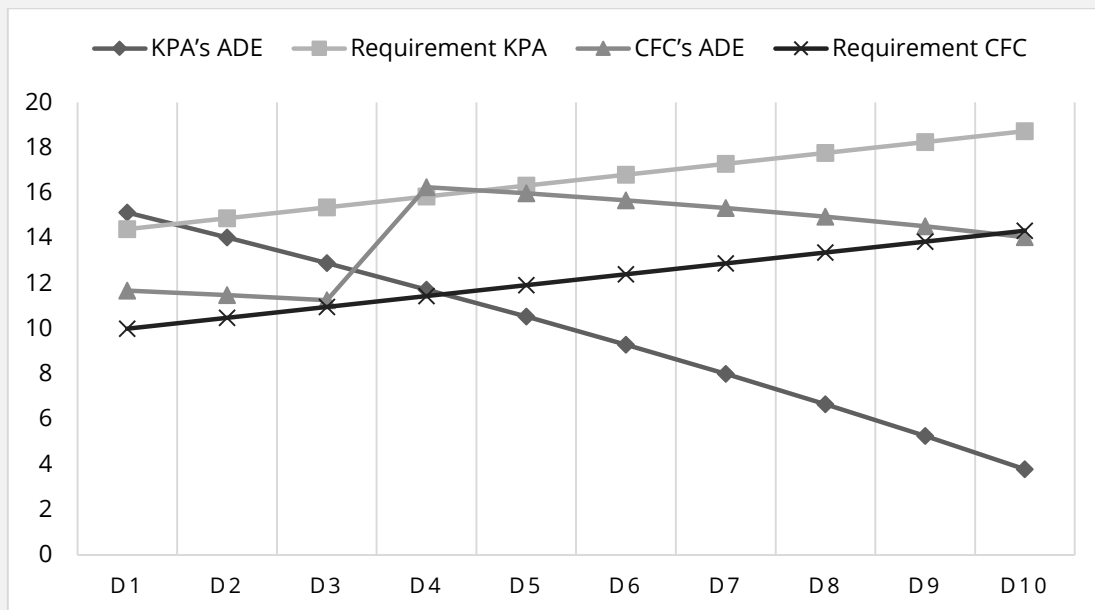
⁸⁹ *Op.cit.* Robert L. Helmbold

⁹⁰ *Op.cit.* Edward B. Atkeson; *op.cit.* Jae-Jung Suh, 1999

second conflict would probably see very little, if any, Russian and Chinese support for a renewed North Korean offensive⁹¹. Moreover, after ten days, a significant number of US troops would be able to pour into the battlefield and possibly crush the KPA. This is coherent with General Hollingsworth’s “nine day scenario”⁹². Lee also estimates that the outcome of a Second Korean War would be fixed within the first two weeks and that the KPA is planning for a victory within seven days⁹³.

There are several possible war termination conditions. First, for North Korea, victory would be to reach Seoul, which is 47 kilometers away from the border. Another way to win would be to inflict so many casualties on the CFC’s forces that they cannot oppose a dense defense of the FEBA and that the KPA is able to break through their lines. Winning for the CFC means holding Seoul and depleting the KPA so much that it lacks the forces to fully populate the FEBA and is unable to keep moving forward anymore. For populating the FEBA on the first day, the KPA needs 14.4 ADE while the CFC needs 10. These requirements increase with the growth of the North’s salients due to the KPA advance of 4 km per day.

Figure 1. No KPA’s reserve scenario



The model has been used for describing a North Korean assault with and without counting the reserves. In the scenario with no reserve (Figure 1), the DPRK is defeated on the second day of conflict after advancing a mere four kilometers; it lacks the combat power to populate the whole FEBA. The CFC is able to hold the front without risking a

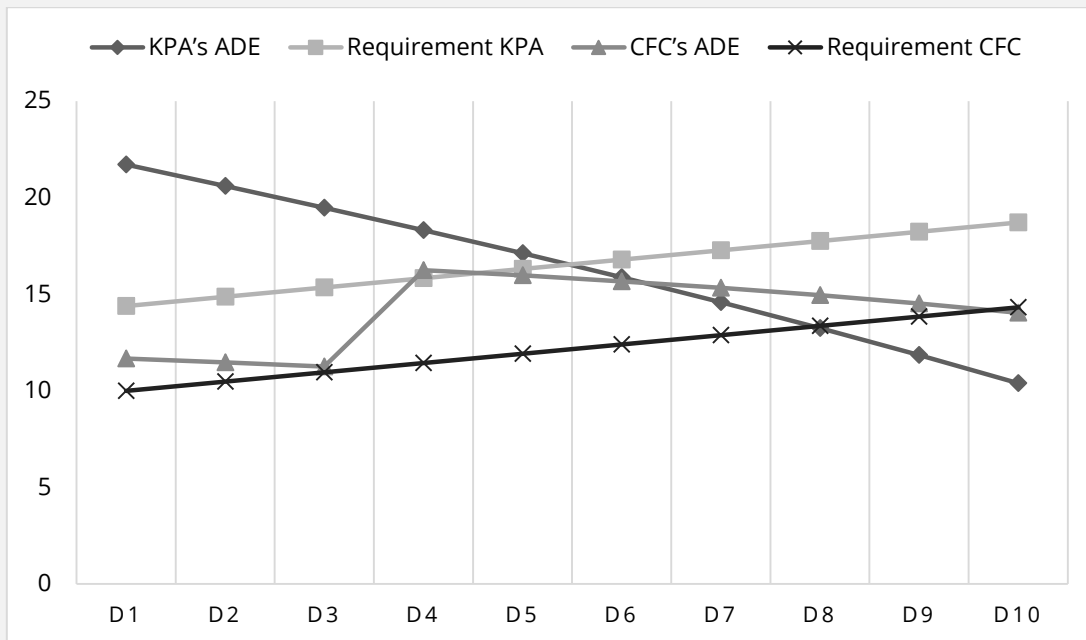
⁹¹ Although it cannot be totally ruled out, depending on the international context

⁹² Russell Spurr, “The Hollingsworth Line,” *Far Eastern Economic Review*, Vol 91, Issue 9, 1976, p. 27

⁹³ *Op.cit.* Chung Min Lee

catastrophic breakthrough.

Figure 2. KPA's reserves included scenario



In the scenario with reserves (Figure 2), the CFC begins to lack troops to populate the FEBA only on the tenth day while the KPA comes to the same situation on the sixth. It means that the North Korean offensive would theoretically come to a stalemate far before reaching Seoul.

This study's results are overwhelmingly optimistic, since the DPRK is defeated even under the most heroic assumptions and after a series of 'if': if the North can mobilize all of its reserves without being detected and if US reinforcements do not start arriving during the first ten days. Many of the aforementioned assumptions are very conservative and quite unrealistically favorable to the North. Geographical constraints and bottlenecks do not bother the KPA much; combat power scoring has been magnanimous; exchange rate is reasonable; advance rate against such an entrenched opponent is legendary; CFC's aircraft sortie rate and lethality are very low, and its air forces and ground forces attrition rates are rather high. In almost any case, the CFC should win a Second Korean War.

It is generally estimated that one casualty out of four is a killed in action—KIA⁹⁴. If the output of five days of the no-reserve scenario is used and if one assumes that the KPA has a divisional manpower of 560,000 men and the CFC one of 450,000 men, they respectively suffered a 30 % and an 8 % loss of the initial force. The KPA endured 170,000 casualties including around 43,000 KIA and the CFC endured 36,000 casualties including 9,000 KIA.

⁹⁴ *Op.cit.* Christopher A. Lawrence; *op.cit.* Michael O'Hanlon, 1998

Among them, 1,700 would be US casualties, resulting in 400 KIA.

The present study's results are grossly in line with older ones. According to Atkeson, the DPRK would have been stopped along the Imjin River in one week or even less⁹⁵. After one month and ten days of war, North Korean troops would be on the verge of collapse and Allied troops would already be 50 kilometers into North Korean territory. It is also consistent with other models such as Dupuy's Quantified Judgment Model⁹⁶ or Suh's simplified version of the Adaptive Dynamic Model⁹⁷.

Such models as the one used here are mere abstractions that necessitate gross simplifications of warfare, which is far more complex than a simple competition in firepower along a frontline. It misses numerous other factors, some of which would still probably be advantageous to the CFC. "In Korea, infantry is the arm of choice for assaults and defenses in the forward areas, with artillery playing a major role in these engagements. The lack of armor to protect the infantry and the large amounts of artillery present suggest that attrition should be much higher than one would expect in a European case [...] attrition rates may be, relatively, two to four times higher"⁹⁸. During a war, North Korean artillery would have to move out of their hardened artillery sites for following progressing forces. They would be at great risk in the open while CFC's tubes could stay in their shelters⁹⁹.

Moreover, since area-effects munitions would decimate North Korean forces, only the hardest targets— namely tanks—would be able to pass through the 'meat grinder'. The KPA would be greatly imbalanced, since following artillery, infantry, and logistics would suffer far more. North Korean 'mechanized' units are mainly truck-mobile infantry units and it is dubious that simple trucks can survive for long on a modern battlefield. The North's tanks isolated from infantry, artillery, and air defense would not fare very well¹⁰⁰. *Blitzkrieg* practitioners usually use close air support to circumvent the lack of artillery to cover the tanks¹⁰¹. However, as discussed earlier, the KPAAF is likely to get trounced at the very outset of any war.

It has been estimated that a M60A1 matched against a T-62 with a combination of

⁹⁵ *Op.cit.* Edward B. Atkeson

⁹⁶ Trevor N. Dupuy, "New Perspectives on the Security of Korea," *The Korean Journal of Defense Analysis*, Vol 1, Issue 2, 1989, pp. 199-216; for a good assessment of this model, see Joseph F. Ciano, "The Quantified Judgment Model and Historic Ground Combat," MA diss., Naval Postgraduate School, 1988

⁹⁷ *Op.cit.* Jae-Jung Suh, 2007

⁹⁸ *Op.cit.* Patrick Allen, p. 34

⁹⁹ *Op.cit.* Edward B. Atkeson

¹⁰⁰ *Op.cit.* Nick Beldecos and Eric Heginbotham

¹⁰¹ Richard J. Stoll, "The Russians Are Coming: A Computer Simulation," *Armed Forces and Society*, Vol 16, Issue 2, 1990, pp. 193-213

obstacles and prepared defensive positions can hope to obtain an exchange rate of 17.4:1 when a 1:1 force ratio is applied and a 10.1:1 exchange rate when a 2:1 force ratio is applied¹⁰². While the KPA still massively relies on tanks equivalent or older than the T-62, the CFC has in its inventory far more powerful tanks than the M60A1.

If North Korea was nevertheless against all odds on the verge of breaking through the defenses of the South, the superiority of the CFC in C4ISR systems would help it to identify breakthroughs sectors early enough to send reinforcements for closing any potential hole¹⁰³. The CFC is well-positioned with highly mobile reserves for counterattacking advancing enemy's spearheads¹⁰⁴. Moreover, since the control of large military formations in urban areas is more difficult, the CFC would have an edge if fighting was to break out in urban areas such as Seoul's suburbs, once again because it has better C4ISR systems than the KPA¹⁰⁵.

Finally, even if one does not trust mathematical models, the simpler '3:1 rule' points in the same direction. It is a rule of thumb used by the military and scholars as a guideline to follow if one wants to successfully defend a position and thwart an offensive. It is based on the expectation that the attacker usually suffers more casualties than the defender, since the defender has the benefit of prepared positions, known terrain and that the attacker has to advance over open terrain, where it is exposed to enemy fire. "As a rule of thumb, [the defenders] should seek not to be outweighed more than 3:1 in terms of combat power. With very heavy air and field artillery support on favorable terrain, it may be possible to defend at a numerical disadvantage of something like 5:1 for short periods of time"¹⁰⁶. It has been used by military planners since before World War I¹⁰⁷. The British during the First World War concluded that "in a conflict between foes of the same standard of skill, determination and valour, numbers approaching three to one are required to turn the scale decisively"¹⁰⁸. According to the Wehrmacht general Gotthard Heinrici, based on his experience on the Eastern Front during World War II, for breaking through a firm and dense defense, a 3:1 advantage is a bare minimum¹⁰⁹. Consequently, "an attack requires more than a 3:1 advantage on each main axis to succeed" in breaking

¹⁰² *Op.cit.* Jae-Jung Suh, 2007

¹⁰³ *Op.cit.* Jonghyuk Chung

¹⁰⁴ *Op.cit.* Edward B. Atkeson

¹⁰⁵ *Op.cit.* Paul Bracken

¹⁰⁶ Headquarters, Department of the Army, *FM 100-5 Operations*, Washington, DC: US Government Printing Office, 1976, p. 5-3

¹⁰⁷ Charles A. Kupchan, "Setting Conventional Force Requirements: Roughly Right or Precisely Wrong?" *World Politics*, Vol 41, Issue 4, 1989, pp. 536-578

¹⁰⁸ *Op.cit.* B. H. Liddell Hart, p. 203

¹⁰⁹ B. H. Liddell Hart, *The German Generals Talk*, New York, NY: Quill, 1979, p. 216

through the defensive lines and wrecking the enemy's rear¹¹⁰. The rule should be understood for a corps sector or smaller; it is not theater-wide¹¹¹.

If this rule is to be followed, a 1.5:1 advantage at the theater level may be enough to muster a sufficient force ratio at the sector level. Accordingly, North Korea would have a hard time trying to muster locally a 3:1 force ratio for breaking through the CFC's lines. The force ratio no matter whether reserves are included or not does not exceed 1.3:1 (reserves included: 21.7 KPA ADE against 16.9 CFC ADE; reserves excluded: 15.1 KPA ADE against 11.7 CFC ADE). This is another clue of the difficulty of winning a war for the North.

b. Results discrepancy and North Korea's force levels

The failure of the KPA to populate the FEBA on the second day of a war without mobilizing its reserves is puzzling. The FEBA is only 250 kilometers long and, according to *The Military Balance 2018*¹¹², the North Korean ground forces muster a gigantic 1,100,000 troops—the equivalent of the whole Russian army. This discrepancy can be explained in several ways. An overview of North Korean divisional manpower according to its estimated TOE shows that it should have around 560,000 men which represent the equivalent of around 50 notional divisions strong of 11,000 men¹¹³. However, this study's methodology assigns the DPRK a total combat power of around 15 ADE. Such a result is due to the fact that the KPA is mostly made of infantry units which are relatively light and lacking punch compared to more heavily armored forces but also because of the disrepair of its mostly out of date weaponry. Nevertheless, if the divisional manpower is around 560,000, where have the remaining 540,000 troops gone?

The Military Balance gives the figure of 1,280,000 men for the whole KPA and the one of 1,100,000 men for the ground forces alone. As aforementioned, this figure looks very large. For understanding the figures of North Korea's armed forces, it is enlightening to

¹¹⁰ *Op.cit.* John J. Mearsheimer, 1982, pp. 16-17

¹¹¹ For a detailed discussion of the 3:1 rule, see: John J. Mearsheimer, "Assessing the Conventional Balance: The 3:1 Rule and Its Critics," *International Security*, Vol 13, Issue 4, 1989, pp. 54-89; Paul K. Davis, *Aggregation, Disaggregation, and the 3:1 Rule in Ground Combat*, Santa Monica, CA: RAND Corporation, 1995. For a critic of this rule, see: *op.cit.* Christopher A. Lawrence; Joshua M. Epstein, "Dynamic Analysis and the Conventional Balance in Europe," *International Security*, Vol 12, Issue 4, 1988, pp. 154-165; Joshua M. Epstein, "The 3:1 Rule, the Adaptive Dynamic Model, and the Future of Security Studies" *International Security*, Vol 13, Issue 4, 1989, pp. 90-127. Dupuy's calculations also tend to accredit the 3:1 rule: Trevor N. Dupuy, "Mythos or Verity? The Quantified Judgment Model and German Combat Effectiveness," *The Journal of Military History*, Vol 50, Issue 4, 1986, pp. 204-210

¹¹² *Op.cit.* The International Institute for Strategic Studies

¹¹³ *Op.cit.* James M. Minnich; *op.cit.* Marine Corps Intelligence Activity

compare the ratio of man-to-system in both North Korean navy and air force with the ones of other countries to know if their figures also suffer from the same discrepancy. The US Air Force has a man-to-system ratio of 78:1, the Russian Air Force has a 55:1 ratio and the Chinese People's Liberation Army Air Force has one of 102:1. Pertaining to navies, the US ratio is 1173:1, the Russian one is 581:1 and the Chinese one is 533:1. North Korean ratios for the air force and the navy are not bigger than the ones of other countries. The air force has a man-to-system ratio of 78:1 and the navy a ratio of 122:1—the navy is made at 80% of small coastal crafts. Hence, this mysterious excess of men noticed can only originate from the ground forces.

A gross estimation of Russian ground forces' divisional manpower based on *The Military Balance* gives around 250,000 men. If one retrenches a notional 10% of the force dedicated to general headquarters and overhead¹¹⁴, *The Military Balance's* number of 280,000 men looks very coherent. Russia, however, has an 180,000 men-strong general command and support service while North Korea does not. The discrepancy of the KPA's figure may be explained by the fact that support forces are included into the ground forces count. If a notional 40% of the Russian command and support service is dedicated to the ground forces, it means that 72,000 men are required to support 280,000 (almost 1:4)¹¹⁵. With the same notional 10% for general headquarters and overhead added to its 560,000 divisional troops, the DPRK would so need around 150,000 men for supporting 620,000—a total of 770,000 men. The whole KPA would so number around 950,000 personnel and the ground forces would be 30 % smaller than what is believed. Since Russian troops are equipped with more numerous and more modern hardwares, it is likely than North Korea needs far less support troops than Russia. The estimations developed here are probably an upper bound.

Miyamoto states that Korean Ministry of National Defense, Japanese Ministry of Defense, and IISS' estimations are unsourced and systematically too high and that alternative sources do exist¹¹⁶. According to him, the KPA represented 700,000 men in 2008 and composed 3% of the North Korean population. 3% of today's population would grossly amount to 760,000 men. The 700,000 men figure seems to be a low estimation and 1,280,000 a very high one. The truth is probably somewhere in between. Maintaining a 1,280,000 men-strong army for generating so little combat power would indeed be a high price to pay. The results of this study encourage to take mainstream data with a grain of salt. For example, it is well-known that during the Cold War, the intelligence community

¹¹⁴ Estimation used in *op.cit.* Barry R. Posen, 1991

¹¹⁵ Since ground forces represent around 40% of the whole Russian armed forces

¹¹⁶ Satoru Miyamoto, "Military Organizations and Force Strength of Korean People's Army," Paper presented at The World Conference on North Korean Studies, Seoul, 13-14 October 2015

generally overestimated Soviet force levels¹¹⁷.

4) Conclusion

Campaign analysis cannot be a reflection of how a war could or would unfold¹¹⁸. Only the experimentum crucis that would be an actual conflict can provide a definitive answer. It is however an interesting approach for analyzing both sides' military postures. This study has hopefully argued that the CFC stands tremendous odds to win a Second Korean War if it was to erupt. The military balance was far worse in the 1980s, when it was believed that the North could win a war within two weeks¹¹⁹. Some argue that the North has circumvented its relative military decline by stepping up its artillery capabilities for striking heavily on Seoul¹²⁰. However, it is hard to imagine a situation where an artillery barrage on Seoul would not lead to a South Korean/American riposte and to a larger conflict¹²¹. If North Korea really commits to effective denuclearization, the South Korea/US alliance is sure to enjoy a net conventional military superiority on the peninsula¹²².

However, South Korea should envision any reduction of its forces quite carefully. Seoul has indeed already announced its intentions to unilaterally reduce its manpower¹²³. Its current force posture represents a perfect mix for stopping any North Korean invasion. Massive reductions of forces should happen only if they are compensated by equivalent gestures from the North. Although the United States add little ground combat power, its air support is an important piece of the puzzle. For staying on the safe side, the CFC should be maintained until the status quo evolves significantly because it has a real military utility¹²⁴.

¹¹⁷ Matthew A. Evangelista, "Stalin's Postwar Army Reappraised," *International Security*, Vol 7, Issue 3, 1982, pp. 110-138; Raymond L. Garthoff, "Estimating Soviet Military Force Levels: Some Light from the Past," *International Security*, Vol 14, Issue 4, 1990, pp. 93-116

¹¹⁸ *Op.cit.* Charles A. Kupchan

¹¹⁹ Kwan-Chi Oh, "The Military Balance on the Korean Peninsula," *The Korean Journal of Defense Analysis*, Vol 2, Issue 1, 1990, pp. 95-109

¹²⁰ *Op.cit.* Bruce E. Bechtol

¹²¹ On the current artillery threat, see Yvonne K. Crane, Gian Gentile, Dan Madden, Michael J. Mazarr, and Stacie L. Pettyjohn, *The Korean Peninsula: Three Dangerous Scenarios*, Santa Monica, CA: RAND Corporation, 2018

¹²² It should not be forgotten that North Korea has a stock of at least 2,500 tons of chemical weapons: John V. Parachini, *Assessing North Korea's Chemical and Biological Weapons Capabilities and Prioritizing Countermeasures*, Santa Monica, CA: RAND Corporation, 2018. However, these weapons should not affect considerably the outcome of a conflict: *op.cit.* Michael O'Hanlon, 1998

¹²³ The Straits Times, "South Korea Unveils Defence Reform Plan," 28 July 2018, <https://www.straitstimes.com/asia/east-asia/south-korea-unveils-defence-reform-plan>, accessed 20/09/2018

¹²⁴ Hwee Rhak Park, "The Transfer of Wartime Operational Control in Korea: History, Risks and Tasks from a Military Perspective," *The Korean Journal of International Studies*, Vol 8, Issue 2, 2010, pp. 327-351

The issue of South Korean force levels goes beyond the North Korean case. If North-South relations keep improving and, either by disarmament or reunification, the North is no longer a threat to the South, China would become the new main threat for Korea. The Peninsula, whether or not reunified, would need to maintain significant forces for dealing with such a formidable neighbor¹²⁵. Coincidentally, US presence on the Korean Peninsula is not only a deterrent against the DPRK; it has also a critical asset in the strategic competition with China in Northeast Asia.

Regarding North Korea, two main scenarios can be envisioned. The first one is the pursuit of the current stalemate. The country continues to invest huge amounts of money and manpower into its gigantic military apparatus. Its hardwares are already mostly obsolete and it can only get worse and worse. Although a massive army can be psychologically rewarding and maintains the illusion of power, it would only be a paper tiger impeding economic development by diverting a significant part of the workforce.

In the other scenario, the DPRK utilizes economic betterment for downsizing and modernizing the KPA. It is basically the path followed by Russia and China in recent years: fewer men but better trained and equipped with better weapons. For example, a notional mix of 18 1980s Soviet motorized rifle divisions, five tank divisions, and three artillery divisions would generate more firepower than the current force¹²⁶. On the basis of the calculations made in the previous section, KPA's ground forces could be reduced to less than 400,000 men if only the infantry units could be fully mechanized and reequipped with more modern equipment (286,000 divisional troops, 30,000 overhead and HQ personnel, and 79,000 general support personnel; the overall figure for the KPA hence becomes 580,000 out of 950,000 originally). Such a modernization and troop reduction effort would have several beneficial effects for the regime: although it does not decrease the KPA effective combat power, it releases workforce for the development of the economy. Downsizing the army away from the one million men figure may also help alleviate the feeling of threat experienced by Japan, South Korea, and the United States and pave the way for more productive relationships. North Korea may use Russian or Chinese weaponry and assistance for reaching these goals. However, buying masses of new weapons would be extremely expensive for such a limited economy.

Notwithstanding these issues, this analysis has shown that South Korea and its American ally should be able to deter any North Korean invasion. The North could be tempted to

¹²⁵ Hyun Lee, "An Analysis of Size and Structure of the Army of Reunified Korea," MA diss., Naval Postgraduate School, 2010

¹²⁶ On a T-72 tank basis: *op.cit.* Allen D. Raymond. This would represent 15.8 ADE, compared to the current 15.1

launch a *blitzkrieg* if a sudden occurrence or political collapse makes the South an easy prey. It might also come from an attempt to preempt a South Korean/US attack or from the influence of aggressive Russian or Chinese policies. However, such scenarios are far-fetched. Because of an unfavorable military balance, an invasion of the South is simply not a serious option.



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