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Fighting Russia? Modeling the Baltic Scenarios

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ABSTRACT: This article presents five scenarios that might result from a Russian coup de main in the Baltic region. The author argues the North Atlantic Treaty Organization should analyze force capabilities further to ensure Alliance nations can adequately respond if Russia attacks across its border with Estonia and Latvia.

Russia's annexation of Crimea, involvement in Donbas, and support of the Bashar al-Assad regime in Syria have strained the country's relations with the West. Throughout this period of increased tension, defense analysts from countries in the North Atlantic Treaty Organization (NATO) have explored ways to deter or defeat additional acts of aggression committed by Russia. Current literature covers a variety of topics such as conventional war scenarios, deterrence strategies, cyber defense, countering political subversion, and the status of Russia's military.[1] Through quantitative modeling, this article contributes to this discussion by examining how variances in force employment and size affect Russia's chances of employing conventional warfare to expand into the Baltic region.[2]

Although an open conflict between Russia and the West is unlikely due to the escalation risks between states with nuclear weapons, should a war erupt, it would most likely be fought along Russia's border with Estonia and Latvia.[3] Within these nations reside many ethnic Russian minorities who form enclaves similar to those Moscow "intervened" on behalf of in the Ukraine. That intervention led NATO to enhance its military presence in the region for deterrence purposes.[4]

One scenario suggests Russia may attempt to conquer the Baltic countries with a hasty attack along its border. Such an operation would

1 Wesley Clark et al., *Closing NATO's Baltic Gap* (Tallinn, Estonia: International Centre for Defence and Security, 2016); Andrew Radin, *Hybrid Warfare in the Baltics: Threats and Potential Responses* (Santa Monica, CA: RAND Corporation, 2017); Phillip Karber and Joshua Thibeault, "Russia's New-Generation Warfare," Association of the United States Army, May 20, 2016; Timothy L. Thomas, *Russia Military Strategy: Impacting 21st Century Reform and Geopolitics* (Fort Leavenworth; KS: Foreign Military Studies Office, 2015); and Michael Connell and Sarah Vogler, *Russia's Approach to Cyber Warfare* (Arlington, VA: CNA, 2017).

2 Douglas Macgregor to the National Commission on the Future of the Army, "Competitive Performance Analysis of US Army Brigade-Based Force and Alternative Force Design, Reconnaissance Strike Group (RSG) in Baltic Warfighting Scenario," September 7, 2015, National Commission of the Future of the Army; Leszek Elak and Zdzisław Śliwa, "The Suwałki Gap: NATO's Fragile Hot Spot," *Zeszyty Naukowe AON* 103, no. 2 (2016): 24–40; and David A. Schlapak and Michael W. Johnson, *Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics* (Santa Monica, CA: RAND Corporation, 2016).

3 R. Reed Anderson et al., *Strategic Landpower and a Resurgent Russia: An Operational Approach to Deterrence* (Carlisle, PA: Strategic Studies Institute, 2016), 11–15; and "The Geopolitics of Russia: Permanent Struggle," Stratfor, April 15, 2012.

4 NATO, *NATO's Enhanced Forward Presence* (Brussels: Public Diplomacy Division, 2017).

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likely be more tempting to Moscow than war after a deliberate buildup.[5] Although the latter strategy would allow the superior strength of NATO allies to be mobilized to defend its small members, a RAND study argued the Alliance would suffer a quick defeat if Russia attempted the former.[6] Optimal force employment is one important factor to consider in such analysis due to its impact on combat outcomes and its role in determining regional military requirements.[7] Better estimates of these requirements can also reduce the probability of overcommitting scarce security resources.

Based on the modeling, a forward-oriented defense would be untenable. But NATO could prevent a coup de main from succeeding with a different set of employment choices. These efforts would need to include a defense arrayed in depth with positions minimally exposed to observation and a large force kept in reserve. Stopping Russia's offensive may require ceding parts of Estonia's and Latvia's eastern territories as well as maintaining soldiers at a high state of readiness to implement complex force-employment choices. Additionally, if Russia increases its available strength by keeping more units near its western border or acquiring more personnel, NATO defenders could still be overrun. Because Russia appears to be taking such actions while also modernizing its military, additional NATO forces and improved weaponry will likely be needed in the near future.

Modeling Choice and Explanation

Civilian researchers often lack access to sophisticated computer programs and to wargaming models used by military and defense contractors since the 1980s.[8] Of the options publicly available, many treat questions of force employment implicitly or offer few variables.[9] Although less detailed and precise than sophisticated computer models used by the Pentagon, Michael E. O'Hanlon explains comparatively simpler models can make up for this shortcoming by "requiring a user to think pragmatically, historically, and intuitively about the modeling enterprise—rather than running the risk of getting lost in the math."[10] Thus, this article draws from Stephen Biddle's *Military Power*, which explains how increasingly lethal weaponry made mass movement in the open impossible, or at best very costly, by the early twentieth century.

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5 John W. Nicholson, "NATO's Land Forces: Speed and Strength Matter," *Prism* 6, no. 2 (2016): 31.

6 Schlapak and Johnson, *Reinforcing Deterrence*. For a counterargument and rebuttal, see Michael Kofman, "Fixing NATO Deterrence in the East Or: How I Learned to Stop Worrying and Love NATO's Crushing Defeat By Russia," War on the Rocks, May 12, 2016; and Karl Mueller et al., "In Defense of a Wargame: Bolstering Deterrence on NATO's Eastern Flank," War on the Rocks, June 14, 2016.

7 Force employment refers to the operational concepts, doctrine, and tactics used by militaries.

8 John A. Battilega and Judith K. Grange, eds., *The Military Applications of Modeling* (Wright-Patterson Air Force Base, OH: Air Force Institute of Technology Press, 1984).

9 The combat model of COL Trevor N. Dupuy, US Army retired, does not have force employment explicitly counted despite a broad array of variables. Joshua Epstein's work at the Brookings Institution only has the attacker's rate of advance and the defender's rate of withdrawal as force employment variables. Trevor N. Dupuy, *Numbers, Predictions, and War: Using History to Evaluate Combat Factors and Predict the Outcome of Armed Conflict* (Fairfax, VA: Hero Books, 1985); and Joshua M. Epstein, *The Calculus of Conventional War: Dynamic Analysis without Lanchester Theory* (Washington, DC: Brookings Institution, 1985), 21–22.

10 Michael E. O'Hanlon, *The Science of War: Defense Budgeting, Military Technology, Logistics, and Combat Outcomes* (Princeton, NJ: Princeton University Press, 2009), 72.

As a consequence, combatants adopted a series of force employment techniques that created a strategy of a "tightly interrelated complex of cover, concealment, dispersion, suppression, small-unit independent maneuver, and combined arms at the tactical level, and depth, reserves, and differential concentration at the operational level of war."[11] While this system, or major elements of it, can lead to better combat outcomes, it is not synonymous with good practice. Instead, surviving modern firepower requires trade-offs. Additionally, the complexity of this system makes it difficult for unskilled soldiers to implement.

Biddle's aggregate and deterministic representation, which explains how force employment affects the outcome of continental warfare, measures technological sophistication with a weighted average of the years tanks and combat aircraft were introduced for the two combatants. This article adds factors for anti-tank weapons and armored vehicles to provide a more accurate metric for the equipment likely to be deployed in contemporary Baltic scenarios.

Although this method does not provide a level of detail equal to computer simulations, it is a viable option for allowing a single person to make computations while accounting for numerous, quantifiable variances in force employment. Moreover, this model can help predict the likelihood of a defender containing an offensive before it manages to break through the depth of the defensive positions. If the offensive is likely to be contained, the amount of ground gained by the attacker can be calculated. The approach also provides outputs for casualties, territorial gains, and campaign duration based on changes in variables.

The model assumes breakthroughs, which provide an attacker with the chance to gain ground at low cost, lead to high defender casualties and territorial loss, but without specific quantities. Such feats can give the attacker control of the entire theater of operations as, once past the main defenses, the force moves quickly in the open to envelope or isolate forward deployed defenders. Additionally, the attacker can sever the defender from supporting units needed for sustainment. In this situation, defenders fight with greatly reduced effectiveness, devolve into panic and disorder, or even surrender.[12]

Force-Employment Variables

The model allows attackers to change the force employment variables of assault frontage and the velocity of his forces' assault with differing effects based on chapter 3 and the appendix of *Military Power*. Assault frontage is the width of the theater in which the attacker conducts an offensive operation. Narrower frontages allow the attacker to achieve a greater ratio of forces at the point of attack, which allows an offensive to penetrate deeper with all else equal. Drawbacks of narrower assault frontages include greater vulnerability to counteroffensives that threaten the attacker's lines of communication, resupply, and reinforcements due to fewer avenues for rapid movement. These frontages may also

11 Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2004), 3.

12 Biddle, *Military Power*, 42–44; and Christopher Bellamy, *The Evolution of Modern Land Warfare: Theory and Practice* (New York: Routledge, 2016), 17–21.

require an attacker to echelon units for the dispersion characteristic of modern tactics.

Velocity of assault refers to the attacker's net attempted rate of advance during an offensive. A lower assault velocity provides attackers with greater opportunity to implement modern system tactics. Furtive and dispersed movement, reconnaissance, and coordinating suppressive fire, are time-consuming actions. Ceteris paribus, lower assault velocities provide an attacker the ability to take a given amount of ground with fewer casualties or to expend a given number of casualties for more ground. Slower assault velocities have the cost of giving the defender more time to counterconcentrate against an offensive.

In terms of force employment, defenders can modify the fraction of their forward deployed forces exposed, the depth of their defensive positions, the velocity at which their forces in reserve move, and the fraction of their forces kept in reserve. The fraction of forward garrison exposed represents the vulnerability of the defenders not held in reserve. Given the lethality of modern weaponry, it is important to disperse defending soldiers in concealed, covered fighting positions. There is no incentive to increase exposure. But preparing defenses is a challenging task attempted with varying degrees of success.

Greater defensive depth extends the time an attacker needs to implement modern forces and it provides more time to concentrate against an offensive. Likewise, holding more forces in reserve results in more defenders for counterconcentration. At higher values, these two variables affect the attacker's ability to achieve a breakthrough and to make territorial gains.

Scenario Overview

The scenarios identified here involve a Russian offensive that begins after a period of hasty mobilization. Russia launches the offensive from its shared borders with Estonia and Latvia combined with minor attacks and demonstrations. The primary metrics are Russia's projected territorial gains regardless of the ability to break through NATO's defenses. If Russian troops achieve a breakthrough, it is assumed they take most of the Baltic territory. This article focuses on a coup de main scenario over one week and does not necessarily deny Russia the ability to make further advances during a prolonged campaign.

Several assumptions simplify the scenarios. First, the Russian ground units in the Kaliningrad oblast are not explored since 4 brigades from Polish and NATO reaction forces are assumed to defend the line of communications and the Suwalki Gap as well as reduce or contain offensive forces within the enclave. Because Russia has 3 maneuver brigades in that region when fully mobilized, the larger Allied forces are presumed at least able to contain any ground offensives originating in the enclave.[13]

Second, in the short period of one week and with air forces of comparable size, neither side is expected to achieve air superiority, to engage in a one-sided preliminary bombardment of the other, or to

13 Gudrun Persson, ed., *Russian Military Capability in a Ten-Year Perspective—2016* (Stockholm: FOI, 2016), 81.

achieve full deployment of all planned formations in the region. Because the opposing air forces will attempt to defeat their counterparts, neither combatant is likely to provide disproportionate air support to its ground forces within ten days postmobilization.[14]

The defined structures for Russia's and NATO's three progressively larger forces are based on recent and projected trends for expanding the strength of each combatant in the Baltic region. The depth of the defenses and the fraction of the defender's forward garrison exposed comprise the defender's variables of force employment. The attacker's variables include the width and velocity of assault, which will vary based on the defender's choices and the attacker's campaign objectives. To attempt a breakthrough, the attacker chooses a narrow width of assault and the slowest velocity of assault that allows a breakthrough within six days. This maneuver assumes the Russian exploitation on the seventh day begins the collapse of NATO's theater defense. In scenarios with limited aims, the attacker utilizes an increased width of assault to account for consolidating the defense of territorial gains and an assault velocity that will maximize territorial gain within seven days.

The width of the theater, a variable used for the model, is the total length of Estonia's and Latvia's borders with Russia. Including one-third of the length of the large lake border between Russia and Estonia accounts for an observation force and reduces the bias created with no NATO coverage in this area. Some of these troops could also be diverted to guard against disruptions from Russian infiltrators behind the front.

14 For similar reasoning by the RAND Corporation, see Schlapak and Johnson, *Reinforcing Deterrence*, 6.

Scenario 1. NATO's Defense versus Russia's Invasion (2016)

The first scenario considers the force sizes and the equipment of the two combatants in 2016, which provides an analysis of how NATO might have performed shortly after Russia invaded Ukraine. If NATO's defense at these force levels is successful, the Alliance could likely reduce its manpower in the Baltic, if Russia did so as well. Regarding the orders of battle, 11 active duty combat battalions in Estonia, Latvia, and Lithuania are mobilized. The United States deploys 3 light battalions and a reinforced Stryker battalion, while the United Kingdom musters an airborne battalion. From its Western Military District, Russia mobilizes 5 motorized infantry, 5 mechanized infantry, 8 airborne infantry, and 4 tank battalions.

Regardless of exposure, a defensive depth of 10 kilometers is inadequate for preventing a breakthrough. Additionally, the attacker can break through defenses prepared 30 kilometers deep except when there is low defensive exposure. Even then, advances extend into the last 3 kilometers, which given the deterministic nature of the model, suggests a breakthrough would still be plausible. Albeit narrowly at higher levels of exposure, 50 kilometers of defenses result in a contained offensive. In the case of limited aims offensives, the attacker can also break through against shallow defenses. Against deeper defenses, the attacker can be contained after an advance of 17–29 kilometers.

These results suggest that in 2016, the Baltic states would have been in danger even with the technology acquired since NATO began reacting to Russian aggression in Europe. Russia would have struggled to defeat a modern system defense with high depth and low exposure but could have achieved a breakthrough in most other cases. Alliance units would have to have been well-trained in implementing complex modern system techniques and have had their preparations completed on short notice, though. Furthermore, this outcome suggests that unless Moscow makes notable reductions in its western units and their readiness, NATO cannot reduce its own strength without risk. Russia has few feasible objectives for a limited offensive. There are few large towns in the eastern Baltics, with the exception of Narva, in Ida-Virumaa County, on the northeastern isthmus of Estonia.[15]

Scenario 2. NATO's Defense versus Russia's Expanded Capabilities (2017)

The second scenario examines NATO's ability to defend against a coup de main given the status of Russia's military buildup before 2017 without an expanded force on short notice nor further efforts of modernization. Changes to the Russian order of battle reflect raising 3 new divisions, partly from currently existing brigades, in the Western Military District.[16] Expected to have 4 maneuver regiments each, two divisions of the reformed Guards Tank Army are near full strength and 2–3 divisions are in early development. This article considers the third, an armored division, will also be raised and fully manned or

15 Ene Narusk and Liis Haugas, eds., *Regional Development in Estonia 2014* (Tallinn, Estonia: Statistics Estonia, 2014); and "Estonia: Administrative Division," City Population, accessed November 12, 2017.

16 Michael Kofman, "Russia's New Divisions in the West," *Russia Military Analysis* (blog), May 7, 2016; Michael Peck, "Next Stop Berlin? Moscow's Nazi-Killing Tank Unit Is Back," *National Interest* 142 (April 1, 2016); and "Chapter 5: Russia and Eurasia," *Military Balance* 117, no. 1 (2017): 218–21.

that high-readiness armored forces from neighboring districts will be available. These additions will allow Russia to mobilize the following additional battalions in time for the scenario: 3 tank, 2 motorized infantry, 1 mechanized infantry, and 1 airborne. infantry. Russian forces also have more modern equipment, such as larger numbers of AT-13 anti-tank missiles rather than AT-7s.

With this model, combinations of defensive depths and force exposure levels fail to contain a breakthrough attempt—except at depths of 50 kilometers and lower exposure. Even then, the attacker comes close to a breakthrough, suggesting a contained offensive would not be guaranteed. The capability of a limited aims offensive improves modestly, allowing Russia to advance a few more kilometers. Viable objectives, however, remain outside easy reach. Shallow defenses allow these limited offensives to achieve breakthrough, much as in the first scenario.

These results indicate NATO needed to expand the Baltic capability that was in place by the end of 2016 to provide an adequate defense of Estonia and Latvia. Even with well-trained and prepared soldiers, a Russian invasion on short notice before that expansion could have overrun large swathes of the Baltic countries.

Scenario 3. NATO's Enhanced Forward Presence versus Russia's Expanded Capabilities (2018)

This scenario examines the defense of NATO's current force, with an enhanced forward presence and units being raised by the Baltic countries, against a Russian coup de main.[17] Russia's order of battle is the same as in the previous scenario. The NATO force is augmented by a US Army armored brigade as well as formations from NATO's enhanced Forward Presence battlegroups for each Baltic country.[18] These units serve as a deterrent to Russian aggression in Eastern Europe, promising full Alliance participation in the event of a conflict.

The scenario portrayed in table 1 indicates breakthrough would only occur when the defensive depths are at 10 kilometers. The invasion is halted before penetrating into the deeper defensive positions. This scenario suggests NATO's current strength in the Baltics could defeat a Russian coup de main, and that no radical increases are needed for the near future. Furthermore, the defense could be successful with lower levels of readiness and training than the other scenarios, allowing more room for error. With limited aims, a Russian offensive could be halted with a forward-oriented posture and low levels of exposure. Such force employment by the defenders would be risky, though, as a breakthrough attempt could still penetrate shallow defenses. Otherwise, the ground gain of the invader is less than in previous scenarios, and few objectives are within reach in those cases.

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17 Srivari Aishwarya, Estonia To Invest in Ammunition and Armaments for Its 2nd Infantry Brigade, Army Technology, March 13, 2017; and "A New Brigade Named Žemaitija Is Established within the Lithuanian Armed Forces in Western Lithuania," Lithuanian Armed Forces, December 31, 2015.

18 NATO, *NATO's Enhanced Forward Presence*; John Vandiver, "New Tank Brigade Arrives in Europe for Mission in the East," *Stars and Stripes*, September 13, 2017; and "Boosting NATO's Presence in the East and Southeast," NATO, accessed August 11, 2017.

Table 1. Outcomes of NATO Enhanced Forward Presence versus Russia's Expanded Force (2018)

Breakthrough Attempt

Fraction of Forward Garrison Exposed	Depth of Forward Defenses	Width of Assault	Velocity of Assault	Ground Gained by Attacker	Breakthrough
	Depth, width, velocity, and ground in kilometers per day (km/day)				
0.10	10	5	1.67	14.23	Yes
0.10	30	5	5.00	18.82	No
0.10	50	5	8.33	20.12	No
0.25	10	5	1.67	16.95	Yes
0.25	30	5	5.00	22.35	No
0.25	50	5	8.33	23.87	No
0.40	10	5	1.67	20.93	Yes
0.40	30	5	5.00	27.50	No
0.40	50	5	8.33	29.34	No

Limited Aims Offensive

Fraction of Forward Garrison Exposed	Depth of Forward Defenses	Width of Assault	Velocity of Assault	Ground Gained by Attacker	
0.10	10	15	1.2	7.55	
0.10	30	15	2.0	13.45	
0.10	50	15	2.6	17.26	
0.25	10	15	1.3	8.70	
0.25	30	15	2.2	15.35	
0.25	50	15	2.9	19.53	
0.40	10	15	1.5	10.02	
0.40	30	15	2.6	17.38	
0.40	50	15	3.3	22.49	

*For each case, 50 percent of defenders are in reserve, moving at a velocity of 20 km/day.

	Combat Maneuver Personnel	**Year Major Weapon Systems Introduced (Weighted Mean)**
Aggressor	11,600	1985.4
Defender	11,870	1985.2

Scenario 4. NATO's Enhanced Forward Presence versus Russia's Planned Capabilities (2020)

The fourth scenario involves NATO's enhanced Forward Presence and a liberal estimate of the Russian army's strength in 2020. Russia's force structure notably includes all of the planned divisions in the Western Military District and the largest plausible unit rosters. The two divisions in the 1st Guards Tank Army and the airborne forces are assumed to be at a high state of readiness, able to mobilize more units for the invasion. These factors add an airborne battalion, 3 tank battalions, 2 mechanized infantry battalions, and 2 motorized infantry battalions. Although the newest ground combat vehicles, the T-14 Armata main battle tank and T-15 Bagulnik infantry fighting vehicle, are also capable of participating in the offensive, the costs combined with Russia's recent economic troubles suggest that only select units will receive them.[19]

At this strength, the invaders can break through shallow defenses regardless of the defender's exposure. At depths of 30 kilometers, the Russian attack leads to breakthrough in all but the lowest defender exposure levels. Even then, the offensive is contained less than one kilometer away from a breakthrough. A defensive depth of 50 kilometers leads to a contained offensive in all cases. The territorial gain from limited aims offensives are similar to those in the previous scenarios. Few major objectives are in easy reach, and any NATO attempt to limit the advance with a forward-oriented defense risks a breakthrough.

These outcomes suggest that even if Russia achieves its military buildup goals, an aggressive use of modern system force employment by the defenders could halt the attack. Consequently, an urgent need for NATO to strengthen its Baltic defenses further is absent even though modernizing weaponry, increasing force structures, improving readiness levels, and expanding training for soldiers would be wise.

Scenario 5. NATO's Expanded Forward Presence versus Russia's Planned Capabilities (2020)

In the fifth scenario, NATO expands its force structure to counter a Russian coup de main attempted in 2020 after Moscow's planned buildup. To the Alliance effort, the Baltic countries add 3 new maneuver battalions, and the United States contributes an additional armored brigade, which would bring the strength of America's ground forces in Europe to pre-2013 levels.[20] Other NATO members with a large population and defense budget—such as France, Germany, or the United Kingdom—could also provide the additional brigade. Russia's order of battle remains the same as in the fourth scenario. The NATO effort also benefits from improved weapon systems such as additional Javelin anti-tank missiles, CV90 infantry fighting vehicles, and Spike anti-tank missiles.[21] The results shown in table 2 indicate NATO can contain this Russian offensive when its defenses are 50 kilometers deep even with relatively exposed defenders.

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19 "Armata Main Battle Tank," Military-Today, accessed July 26, 2018.

20 John Vandiver, "Pentagon Lays Out Significant Cuts to U.S. Forces in Europe," *Stars and Stripes*, February 16, 2012.

21 "First IFVs Arrive in Estonia," *Postimees*, October 7, 2016; Thomas Newdick, "Fearing Russia, One of Europe's Smallest Armies Just Bought a Bunch of Armored Vehicles," War Is Boring, September 19, 2014.

Table 2. Outcomes of NATO Expanded Force versus Russia's Planned Force (2020)

Breakthrough Attempt

Fraction of Forward Garrison Exposed	Depth of Forward Defenses	Width of Assault	Velocity of Assault	Ground Gained by Attacker	Breakthrough
	Depth, width, velocity, and ground in kilometers per day (km/day)				
0.10	10	5	1.67	15.87	Yes
0.10	30	5	5.00	20.93	No
0.10	50	5	8.33	22.36	No
0.25	10	5	1.67	18.90	Yes
0.25	30	5	5.00	24.87	No
0.25	50	5	8.33	26.55	No
0.40	10	5	1.67	23.36	Yes
0.40	30	5	5.00	30.63	Yes
0.40	50	5	8.33	32.66	No

Limited Aims Offensive

Fraction of Forward Garrison Exposed	Depth of Forward Defenses	Width of Assault	Velocity of Assault	Ground Gained by Attacker	
0.10	10	15	1.20	8.40	
0.10	30	15	2.10	14.65	
0.10	50	15	2.80	18.58	
0.25	10	15	1.40	9.30	
0.25	30	15	2.40	16.33	
0.25	50	15	3.10	20.99	
0.40	10	15	1.60	10.70	
0.40	30	15	2.70	18.89	
0.40	50	15	3.50	24.17	

*For each case, 50 percent of defenders are in reserve, moving at a velocity of 20 km/day.

	Combat Maneuver Personnel	**Year Major Weapon Systems Introduced (Weighted Mean)**
Aggressor	15,120	1991.3
Defender	14,220	1988.3

The invasion could also be halted earlier by using defenses 30 kilometers deep with low levels of exposure. As previously identified, the shallow defenses failed to prevent a breakthrough. In the event of a limited aims offensive, a defensive depth of 10 kilometers leads to breakthrough only with exposed defensive positions. Most other combinations lead to advances of 14–25 kilometers. A moderate defensive depth of 30 kilometers leads to the attacker gaining less than 20 kilometers of ground. That depth combined with low exposure levels could prevent a breakthrough while limiting the territorial gain of a limited offensive. Thus, with a moderate expansion, NATO can be prepared to defend against even an optimistic Russian offensive.

Modeling Results

In nearly every case examined during this modeling, Russia penetrated a forward-oriented NATO posture. Considering the size of the theater and the small defensive force, this outcome is unsurprising. The advantage of such a posture is the chance to reduce territorial gain if the offensive can be contained. Also in most cases, a defense deployed in depth, with limited exposure, and with a large force in reserve, managed to contain the offensive. In scenarios involving the stated force employment options and higher disparities in numbers or equipment, containment succeeds by narrower margins. Limited offensives were less promising for Russia. Regardless of force structure, they could not advance more than 35 kilometers in a week. Neither Estonia nor Latvia has many cities near their border with Russia. Because of this, there are few lucrative targets worth attempting a limited aims offensive, except possibly the northeastern region of Estonia.

The results lead to several suggestions regarding NATO force employment and structure in the Baltics. First, NATO should consider adopting a defensive concept of operations that includes a combination of well-concealed defensive positions arrayed in depth and a large fraction of forces in reserve. Specifically, the operational concept would attempt to force a Russian invasion either to proceed at a pace too slow to defeat NATO before reinforcements can arrive or to make an exposed rush that becomes too costly to sustain. This approach would sacrifice more ground if Russia attempted a limited offensive, but it offers a strong possibility of containing a breakthrough offensive that could collapse NATO's defense theater wide. Even in the event of a limited offensive, most of the Baltic territory could be held. Lacking the ability to overrun Estonia and Latvia quickly, while also having few feasible objectives for a limited offensive, Russian aggression could be defeated or deterred.

Regarding force structure, modeling suggests NATO's strength in the Baltic region, the availability of immediate reinforcements, and the expansion of regional armies are currently adequate. As Russia expands its military strength in the region, though, this status could change. As long as Russia adds and modernizes units in its western region, more NATO troops with increasingly better equipment will be required to contain an offensive at safe margins. If Russia follows through with its military expansion plans through the 2020s, however, major NATO powers will need to contribute more forces.

Examining Other Factors

Other variables that could influence combat outcomes in the Baltic region should also be considered. Equipment differences, for example, could result in NATO's predominately light forces, which lack the tactical mobility, firepower, and protection that Russia's mechanized units have, being pinned down and outmaneuvered while struggling to damage the attacker's armored vehicles.[22] Additionally, NATO's limited quantities of land-based fires and air defense assets, in comparison to Russian formations, could be an issue in a scenario where the Alliance has not gained air superiority. Finally, concerns may arise that the low force-to-space ratio of NATO troops could not halt an attacker due to the low concentration of soldiers and porous defenses.[23]

While these are reasonable concerns, these factors are unlikely to cause radically different combat outcomes. The Baltic countries are buying new advanced anti-tank missiles, armored transport vehicles, artillery, and air defense systems that contribute to NATO's military effort to modernize equipment. More land-based fires, counterbattery capabilities, and air defense units, however, would still be helpful. Additionally, the rough, wooded terrain of the eastern Baltics could partially negate some of the advantages of mechanized units.[24]

Although the force-to-space ratio for NATO would be low by historic standards, it would still be plausible.[25] In 2006, for instance, a brigade-sized light infantry force of Hezbollah fighters defended southern Lebanon with 5.5 soldiers per square kilometer.[26] Hezbollah provided fierce resistance against a larger Israeli force with armored units. After surviving weeks of aerial bombardment, Hezbollah still prevented the Israel Defense Force from advancing more than 20–25 kilometers in 72 hours.[27] In the early phases of Operation Desert Shield, the American military planned to defend against a larger Iraqi army over an area of more than 36,000 square kilometers and 200 kilometers depth with 4 divisions, three of which were not heavily mechanized.[28] The suggested force employment in the Baltics would involve a density of roughly two soldiers per square kilometer.[29] This distribution would be thinner than the examples above, but not drastically so. Additionally, the rough terrain in the western Baltics would require an attacker to be more reliant on roads for fast movement, providing defenders with a chance to

22 Schlapak and Johnson, *Reinforcing Deterrence*, 5–6.

23 Felix K. Chang, "NATO's Baltic Defense Challenge," Foreign Policy Research Institute, June 7, 2017.

24 Over 60 percent of Estonian and Latvian territory is marshland or forest. "Land Use/Cover Area frame Survey 2012." European Commission (Eurostat), *Land Use/Cover Area Frame Survey 2012: Buildings, Roads, and Other Artificial Areas Cover 5% of the EU*, 154/2013 (Luxembourg: Eurostat, October 25, 2013).

25 In the war in Donbas, battalions occasionally held frontages of 40 kilometers. Karber and Thibeault, "Russia's New Generation Warfare."

26 Stephen Biddle and Jeffrey A. Friedman, *The 2006 Lebanon Campaign and the Future of Warfare: Implications for Army and Defense Policy* (Carlisle, PA: Strategic Studies Institute, 2008), 56–57.

27 Matt M. Matthews, *We Were Caught Unprepared: The 2006 Hezbollah-Israeli War* (Fort Leavenworth, KS: US Army Combined Arms Center, 2008), 50–56.

28 Robert H. Scales, *Certain Victory: The U.S. Army in the Gulf War* (Washington, DC: Potomac, 2006), 90–99.

29 This is for an estimate of an area 24,500 square kilometers and a conservative NATO ground force of 47,500 personnel.

concentrate on those avenues of approach. Thus, there is little reason to believe a low force-to-space ratio would significantly alter the outcome.

Recommendations

Preparing NATO forces to conduct a defensive operation with a complex force employment scheme similar to the one described above would demand a high level of readiness and extensive training. The forward defenders need to provide an early warning for the main defenses and delay the attackers. They would have to select and create concealed fighting positions with covered routes of retreat.[30] The force would execute challenging military tasks such as delaying actions and withdrawals as well.[31] These decisions demand judgment about when to retreat to avoid being overrun, how to slow down the attacking force, and how to coordinate fires to cover the withdrawal. The forces in reserve must move significant distances while minimizing casualties from deep strikes and then conduct a counterattack.[32] The skills needed for these tasks can be learned only with extensive practice. All Alliance countries need to invest the necessary resources to ensure their contingents maintain or acquire the required level of proficiency.

If NATO forces decide to plan a defense of the Baltics based on the conclusions above, there are several avenues for further research. Defense strategists should use additional modeling and simulation, perhaps at finer levels of detail, to test, specify, and modify the concept of operations. Strategists must study the rates at which NATO and Russia could send reinforcements to the region. Even if a coup de main is prevented, the Baltics could still be overrun if the Alliance cannot quickly mobilize relief forces. The Alliance should examine the conditions for expanding its regional deterrent to maintain credibility. Finally, the allied militaries must ensure they have the skills and readiness needed to conduct a complex campaign on short notice. Most notably, force employment warrants additional study in analyzing a potential Baltic conflict. Material factors may be easier to quantify, but the nonmaterial can have as much, or even more, influence on the outcomes of battle.

30 Biddle, *Military Power*, 44–46.

31 HQDA, *Offense and Defense*, vol. 1, FM 3-90-1 (Washington DC: HQDA, 2013). Chapter 9 of the field manual goes into detail on the associated difficulties.

32 Biddle, *Military Power*, 46–48.