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VOJAŠKO URAVNOVEŠENJE ZA PRIHODNJE SPORAZUME O KONVENCIONALNIH SILAH V EVROPI

MILITARY BALANCING FOR FUTURE CONVENTIONAL ARMS CONTROL AGREEMENTS IN EUROPE

Povzetek Kvalitativna ocena konvencionalnega vojaškega ravnovesja med Natom in Rusijo je lahko podlaga za morebitne sporazume o nadzoru nad konvencionalnimi silami (CAC) v Evropi. Članek obravnava metode za ocenjevanje zmogljivosti sil in vojaškega ravnovesja; sledijo predlogi za posodobitev metod, ki izhajajo iz spoznanj o nedavnih spopadih, trendih in razvoju vojaških zmogljivosti. Pri tem predstavlja model ponderirane statične analize sil za oceno vojaškega ravnovesja, ki se lahko uporabi za sporazume CAC, t. i. kvantitativni pristop k nadzoru nad konvencionalnimi silami (QuACAC). Ta lahko pripomore k zmanjšanju nesoglasij med pogajalskimi stranmi in omogoči prilagajanje sporazumov CAC.

Ključne besede ***Vojaško ravnovesje, nadzor nad konvencionalnimi silami, rusko-ukrajinska vojna, pokonfliktni sporazumi.***

Abstract A qualitative assessment of the conventional military balance between NATO and Russia may form a basis of any potential conventional arms control (CAC) agreement in Europe. Article discusses methods to assess force capability and military balances, and then suggests updates to the methods based on insights from recent conflicts, military capability trends and developments. The article offers a weighted static force analysis model to assess military balances, that can be used for CAC agreements, called the Quantitative Approach to Conventional Arms Control (QuACAC). This approach may help narrow areas of disagreement between negotiating parties, and provide a basis for CAC agreement adaptation.

Key words ***Military Balance, Conventional Arms Control, Russo-Ukraine War, Post-Conflict Agreements.***

Introduction

The Russo-Ukraine War is the most significant and cataclysmic event in post-Cold War Europe. While there are numerous causes, one of them is likely the failure of conventional arms control (CAC) agreements in Europe (Lippert, 2024). Specifically, Russia invaded Ukraine in part because it was dissatisfied with the relative balance of conventional military power between it and the North Atlantic Treaty Organization (NATO), and Moscow's efforts to address this through CAC agreements had failed. While an agreement between Russia and Ukraine might bring an end to that conflict, a bilateral agreement may not successfully address the war's structural causes. Rather, a broader, European-wide CAC agreement is more likely to resolve Russia's long-standing complaints and establish a more stable, secure military balance, which may in turn prevent another major conflict in Europe.

Military balance is an important concept for states' assessments of their own relative power (Levy, 1998; Van Evera, 1999); it determines states' interests in entering CAC agreements, and is often a principle consideration for the agreements' design. Military balance is the comparison of states' or blocs' conventional military forces, based on their military equipment, personnel, readiness, logistics, command, control, and communications (C3), intelligence, and other relevant factors (Skypek, 2010; Zanella, 2012). While military balance is an important determinant of power and a driver of CAC agreements, the question of how to measure military balance remains. During the Cold War, for example, NATO and the Soviet Union entered into an open dispute about their military balance, with each side accusing the other of being more threatening. While imprecise assessments of one another's military balances may be sufficient for the purposes of strategic planning or public communications, CAC agreements require a greater precision, because most CAC agreements result in specific, quantitative limitations (including prohibitions, or quantities of zero).

This article discusses several methods for quantitatively assessing military balance and proposes a specific methodology for CAC agreements. This methodology, the Quantitative Approach to Conventional Arms Control (QuACAC), is not intended to predict conflict outcomes. Rather, it is a tool to assess and calculate military balances to determine which mixes of forces could be reduced, limited, or prohibited to reach a CAC agreement.

1 STATIC AND WEIGHTED MEASUREMENTS COMPARISONS

Two commonly used methodologies to compare military power are static counts and weighted static counts (Rohn, 1990, tbl. S1). Each offers advantages and disadvantages for CAC.

Static measurements generally divide military equipment into categories and count personnel as equal. A basic count could consider that a second-generation fighter aircraft may be counted the same as a fifth-generation aircraft, and a 105 mm World War Two-era towed howitzer could be counted the same as a precision-munition firing 155 mm self-propelled cannon. To what extent one separates the categories

– for example, air superiority aircraft from ground attack aircraft, or wheeled armoured personnel carriers (APCs) from tracked infantry fighting vehicles (IFVs) – will vary from one report or analysis to another. Static measurements can also divide comparisons into within-equipment type categories, for example by aircraft or tank generation, artillery type (tubed versus rocket), and short versus long-range surface-to-air missiles (SAMs). Personnel tend to be counted equally as one equal unit per person.

There are two advantages to static count approaches for CAC: the counting requires few subjective judgements, and it can be done relatively quickly, provided that the necessary information is available. At the same time, static approaches fail to capture important differences. While many military vehicles fall into generations, the evolution is more continuous and iterative than incremental; thus, there may be different assessments as to whether or not a given system falls into one or another generation. Categorizing by performance capability poses similar challenges, as the "dividing line" between categories can be arbitrary. For example, the definition of short, medium, or long range for artillery or SAMs is arbitrary; or in the case of naval ships, the number of vertical missile launch tubes may be more relevant than the size (water displacement) or named class (frigate, corvette, destroyer, aircraft carrier, etc.).

A third complication may arise from weapon systems that straddle multiple categories, such as a wheeled vehicle with a large cannon (such as the US Stryker-based M1128 Mobile Gun System). Static measures do not account for any qualitative differences between weapon systems which could be similar in key physical aspects. For example, an M1-A1 Abrams tank with thermal sights, advanced targeting capabilities, and thicker armour would be counted the same as a T-72 which lacked thermal sights, had a comparatively poorer targeting system, and thinner armour – even though these differences were decisively significant in the 1991 Gulf War (Zaloga and Laurier, 2009). Military personnel are treated equally regardless of differences in training and equipping.

Thus, a static count minimizes the number of subjective analyses and permits rapid assessment, but it ignores important details, particularly qualitative differences. One important consideration of static counts is that most CAC agreements apply static limitations (rather than weighted or qualitative). For example, the 1990 Conventional Armed Forces in Europe (CFE) and Adapted CFE (A/CFE) Treaties designated all weapons systems within the 5.5 categories (battle tanks, armoured combat vehicles, artillery, combat aircraft, attack helicopters; collectively referred to as treaty limited equipment (TLE), and armoured vehicle-launched bridges (which are not considered a major TLE category) as equal for counting purposes. Whether a tank was produced in 1955 or 1990 did not matter from the treaty's compliance perspective.

2 WEIGHTING FORCES

A weighted value is the assigned value of an item relative to other items being calculated or compared in the same context. For assessing military capabilities, and particularly CAC, this means that one tank does not necessarily have the same value as another. A modern MBT has a higher value or score than a 1950s tank, because a modern MBT has a number of advantages and improvements in comparison. There is no single, accepted, and accurate method to weigh military forces, in part due to inherent subjectivity. However, as most CAC agreements focus on personnel and equipment rather than units (due to the difficulty of measuring a unit and the wide variety of unit compositions), this section will discuss some of the factors and issues to consider in weighing the capability points of various military systems and supporting capabilities. The Russo-Ukraine War provides important insights – but these are all tentative as the data is incomplete and unverified. As a launching point, this article will discuss the five major CFE TLE categories. Whether or not these would again be the focus of a CAC agreement, these systems remain the backbone of NATO and Russia's militaries, and could still be credibly considered offensive in nature because of the ability to mass them, and their battlefield affect when massed. The QuACAC methodology uses a rhetorical standard infantry soldier as the baseline, with a military capability score of 1.

Main battle tanks, often over fifty metric tons of steel sporting a 120 mm cannon or larger, remain relevant and likely remain a key enabler of offensive, manoeuvre operations, although the Russo-Ukraine War suggests that they enjoy less freedom of movement than in the past (Zabrodskyi et al., 2022). Tanks' qualitative differences may include the quality of thermal sights, data connectivity, and possibly the possession of active defences, artificial intelligence (AI), optionally manned configuration, and drone integration. Some of these technologies are emerging and unproven, although the quality of thermal sights and gun accuracy may be among the tank's most important features.

Artillery has seen less development than tanks in the past several decades, with the greatest advances being in guided munitions. The guided rockets fired by MLRS/HIMARS have proven their effectiveness in Ukraine, striking logistics nodes, command and control centres, and bridges, among other targets. Computing and drones add significant capability to artillery accuracy, and integrated targeting systems on an otherwise half-century old artillery system can significantly improve its performance. Artillery comes in several different configurations or types, including towed, self-propelled, tube and rocket. Each has their advantages and disadvantages, with capability points likely being determined by a combination of accuracy, range, and explosive power.

Armoured combat vehicles include wheeled armoured personnel carriers and tracked infantry fighting vehicles. These vehicles are often primarily designed to transport infantry, and it is generally accepted that these vehicles are essential for

conducting a major offensive in a large-scale modern conflict because the armour offers some protection compared to a civilian or unarmoured military vehicle, attacking solely by foot is nothing short of suicidal, and infantry need to keep up with tanks in order to provide mutual, combined arms support. Many armoured combat vehicle models evolved to serve a variety of missions, with some vehicles such as the US M114, the US Stryker, the Soviet/Russian BMP-2, and the Soviet/Russian BTR-80 modified over time to incorporate additional functionality such as carrying large mortars, rockets, lasers, SAMs, anti-tank weapons, and anti-aircraft guns. The simplest and cheapest versions tend to have minimal weapons but are sufficient to transport soldiers to the combat area, if not to provide direct fire support. With greater firepower they can inflict greater damage, although sometimes at the cost of troop-carrying capability, at some financial cost, and potentially presenting themselves as a more vulnerable target depending on how they are used. Capability points would likely be based upon some combination of armour, wheeled vs. tracked (with tracked being more valuable), and firepower.

Attack helicopters are generally more similar to one another than armoured combat vehicles or tanks, making comparisons much simpler. Examples of this weapon category include the US AH-64 Apache and the Russian Mi-28 Havoc. Attack helicopters are usually armed with a variety and mix of rockets, guided missiles, and guns. Capability points would likely be based on the weapons that the helicopter could employ, the number of weapons, targeting capabilities such as long-distance thermal imaging and data sharing, range, and speed.

Aircraft are complicated to assess, and the CFE approach was to simply count any kind of combat aircraft as a single unit subject to TLE, despite their differences. For example, an A-10 Warthog, an F-15A Eagle, and an F-111B bomber have little in common with one another (close air support, air superiority, and medium bombing, respectively). This presents a significant challenge in assessing capability values. For example, in the US wars in Iraq and Afghanistan, air superiority aircraft were of marginal utility when the enemy no longer had aircraft to fly. Similarly, the viability of dedicated ground-attack aircraft in airspace denied by enemy fighters and anti-aircraft weapons is uncertain. As most of the US's adversaries have learned in recent conflicts, most types of aircraft have no value due to US air superiority. Aircraft may also vary significantly in cost and age. One might argue that an old, inexpensive land vehicle may still be useful in combat, either as a static defence or, in the case of a personnel carrier, still able to perform that role; but an outdated aircraft will have little utility in a conflict, being vulnerable to SAMs and superior fighter aircraft.

Counting military personnel can be complicated. First, there is the question of whether to count all military personnel, combat personnel only, or combat and combat support personnel (logistics, communications, etc.). For example, personnel in an education or diplomatic setting might not be counted. Second, there is the question of whether or not to limit the applicability by service. CFE-1A, for example, only limited ground and air – not naval – personnel. Finally, today many military functions that were

once performed by uniformed personnel are carried out by contractors, including cooking, guard tasks, construction, and rear area facility security. NATO forces do not use private military companies (PMCs) for major combat operations, such as combined arms operations, although Russia uses the PMC Wagner Group for tasks traditionally conducted by uniformed forces (Axe, 2022).

Most naval forces were not included in the CFE or A/CFE Treaty, although there are some restrictions on naval ships entering the Black Sea as part of the 1936 Montreux Convention. There are several reasons why naval forces were not limited in the CFE or A/CFE Treaties despite the Soviet Union's desire to include them in the CFE Treaty due to a perception of NATO's naval superiority, including the ease with which naval forces could move, which could make verification difficult, and NATO's view that naval forces were essential to secure the Atlantic sea route vital to European defence (Wilcox, 2020).

Naval forces pose several problems for calculating capability points, aside from verification. The first is when to count them in the Area of Application (AoA). While a fully equipped mechanized brigade may require days to weeks to move several hundred or thousand kilometres (Shurkin, 2017; Gustafsson et al. 2019; Hodges and Lawrence, 2020; CEPA Task Group, 2021), naval vessels can make the journey much quicker, fully equipped and prepared to fight. This is especially true of NATO naval forces, which operate around the world outside the existing CFE AoA. On the other hand, certain naval forces outside the AoA may play a marginal role in certain conflict scenarios such as surprise attacks. On the other hand, calculating naval forces' capability scores with the ship as the central counting unit should pose less of a problem. Ships can be categorized by mass (water displacement) and class, with ships of the same mass and class and of approximately the same age tending to have similar capabilities. Ships may have a specialization such as air defence, ballistic missile defence, or anti-submarine warfare (ASW), but these can still be equally countable capabilities. Moreover, most ships above a certain size (corvette and larger) can perform multiple missions even if they are more capable in one area, and the mission focus can be modified with changes to missile loadout. The number of vertical launch tubes is one way to count and compare many types of combat vessels. Aircraft or assault troops carrying capacity is another basis of calculation for these types of vessels.

Heavy bombers were not limited in the CFE or A/CFE Treaties, although some of them are or were controlled by US-Russian nuclear arms control agreements, and Russia sought to impose limits on the aircraft in its 2021 proposal to the US (Russian Foreign Ministry, 2021). Another reason not to limit heavy bombers is that, as with naval vessels, heavy bombers can travel long distances relatively quickly, complicating compliance. Some aircraft are also capable (with in-flight refuelling) of flying almost halfway around the world, dropping their payloads, and returning to their base of departure without ever landing (Tirpak, 1999). For Russia and the US,

for example, this means they could keep their heavy bomber forces far out of range of most enemy weapons and potentially outside the AoA.

Some of the differentiating characteristics of heavy bombers include speed, stealth, payload, and range. Experience with stealth aircraft since the 1991 Gulf War suggests that stealth may be the most important feature for a heavy bomber, enabling it to fly into contested enemy airspace with a high chance of survival, especially when other measures, such as the suppression of enemy air defences (SEAD) and other counter-radar operations, are taken. Heavy bombers have relatively large payloads (compared to fighter-bombers), and can, in certain circumstances, account for a high proportion of air-dropped munitions (Tirpak, 1999; Butowski, 2022).

Given their speed and range, it is not unreasonable to include a state's entire heavy bomber force in any capabilities scoring. The highest points would be assigned to stealth bombers, with other characteristics being considered. Heavy bombers are higher-cost aircraft produced in lower quantities, making them more valuable than fighter aircraft and thus reasonably credited with a higher capability score.

This section has only analysed some categories of weapons and weapon systems, due to space limitations (for example, SAMs have not been included). The QuACAC methodology, however, enables the inclusion of any weapon system. There are other approaches to both weighing and comparing military forces and modelling conflict outcomes to determine the impact of CAC agreements. These are summarized in Table 1.

Table 1: Methodology Comparison

Name/Source	Methodology Type	Advantages	Disadvantages
QuACAC	Weighted Static	Accounts for and calculates weapons, personnel, and overall systems in great detail.	Substantial subjectivity in the scoring.
Meisel et al. Military Equipment Index (MEI) (Meisel, Moyer et al, 2020)	Weighted static	Scores weapon systems.	Does not account for force enhancers or detractors, and it is not clear whether it accounts for differences within models such as minor upgrades, as its focus is on generations. No inclusion of personnel.
Global Firepower (*Military Strength Comparisons for 2022*, no date)	Multi-method	Calculates an overall power score to compare between countries.	Includes population, economy, and other variables that are not relevant to CAC.

Name/Source	Methodology Type	Advantages	Disadvantages
Lowy Institute Asia Power Index (*Lowy Institute Asia Power Index*, no date)	Weighted static	Includes quantified qualitative variables such as training, readiness, command and control, number of military personnel, and weapons and platforms. The data provided goes down to medium detail, e.g. for land warfare firepower it counts the number of armoured vehicles, but aggregates tanks and IFV; and for aircraft it seems to merely provide a raw count. In the category of "signature capabilities" it includes intelligence and cyber, as well as some weapons. It is unclear how the sub-measures are aggregated or calculated to determine a military capability score.	Limited to Asia, and may overly aggregate some areas.
US weapon effectiveness index/weighted unit value (WEI/WUV) (Watts, 2017)	Weighted static	Based on micro-level firepower and the capabilities of individual systems.	Does not account for personnel nor for non-lethal force enhancers such as command and control systems.
Forward Edge of the Battle Area (FEBA) Attrition Model (Posen, 1984)	Dynamic Conflict Model	Attempts to calculate advance rates based on several variables such as force size, force quality, airpower, and reinforcement rates.	While it can be useful to assess the potential of a surprise attack (its application during the Cold War), it only applied to a single scenario of a surprise attack along a straight front. Some, if not many, of the variables are highly subjective, such as Armoured Division Equivalents (ADEs).

3 FORCE MULTIPLIERS AND SUBTRACTORS

Force multipliers are "a capability that, when added to and employed by a combat force, significantly increases the combat potential of that force and thus enhances the probability of successful mission accomplishment" (Joint Publication 3-05.1: Joint Special Operations Task Force Operations, 2007). In a NATO-Russia conflict, these could be command, control, communications, intelligence, surveillance, and reconnaissance (C3ISR), logistics, transportation infrastructure, morale, medical

support, cyber capabilities, electronic warfare, space-based capabilities, and other factors.

A force subtractor is a characteristic of a military force which could decrease its force effectiveness, including low morale, poor integration between units (such as in a coalition environment where units are not used to working together), and a poor command structure (such as a multinational command structure like NATO where there are multiple and conflicting lines of command).

The methodology can work with a given capability being accounted for only on one side as a net advantage (for example, if NATO is considered as having better logistics it could be given a ten-percentage point advantage); or each side could account for the capability (for example NATO might get an increase of five percentage points, while Russia gets a decrease of five). The advantage of the latter approach is that capability changes are easier to incorporate and calculate.

4 THE QUACAC EQUATION

The QuACAC methodology uses a single soldier as the baseline for military capability to simplify the equation, which aggregates equipment and personnel. From a single soldier (for example, a standard US dismounted infantryman) having a baseline score of one, other weapon systems are assessed against this baseline. The equipment does not need to have a weapon to count; rather, the score considers its contribution to the battlefield. For example, an unarmed transport vehicle such as an unarmed Humvee may be given a score of 5, as it contributes to the battlefield as a general utility vehicle. The advantage of this approach is that having a single baseline simplifies calculations (compared to having a baseline score for each category of weapon systems). The disadvantage is that there is a significant arbitrary and subjective judgment in comparing a battle tank with rocket artillery or a soldier with a naval surface combatant.

This article proposes the following equation to calculate force capability for CAC, and is equally applicable to a single or a group of states, or an entire alliance such as NATO (see Table 2 for explanation of the variables).

Table 2: QuACAC Variables

Abbre-viation	Variable name	Explanation	Method of determination
T	Total capability points	This is the total military capabilities score which reflects one state or alliance's net, calculated military capability.	This calculation is a real number determined by the equation which measures personnel and equipment.
E	Military equipment capability total score	This is the sum capability of all military equipment, including logistics vehicles, command and control, and combat systems.	This is obtained by determining a score for each piece of relevant equipment (as determined by agreement), and then adding up all the individual points. The baseline of the score is a single, generic infantry soldier.
Em	Equipment force multiplier (percentage)	This is the total equipment force multiplier, which might consider intangible factors such as maintenance levels, supplies, and interoperability.	A percentage is determined by considering to what extent the equipment is more than the sum of its individual components. Some possible contributors to assigning a positive percentage could include good maintenance records, close interoperability, relatively uniform equipment, and substantial support from outside the area of application (such as satellites).
Es	Equipment force subtractor or disadvantage (percentage)	This is a calculation of detracting factors for all equipment, such as low maintenance, poor supply chain, and non-interoperability.	A percentage is determined by considering to what extent the equipment is less than the sum of its individual components. This might be an overly burdensome variety of weapons, poor maintenance and logistics support, non-interoperability of weapon systems, or lack of munitions.
P	Personnel (quantity)	This is a calculation of the number of relevant military personnel.	This can potentially include contractors, especially if these contractors perform traditionally uniformed roles and/or the roles are performed and counted for other states and alliances when performed by government personnel. The number of personnel are added up with a relatively simple one person equals one point. However, a person may count for less than one if, for example, they are a reservist with infrequent training.

Abbre-viation	Variable name	Explanation	Method of determination
Pm	Personnel multiplier (percentage)	This modifier accounts for e.g. high morale, high quality training, longer periods of service, combat experience, and level of individual equipping (kit).	A percentage is determined by considering to what extent the personnel are more than the sum of the individuals. This could include very modern and expensive personal equipment such as night vision devices and digitally aimed rifles, high quality training and readiness, and a high average number of years of service.
Ps	Personnel subtractor or disadvantage (percentage)	This modifier accounts for factors that reduce the capabilities of the personnel, such as low morale, poor health, poor training, language barriers, internal political problems, and interoperability issues (e. g. substantial differences between alliance members).	A percentage is determined by considering to what extent the personnel are less than the sum of the individuals. This could include linguistic barriers between units or alliance members, poor training, low quality personal equipment.

$$T = \left(E \times \left(\frac{100+E_m-E_s}{100}\right)\right) + \left(P \times \left(\frac{100+P_m-P_s}{100}\right)\right)$$

While the equation is simple, its implementation admittedly faces many challenges. First, an accurate assessment of each variable requires a large dataset of information. Second, scoring each model and version of equipment and assessing troop quality requires in-depth knowledge and subjective judgment. One person could assess a Russian T-14 Armata tank as being worth 105 points, while another would assess them as 125. Similarly, different analysts may give different weights and make different judgments about morale, political unity, command unity, logistics, and so on. Third, the workload to inventory every piece of relevant equipment is substantial. Fourth, which capabilities to include or exclude could be a substantial area of dispute (Kulesa, 2018).

5 QUACAC AND CAC AGREEMENTS

This methodology is not intended to predict conflict outcomes, but can be used throughout the CAC lifetime from conception through negation to implementation. Prior to any negotiations, this tool permits scholars and practitioners to quantify the military balance and determine what the needs for CAC may be and what goals any CAC may have. During CAC negotiations, this methodology is a way for parties to discuss one another's existing military capabilities, develop proposals by quantifying trades, and aim for a common end-state. The methodology can suggest possible trades of different weapons systems, such as Russia agreeing to a limit of 1500 tanks

and 200 combat aircraft for a NATO limit of 700 tanks and 400 aircraft. Such an agreement would not just be based on the number of TLE, but on their quality. This methodology can also deal with vehicles which do not comfortably fall into a single category, such as armoured combat vehicles with a heavy gun, or a vehicle which takes on the characteristics of artillery and a tank. The methodology can also support ratio-based treaties, wherein military systems are limited at a certain ratio while taking into account qualitative differences.

The methodology allows interested parties to observe changes in the military balance, which may be necessary throughout the implementation phase, as any number of factors, including major shifts in force structure, technology advances, equipment upgrades, and alliance changes, could affect the military balance. Geopolitical and other changes, for example, clearly altered the military balance following the CFE Treaty's signature, but the treaty itself was unable to adjust to take the wave of changes into account. Another advantage of this methodology is that it can relatively easily consider changes in blocs and alliances by adding or subtracting states' capability points and adjusting the force multiplier and subtractor variables as necessary.

By quantifying, however imperfectly, the military balance using the QuACAC, negotiating sides can have a dialogue based on concrete, quantitative assessments rather than opaque simulations, intuition, or a complicated series of mathematical models. This can serve to narrow differences by establishing a common understanding of the military balance, potential TLE, and prohibited systems.

Conclusion

Symmetric or proportional CAC agreements may have many approaches and outcomes. If the goal is merely to have some agreement, in the belief that some agreement is better than none, then choices and negotiations may not be difficult, because such an approach is not likely to impose substantive restrictions. An example of this might be the prohibition of forces in a small geographical area. Yet a sweeping agreement which seeks to resolve major instabilities in a security relationship, especially between NATO and Russia, are likely to require substantial CAC measures. Ideally, measures should increase stability by resolving the security dilemma, preserving deterrence, and promoting defensive capabilities while hampering offensive capabilities. At the same time, NATO and Russia need to establish and preserve a military balance that is mutually acceptable least one side or both feel threatened, resulting in a cycle of arms racing, mistrust, threats and accusations, and ultimately conflict.

It is uncertain whether it is possible to have a CAC agreement between NATO and Russia in which deterrence is preserved, the security dilemma is resolved, defensive capabilities are superior to offensive ones, and there is a harmonious military balance. One side or both may have to accept compromises in these areas, but this methodology helps to lay out clearly what is being agreed to, and can serve as a common metric for substantial changes in the military balance and international security environment, possibly by a dedicated, neutral international organization

(IO) which is charged at the least with monitoring and assessment, but which may also have a substantial inspection role on a par with that of the International Atomic Energy Agency (IAEA) (Lippert, 2023).

The creation of a new IO focused on a new Europe-wide CAC agreement which applies the QuACAC methodology could go a long way towards increasing the likelihood of any agreement succeeding, as some data suggest that the more states delegate authority to a CAC agreement executor, the more likely the agreement is to succeed. Recent successful agreements with a high delegation to IOs include the 1996 Sub-Regional Arms Control Agreement for the Balkans (a Balkans CFE Treaty), which had the close involvement of the Organization for Security and Cooperation in Europe (OSCE), and the 2008 Six-Point Peace Plan for Georgia, which was implemented in large part by the European Union. However, the 2015 Minsk Agreements were an abject failure, despite a massive effort on the part of the OSCE (Lippert, Forthcoming). Another approach to increase the probability of agreement success is the inclusion of third-party states as signatories and/or implementers. In brief, third-party states may serve as neutral, objective arbiters in negotiations and implementation, and they may raise the diplomatic cost of violations and defection (Lippert, Forthcoming).

In the near-term, a QuACAC-based CAC agreement could lock in the existing military balance between NATO and Russia when the Russo-Ukraine War ceases, or the two sides could negotiate an agreement which takes other approaches, such as holding one side's levels at the current state (which would likely mean a relatively weak Russia due to significant losses), or holding one side's forces in the present state while the other decreases or is permitted to increase up to a ceiling as applicable. Russia may seek security guarantees from NATO through CAC if Moscow seeks to retain its post-Russo-Ukraine War military at the levels and capabilities at the cessation of hostilities, perhaps because of a desire to avoid an expensive rearmament or due to a change in leadership. This would echo the impetus for the CFE Treaty wherein then-General Secretary Mikhail Gorbachev sought to lock in force reductions with NATO linked to the unilateral Soviet force reductions motivated in part by the desire to improve the Soviet economy and decrease tensions with the West (Foerster, 2002, p 43).

The Russo-Ukraine War began in part because of disputes and interpretive misunderstandings about the military balance between NATO and Russia. First, Russia viewed NATO's military capabilities as threatening, while NATO did not view itself as threatening. Second, neither side could agree on what a stable balance should be – which was manifested in the failure to maintain the existing and establish new CAC agreements. The QuACAC methodology is a tool which could assist in resolving some of the issues which drove the dispute. First, it can offer states a yardstick to measure one another's military capabilities to see to what extent there is or is not parity or, at least, a mutually perceived fair distribution of military capability. With a transparent tool that, ideally, both sides could use to measure force capability,

the path is open to a CAC agreement like the CFE Treaty. An arms control agreement based on and then managed by the QuACAC methodology would reduce the risk of conflict, because state parties and blocs would have a means to both negotiate and fix relative power at a certain ratio. At the same time, it offers states a tool to assess and potentially adapt to changes in military system capabilities and alliances (unlike the CFE Treaty).

The Russo-Ukraine War is the most destructive and calamitous event in Europe since World War Two, although it is only a sample of the destruction that could rain upon Europe were a conflict to erupt between NATO and Russia. CAC may be one of the key instruments to prevent such an outbreak of annihilation. Preventing such a war, which the QuACAC methodology can contribute to through CAC agreements, is imperative. While the obstacles to drafting a mutually acceptable agreement are substantial, the high costs of conflict of which we are daily reminded of may compel parties to overcome resistance to cooperation.

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