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Nuclear warfare beyond counterforce

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Abstract: A counterforce attack intends to disable an opponent's nuclear arsenal to limit potential damage from that adversary. We postulate a future when hardening and deeply burying fixed sites, transition to mobile strategic systems, and improved defences make executing a counterforce strategy against an adversary's nuclear forces extremely difficult. Additionally, our postulated future has multiple nations possessing nuclear weapons. Consequently, each country needs to consider multiple actors when addressing the question of how to deter a potential adversary's nuclear attack. We examine six nuclear targeting alternatives and consider how to deter them. These strategies include nuclear demonstration, conventional military targets, and attacks consisting of communications/electronics, economic, infrastructure, and population centers that a nation might consider striking with nuclear weapons. Since these alternative strikes require only a few nuclear weapons, executing one of them would not significantly shift the balance of nuclear forces. The attacking country's remaining nuclear forces may inhibit the attacked country or its allies from responding. How can nations deter these limited nuclear attacks? Potentially, threatening economic counter-strikes seems to be the best alternative. How might escalation be controlled in the event of a limited attack? Other instruments of power, such as political or economic, might be employed to bolster deterrence against these types of nuclear strikes.

Keywords: nuclear strategy, deterrence, targeting

1 Introduction

Nuclear deterrence is based on the threat of retaliation if attacked (Lieber and Press 2017). Mazarr (1991) states 'one

of the crucial aspects of nuclear deterrence is a strategy for targeting a retaliation to achieve the greatest deterrent effect.' Gray (2007) concludes 'there has to be a nuclear strategy' indicating the intended response to a nuclear strike to deter an adversary.

The goal of counterforce attacks is to disarm the adversary's nuclear forces. The United States and the Soviet Union transitioned from targeting cities to a counterforce strategy during the Cold War as weapon delivery accuracy improved and weapon yields increased. Arguments for a counterforce strategy include limiting nuclear retaliation by destroying an adversary's offensive nuclear capabilities. Ewers (2016) contends, 'The United States should maintain a counterforce targeting strategy to hold the nuclear forces at risk and provide restraint from escalation with the peers and near-peers.' Additionally, attacking an adversary's nuclear weapons is considered a more moral approach than targeting cities.

A common current nuclear approach contends that adversaries are deterred from attacking a country with nuclear weapons because the attacked country could respond with any of their surviving nuclear weapons (Ewers 2016). In other words, if an adversary cannot execute a counterforce strategy that completely cripples their target's nuclear capabilities, they will not attack with nuclear weapons. This article challenges the notion that a counterforce strategy, which targets an adversary's nuclear capabilities, effectively deters all nuclear attacks.

Consider a hypothetical situation where two countries each have over a thousand nuclear weapons. One country attacks the other with a single nuclear weapon. Would the attacked country strike back or be deterred by their adversary's remaining arsenal? What if the nuclear attack caused significant economic damage but didn't directly kill anyone? Would the attacked country strike back against the other's population? If neither side can destroy the other side's nuclear weapons, what types of targets might they attack? This paper examines targets that do not fall under the current counterforce strategy, not as advocates of these targets, but to ensure that all types of nuclear attacks are deterred.

Before discussing possible attack and appropriate responses, we first examine three trends which may undermine a country's ability to execute a counterforce

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strategy, improved weapon system survivability, enhanced defences, and expanded proliferation (Gallagher and Soricice 2014).

1.1 Survivability

States with nuclear weapons have improved the survivability of their nuclear weapons and associated delivery systems in case of an adversary attack, even with nuclear weapons. The initial efforts included reinforcing fixed sites to withstand nuclear blasts. These efforts have expanded into creating deeply buried facilities.

Another approach has been to increase the mobility of strategic nuclear delivery systems, thus ensuring that they are challenging to find and target. For example, aircraft capable of delivering nuclear weapons have always been mobile targets that could shift from one airfield to another to reduce the chance of being destroyed. Additionally, land-based ballistic missile launchers are being deployed on either trucks or trains to make them difficult to target.

The sea-launched ballistic missile submarines have combined mobility and hardening; the submarine's strength to withstand water pressure is also effective protection against nuclear blast overpressure and dynamic pressure. Additionally, these submarines operate in the world's largest thermal sink, which reduces their susceptible range to thermal effects. Hence, submarines are not only challenging to find, but they are also highly resistant to nuclear weapon effects should they be detected.

While decreasing their nuclear forces in total numbers, the United States and Russia have steadily increased the percentages of their nuclear forces that are survivable through mobility. Lieber and Press (2017) and Long and Green (2015) contend that improvements in intelligence technology will eventually track and target current mobile delivery methods; however, future sensing capabilities may be rapidly overwhelmed with decoys and other new countermeasures. We also presume that a country initiating a strike would expend their vulnerable weapons and maintain their more survivable weapons in reserve. For this article, we postulate a future where hardening, mobility, deception, and other means will continue to make targeting an adversary's strategic systems increasingly much more difficult.

1.2 Defences

Nations are also increasing their defences to reduce any adversary's ability to penetrate to their targets. Defences

are not new (Cimbala and McDermott 2015). Countries threatened by adversaries attacking with bombers and cruise missiles have established air defence networks. For a while, stealth technology mitigated the advances of air defences; however, the improved sophistication of integrated air defence networks may significantly reduce the ability of bombers and cruise missiles to penetrate to targets. Along with enhanced detection, the range of interceptor missiles has dramatically increased.

Local area defences against ballistic missiles have existed for decades. Recent trends have indicated an increase in the size of the defended area and the effectiveness of the interceptors (Lowther and Cimbala 2017). For example, the Office of the Secretary of Defense (2019) in *the 2019 Missile Defense Review* states, 'The United States is protected against a limited ICBM [inter-continental ballistic missile] attack.'

One possible counter to improved defences is faster penetrators, such as hypersonic weapons. A few weapons with such advanced penetrative capabilities may even be able to assist in deterring an attack from a country with an extensive defence network. Zala (2019) concludes the 'new non-nuclear weapon technologies – such as ballistic missile defense, anti-satellite weapons, and precision-strike missile technology – will make nuclear deterrence relationships that were once somewhat stable less so.'

1.3 Proliferation

Proliferation is another challenge to a counterforce strategy (Mazarr 1995; Jo and Gartzke 2007). During the Cold War, the United States and the Soviet Union only had to be concerned about the size of their arsenal relative to their single adversary. Now, each country must also consider its nuclear arsenal relative to all potential nuclear-armed adversaries and coalitions. An extensive exchange between two countries might leave the third country with the most remaining nuclear weapons (Kristensen and Norris 2018).

1.4 Study assumptions

For this discussion, we postulate a future world where the following holds. Multiple states have nuclear weapons. No state or coalition of states can execute a counterforce first strike that sufficiently eliminates an adversary's nuclear weapons to not be concerned about a nuclear counter-strike in response. No countries have

an effective global defence system, rendering all vulnerable to strategic attacks. Each nation needs to consider multiple adversaries. Contrary to our assumptions, Lieber and Press (2017) contend that ‘hardening and concealment—have been undercut by leaps in weapons accuracy and a revolution in remote sensing’ and further ‘countries that have considerable resources can buck these trends and keep their forces survivable, albeit with considerable cost and effort.’ In contrast, Mazarr (2007) states that the United States cannot achieve any of its counterforce goals.

2 Alternatives to counterforce targeting of nuclear capabilities

We examine six potential hostile uses of nuclear weapons: demonstration, conventional military forces, electronic, economic, infrastructure, and cities. We do not include the targeting of government leaders because they are considered counterforce targets and have generally been made survivable through either hardening or mobility. Since no country can effectively execute a counterforce strategy in our postulated future, these cases may constitute potential deterrent threats, first strikes, or responses to strikes. For each of these six use cases, the country should consider the following aspects: relative balance of military power, effect on the adversary and other countries, morality, and world opinion, along with potential adversary and global responses.

2.1 Nuclear-use assumptions

Regarding the relative balance of weapons, we contend that the following nuclear attack scenarios would use one or few nuclear weapons, so these strikes would not considerably change the relative balance of power between the attacking nation, their adversary, and other nuclear-capable nations. However, this greatly complicates the deterrence framework. After expending only a few weapons, the belligerent country retains sufficient weapons to deter a counterforce response. As an alternative response, the attacked country might respond with one or more of the limited strike options being evaluated. However, if the strike and counter-strike cycle proceeds unabated—or worse, escalates—each country will continue to deploy nuclear weapons from their limited arsenal. If this continues, one country will eventually deplete its arsenal of nuclear weapons to the point

of not having a viable response. Additionally, either country involved in nuclear exchanges may also become vulnerable to coercion from other nuclear-armed states.

Another consideration in using a nuclear weapon is the range of effects on the adversary, which includes expected fatalities and economic loss. The fallout may also cause fatalities and losses in other countries. Additionally, other countries may be impacted indirectly, such as through loss of critical supplies or inhibited trade.

The leaders should consider the morality of a nuclear attack. The Just War Theory provides four tenets that leaders of a country considering military action should evaluate: (1) the gravity of the threat to their country, (2) alternative means, other than nuclear weapons, to respond, (3) serious prospect of success, and (4) proportionate response to the threat (Martino 1988). United States Catholic bishops promulgate that ‘the indiscriminate and disproportionate nature of nuclear weapons’ cannot achieve this last tenet (Hollerich and Cantu' 2017). The purpose of a moral response is not retribution but to prevent further harm. If an adversary attacked with their only nuclear weapon, the response should not be a punitive nuclear strike. With nuclear weapons use, the proportionate response is often summarised as the civilian impact, particularly civilian fatalities (Sagan and Weiner 2021). Lonsdale (2019) cites the four Just War tenets in evaluating a country’s published nuclear-use policy. Although likely stated differently, world opinion may focus on the same aspects.

Finally, a leader considering nuclear weapons should examine how their adversary or other nations may respond. Political alliances or treaties may compel other countries to respond. If the strike is not counterforce, it will not have diminished the adversary arsenal of nuclear weapons. Will the strike result in an escalating counter-strike? A strike that the attacked country perceives as having extremely inappropriate consequences with regard to the circumstances is probably more likely to result in a significant and possibly more consequential response. For example, in response to a naval blockade, a strike that limits trade routes might escalate less than an attack on a city.

Besides a retaliatory strike or perhaps in combination with a nuclear strike, how else might other countries respond? Could they affect financial and economic assets or impose diplomatic and political costs? In the Cold War, nuclear weapons deterrence was predominately achieved with the threats of retaliatory nuclear strikes.

Countries may try diplomacy to increase the costs towards adversaries who want to use and maintain nuclear

weapons and reward the benefits to those who decide not to. Countries that limit or forego nuclear capabilities can receive defense pacts, open trade, and participation in world political forums. In contrast, countries that seek to maintain or even expand nuclear capabilities could face sanctions that include embargos, restricted diplomatic relations, and travel limitations.

This diplomacy aims to penalise powers that seek nuclear capabilities and reward those who don't, hoping that countries decide not to use nuclear weapons. We want to be clear that the power of nuclear weapons put them in their own category—their use is unlikely to be deterred except by the threat of counter-nuclear strikes. However, other instruments of national power may make the cost too high when combined with counter-nuclear strikes. (Caswel et al. 2011).

The United States Department of Defense (2006) bases its Deterrence Operations Joint Operating Concept on the central idea of influencing another country's decision calculus. The steps to deter a country from undertaking undesirable action may be categorised in four ways. The first is to incentivise restraint, which is avoiding the undesired action. The next is to disincentivise any nuclear action. Encouraging restraint from the undesirable action may be a combination of improving advantages/benefits and reducing disadvantages/costs. In contrast, steps, which include conditional threats, increase the consequences of taking the undesired action and may reduce advantages/benefits along with imposing costs of the undertaking. Table 1 shows the four categories of steps applied to deterring the use of nuclear weapons.

Political, Military, Economic, Social, Information, Infrastructure (PMESII) (Hillson 2009; Lawrence and Murdock 2009; Ducote 2010; Hartley 2015) is an organising construct for evaluating the effects of government and military actions. The PMESII categories provide one approach to identifying advantages and disadvantages. Political benefits may be a favourable treaty or

diplomatic relationship, whereas political disadvantages might be restricted diplomatic access. Military advantages include joint training and exercises, and costs may be improved military capabilities of countries threatening countries. Economic benefits are trade agreements or investments with costs being sanctions and other trade restrictions. Social advantages are open travel versus restricted adoptions and immigration. Information advantage is student studies and access to technologies. One possible infrastructure benefit may be investments and developments. The potential benefits and costs are beyond what the military can provide or impose. The whole government can provide greater incentives and disincentives.

How may a country attempt to control escalation? The same logic as the original deterrence, shown in Table 1, applies where the opponent needs to perceive the consequences of an attack, the cost, and benefits and decide not to make any undesired actions. Preventing escalation means the undesired action is a response that has consequences of a larger magnitude. The goal in preventing escalation is to convince the opponent that there are worse options if they respond too aggressively compared to a restrained response or even not responding. A country that executes the first strike hopes to achieve – conducting their strike and deterring a response.

Because of the extensive consequences of deploying a nuclear weapon, deterrence requires significant consequences. Most likely, deterrence will require actions beyond just the military instrument of power. For example, a joint declaration by military and economic allies that they will freeze all financial assets of a country that uses nuclear power against them in any capability would likely contribute to a stronger deterrent. These actions are intended to increase the cost of using nuclear powers to potential aggressors.

2.2 Alternative nuclear targets

We identified and examine a type of target with effects primarily in each of the PMESII categories as alternatives to counterforce targets of the adversary's strategic nuclear systems and national leadership. For example, we examine a demonstration detonation for the political category and an electromagnetic pulse (EMP) in the information category. We examine the six alternatives to the current counterforce strategy, listed in Table 2 in order of the least to most civilian impact.

Tab. 1: Categories of steps to deter a country's use of nuclear weapons

Perceptions of country being deterred	Restraint from undesired action: Hence, do not use nuclear weapons	Action being deterred: Use of nuclear weapons
Benefits and advantages	Increase benefits and improve advantage	Deny benefits and decrease advantages
Costs and disadvantages	Decreasing costs and reducing disadvantages	Impose costs and increase disadvantages

Tab. 2: Alternative nuclear targets

PMESII category	Alternative nuclear target examined
Political	Nuclear demonstration detonation
Military	Conventional military forces
Economic	Transportation nodes
Social	Population center (Cities)
Information	High-altitude electromagnetic pulse (EMP)
Infrastructure	Power generation plants

PMESII, political, military, economic, social, information, infrastructure.

2.2.1 Nuclear demonstration detonation

A nuclear weapon demonstration could indicate that a country is willing and able to cross the nuclear threshold in response to a particular crisis. Presumably, the nuclear demonstration would not negatively affect the country. An example of this would be to have a detonation near the target country's coastal water.

What might a country gain from conducting a nuclear demonstration? First, a demonstration would confirm their nuclear capability and indicate a willingness to use nuclear weapons. Second, if a conflict is already waging, the demonstration may be a 'shot over the bow,' warning of targeted use if their demands are not met. Third, the political and psychological costs would be enormous for the threatened nation and any allies, possibly ending the conflict right there. Fourth, world opinion may condemn further actions due to the fear of the employment of nuclear weapons.

Responding to a nuclear demonstration with another demonstration does not appear to have much value. The first demonstration indicates an intention to escalate to the deployment of nuclear weapons. The country conducting that first demonstration likely already knows its opponent has nuclear weapons; hence, the other country responding with a demonstration is unlikely to deter the nuclear escalation they have threatened. Furthermore, responding with a demonstration may be counterproductive if that demonstration is perceived as an unwillingness to strike with nuclear weapons. However, the issue of how to respond to a nuclear demonstration is challenging. Ignoring the demonstration may result in the use of nuclear weapons forewarned by the demonstration. But, does a demonstration, with no causalities by definition, warrant a nuclear strike with causalities in response? Yielding to the demands of a country that demonstrated a willingness to resort to nuclear weapons might simply incentivize nuclear demonstrations and may escalate to their use for damage.

In the past, deterrence of nuclear weapons was achieved through a threatened response with nuclear weapons. In this case of a nuclear demonstration (and other cases to follow), nuclear deterrence does not appear achievable with only the threat of responding with nuclear weapons. Nuclear deterrence needs to rely on more than the threat of reciprocal use of nuclear weapons. In our opinion, nuclear deterrence needs to incorporate actual benefits and threatened costs from other instruments of national power.

2.2.2 Conventional military forces

One side could employ a nuclear weapon in advance or change the trajectory of a conflict with conventional forces (Hefty et al. 2015). Countries may be prone to rely on nuclear weapons to counter conventional military threats since maintaining nuclear weapons may be less expensive than fielding a conventional military sufficient to repel attacks. Potential targets may be either field forces or their support facilities. The targeted conventional forces may be on or close to the country's territory; the fallout may affect future force movement and civilians.

The effects on the adversary forces and civilian population (potentially including the citizens in the country employing the nuclear weapon if they are trying to stop an invasion) depend upon the particular circumstances. Responding with a nuclear strike on military forces of the first country is probably unlikely to deter a country desperate enough to escalate to nuclear weapons.

Leaders may contend that striking invading conventional forces is a moral use of nuclear weapons if the existence of their government is threatened. For example, North Korea may deploy a nuclear weapon to stop an invasion (Davis et al. 2016). However, could the threat of nuclear-use by a major power deter the losing side from using nuclear weapons in a conventional conflict? While the state losing a conventional war would likely have a grave threat to their national existence, the 'winning' side would unlikely meet the moral standard of the Just War tenet of a grave threat to justify a nuclear response.

Does 'winning' a conventional conflict against a country armed with nuclear weapons result in the losing side using their weapons? Talmadge (2017) states yes; 'China might see several forms of limited nuclear escalation as its least-bad response to this sort of threat to its nuclear deterrent, notwithstanding the country's no-first-use policy.' This finding illustrates recurring dilemmas that the United States may face in conventional wars with other nuclear-armed adversaries. Morgan et al. (2015)

conclude ‘there is probably no case in which U.S. forces could neutralize an opponent’s nuclear capabilities with a high enough probability of success that U.S. leaders would let them attempt it.’ In conclusion, deterring the use of nuclear weapons during a conventional war with a nuclear-powered nation is very difficult.

2.2.3 Information category: EMP high-altitude attack

A high-altitude detonation could send an EMP over a large region that may disrupt or destroy electrical and computer systems. While the attack would certainly affect functions in society, no individuals would be direct fatalities or casualties of the detonation. However, in well-developed countries, the indirect impacts of destroying and disrupting the computer and electrical networks would be devastating. Furthermore, the detonation would likely also affect satellites and impact many nations beyond their adversary.

2.2.4 Economic strike

Destroying one or several key nodes of various networks could have a devastating economic impact. Targets in this category may include container-loading facilities at seaports, railroad centers, or key bridges or tunnels. Besides transportation chokepoints, other networks may have critical nodes. Possible examples include satellite-control stations or data warehouses.

Attacks on these types of targets might be planned at off-hours to minimise civilian fatalities, particularly if accurate, (relatively) low-yield nuclear weapons were used. The impact would likely be protracted since the fallout would significantly delay repair or rebuilding. The impact would likely ripple through all the country’s trading partners.

In a conflict between two major powers, the attacked country may be able to respond to a nuclear attack in a similar capacity against the attacking country. This response requires the ability to penetrate their defences with a weapon of appropriate yield and accuracy. Additionally, the response should be proportionate in casualties and economic impact to avoid an escalating response from the initial attacker.

2.2.5 Infrastructure strike

Another set of nuclear targets are infrastructure facilities. Potential targets include power plants or key nodes in

the electrical grid, water supply, and possible waste distributions. We categorise these separately from economic targets because they have a more direct and extensive impact on civilians. Additionally, some of these targets, like dams, have specific prohibitions in international law.

The detonations could be conducted to minimise direct civilian casualties. However, very rapidly, the civilian population would be affected by an infrastructure attack. A proportionate response (or deterrence threat) may be a similar attack. The responding country would need weapons delivery with sufficient accuracy and appropriate low-yield weapons. Some large conventional weapons can produce blasts larger than the lowest yield nuclear weapons and may provide a non-nuclear means of response and hence enable deterrence.

2.2.6 Social category: Population centers

Our final target category is population centers and cities. The intended effect is civilian casualties. Most would agree that these do not meet the criteria of the Just War Theory. However, cities are the only two targets historically attacked with nuclear weapons. One may contend those historic strikes resulted from the constraints of weapon yield and delivery accuracy possible at the time. Today, targeting the first-use countries cities with nuclear weaponry would likely result in series of escalating strikes. Could a country respond with an economic strike? Is an economic strike sufficient to deter city busting? One may argue that since no one is sure how leaders will react during a nuclear conflict, an implied threat of striking cities is what underlies deterrence.

2.3 Targeting options results

We examined six types of nuclear weapons uses other than counterforce. Table 3 lists them from left to right in the order of general increasing impact. First, we summarise our conclusions about the deterrence viability of threatening to respond with the same kind of attack. Subsequently, we consider deterring by threatening a more consequential response (a column to the right) and then a less consequential response (a column to the left). Finally, we complete this summary of results by discussing how deterrence options may be made more credible.

In our discussion of each type of nuclear attack, we evaluated whether the threat of responding in kind, meaning the same type of attack, was viable; our

Tab. 3: Impacts by types of nuclear attacks

Impacts	Types of nuclear attacks					
	Demo	Military forces	EMP	Economic	Infrastructure	Population centers
Adversary vital interest	No	Yes	Yes	Yes	Yes	Yes
Civilian casualties	No	Maybe	No	Some	Some	Many
Civilian impact	No	Maybe	Yes	Yes	Yes	Yes
Impact other countries	No	Maybe	Yes	Maybe	Maybe	Maybe (Fallout)
Viability of response in kind	No	Unlikely	No	Maybe	Maybe	Unlikely

conclusions are in the bottom row of Table 3. A country will not be deterred from conducting a nuclear demonstration because of the possibility of their opponent conducting a nuclear demonstration, which has no direct impact on them, in response. A country that is on the losing side of a military conflict and desperate is less likely to be intimidated by the threat of a nuclear strike. The losing side has more to gain by using their nuclear weapons against their enemy's military ground forces. A response with EMP is difficult because it cannot be isolated to the country that first employed an EMP strike. An economic and infrastructure attack is possible; however, it would be highly dependent upon the situation—these types of responses should be investigated. Gallagher and Sorice (2014) argue that threatened responses of targeting population centers may lack enough credibility to provide deterrence. All of these cases present deterrence challenges based on threatening to respond with the same kind of nuclear attack.

In general, threatening to respond with a more severe attack (a column to the right in Table 3) would be more consequential and may be perceived as disproportionate and escalatory. Similarly, a threatened response with a nuclear attack that is less consequential (a column to the left in Table 3) may be perceived as a weak response and not be a sufficient deterrent. After an adversary's destructive attack, a nuclear demonstration would be of no consequence to the adversary and be perceived as a very weak response. Similarly, responding to a nuclear attack on electronic systems, economy, infrastructure, or cities by attacking the aggressor's conventional military forces would not have a considerable impact. Furthermore, striking conventional forces would be difficult without inflicting extensive civilian damage, unless deployed in a combat theatre. The wide impact of EMP does not make it a credible response to achieve nuclear deterrence. However, carefully crafted economic or infrastructure may provide viable responses to ensure deterrence and should be examined.

We contend viable deterrence requires a credible threat. One of our main objectives against various

responses to nuclear attacks is that the consequences are disproportionate. Lower yield nuclear weapons provide additional, perhaps more credible, options. For example, low-yield weapons enable striking economic targets with limited casualties. Opponents argue those types of improvements make nuclear weapons more useable. Yet, usability is the heart of the deterrence's threatened harm. Too large of yield may not be viable and limit a country's ability to respond and hence deter in the first place.

Additionally, the quantity of nuclear weapons affects deterrence. Rauchhaus (2009) found that when both sides have symmetry in a nuclear weapons capability, there is significantly less chance of war. Modern deterrence requires sufficient weapons to execute a response and needs to have enough weapons to continue to deter the employment of nuclear weapons.

3 Conclusion

Even when counterforce strikes have been deterred, countries may consider limited nuclear strikes to advance their objectives. We examined six types of targets that align with the PMESII categories. For all the types of nuclear attacks that we examined, we contend that deterrence of limited nuclear strikes is difficult to achieve when limiting response to nuclear strikes. Deterrence increases by improving the benefits made available for restraint and increasing the consequences of executing nuclear actions. The whole government, not just the military, can affect the cost and benefits of nuclear weapons to other nations. Hence, deterrence can be strengthened with the use of other instruments of power. The deterrence of not using (or better not even maintaining) nuclear weapons requires initiatives to incentivise benefits and reduce costs. Those may include economic and political initiatives. Similarly, for those countries that use nuclear weapons, deterrence threats should include specific penalties that increase their costs and reduce their benefits.

4 Recommendations

A deterrence policy solely focused on nuclear counterforce appears to be insufficient to deter nuclear aggression in the rapidly evolving technological and nuclear landscape. Specifically, we examine cases where an adversary might consider a limited nuclear strike with the hope that their remaining arsenal of nuclear weapons will prevent or limit any response against them. Our analysis is far from conclusive; however, these cases pose potential situations that should be further studied. Countries should evaluate broader deterrence policies to deter and disincentivise nuclear aggression in any capacity. Since the required responses may involve considerably more than retaliatory nuclear strikes, the whole government, not just the military, should contribute to the development and implementation of the new deterrence policies.

5 Disclaimer

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