

DETECTING AND THREATENING IN THE RUSSIAN-UKRAINIAN WAR: A GAME THEORY PERSPECTIVE

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SUMMARY

Russia's full-scale invasion of Ukraine in 2022 marked a significant turning point in the post-World War II history of Europe, with the realist and idealist views on international relations offering contrasting interpretations of its underlying sources. On one side, realist scholars argue that Russia invaded Ukraine because of the West's aggressive stance in promoting democracy, NATO enlargement, and EU expansion. On the other side, idealist scholars argue that Russia invaded Ukraine because of the West's appreciation for partnership and thus failure to come up with a compelling deterrence strategy, making the costs of war outweigh the benefits of anything else Russia could have gained either internally or externally. While each perspective provides valuable insights, neither captures entirely the complex dynamics of foreign affairs, which frequently straddle a middle ground between the conflictual and cooperative states of nations. This paper takes on a game theory approach to bridge the gap between the realist and idealist views on international relations, with the analysis of two scenarios: a limited deterrence game, viewing the conflict as a proxy war between NATO and Russia, and an extended deterrence game, seeing the conflict as a direct war between Russia and Ukraine with potential help from NATO. The findings offer a nuanced understanding of the dynamics between Russia, Ukraine, and NATO with practical significance, suggesting that NATO should have employed a strategy of decisive support for Ukraine, as anything less allowed Russia to underestimate the consequences of the full-scale invasion.

Keywords: Russian-Ukrainian war, NATO, game theory, strategy, international relations, realism, idealism

INTRODUCTION

Dawn broke, and with it, the biggest military invasion seen in Europe since World War II. It was 24 February 2022, and Russian troops were crossing into Ukrainian territory from Russia in the east, from Belarus in the north, and from Russian-annexed Crimea in the south. As the conflict unfolded, the whole world was asking if the Russian-Ukrainian War was a failure of Western deterrence¹ or a consequence of perceived Western aggression.²

This question is yet to be fully answered. On one side, realist scholars argue that Russia invaded Ukraine because of the West's aggressive stance. For example, one of the most prominent of these viewers, John Mearsheimer, argues that NATO threatened Russia by constantly expanding closer to Russian borders (Mearsheimer, 2014, p. 1). This left Russia with no other choice but to invade in order to protect itself. However, on the other side, idealist scholars argue that Russia invaded Ukraine because of the West's failure to come up with a compelling deterrence strategy, making the costs of invasion outweigh the benefits of anything else Russia could have gained either internally or externally. For example, one of the most prominent of these viewers, Michael McFaul, thinks that the invasion of Ukraine and the use of the Cold War rhetoric with NATO as the main enemy in internal politics brought considerable benefits like creating cohesion and fostering support for

the Russian President Vladimir Putin (McFaul, 2014, p. 170). This implies that the West didn't deny benefits and impose costs enough to change Russia's course of action. While comprehensive, both theories fail to fully explain the roots of the Russian-Ukrainian war.

The realist perspective tends to depict nations as inherently self-interested and thus usually uncooperative. In contrast, the idealist one tends to depict nations as cooperative and thus occasionally overlooking national interests. However, the reality typically lies somewhere in between these two extremes, with countries balancing competition and partnership. For example, nations can determine preferred courses of action for interacting with other nations by assigning probabilities and weighing the benefits and costs associated with the attack and defense in strategic games. This paper uses mathematical modeling to find the optimal strategy that NATO could have taken to prevent the Russian-Ukrainian war by considering both the conflictual and the cooperative state of nations in order to bridge the gap between the realist and idealist perspectives. The findings offer a nuanced understanding of the dynamics between Russia, Ukraine, and NATO with practical significance, suggesting that NATO should have employed a strategy of decisive support for Ukraine, as anything less allowed Russia to underestimate the consequences of invading Ukraine.

1 In the weeks after the invasion, media sources published articles centered around explanations for why Western deterrence failed in Ukraine. See Braun, A. (2022, February 24). Western deterrence has failed in Ukraine. *The Globe and Mail*. <https://www.theglobeandmail.com/opinion/article-western-deterrence-has-failed-in-ukraine/>; Schadlow, N. (2022, March 20). Why deterrence failed against Russia? *The Wall Street Journal*. <https://www.wsj.com/articles/why-u-s-deterrence-failed-ukraine-putin-military-defense-11647794454>; Drezner, D. W. (2022, March 27). Why did deterrence fail in Ukraine? *The Washington Post*. <https://www.washingtonpost.com/outlook/2022/03/27/why-did-deterrence-fail-ukraine/>; and Collins, L. (2023, February 20). U.S. deterrence failed in Ukraine. *Foreign Policy*. <https://foreignpolicy.com/2023/02/20/ukraine-deterrence-failed-putin-invasion/>.

2 Before the invasion on 24 February 2022, Russian President Vladimir Putin addressed the Russian nation, using threats to Russian security coming from Western countries as a pretense to announce the special military operation in Ukraine. See President Vladimir Putin. (2022, February 24). Address by the President of the Russian Federation. *Official Internet Resources of the President of Russia*. <http://www.en.kremlin.ru/events/president/transcripts/67843>.

CURRENT THEORIES

Vladimir Putin is undeniably responsible for initiating and leading the Russian-Ukrainian war. However, thinkers are still debating about the motivation behind these actions. Realism and idealism are the two prevailing theories offering contrasting explanations for the crisis's roots and progression.

Some realists think the blame for the Russo-Ukrainian conflict lies with the hostile West, which assertively expanded towards the East. In this view, the war represents nothing more but power struggles between Russia and the West, with both sides seeking to advance their own influence in the region. According to the article "Why the Ukraine Crisis is the West's Fault" by John Mearsheimer, "the West's triple package of policies – NATO enlargement, EU expansion, and democracy promotion" threatened Russia's power in its sphere of influence. Moreover, the aggressive acts of invading Abkhazia and South Ossetia in Georgia in 2008 or Crimea in Ukraine in 2014 were fueled by Russian resentment over a supposedly broken Western promise made in the early 1990s, saying that NATO would not continue to expand towards Eastern Europe when 12 countries were actually added in three subsequent rounds of NATO enlargement since then (Mearsheimer, 2014, pp. 1-2). For example, during NATO's 1995 bombing campaign in Bosnia, then-Russian President Boris Yeltsin said, "It would be a major political error on the part of those who are now insisting on expanding NATO... It will mean a conflagration of war throughout all Europe," highlighting worries over the growing NATO influence.³ Now, in the morning of 24 February 2022, current Russian President Vladimir Putin said, "In response to our proposals, we invariably faced either cynical deception and broken promises... while the North Atlantic alliance continued to expand despite our protests and concerns [with] its military machine moving and [...] approaching our border," again emphasizing Russia's stance against NATO expansion.⁴ In this view, there was no other choice left for Russia but to invade in order to reassert control over its near abroad.

However, this perspective that places blame solely on the West for the Russo-Ukrainian has a couple of major flaws. For example, these kinds of realist arguments overlook the significant progress achieved in international cooperation since the end of the Cold War. In May 1997, NATO and Russia signed the Founding

Act on Mutual Relations, Cooperation, and Security,⁵ a path to NATO-Russia cooperation in "build[ing] a stable, peaceful and undivided Europe ... to the benefit of all its people" together. Furthermore, the treaty acknowledged that NATO and Russia "share the goal of overcoming the vestiges of earlier confrontation and competition, as well as strengthening mutual trust and cooperation" in a world where the two entities "no longer consider each other as adversaries" (Founding Act on Mutual Relations, Cooperation, and Security, Preamble). Then, in September 2002, NATO and Russia continued on the path of cooperation by agreeing to create a NATO-Russia Council,⁶ where "the individual NATO member states and Russia have worked as equal partners on a wide spectrum of security issues of common interest" (NATO-Russia Relations: A New Quality, Preamble). All these changes came about as mutually beneficial agreements rather than mere attempts to appease Russia during NATO's growth. Moreover, according to previously secret documents that came to light in recent years, "Contrary to Russian allegations, there was never a formal deal about NATO expansion" (Sarotte, 2014, p. 92). Therefore, the claims that Russia invaded Abkhazia and South Ossetia in Georgia in 2008 and Crimea in Ukraine in 2014 solely because it wanted to retaliate against NATO's expansion are misleading. Building up to that point in time, cooperation with NATO was reaching new heights on top of the fact that there was no broken promise to begin with. Indeed, a main flaw of realists is their perception of the world as inherently self-interested and thus usually uncooperative.

Some idealist scholars think the blame for the Russian-Ukrainian war lies with the lenient West, which lacked a compelling deterrence strategy. In this view, the war is nothing more than the result of the West being unable to make the costs of invasion outweigh the benefits of anything else Russia could have gained, either internally or externally. According to the article "Faulty Powers: Who Started the Ukraine Crisis?" by Michael McFaul, during the last decades, Russia had exhibited a complex interplay of cooperation and confrontation with the West, with the shifts in this relationship not necessarily following the timeline of policy shifts in the approach of the West towards Russia (McFaul, 2014, p. 167). This suggests that the changes in Russian foreign policy are most likely the "result of internal political dynamics, [with] the shifts beg[ining] when Russian

3 In September 1995, then-Russian President Boris Yeltsin criticized the growing influence of NATO in Eastern Europe, which supposedly ignored Russia in its efforts to create a post-Cold War approach to international security. See Williams, C. J. (1995, September 9). Yeltsin lashes out at NATO strikes in Bosnia. *The Los Angeles Times*. <https://www.latimes.com/archives/la-xpm-1995-09-09-mn-44006-story.html>.

4 Ibidem (2).

5 The treaty consisted of five primary sections explaining the fundamental principles of the relationship, including the mechanisms to facilitate military and political cooperation between NATO and Russia. See *Founding Act on Mutual Relations, Cooperation, and Security between NATO and the Russian Federation*, NATO-Russia, May 27, 1997, retrieved from NATO. https://www.nato.int/cps/en/natohq/official_texts_25468.html.

6 The NATO-Russia Council, in which the meetings took place in the equal and individual partners format, replaced the Permanent Joint Council for consultation and cooperation created by the 1997 NATO-Russia Founding Act, in which the meetings took place in the bilateral NATO+1 format. See *NATO-Russia Council*, NATO-Russia, May 28, 2002, retrieved from NATO. https://www.nato.int/cps/en/natohq/topics_50091.html.

President Vladimir Putin and his regime came under attack,” not in response to the actions taken by the West (McFaul, 2014, p. 169). More specifically, the invasions of Abkhazia and South Ossetia in Georgia in 2008 and Crimea in Ukraine in 2014, along with the portrayal of NATO as the primary adversary for Russia, yielded significant benefits in internal politics like diverting attention from fraudulent elections, garnering support for the regime within Russia, and fostering cohesion against the common enemy taking the shape of the West. For example, an analysis of the approval ratings of authorities reveals that instances of Russian aggression led to periods when Russian President Vladimir Putin’s approval rating in the country experienced a significant rating rise from unusually low levels in the mid-60% range to more typical levels in the high 80%.⁷ In this view, Russian President Vladimir Putin might have thought that the potential gains of securing nationwide support would outweigh the potential losses from engaging in aggression if those even existed.

However, this perspective that places the fault with the lenient West which lacked a compelling deterrence strategy also has significant shortcomings. For example, even though the West still cooperated with Russia, it did

impose economic and political sanctions in response to Russian aggression over the last decades.⁸ However, it might be that there were miscalculations about how strong or weak the impact of these sanctions would be in the cost-benefit analysis done either by Russian President Vladimir Putin or by the West. It doesn’t seem that the error was fully made by the West, considering the economic and political sanctions should’ve theoretically affected Russia because of the hold on the newly started partnerships with other NATO countries worldwide. However, it doesn’t seem that Russia fully made the error either, considering how practically the West has fallen short in decreasing collaboration in response to Russian aggression previously. For example, Germany went on to build the Nord Stream 2 pipeline with Russia after the annexation of Crimea in 2014.⁹ This seems like a paradox. However, it can be explained by the fact that the West overvalues while Russia undervalues the importance of partnerships between countries worldwide and between each other. Indeed, a main flaw of the idealists is to depict nations as valuing teamwork and occasionally overlooking national interests, thereby neglecting the approaches of some countries that have demonstrated a predisposition to prioritize national interests over international norms.

PROPOSED THEORY

The realist perspective tends to depict nations as inherently self-interested and thus usually uncooperative. In contrast, the idealist one tends to depict nations as cooperative and thus sometimes overlooking national interests. However, the actual dynamics of international relations are much more nuanced, usually falling somewhere in the middle of these two perspectives. Countries are ultimately self-interested but also recognize the value of partnerships, alliances, and cooperation in the face of larger threats and shared interests. For example, former United States ambassador to Russia Michael McFaul pointed out that the US needs to advance both its realist and idealist agendas, which are not necessarily mutually exclusive.¹⁰ This paper hypothesizes that game theory provides a way to bridge the gap between the realist and

idealist perspectives. The preferred courses of action for interacting with other nations are determined by assigning probabilities and weighing the benefits and costs of attack and defense in strategic games, which automatically takes into account both the conflictual and cooperative states of nations. Moreover, the outcomes of different strategies can be computed with their respective probabilities for occurring, which is of practical significance to deciding on the best course of action NATO could have taken to prevent the Russian-Ukrainian war. Only a limited number of papers apply game theory to the Russian-Ukrainian war and even less so to the context of comparing the idealist and realist theories. Moreover, most papers consider the games to be between Russia and NATO rather than between Russia and Ukraine or Russia and Ukraine with

7 Russian President Vladimir Putin’s approval rating increased from 61% in August 2021 to 83% in March 2022 after Russia invaded Ukraine, from 61% in November 2013 to 86% in June 2014 after Russia annexed Crimea from Ukraine, from 78% in April 2007 to 88% in September 2008 after Russia backed up South Ossetia and Abkhazia against Georgia. See Levada Center. (updated till March 2024). Approval of the authorities. *Levada Center*. <https://www.levada.ru/en/ratings/>.

8 After the annexation of Crimea in Ukraine in 2014, a series of sanctions, which progressed in severity from Tier 1 (diplomatic) to Tier 2 (individuals and entities) and finally to Tier 3 (economic), were applied. See European Council of the European Union. (2024) Timeline - EU sanctions against Russia. *European Council*. <https://www.consilium.europa.eu/en/policies/sanctions-against-russia/timeline-sanctions-against-russia/>.

9 The German companies E.ON SE and BASF SE/Wintershall Holding GmbH, the Anglo-Dutch Royal Dutch Shell plc, the Austrian OMV AG, and the French ENGIE S.A. signed a shareholder agreement with the Russian company PJSC Gazprom to implement the Nord Stream 2 project in order to supply Russian natural gas to the EU market. See *Nord Stream AG welcomes shareholder agreement for additional gas supply infrastructure through the Baltic Sea*, Nord Stream-Gazprom, September 4, 2015, retrieved from Nord Stream. <https://www.nord-stream.com/press-info/press-releases/nord-stream-ag-welcomes-shareholder-agreement-for-additional-gas-supply-infrastructure-through-the-baltic-sea-470/>.

10 This is a summary of the argument rather than an exact wording of what was said by former United States ambassador to Russia Michael McFaul. See Whitmore, B. (2021, April 14). Realism, idealism, and the reset. *Radio Free Europe*. https://www.rferl.org/a/Realism_Idealism_And_The_Reset/2012521.html.

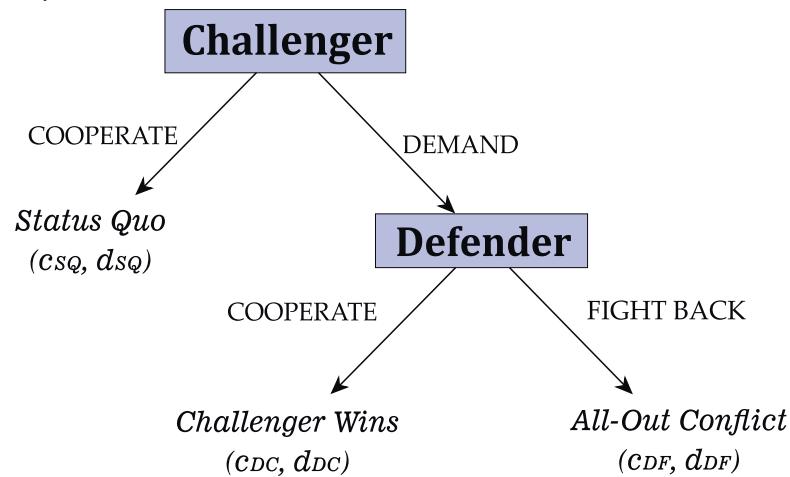
NATO, failing to fully account for the regional dynamics of Eastern Europe as well as the will of the Ukrainian people. This paper hopes to overcome these limitations by taking on the analysis of two scenarios — a limited deterrence game, viewing the conflict as a proxy war between NATO and Russia, and an extended deterrence game, seeing the conflict as a direct war between Russia and Ukraine with potential help from NATO.

In a simplistic approach, some could see the conflict between Russia and Ukraine as a proxy confrontation between NATO and Russia with the options of either maintaining peace or initiating a proxy war between each other. To explore this, a limited deterrence game was used. Russia takes the role of the challenger, which has the two choices of 1) invading Ukraine (demand) and 2) not invading Ukraine (cooperate), while NATO takes the role of the defender, which has the two choices of 1) help Ukraine via military and humanitarian aid (fight back) and 2) send thoughts and prayers (cooperate). If the

challenger (Russia) chooses to cooperate, the status quo is maintained, resulting in payoffs of c_{SQ} for the challenger and d_{SQ} for the defender. However, if the challenger chooses to demand (invade), the defender (NATO) has the two options of 1) surrendering, resulting in payoffs of c_{DC} for the challenger and d_{DC} for the defender, or 2) fighting, leading to payoffs of c_{DF} for the challenger and d_{DF} for the defender.¹¹ The extensive form of the game is presented in Figure 1.¹² Notice that this approach captures only two big players represented by NATO and Russia and only binary choices given by cooperation and demanding/fighting back. This simplification may not fully capture the complexity of the situation. For example, if the West does not offer aid, in this modeled game, Ukraine faces an automatic loss, while in reality, Ukraine has the option to fight alone for a hopeful win. Regardless, this simplified model serves as a starting point for understanding the dynamics between Russia and Ukraine, which is backed up by NATO.

Figure 1

Extensive Form of the Simple Game



To analyze the equilibrium and, thereby, the optimal strategies for the game, the preferred states of the world and/or their payoffs for each of the players were established. **It was assumed that the challenger (Russia) prefers $c_{DC} > c_{SQ} \geq c_{DF}$.** Clearly, $c_{DC} > c_{DF}$ and $c_{DC} > c_{SQ}$ because otherwise Russia would have no interest in Ukraine. Then, it seems reasonable to assume $c_{SQ} \geq c_{DF}$ because the costs of the war coming from economic and political sanctions as well as from human and infrastructure losses can significantly surpass the potential benefits of winning control over

Ukraine. **Also, it was assumed that the defender (NATO) prefers $d_{SQ} > d_{DF} \geq d_{DC}$.** Clearly, $d_{SQ} > d_{DC}$ and $d_{SQ} > d_{DF}$ because Ukraine would not have any problems with being invaded otherwise. Then, it seems reasonable to assume $d_{DF} \geq d_{DC}$ because the costs of losing control over Ukraine might outweigh the costs of the war coming from human and infrastructure losses. Given these preferred states of the world for both Russia and NATO, two equilibriums were found given by 1) the unstable one in which both players cooperate and 2) the stable one in which both players demand/fight back.¹³

11 This is an adaptation of a game proposed by Jhon Harsanyi for modeling conflicts between two actors. See Harsanyi, J. C. (1977). *Rational behavior and bargaining equilibrium in games and social situations*. New York, USA: Cambridge University Press.

12 The extensive form of a game captures the sequence of choices, the potential outcomes with associated payoffs, and the information available to the player at decision points. This is a schematic approach to the construction of the game described above. See Kuhn, H. W. (1953). *Extensive games and the problem of information*. Princeton, NJ: Princeton University Press.

13 Stable and unstable are used in the mathematical sense. For an intuitive analysis, we ignore the equality signs between the payoffs: At node 2, the defender chooses to fight back because $d_{DF} \geq d_{DC}$. Then, at Node 1, the challenger chooses to cooperate because $c_{SQ} \geq c_{DF}$, anticipating that the defender will choose to fight back. Thus, we get the equilibrium given by the Status Quo. For a complex analysis, we consider the equality signs between the payoffs. We have the same thought process as above, except at node 2, the defender chooses to fight back with probability p_d instead of 1, and at node 1, the challenger chooses to demand with probability p_c instead of 1, anticipating that the defender will choose to fight back with some known probability. Thus, we get the equilibrium given by the Status Quo or the All-Out Conflict. This requires more mathematical analysis, which we are not going to go into here because it goes beyond the scope of the paper.

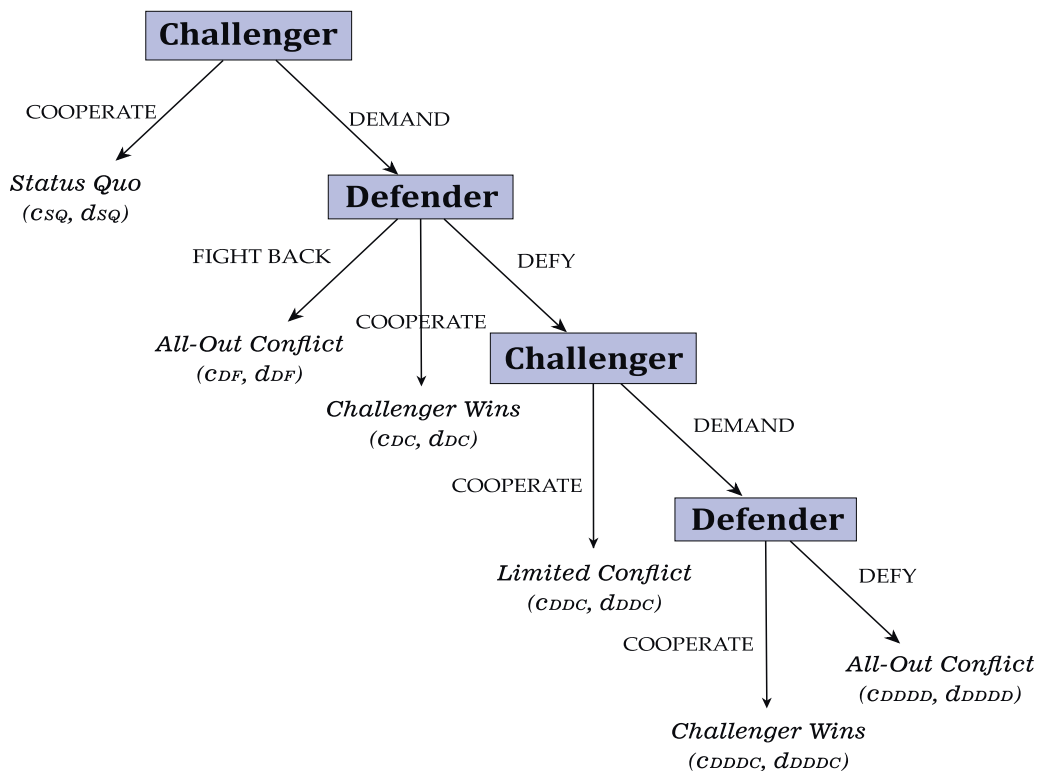
The Status Quo equilibrium where Russia and NATO both cooperate would be better. However, it might not be possible by default, given that Russia showed signs of not being willing to cooperate before by displaying signs of aggression in Eastern Europe. Translated into the game above, this means Russia assessed that the probability of NATO cooperating and thereby reaching the Status Quo equilibrium was high. Given this, Russia might have believed that the probability of demanding and then ending up in the Challenger Wins spot was high, too. This would result in losing Ukraine. Then, the best strategy for NATO would be not to cooperate by consistently supporting Ukraine in resisting Russian meddling in its affairs in order to make the probability of NATO cooperating, and thereby reaching the Status Quo equilibrium, seem low. Given this, Russia might believe that the probability of demanding and then ending up in the Challenger Wins spot will also be low. Paradoxically, Russia and NATO could move the All-Out Conflict to the Status Quo equilibrium by threatening each other enough to give up cooperation.

In a more complex approach, some could see the conflict between Russia and Ukraine as a direct confrontation, with the options of either maintaining peace or initiating a direct war between each other, with Ukraine potentially being or not helped by NATO. To explore this, an extended deterrence game was used. Russia takes the

role of the challenger, which has the two choices of 1) invading Ukraine / continue invading Ukraine (demand) and 2) not invading Ukraine / giving up on invading Ukraine (cooperate), while Ukraine takes the role of the defender, which has the three choices of 1) fighting with help from NATO via military and humanitarian aid (fight back), 2) fighting without help from NATO (defy), and 3) give up fighting (cooperate). If the challenger (Russia) chooses to cooperate, the status quo is maintained, resulting in payoffs of c_{SQ} for the challenger and d_{SQ} for the defender. However, if the challenger chooses to demand (invade), the defender (Ukraine) has the three options of 1) surrendering, resulting in payoffs of c_{DC} for the challenger and d_{DC} for the defender, 2) fighting back with help from NATO, leading to payoffs of c_{DF} for the challenger and d_{DF} for the defender, or 3) enter an escalation cycle, resulting in different payoffs depending on whether the challenger decides to give up or engage in the escalation cycle.¹⁴ The extensive form of the game is presented in Figure 2.¹⁵ Notice that this approach captures Ukraine alongside the two big players represented by NATO and Russia with more than just the binary choices given by cooperation and demanding/fighting back. Hence, this adaptation addresses the weakness of the previous game, allowing for a better understanding of the dynamics between Russia and Ukraine backed up by NATO.

Figure 2

Extensive Form of the Adapted Game



¹⁴ This is an adaptation of a game proposed by Frank Zagare and Marc Kilgour for modeling the Cuban Missile Crisis. See Zagare, F. C., & Kilgour, D. M. (2000). *Perfect deterrence*. Cambridge, UK: Cambridge University Press.

¹⁵ Ibidem (13).

To analyze for the equilibrium and, thereby, the optimal strategies for the game, the preferred states of the world and/or their payoffs for each of the players were established. **It was assumed that the challenger (Russia) prefers** $c_{DC} > c_{DDDC} > c_{SQ} > c_{DDC} \geq c_{DF} > c_{DDDD}$. Clearly, $c_{DDDC} > c_{SQ}$ and $c_{DC} > c_{SQ}$ because otherwise Russia would have no interest in Ukraine. Also, it seems reasonable to presume $c_{DC} > c_{DDDC}$ because a world where you win directly is better than a world where you have to use resources only to end up in the same situation. Moreover, $c_{SQ} > c_{DDC}$ because Russia used resources only to end up in what could be argued to be a similar situation to the Status Quo. Then, it seems reasonable to assume $c_{DDC} \geq c_{DF}$ and $c_{DDC} > c_{DDDD}$ because the costs of the war coming from economic and political sanctions as well as from human and infrastructure losses can significantly surpass the potential benefits of winning control over Ukraine. Moreover, $c_{DF} > c_{DDDD}$ because a world where you directly get into an all-out conflict is better than a world where you have to use resources only to end up in the same situation. **Also, it was assumed that the defender (NATO) prefers** $d_{SQ} > d_{DDC} > d_{DF} > d_{DDDD} \geq d_{DC} > d_{DDDC}$. Also, it seems reasonable to presume $d_{SQ} > d_{DDC}$ because Ukraine used resources only to end up in what could be argued to be a similar situation to the Status Quo. Clearly, $d_{DDC} > d_{DF}$ and $d_{DDC} > d_{DDDD}$ because Ukraine would not have any problems with being invaded otherwise. Moreover, $d_{DF} > d_{DDDD}$ because a world where you directly get into an all-out conflict is better than a world where you have to use resources only to end up in the same situation. Then, it seems reasonable to assume $d_{DDDD} \geq d_{DC}$ and $d_{DDDD} > d_{DDDC}$ because the costs of losing control over Ukraine might outweigh the costs of the war coming from human and infrastructure losses. Moreover, $d_{DC} > d_{DDDC}$ because a world where you win directly is

better than a world where you have to use resources only to end up in the same situation. Given these preferred states of the world for NATO, Ukraine, and Russia, three equilibriums were found given by 1) the unstable one in which both players cooperate and 2) the two stable ones in which both players demand/fight back.¹⁶ Like before, the Status Quo equilibrium in which Russia and NATO both cooperate would be better. However, this might not be possible by default, given that Russia showed signs of not being willing to cooperate before by displaying signs of aggression in Eastern Europe. Translated into the game above, this means that Russia assessed that the probability of NATO not helping Ukraine to fight back, and thereby, the whole game becoming a version of the simple game analyzed above, except now with the two players being Ukraine and Russia instead of NATO and Russia,¹⁷ was high. Given this, Russia might have believed that the probability of demanding and then ending up in the Challenger Wins spot, either with Ukraine backed up by NATO or Ukraine alone, was high, too. Then, the best strategy for Ukraine would be not to give up fighting. And then, the best strategy for NATO would be not to cooperate by consistently supporting Ukraine in resisting Russian meddling in its affairs in order to make the probability of NATO cooperating, and thereby reaching the Status Quo or Limited Conflict equilibrium, seem low. Given this, Russia might believe that the probability of demanding and then ending up in the Challenger Wins spot, either with Ukraine backed up by NATO or Ukraine alone, will be low, too. Like before, paradoxically, Russia and Ukraine, with help from NATO, could move the All-Out Conflict equilibrium to the Status Quo equilibrium by threatening each other enough with no cooperation. This is a powerful deterrence strategy.

REPLIES

Some might argue that the mathematical models proposed above rely on strong assumptions, which might oversimplify the complexity of the situation. For example, both games analyze the Russia-Ukrainian war as an isolated event in which Russia is presumed to be the challenger while NATO alone or supporting Ukraine is presumed to be the defender. However, this specific confrontation exists within a broader geopolitical context marked by a history of friction between NATO,

Ukraine, and Russia. Therefore, it is possible to interpret the Russia-Ukrainian war as part of a larger strategic game where NATO could have provoked Russia, fundamentally altering the dynamics and the roles in both games presented above.

While the counterargument holds merit, examining the history of confrontations between Russia and NATO shows that Russia showed clear signs of not cooperating by engaging in aggression long before NATO showed

16 Stable and unstable are used in the mathematical sense. For an intuitive analysis, we ignore the equality signs between the payoffs: At node 4, the defender chooses to defy because $d_{DDDD} \geq d_{DC}$. At Node 3, the challenger chooses to cooperate because $c_{DDC} \geq c_{DDDC}$, anticipating that the defender will choose to defy. At Node 2, the defender chooses to defy because $d_{DDC} > d_{DF}$ and $d_{DDC} > d_{DC}$, anticipating that the challenger will choose to cooperate. Then, at Node 1, the challenger will choose to cooperate because $c_{SQ} > c_{DDC}$. Thus, we get the equilibrium given by the Status Quo. For a complex analysis, we consider the equality signs between the payoffs. We have the same thought process as above, except at node 4, the defender chooses to fight back with probability p_{DD} instead of 1, then at node 3, the challenger chooses to demand with probability p_{CC} instead of 1, anticipating that the defender will choose to defy with some known probability, then at node 2 the defender chooses to defy with some probability p_D instead of 1 and fight back with some probability p_F instead of 0, anticipating that the challenger will choose to demand with some known probability, and then at node 1, the challenger chooses to demand with probability p_C instead of 1 anticipating that the defender will choose to defy or fight-back with some known probabilities. Thus, we get the equilibrium given by the Status Quo or the two All-Out Conflicts. This requires more mathematical analysis, which we are not going to go into here because it goes beyond the scope of the paper.

17 Notice that the analysis of the game captures the trend of Ukraine choosing to fight alone even when it will not be helped by NATO.

signs of not cooperating by expanding toward Eastern Europe. For example, an armed conflict broke out between Moldova and its self-proclaimed breakaway state, Transnistria, in 1992. Even though this was de jure an internal war of Moldova, multiple sources argue it became de facto an external war joined by Russia, which was “exerting full control over the proclaimed breakaway state Transnistria [and thereby the conflict]” through Russian troops present on the ground as well as the transfer of weapons and public utterances to Transnistria (O’Reilly & Higgins, 2008, p. 71). This was part of a larger plan of Russia to destabilize Moldova in order to challenge its existing political order and keep it under its sphere of influence.¹⁸ A similar armed conflict happened with South Ossetia in 1991. Moreover, it is important to note that both of these wars in which Russia

was aggressive by meddling with the affairs of sovereign countries happened before NATO supposedly was aggressive too by expanding towards Eastern Europe. Considering these historical events, it is plausible to view Russia as the challenger not only within the broader geopolitical game but also within the isolated game of the Russia-Ukrainian war. However, this doesn’t mean that the proposed mathematical models don’t oversimplify the complexity of the Russian-Ukrainian dynamic. Like any analytical tool, game theory involves certain simplifications like removing uncertainty — players acting under complete information about each, removing decisions made simultaneously — players make choices sequentially, and more. Of course, these assumptions might not be true in real life. Further research is needed to make the games address these kinds of weaknesses.

CONCLUSION

Assuming states lean toward being fully conflictual or fully cooperative removes certain dynamics from the picture of international relations. In contrast, assuming that states are rational by switching to the choices with the best payoffs helps capture a multitude of dynamics in the pictures of international relations as states can be fully cooperative, fully conflictual, or a mix of the two, all depending on different probabilities, with all these scenarios being open to analysis. Therefore, by assigning probabilities and evaluating the costs and benefits of strategic actions, game theory provides a nuanced approach that accounts for both partnership and confrontation among nations. In particular, game theory offers a way to bridge the gap between the realist and idealist perspectives on the Russian-Ukrainian war, offering a nuanced understanding of the dynamics between Russia, Ukraine, and NATO with practical significance and also suggesting that NATO should have employed a strategy of decisive support for Ukraine,

as anything less allowed Russia to underestimate the consequences of the full-scale invasion. During the initial two decades following the collapse of the Soviet Union, there was little consideration in the West regarding the necessity of deterring Russia. The prevailing perception was that Russia, with its economic and military vulnerabilities, lacked the capacity to achieve its global aspirations, which made the question of deterring Russia no longer a pressing concern (Renz, 2023, p. 8). However, the analysis done by this paper revealed that decisive deterrence would have been the optimal strategy for NATO to prevent the Russian-Ukrainian war. While it is impossible to change the past, there is still an opportunity for the West to embrace decisive deterrence in the present in order to prevent future conflicts of a similar nature, thereby helping maintain stability and security in the international arena. Most importantly, there is still an opportunity for the West to be more decisive about helping Ukraine now.

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¹⁸ The European Court of Human Rights has declared that the authorities of the Russian Federation contributed both militarily and politically to the creation of a separatist regime in Moldova. See European Court of Human Rights. (2004, July 8). *Ilascu and Others v. Moldova and Russia*. <https://hudoc.echr.coe.int/fre#%7B%22itemid%22:%5B%22002-4244%22%5D%7D>.

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