



# Free riding in NATO after the Rise of Russia: cost sharing, free riding and selective incentives in NATO from 2009 to 2019

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## Abstract

After a period of relative overperformance due to the focus on output indicators in the North Atlantic Treaty Organization's (NATO) burden-sharing debate, we ask whether the shift back to input indicators prior to the Ukraine War meant that the smaller NATO allies have returned to their fringe position as NATO underperformers. According to the deterrence model, smaller allies are induced to free ride to a higher degree than mid-sized allies. Utilizing insights from public choice theory, our analysis demonstrates, first, that there is no support to the claim that the size of NATO member state GDP determines the percentage of GDP spent on defence. Second, selective incentives tend to reduce the incentive for small allies to free ride. The relationship between GDP and the percentage of GDP spent on defence capabilities is therefore conditional upon the net gain of the individual member state. Defence capabilities that are characterized as a public good when we control for exposed borders indicate a higher percentage of GDP spent on defence. Our conclusions show that even though small allies continue to free ride, they do so less than expected due to the existence of selective incentives in the period from 2009–2019.

**Keywords** NATO · Free riding · Public choice · Alliances · Defence spending

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## Introduction

The North Atlantic Treaty Organization (NATO) alliance was a security response that arose early in the Cold War. The concern that the Western European countries were unable to deter the military threat from the Soviet Union triggered an American commitment to guarantee security and support for its allies. As the commitment gave the European NATO members an incentive to spend less on defence, the treaty also included Article 3 in the Washington Treaty to prevent free riding among the European allies.<sup>1</sup> Defence spending in proportion to GDP has traditionally been the principal indicator employed to ensure that “nobody gets a free lunch” to prevent free riding behaviour among the smaller European allies. But the choice of this indicator set the stage for ongoing transatlantic debates and conflicts. The United States (US) spent far more on defence in proportion to GDP than the smaller allies, and accusations of free riding have haunted much of the political and academic debate about NATO.<sup>2</sup>

The disappearance of the Soviet threat transformed NATO’s strategic environment and the nature of the transatlantic burden-sharing game. NATO’s principal mission shifted from deterrence and defence to out-of-area operations. NATO enlargement was therefore both a means to consolidate the NATO framework as well as to create a pool of loyal and dependent allies that could be mobilized to support US interests around the globe in exchange for the security. The Cold War input burden-sharing indicator remained in use, but output measures designed to pressure the countries of Europe to develop more deployable forces capable of supporting US interests were also introduced as a means to evaluate whether the members paid their fair share of the burden.<sup>3</sup> Many small European states embraced this change of indicators and became eager participants in interventions such as those in Afghanistan, Iraq, Libya and Syria.<sup>4</sup> The literature has pointed out how the transformation of the alliance was a success in the sense that NATO was able to mobilize ‘oversized’ coalitions of smaller allies that were claimed to ‘punch above their weight’ in these operations.<sup>5</sup>

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<sup>1</sup> P. Viggo Jakobsen and Jens Ringsmose, ‘Burden-Sharing in NATO: The Trump Effect Won’t Last’, *Norwegian Institute of International Affairs*.

<sup>2</sup> Anthony Cordesman, *NATO’s ‘Brain Death’ Burden sharing Blunders: Focusing on the Right Investment, Force Strength, and Readiness Needs* (Washington, D.C.: Center for Strategic and International Studies, 2019).

<sup>3</sup> Jakobsen and Ringsmose have shown how Cold War burden-sharing was largely associated with the input dimension, while post-Cold War burden-sharing was associated with the output dimension. Since 2014, the debate seems to have returned to its Cold War focus on input. This has largely resulted from the Rise of Russia and the U.S. interest in reducing its international engagement through military interventions as a consequence of the Rise of China. P. Viggo Jakobsen and Jens Ringsmose, ‘Burden-Sharing in NATO: The Trump Effect Won’t Last’, *Norwegian Institute of International Affairs*.

<sup>4</sup> Tim Haesebrouck, ‘NATO Burden Sharing in Libya: A Fuzzy Set Qualitative Comparative Analysis,’ *Journal of Conflict Resolution* 61, no. 10, (2017a): 2235–2261; Tim Haesebrouck, ‘EU Member State Participation in Military Operations: A Configurational Comparative Analysis,’ *Cambridge Review of International Affairs* 30, nos. 2–3 (2017b): 137–59.

<sup>5</sup> Jens Ringsmose, ‘NATO Burden Sharing Redux: Continuity and Change after the Cold War,’ *Contemporary Security Policy* 31, no. 2 (2010): 319–38.



Theoretically, it has been suggested that the focus on output due to the increase in NATO out-of-area engagements has helped to overcome some of the free-riding problems inherent in the alliance structure. These engagements have provided selective incentives for the smaller allies in the form of prestige, status and public recognition as loyal, relevant, and trustworthy allies that create value and relevance for the NATO security guarantee.<sup>6</sup>

The rise of the new post-Cold War Russian threat changed the burden-sharing game anew when Russia annexed Crimea in 2014 and Russian invasion of Ukraine in 2022.<sup>7</sup> The annexation transformed the strategic environment as a military threat to NATO's European allies, and NATO had to refocus on territorial defence and deterrence in Europe. Although out-of-area missions did not vanish, participation now became secondary in the assessment of the smaller allies' fulfilment of their obligations, as the input dimension yet again came to dominate the burden-sharing debate.

This article assesses whether the 'Rise of Russia' since 2014 until 2019 has triggered the recurrence of old European habits of free riding on U.S. security provision or whether the increased threat situation has produced selective incentives for the smaller European allies that have induced the Europeans to overcome free-riding incentives.

Utilizing insights from public choice theory, we ask whether the smaller NATO allies have returned to their traditional fringe role in the alliance or have sought to protect their role as relative over-performers, which they earned prior to 2014? We expect the small alliance members to choose to free ride, whether because the targeted 2% threshold is difficult to obtain due to the strong incentives in the alliance structure or for domestic reasons. Smaller member states might also be expected to free ride more than larger European allies due to the larger members' broader security interests.

The article contributes to the recent wave of literature on the burden-sharing debate by focusing on whether the smaller European allies follow the theoretical predictions about free riding, where it is argued that the smallest allies tend to free ride more than the larger allies, who often tend to have broader military and geostrategic interests. This has led to expectations of positive correlations between country size and the share of military spending to GDP.<sup>8</sup>

<sup>6</sup> Ringsmose, 'NATO Burden Sharing,' P. Viggo Jakobsen, 'The Danish Libya Campaign: Out in Front in Pursuit of Pride, Praise, and Position,' in *Political Rationale and International Consequences of the War in Libya*, ed. Dag Henriksen and Ann K. Larssen (Oxford: Oxford University Press, 2016), 192–208; P. Viggo Jakobsen, Jens Ringsmose and Håkon L. Saxi, 'Prestige-Seeking Small States: Danish and Norwegian Military Contributions to U.S.-Led Operations', *European Journal of International Security* 3 no. 2 (2018): 256–77. Rasmus B. Pedersen, 'Bandwagon for Status: Changing Patterns in the Nordic States' Status-Seeking Strategies?', *International Peacekeeping* 25, no. 2 (2018): 217–41; P. Viggo Jakobsen and Sten Rynning, 'Denmark: Happy to Fight, Will Travel', *International Affairs* 95, no. 4 (2019): 877–95.

<sup>7</sup> Please note that the article was accepted 30 September 2021.

<sup>8</sup> Thomas Plümpert and Eric Neumayer, 'Free-Riding in Alliances: Testing an Old Theory with a New Method', *Conflict Management and Peace Science* 32, no. 3 (2015): 247–68.



Our conclusions do not support the expectation that the smaller allies free ride on the larger allies to the degree expected by the theoretical models in the period. Rather, our conclusions suggested that the existence of selective incentives in the form of external pressure reduces the incentive for the smaller European allies to free ride. The relationship between GDP and percentage of GDP spent on defence capabilities is therefore conditional on the member states' individual net gain from the NATO-provided security. We find that the presence of an individual positive net gain determines the correlation between size of GDP and percentage of GDP spent on defence. Consequently, despite the incentive to free ride, small GDP member states also contributed to the alliance's aggregate defence capabilities.

The observation that selective incentives (e.g., exposed borders) reduce the incentive to free ride is expected to be particularly applicable to NATO member states, as NATO provides a public good of security. Our conclusions indicate that the Rise of Russia from 2014 and onwards have produced selective incentives that have helped to overcome some of the free-riding tendencies in the alliance, as the degree of free riding is generally lower than expected. We demonstrate that the original argument about free-rider incentives and selective incentives in the rational choice literature<sup>9</sup> still has significant explanatory power up till 2019. The conclusions also point to that the recent increase in small states defence spendings is not only triggered the immediately 'crisis situation' triggered by the Russian invasion of Ukraine in 2022 but represent a longer tendency in the small state's alliance behaviour.

## Theorizing free riding in the NATO alliance

The literature on burden-sharing between NATO members traditionally takes its point of departure in Olson and Zeckhauser's expectation<sup>10</sup> that, on the basis of the collective action problem, self-interest-maximizing member states in alliances will free ride given the assumption that alliances produce public goods.<sup>11</sup> Olson and Zeckhauser's core argument<sup>12</sup> is that NATO's output (security) can be understood as a pure public good, meaning that once a state is allowed into the military alliance, it is impossible to prevent it from profiting from the benefits produced by the collective efforts of the other alliance members. This suggests that collective action

<sup>9</sup> Mancur Olson, *The Logic of Collective Action* (Cambridge: Cambridge University Press, 1965); Mancur Olson and Richard Zeckhauser, 'An Economic Theory of Alliances', *Review of Economics and Statistics* 48 (1966): 266–79.

<sup>10</sup> Olson and Zeckhauser, 'An Economic Theory'.

<sup>11</sup> Mancur Olson, 'Increasing the Incentives for International Cooperation', *International Organization* 25, no. 4 (1971): 866–74; Joseph Lepgold, 'NATO's Post-Cold War Collective Action Problem', *International Security* 23, no. 1 (1990): 78–106; John R. Oneal, 'Testing the Theory of Collective Action: NATO Defense Burdens 1950–1984', *Journal of Conflict Resolution* 34, no. 3, (1990): 426–48; Gert T. Svendsen, 'Collective Action Problem', in *The Palgrave Encyclopedia of Interest Groups, Lobbying and Public Affairs*, ed. Phil Harris et al. (London: Palgrave Macmillan) (in press).

<sup>12</sup> Olson and Zeckhauser, 'An Economic Theory'.



problems will emerge as rational alliance members seek to benefit from their partners' efforts.<sup>13</sup>

This logic produces different incentives for smaller and larger member states in the alliance. Take, for example, a small European ally and the alliance leader: the US. Figure 1 below illustrates a situation where international security will be under-supplied. The horizontal axis depicts the level of security, a public good provided by the state. The vertical axis shows the costs and benefits to countries in US\$ from producing units of security. Now, the optimal level of security provision can be identified as an equilibrium where marginal aggregated demand crosses the marginal costs of supply. The four main curves in Fig. 1 provide an example of demand ( $D$ ) at country level (small ally and US), adding up to aggregated demand (world as a whole in this hypothetical example) and supply ( $S$ ).

For the sake of simplicity, assume that the preferences and purchasing power of a small ally and American citizens are identical, meaning that the only variation stems from the fact that the US has a much larger population. The total demand curve for all Americans can then be shown as  $D_{US}$ . Due to the vertical aggregation of individual demand curves, the US as a big country sums up far above the total demand curve  $D_{small\ ally}$  for the small ally.

The marginal costs of providing international security will increase for each extra unit provided, and then it will be extremely costly, if not impossible, to reach the state of 100%. Still, to illustrate the free-rider problem further, let us just assume that the marginal costs of providing the public good are constant within the interval we are looking at here. This simplification of the supply curve,  $S$ , does not affect the overall argument when we try to explain as much as possible with as little as necessary. Within the interval, one could imagine buying extra fighter aircraft at the constant price of  $P$ .

How much security is it then rational for single countries to supply? In the example, the small member will provide  $Q_{small\ ally}$  (at the total cost of  $OPAQ_{small\ ally}$ ), and the US  $Q_{US}$  (at the total cost of  $OPBQ_{US}$ ). If, however, the smaller ally knows that the US will provide  $Q_{US}$ , it is rational to free ride and receive  $Q_{US}$  without contributing. Such an extraordinary amount of  $Q_{US}$  is much more than  $Q_{small\ ally}$  and increases the private welfare gain at zero cost. In other words, the small ally will get the security while the US foots the bill. If all countries try to free ride on the US in this way, a significant undersupply of security will occur.

This disproportionality is investigated in a wide range of studies over a long period, where a positive correlation between GDP and the share of GDP spent on defence capabilities indicates free riding. Table 1 below presents these studies, which are selected based on the comparability of method and overlapping periods.

Results in the literature show that from 1964 to 2010, the significantly positive correlation between national GDP and percentage of GDP spent on defence capabilities is present from around 1968. Therefore, it was not shown that small GDP member states are free riding on large GDP member states until Sandler and Shimizu

<sup>13</sup> Olson, *Logic of Collective Action*; Olson and Zeckhauser, 'An Economic Theory'.



once again demonstrated an indication of disproportionality.<sup>14</sup> Thus, large GDP member states may have yet again started carrying a greater share of the burden. A member state of an alliance protects its citizens and industry by avoiding war. The size of a member state's GDP is therefore expected to affect the percentage of GDP spent on defence. In NATO, high-GDP member states are expected to demand a larger amount of defence capabilities, whereas small-GDP member states are more likely to free ride.

**Hypothesis 1** Small countries will free ride on big countries, leading to an under-supply of security.

It has often been pointed out in the literature that coercion or 'selective incentives' reduce the risk of free riding in international alliances. Organizations such as NATO may need special incentives to support themselves. This incentive must be 'selective', so that 'those who do not join the organization working for the group's interest, or in other ways contribute to the attainment of the group's interest, can be treated differently from those who do.'<sup>15</sup>

The joint-product model implies that, rather than a given good or service simply yielding a single, non-excludable and non-rival benefit, it will provide multiple benefits, which vary in their degree of publicness among a given group of states. Defence capabilities are defined as capabilities that have a protective aspect and deployed armed forces that are used to limit the damage in one particular area should the alliance be attacked. Second, defence capabilities have a country-specific aspect, such as capabilities stationed in former colonies or the eradication of national terrorist cells, which constitute a greater threat to the individual member states than to the alliance as a whole.<sup>16</sup>

Such selective incentives can be negative (punishment of defectors) or positive (reward for not free riding). A shift in private incentives will change behaviour when countries behave in an economically rational manner and out of self-interest. The alliance theory has recently tested such negative and positive incentives in relation to the willingness of smaller allies to participate in international operations. Negative incentives have often been associated with Snyder's alliance security dilemma, which argues that small states' alliance behaviour is largely driven by a 'fear of abandonment' logic, where failure to accept the demands or invitations raised by the alliance leader means that the smaller allies will face various punishments in the form of marginalization or exclusion.<sup>17</sup> Following this logic, there is a fear of alliance marginalization or even defection by the alliance hegemon if it cannot see the value of vastly oversupplying security to alliance members. If the threat of defection

<sup>14</sup> Todd Sandler and Hirofumi Shimizu, 'NATO Burden Sharing 1999–2010: An Altered Alliance', *Foreign Policy Analysis* 10, no. 1 (2014): 43–60.

<sup>15</sup> Olson, *Logic of Collective Action*, 51.

<sup>16</sup> Todd Sandler and Keith Hartley, 'Economics of Alliance: The Lessons of Collective Action', *Journal of Economic Literature* 39, no. 3 (2001), 869–96.

<sup>17</sup> Glenn H. Snyder, 'The Security Dilemma in Alliance Politics', *World Politics* 36, no. 4 (1984), 466–68; Glenn H. Snyder, *Alliance Politics* (Ithaca, NY: Cornell University Press, 1997), 180–92.



is considered credible, it might affect the degree of free riding among smaller allies. Because small NATO allies recognize that they cannot secure their own territorial security without NATO or the US, a crucial concern is to remain a relevant and attractive ally in the eyes of the hegemon to ensure that it will not shirk on its security guarantee.<sup>18</sup>

In sum, the main argument in the modified threat perspective is that in asymmetric alliance relations such as those among the NATO allies, small states face selective incentives to ‘over-perform’ in order to prove that they are still relevant and defend-worthy.<sup>19</sup> Ringsmose’s modified version of the threat hypothesis<sup>20</sup> thereby suggests that a key to NATO’s success and ability to mobilize international US-driven coalitions to out-of-area operations (e.g., in Afghanistan) relates to its ability to produce regional European security as the smaller European states fear abandonment or U.S. shirking if they do not deliver in these operations. A countervailing development is the European Union’s (EU) potential future independent security role. For example, the European External Action Service (EEAS) has actively promoted the notion that the EU should become an autonomous actor and increasingly independent from NATO and the US.<sup>21</sup> Furthermore, the EU is increasingly trying to tackle security challenges together with its eastern and southern neighbours through bilateral dialogues and funding initiatives.<sup>22</sup>

To minimize free riding, it is therefore crucial that the US and NATO design institutional arrangements that include an efficient system of selective negative or positive incentives to enhance the level of individual benefits of participation.<sup>23</sup> The total costs of achieving security should be shared according to the size of GDP and the resulting marginal willingness to pay; however, identifying the true aggregated demand curve for a given country is difficult. Reported demand will often be over-estimated, because when people in the street are asked about their hypothetical willingness to pay, talk is cheap and they are not actually going to pay.<sup>24</sup> In contrast, it is technically feasible to calculate the supply curve,  $S$ ; for example, what an extra aircraft fighter will cost.

A higher degree of individual benefits than of costs will therefore determine the relationship between GDP and percentage of GDP spent on defence. Individual

<sup>18</sup> Jens Ringsmose, ‘Paying for Protection: Denmark’s Military Expenditures during the Cold War’, *Cooperation and Conflict* 44, no. 1 (2009), 73–97; Ringsmose, ‘NATO Burden Sharing’; Kristian S. Kristensen and Kristian K. Larsen, ‘Denmark’s Fight against Irrelevance, or the Alliance Politics of “Punching above Your Weight”’, in *Global Allies: Comparing US Alliances in the 21st Century*, ed. Michael Wesley (Acton: ANU Press, 2017), 59–76.

<sup>19</sup> Kristensen and Larsen, ‘Denmark’s Fight against Irrelevance’.

<sup>20</sup> Ringsmose, ‘NATO Burden Sharing’.

<sup>21</sup> Knud E. Jørgensen, Jonas G. Kaas, Tony B. Knudsen, Gert T. Svendsen and Laura Landorff, ‘The EEAS Navigating Foreign Policy Paradigms’, *European Politics and Society*, 2020.

<sup>22</sup> EEAS, *The EU and Its Neighbours: Tackling Security Challenges Together*. European External Action Service, Brussels, 24/11/2020, UNIQUE ID: 201124\_14.

<sup>23</sup> Rasmus B. Pedersen, ‘Jumping on the Bandwagon: Status Seeking as a Driver for Sweden’s Involvement in NATO-led Operations?’, *International Politics*, 2019.

<sup>24</sup> Arye L. Hillman, *Public Finance and Public Policy: A Political Economy Perspective on the Responsibilities and Limitations of Government* (Cambridge: Cambridge University Press, 2019).



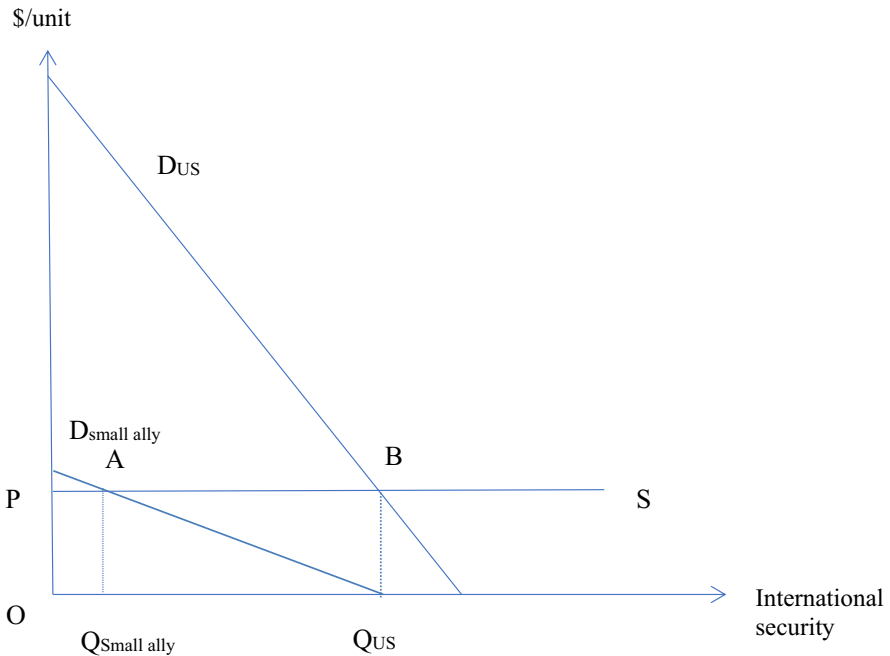


Fig. 1 How a small ally can free ride on the alliance hegemon

**Table 1** Studies concerning the relationship between GDP and share of GDP spent on defence

Study	Findings in period	
	Significantly positive	Insignificant
Olson and Zeckhauser (1966)	1964	
Russett (1970)	1950–67	
Sandler and Forbes (1980)	1960–66	1967–75
Oneal and Elrod (1989)	1953–68	1969–84
Sandler and Murdoch (2000)		1988–99
Sandler and Shimizu (2014)		1999–2010

benefits could include *protection* of a limited border zone and ally-specific benefits that primarily benefit the individual ally.<sup>25</sup> A positive net gain following the sum of both positive and negative selective incentives from participation will strongly reduce the incentives of small states to free ride. One explanation may be that some small-GDP member states will have higher defence expenditure because they have exposed borders requiring increased defence capabilities on their own territory.

<sup>25</sup> Todd Sandler and John F Forbes, ‘Burden Sharing, Strategy and the Design of NATO’, *Economic Inquiry* 18, no. 3 (1980), 425–44.





Defence is thus characterized as a competing good with individual benefits for the member states. The intention is therefore not to analyse trends in the distribution of defence capabilities within NATO in terms of whether their aim is deterrence, protection or the promotion of the alliance's specific purposes; instead, we focus on the presence of defence capabilities, which – apart from the deterrent aspects in the deterrence model – are more excluding and competing. This leads us to Hypothesis 2.

**Hypothesis 2** If small countries face costs from selective incentives that exceed their net benefit from free riding, they are more likely to cooperate and contribute to the provision of international security.

## Method, conceptualization and measuring free riding

The financial burden is defined as the allies' percentage of GDP spent on defence expenditures. We derive hypotheses from two complementary expectations regarding disproportionality and individual net gain based on the costs and benefits of the percentage of GDP an ally is spending on the common defence. Defence expenditure is defined as payments made by a national government specifically to meet the needs of its armed forces, those of allies or of the alliance, which includes resources allocated to NATO categories, such as military equipment, staff and infrastructure.<sup>26</sup> In accordance with previous studies, benefits from defence capabilities are defined based on the assumption that each member state protects its citizens and industry by avoiding war. The size of a member state's GDP is therefore expected to affect the percentage of GDP spent on defence.<sup>27</sup> To include NATO enlargements with small contributors (e.g., Albania, Croatia, Montenegro), the period is limited to 2009–2019, as these small contributors increase the expectation about free riding in accordance with the theory.<sup>28</sup>

To examine the development and then compare the tendency of free riding regarding NATO's provision of defence capabilities up till 2019, the methodological choices are made in accordance with the existing literature on NATO burden-sharing.<sup>29</sup> Based on the theoretical definition, the member states obtain the protection of their citizens and industry by avoiding war, which is why large member states are expected to deliver a greater financial contribution than small member states.<sup>30</sup> Size is measured in accordance with previous studies based on national GDP, which for

<sup>26</sup> NATO, *The Secretary General's Annual Report 2016*. NATO HQ Brussels, 2016, 120.

<sup>27</sup> Olson and Zeckhauser, 'An Economic Theory', 274; Sandler and Forbes, 'Burden Sharing', 438.

<sup>28</sup> The data therefor do not include North Macedonia who joined in 2020 and Finland (2023) and Sweden.

<sup>29</sup> Iceland has been left out of the analysis. It is the only NATO member without armed forces, and its defence capabilities are therefore not comparable with the rest of the Alliance; NATO, *Secretary General's Report 2016*, 120.

<sup>30</sup> Olson and Zeckhauser, 'An Economic Theory', 274; Sandler and Forbes, 'Burden Sharing', 438.



the sake of comparability during the period under investigation is specified in current U.S. dollars.

The financial contribution is defined as each member state's percentage of GDP spent on defence capabilities.<sup>31</sup> This objective is suitable to examine the relationship because we want to investigate whether member states are free riding in relation to the agreed upon goal of defence expenditure amounting to 2% of GDP. At the same time, it allows us to compare the costs across the member states based on NATO's definition of defence capabilities, which includes all expenses of the member states' military forces, including military and civilian staff.<sup>32</sup> To account for the same components when comparing the measures across countries, we use data from SIPRI.<sup>33</sup> Following other studies, this measurement reduces the problem of pricing unique defence goods, which can lead to a potential bias of inflated measures.<sup>34</sup>

The member states' net gain from the alliance is measured by the relationship between each member state's share of NATO's total costs and the benefits calculated in per cent. The aim is the ratio of the allies' share. Thus, as opposed to the financial contribution, costs are measured among the allies as each member state's individual share of NATO's total defence expenditure.

Benefits are defined as protection of citizens and industry. To measure the ratio of the allies' share of benefits, a proxy consisting of three dimensions in accordance with previous studies is applied: each member state's individual share of NATO's total GDP, share of NATO's total population, and proportion of NATO's total, exposed borders.<sup>35</sup> The measure includes benefits that, in addition to containing deterrent defence capabilities, also include benefits that are private. Benefits by the share of GDP are included because large GDP member states have more to lose regarding industry in the event of war. In this context, large-population member states will secure a larger number of inhabitants compared to small-population member states, which is why population is included.

The length of exposed borders that cover each member state's border that is not adjacent to that of other NATO member states/sea borders is included as the last proxy for benefits, as the defence of the alliance ensures the protection of exposed member state borders; hence, this is a special benefit for the individual country.

Data for national GDP and population are from the World Bank.<sup>36</sup> Data for length of exposed borders stem from the U.S. Central Intelligence Agency<sup>37</sup> and have been prepared by Sandler and Shimizu.<sup>38</sup> These three proxies for benefits among the allies

<sup>31</sup> Data for GDP is delivered by World Bank 2020. 'Data for NATO Member States Include Gross Domestic Product and Population in the Period 2009–2019', 2020 (accessed 3 November 2020).

<sup>32</sup> NATO, *Secretary General's Report 2016*.

<sup>33</sup> SIPRI, Stockholm International Peace Research Institute, 'Data for NATO Members' Military Expenditures during the Period 2009–2019' 2020 (accessed 3 November 2020).

<sup>34</sup> Sandler and Forbes, 'Burden Sharing'.

<sup>35</sup> Sandler and Forbes, 'Burden Sharing', 435; Todd Sandler and James C. Murdoch, 'On Sharing NATO Defence Burdens in the 1990s and Beyond', *Fiscal Studies* 21, no. 3 (2000), 312.

<sup>36</sup> World Bank, 'Data for NATO Member States'.

<sup>37</sup> US Central Intelligence Agency (2020).

<sup>38</sup> Sandler and Shimizu, 'NATO Burden Sharing'.



are aggregated in an overall objective as an average indicator of benefits. In the specification of each ally's utility function between the different proxy for benefits, these are weighted evenly with one-third each (as in previous studies).

The relationship between member state GDP and the percentage of GDP it spends on common defence (Hypothesis 1) is explored using a Spearman's rank correlation test. The test demonstrates the relationship between the member states' individual, ranked position of GDP and percentage of GDP spent on defence for each individual year. This is primarily used because it is non-parametric, which makes it possible to compare data with considerable variation. This makes it possible to compare, for example, the US with Albania, because the test comparing rankings is robust to outliers and small measurement errors.<sup>39,40</sup>

## Testing the two hypotheses

**Hypothesis 1** The deterrence model sees provided defence capabilities as a public good, since the defence aspect ensures deterrence toward enemies. The deterrent element in NATO defence has been the foundation of the alliance's existence: 'An attack on one is considered as an attack on all'.<sup>41</sup> NATO thus provides a common security for the entire North Atlantic region through deterrence, from which member states, irrespective of their contributions, cannot be excluded. At the same time, the defence is considered non-competing by a deterrence effect, which is unchanged or possibly improved when more states obtain security through the alliance. According to Hypothesis 1, we will first examine whether there is any indication of free riding by disproportionality in the alliance burden-sharing. By ranking the member states according to GDP, a similar ranking in relation to percentage of GDP spent on defence is expected. This will be examined in the following sections, but first an overview of the distribution among NATO member states (see Table 2).

Percentage of GDP spent on defence thus states the financial contribution spent on defence capabilities. The objective does not differentiate between whether it is spent on national defence or, for example, on NATO military operations and missions.<sup>42</sup> This may lead to an analytical finding that a larger proportion of GDP spent on defence goes to defence capabilities, which not only provide benefits for

<sup>39</sup> Sandler and Shimizu, 'NATO Burden Sharing', 51.

<sup>40</sup> The restriction from using rankings is that, in contrast to OLS regression, this method does not provide knowledge of the distance between the member states, meaning that exact values in data are lost. At the same time, the relative, limited amount of control variables constitutes a possible bias in left-out variables. However, since the method corresponds to previous studies, these two reservations are not assessed as a deterioration in relation to commenting on the development.

<sup>41</sup> Washington Treaty. *The North Atlantic Treaty 4. April 1949*.

<sup>42</sup> Alexander Mattelaer, 'Revisiting the Principles of NATO Burden-Sharing', *Parameters* 46, no. 1 (2016), 29.



the alliance as a whole but for the individual member state in particular. It is therefore relevant to examine the member states' respective abilities to provide private defence capabilities. The empirical findings of the investigation about disproportionality in burden-sharing from the deterrence model are presented in Table 3 below.

Model I in Table 3 shows that there is only a significant, positive correlation between allies' GDP and the member states' percentage of GDP spent on common defence in 2012, which indicates the tendency in this period towards disproportionality among the member states. This finding supports the expectation that small-GDP member states are free riding on large-GDP member states. For the years 2009–2011 and 2013–2019, however, the relationship is insignificant, which is why, for the entire period, there is no indication of significant disproportionality among member states. Furthermore, Models 2 and 3 investigate the relationship when we control for level of prosperity and exposed border. Model 2 shows how a constant level of prosperity exacerbates the disproportionality in burden-sharing, which becomes significant from 2010 to 2015 and in 2017. Despite the prosperity level, large-GDP member states appear to be spending a greater percentage of GDP on defence. When the variable for an exposed border is kept constant in Model 3, however, the relation no longer appears significant. A correlation between member state size of GDP and percentage of GDP spent on defence therefore cannot be ruled out. Thus, the expectation about disproportionality based on the deterrence model as put forward in Hypothesis 1 is not supported.

**Hypothesis 2** This analysis examines Hypothesis 2 using a joint-product model based on whether free riding is reduced by a positive net gain of an ally's individual share of NATO's benefits in relation to the share of expenditure. The first three columns in Table 4 illustrate the member state costs and benefits for 2009 and 2019. The intervening years are included in the calculations but omitted from the table because they only contain minor deviations. For each year, the left column shows the member state's individual share of NATO's total defence expenditure, while the right column shows the member state's share of NATO's total benefits as an equal, weighted average of the proportion of NATO's GDP, population and exposed borders. In the fourth column, the member state's individual net gain is stated as the average of the relationship between costs/benefits for all years between 2009 and 2019.

As expected, Table 4 demonstrates how the proportion of costs in the alliance differs widely. In 2016, for example, Albania, Bulgaria, Croatia, Latvia, Lithuania, Luxembourg and Slovenia each cover less than 0.1 per cent of NATO's total defence expenditure, whereas the US as the largest contributor by far covers more than 66 per cent. The three largest contributors after the US—France, the UK and Germany—account for, respectively, 6.1, 5.2 and 4.5 per cent of NATO's defence expenditure. Table 4 also reveals a positive net gain for all NATO allies except the US.



The difference in average net gain in Table 4 indicates that the relationship between the size of national GDP and percentage of GDP spent on defence varies according to the presence of a positive net gain. In addition to deterrent defence capabilities, the joint-product model includes selective incentives that are used as an explanation for why small GDP member states may also contribute to the alliance if they have a positive net gain. This supports Hypothesis 2, since such individual net gain will be an incentive to reduce free riding among small-GDP member states.

Second, Table 4 shows that the US has a negative net gain of approximately 40 percentage points, which demonstrates how its benefits are broadly exceeded by the costs. This is in line with the theory, as the large U.S. GDP implies that the country's reaction curve will never cross that of small member states. Thus, the US will demand a much larger amount of defence capabilities and will alone be expected to provide all of the defence capabilities for NATO so that the other member states could simply free ride. As lower-GDP member states also assume a certain share of the alliance's costs, this indicates that the positive net gain suggests that the US can contribute with less compared to the case featuring pure free riding. However, Table 4 shows that this is apparently not sufficient to make all member states spend 2 per cent of GDP on defence. The large share of costs in relation to benefits therefore shows how, with a negative net gain, the US continues to contribute the most to the alliance, but that the contribution is smaller than if it should have provided all of the defence capabilities by itself. This is also in line with the expectation from Hypothesis 2, because the negative net gain thus reduces the relationship between GDP and percentage of GDP spent on defence expenditure. Thus, small GDP member states should provide a higher degree of defence capabilities to obtain the amount they demand.

The equal weighting of the three benefits has been criticized because member states must be expected to weight these benefits in very different ways, and exposed borders will distort the distribution ratio.<sup>43</sup> For example, with this weighting, Canada will appear as a large outlier due to its border to the north, even though the threat cannot necessarily be compared with, for example, the Eastern European member states' borders with Russia. This will create a potential bias, which it is not possible to correct for without detailed knowledge of the allies' military priorities. Moreover, the goal for the benefits includes a non-exhaustive category of potential benefits from the alliance, which is why the goal may underestimate the effect. Taking these reservations regarding the interpretation of the results into consideration, the goal of the benefits is applied based on the argument that we want to examine whether (and not the extent to which) free riding is affected.

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<sup>43</sup> Binyam Solomon, 'NATO Burden Sharing Revisited', *Defence and Peace Economics* 15, no. 3 (2004), 252.



**Table 2** Distribution between NATO member states in 2019

Category	Country	Percentage of GDP spent on defence	Military expenditure (billion USD)
Group 1 > 2.5% of GDP	US	3.4	731.75
	Bulgaria	3.2	2.13
	Turkey	2.7	20.45
	Greece	2.6	5.47
Group 2 2.0–2.5% GDP	Estonia	2.1	0.66
	Romania	2.0	4.94
	Latvia	2.0	0.71
	Lithuania	2.0	1.08
	Poland	2.0	11.90
Group 3 1.5–2.0% GDP	Portugal	1.9	4.51
	France	1.9	50.12
	Slovak Republic	1.8	1.87
	United Kingdom	1.7	48.65
	Norway	1.7	7.00
	Croatia	1.7	1.01
	Montenegro	1.6	0.09
Group 4 1.0–1.5% GDP	Italy	1.4	29.79
	Netherlands	1.3	12.06
	Denmark	1.3	4.56
	Canada	1.3	22.20
	Germany	1.3	49.28
	Albania	1.3	0.20
	Spain	1.2	17.18
	Hungary	1.2	1.90
	Czech Republic	1.1	2.91
	Slovenia	1.1	0.57
Group 5 < 1% of GDP	Belgium	0.9	4.82
	Luxembourg	0.6	0.43

Table shows the percentage of GDP that NATO member states spend on defence ranked by size of GDP in current US dollars. GDP by the World Bank (World Bank, Data for NATO Member States). Percentage of GDP spent on defence from SIPRI (SIPRI, Data for NATO Members' Military Expenditures). Iceland is not included, as its defence capabilities are not comparable with those of the rest of the alliance (NATO, *Secretary General's Report 2016*, 120)

## Conclusion

The research question asked whether the return to input indicators in the burden-sharing debate means that the smaller European allies have returned to their fringe position in NATO. The main result demonstrated how, despite the incentives to free ride, pure free riding among NATO members does not occur. Contrary to expectations, there is no direct connection between member state GDP and percentage of



**Table 3** Correlation between GDP and percentage of GDP spent on common defence

Year	Model I GDP	Model II GDP/POP constant	Model III GDP/POP and exposed borders constant
2009	0.25	0.37	0.17
2010	0.29	0.40*	0.17
2011	0.37	0.50**	0.24
2012	0.40*	0.51**	0.23
2013	0.34	0.47*	0.20
2014	0.35	0.47**	0.19
2015	0.30	0.45*	0.14
2016	0.21	0.34	– 0.05
2017	0.23	0.39*	0.03
2018	0.08	0.27	– 0.12
2019	0.01	0.24	

\*, \*\*, \*\*\* $P < 0.05$ ;  $P < 0.01$ ;  $P < 0.001$ . Spearman partial regression used to test rank correlations for each year individually.  $N = 28$  (Montenegro included when membership was obtained in 2017; World Bank, 'Data for NATO Member States'; SIPRI, 'Data for NATO Members' Military Expenditures')

GDP spent on defence. By including the member states' individual benefits and the costs of the alliance, the analysis indicates that free-riding incentives are reduced by a positive net gain. Thus, incentives to free ride still exist, but the provision of defence capabilities with individual benefits, such as border exposure, reduces the incentive to free ride. Utilizing insights from public choice theory, our analysis demonstrates, that there is no support to the claim that the size of NATO member state GDP determines the percentage of GDP spent on defence which means that there no support for Hypothesis 1: that small countries will free ride on big countries and cause a significant undersupply of alliance security provisions.

However, Hypothesis 2, that selective incentives reduce the incentive to free ride, finds support. The relationship between GDP and percentage of GDP spent on defence capabilities is therefore conditional on the member states' individual net gain. However, equal weighting for each member state between the share of NATO's GDP, share of population and share of external border is not necessarily an exhaustive measure for possible benefits in the joint-product model. This conclusion indicates that even though small allies continue to free ride, they do so less than the theoretical models would lead us to expect. Thus, we have shown how this contemporary NATO case confirms the original rational choice predictions made by Olson and Olson and Zeckhauser.<sup>44</sup>

Based on the correlation between the member states' ranked position in relation to size of GDP and the percentage of GDP spent on defence, this study has contributed

<sup>44</sup> Olson, *Logic of Collective Action*; Olson and Zeckhauser, 'An Economic Theory'.



**Table 4** Cost/benefit from share of NATO expenditure and average share of benefits

	2009		2019		2009–2019 Net gain for entire period
	Share of costs	Avg. share of benefits	Share of costs	Avg. share of benefits	
Albania	0.02	0.20	0.02	0.17	0.17
Belgium	0.55	0.89	0.47	0.84	0.37
Bulgaria	0.09	0.40	0.21	0.38	0.30
Canada	1.87	22.38	2.14	22.47	20.52
Croatia	0.11	0.91	0.10	0.88	0.80
Czech Republic	0.27	0.63	0.28	0.61	0.38
Denmark	0.43	1.25	0.44	1.20	0.80
Estonia	0.03	0.47	0.06	0.47	0.42
France	5.57	5.66	4.84	5.12	0.18
Germany	4.55	6.82	4.76	6.41	2.11
Greece	1.05	2.10	0.53	1.91	1.34
Hungary	0.15	0.56	0.18	0.54	0.40
Italy	3.36	5.26	2.59	4.62	2.01
Latvia	0.04	0.20	0.07	0.19	0.15
Lithuania	0.04	0.25	0.10	0.24	0.19
Luxembourg	0.02	0.07	0.04	0.08	0.05
Montenegro	–	–	0.01	0.07	0.02
Netherlands	1.20	2.62	1.16	1.40	0.46
Norway	0.02	2.79	0.68	3.22	2.61
Poland	0.78	2.02	1.15	2.01	1.03
Portugal	0.49	0.81	0.44	0.73	0.32
Romania	0.22	1.08	0.48	1.05	0.77
Slovak Republic	0.13	0.30	0.18	0.30	0.18
Slovenia	0.08	0.16	0.05	0.15	0.10
Spin	1.99	3.71	1.66	3.29	1.65
Turkey	1.58	4.17	1.98	4.49	2.66
United Kingdom	5.71	6.00	4.70	5.91	0.54
United States	69.65	28.30	70.68	31.24	– 40.47

The member states are listed alphabetically; the proportion of the cost/benefit is indicated in per cent and the net profit in percentage points (World Bank, ‘Data for NATO Member States’; SIPRI, ‘Data for NATO Members’ Military Expenditures’). The measurement for net gain/loss is only used for between-country comparison, as the measure for each country risks distorting the degree to which some countries are losing, since it accounts for allocated forces that, should an event occur that warranted a response from the country, likely would be drawn away

to the debate with empirical data for the period from 2009 to 2019. When we controlled for member states’ exposed borders, the statistical model did not demonstrate disproportionality among the member states by examination of defence capabilities that are characterized as a public good. The insignificant finding can be considered a continuation of the trends identified in the literature since 1968, which therefore





does not support the argument that we see increased disproportionality between contributions from large and small member states in the years around 2000.<sup>45</sup> The percentage share of GDP that small-GDP member states spend on defence thus seems to be conditional on the presence of a benefit, which is individual for each country.

In addition to the empirical update of the previously examined expectation of disproportionality, we investigated whether free riding is affected by the member states' benefits and costs to the alliance. We found signs that the incentive to free ride wanes when the alliance provides defence capabilities from the joint-product model, which can be characterized as public goods with private aspects. The total benefits could be measured based on a proxy consisting of each member state's individual share of NATO's total GDP, share of NATO's total population and proportion of NATO's total, exposed border, where the difference shows the member state's net gain. In accordance with the existing literature, an equal weighting of the three benefits is applied, which despite uncertainty about underestimation of the effect was used to demonstrate the effect instead of clarifying the extent to which it influenced the situation. On this background, we found that the presence of an individual positive net gain determines the correlation between size of GDP and percentage of GDP spent on defence. Consequently, despite an incentive to free ride, small-GDP member states also contributed to NATO's provision of defence capabilities.

The discovery that the costs of selective incentives, such as exposed borders, reduce the incentive to free ride is expected to be particularly applicable for NATO, which provides the public good of security. However, the theoretical expectations regarding member state allocation of resources are also expected to apply to other international partnerships. In a future study, it would be interesting to investigate the importance of a positive net gain for the group of countries by provision of, for example, environmental improvements or development aid instead of just defence capabilities.

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<sup>45</sup> Sandler and Shimizu, 'NATO Burden Sharing'.



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