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KIEL POLICY BRIEF

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The Economic Costs of War by Other Means

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- We quantify the lower bound of the costs of sanctions using a gravity model of international trade and a general equilibrium simulation model.
- We find that sanctions amount to a loss in GDP of about 34 billion USD in 2020 for the sanctioning NATO countries collectively, but the costs of sanctions are very unevenly distributed.
- No other country contributes as much as Germany (8.1 billion USD), while the costs for the US amount to 2.6 billion USD.
- Accounting for sanctions, countries' contributions to global security as a share of GDP are closer to the 2% NATO target than a narrow focus on military expenditure alone would suggest. Hence, there is less free-riding than some observers suspect.

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OVERVIEW/ÜBERBLICK

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Keywords: Sanctions, NATO, trade policy, global security

- Militärische Interventionen werden zunehmend durch Sanktionen ersetzt, um außenpolitische Ziele der globalen Sicherheit zu verfolgen. Beide Mittel verursachen ökonomische Kosten.
- Anhand des Gravitationsmodells des internationalen Handels und eines allgemeinen Gleichgewichtsmodells quantifizieren wir die Untergrenze von Sanktionskosten.
- Die Sanktionen implizieren für die sanktionierenden NATO-Staaten im Jahr 2019/2020 einen BIP-Verlust von rund 34 Milliarden USD. Diese Sanktionskosten sind jedoch sehr ungleich verteilt.
- Kein anderes Land trägt so viel zu den Sanktionskosten bei wie Deutschland (8,1 Milliarden USD), während die Kosten für die USA weniger als 2,6 Milliarden USD betragen.
- Bezieht man die Sanktionskosten mit ein, liegen die Beiträge der Länder zur globalen Sicherheit als Anteil am BIP näher am NATO-Ziel von 2 %, als ein enger Fokus auf die Militärausgaben allein vermuten lässt. In Bezug auf Beiträge zur globalen Sicherheit gibt es daher weniger Trittbrettfahren als manche Beobachter vermuten.

Schlüsselwörter: Sanktionen, NATO, Handelspolitik, globale Sicherheit

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A CRISIS IN TIMES OF CRISIS: COMBATING COVID-19 UNDER SANCTIONS IN IRAN

Sonali Chowdhry, Gabriel Felbermayr, Julian Hinz, Katrin Kamin, Anna-Katharina Jacobs, and Hendrik Mahlkow

1 INTRODUCTION: SANCTIONS AND COLLECTIVE SECURITY

The "War by Other Means" theory put forward by Blackwill and Harris (2016) argues that military effort and economic sanctions are strategic substitutes. If this is indeed the case, then the extent of a country's contribution towards collective security does not depend on its military spending alone but also on the financial burden of economic sanctions. In this policy brief, we examine this financial burden by calculating the costs of sanctions imposed by NATO countries. We find that European countries bear a much higher cost of sanctions than the US, relative to their respective GDP values. Since the use of sanctions has increased substantially over the last decades (Felbermayr et al., 2020), European countries should consequently expect to shoulder greater financial burdens from sanctions even if their military budgets remain stable.

In 2014, after a decade long debate, NATO members agreed to increase their defense spending to 2% of their GDPs by 2024. This agreement is not legally binding—moreover, the rationale of such a fixed percentage target for defense expenditure is open to dispute, especially when NATO countries are experiencing severe contractions in economic activity due to unexpected shocks such as COVID-19. However, since taking office, US President Trump has repeatedly criticized NATO countries for not meeting this spending target.

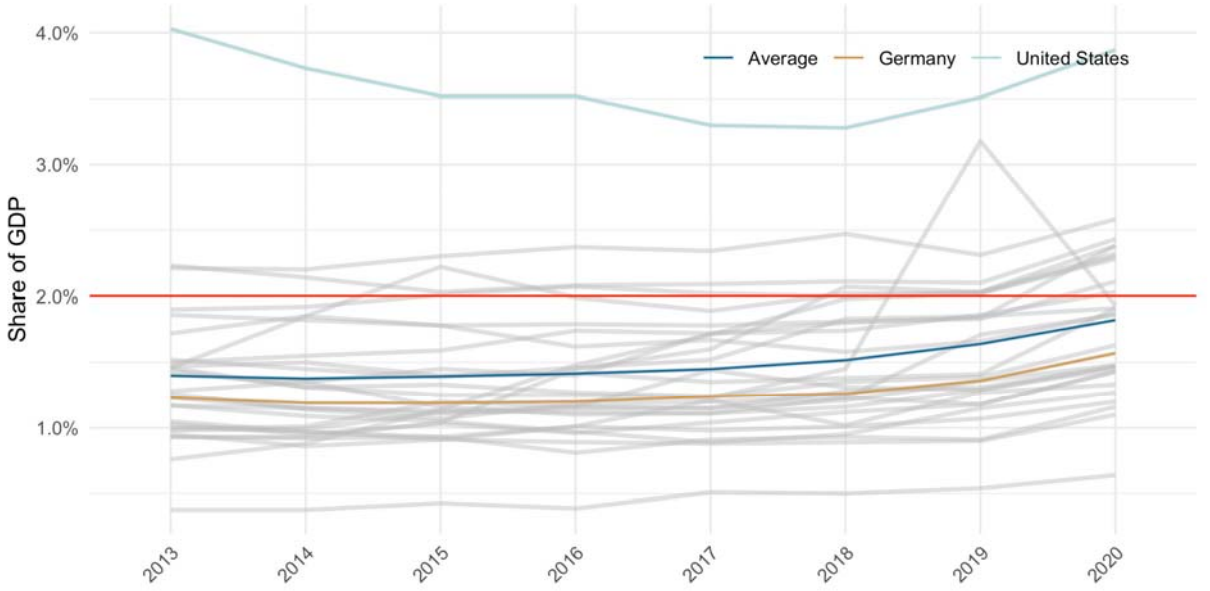
For example, on March 18, 2017, after a meeting with German Chancellor Angela Merkel, US President Trump tweeted: "Germany owes vast sums of money to NATO & the United States must be paid more for the powerful, and very expensive, defense it provides to Germany!". A couple of days later (May 30, 2017) he added, also on Twitter: "We have a MASSIVE trade deficit with Germany, plus they pay FAR LESS than they should on NATO & military. Very bad for U.S. This will change."[1]

Indeed, many NATO countries including Germany fail to meet the 2%-target with currently only ten members (including the US) allocating more than the target value. Figure 1 shows the evolution of these expenditures over time. German politicians have argued that official development assistance (ODA) also contributes towards making the world a safer and more

[1] See tweets via Internet (22.10.2020): <https://twitter.com/realDonaldTrump/status/869503804307275776>; <https://twitter.com/realDonaldTrump/status/843088518339612673>, and <https://twitter.com/realDonaldTrump/status/843090516283723776>.

stable place, and should therefore be considered simultaneously with the military spending target.[2] Indeed, on ODA, EU countries tend to fare better. According to OECD data, the US share of expenditure on ODA as a percent of GDP, 0.16%, fails to reach the United Nations target of 0.7% of GDP by a wide margin, while Germany, contributing 0.6% of GDP, is much closer to the target.[3] This argument, however, has not impressed the US administration; probably because ODA and military spending are not seen as close substitutes but rather as policy instruments that have very different objectives.

Figure 1:
NATO defense spending over time, 2013–2020



Note: The figure shows the time series of military spending as a percentage of GDP for NATO members over time. Data is drawn from NATO reports.

Source: Own visualization, data from NATO via Internet (22.10.2020): <https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/pr-2020-104en.pdf>.

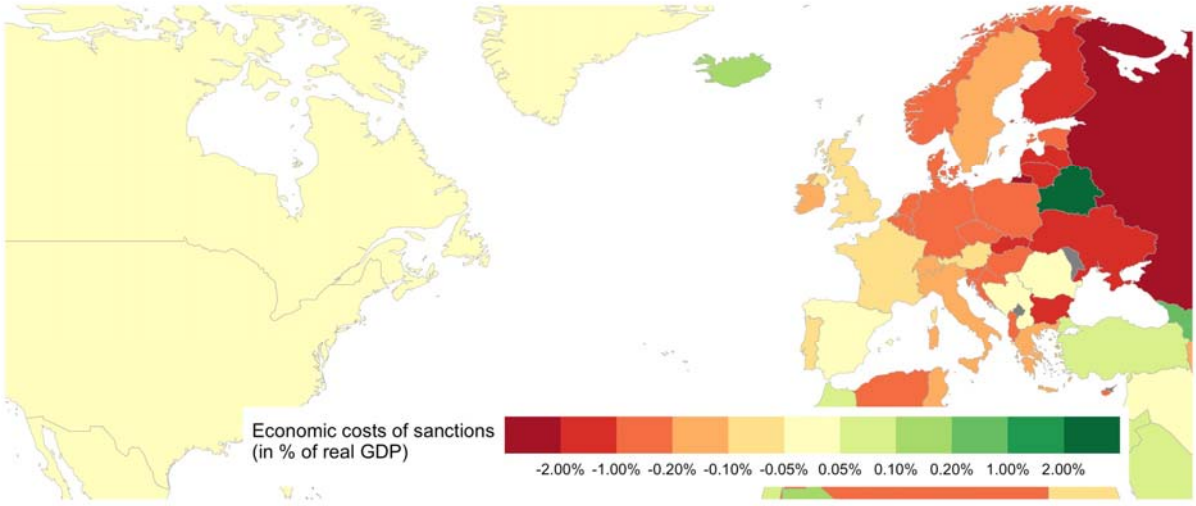
The question arises to what extent NATO members really contribute towards collective security, once we factor in the cost of war by other means. In this policy brief, we focus specifically on one component of these costs, namely the cost of sanctions, as sanctions are important instruments in the foreign policy tool kit frequently used to pursue geopolitical objectives. They seek to deter countries from pursuing policies that may violate international law or threaten peace and risk national security, both in the target as well as in the sanction sending country. Instead of (or in addition to) military intervention, countries can adopt measures that target the sanctioned country's economy through a wide range of restrictions such as on trade flows, financial transactions, travel and military assistance.

[2] See the remarks by Chancellor Angela Merkel in 2019 via Internet (22.10.2020): <https://www.handelsblatt.com/24120562.html?share=mail>.

[3] See via Internet (22.10.2020): <http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/official-development-assistance.htm>.

This economic isolation is intended to penalize regimes and alter their decision-making. However, sanctions impose these costs not only on the targeted nations but also on the sanctioning (the "sender") and third party countries. In the case of trade and financial sanctions for instance, the resulting increase in cross-border frictions in the movement of goods and capital raises costs for businesses that export to and import from the sanctioned country. Costs are amplified when i) sanctions are poorly targeted leading to collateral damage, e.g., declining trade even in nontargeted products (Crozet and Hinz, 2016) and; ii) in the presence of global value chains if firms' production processes rely on inputs from the sanctioned nation (Chowdhry et al., 2020).

Figure 2:
Cost of sanctions: Real GDP lost due to the current sanctions regime



Note: As a preview of more complete results below, this figure shows the economic costs of the current sanctions regime for a selection of countries. The exercise simulates the opportunity costs of sanctions by assuming an end of all sanction regimes based on most recent data (2018) and compares this hypothetical scenario with the status quo where sanctions are in place.

Source: Own computation.

The aim of our analysis is to compute the costs borne by NATO countries as sanction senders. We do so by simulating a hypothetical scenario—a world in which NATO members do not impose any sanctions beyond those mandated by the UN. We interpret the resulting changes in their real GDP as the cost of imposing sanctions. These costs constitute NATO members' "extended" defense spending, i.e., defense spending undertaken in addition to military expenditure. Figure 2 displays the changes in real GDP discussed above. Evidently, the incidence of costs due to sanctions is highly asymmetric—with a few small states, most of them in Eastern Europe such as the Baltic States, Slovakia or Bulgaria, incur sanction costs amounting to about 1% of GDP or more. In contrast to costs of 0.01% of GDP borne by the US. The sanction regime is about eighteen times as costly in Germany, which contributes about 0.2% of its GDP. Five additional NATO countries surpass the 2% target of defense

spending, once sanctions are factored in.[4] Moreover, according to our estimates, Lithuania essentially catches up with the US as the "biggest spender" in terms of GDP.

Our analysis quantifies the "price tag" associated with sanctions and contributes broadly to contem- porary discussions in geoeconomics. The political science literature has largely focused on studying either the success of sanctions or the effectiveness of sanctions and its determinants. The success of sanctions hinges on the initial stability of the target country (Dashti-Gibson et al., 1997) and not necessarily on international support (Drezner, 2000). The effectiveness of sanctions depends on the status of the prior relationship of target and sender country (Jing et al., 2003) as well as on the number of veto players a target government has to deal with in order to counter sanctions (Jeong and Peksen, 2019).

The literature also provides evidence that economic pain does not induce anti-goverment activity (Allen, 2008). Opposition groups seem to be disproportionately hurt by economic sanctions, and thus have lower capacity to pressurize the government towards reforms (Peksen and Drury, 2010). Furthermore, threats of economic sanctions can increase the intensity of conflict violence (Hultman and Peksen, 2017). Additionally, Afesorgbor and Mahadevan (2016) show that especially trade and financial sanctions exacerbate income inequality in the target countries.

The remainder of this policy brief is structured as follows: In Section 2, we briefly describe the computable general equilibrium (CGE) model we use to quantify the costs of sanctions and the various datasets used. Section 3 describes our hypothetical scenario and reports the results from simulating this scenario. Section 4 concludes.

2 METHODOLOGY AND DATA

To quantify the costs of sanctions, we use the KITE (Kiel Institute Trade Policy Evaluation) model which is based on the trade model proposed by Caliendo and Parro (2015).[5] This is a computable general equilibrium model of international trade that pays special attention to the intra- und international input–output linkages. In the modern world economy, where countries are strongly linked through global value chains (GVC), this is important. Moreover, in the context of our application, GVCs imply that countries without sanctions of their own can nonetheless be affected.

We augment the KITE model in order to analyze the economic impact of sanctions. With this model, we are able to compute changes in trade flows, prices, production and welfare that are induced by hypothetical policy shocks defined beforehand. Models of this kind are regularly applied to simulate changes in trade policy, such as the conclusion of free trade agreements or a (temporary) increase in trade restrictions, such as tariffs. The model ignores restrictions on the flow of finance, on the mobility of persons or on technological co-

[4] The Netherlands come close to the mark with 1.99%, Germany ends up at 1.8% of GDP.

[5] The model is explained in greater detail in the forthcoming working paper tied to this policy brief. Also refer to Aichele et al. (2016) for a similarly structured model.

operation. Moreover, it is static. As a consequence, we probably identify the lower bound of the true costs of sanctions.

In the model, changes in trade policy translate into changes in trade costs. We treat the imposition of sanctions in a similar fashion, where the enforcement of sanctions increases trade costs. The model allows us to quantify disaggregated trade and output effects for 65 sectors and 141 regions, covering more than 90% of economic activity worldwide. Furthermore, we can identify changes in real GDP, defined in this study as the change in total production discounted by the change in the price index.

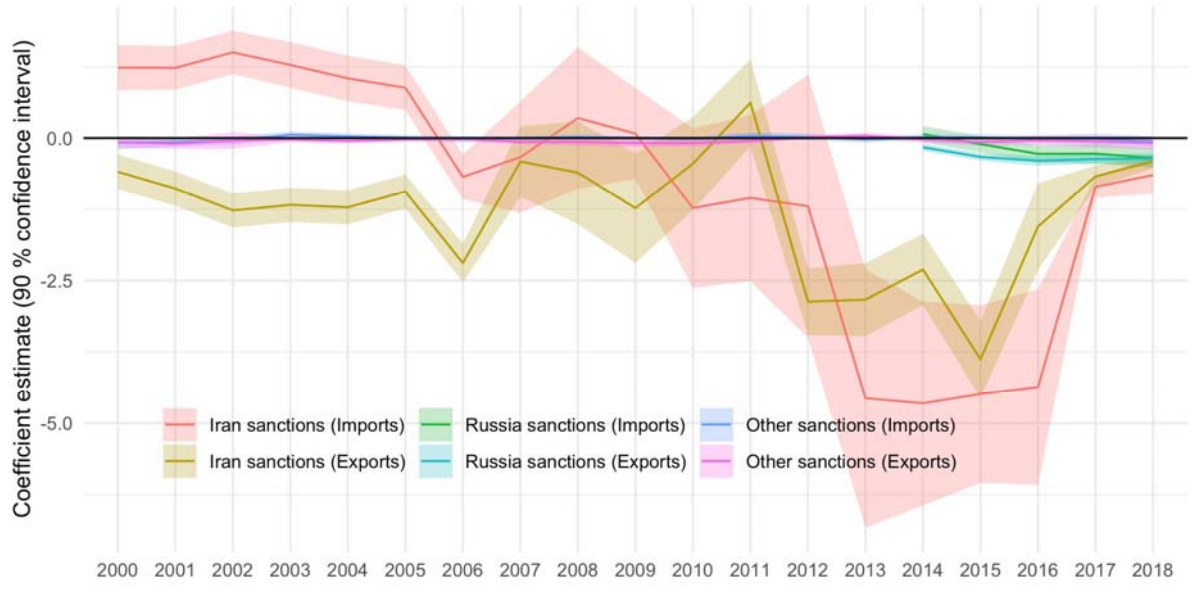
We use standard sources of data to enrich this model. The global input-output-database GTAP 10 provides us with detailed information about global value chains. Furthermore, standard databases such as the UN Comtrade database for trade data as well as WITS and MacMaps databases for tariff data are used to define the baseline scenario (status-quo) in our model. As the focus of our analysis lies in the evaluation of international sanctions regimes, we make use of the newly available and most comprehensive up-to-date database on bilateral sanctions—the Global Sanctions Data Base (GSDB) by Felbermayr et al. (2020).

Finally, certain parameters that enter the model cannot be observed and hence need to be estimated with econometric techniques. These include the so called "trade elasticity" which measures the sensitivity of sectoral trade flows towards changes in the costs of conducting trade in these sectors, e.g., through tariffs, NTBs or sanctions. We calculate the required parameters with the well known gravity model of international trade (see, e.g., Head and Mayer, 2014). The KITE model belongs to a wider class of models that give rise to exactly such a gravity equation. Data on defense spending is drawn from official NATO statistics on defense spending[6] and the Stockholm International Peace Research Institutes Military Expenditure Database (SIPRI, 2020).

We estimate the impact of sanctions on trade flows using state-of-the-art econometric techniques. More specifically, we regress the universe of bilateral trade flows on indicators of bilateral sanctions (for both exports and imports), other policy changes (e.g., the formation of currency unions or free trade agreements) and, importantly, on fixed effects for origin-year, destination-year and origin- destination characterstics. We use data from UN Comtrade betwen 2000 and 2018, aggregated to above-mentioned 141 countries/regions and sectors. We estimate an annual coefficient for all sanctions regimes, singling out the separate effects of the Russia and Iran sanctions. These sanction regimes are important for this analysis for two reasons: First, in the context of US accusations towards NATO, both sanctions regimes are politically as well as geographically important for NATO countries. Second, they are unprecedented in depth and severity.

[6] Via Internet (22.10.2020): <https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/pr-2020-104-en.pdf>.

Figure 3:
Coefficients from Gravity Estimation, 2000–2018



Note: The figure shows the coefficients from the estimation of the gravity model. Standard errors are clustered at destination × year level, 90% confidence interval.

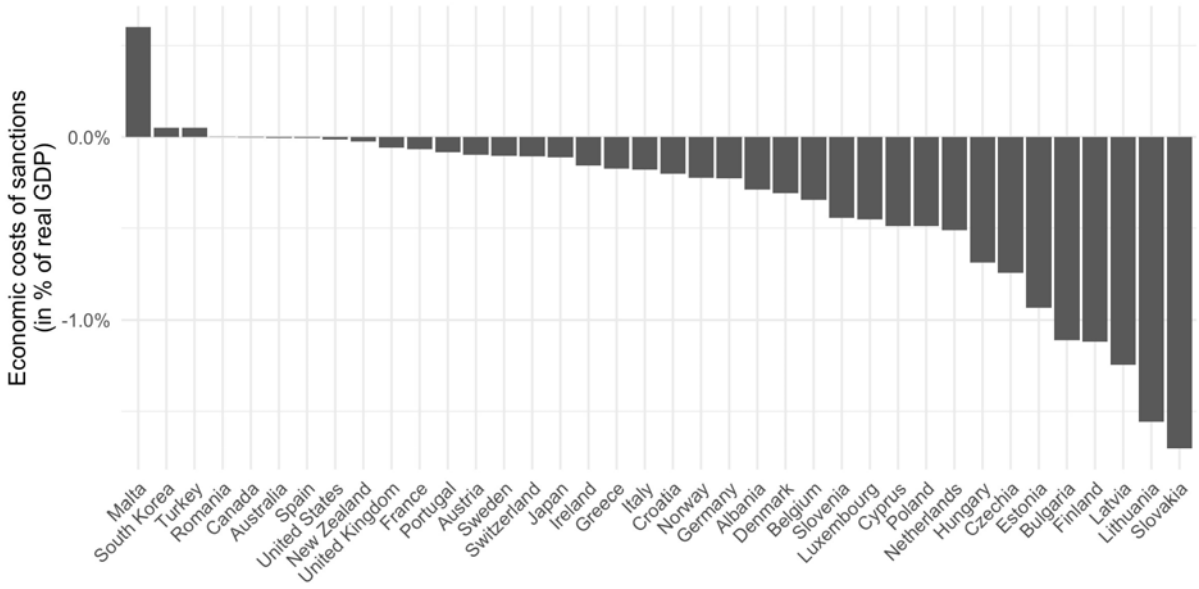
Source: Own estimation.

The gravity results as plotted in figure 3 are interesting, but they only quantify the amount of trade that is destroyed by sanctions. A coefficient of -0.4, for example, implies that trade flows fall by $100\% \, (\exp -0.4 - 1) = -32.97\%$ due to the sanctions. However, the shortfall in trade is no measure for the economic costs of sanctions, as trade can be redirected to other countries or absorbed by the home market. To assess the economic costs, i.e., the lost value added due to a less efficient pattern of trade, one needs a simulation model.

3 SIMULATING THE ECONOMIC COSTS OF SANCTIONS

As mentioned in Section 1, we quantify the "extended" costs of defense borne by NATO members by simulating a hypothetical scenario with the CGE model. In this scenario, we eliminate all sanctions that are enforced by NATO members, in particular the Russia and Iran sanctions, while retaining both UN-mandated as well as any unilateral/plurilateral sanctions imposed by all other countries. From the gravity estimates, using trade elasticities, we back out the increase in trade costs brought about by sanctions and use it in our model. More precisely, we take the world as we observe it in 2018, the latest year for which all necessary data is available, as the baseline (i.e., with sanctions in place), and calculate a counterfactual, a world in which NATO members do not impose any sanctions beyond those mandated by the UN. In this counterfactual scenario, trade costs are lowered which translates to a change in real GDP. This strategy identifies the economic costs of sanctions as of 2018. The economic cost of sanctions is thus calculated as the change in real GDP between this scenario and the baseline.

Figure 4:
Economic costs of sanctions in percent of GDP

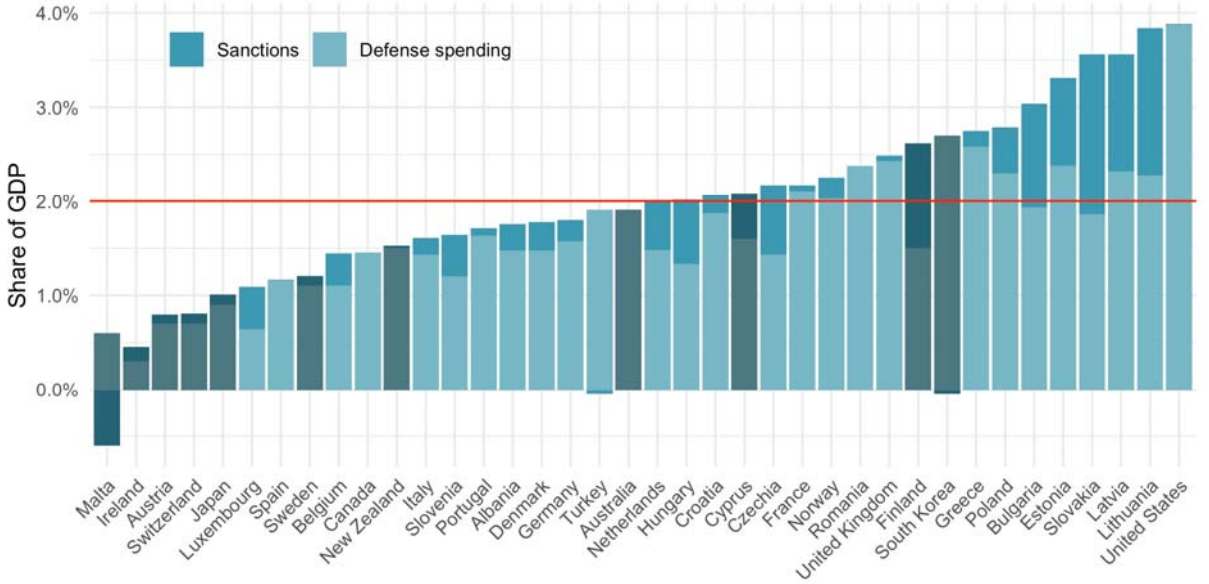


Note: The figure shows the economic costs of the current sanctions regime for a selection of countries. The exercise simulates the opportunity costs of sanctions by assuming an end of all sanction regimes based on 2018 data and compares this situation with the current status quo where sanctions are in place.

Source: Own computation.

Figure 4 displays the change in real GDP between the counterfactual and baseline scenarios. We note that the cost of sanctions is particularly high (> 1% of GDP) for some NATO members—Slovakia, Lithuania, Latvia, Bulgaria and Finland. The costs are also substantial for Estonia, Czechia, and Hungary. Several of these most affected countries have close geographical proximity to Russia, with Estonia, Latvia and Lithuania being former members of the Soviet Union. This indicates that sanctions on Russia are particularly expensive for countries that are close to Russia and that would trade more intensively with the country in the absence of those sanctions. In comparison, the US spends only 0.01% of GDP (2.6 bn USD) on sanctions, far below important NATO members such as Germany, Netherlands, Italy, and Poland with expenditure amounting to 8.1, 4.2, 3.1, and 2.6 bn USD, respectively. Outside of NATO, but also an important US ally, Japan incurs sanctions costs amounting to 5.1 bn USD. Turkey, also a NATO member, is seen to slightly benefit from the sanctions regime (0.3 bn USD), likely due to trade diversion effects from nearby Iran and Russia that appear to be beneficial for the country. For similar reasons, Malta and South Korea, which are not a NATO members, appear to benefit (0.09 bn USD and 0.9 bn USD, respectively).

Figure 5:
Cost of sanctions and defense spending for NATO and select non-NATO countries



Note: The figure shows military spending in percent of GDP, as reported by SIPRI for non-NATO member states for 2019 and by NATO for its member states for 2020, and the economic costs of sanctions as estimated in the present paper based on 2018 data. Grey-shaded countries are non-NATO member states. NATO members North Macedonia and Montenegro are missing due to missing trade data.

Source: Own computation.

In the next step, we add the costs associated with sanctions to the most recent official data on countries' reported defense spending and assess whether their overall expenditure meets the 2% target.[7] Figure 5 reports the outcome.[8] With sanctions now incorporated, five additional NATO countries can be seen to reach or in fact exceed the 2% threshold.[9] Several countries that had already met the 2% goal just based on defense spending alone—Lithuania, Latvia, Estonia, Poland, Greece and Norway—incur substantial additional expenses as a result of sanctions. Even for countries that still do not meet the 2% target, sanctions add considerably to the overall defense expenditure, e.g., Luxembourg, Belgium and Slovenia. Germany, particularly criticized by President Trump, reaches 1.8% after including sanctions. Therefore, focusing only on military expenses significantly under- estimates the extent to which NATO allies contribute towards protecting and promoting collective security.

Table 1 shows the breakdown of the economic cost of sanctions. Adding over all NATO members, the results imply that sanctions impose an economic cost of approximately 34 bn USD. Compared to 1,09 bn USD of total military spending, this is relatively minor. However, the burden is almost exclusively borne by EU members of NATO who contribute about 30 bn USD through sanctions.

[7] Via Internet (Datum): <https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/pr-2020-104-en.pdf>.

[8] Also see Table 1 for detailed results.

[9] These five countries being Slovakia, Bulgaria, Czechia, Croatia and Hungary.

Table 1:
Economic cost of sanctions and defense spending, 2019/2020, in million USD

Country	NATO	EU	GDP	Cost of Sanctions		Cost of Defense		Total Cost	
			mn USD	mn USD	% GDP	mn USD	% GDP	mn USD	% GDP
Albania	yes	no	14,286	41	0.29	210	1.47	251	1.76
Australia	no	no	1,535,454	84	0.01	29,174	1.90	29,258	1.91
Austria	no	yes	441,163	430	0.10	3,088	0.70	3,518	0.80
Belgium	yes	yes	470,273	1,626	0.35	5,173	1.10	6,799	1.45
Bulgaria	yes	yes	61,917	686	1.11	1,195	1.93	1,881	3.04
Canada	yes	no	1,527,586	47	0.00	22,150	1.45	22,197	1.45
Croatia	yes	yes	52,727	107	0.20	986	1.87	1,093	2.07
Cyprus	no	yes	24,355	119	0.49	390	1.60	509	2.09
Czechia	yes	yes	212,448	1,581	0.74	3,038	1.43	4,619	2.17
Denmark	yes	yes	320,952	988	0.31	4,718	1.47	5,706	1.78
Estonia	yes	yes	28,109	262	0.93	669	2.38	931	3.31
Finland	no	yes	266,939	2,984	1.12	4,004	1.50	6,988	2.62
France	yes	yes	2,381,374	1,572	0.07	50,247	2.11	51,819	2.18
Germany	yes	yes	3,571,592	8,083	0.23	56,074	1.57	64,157	1.80
Greece	yes	yes	185,465	322	0.17	4,785	2.58	5,107	2.75
Hungary	yes	yes	137,519	946	0.69	1,829	1.33	2,775	2.02
Ireland	no	yes	385,256	601	0.16	1,156	0.30	1,756	0.46
Italy	yes	yes	1,737,972	3,114	0.18	24,853	1.43	27,967	1.61
Japan	no	no	4,574,976	5,094	0.11	41,175	0.90	46,269	1.01
Latvia	yes	yes	31,121	387	1.24	722	2.32	1,109	3.56
Lithuania	yes	yes	49,035	764	1.56	1,118	2.28	1,882	3.84
Luxembourg	yes	yes	65,938	298	0.45	422	0.64	720	1.09
Malta	no	yes	14,734	–89	–0.60	88	0.60	–0	–0.00
Netherlands	yes	yes	815,338	4,177	0.51	12,067	1.48	16,244	1.99
New Zealand	no	no	218,939	57	0.03	3,284	1.50	3,341	1.53
Norway	yes	no	328,621	737	0.22	6,671	2.03	7,408	2.25
Poland	yes	yes	523,609	2,561	0.49	12,043	2.30	14,604	2.79
Portugal	yes	yes	213,006	179	0.08	3,472	1.63	3,651	1.71
Romania	yes	yes	231,008	–3	–0.00	5,498	2.38	5,495	2.38
Slovakia	yes	yes	94,247	1,604	1.70	1,753	1.86	3,357	3.56
Slovenia	yes	yes	48,667	216	0.44	584	1.20	800	1.64
South Korea	no	no	1,696,686	–872	–0.05	45,811	2.70	44,939	2.65
Spain	yes	yes	1,212,845	70	0.01	14,069	1.16	14,139	1.17
Sweden	no	yes	595,044	613	0.10	6,545	1.10	7,159	1.20
Switzerland	no	no	725,690	768	0.11	5,080	0.70	5,848	0.81
Turkey	yes	no	696,492	–349	–0.05	13,303	1.91	12,954	1.86
United Kingdom	yes	no	2,454,074	1,427	0.06	59,634	2.43	61,061	2.49
United States	yes	no	20,282,997	2,571	0.01	784,952	3.87	787,523	3.88

Note: GDP in current prices and exchange rates. As for NATO members, non-NATO member GDP figures for 2019 are sourced from the OECD, defense spending as reported by SIPRI for non-NATO member states for 2019 and by NATO for its member states for 2020, and the economic costs of sanctions in terms of share of GDP as estimated in the present paper based on 2018 data. NATO members North Macedonia and Montenegro are missing due to missing trade data.

Source: Own computation.

The EU members who are also in NATO spend 1.65% of GDP on military; sanctions including, they contribute 1.89%, only slightly shy of the envisaged 2% target. In the case of Germany, about 12.6% of the total contribution to collective security falls on sanctions; in countries with larger military budgets like the United Kingdom or the US that share is 2.3% and 0.3%, respectively. In smaller countries the share can be as high as 48% (Slovakia). Hence, there is a very large degree of heterogeneity in the cost burden sharing of sanctions.

Summarizing, one can conclude that sanctions are costly and that these costs are borne to a greater extent by European countries than the US. Moreover, these sanctions account for a significant share of the total expenditure undertaken toward maintaining collective security for a large number of NATO members.

4 CONCLUDING THOUGHTS

The "War by Other Means" hypothesis postulates that military effort and economic sanctions are, at least to some extent, strategic substitutes. If this hypothesis stands, one should look not at military spending alone but also the economic costs imposed by sanctions when quantifing a country's contribution to collective security. Our analysis finds that sanctions-related costs are substantial: using most recent data for 2019 and 2020, they add up to approximately 34 billion USD for the NATO countries. Of these 34 bn USD, 88% of the cost is borne by NATO members who are also members of the EU27. For those countries, the GDP share of total contribution to collective security including sanctions is 1.60%, while that of military spending is 1.37%.

Hence, EU members such as Germany contribute more to collective security than critics such as US President Trump claim. Taking sanctions into account, the US is only barely NATO's biggest contributor in terms of GDP shares. Lithuania too bears a very substantial cost of NATO sanctions regimes (1.56% GDP). Of course in terms of values, Lithuania's sanctions costs amount to 0.8 billion USD in comparison to 2.6 bn USD spent by the US.

In their book, Blackwill and Harris (2016) argue that the US should make greater use of economic sanctions in achieving their national security objectives. Our analysis shows that this has repercussions on US allies, since they tend to bear higher costs from economic sanctions than the US, i.e., because of their higher reliance on international trade with sanctioned countries.

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