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# The Economic Effects of International Sanctions: An Event Study\*

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## Abstract

Although international sanctions are a widely used instrument of coercion, their economic effects are still not fully understood. This study uses a novel dataset and an event study approach to evaluate the economic consequences of international sanctions, thereby accounting for pre-treatment dynamics in countries subject to sanctions. Our analysis focuses on the effects of sanctions on GDP growths as well as various transmission channels through which sanctions affect economic activity. We document a significant negative effect of international sanctions on GDP growth and its components (consumption, investment, and government expenditures) as well as on trade and foreign direct investment. Additional panel difference-in-differences estimations reveal that this detrimental effect is driven by financial sanctions and US unilateral sanctions.

**JEL Codes:** F43, F51, F52, F53, O43, O47.

**Keywords:** Economic growth; event study; international sanctions; transmission channels.

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# 1 Introduction

International sanctions are one of the most widely used instruments of coercion in international politics. Since the end of World War II, Aidt et al. (2020) count more than 1,400 incidences of states being threatened with or targeted by sanctions. Sanctions inflict economic harm to force the target country to change its policies or to comply with the sender state's interests. In fact, Hufbauer et al. (2009) show that sanctions are more likely to be successful the harder the target country's economy is hit. Detailed knowledge of the economic effects of sanctions is thus essential to understanding if and how sanctions are able to achieve their goals. However, research on the economic effects of international sanctions is far more scarce than research on their political and humanitarian consequences. The limited empirical evidence suggests that sanctions trigger financial crises (Hatipoglu and Peksen 2018; Peksen and Son 2015) and reduce income per capita (Neuenkirch and Neumeier 2015). Reductions in trade (Afesorgbor 2019; Crozet and Hinz 2020; Felbermayr et al. 2020b) and foreign direct investment (Biglaiser and Lektzian 2011; Mirkina 2018) are likely transmission channels, but both can be undermined by sanctions busters (Barry and Kleinberg 2015; Early 2015; Haidar 2016, 2017; Lektzian and Biglaiser 2013). The effect of sanctions on the informal economy appears to be ambiguous (Early and Peksen 2019; Farzanegan and Hayo 2019).

This study conducts a comprehensive analysis of the economic effects of international sanctions based on a panel-data event study design. Our research design has the advantage that empirical estimates can be plotted with the help of intuitive graphs based on a straightforward econometric approach. These graphs show dynamic post-treatment effects and allow testing the identifying assumption of parallel pre-event trends in the treatment and control group (Schmidheiny and Siegloch 2020). A similar empirical approach is used by Berger et al. (2013) to show that CIA interventions during the Cold War led to an increase in trade flows from the US to target countries. The event study approach advances our understanding of the causal treatment effects of sanctions. It is employed not only to economic growth rates as the dependent variable, but also to a range of potential transmission channels. Unlike in previous studies, these transmission channels are evaluated in a uniform empirical framework that ensures a reasonable identification of causal effects,

which are comparable and cannot result from carefully selected model specifications. Some transmission channels are even tested empirically for the first time. Moreover, we employ a novel dataset of international sanctions with an unprecedented quality and time- and country-coverage (Felbermayr et al. 2020a; Kirilakha et al. 2021).

Our key results are as follows: We document a significant negative effect of international sanctions on GDP growth and its components (consumption, investment, and government expenditures) as well as on trade and foreign direct investment. We are confident that our findings have a causal interpretation, as we do not find a significant deterioration of the state of the economy in the years before the imposition of sanctions. The estimated effects are also economically relevant, as we document, for instance, a decline of 4 percent in the target country's GDP per capita over the first two years of a sanction episode and find no indication of a recovery during the first three years after sanctions are lifted. Additional panel difference-in-differences estimations reveal that the adverse economic effects are driven by US unilateral sanctions and financial sanctions (except for the effect on trade, which is primarily due to trade sanctions). Finally, governments react politically to sanctions and specifically democracies shift expenditures towards the military.

In contrast to their economic effects, the political and humanitarian consequences of sanctions have been studied extensively. The existing empirical evidence calls the common assumption that sanctions are less harmful to the target state's population than military interventions into question. International sanctions have been shown to worsen the target government's respect for human rights (Adam and Tsarsitalidou 2019; Gutmann et al. 2020; Peksen and Drury 2009; Wood 2008) as well as the health situation and life expectancy of the target state's population (Allen and Lektzian 2013; Gutmann et al. 2021). Moreover, vulnerable segments of society are found to be hit the hardest (Afesorgbor and Mahadevan 2016; Gutmann et al. 2021; Neuenkirch and Neumeier 2016; Peksen 2016). Sanctions can also be costly to the sender country, as illustrated by the sanctions against Russia after its illegal annexation of Crimea in 2014 (Bělin and Hanousek 2021; Crozet and Hinz 2020; Gullstrand 2020; Kholodilin and Netšunajev 2019) or against China after the Tiananmen Square Incident in 1989 (Webb 2020). And even the conformity of international sanctions with the standards prescribed by international law has become contested (Early and Schulzke 2019;

Gutmann et al. 2018). Whereas the aforementioned humanitarian consequences of international sanctions can be considered side effects of a blunt policy instrument, the damage caused for the target country's economy is clearly calculated.

The remainder of the paper is structured as follows. Section 2 describes our estimation approach, which follows closely the event study design of Schmidheiny and Siegloch (2020) and adds standard difference-in-differences estimations. Moreover, we discuss the data employed in our empirical analysis with an emphasis on the novel sanctions dataset collected by Felbermayr et al. (2020a) and Kirilakha et al. (2021). In Section 3, we present our empirical results and discuss them in light of the extant evidence in the literature. We start by evaluating the growth effects of sanctions, before moving on to potential transmission channels. Section 4 concludes.

## **2 Estimation approach and data**

### **2.1 Estimation approach**

Identifying the causal effect of international sanctions on economic activity is challenging. Sanctions are typically imposed on countries that are characterized by unstable political and social conditions (Gutmann et al. 2021; Jing et al. 2003). This implies that countries subject to sanctions could have exhibited a poor economic performance even if sanctions had not been imposed. We employ two strategies to tackle this problem. First, we adopt an event study design to capture trends up to three years before and after each sanction episode. Thereby, we can test whether macroeconomic conditions in sanctioned countries are already on a downward trajectory before the imposition of sanctions. In this regard, the event study design allows us to disentangle the treatment effect of sanctions from their selection effect. Second, we compare the economic performance of sanctioned countries to the performance of countries that are threatened with sanctions. Arguably, the social, political, and economic situation in countries threatened with the imposition of sanctions should be comparable to the situation in countries that are actually targeted by sanctions. This setup ensures that we evaluate the consequences of international sanctions by comparing sanctioned countries to what comes closest to a counterfactual.

Of course, sanction threats are not a perfect counterfactual to imposed sanctions and one could argue that we either over- or underestimate the actual consequences of sanctions. On the one hand, sanction threats already damage the economy of the target country (Walentek et al. 2021). On the other hand, the escalation of sanction threats to sanctions is not a random process and one could speculate that sanctioned countries are worse off in the first place when compared to those who are only threatened with sanctions. Nevertheless, the strength of our empirical approach is the combination of the event study design with using sanction threats as a counterfactual, because we can evaluate whether the parallel trend assumption is fulfilled, given our definition of treatment and counterfactual.

Our empirical model is specified as follows:

$$y_{i,t} = \beta_{no}D_{no,i,t} + \sum_{j=1}^3 \beta_{pre,-j}D_{pre,i,t-j} + \sum_{j=1}^{11+} \beta_{sanc,j}D_{sanc,i,tj} + \sum_{j=1}^3 \beta_{post,+j}D_{post,i,t+j} + \gamma X_{i,t} + \alpha_i + \tau_t + \epsilon_{i,t} \quad (1)$$

The unit of analysis is the country-year.  $y_{i,t}$  is one of our macroeconomic indicators of interest. Our event study indicators  $D_{sanc,i,tj}$  are dummy variables that are equal to 1 if a sanction was in place in country  $i$  and year  $t$ . We include individual dummies for each of the first ten years in which a country was subject to sanctions and summarize all longer-lasting sanctions in the category 11+.  $D_{pre,t-j}$  and  $D_{post,t+j}$  are dummy variables that are equal to 1 in the three years before and after a sanction episode. Their inclusion allows us to assess the economic condition in a sanctioned country before sanctions became effective and after they have been lifted.  $D_{no,i,t}$  is a dummy that is equal to 1 in case country  $i$  was neither subject to sanctions nor to a sanction threat in year  $t$ . Consequently, our event study indicators measure the effect of sanctions on the target country's economy relative to countries only being threatened with sanctions.  $X_{i,t}$  is a vector of control variables,  $\alpha_i$  and  $\tau_t$  are country- and year-fixed effects, and  $\epsilon_{i,t}$  is the error term.

We complement our event study analysis with standard panel difference-in-differences estimations. Their general specification is as follows:

$$y_{i,t} = \beta_{no}D_{no,i,t} + \sum_{s=1}^k \beta_{sanc}^s D_{sanc,i,t}^s + \gamma X_{i,t} + \alpha_i + \tau_t + \epsilon_{i,t} \quad (2)$$

$D_{no,i,t}$ ,  $X_{i,t}$ ,  $\alpha_i$ ,  $\tau_t$ , and  $\epsilon_{i,t}$  are defined as above. Depending on the specification, we employ three different sets of dummies  $D_{sanc,i,t}^s$ . In the first specification, we explore the average treatment effect of sanctions and employ a binary dummy variable that takes the value 1 for each year in which a given country is subject to sanctions. In the second specification, we want to estimate effects for different senders. Roughly half of the sanction country-years in our sample (see also Table A4 in Appendix A) are unilateral sanctions imposed by the US. Hence, we include one dummy for US unilateral sanctions and one for other sanctions. In the third specification, we distinguish between four non-disjunctive types of sanctions, that is, arms and military assistance sanctions, financial sanctions, trade sanctions, and other sanctions. In all three specifications, the reference category are years in which a country was subject to sanction threats, but not to sanctions.

Eqs. (1) and (2) are estimated with ordinary least squares and standard errors are clustered at the country level.

## 2.2 Data

We employ eight different dependent variables ( $y_{i,t}$ ). These include the growth rates of real GDP, private consumption, and government expenditures. In addition, we use the natural logarithm of investment, foreign direct investment (FDI), official development assistance (ODA), and trade openness (the sum of exports and imports).<sup>1</sup> Finally, we explore whether sanctions affect the composition of government expenditures by using the share of public spending on the military. All macroeconomic variables (including the controls) are winsorized at the 2.5% and 97.5% percentile to mitigate the influence of outliers.

The choice of our control variables ( $X_{i,t}$ ) broadly follows Neuenkirch and Neumeier (2015). First, we consider covariates that are standard in economic growth equations: the log of real GDP per capita and population growth. We lag these variables by one year to mitigate problems of reverse causality. In addition, we account for the main reasons for the imposition of international sanctions and include indicators for the protection of human rights in a country, the level of democracy, and the occurrence of major and minor conflicts.

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<sup>1</sup>For these four variables, employing growth rates does not reveal meaningful results due to their very high volatility, even after a winsorization at the 2.5% and 97.5% percentile.



A list of all control variables along with their definitions and data sources can be found in Table A1 in Appendix A. Table A2 shows descriptive statistics.

Our indicators for international sanctions are taken from the novel Global Sanctions Database (Felbermayr et al. 2020a; Kirilakha et al. 2021). We limit our analysis to sanctions by the United Nations, the United States, and the European Union, since these are the senders with the largest number of sanction episodes.<sup>2</sup> The databases by Morgan et al. (2014) and Weber and Schneider (2020) are used to identify country-years in which states were threatened with the imposition of sanctions by one of our three senders.

Our dataset covers 162 countries and the period 1960–2016. It comprises 6,953 observations for which data is available for all control variables. 76 countries and a total of 980 country-years in our dataset were exposed to sanctions.<sup>3</sup> Sanction threats (but no sanctions) were in place in 944 country-years. Tables A3 and A4 in Appendix A provide a detailed overview of the countries included in our dataset, the number of observations in each sanction category, as well as the pre- and post-event trend indicators.

## 3 Empirical results

### 3.1 Presentation and interpretation of results

In the presentation of our empirical results, we focus on the findings from our event study design (cf. Eq. (1)). To facilitate the interpretation, we illustrate the coefficient estimates of the event study indicators graphically in Figures 1–3. The results for the panel difference-in-differences specifications (binary sanctions indicator, different sender-indicators, and different sanction type-indicators; cf. Eq. (2)) can be found in Tables B1–B3 in Appendix B. To save space, we do not discuss the results of the control variables in detail. However, the coefficient estimates for major conflicts serve as a benchmark to evaluate the economic relevance of sanctions.

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<sup>2</sup>The number of Russian (21) and Chinese (3) sanction episodes in the database is too small for a meaningful analysis.

<sup>3</sup>Six countries (Afghanistan, Cuba, Lebanon, Liberia, South Sudan, and Yugoslavia) were subject to sanctions throughout all observations for which we have complete data. Hence, the sanctions indicators are absorbed by the country-fixed effects in these cases. Nevertheless, the inclusion of these countries in our sample leads to a more efficient estimation of the vector of parameters  $\gamma$ .

Two types of patterns in the data can be indicative of a causal sanction effect. The first one is a swift adjustment after the imposition of sanctions that clearly deviates from the pre-sanction dynamics in the dependent variable. In the case of economic growth, one would expect a decline in growth rates during the first years after the imposition of sanctions. These effects might fade out as sanction busting states and black markets exploit opportunities for arbitrage and thereby mitigate some of the damages caused by sanctions. However, these might also be sustained if senders continuously expand the scope of sanctions and make sure that these are rigorously enforced.

The second pattern that can be consistent with a causal sanction effect is an adjustment that already sets in briefly before sanctions are imposed. Specifically, this concerns the final year before a sanction episode starts, when it is often already foreseeable that sanctions will be imposed in the near future, for example after the conclusion of investigations or (domestic or international) political negotiations. Malani and Reif (2015) show that changes in outcomes before the adoption of a new policy can be explained by anticipation effects, which arise naturally out of many theoretical models. Biglaiser and Lektzian (2011) find evidence for anticipation effects among US investors ahead of US-imposed sanctions.<sup>4</sup> Bayesian updating of economic actors with incomplete information would suggest that the disruptive effects of sanctions will be felt increasingly while sanctions become more and more likely and are eventually imposed.

Our results in Figures 1–3 are not indicative of a significant downward trajectory before the imposition of sanctions. Nevertheless, there could be differences across countries in the pre-trend dynamics. In particular, countries that were subject to sanction threats before the imposition of sanctions might be more prone to anticipation effects than non-threatened countries. This group of countries could also drive the overall results. Consequently, we interact the pre-trend dummies with an indicator for the countries subject to sanction threats. Our results for this extension (available on request) do not provide evidence for a downward trajectory of countries subject to sanction threats before the actual imposition of sanctions. Hence, we are confident that our findings have a causal interpretation.

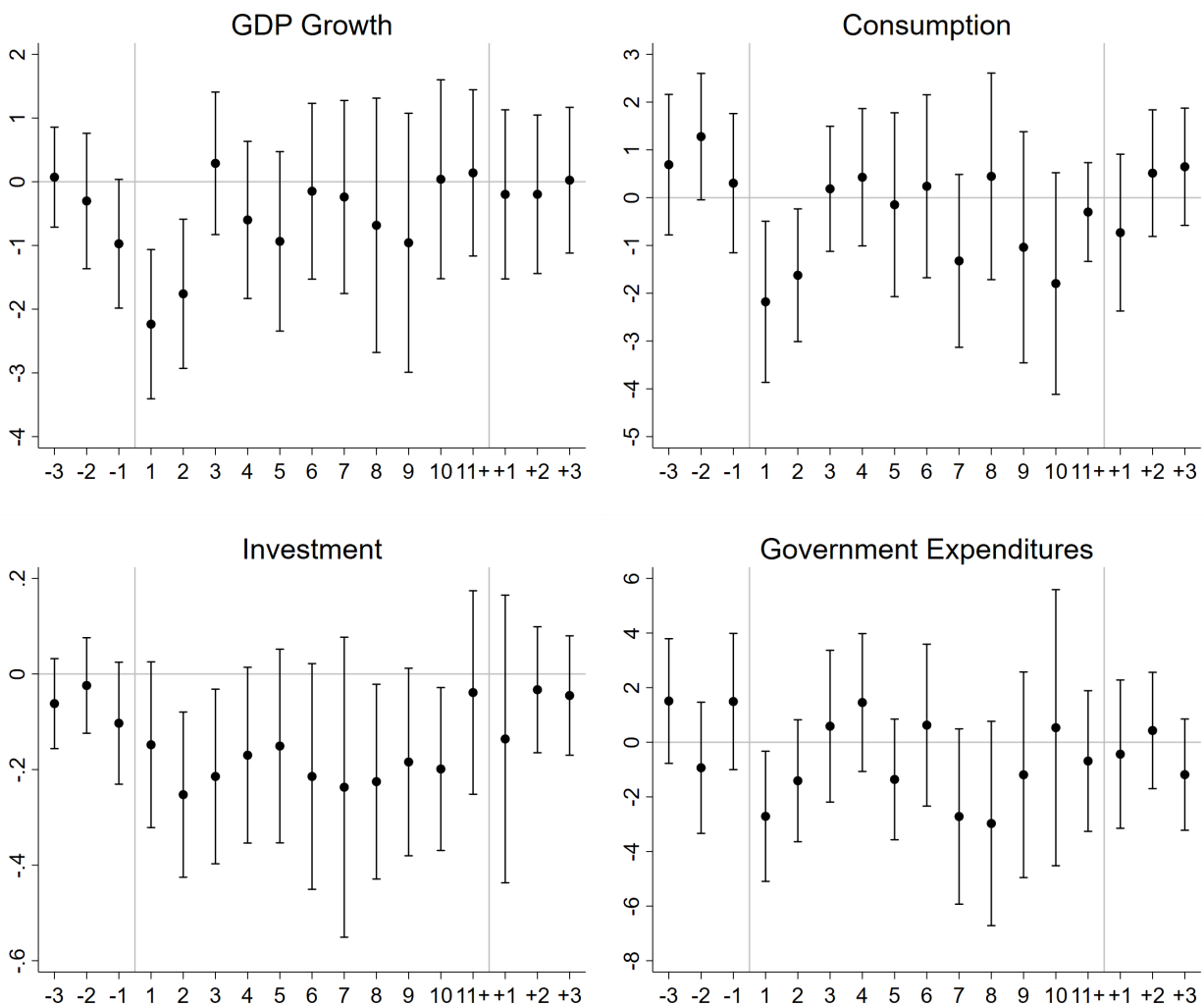
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<sup>4</sup>Dube et al. (2011) provide complementary evidence regarding the effect of US-backed coups on stock prizes of partially nationalized multinational companies. Top-secret pre-coup authorizations accounted for a larger share of stock price increases than the coup events themselves.

### 3.2 Results for GDP growth and its main components

Figure 1 plots the coefficient estimates for the growth rate of GDP and its main components alongside 95% confidence bands. The pre-treatment trend is indicated by  $-3$ ,  $-2$ , and  $-1$  and the post-treatment trend by  $+1$ ,  $+2$ ,  $+3$ . The effect of sanctions on the variable of interest during the first, second, ..., eleventh-plus year of a sanction episode is represented by  $1$ ,  $2$ , ...,  $11+$  on the horizontal axis. The reference point for all these effects are countries that are subject to sanction threats, but not to sanctions.

Figure 1: Effects of International Sanctions on GDP Growth and its Main Components



*Notes:* Figure shows the effects of sanctions over time ( $1, 2, \dots, 11+$ ) alongside the pre-treatment trend ( $-3, -2, -1$ ) and the post-treatment trend ( $+1, +2, +3$ ). The dependent variables are the growth rate of GDP, private consumption, and government expenditures as well as the natural logarithm of investment (all per capita). The reference category is countries subject to sanction threats. 95% confidence bands are indicated by whiskers. Additional results of panel difference-in-differences estimations can be found in Tables B1–B3 in Appendix B.

Our findings indicate that international sanctions lead to a reduction of GDP growth during the first ( $-2.24$  pp) and second year ( $-1.76$  pp) of a sanction episode. Both coeffi-

coefficients are significant at the 1% level.<sup>5</sup> There is no indication of a recovery in GDP growth rates, even during the first three years after the sanctions have been lifted. Hence, our results suggest that sanctioned countries are pushed to a lower growth path and remain there. The adverse effect of sanctions on GDP growth rates translates into a 4 percent drop in the target country's GDP per capita, highlighting the economic relevance of the effect. This effect appears to be mainly driven by US unilateral sanctions with an average annual negative effect of  $-1.17$  pp (see Table B2) as well as financial sanctions ( $-1.51$  pp, see Table B3). These average effects are smaller than those of major conflicts, which range between  $-3.06$  pp and  $-3.16$  pp.

The pattern of the effect of sanctions on consumption growth, the largest subcomponent of GDP, resembles that of GDP growth. Sanctions are detrimental to consumption during the first ( $-2.18$  pp) and second year ( $-1.62$  pp). On average, sanctions reduce consumption growth by  $-0.85$  pp (see Table B1). Again, the overall effect appears to be driven by US unilateral sanctions ( $-1.07$  pp, see Table B2) and financial sanctions ( $-1.42$  pp, see Table B3).<sup>6</sup> To put these numbers into perspective, one can again compare them to the effects of major conflicts (between  $-1.98$  pp and  $-2.00$  pp). The decline in consumption due to sanctions does not show any sign of an anticipation effect. This is not surprising, as there are two countervailing effects on consumption while the imposition of sanctions becomes more likely. On the one hand, consumption smoothing should lead to a decline in consumption due to an expected decline in future income. On the other hand, consumers are incentivized to stockpile goods that might become scarce and thus more valuable under sanctions.

The negative effect of sanctions on investment is significant during the second ( $-25.2\%$ ), third ( $-21.4\%$ ), eighth ( $-22.5\%$ ), and tenth year ( $-19.9\%$ ) with an average effect of  $-13.8\%$  (see Table B1). The effect is driven by US unilateral sanctions ( $-17.0\%$ , see Table B2). For comparison, the average negative effect of major conflicts on investment ranges between  $-11.4\%$  and  $-12.1\%$ . Investment, unlike consumption, appears to decline already in the final year before sanctions are imposed, although this effect is not statistically significant. It is striking how the precision with which changes in investment are estimated declines,

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<sup>5</sup>Note that growth rates already adjust downwards (albeit insignificantly) in the final year before sanctions are imposed. However, the coefficient for the first year of a sanction episode is significantly different from that of the final pre-trend year ( $F(1,160) = 3.98^*$ ).

<sup>6</sup>Studying the effects of sanctions in a panel of 30 developing countries over a 20-year period, Williams (2020) finds only weak evidence for a negative effect on household consumption.

starting in that year. This might be due to a very heterogeneous response of investors across countries to the (expected) sanction imposition.

Finally, sanctions also lead to a swift reduction in the growth rate of government expenditures. In this case, significant effects are only found during the first year of a sanction episode ( $-2.71$  pp). Financial sanctions are again the main contributor ( $-1.56$  pp, see Table B3). To sum up, we find that sanctions seem to harm economic growth via reducing domestic consumption, investment, and government expenditures. The results are consistent with previous research showing an adverse effect of sanctions on income per capita (Neuenkirch and Neumeier 2015).

### 3.3 Results for military expenditures

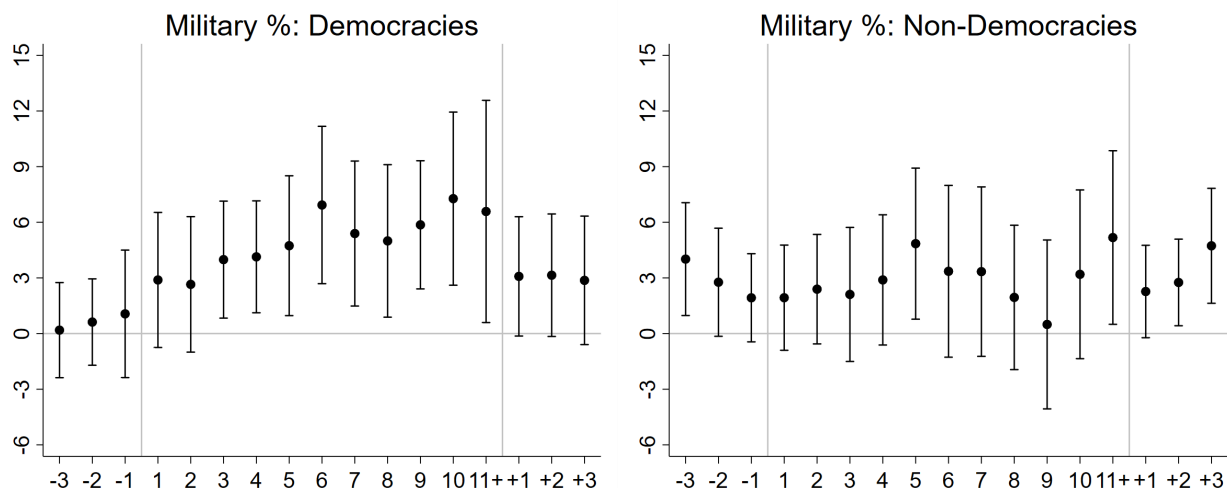
In the next step, we analyze the effect of sanctions on the composition of government expenditures. We focus on the share of government spending on the military for data availability reasons and because this spending category is of particular relevance to understanding how governments defend themselves against external economic pressure campaigns.<sup>7</sup>

Figure 2 provides separate plots for democracies (as indicated by a polity2 score above 5) and non-democracies, because we expect differences in how these governments reallocate their expenditures under sanctions. In general, one might expect that governments facing international sanctions reallocate resources from civilian spending categories to military spending (Cappella-Zielinski et al. 2017; Nordhaus et al. 2012). The limited empirical evidence regarding that question, however, indicates that, at least in Iran, military expenditures declined due to international sanctions (Dizaji and Farzanegan 2021; Farzanegan 2019). One might further expect that especially democracies, because they generally invest less in their security apparatus, will start reallocating resources to military spending while under international sanctions. This serves not only the purpose of national defense in case the political conflict further escalates, but it can also be an attempt to signal to not comply with the sanction senders' demands.

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<sup>7</sup>For instance, the number of observations decreases to less than 3,000 if we analyze the effect of sanctions on government expenditures on education.

Figure 2: Effects of International Sanctions on the Composition of Government Expenditure



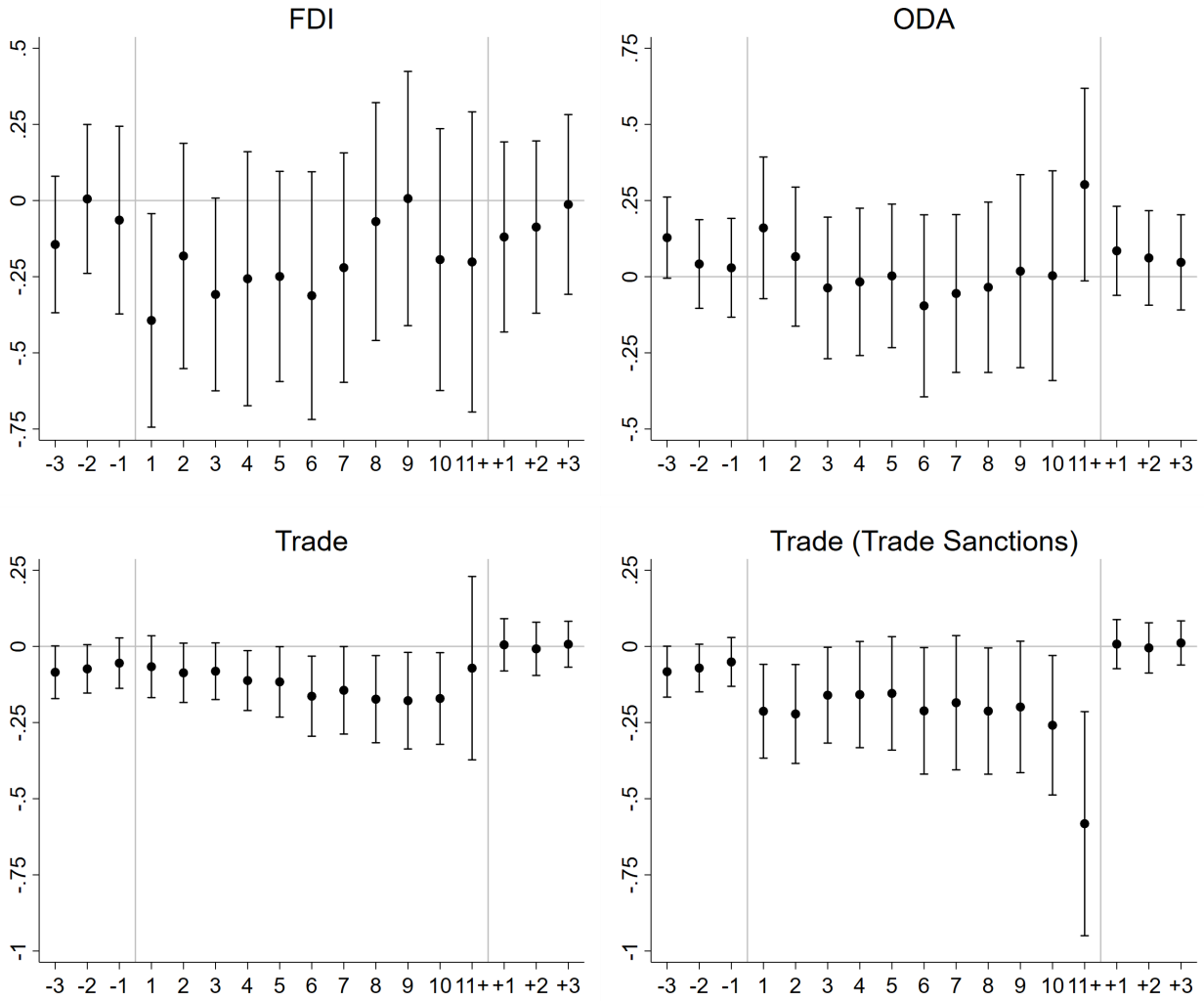
Notes: Figure shows the effects of international sanctions over time (1, 2, ..., 11+) alongside the pre-treatment trend (-3, -2, -1) and the post-treatment trend (+1, +2, +3). The dependent variable is the share of government expenditures spent on the military. The reference category is countries subject to sanction threats. 95% confidence bands are indicated by whiskers. Additional results of panel difference-in-differences estimations can be found in Tables B1–B3 in Appendix B.

The relative share of military spending increases in both, democracies and non-democracies, when sanctions are imposed. The effect for democracies is significant over the whole time horizon considered here with the exception of the first two years. The peak effect is found in the tenth year (7.27 pp). In addition, the pre-trend is insignificant for democracies, allowing for a causal interpretation of the effect of sanctions. For non-democracies, the effect is significant during the fifth year and for long-lasting sanctions (11+) with a peak increase of 5.18 pp after 11+ years. However, we warn against a causal interpretation of this result, as there is a significant pre-trend in the three years before sanctions are imposed. When considering all targeted countries, the average effect amounts to an increase by 2.69 pp (see Table B1). Hence, our results indicate that sanctions lead to a diversion of government spending away from civilian spending categories, specifically, in democratic countries.

### 3.4 Results for cross-border transactions

Our third set of results concerns cross-border transactions. Figure 3 presents the effects of sanctions on FDI, ODA, and trade. In addition, we specifically assess the effect of trade sanctions on trade (bottom right panel). In general, one would expect negative effects of international sanctions in each of these outcomes.

Figure 3: Effects of International Sanctions on FDI, ODA, and Trade



Notes: Figure shows the effects of international sanctions over time (1, 2, ..., 11+) alongside the pre-treatment trend (-3, -2, -1) and the post-treatment trend (+1, +2, +3). The dependent variables are the natural logarithms of FDI, ODA, and trade (all per capita). The reference category is countries subject to sanction threats. 95% confidence bands are indicated by whiskers. Additional results of panel difference-in-differences estimations can be found in Tables B1–B3 in Appendix B.

We find that international sanctions lead to a reduction in FDI during the first year of a sanction episode (-39.3%). Yet again, this effect is mainly driven by US unilateral sanctions (see Table B2). The average effect of this sanction type (-30.3%) is of similar magnitude as that of major conflicts (-33.2%). In contrast, we do not detect a significant reduction of ODA during a sanction episode. Nevertheless, Table B1 reveals that countries without sanctions or sanction threats receive significantly more development assistance (17.5%) than the reference category of countries that are subject to sanction threats. This is in line with our argument above that choosing sanction threats as a reference category is conservative in the sense that economic and political actors already react to the mere threat of sanctions in

ways that can harm the economy. In the case of ODA, the only significant sanction type (i.e., the only sanctions with an effect that is significantly larger than that of the threat itself) are financial sanctions with a negative effect of  $-20.3\%$  (see Table B2).

Sanctions have a detrimental effect on the volume of total trade during the fourth to tenth year of a sanction episode. The peak effect is found after nine years ( $-17.8\%$ ). The average negative effect of US unilateral sanctions is  $-10.1\%$  (see Table B2) and, unsurprisingly, trade sanctions are driving the overall effect ( $-22.0\%$ , see Table B3). An in-depth analysis of trade sanctions over time shows an immediate drop of trade during the first three years after the imposition of sanctions as well as after six and eight years. The strongest negative effect is found for long-lasting sanctions (11+) that lead to a huge reduction in the volume of trade ( $-58.2\%$ ).

Summing up our third set of results, we find, in line with the literature (Mirkina 2018), that the imposition of sanctions leads to a reduction in FDI. However, unlike Biglaiser and Lektzian (2011), who show that US investors divest ahead of US sanctions, we do not find an anticipation effect or any significant pre-trend in FDI. Surprisingly, we do not find an effect of sanctions on ODA, although it has been shown that the US and other major sender countries use their influence, for example, in IMF lending decisions to prevent support for countries under international sanctions (Peksen and Woo 2018). However, there seems to be a simple explanation for this null-effect. Our reference category, that is countries threatened with sanctions, already receives significantly less ODA than other countries, such that the actual imposition of sanctions does not lead to a significant further reduction. Finally, we find a negative effect of sanctions on trade that is consistent with the previous literature (Afesorgbor 2019; Crozet and Hinz 2020; Felbermayr et al. 2020b). Again, we are confident in the causal interpretation of our results, since we do not detect a significant pre-trend.<sup>8</sup>

## 4 Conclusion

We have conducted the so far most comprehensive analysis of the macroeconomic consequences of international sanctions. The choice of our event study design is more conserva-

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<sup>8</sup>Most previous studies have not accounted for such pre-trends. Crozet and Hinz (2020) do account for a possible anticipation effect and find a significant decline in trade during the three months before sanction imposition.



tive than the model specifications commonly utilized in the sanctions literature. However, accounting for possible pre-trends in sanctions is crucial in order to not overestimate the adverse effects of sanctions.

We document a significant negative effect of international sanctions on GDP growth and its components (consumption, investment, and government expenditures) as well as on trade and foreign direct investment. Our results are not indicative of a significant downward trajectory before the imposition of sanctions. Hence, we are confident that our findings can be interpreted causally. The effects are of economic relevance, as we document, for instance, a drop of 4 percent in the target country's GDP per capita during the first two years of a sanction episode and find no indication of a recovery, not even during the first three years after the sanctions have been lifted. Additional panel difference-in-differences estimations reveal that the detrimental effect is mainly driven by US unilateral sanctions and by financial sanctions (or by trade sanctions when we study the effect on trade). Finally, governments react politically to sanctions and specifically democracies shift expenditures towards the military.

Anticipation effects in the context of international sanctions clearly remain an important phenomenon to be studied in future research, even though we do not find significant pre-trends in our event study design. This will require more precise data on when incidents took place that motivated sanctions and on the timing of the discussion about imposing sanctions. International news archives might be able to provide such information. Of course, this also requires macroeconomic data at a higher frequency.

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## Appendix A: Background on Dataset

Table A1: Variable Definitions and Sources

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**Log(GDP pc); GDP pc Growth.** Natural logarithm of real GDP per capita in 2010 US dollars; growth rate of real GDP per capita. *Source:* World Bank.

**Consumption pc Growth.** Growth rate of final consumption expenditures per capita in 2010 US dollars. *Source:* World Bank.

**Log(Investment pc + 1).** Natural logarithm of gross capital formation per capita in 2010 US dollars (values < 0 are set to 0 in original series). *Source:* World Bank.

**Gov. Exp. pc Growth.** Growth rate of general government final consumption expenditures per capita in 2010 US dollars. *Source:* World Bank.

**Log(FDI pc + 1).** Natural logarithm of net inflows of foreign direct investment per capita (values < 0 are set to 0 in original series). *Source:* World Bank.

**Log(ODA pc + 1).** Natural logarithm of net official development assistance received per capita (values < 0 are set to 0 in original series). *Source:* World Bank.

**Log(Trade pc).** Natural logarithm of total trade (sum of exports and imports of goods and services) per capita in 2010 US dollars. *Source:* World Bank.

**Military Exp. %.** Share of government expenditures spent on the military. *Source:* World Bank.

**Population Growth.** Growth rate of total population. *Source:* World Bank.

**Human Rights.** Latent human rights protection scores with higher values indicating a better protection. *Source:* Fariss (2019).

**Polity2; Democracy.** Democracy indicator that ranges from strongly democratic (+10) to strongly autocratic (-10); binary indicator for polity2 scores between 6 and 10. *Source:* Polity5 Dataset.

**Major Conflict; Minor Conflict.** Armed conflicts resulting in at least 1,000 battle-related deaths in a given year; conflicts resulting in between 25 and 999 battle-related deaths. *Source:* UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002).

**Sanctions.** Binary indicator for country-years with sanctions in place. *Source:* Global Sanctions Data Base (Felbermayr et al. 2020a; Kirilakha et al. 2021).

**Threats.** Binary indicator for country-years with sanction threats in place but no actual sanctions. *Source:* TIES Dataset (Morgan et al. 2014) and EUSANCT (Weber and Schneider 2020).

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Table A2: Descriptive Statistics

	All Observations		No Sanctions		Sanctions	
	Mean	<i>N</i>	Mean	<i>N</i>	Mean	<i>N</i>
GDP pc Growth	2.06	6949	2.11	5972	1.76	977
Consumption pc Growth	2.16	5274	2.22	4546	1.74	728
Log(Investment pc)	6.79	5281	6.93	4555	5.89	726
Gov. Exp. pc Growth	2.49	5124	2.5	4473	2.45	651
Military Exp. %	17.48	5488	16.82	4811	22.12	677
Log(FDI pc)	3.21	6119	3.35	5258	2.4	861
Log(ODA pc)	2.94	5246	2.96	4340	2.83	906
Log(Trade pc)	7.68	5484	7.82	4742	6.76	742
Lag[Log(GDP pc)]	8.13	6953	8.23	5973	7.48	980
Lag(Population Growth)	1.81	6953	1.78	5973	1.97	980
Human Rights	-0.04	6953	0.16	5973	-1.29	980
Polity2	1.82	6953	2.28	5973	-0.98	980
	<i>X</i> = 1	<i>N</i>	<i>X</i> = 1	<i>N</i>	<i>X</i> = 1	<i>N</i>
Major Conflict	347	6953	217	5973	130	980
Minor Conflict	898	6953	651	5973	247	980
Democracy	3176	6953	2968	5973	208	980

*Notes:* Table shows the means and non-zero observations ( $X = 1$ ) for all left-hand side variables and control variables. Columns ' $N$ ' show the number of observations in the full dataset, without sanctions in place, and with sanctions in place. All macroeconomic variables (including the controls) are winsorized at the 2.5% and 97.5% percentile.



Table A3: List of Countries

Afghanistan (0/3), Albania (36/0), Algeria (52/3), Angola (19/17), Argentina (42/13), Armenia (26/0), Australia (55/0), Austria (55/0), Azerbaijan (15/11), Bahrain (36/0), Bangladesh (45/0), Belarus (13/13), Belgium (55/0), Benin (55/0), Bhutan (36/0), Bolivia (51/4), Botswana (51/0), Brazil (48/7), Bulgaria (36/0), Burkina Faso (55/0), Burundi (48/7), Cambodia (12/11), Cameroon (48/7), Canada (46/0), Cape Verde (36/0), Central African Republic (48/7), Chad (55/0), Chile (34/21), China (9/46), Colombia (52/3), Comoros (36/0), Congo (55/0), Costa Rica (55/0), Cote d'Ivoire (37/18), Croatia (21/0), Cuba (0/46), Cyprus (41/0), Czech Republic (26/0), Democratic Republic of Congo (28/27), Denmark (55/0), Djibouti (1/0), Dominican Republic (55/0), Ecuador (51/4), Egypt (47/8), El Salvador (43/8), Equatorial Guinea (27/9), Eritrea (13/7), Estonia (23/0), Ethiopia (21/14), Fiji (24/23), Finland (55/0), France (55/0), Gabon (55/0), Gambia (41/9), Georgia (26/0), Germany (46/0), Ghana (55/0), Greece (55/0), Guatemala (23/32), Guinea (21/9), Guinea-Bissau (36/7), Guyana (51/0), Haiti (24/31), Honduras (54/1), Hungary (25/0), India (42/13), Indonesia (32/23), Iran (22/33), Iraq (11/30), Ireland (46/0), Israel (33/22), Italy (55/0), Jamaica (50/0), Japan (55/0), Jordan (37/4), Kazakhstan (26/0), Kenya (45/9), Kosovo (9/0), Kuwait (20/0), Kyrgyz Republic (26/0), Laos (32/0), Latvia (21/0), Lebanon (0/13), Lesotho (51/0), Liberia (0/16), Libya (6/11), Lithuania (21/0), Luxembourg (55/0), Macedonia (26/0), Madagascar (50/5), Malawi (51/2), Malaysia (55/0), Mali (47/2), Mauritania (55/0), Mauritius (40/0), Mexico (55/0), Moldova (7/14), Mongolia (35/0), Montenegro (11/0), Morocco (50/0), Mozambique (36/0), Myanmar (26/29), Namibia (27/0), Nepal (55/0), Netherlands (55/0), New Zealand (46/0), Nicaragua (38/17), Niger (47/8), Nigeria (44/11), Norway (55/0), Oman (51/0), Pakistan (39/16), Panama (52/3), Papua New Guinea (42/0), Paraguay (50/5), Peru (41/14), Philippines (55/0), Poland (26/0), Portugal (46/9), Qatar (16/0), Romania (20/6), Russia (23/4), Rwanda (40/15), Saudi Arabia (48/0), Senegal (55/0), Sierra Leone (41/14), Singapore (52/0), Slovak Republic (24/0), Slovenia (26/0), Solomon Islands (25/0), South Africa (19/36), South Korea (50/5), South Sudan (0/6), Spain (55/0), Sri Lanka (52/3), Sudan (27/28), Suriname (35/7), Swaziland (46/0), Sweden (55/0), Switzerland (46/0), Tajikistan (26/0), Tanzania (28/0), Thailand (53/2), Timor (15/0), Togo (30/25), Trinidad and Tobago (55/0), Tunisia (45/6), Turkey (45/10), Turkmenistan (26/0), Uganda (34/0), Ukraine (23/3), United Arab Emirates (41/0), United Kingdom (55/0), United States (55/0), Uruguay (50/5), Uzbekistan (16/10), Venezuela (44/10), Vietnam (32/0), Yemen (20/6), Yugoslavia/Serbia (0/21), Zambia (50/3), Zimbabwe (17/20).

*Notes:* First figure in parentheses is the number of years for a country without sanctions in place. Second figure indicates the number of years with sanctions against that country.

Table A4: Frequency of Sanctions

<b>Sanctions in General</b>		<b>Sanctions over Time</b>	
No Sanctions or Threats	5029	Pre-Trend –3 Years	85
Sanction Threats	944	Pre-Trend –2 Years	88
Sanctions	980	Pre-Trend –1 Year	98
<b>Sanction Senders</b>		Sanctions Year 1	101
US Unilateral Sanctions	484	Sanctions Year 2	98
Other Sanctions	496	Sanctions Year 3	90
<b>Sanction Types</b>		Sanctions Year 4	75
Trade Sanctions	387	Sanctions Year 5	61
Arms / Military Sanctions	699	Sanctions Year 6	52
Financial Sanctions	708	Sanctions Year 7	42
Other Sanctions	372	Sanctions Year 8	36
		Sanctions Year 9	36
		Sanctions Year 10	33
		Sanctions Year 11+	356
		Post-Trend +1 Year	79
		Post-Trend +2 Years	75
		Post-Trend +3 Years	73

*Notes:* Table shows the frequency of observations of the different sanctions indicators for which all control variables are available (see also Table A2). Total number of observations in dataset: 6,953. Sanction types are non-disjunctive.

# Appendix B: Results of Panel Difference-in-Differences Estimations

Table B1: Average Treatment Effects of International Sanctions

	GDP Gr.	Cons. Gr.	Log(Inv.)	Exp. Gr.	Milit. %	Log(FDI)	Log(ODA)	Log(Trade)
Lag[Log(GDP pc)]	-2.030** (0.431)	-1.762** (0.417)	1.046** (0.090)	-1.113 (0.708)	-2.403 (1.665)	0.835** (0.118)	-0.483** (0.099)	1.127** (0.118)
Lag(Population Growth)	-0.684** (0.163)	-0.680** (0.198)	0.009 (0.026)	-0.607 (0.334)	0.559 (0.463)	-0.044 (0.056)	0.046 (0.037)	-0.031 (0.027)
Human Rights	0.133 (0.143)	0.234 (0.185)	0.006 (0.025)	0.239 (0.287)	-2.155** (0.543)	0.199** (0.062)	-0.022 (0.051)	0.070** (0.025)
Polity2	-0.004 (0.022)	-0.038 (0.033)	0.001 (0.007)	-0.048 (0.044)	-0.299** (0.087)	-0.004 (0.009)	0.020** (0.007)	0.007 (0.005)
Major Conflict	-3.108** (0.493)	-1.984** (0.469)	-0.119* (0.058)	-0.762 (1.241)	2.402 (1.666)	-0.336* (0.154)	-0.104 (0.105)	-0.071 (0.048)
Minor Conflict	-0.493 (0.272)	0.040 (0.324)	-0.027 (0.039)	0.866 (0.484)	1.170 (0.868)	-0.063 (0.095)	-0.070 (0.071)	-0.003 (0.041)
No Sanctions or Threats	-0.063 (0.210)	-0.083 (0.223)	-0.040 (0.028)	-0.223 (0.338)	0.003 (0.546)	-0.055 (0.083)	0.175* (0.074)	-0.017 (0.019)
Sanction Threats	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Sanctions	-0.569 (0.390)	-0.849* (0.395)	-0.138* (0.067)	-0.962 (0.633)	2.687* (1.193)	-0.214 (0.132)	0.063 (0.096)	-0.085 (0.050)
Observations	6949	5274	5281	5124	5488	6119	5246	5484
Obs. w/ Sanctions	977	728	726	651	677	861	906	742

Notes: Table shows estimates of Eq. (2) and different dependent variables. Standard errors (in parentheses) are clustered at the country level. Models contain country-fixed effects and time-fixed effects. \*\* and \* indicate significance at the 1% and 5% level.

Table B2: Average Effects of Different Sanction Senders

	<b>GDP Gr.</b>	<b>Cons. Gr.</b>	<b>Log(Inv.)</b>	<b>Exp. Gr.</b>	<b>Milit. %</b>	<b>Log(FDI)</b>	<b>Log(ODA)</b>	<b>Log(Trade)</b>
Lag[Log(GDP pc)]	-2.027** (0.422)	-1.771** (0.416)	1.044** (0.090)	-1.127 (0.712)	-2.381 (1.673)	0.839** (0.116)	-0.479** (0.099)	1.128** (0.115)
Lag(Population Growth)	-0.675** (0.163)	-0.681** (0.198)	0.009 (0.026)	-0.608 (0.333)	0.570 (0.464)	-0.043 (0.056)	0.046 (0.037)	-0.031 (0.027)
Human Rights	0.167 (0.145)	0.246 (0.187)	0.008 (0.025)	0.255 (0.287)	-2.104** (0.541)	0.205** (0.062)	-0.019 (0.052)	0.071** (0.025)
Polity2	-0.005 (0.021)	-0.038 (0.033)	0.001 (0.007)	-0.049 (0.044)	-0.303** (0.088)	-0.005 (0.009)	0.020** (0.007)	0.006 (0.005)
Major Conflict	-3.064** (0.480)	-2.003** (0.462)	-0.121* (0.058)	-0.779 (1.239)	2.326 (1.662)	-0.332* (0.155)	-0.099 (0.105)	-0.072 (0.048)
Minor Conflict	-0.521 (0.270)	0.021 (0.322)	-0.029 (0.039)	0.845 (0.487)	1.098 (0.865)	-0.067 (0.094)	-0.071 (0.070)	-0.004 (0.040)
No Sanctions or Threats	-0.064 (0.210)	-0.081 (0.222)	-0.039 (0.028)	-0.217 (0.339)	0.028 (0.543)	-0.054 (0.083)	0.175* (0.074)	-0.017 (0.019)
Sanction Threats	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
US Unilateral Sanctions	-1.166** (0.363)	-1.070** (0.365)	-0.170* (0.066)	-1.237 (0.745)	1.739 (1.353)	-0.303* (0.135)	0.019 (0.110)	-0.101* (0.040)
Other Sanctions	0.172 (0.614)	-0.486 (0.618)	-0.084 (0.084)	-0.510 (0.893)	4.032* (1.831)	-0.110 (0.175)	0.126 (0.132)	-0.062 (0.092)
Observations	6949	5274	5281	5124	5488	6119	5246	5484
Obs. w/ Sanctions	977	728	726	651	677	861	906	742

Notes: Table shows estimates of Eq. (2) and different dependent variables. Standard errors (in parentheses) are clustered at the country level. Models contain country-fixed effects and time-fixed effects. \*\* and \* indicate significance at the 1% and 5% level.

Table B3: Average Effects of Different Sanction Types

	<b>GDP Gr.</b>	<b>Cons. Gr.</b>	<b>Log(Inv.)</b>	<b>Exp. Gr.</b>	<b>Milit. %</b>	<b>Log(FDI)</b>	<b>Log(ODA)</b>	<b>Log(Trade)</b>
Lag[Log(GDP pc)]	-2.085** (0.400)	-1.739** (0.429)	1.050** (0.089)	-1.075 (0.740)	-2.298 (1.679)	0.858** (0.118)	-0.484** (0.101)	1.137** (0.109)
Lag(Population Growth)	-0.679** (0.159)	-0.679** (0.196)	0.009 (0.026)	-0.610 (0.333)	0.592 (0.465)	-0.045 (0.057)	0.043 (0.037)	-0.034 (0.026)
Human Rights	0.124 (0.145)	0.224 (0.186)	0.005 (0.025)	0.277 (0.278)	-2.079** (0.545)	0.204** (0.063)	-0.023 (0.052)	0.066* (0.026)
Polity2	-0.004 (0.022)	-0.039 (0.033)	0.001 (0.007)	-0.044 (0.045)	-0.295** (0.087)	-0.004 (0.009)	0.020** (0.007)	0.006 (0.005)
Major Conflict	-3.159** (0.489)	-1.986** (0.452)	-0.114* (0.057)	-0.806 (1.196)	2.375 (1.663)	-0.326* (0.157)	-0.110 (0.103)	-0.062 (0.048)
Minor Conflict	-0.517 (0.273)	0.006 (0.327)	-0.026 (0.038)	0.764 (0.480)	1.125 (0.872)	-0.059 (0.094)	-0.072 (0.069)	-0.000 (0.040)
No Sanctions or Threats	-0.089 (0.206)	-0.078 (0.217)	-0.030 (0.027)	-0.032 (0.346)	-0.021 (0.541)	-0.008 (0.079)	0.138* (0.068)	-0.019 (0.019)
Sanction Threats	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Arms / Military Sanctions	0.746 (0.552)	0.310 (0.470)	-0.085 (0.091)	0.890 (0.774)	2.284 (1.274)	-0.166 (0.155)	0.213 (0.128)	-0.002 (0.055)
Financial Sanctions	-1.511** (0.492)	-1.419** (0.423)	-0.093 (0.054)	-1.561* (0.722)	0.843 (1.274)	0.002 (0.136)	-0.203* (0.092)	-0.038 (0.042)
Trade Sanctions	-0.150 (0.527)	-0.281 (0.642)	-0.048 (0.082)	0.373 (1.441)	0.825 (1.667)	-0.126 (0.218)	-0.112 (0.128)	-0.220** (0.082)
Other Sanctions	0.090 (0.571)	0.350 (0.672)	0.128 (0.080)	0.256 (1.014)	1.174 (1.660)	0.191 (0.195)	0.122 (0.113)	0.035 (0.106)
Observations	6949	5274	5281	5124	5488	6119	5246	5484
Obs. w/ Sanctions	977	728	726	651	677	861	906	742

Notes: Table shows estimates of Eq. (2) and different dependent variables. Standard errors (in parentheses) are clustered at the country level. Models contain country-fixed effects and time-fixed effects. \*\* and \* indicate significance at the 1% and 5% level. Sanction types are non-disjunctive.