

## **When Do Economic Sanctions Work?**

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## **Abstract**

Economic sanctions are a widespread tool in international relations. Modern economic interdependence and connection present leverage that allows affecting a state's behavior without using military force or long negotiations. However, the effectiveness of these measures is still very debatable.

The study used a logistic regression and marginal effect analysis to find what factors lead to the increase in the probability of the success of sanctions. The main findings are that, despite the conventional thought, large pre-sanctions reliance on trade, financial restrictions, and international cooperation do not increase the probability of success. The sanctions are more likely to end successfully when a) they include a *complete* ban on trade with the targeted state, b) last for many years, c) are imposed on countries that are politically non-free or partially free, and d) aim to restore democratic order or to achieve some other narrowly defined objective.

**JEL** F0, F5, F6, H0, H7, H8, Y

**Keywords** Economic Sanctions, Trade, International Relations

## **Introduction**

Economic sanctions are a widespread tool in international relations. Modern economic interdependence and connection present leverage that allows affecting a state's behavior without using force or long negotiations. Thus, sanctions have been often used to punish, constrain, or change a sanctioned state or its policy through trade restrictions or economic embargo, among other types of economic and non-military pressure. In other words, the tool itself is usually in the economic sphere, but the aims are political. Nevertheless, the success of economic sanctions, if there is any, is not obvious or immediate and still undergoes academic debate (CFR, 2019).

However, the question on the conditions for successful sanctions became even more relevant during the writing of this paper, when the Russian invasion of Ukraine took place. In the modern world of intricate international economic and political relations, the countries of the North Atlantic Treaty Organization (NATO) and some others are using unprecedented sanction pressure on Russia. Nevertheless, the war is still happening, and more people start to question how impactful the sanctions are. To answer that this paper investigates the question of when economic sanctions do work.

## **Literature Review**

Bali and Rapelanoro (2021) offered a framework for the development of economic sanction indexes so that it would be easier to simulate international economic sanctions in the econometric models. Since dummy variables are not always suited for economic sanctions modeling, the authors of the paper suggested their index because it allows “to calibrate the weight attributed to each sanction depending on its type, the sanction sender's ability to apply economic pressure, and the effect of time on sanctions' effectiveness.”

They also compared their model with the alternative indexes, which had some limitations, such as stagnation when the sanctioning stops, even though the effect of the sanction should decrease over time after the implementation stops. Additionally, their index allows to treat sanctions independently from each other, while also assigning different weights to different sanctions, allowing a more faithful simulation.

Morgan and Kobayashi (2021) suggested that the traditional theoretical framework on sanctions was flawed. Traditional thought is that the sanctioning and the sanctioned states strategically interact, paying close attention to each other's moves and expectations of reactions. According to the authors, this is not the case at all, since the sanctions affect the third parties, the private entities, so more close attention should be paid to enforcement costs and economic adjustments at the micro-level.

Sabtan et al. (2019) assessed the effectiveness of the sanctions implemented by OPEC toward US shale oil producers in 2014. The sanctions did not end the way OPEC anticipated, which, as the authors argued, was due to an inaccurate assessment of the opponent's preferences. In order to accurately model a state's preferences, their paper developed an inverse Graph Model for Conflict Resolution to simulate the situation where OPEC won.

Peksen (2019) provided a review of the academic literature on the effectiveness of economic sanctions. The general findings were that economic sanctions were more effective in achieving their goals if they were multilateral sanctions led by international organizations; if they produced significant economic costs on the target state; if they were aimed at allies and not rivals; if they were imposed with less ambitious policy goals; and if they were imposed on states that were democratic. Surprisingly, academic research indicated that though targeted sanctions

have become the most popular type of sanctions, they fail to achieve their intended objectives more often than traditional trade and investment sanctions.

Finally, to further the debate on economic sanctions, Biersteker et al. (2015) summarized seven key characteristics of sanctions that succeeded. These were: 1) pre-sanctions trade volumes need to be important for the targeted party; 2) sanctions tend to succeed most in the initial years of implementation; 3) expectations, credibility, and strategic interaction play a major role; 4) sanctions were against the democratic target; 5) strong multilateral political commitment; 6) narrowly defined goals & multiple policy instruments. The final characteristic 7) ‘Targeted’ sanctions can be as effective as comprehensive sanctions, which aligns with the findings in Peksen’s review (2019).

## Methodology

I focused on the sanctions that had a clear objective and an outcome, labeling complete success of sanctions as 1, whereas partial success (some demands were met but not all) and failure are labeled as 0. Since I had a dichotomous response variable, a logistical regression model was implemented to identify which combination of different factors and sanction types led to the highest probability of complete success.

Given the explanatory variables (both binary and continuous), logit model can predict the probability of the dependent variable being 1 or 0 (Wooldridge, 2006).

$$P = \frac{\exp(\beta_0 + \beta_1 trade + \beta_2 comprehensive + \dots + \beta_{21} regime + \beta_{22} duration)}{1 + \exp(\beta_0 + \beta_1 trade + \beta_2 comprehensive + \dots + \beta_{21} regime + \beta_{22} duration)} + \epsilon$$

There was a total of 22 variables in the model that could be categorized into 3 groups: 1) types of sanctions; 2) objectives of sanctions; and 3) non-binary variables. First, two groups were dummy variables, while the third group included continuous and categorical variables, such as

duration of sanctions, the political status of the sanctioned states, reliance on trade, etc. The assumption was that the coefficients associated with all types of sanctions and some objectives would have a positive and significant impact on the probability of success. The duration, on the other hand, should have had a negative impact. Additionally, the political status of the sanctioned states was expected to have significant influence. For smoother explanation and illustration, the variables statistics and model estimations were divided into the three categories mentioned above.

### **Data and Summary Statistics**

I used the Global Sanction Database (GSDB) composed by Aleksandra Kirilakha et al. (2021) as the main source of empirical data on sanctions and their success. This database included the sanctions implemented from 1949 to 2020, showing their beginning date, end date, type, objective, and most importantly – the result. There were four possible results: the goal was achieved (total success), some goals were achieved (partial success), complete failure, and negotiation settlement.

From this database, the total sample of sanctions with a single objective and clear results was taken, disregarding ongoing sanctions and those with multiple objectives. Combining this sample with the Freedom House and World Bank databases gave a total of 465 cases of sanctions spanning from 1972 to 2019 that could have multiple types, but only one objective.

The GSDB defines trade sanctions as measures that aim to limit economic interactions with a target country by reducing international trade. These sanctions have several characteristics that can prove valuable when examining economic sanctions. First, the authors distinguished among sanctions on exports from the sender to the target (i.e., export sanctions), sanctions on

imports from the target to the sender (i.e., import sanctions), and sanctions that simultaneously apply to both exports and imports between the two sides (i.e., bilateral trade sanctions). Second, there are partial (targeted) sanctions that apply only to a specific sector(s) of trade and complete trade sanctions that apply to all sectors.

In my model, 1 was assigned if trade sanctions were imposed and 0 if not. I treated all other types of sanctions, similarly (Table 1). The trade sanctions have a subcategory of comprehensive sanctions, that is, when the sanctions block trade completely. The sanctions that included a complete trade ban were labeled 1 as comprehensive and 0 otherwise.

Another category of sanctions presented in the GSDB is financial restrictions. In many cases, these sanctions involve freezing the exchange of financial assets and investments for the targeted state. The third category of sanctions restricts the freedom of geographical movement of individuals. Presumably, this category should have a positive coefficient. It is hard to know how significant it would be though because this kind of sanction seems to be more of a punishment, rather than a coercive tool. Arms sanctions restrict arms sales. This category should have a certain positive effect because I expect most of the sanctioned regimes to rely on arms and military force. The effect would not be very significant, however, since it has often been the case that a new arms dealer would save the situation. There are also categories of military sanctions blocking military assistance that does not include arms sale and one more category (other) that includes miscellaneous other types of sanctions, mostly diplomatic ones.

As Biersteker (2015) and Peksen (2019) noted, multilateral commitment also plays a significant role in how successful sanctions would be. Because of that 1 was assigned to the sanction cases, where an international organization (United Nations, European Union, etc.) acted as a sanctioning party or one of them, and 0 if no international organization was involved.

Table 1. The Summary Statistics for the variables by types of sanctions

<b>Types of Sanctions</b>				
<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
trade	465	0.422	0	1
financial	465	0.46	0	1
arms	465	0.202	0	1
military	465	0.226	0	1
travel	465	0.172	0	1
other	465	0.159	0	1
comprehensive	465	0.052	0	1
multilateral	465	0.288	0	1

Source: Data was obtained from GSDB (Kirilakha, 2021). “Mean” represents the percentage of the total number of sanctions.

Additionally, I created dummy variables for each objective of the sanctions since some objectives are more likely to be achieved according to Peksen (2019) (Table 2). The dummy variable for the rarest objective (“end territorial conflict”) was dropped.

Table 2. The Summary Statistics for the variables by types of objectives

<b>Types of Objectives</b>				
<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
democracy	465	0.252	0	1
human_rights	465	0.176	0	1
policy_change	465	0.138	0	1
other_obj	465	0.135	0	1
prevent_war	465	0.123	0	1
end_war	465	0.103	0	1
destab_regime	465	0.032	0	1
terrorism	465	0.028	0	1

Source: Data was obtained from GSDB (Kirilakha, 2021). “Democracy” stands for restoration of democratic regime or elections, usually after a coup.



The variables not directly presented in the GSDB that I used were duration, regime, the size of the sanctioned state's GDP, and trade as a share of its GDP a year before sanctions. The duration of the sanctions has a significant effect on the sanctions' success since over time the target's economy adapts to new circumstances.

Additionally, democratic regimes, when sanctioned, tend to comply and concede, leading to the success of sanctions (Peksen, 2019), suggesting that it is useful to add a variable that would distinguish democratic regimes from undemocratic ones. I used the Freedom House database of Countries and Territories by polity status, where F is a free country, PF is a partially free country, and NF is not a free country. This variable was categorical with F as the base level.

Assuming that the higher is the reliance of a sanctioned state on trade, the more likely that state is to feel the burden of sanctions and concede to the demands, I used the database of the World Bank to add the trade as a share of the state's GDP to the model. Unfortunately, it did not contain the data for all countries and years, so there were 90 missing values. Also, anticipating that the countries with larger economies are harder to hurt by economic sanctions, I used World Bank data on GDP; it was in billions of US dollars at the level of the year 2015 (US was a GDP outlier with a z-score of 11).

Table 3. The Summary Statistics for the non-binary variables

<b>Non-binary Variables</b>				
<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
Trade_%	375	58.791	0.027	173.369
GDP	465	326.336	0.31	14121.056
duration	465	4.525	1	34
regime	465			
... Free	82	17.6%		
... Not Free	217	46.7%		
... Part. Free	166	35.7%		

Source: Data obtained from GSDB, Freedom House, and World Bank.

## **Model Estimations**

First, I ran the logit model regression using all the variables. Tables 4-6 show that financial, arms, and travel sanctions have negative signs, as do the sanctions aimed at terrorism, suggesting the negative effect of these coefficients on the probability of success. Out of 20 variables, however, only 6 were statistically significant at a 10% level and only 2 at 5%. Among the dummy variables for the different types of sanctions only “other”, the least defined and common type of sanctions in the GSDB, and “comprehensive” were significant. Duration and regime were statistically significant. So was the size of the GDP, however, again, only at the 10% level.

I dropped all the variables that were not significant at the 10% level, keeping, however, the variables for objectives that had the lowest number for the p-value, when compared to other “objective” variables. After running the second model with the remaining variables, all of them became significant, except the “other”.

The second model proved to be an improvement, judging from the lower AIC, BIC, and prediction rate estimations (Table 7).

Table 4. Model estimations by types of sanctions

<b>Types of Sanctions</b>		
	<b>Model 1</b>	<b>Model 2</b>
(Intercept)	-2.17 *	-1.62 ***
	(1.01)	(0.42)
trade	0.46	
	(0.28)	
financial	-0.17	
	(0.26)	
arms	-0.19	
	(0.34)	
military	0.37	
	(0.29)	
travel	-0.02	
	(0.33)	
other	0.61	0.65*
	(0.35)	(0.31)
comprehensive	1.19	1.38 *
	(0.66)	(0.62)
multilateral	0.32	
	(0.27)	

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ .

Source: Own calculations using data from GSDB.

Table 5. Model estimations by types of objectives

<b>Types of Objectives</b>		
	<b>Model 1</b>	<b>Model 2</b>
democracy	1.28	0.73 **
	(0.97)	(0.28)
human_rights	0.50	
	(0.98)	
policy_change	0.21	
	(0.96)	
other_obj	1.12	0.73 *
	(0.97)	(0.33)
prevent_war	0.50	
	(0.96)	
end_war	1.38	1.09 *
	(1.03)	(0.46)
destab_regime	0.85	
	(1.13)	
terrorism	-0.01	
	(1.17)	
*** p < 0.001; ** p < 0.01; * p < 0.05.		

Source: Own calculations using data from GSDB.

Table 6. Model estimations for non-binary variables

<b>Non-binary Variables</b>		
	<b>Model 1</b>	<b>Model 2</b>
`Trade_%`	-0.00 (0.00)	
GDP	0.00 (0.00)	0.00 * (0.00)
duration	0.09 ** (0.03)	0.08 ** (0.03)
regimeNF	0.78 (0.41)	0.78 * (0.38)
regimePF	0.91 * (0.41)	0.83 * (0.39)

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\*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05; . p < 0.1

Source: Own calculations using data from GSDB, Freedom House, and World Bank.

Table 7. Two models comparison

	<b>Model 1</b>	<b>Model 2</b>
N	375	375
AIC	516.17	499.25
BIC	602.57	538.51
Pseudo R2	0.16	0.14
Prediction Rate	0.632	0.656

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Source: Own calculations using data from GSDB, Freedom House, and World Bank.

After that I used the second model to predict the outcomes and compared the predicted outcomes with the actual observations, receiving prediction correctness rate of 65.6%.

Since it is confusing to interpret the coefficients of the logit model, I estimated the marginal effects (average predicted probabilities) as well (Table 8). The marginal effects show the change in probability when the independent variable increases by one unit. In the case of the dummy variables, the change is from 0 to 1 (Wooldridge, 2006).

Table 8. Marginal effects of the variables from Model 2

	Marginal Effects
other	0.15 * (0.07)
duration	0.02 ** (0.01)
comprehensive	0.31 * (0.14)
regimeNF	0.17 * (0.08)
regimePF	0.18 * (0.08)
GDP <sup>1</sup>	0.00 * (0.00)
end_war	0.25 * (0.10)
democracy	0.16 ** (0.06)
other_obj	0.17 ** (0.07)
AIC	499.25
BIC	538.51

\*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05; . p < 0.1

Source: Own calculations using data from GSDB, Freedom House, and World Bank.

1. Marginal effect of GDP is 0.01%.

First and foremost, it is safe to assume that the type of sanctions does not matter generally, however, if sanctions are on trade and they are comprehensive, the probability of success increases by 31%. We can also observe that each additional year of sanctions increases the probability of total success by 2%. Both findings conflict with the recent literature. The sanctions aimed at restoring democracy and ending a war have a higher probability of success by 16% and 25%, respectively. The probability of sanctions with the goal of “other\_obj” to succeed is higher by 17%. Since this category includes the goals that do not fall under any other general objectives, this might confirm the theory that sanctions with more narrowly defined goals are more likely to succeed (Biersteker, 2015). The marginal effect of the size of GDP is statistically significant, however, the effect itself is small, with a 0.01% increase for every additional billion of US dollars. Finally, the estimation shows that if a sanctioned country is only partially free, PF, the sanction’s probability of success increases by 18%, and by 17% for Non-Free country, with Free countries as a base level. This surprisingly contradicts the conclusions made by both Peksen (2019) and Biersteker (2015), who concluded that democratic regimes were more compliant.

## **Discussion and Conclusion**

The results of this study contradict the existing literature to a great extent. Firstly, Biersteker et al. (2015) concluded that in general pre-sanction trade volumes matter and, if important for the targeted state, should increase the probability of success of sanctions. This study shows, however, that the reliance of the sanctioned state on trade prior to the imposition of sanctions has no significant effect. Another conclusion made by Biersteker et al. (2015) was that sanctions tend to succeed most in the initial years of implementation. I, on the other hand, have discovered that on average every additional year of sanctions increases the probability of success



by 2%. This does not contradict the theory that sanctions are most impactful or costly to the targeted state in the initial years, but does imply that the longer sanctions are imposed, the more likely they are to succeed, contradicting some academic literature.

Another important finding is that the type of sanctions has almost no effect on the outcomes, including the sanctions that involve multilateral commitment. The only exception is comprehensive sanctions. This might conflict with the notion that “targeted” sanctions are as effective as comprehensive ones, however in this study targeted sanctions were represented only by travel and financial sanctions (that were not limited only to those targeting individuals and companies), which probably skewed the results.

The results that partially support the existing literature (Biersteker, 2015) are that the sanctions aimed at narrowly defined objectives have a higher probability of ending successfully. The other two types, on the other hand, contradict this theory, since it was shown that sanctions aimed to end war or restore democratic order (both very ambitious policy goals) have an even higher probability of success. Nevertheless, this might be the case because of the inevitability of the wished outcomes, such as the fact very few wars do not end, while sanctions had no significant effect on the outcome. The same could be argued about the restoration of democracy. Further research regarding these outcomes and sanctions' effect on them could be studied.

Additionally, one of the major findings is that sanctions directed at democratic states, represented by Free countries according to Freedom House, are least likely to succeed, compared to Partially Free and Non-Free countries. This is in direct contradiction to the literature (Peksen, 2019), which states that democracies are more likely to comply. This might be due to the fact that democracies have too many groups of interest and long decision-making processes, whereas less democratic countries are quicker to make changes thus removing the sanctions. Another

explanation can be that since sanctions hurt third parties, such as businesses, if the business adapts to the new circumstances and bears no costs, the damage done by sanctions diminishes decreasing the probability of their success. Perhaps, it is easier to adapt in a Free country rather than a Non-Free country. The variables representing corruption index and ease of doing business should help us investigate this, the data however is limited only to the most recent cases.

To conclude, this study sheds new light on the subject of economic sanctions prompting further research and revision of the old conclusions.

**Acknowledgements** I offer special thanks to Dr. Alison Kelly and Dr. Jonathan Haughton for their valuable feedback and support.

## References

1. Bali, M., & Rapelanoro, N. (2021). How to Simulate International Economic Sanctions: A Multipurpose Index Modelling Illustrated with EU Sanctions against Russia. *International Economics*, 168, 25–39.
2. Council on Foreign Relations. “What Are Economic Sanctions?” Accessed February 11, 2022. <https://www.cfr.org/background/what-are-economic-sanctions#chapter-title-0-8>
3. Kirilakha, Aleksandra & Felbermayr, Gabriel & Syropoulos, Constantinos & Yalcin, Erdal & Yotov, Yoto, 2021. "[The Global Sanctions Data Base: An Update that Includes the Years of the Trump Presidency](#)," [School of Economics Working Paper Series](#) 2021-10, LeBow College of Business, Drexel University, revised 15 Mar 2021.
4. Morgan, T. C., & Kobayashi, Y. (2021). Talking to the hand: Bargaining, strategic interaction, and economic sanctions. *European Economic Review*, 134. <https://doi.org/10.1016/j.euroecorev.2021.103685>
5. Peksen, D. (2019). When do imposed economic sanctions work? A critical review of the sanctions effectiveness literature. *Defense and Peace Economics*, 30(6), 635-647.
6. Sabtan, B., Kilgour, M. D., & Hipel, K. W. (2019). Assessing the effectiveness of economic sanctions. *EURO Journal on Decision Processes*, 7(1/2), 69–82.
7. van Bergeijk, P.A.G, & Biersteker, T. (2015, January). How and when do sanctions work? The evidence. *On target? EU sanctions as security policy tools*. doi:10.2815/710375
8. Wooldridge, J. M. (2006). *Introductory econometrics: A modern approach*. Mason, OH: Thomson/South-Western.