A survival analysis of trade sanctions. A look at sanctions over the past 70 years

Preliminary - work in progress

This draft: March 20, 2023

Comments welcome

Maximilien Goux

University of Halle-Wittenberg

Martin Klein

University of Halle-Wittenberg

March 20, 2023

Abstract

Trade sanctions are a typical policy tool governments use to achieve specific political or strategic goals. In this study, we conducted a survival analysis of trade sanctions spanning the past seventy years to determine their effectiveness. Our analysis reveals that not all sanctions are equally successful in exerting pressure on target countries to modify their behaviour. Specifically, sanctions related to democracy standards tend to be more effective than those related to terrorism. Furthermore, we discovered that implementing and enforcing sanctions can be challenging, as countries frequently find ways to circumvent them. Our study provides evidence of which sanction objectives and types are more likely to succeed and which are not the optimal policy tool.

Keywords: GSDB, Trade Sanctions, Survival Analysis

JEL Classification: F51

Corresponding author: Maximilien Goux, Martin Luther University of Halle-Wittenberg, Department of Economics, Große Steinstraße 73, D - 06099 Halle (Saale), Germany. Tel.: +49 345 55 23327; Fax: +49 345 55 23327. Email: maximilien.goux@wiwi.uni-halle.de *Acknowledgements*:

1 Introduction

Sanctions are a common political tool used to address international conflicts. Previous research has examined whether sanctions are effective in achieving their intended outcomes for the imposing country. The first investigation of the United Nations embargo against Rhodesia suggested that sanctions may not achieve their goals (see (**??**). Subsequent research using a sanctions dataset confirmed this finding, revealing that only around 36% of sanctions achieved their intended goals (see (Hufbauer et al., 2007)). However, recent research has focused on identifying characteristics that may increase the chances of a sanction's success, such as imposing sanctions against allies (see (Allen, 2005, 2008; Drezner, 1999)), democratic countries (see (Bapat et al., 2013)), or countries experiencing political upheaval (see (Bolks and Al-Sowayel, 2000; Brooks, 2002; Lektzian and Souva, 2007)). Nevertheless, the research on this topic is inconsistent, and some studies have found no relationship between the success of a sanction and these criteria (see (Drury, 1998; Krustev and Morgan, 2011)).

This paper seeks to identify additional factors that influence the effectiveness of sanctions beyond those already identified in the literature. Specifically, we will focus on the objectives and types of sanctions to determine whether the success of a sanction can be predicted at the outset. To address this research gap, we must consider two main challenges. First, we must include the critical characteristics of sanctions that have already been studied. In addition, we will examine the different objectives and types of sanctions, which previous research has not emphasized, instead focusing on the relationship between the imposing and target countries and factors such as democracy, trade, and GDP. We will include these three factors as control variables in our analysis.

Our second challenge is the different possible outcomes of a sanction. These outcomes include complete success, partial success, failure, or settlement through negotiation. While our focus will be on sanctions that result in complete success, which is the desired outcome, we must also con-

sider other potential outcomes. To achieve this, we will use the comparative risk analysis as our empirical method, including all possible outcomes in the analysis rather than only the complete success outcome.

For our analysis, we utilized the 2021 edition of the Global Sanction Database (GSDB) to obtain the required sanctions data. Compared to other databases, such as the Hufbauer Schott and Elliot database (HSE), the GSDB covers a greater number of sanction cases (1101 as opposed to 204 in the HSE). Another database, the Threat and Imposition of Economic Sanctions (TIES) database, is comparable in size to the GSDB, with approximately 1412 sanction cases. However, the TIES database only includes sanctions up to 2005, whereas the GSDB includes more recent sanctions up to 2019. Additionally, unlike TIES, the GSDB covers non-economic sanctions as well (see (Felbermayr et al., 2020)).

This paper adds to the existing literature by examining the different objectives and types of sanctions and how they can affect the outcome of the sanction. We utilize the comparative risk analysis, which has not been previously applied in sanction analysis, and a relatively new database as a source. Our main conclusion is that the success of sanctions varies depending on their objectives and types. Therefore, we suggest that sanctions be used as a political tool only for specific objectives, rather than as a universal tool for all political goals.

The paper's remaining sections are organized as follows. Section 2 provides a concise literature review, and in section 3, we provide a comprehensive description of the GSDB database. Section 4 outlines the methodology for our analysis, and section 5 elaborates on how we utilize and expand the GSDB for comparative risk analysis. In section 6, we present our primary findings and engage in a discussion, which leads to our conclusion in section 7.

2 Institutional Background

2.1 Literature Review

Economic sanctions can be imposed by individual states or supranational organizations like the United Nations (UN) or European Union (EU) on other states or organizations to influence their political or economic behaviour (see (Schneider, 1997)). This practice dates back to ancient Greece, where individual Greek cities imposed trade barriers on each other to weaken their opponents. In the 20th century, economic sanctions gained greater significance due to increasing international economic interdependence, making them a potent tool for exerting pressure on countries. The League of Nations, the UN's predecessor organization, imposed the first economic sanction, an arms embargo against Bolivia and Paraguay during the Chaco War in 1932, which helped bring the warring parties to the negotiating table and increased their willingness to make peace (see (Fenwick, 1934), (Schneider, 1997)). During the Cold War era, many sanctions were imposed by individual countries against the other bloc. After the Cold War, numerous sanctions were adopted by the UN, but individual states continue to impose sanctions when there is no consensus on an issue at the supranational level. The US imposes the most sanctions of any country in the world.

It is important to acknowledge that imposing sanctions does not guarantee their success, which can depend on various factors. Domestically, the government may face pressure to meet the sanction requirements due to economic losses resulting from reduced imports and exports, as well as welfare losses. Regarding foreign policy, the target country's international isolation can promote the success of the sanction. However, in some cases, the target population may develop a victim mentality and blame the countries or organizations that imposed the sanction for their

economic hardship rather than their own government. This can lead to greater cohesion within the country and stronger advocacy for the regime being sanctioned.

Moreover, in foreign policy, there may be opportunities to enhance cooperation with countries subject to sanctions (Galtung, 1967)). On average, only 34% of sanctions have proven to be successful (see (Hufbauer et al., 2007)). In fact, according to (Pape, 1998), success rates may be even lower.

Previous studies have examined individual factors that may contribute to the effectiveness of sanctions. One such factor is the high political costs that the target country incurs as a result of the sanction. The greater the costs, the more likely the country is to comply with the sanction's objectives. However, this theory is based on only three case studies (see (Blanchard and Ripsman, 1999)). (Bapat et al., 2013) support this idea, adding that a country that is more integrated into the global political and economic landscape is more likely to be impacted by a sanction. It is also crucial to apply sanctions judiciously, targeting specific individuals instead of imposing them on an entire country (see (Morgan and Schwebach, 1996; Cortright and Lopez, 2002)).

Another factor that may impact the success of a sanction is the relationship between the two parties involved. If the two countries are allies or have a positive relationship, a sanction imposed by one country may be more likely to succeed (see (Allen, 2005, 2008; Drezner, 1999; Jing et al., 2003)). However, (Drury, 1998) and(Krustev and Morgan, 2011) were unable to confirm this finding in their analyses.

Another critical factor in the success of sanctions is the level of democracy in a country. It is widely agreed that democratic countries are more likely to comply with sanctions than autocratic countries, as well as those that have experienced internal unrest (see (Brooks, 2002; Bolks and Al-Sowayel, 2000; Lektzian and Souva, 2007)). Additionally, the country imposing the sanction is

crucial. Sanctions imposed by a group of states are more likely to succeed than those imposed by individual states (see (Bapat and Morgan, 2009; Kaempfer and Lowenberg, 1999; Martin, 1993; Miers and Morgan, 2002)).

The duration of the sanction is another crucial factor in its success. In the initial years, when imposing countries are united, the effects on the targeted economy can be significant, including high capital flight (see (Nelson, 2017)) and a deteriorating market situation (see (Marinov, 2005)). However, after this initial period, the targeted economy may adjust to the market restrictions imposed by the sanctions, improving the unfavourable market situation (see (Dizaji and van Bergeijk, 2013)). At the same time, the unity of the sanctioning countries decreases the longer the sanction lasts, and the desired effect fails to materialize (see (Bond et al., 2015) (Moret et al., 2016)). It is even possible for sanctions to negatively affect the imposing country (see (Smeets, 2018)).

There exists a considerable amount of research on the various factors that contribute to the success of sanctions, including recent studies on ongoing disputes between the US, the European Union, Russia, Iran, and other countries. However, these studies have not reached a consensus on the effectiveness of sanctions or the circumstances that lead to their success. Despite this, our analysis will draw on the most frequently identified success factors.

3   Descriptive statistics for GSDB data

We begin by presenting several basic statistics for the data in GSDB.

Figure 3.1: Annual counts of sanctions and affected countries
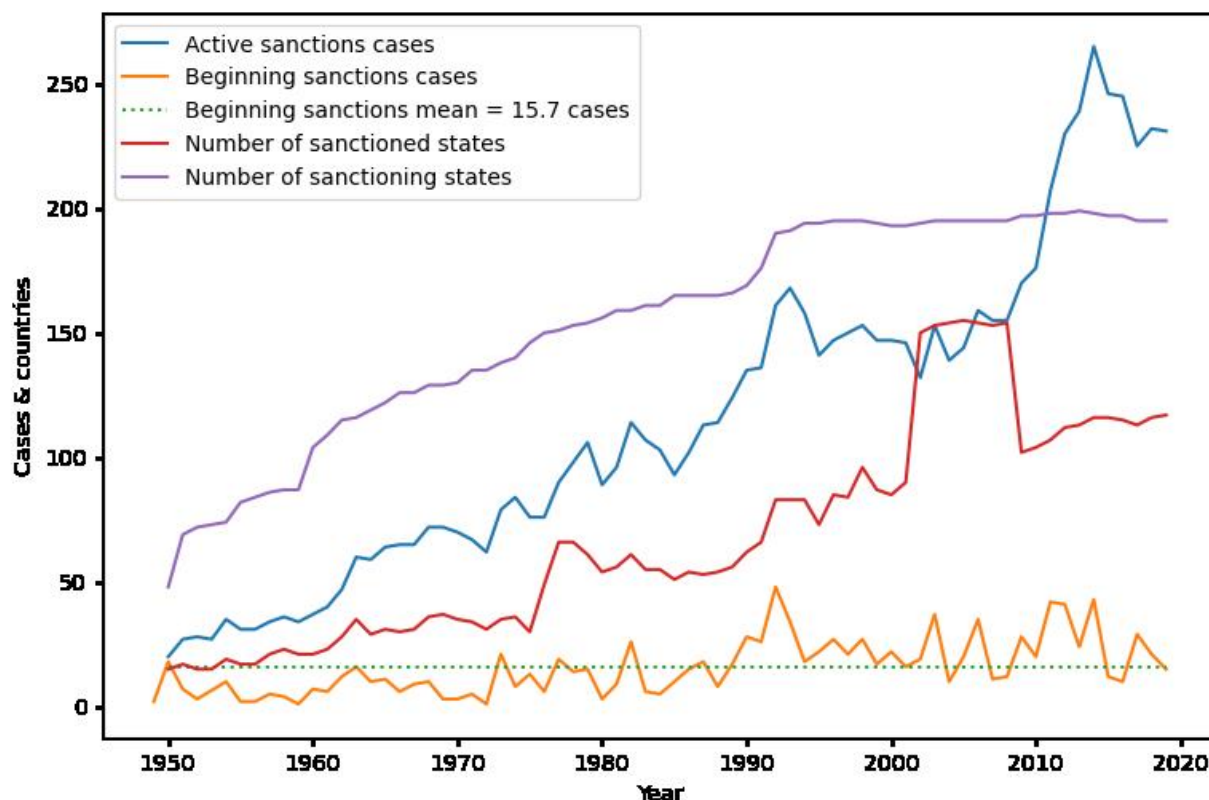
Figure 3.1 provides information on the number of sanction cases per year, the number of countries involved in sanctioning and being sanctioned, and the duration of cases. Active sanction cases per year refer to those that began in the specified year and have not ended. The data show a consistent increase in the number of sanctions, from a small amount in the 1950s to over 200 active cases by the end of the study period. A particularly steep rise is evident from the year 2000 onwards. The dynamics of active sanction cases are partly driven by the emergence of new sanction cases, which fluctuate around an average of 15.7 cases per year. Since 1990, the number of new cases has increased markedly, while it was below average before that period. Another factor influencing the number of active sanctions is the duration of cases. Interestingly, the number of active cases stagnated in the mid-1990s, even as the number of new cases per year rose. Further details on

case duration will be discussed below.

The number of countries involved in sanction cases generally correlates with the number of issues. On the sanctioning side, we see that by 1990, around 200 countries were involved in at least one sanctioning case per year, and this level has been maintained since then. As explained below, the rise of multilateral sanctions since 1990 has contributed to this trend, which means that most countries have been directly or indirectly involved in at least one sanctions case per year on the sanctioning side since 1990.

In contrast, the number of countries being sanctioned is smaller than that of sanctioning countries and has shown an upward trend over time, except for a notable exception between 2002 and 2008. During this period, the US imposed sanctions against countries that had ratified the International Criminal Court (ICC) Rome Statute, in line with the American Service-Members' Protection Act of 2002. This led to a "hump" in the data.

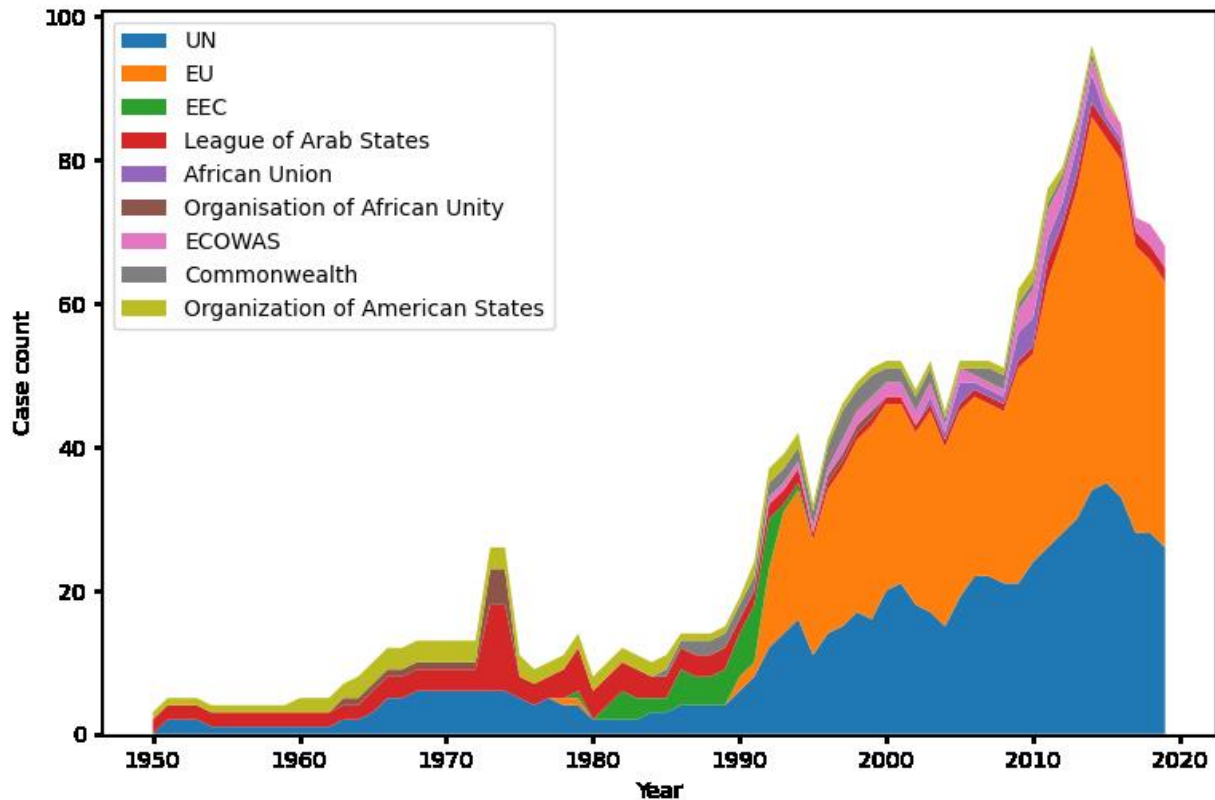Figure 3.2: Multilateral Sanctions in Total Sanctions Cases
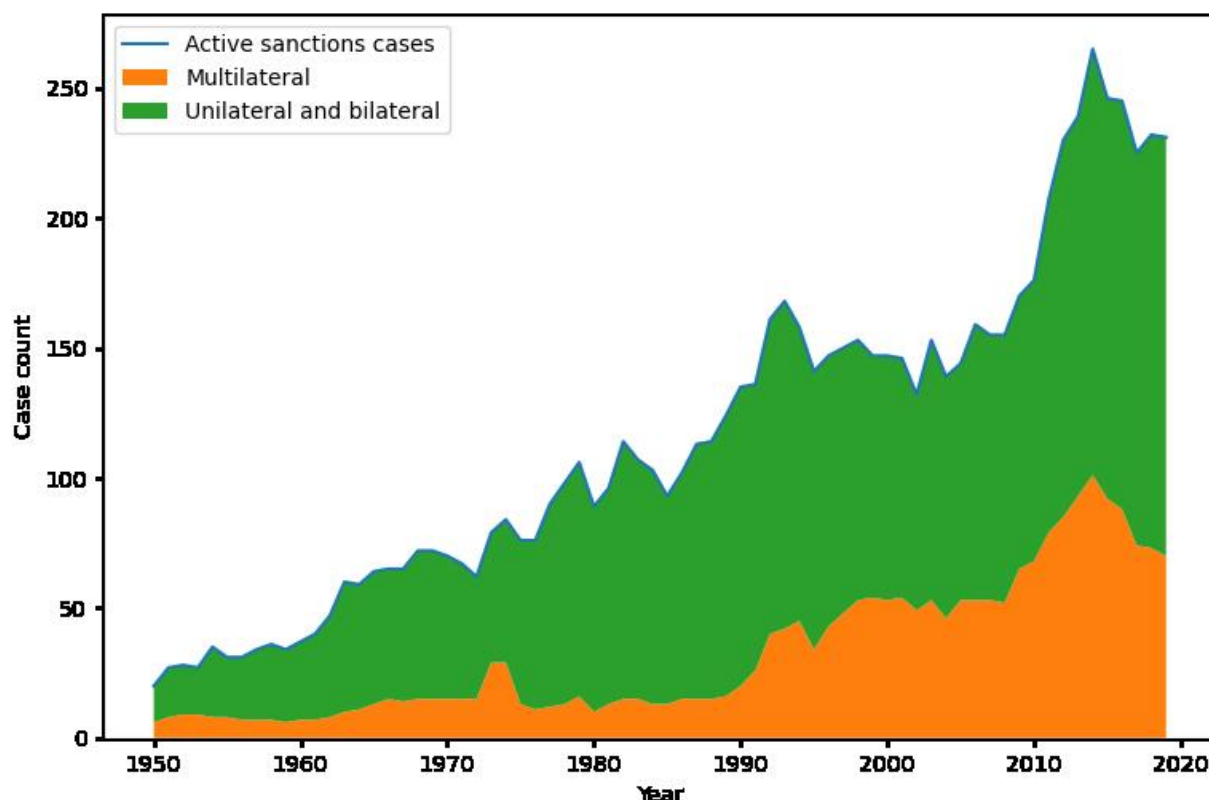
Source: GSDB V2

In Figure 3.2, the total annual case count is divided into two parts. The lower part represents sanctions cases where an international organization is listed as the sole sanctioner. Sanctioning cooperation between, for example, the UN and EU does not occur in these cases; only the UN or EU acts alone. The figure shows that while the share of multilateral sanctions is increasing, unilateral and bilateral sanctions still have a larger share.

Tables 5 and 6 list international organizations and other non-state entities in GSDB that have imposed sanctions, while Tables 7 and 8 list sanctioned entities. The tables indicate that international organizations frequently impose sanctions but are rarely sanctioned themselves. Terrorism and territorial conflicts are the primary reasons for non-state entities being targeted by international sanctions. The USA is particularly active in imposing sanctions but is infrequently targeted by them. Iran and Fiji are the most frequently sanctioned countries, each with 29 cases.

Figure 3.3: Non-state entities involved in sanctions cases

Source: GSDB V2

Figure 3.3 offers a more comprehensive overview of the development of multilateral sanctions over time. Prior to 1990, these measures were relatively limited, with the exception of the Arab oil embargo against the USA and other countries following the Yom Kippur War in 1973. However, multilateral sanctions experienced a sharp upsurge after 1990, primarily due to the efforts of two international organizations: the United Nations and the European Union. Notably, the transition from the EEC to the EU was accompanied by a significant increase in European sanctioning activities.

Figure 3.4: Number of sanctions cases involving major players
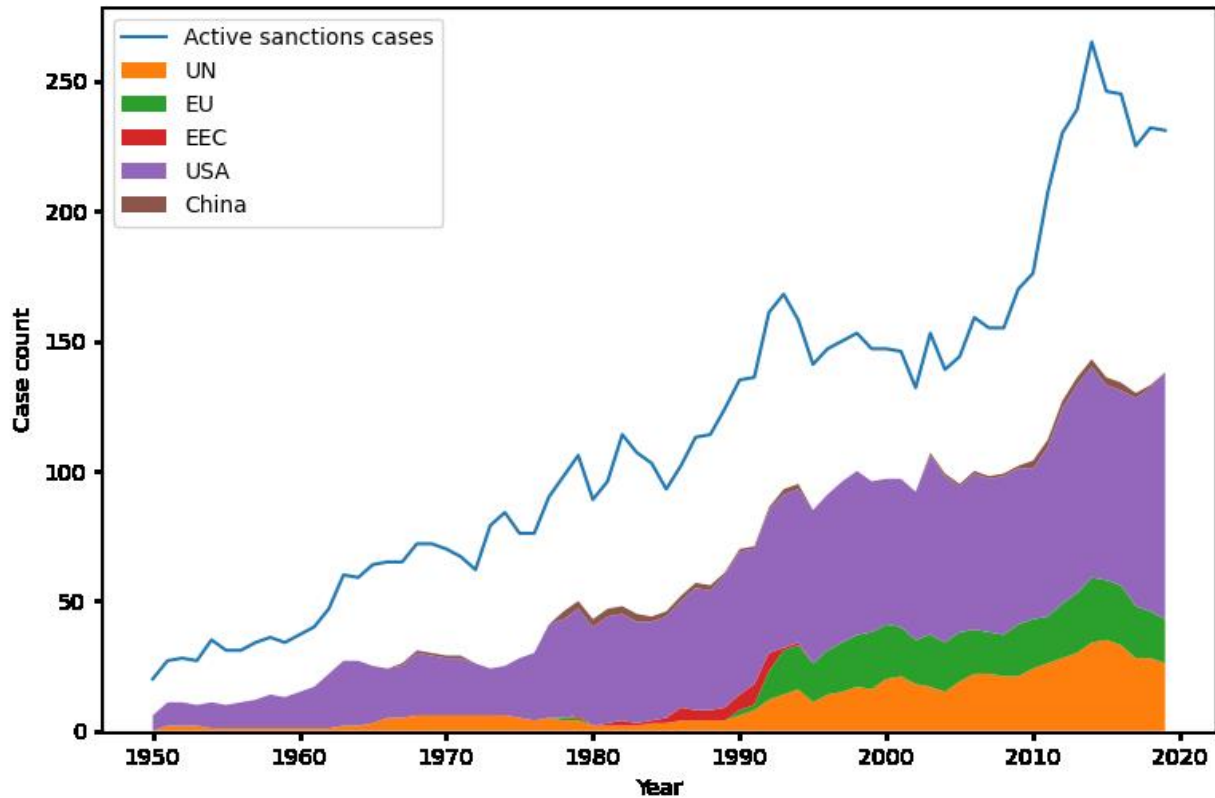
Source: GSDB V2

Although the EU issues a significant number of international sanctions, it is not the largest player in this arena. Figure 3.4 displays the "top players" in international sanctions, which are limited to four: the EU and UN as international organizations and the United States and China as states. Recent data shows that the EU, UN, or United States issued over half of active sanctions cases. Despite some sanctioning activity, China remains a small player compared to the other three.

Figure 3.5: Duration of sanctions cases per last years of cases
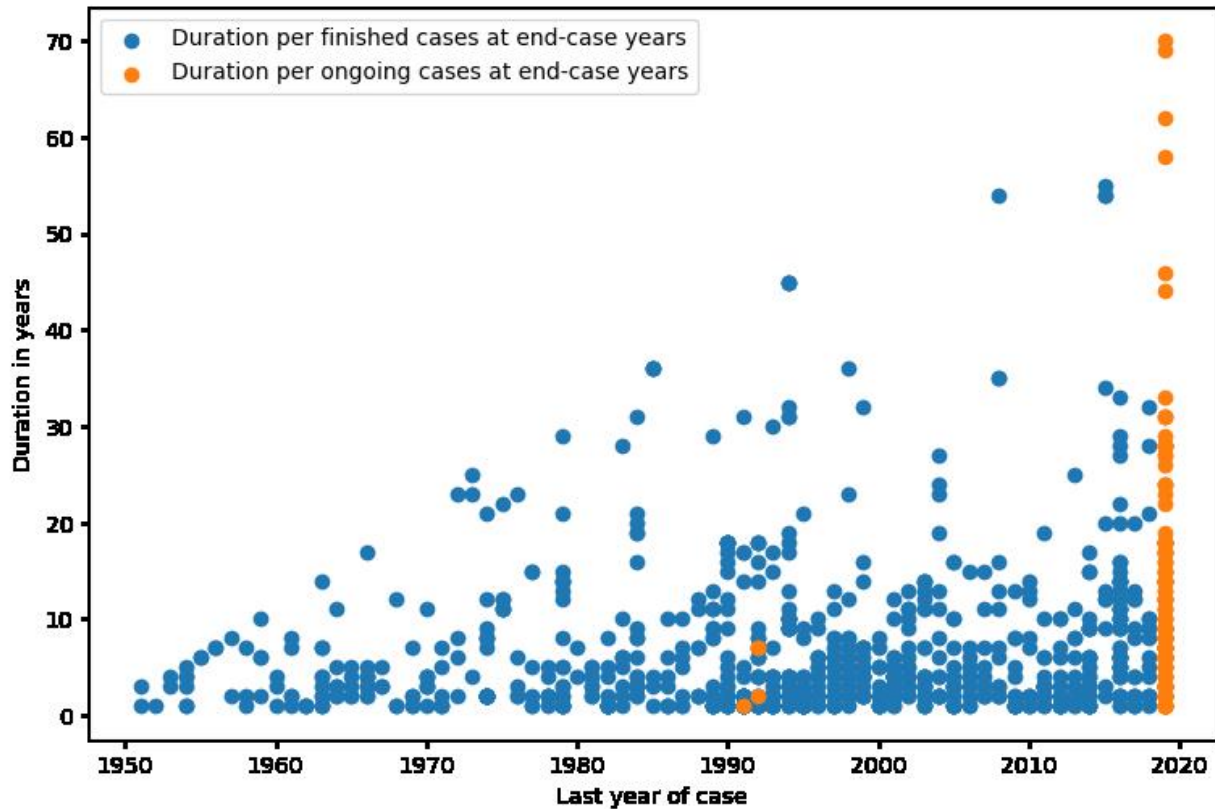
Firstly, we examine the duration of sanctions, using Figure 3.5 to illustrate how long each sanctions case lasted, based on the year of their conclusion or for all active cases until 2019, with right-censored data on all ongoing cases. The blue dots represent the time taken to conclude each case (regardless of its outcome), while the orange dots represent the ongoing cases that are still being monitored. Three active cases were terminated in the mid-1990s, in which the party imposing sanctions either dissolved or transferred to a new organization. All other active cases, recorded in the Global Sanctions Database (GSDB), are indicated as having ended in 2019, causing the corresponding dots to cluster at the far right edge of the graph. The diagram reveals that the duration of cases varies significantly, with many cases ending quickly but a few lasting for several decades.

Lastly, Figure 3.6 depicts minor variations in the average and median duration of different types of sanctions. Arms sanctions, on average and by the median, tend to last the longest.

Figure 3.6: Case duration for different types of sanctions
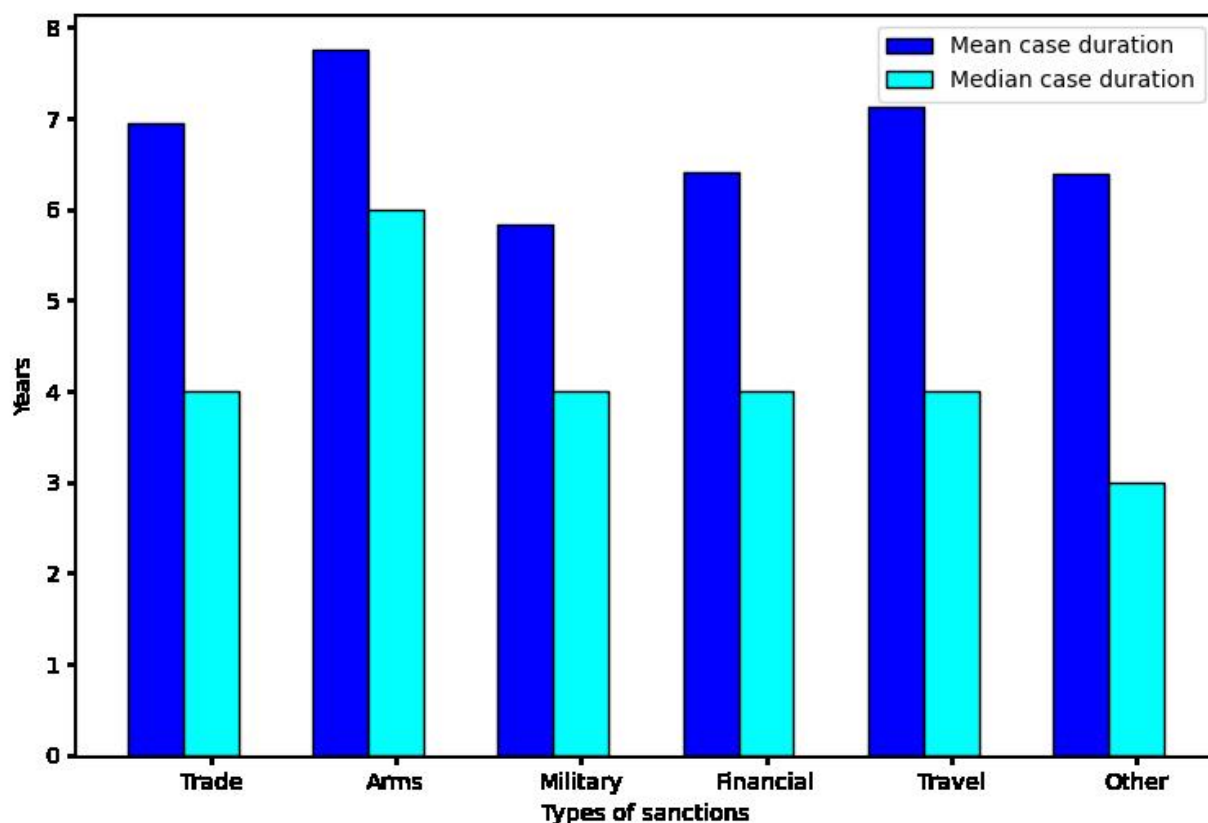
The GSDB provides information regarding the objectives of sanctions. In Figure 3.7, the number of sanctions cases that begin each year is combined with their respective objectives (represented by the coloured areas). Cases can have multiple objectives, which results in a greater number of objectives than cases. While this was uncommon in earlier years, it has become more prevalent recently. Figure 3.1 illustrates a significant increase in sanctions cases after 1990, accompanied by a corresponding rise in stated objectives. However, this increase is attributable to three sanctions objectives: human rights, democracy, and ending the war. The figure indicates a possible regime shift, with differences in the numbers and objectives of sanctions regimes before and after 1990.

Figure 3.7: Objectives for beginning sanctions cases
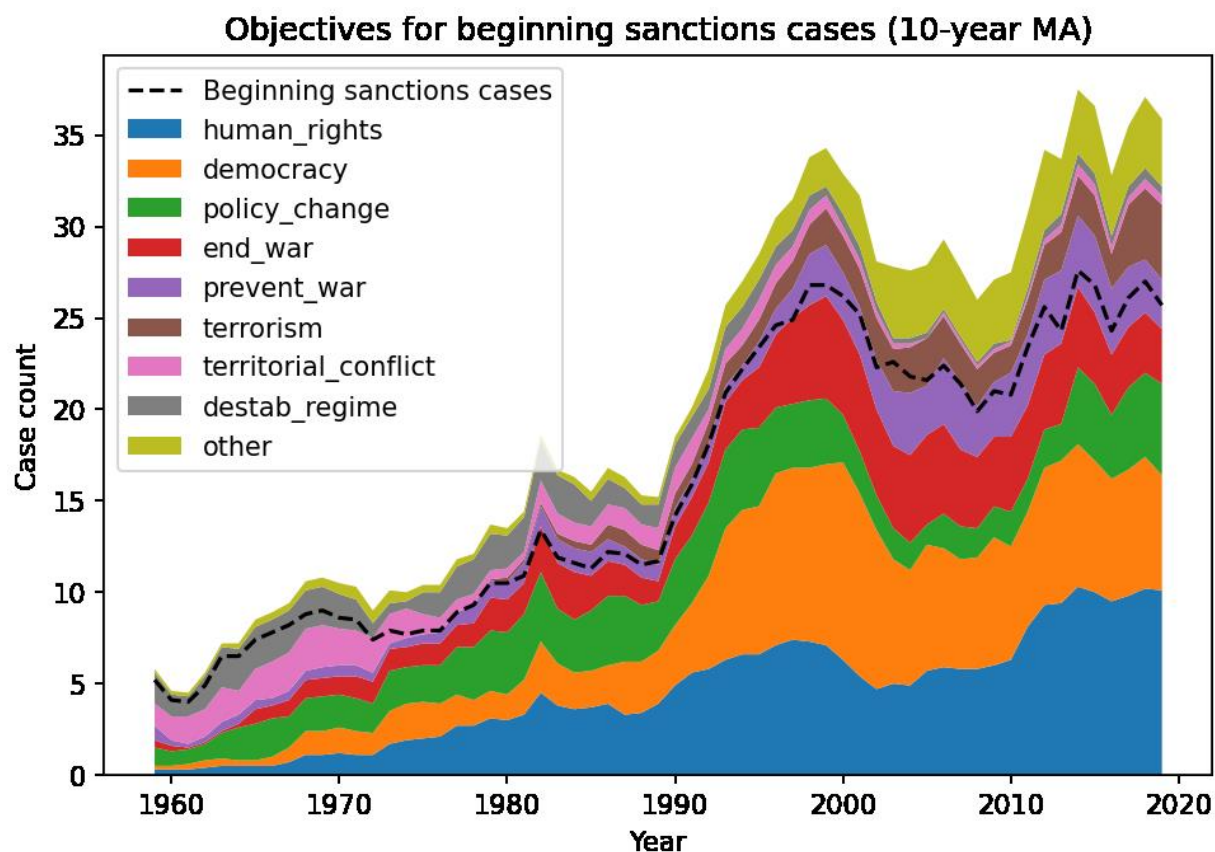
Source: Own estimation on the GSDB

Figure 3.8: Objectives for beginning sanctions cases (shares)
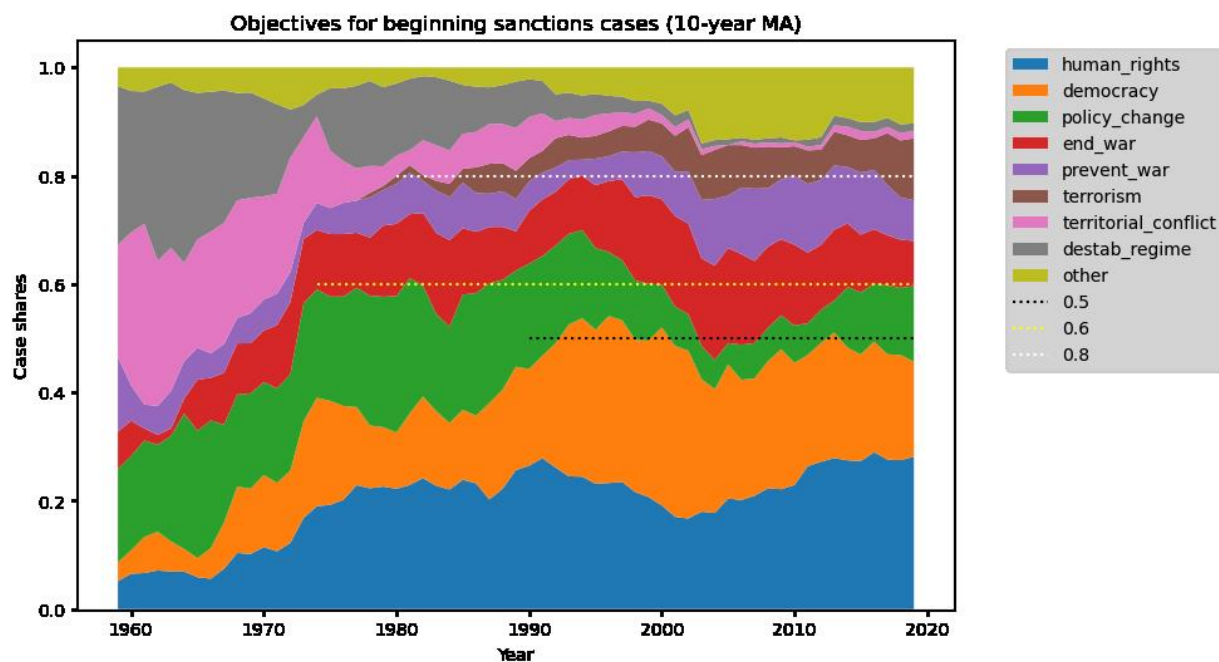
Source: Own estimation on the GSDB

This point is further emphasized by Figure 3.8, which displays the same data as the previous figure but focuses only on the shares of stated objectives in the annual totals. The figure suggests that there was another regime shift in addition to the one that occurred around 1990, specifically one that occurred around the mid-1970s. Both regime shifts are apparent in the changes in objectives and the concentration of sanctions cases on a few objectives. The dotted lines summarize the three stylized facts on the figure.

- From the early or mid-1970s onward, approximately 60 per cent of all new annual sanctions cases state one of three objectives: human rights, democracy, or policy changes.

- From 1980 onward, 80 per cent of beginning sanctions cases are connected to five objectives, i.e. the previous three-plus, the two objectives of ending or preventing war.

- From 1990 onward, 50 per cent of all new sanctions cases are focused either on human rights or on democracy.

It is worth noting that sanctions have been used to counter-terrorism since the 1980s, and this trend has continued to increase steadily over time. According to the latest available data, it has now become the fourth most commonly cited objective in the GSDB database.

4 Estimation Strategy - Comparative Risk Analysis

In our previous analysis of the Global Sanctions Database (GSDB), we observed that the duration of sanctions recorded in the database varied depending on the type of sanction imposed, such as trade, weapons, military, finance, travel, and other (refer to Figures 3.6 and 3.7). Notably, weapons-related sanctions tended to have longer durations than those related to other categories. To further investigate these findings, we plan to utilize a comparative risk analysis, a type of survival analysis. The first step of our analysis involves using comparative risk analysis to assess the average duration of sanctions in the event of success or failure. Our goal is to determine the duration most likely to yield successful results and the point at which a sanction is unlikely to achieve its desired outcome. In the second step, survival analysis is utilized to calculate the probability of a sanction's success based on factors such as its type (e.g. trade, weapons, military, finance, travel), objectives (e.g. ending a war, combating terrorism, resolving a territorial conflict, protecting human rights, changing policy, promoting democracy, destabilizing a regime, preventing war), actors involved (e.g. the UN, the EU), and other variables including GDP, democratic index, and trade openness. These results are particularly useful in identifying the most effective type of sanction to achieve specific goals and highlighting objectives that are unlikely to be accomplished through sanctions.

We employ comparative risk analysis to estimate the impact of the mentioned variables on the hazard rate of sanctions leading to total success. Comparative risk analysis is founded on survival analysis, which predicts the expected duration of time until a specific event happens. In contrast to survival analysis, comparative risk analysis accounts for the possibility that different events may lead to the subject's exclusion from observation. In our study, the event of interest is "total

success," defined as a sanction being successful if the recipient achieves the objectives established by the sender, as determined by the sender.[1]

Competing events comprise partial success, in which the sanctioned country accepts some of the sanctioning country's demands, as exemplified by the US sanction against Ecuador in 1995, which was lifted when international observers were sent to the region; failure, which occurs when the reasons for imposing sanctions do not improve, or when sanctions are lifted before achieving their intended goals, as seen in the case of US sanctions against Indonesia; and negotiation settled, which is when a sanction ends through negotiations when conflicting parties agree to settle their dispute, as demonstrated by the EU sanction against Eritrea and Ethiopia in response to the war between the two countries in 1998.

We utilized the (Fine and Gray, 1999) model, which employs the Cox proportional hazard function to analyse sanctions over the past 70 years. The model utilizes a cumulative incidence function in the comparative risk analysis, which is comprised of two products:

1. The expected hazard for the event, "total success," at time tf:

$$\hat{h}_c\left(t_f\right) = \left(\frac{m_{ct_f}}{n_{t_f}}\right) \tag{4.1}$$

Here $\mathbf{m}_{cf}$ denotes the number of events for risk c at time $\mathbf{t}_f$ and $\mathbf{n}_f$ denotes the number of sanctions at that time.

2. The estimated survival probability over all previous periods until the event:

$$\hat{S}\left(t_{f-1}\right) \tag{4.2}$$

---

[1]An example of a sanction ending with total success is the sanction the US imposed on Haiti in 1991.

This includes all survival functions until the event occurs at time $\mathbf{t}_f$. For a sanction case to be eliminated at time $\mathbf{t}_f$ with the event of "total success," it must have survived all possible events before $\mathbf{t}_f$. By multiplying the two products, 4.1 and 4.2, it is possible to calculate the estimated incidence probability:

$$\hat{I}_{ts}\left(t_f\right) = \hat{S}\left(t_{f-1}\right) * \hat{h}_c\left(t_f\right) \tag{4.3}$$

The probability of a sanction being eliminated due to the event "total success" is the product of outlasting the previous periods and the cause-specific hazard at time $\mathbf{t}_f$.

Thus, the cumulative incidence function (CIF) is the addition of all incidences (from $\mathbf{t}_f$ with f'= 1 to $\mathbf{t}_f$ with f'= f) over all possible events:

$$CIF_c(t_f) = \sum_{f'=1}^{f} \hat{I}_{ts}\left(t_f\right) = \sum_{f'=1}^{f} \hat{S}\left(t_{f-1}\right) * \hat{h}_c\left(t_f\right) \tag{4.4}$$

Compared to the 1-Kaplan Meier estimate, the CIF 4.4 is equal to 1-KM when there are no competing events. However, when multiple competing events occur, as in our case, the result of the CIF is always less than 1-KM. Additionally, the sum of all CIFs for different events equals the total hazard, making CIF advantageous. The Fine and Gray model employs the CIF to transfer the Cox proportional hazard model for several competing events and treat the CIF as a sub-

distribution function. The sub-distribution function for the event of total success of a sanction is expressed as:

$$h_{c,CIF}(t) = \lim_{\triangle \to 0} \frac{Pr\left(t < T_c < t + \triangle t \mid Tc > t \bigcup T_{c'} \leq t, c' \neq c\right)}{\triangle t} \tag{4.5}$$

Function 4.5 estimates the hazard for event c at time t based on the remaining risks at time t, considering all previously occurred event types, including competing events. This yields the CIF-based hazard model, given by Equation (4.6):

$$h_{c,CIF}(t) = h_{0c,CIF}(exp)\left[\sum_{i=1}^{P} \gamma_i X_i\right] \tag{4.6}$$

The sub-population's proportional hazard assumption is met by this model. The gammas in the model assess the influence of the covariates on the risk of dropping out due to total success in the presence of competing events, such as partial success, failure, and negotiated settlement. When the effect of the covariates is greater than 1, it raises the risk of dropping out due to total success, while it reduces the risk when it is less than 1. It's worth noting that an increase in hazard is desirable for the sender, while a decrease in risk implies that a sanction is less likely to result in total success.

5 GSDB sanctions dataset for our analysis

Our analysis of sanctions over the past 70 years uses the second version of the Global Sanctions Database (GSDB). The GSDB is a collaborative effort between the University of Applied Sciences in Konstanz, the LeBow College of Business at Drexel University, and the Kiel Institute for the World Economy. It contains information on 1,101 sanctions enforced from 1950 to 2019, including the targeted state or non-state entity, the imposing state or group of states, the start and end years of the sanctions, the types of sanctions, the objectives of the sanctions, and a classification of their success. Additionally, it also includes a category of ongoing and terminated sanctions cases.

The GSDB distinguishes between various types of sanctions, including trade, financial, military, arms, travel, and other sanctions. The "other sanctions" category includes measures such as the expulsion of Eritrea from the African Union or Turkey's port bans against Cyprus in 1987 (see (Felbermayr et al., 2020)). Objectives for sanctions also vary and include promoting democracy, destabilizing a regime, ending or preventing war, protecting human rights, changing policy, resolving territorial conflicts, combating terrorism, and an "other" category for objectives that do not fit into the other categories. The GSDB identifies five different statuses for sanctions: ongoing, total success, partial success, failure, and negotiation settled (see (Felbermayr et al., 2020)). However, for our analysis, we consider only the status of total success as a success. Partial success indicates that the objective was not fully met, and we include partial success, failure, and negotiation settled as competing risk events in the analysis.

To analyze the data, we first split individual sanctions with multiple objectives into separate observations. This step is necessary because the GSDB includes the status of each objective individually, and it is possible for one objective to be met while another is not. After this splitting, our

dataset contains 1452 observations from the initial 1101 cases. In the second step, we generate dummy variables for each type and objective of sanctions, resulting in 15 dummy variables (see Table 1).

#	Name of the dummy variable	=1
sanctions types		
1	arms	if sanction typ = arms
2	trade	if sanction typ = trade
3	military	if sanction typ = military
4	travel	if sanction typ = travel
5	financial	if sanction typ = financial
6	other	if sanction typ = other
sanctions objectives		
1	democracy	if sanction objective = democracy
2	terrorism	if sanction objective = terrorism
3	end war	if sanction objective = end war
4	human rights	if sanction objective = human rights
5	destabilize regime	if sanction objective = destab regime
6	territorial conflict	if sanction objective = territorial conflict
7	prevent war	if sanction objective = prevent war
8	policy change	if sanction objective = policy change
9	other sanction objective	if sanction objective = other

Table 1: List of sanction typ and sanction objective dummy variables

Furthermore, we classify sanctions based on the imposing authority, distinguishing among the US, EU, UN, and other country alliances. These entities represent the most frequent enforcers of sanctions (refer to Table 5). Furthermore, we incorporate a variable indicating whether multiple sanctions are currently active against a country. It is reasonable to assume that a higher number of active sanctions against a country increases the pressure to lift them.

In the third phase, we augment our dataset with supplementary information on GDP, democracy index, and trade openness. GDP data is crucial for comprehending the economic context and assessing the economic repercussions of sanctions. While the GSDB sanctions database covers countries from 1950 to 2019, there is no readily available single GDP dataset for this comprehen-

sive period and country range. Consequently, we create our own dataset called the IPW dataset, comprising GDP data from 1950 to 2019, obtained from the following sources:

- The latest available data from the IMF's World Economic Outlook database (WEO database).

- The latest available data from Penn World Tables, currently available in Version 10 (PWT 10.0)

- Data compiled by a team at the Institute for Health Metrics and Evaluation (IHME) at the University of Washington, which provides comprehensive time series of GDP per capita for 210 countries from 1950 to 2015.[2]

The IPW data set was created by combining data from these three sources. We provide detailed information in the appendix C.

We rely on data provided by the Center for Systemic Peace (CSP) to construct the Democracy Index. This comprehensive dataset provides information on each country's Democracy Index over time. Previous studies have suggested that imposing sanctions on democratic governments may be more effective than imposing them on autocracies. The CSP's Democracy Index rates countries on a scale of -10 (full autocracies) to +10 (full democracies) for a given year.

We gather information on trade openness from the World Bank. Trade openness is the total value of a country's imports and exports relative to its gross domestic product (GDP)[3]. It indicates the degree to which a country is integrated into the global economy and, more importantly, how

---

[2]This data set is publicly available for download, with the methodology summarized in the accompanying article.James, S.L., e.a., 2012, Developing a comprehensive time series of GDP per capita for 210 countries from 1950 to 2015, Population Health Metrics 2012, 10:12. URL: http://www.pophealthmetrics.com/content/10/1/12. This data set draws on other resources, notably also the WEO database and Penn World Tables. For earlier years, where these sources provide no information, it also uses other sources, particularly the historical data on economic activity compiled by Angus Maddison.(Cf. the web page of the Maddison project for more information: https://www.rug.nl/ggdc/historicaldevelopment/maddison/)

[3]Source: World Bank. (2020). World development indicators, NE.TRD.GNFS.ZS Trade (% of GDP). Washington, DC, USA: The World Bank.

reliant its economy is on imports and exports. Sanctions may have a higher chance of success if they are imposed on countries with high levels of trade openness compared to self-sufficient countries. Using this supplementary data, we developed various variables based on the GDP, democracy index, and trade openness of targeted countries at the outset of sanctions (refer to Table 2). Furthermore, we added a variable to indicate whether there was a change in democracy in the targeted country during the sanction period. If the Democracy Index score at the start of the sanctions is lower than at the end, we assume some democratic improvement occurred during the sanctions period.

#	Name of the dummy variable	=1
1	high GDP country	if GDP normalized > 2
2	low GDP country	if GDP normalized < 0.55
3	high trade openness country	if trade openness > 100
4	low trade openness country	if trade openness < 50
5	democratic country	if politic score > 16
6	autocratic country	if politic score < 4
7	positive democratic change	if politic score at begin < politic score at end
8	no data on trade openness	if no data on trade openness is available
9	several sanctions same time	if several countries imposed sanctions against one country in the same period
10	US	if the US imposes the sanction
11	EU	if the EU imposes the sanction
12	UN	if the UN imposes the sanction
13	other alliances	if another country alliance imposes the sanction

Table 2: List of additional dummy variables

We constructed several models using these variables to evaluate the resilience of our findings with respect to these factors in our analysis.

6 Main results: comparative risk analysis

6.1 Differences in sanction objectives

In section 5, we divided the 1101 sanctions by different objectives, resulting in 1452 observations. Out of these 1452, 516 (36%) achieved complete success, 198 (14%) achieved partial success,

319 (22%) failed, 81 (6%) resulted in negotiations, and the remaining 338 (23%) are still in effect. Table 3 presents the percentage of sanction types and objectives in the dataset of 1452 sanctions. Financial sanctions were the most common type, accounting for 51%. Human rights were the most frequent among the objectives, followed by democratic objectives. When considering types of sanctions, we observe that a sanction may comprise multiple types, with financial sanctions accounting for half of all sanctions.

#	Name of the dummy variable	percentage
sanctions types		
1	arms	23%
2	trade	35%
3	military	20%
4	travel	22%
5	financial	51%
6	other	17%
sanctions objectives		
1	democracy	20%
2	terrorism	6%
3	end war	12%
4	human rights	22%
5	destabilize regime	6%
6	territorial conflict	5%
7	prevent war	8%
8	policy change	14%
9	other sanction objective	8%

Table 3: Sanctions types and sanctions objectives in %

The percentages of the included dummy variables are presented in Table 4. Most countries subjected to sanctions have a GDP below the average and exhibit low trade openness, or there is no available data on trade openness at the start of the sanction. Regarding democracy scores, no clear trend is observed among the sanctioned countries. Only 12% of the sanctions are against democratic countries and 39% against autocratic countries, but most sanctions have been imposed on countries that do not fall into either spectrum. It is important to note that several sanctions are often active against a single country simultaneously in the dataset. Among the countries imposing

| #	Name of the dummy variable	percentage
1	high GDP country	22%
2	low GDP country	46%
3	high trade openness country	7%
4	low trade openness country	35%
5	democratic country	12%
6	autocratic country	39%
7	positive democratic change	31%
8	no data on trade openness	32%
9	simultaneous sanctions	87%
10	US	33%
11	EU	12%
12	UN	8%
13	other alliances	5%

Table 4: Additional variables in percentage

the sanctions, the United States is the most frequent one, responsible for one-third of all sanctions during the observation period.

In our analysis, we aim to evaluate the effectiveness of sanctions by examining their objectives. We investigate whether certain objectives are more likely to result in successful outcomes than others. However, since each sanction is associated with a specific objective, we lack a suitable control group in our dataset. To address this issue, we first conduct a log-rank test on the individual objectives to determine whether their success probabilities differ significantly from the average of all sanctions. The results of the log-rank test, presented in Table 10 in Appendix 6, identify the objectives that differ from the average. Therefore, we only include the objectives of democracy, destabilization of a regime, territorial conflict, terrorism, and others in our model since the chi-squared test probability is less than 10%. The remaining sanctions, with objectives of ending a war, human rights, policy change, and preventing war, serve as our control group.

6.1.1 Modell 1: Examining the impact of varying objectives on the efficacy of sanctions

Figure 6.1: Cumulative incidence function on sanctions objectives (Model 1) ending with complete success
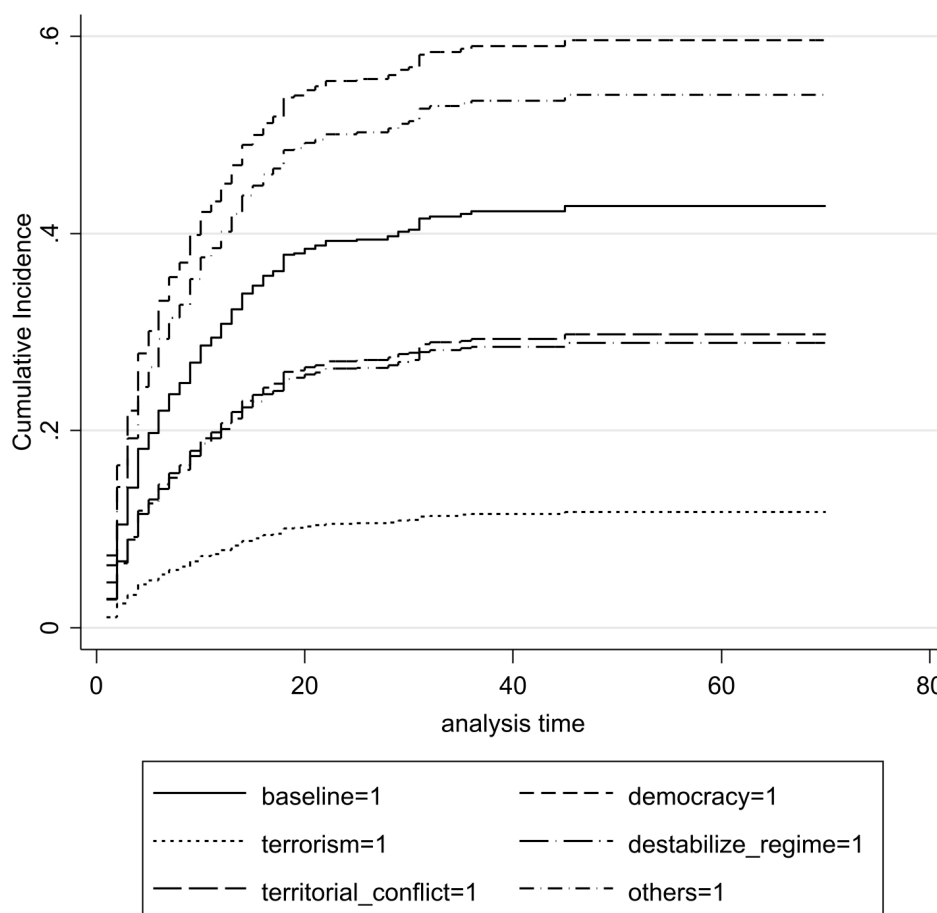
Source: own estimation

The first model presented in Table 9 examines the effectiveness of sanctions by considering their various objectives. The figure presented in 6.1 indicates that certain objectives are more successful than others in achieving complete success. Notably, sanctions aimed at promoting democracy are much more effective in achieving their objectives compared to our control group, the baseline model. Additionally, sanctions with the "others" objective are also more successful. While our analysis does not determine the reasons behind this difference in success rates, one possible explanation could be that sanctions with these objectives are better tailored to the targeted country,

making them more manageable. For the sanctioned country, it is likely easier to fulfil this objective since it is better suited to the country's circumstances and the problem at hand.

In contrast, sanctions with the "democracy" objective are often imposed in response to a specific event, such as a military coup or an undemocratic upheaval against an elected president, to hold democratic elections in the targeted country. The 1973 sanctions on Chile and the 2006 sanctions on Fiji are examples of such sanctions. The sanctions against Chile ended successfully following Patricio Aylwin's electoral victory over dictator Augusto Pinochet. However, the Fiji sanctions case shows that a change of government is not necessarily the outcome of a successful "democracy" sanction, as military chief Frank Bainimarama remained in power after the 2014 election. Nonetheless, since the international observers deemed the election free and fair, many countries saw no reason to uphold the sanctions against Fiji.

In comparison, achieving total success is less likely when the objective is "destabilizing a regime," "territorial conflicts," and particularly, "terrorism." The objective of "terrorism," particularly, is notably challenging to accomplish. Sanctions targeting "terrorism" objectives seem to have minimal chances of success. One possible explanation is the significant ideology behind these terrorist actions. For instance, the 1978 US sanctions on Libya accused the country of state-sponsored terrorism and supporting attacks in Scotland in 1988 and Berlin in 1986. Although the sanctions were lifted in 2004 due to a signed nuclear non-proliferation treaty, the US continued to accuse Libya of supporting terrorism. It would be challenging to convince the Libyan government to acquiesce since doing so would be equivalent to abandoning their raison d'être. The goal of "terrorism" is also frequently employed in sanctions against terrorist organizations such as the Taliban, Al Qaeda, or the Islamic State. "Territorial conflicts" and "regime destabilization" are additional objectives less likely to be achieved with total success than the control group. These objectives seldom succeed due to entrenched territorial conflicts between two nations and the sanctioned governments knowing their populations support them. Hence, they experience less

internal pressure to attain these sanction goals. In many situations, the two conflicting parties impose sanctions on each other due to their territorial dispute, in which case neither is willing to concede. The "destabilization of a regime" sanctions were often used to justify imposing sanctions on the other bloc during the Cold War. For instance, China faced sanctions in the early 1950s and Vietnam after the Vietnam War. However, these sanctions proved mostly unsuccessful as governments challenged their legitimacy, particularly when they altered their form of government in response to a sanction.

6.1.2 Modell 2: First extension incorporating sanction types

Figure 6.2: Cumulative incidence function on sanctions types
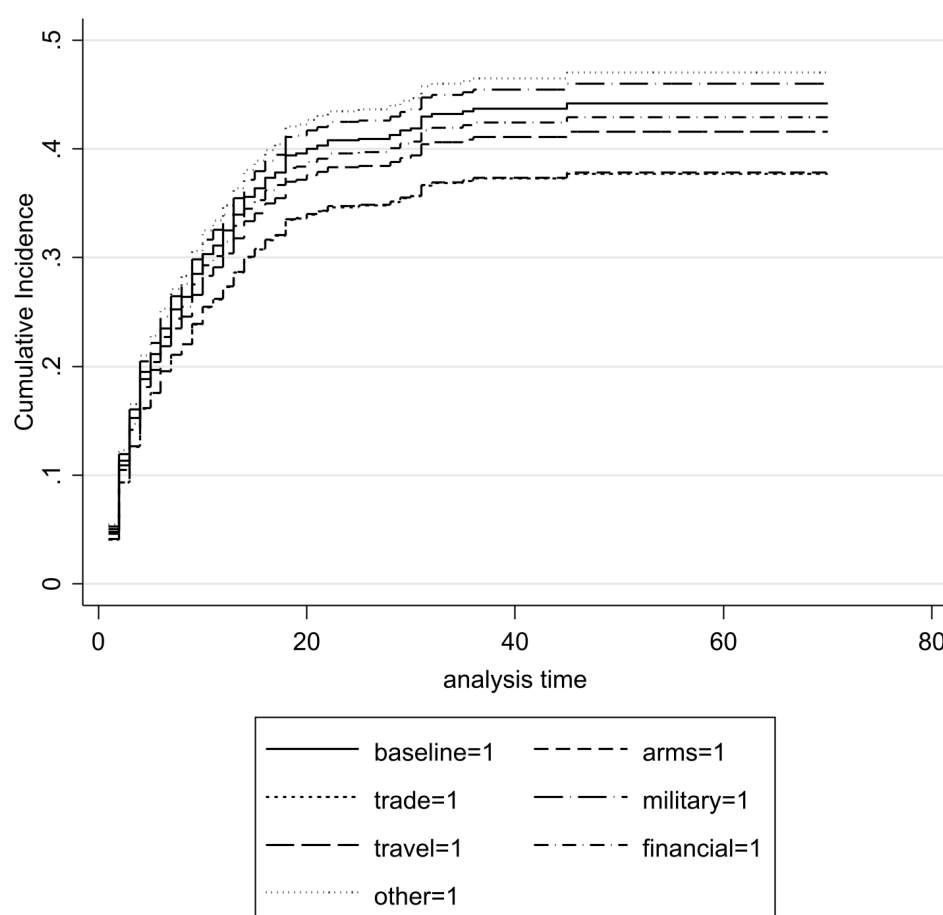
We proceed our analysis by examining different types of sanctions in the first extension, as illustrated in Figure 9 (2). Figure 6.2 indicates that most sanction types show little deviation from the average cumulative incidence for overall sanction success. However, travel and trade sanctions appear to be less effective. When we incorporate the various types of sanctions into our first model, we find that our results remain robust for the objectives, as shown in Table 9 in Appendix 6. Of all the sanction types, only "trade" sanctions have a significant impact. They tend to reduce the probability of sanctions success because they usually target specific products, making them less severe than other types of sanctions. Although the other types are insignificant in this model extension, we include them in subsequent models.

6.1.3 Modell 3: Second extension incorporating imposing countries

In the third model, we gradually expand our analysis. First, we include a year variable for the start of each sanction, with the year 2019 (the last year in our data set) serving as the baseline and each preceding year incrementing the variable by one. This allows us to account for potential time trends. Additionally, we introduce a dummy variable to examine whether multiple sanctions imposed simultaneously can increase the probability of sanctions' success.[4] Finally, we control for the effect of various sanctioning parties, limiting our focus to the most frequently sanctioning countries and organizations, namely the US, the UN, the EU, and other country alliances.

The results of our model extension suggest that UN sanctions and country alliance sanctions (excluding the EU) are more effective in achieving complete success than sanctions imposed by individual countries or loose coalitions of states. This finding corroborates previous research indicating that sanctions imposed by powerful states and broad alliances are more promising than

---

[4]Our analysis indicates that the year variable and the simultaneous sanction variable have no effect, indicating that our main finding is robust in the face of potential time trends and multiple simultaneous sanctions.

those imposed by individual countries. Our analysis confirms that countries facing UN sanctions find it challenging to resist them, which is not surprising given the UN's considerable international influence. Additionally, sanctions imposed by country alliances, such as the African Union or Mercosur (non-EU), also appear to contribute positively to the success of sanctions. For instance, the African Union's sanctions against the Central African Republic resulted in total success in 2003 and 2013. The proximity of sanctioned countries to the sanctioning countries, both culturally and geographically, may be a critical factor in the success of sanctions imposed by country alliances. This proximity allows these alliances to exert more pressure on the sanctioned country, particularly on its government, which increases the likelihood of success.

In contrast, EU and US sanctions seem to have no significant impact, possibly because they lack the cultural and physical proximity that often contributes to the success of sanctions imposed by country alliances. The EU and US often impose sanctions on countries located in more distant regions. However, their overall economic strength does give them some sanctioning power. Nonetheless, their influence on countries outside their hemisphere appears to be relatively negligible.

6.1.4 Modell 4: Third extension incorporating the country characteristics of the sanctioned nations

We expanded our initial series of models to include factors related to the countries targeted by the sanctions (see Table 9). We added variables that account for their GDP, democracy index, trade openness, and positive democratic changes during the sanction period. Our analysis reveals that sanctions against countries with low GDP (<55% of the normalized world GDP) and autocracies are less likely to achieve total success. Interestingly, the probability of success of sanctions

against democracies is not significantly different from that of countries that are not subject to any spectrum. This finding contradicts previous research. However, our analysis suggests that democratic changes positively influence the success of a sanction in the targeted country. There are several reasons why this positive correlation exists. For instance, democratic change may occur when a new government replaces an existing one, or the current government makes concessions. In both cases, the objectives of the sanctions may be met. When the government makes democratic concessions, the democratic goals of the sanctions may be directly impacted, possibly leading to the removal of the sanctions. When there is a change of government, the new government may make concessions on the international stage to legitimize itself. Countries sanctioning the previous government may want to accommodate and support the new government. We cannot conclusively determine which of these reasons is most influential, but we observe that democratic change positively affects the likelihood of sanctions succeeding.

Regarding the level of integration of targeted countries in the global economy, our analysis shows that sanctions against less integrated countries are more likely to succeed than those against more integrated countries. This may seem counterintuitive, but the dataset on trade openness is incomplete. Sanctions against countries for which data is unavailable are less likely to be successful. Countries isolated or undergoing political upheaval often do not report their trade openness and export data, such as Cambodia during the Khmer regime or Afghanistan under the Taliban. We checked for the missing trade openness data in our analysis to account for its absence. We found that sanctions against countries with no export data available during the sanction period are significantly less likely to succeed. This lack of data may indicate that these countries and their governments are so isolated from the rest of the world that they are uninterested in the sanctions.

Figure 6.3: Cumulative incidence function on sanctions objectives (Model 4)
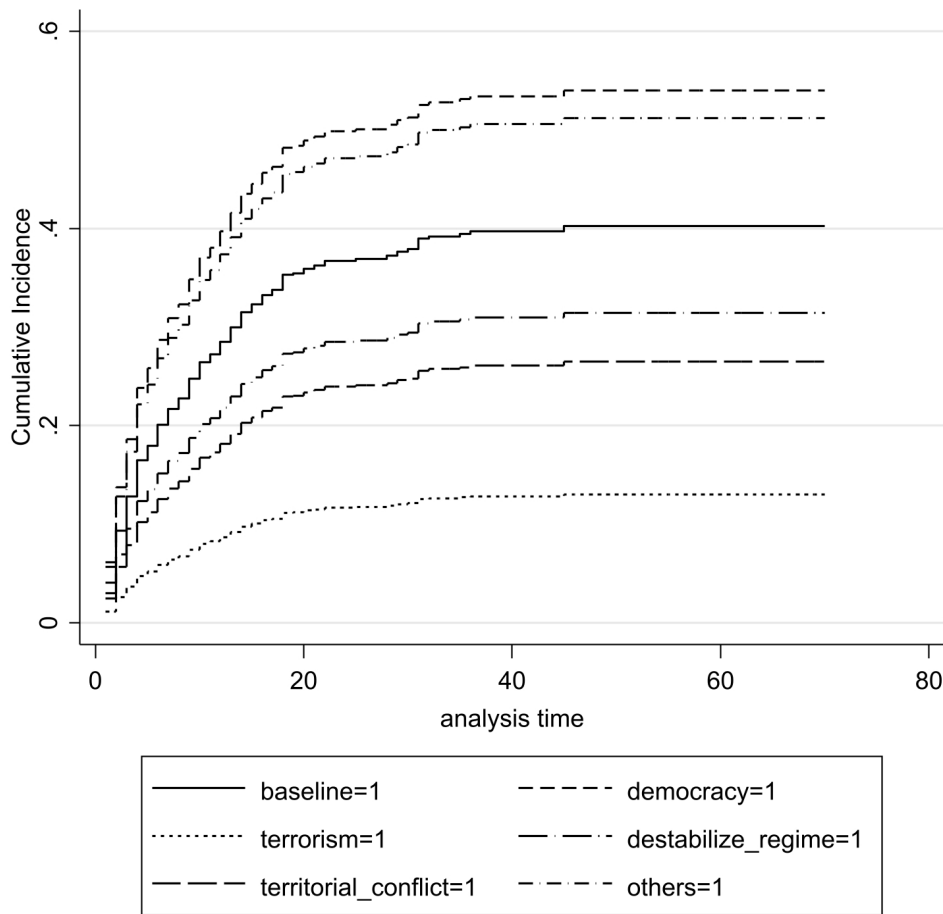
Cumulative incidence functions for different sanction objectives are presented in Figure 6.3 incorporating all three extensions. Our first result, as shown in Figure 6.1, remains robust. Objectives related to "democracy" and "others" are more likely to result in total success, while those related to "terrorism" and "territorial conflict" are less likely to succeed. However, our control variables reveal that the objective of "destabilizing a regime" is no longer significant.

In the last step, we investigated the previously excluded objectives that failed the log-rank test to determine if they significantly impacted the success of sanctions when controlling for other variables. We calculated four separate models for the previously excluded objectives, as shown in Figure 11. Our results indicate that objectives related to "human rights," "preventing war,"

and "policy change" had no significant effect on the total success of sanctions. However, for the objective of "ending a war," we found a positive effect on the total success of sanctions when all control variables were included. We could not determine if this result was driven by a particular control variable or a combination of variables.

In conclusion, our findings regarding objectives related to "democracy," "terrorism," "territorial conflict," and "others" remain robust. Including one of the remaining four objectives did not affect these results. Through this analysis, we demonstrated that different objectives have varying probabilities of success.

6.2 Differences in sanction types

Countries issuing sanctions can use different types of sanctions to achieve their objectives. However, our models do not currently differentiate between different types of sanctions, and we only control for these differences. Our results generally show which sanction objectives have a higher probability of success. Still, we want to conduct a more in-depth analysis to determine whether certain sanction types are more effective for certain objectives. For this analysis, we will include the "end war" objective, which was statistically significant in model 6 (see Figure 11), as the only objective from the control group.

Let us consider all arms sanctions first. Of the total dataset, 23% or 333 were declared as arms sanctions, and 110 ended with total success. The results in Table 12 show that the trends for different objectives remain similar. The democratic objective is more likely to end successfully, while the terrorism objective is less likely to end successfully. In contrast to our main result, destabilizing a regime is more likely to be successful when weapons sanctions are applied. However, this finding is not statistically significant due to fewer observations on arms sanctions. Notably,

the "end war" objective remains positively significant, while the "other" objective is no longer significant in the group of arms sanctions.

We found several differences from our main result when analyzing all separated sanction types. We found that the objective of "end war," besides arms sanctions, was only more often successful when a trade sanction was imposed. In comparison, the objective of destabilizing a regime was much more successful when a military sanction was imposed. The US 1977 sanction against Ethiopia is an example of arms and military sanctions to destabilize a regime. Although the extent of the sanctions' contribution to the regime's defeat against rebels remains unclear, the US achieved its objective of destabilizing the regime and terminated the sanctions once the new government was in place. For the "other" objective, these sanctions were only above average successful when a trade or a military sanction was imposed. Overall, we found that the democracy objective was always positively significant, regardless of which sanction type was assessed.

Let us briefly highlight which types are particularly effective against which specific countries. It is striking that sanctions against countries in a democratic upheaval are very effective across all types of sanctions. In contrast, financial sanctions appear to be less effective against autocratic countries, and trade, arms, and travel sanctions are less effective against countries with lower GDPs. If we look at the sanctioning countries, we see that UN sanctions only make no significant difference in the case of financial sanctions. We see that UN sanctions are far more effective than any other type of sanction. EU and US sanctions, on the other hand, still do not seem to have a significant impact. Only EU travel sanctions significantly increase the chances of a sanction being successful. Sanctions from country alliances seem highly effective with certain types of sanctions, mainly weapons, travel, and "other" sanctions, leading more often to the desired result.

In conclusion, differences in the likelihood of achieving sanction objectives are apparent for the whole dataset and broken down by individual sanction types.

7 Conclusion

This paper aims to investigate the reasons behind the success of sanctions and explore variations in their characteristics. To achieve this goal, we utilized the newly developed Global Sanction Database. Out of the sanctions examined, approximately 36% resulted in complete success. Our objective was to conduct a comparative risk analysis based on previous studies that employed different methodologies. To this end, we have incorporated additional data sources into the GSDB.

We could not refute the results of prior studies regarding the impact of a sanctioned country's GDP and democracy index. However, our research revealed a positive relationship between democratic change in the sanctioned country and the likelihood of sanctions resulting in total success. We aimed to validate the findings of other studies using the GSDB and examine whether the objectives and types of sanctions affect their success rates. Our comparative risk analysis indicated that the probability of success differs according to the sanction's objective. Sanctions with the objectives of democracy, ending war, and other purposes were more likely to succeed, while those aimed at destabilizing a regime, territorial conflicts, and terrorism were less promising.

Therefore, we can conclude that the objective of a sanction has a significant impact on its outcome. However, our conclusions are based on 70 years of data and cannot be generalized to every sanction. For example, a sanction intended to promote democratic values may fail, while one aimed at ending terrorism could be successful. Nevertheless, our findings suggest that the probability of success varies depending on the objective.

Our research indicates that it is worth considering whether sanctions are the best policy tools to address terrorism. Based on our model's conclusions, sanctions can be effective, mainly when promoting democracy. We observed variations in success rates depending on the sanction's ob-

jective, and we cannot claim that sanctions are always ineffective in achieving desired outcomes. Instead, whether or not sanctions can achieve the desired objective depends on the specific circumstances.

A Appendix: Frequency tables

Table 5: Frequency table sanctioning state 1

sanctioning state	frequency	sanctioning state	frequency
United States	366	New Zealand	11
EU	123	Spain	11
UN	81	Uzbekistan	11
Norway	51	Commonwealth	10
Canada	47	ECOWAS	10
United Kingdom	44	China	9
Iceland	38	Belgium	6
Liechtenstein	38	Italy	6
Japan	37	Organisation of African Unity	6
Albania	36	Organization of American States	6
Montenegro	36	Venezuela	6
Australia	34	Cyprus	5
Switzerland	33	Saudi Arabia	5
Macedonia	32	South Africa	5
Croatia	31	Arab Rep. Egypt	4
France	30	Finland	4
Russia	30	Greece	4
Moldova	28	Indonesia	4
Germany	27	Korea, South	3
Bosnia and Herzegovina	26	Argentina	3
Serbia	25	Libya	3
Armenia	24	Malaya	3
Turkey	24	Malta	3
League of Arab States	17	Thailand	3
Georgia	16	Austria	2
Ukraine	16	Azerbaijan	2
Denmark	15	Belgium	2
EEC	14	Brazil	2
India	14	Bulgaria	2
Netherlands	14	Cambodia	2
African Union	13	CoCom	2
Soviet Union	13	Czech Republic	2
Sweden	13	Eritrea	2

Table 6: Frequency table sanctioning state 2

sanctioning state	frequency	sanctioning state	frequency
G8	2	Jordan	1
Hungary	2	Kenya	1
Ireland	2	Kimberly Process Participants	1
Israel	2	Kiribati	1
Lithuania	2	Kuwait	1
Mexico	2	Latvia	1
NATO	2	Liberia	1
Romania	2	Luxembourg	1
Slovakia	2	Maldives	1
Slovenia	2	Mauritania	1
South Vietnam	2	MERCOSUR	1
Taiwan	2	NAFTA	1
Afghanistan	1	Nauru	1
Algeria	1	Niger	1
Bahrain	1	Nigeria	1
Burkina Faso	1	Korea, North	1
Central African Republic	1	OAPEC	1
Chad	1	OIC	1
ChinCom	1	Organization of Eastern Carribean Sta..	1
Colombia	1	Pacific Islands Forum	1
Cominform	1	Paris Agreement Signatories	1
Comoros	1	Peru	1
Congo	1	Poland	1
Costa Rica	1	Portugal	1
CSCE	1	Rwanda	1
Czechoslovakia	1	SADC	1
Ethiopia (excludes Eritrea)	1	Senegal	1
Djibouti	1	Syria	1
Dominican Republic	1	Tanzania	1
FRY	1	Uganda	1
Gambia	1	UNASUR	1
German Democratic Republic	1	United Arab Emirates	1
Hong Kong	1	Yemen, South	1

Table 7: Frequency table sanctioned state 1

sanctioned state	frequency	sanctioned state	frequency
Fiji	29	Niger	10
Iran	29	Israel	9
Pakistan	28	Mali	9
South Africa	28	Portugal	9
Myanmar	27	Sierra Leone	9
Cambodia	24	Soviet Union	9
China	24	Togo	9
Egypt, Arab Rep.	20	Venezuela	9
Libya	20	Zimbabwe	9
France	19	Guinea-Bissau	8
Korea, North	19	Kyrgyzstan	8
Syria	19	Rhodesia	8
Congo, Democratic Republic of the	18	Rwanda	8
Nigeria	18	Yemen, North	8
Yugoslavia	18	Bulgaria	7
India	16	Gambia, The	7
South Vietnam	16	Kenya	7
Sudan	16	Turkey	7
Chile	15	Colombia	6
Haiti	15	Honduras	6
Indonesia	14	Laos	6
Iraq	14	Mauritania	6
Ukraine	14	Nepal	6
Afghanistan	13	Nicaragua	6
Burundi	13	Romania	6
Guinea	13	United States	6
Russia	13	Albania	5
Somalia	13	Algeria	5
Central African Republic	12	Angola	5
Cote d'Ivoire	12	Belize	5
Cuba	12	Dominican Republic	5
Argentina	11	Ecuador	5
Belarus	11	Equatorial Guinea	5
Guatemala	11	Estonia	5
Liberia	11	Gibraltar	5
Peru	11	Palestine	5
Poland	11	Philippines	5
Canada	10	Qatar	5
Eritrea	10	South Sudan	5
Lebanon	10	Suriname	5
Malawi	10	Tunisia	5

Table 8: Frequency table sanctioned state 2

sanctioned state	frequency	sanctioned state	frequency
Uganda	5	Germany	2
Cameroon	4	Ghana	2
El Salvador	4	Hungary	2
Ethiopia (excludes Eritrea)	4	Japan	2
Georgia	4	Korea, South	2
Lesotho	4	Latvia	2
Lithuania	4	Switzerland	2
Moldova	4	Uruguay	2
Panama	4	Zambia	2
Taiwan	4	Liechtenstein	1
Tanzania	4	Antigua and Barbuda	1
Thailand	4	Balkans	1
Transjordan	4	Burkina Faso	1
United Kingdom	4	Congo (Brazzaville)	1
Australia	3	Cyprus (Northern)	1
Brazil	3	Denmark	1
EU	3	Dominica	1
German Democratic Republic	3	ECOWAS	1
Greece	3	Finland	1
Kuwait	3	Grenada	1
Malagasy Republic	3	ICC Rome Statute Signatories	1
Netherlands	3	Ireland	1
North Vietnam	3	Italy	1
Norway	3	Jamaica	1
Paraguay	3	Kazakhstan	1
Tajikistan	3	League of Arab States	1
Turkmenistan	3	Macedonia	1
Uzbekistan	3	Malaya	1
Armenia	2	Malta	1
Austria	2	Mozambique	1
Azerbaijan	2	New Zealand	1
Benin	2	Czechoslovakia	1
Bolivia	2	Saudi Arabia	1
Bosnia and Herzegovina	2	Singapore	1
Ceylon	2	Sweden	1
Chad	2	Terrorist Organizations (Al-Qaeda)	1
Comecon	2	Terrorist Organizations (ISIL and ANF)	1
Costa Rica	2	Terrorist Organizations (Taliban and ..	1
Croatia	2	Terrorist Organizations (Taliban)	1
Cyprus	2	Western countries	1
EEC	2	Montenegro	1

B   Appendix: Main Result - Comparative risk analysis

Table 9: comparative risk analysis models

	(1) objectives	(2) objectives + types	(3) + sender side	(4) + receiver side
democracy	1.835***	1.731***	1.8***	1.673***
	(.181)	(.176)	(.188)	(.181)
terrorism	.204***	.202***	.206***	.25***
	(.083)	(.082)	(.084)	(.102)
destabilize regime	.593*	.579**	.538**	.718
	(.136)	(.135)	(.132)	(.176)
territorial conflict	.618*	.57**	.564**	.583**
	(.145)	(.133)	(.134)	(.147)
other objective	1.433***	1.388**	1.503***	1.432**
	(.218)	(.217)	(.244)	(.244)
trade		.8**	. 805**	.857
		(.079)	(.079)	(.081)
arms		.853	.817*	.79**
		(.099)	(.098)	(.085)
military		.979	.998	.854
		(.116)	(.118)	(.104)
financial		.872	.912	.976
		(.082)	(.086)	(.092)
travel		.964	1.01	1.156
		(.109)	(.116)	(.127)
other type		1.138	1.08	1.138
		(.132)	(.125)	(.133)
simultaneous sanctions			.927	.833
			(.112)	(.102)
year			1.005	1.003
			(.003)	(.003)
UN			1.502**	1.417**
			(.231)	(.212)
EU			1.085	1.059
			(.166)	(.156)
US			1.147	1.018
			(.123)	(.109)
unions			1.711***	1.5**
			(.295)	(.255)
low GDP country				.691***
				(.07)
high GDP country				.975
				(.137)
democratic country				.839
				(.146)
autocratic country				.809**
				(.086)
democratic change				2.062***
				(.195)
high TO				1.181
				(.22)
low TO				1.213*
				(.134)
nodata TO				.687***
				(.087)
Observations	1452	1452	1452	1452
Pseudo R^2	.z	.z	.z	.z
No. of failed	516	516	516	516
No. of competing	598	598	598	598
No. of censored	338	338	338	338

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Source: own estimation

#	Name of the dummy variable	log rank test p-value
sanction types		
1	arms	0.0001
2	trade	0.0035
3	military	0.5012
4	travel	0.0284
5	financial	0.3504
6	other	0.0887
sanction objectives		
1	democracy	0.0000
2	terrorism	0.0000
3	end war	0.6612
4	human rights	0.2601
5	destabilize regime	0.0001
6	territorial conflict	0.0006
7	prevent war	0.4442
8	policy change	0.8761
9	other sanction objective	0.0003

Note: When the log rank test result is higher than 0.2 it is highly unlikely that it will contribute to the model.

Table 10: Log rank test for sanction types and objectives

Table 11: comparative risk analysis models for control objectives

	(5) human rights	(6) end war	(7) prevent war	(8) policy change
human rights	0.874 (.114)			
end war		1.347** (.193)		
prevent war			1.12 (.177)	
policy change				.813 (.134)
democracy	1.579*** (.199)	1.797*** (.206)	1.709*** (.187)	1.625*** (.176)
terrorism	.229*** (.094)	.259*** (.106)	.248*** (.101)	.234*** (.095)
destabilize regime	.667* (.166)	.744 (.184)	.71 (.175)	.656* (.165)
territorial conflict	.532* (.2137)	.592** (.151)	.562** (.143)	.515** (.133)
other objective	1.368* (.241)	1.492** (.259)	1.466** (.254)	1.342* (.24)
trade	.851* (.082)	.866 (.084)	.857 (.083)	.872 (.086)
arms	.814** (.093)	.798** (.091)	.817* (.093)	.81* (.092)
military	.882 (.102)	.866 (.101)	.882 (.103)	.872 (.102)
financial	.973 (.091)	.976 (.092)	.967 (.09)	.964 (.091)
travel	1.16 (.128)	1.156 (.127)	1.164 (.128)	1.165 (.128)
other type	1.152 (.134)	1.138 (.133)	1.15 (.135)	1.138 (.133)
simultaneous sanctions	.85 (.105)	.833 (.102)	.844 (.103)	.827 (.103)
year	1.003 (.004)	1.003 (.003)	1.003 (.003)	1.004 (.004)
UN	1.373** (.207)	1.355** (.205)	1.385** (.212)	1.387** (.211)
EU	1.077 (.16)	1.057 (.158)	1.08 (.16)	1.071 (.159)
US	1.075 (.117)	1.066 (.116)	1.069 (.116)	1.058 (.116)
unions	1.375* (.238)	1.391* (.24)	1.385* (.239)	1.407** (.244)
low GDP country	.705*** (.072)	.681*** (.071)	.705*** (.072)	.69*** (.072)
high GDP country	.955 (.138)	.952 (.134)	.972 (.139)	.985 (.14)
democratic country	.835 (.145)	.868 (.152)	.831 (.146)	.852 (.148)
autocratic country	.801** (.089)	.805** (.088)	.786** (.085)	.776** (.086)
democratic change	2.116*** (.202)	2.116*** (.202)	2.105*** (.2)	2.094*** (.199)
high TO	1.147 (.216)	1.145 (.215)	1.16 (.217)	1.171 (.22)
low TO	1.221* (.134)	1.203* (.133)	1.213* (.133)	1.195 (.133)
nodata TO	.664*** (.086)	.648*** (.084)	.661*** (.085)	.648*** (.085)
Observations	1452	1452	1452	1452
Pseudo R^2	.z	.z	.z	.z
No. of failed	516	516	516	516
No. of competing	598	598	598	598
No. of censored	338	338	338	338

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Source: own estimation

43

Table 12: comparative risk analysis models by different sanction types

	(9) arm sanctions	(10) trade sanctions	(11) military sanctions	(12) financial sanctions	(12) travel sanctions	(12) other sanctions
end war	1.558*	2.734***	1.307	1.318	1.114	1.641
	(.388)	(.645)	(.357)	(.251)	(.264)	(.585)
democracy	2.163***	1.913**	1.909**	1.641***	1.966***	2.492***
	(.576)	(.484)	(.54)	(.244)	(.496)	(.651)
terrorism	0 ***	.514	0***	.266**	.362	.326
	(0)	(.327)	(0)	(.161)	(.246)	(.263)
destabilize regime	1.931	.695	2.412**	.707	.878	.912
	(1.076)	(.327)	(.931)	(.268)	(.809)	(.515)
territorial conflict	. 188	.865	.428	.515	.237*	.991
	(.207)	(.338)	(.481)	(.363)	(.187)	(.43)
other objective	1.118	2.224***	2.436*	1.181	1.667	.58
	(.8)	(.597)	(1.276)	(.389)	(.88)	(.362)
simultaneous sanctions	.856	.982	.393***	.783	.97	.728
	(.366)	(.219)	(.108)	(.146)	(.377)	(.249)
year	1.007	1.006	.996	1.007	1.013	1.02**
	(.008)	(.006)	(.01)	(.006)	(.01)	(.008)
UN	1.665**	1.687**	2.296**	1.29	2.08**	3.705***
	(.207)	(.369)	(.728)	(.319)	(.655)	(1.276)
EU	1.076	.971	.764	1.018	1.644*	1.555
	(.344)	(.264)	(.33)	(.19)	(.466)	(.952)
US	.764	.92	1.203	.923	1.125	1.358
	(.222)	(.188)	(.352)	(.143)	(.352)	(.526)
unions	3.587**	.544	1.439*	1.357	4.004***	2.357**
	(1.802)	(.241)	(1.502)	(.413)	(1.259)	(.811)
low GDP country	.568**	.423***	.778	.842	.485**	.789
	(.143)	(.084)	(.205)	(.134)	(.141)	(.192)
high GDP country	.921	.932	1.085	1.225	1.032	.771
	(.346)	(.194)	(.408)	(.299)	(.399)	(.267)
democratic country	.393	1.497	1.348	.669	.771	1.01
	(.429)	(.433)	(.623)	(.207)	(.546)	(.452)
autocratic country	1.051	1.403	1.114	.635***	.785	.665
	(.269)	(.088)	(.263)	(.099)	(.23)	(.177)
democratic change	2.247***	2.985***	2.743***	2.498***	5.088***	2.286***
	(.54)	(.544)	(.605)	(.331)	(1.329)	(.557)
high TO	2.027	1.03	3.128**	.881	1.221	1.152
	(.966)	(.299)	(1.482)	(.259)	(.65)	(.721)
low TO	1.008	1.221	2.116***	1.077	.966	.985
	(.241)	(.26)	(.59)	(.172)	(.26)	(.264)
nodata TO	.649	.393***	1.65*	.617***	.448***	.338***
	(.214)	(.097)	(.483)	(.111)	(.13)	(.097)
Observations	333	514	290	735	319	243
No. of failed	110	158	106	248	94	100
No. of competing	124	229	104	270	88	102
No. of censored	99	127	80	217	137	41

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Source: own estimation

44

C   Appendix: Methodology of the spliced GDP dataset

We compare income levels of countries using a spliced dataset of real per capita GDP in international dollars sourced from the World Economic Outlook Database (WEO), Penn World Tables (PWT), and the Institute of Health Metrics and Evaluation (IHME). The specific data lines used are:

- WEO: Gross domestic product per capita, constant prices, Purchasing power parity; 2017 international dollar

- PWT: Expenditure-side real GDP at chained PPPs (in mil. 2017US$); divided by population, also from PWT

- IHME: Real GDP per capita IHME ID (2005 base year)

We splice the data backwards in time, starting with the complete WEO dataset and splicing it with PWT data where WEO data ends. We then splice the resulting dataset with IHME data where PWT data ends. This gives us real per capita GDP data for 196 countries from 1950 through 2026. Figure 17 depicts the data, with the colour indicating the data source and the percentage shares of the data sources. The red color denotes WEO data, blue represents PWT data, and black represents IHME data that completes the dataset for the early years.

D   Appendix: GSDB data

Gross Domestic Product (GDP) data are crucial for understanding the economic environment in which sanctions are imposed and assessing their economic impact. Although insufficient GDP data alone, they form the basic economic indicators required. The GSDB sanctions database covers sanctions data for countries from 1950 through 2019. However, ready-made GDP datasets for

this scope of countries and long periods are unavailable. Therefore, we constructed our dataset of complete GDP data to match the sanctions data. This dataset is known as the IPW dataset, where IPW stands for the initials of the three primary data sources used: the Institute for Health Metrics and Evaluation (IHME), Penn World Tables (PWT), and the International Monetary Fund's (IMF) World Economic Outlook database (WEO database).

The dataset is publicly available for download, and the methodology is outlined in the accompanying article.[5] The IPW dataset combines data from other resources, including the WEO database and PWT. When these sources provide no information for earlier years, the historical data on economic activity compiled by Angus Maddison is used. [6]

The IPW dataset includes real per capita GDP in international dollars from all three sources. We use the complete IMF WEO database, going back in time as far as data are available for each country. Where WEO data end for a given country, we splice the WEO series with its PWT series, going backwards with annual growth rates. When PWT data end or are unavailable, we splice the data with the IHME data, again returning with annual growth rates. This process ensures we arrive at a complete dataset from the latest WEO data back to 1950.

The IPW dataset provides data for 192 countries from 1950 through 2026, where the data at the end are WEO projections. 56% of the data are from the WEO database, 24% are from the Penn World Tables, and the remaining 20% are from the dataset compiled by the IHME team. We used two versions of IPW data: (a) per capita real GDP data in international dollars and (b) a detrended version obtained by dividing each year's data under (a) by the annual median across countries. The detrended data have a constant median of 1 each year and thus show only deviations from the median. Further details about the construction of the IPW dataset are provided in the appendix.

---

[5]James, S.L., e.a., 2012, Developing a comprehensive time series of GDP per capita for 210 countries from 1950 to 2015, Population Health Metrics 2012, 10:12. URL: http://www.pophealthmetrics.com/content/10/1/12

[6]Cf. the web page of the Maddison project for more information: https://www.rug.nl/ggdc/historicaldevelopment/maddison/

E   Appendix: Linking GSDB with GDP data

In this appendix, we want to provide a deep insight into the GSDB database and combine data from the sanctions database GSDB with real per capita GDP data in occupied countries. Sources and methodology for our GDP data were described in D, so we proceed directly to the results. A host of questions can be addressed concerning the link between international sanctions and economic activity. Still, here we focus solely on one aspect, namely the relative per capita GDP of countries involved on the sanctioning and sanctioned sides. Which side has the higher GDP per capita, the sanctioning or sanctioning side? Or are there no observable differences?

Figure E.1: Relative GDP per capita for sanctioning and sanctioned countries (case averages)
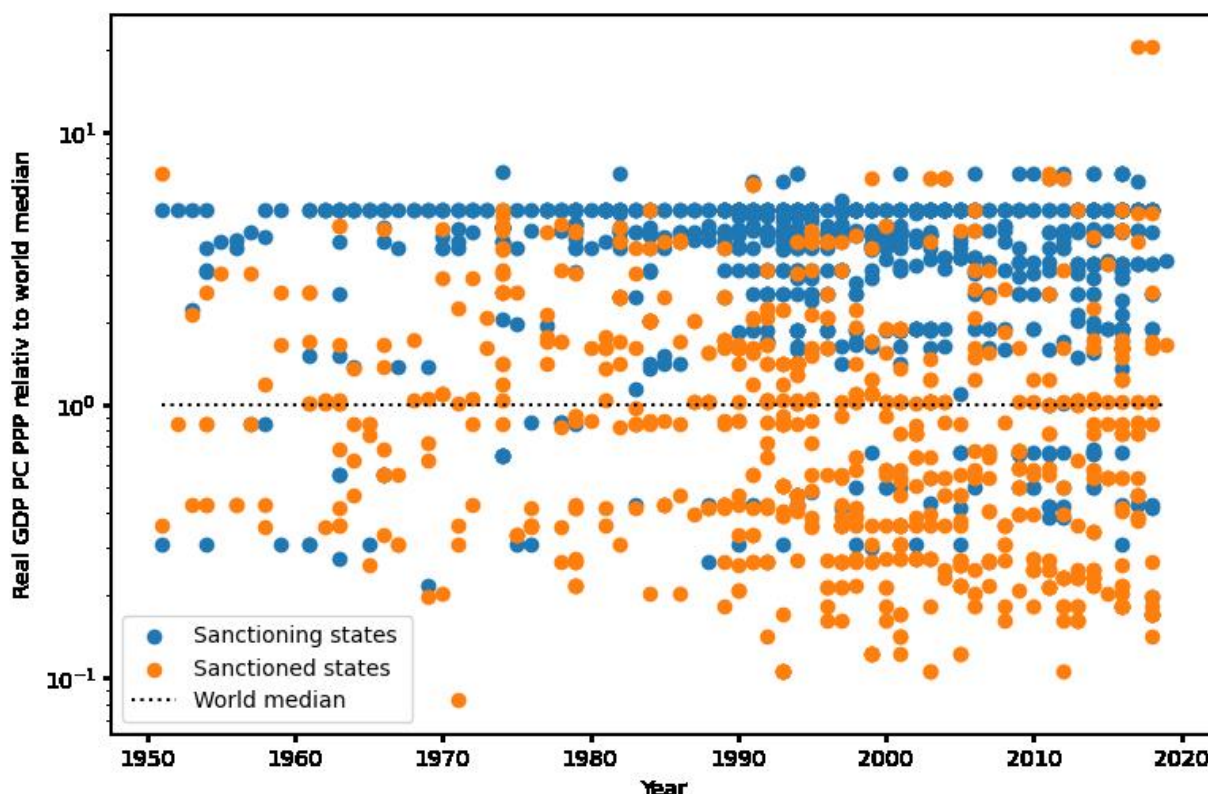
Source: GSDB V2 and IPW data

To answer these questions, we first adopt a case-oriented view. If a sanctions case lasts from 2005 to 2010, we compute the average per capita GDP for the sanctioning countries and the sanctioned country from 2005 through 2010. We use detrended GDP data to focus exclusively on the relative difference in per capita GDP. This means that each year's world median stays at one, and the data

express only differences from this median. The results are presented in Figures E.1 and Figure E.2, which use log scales.

Figure E.2: Relative GDP per capita for sanctioning and sanctioned countries (case averages)
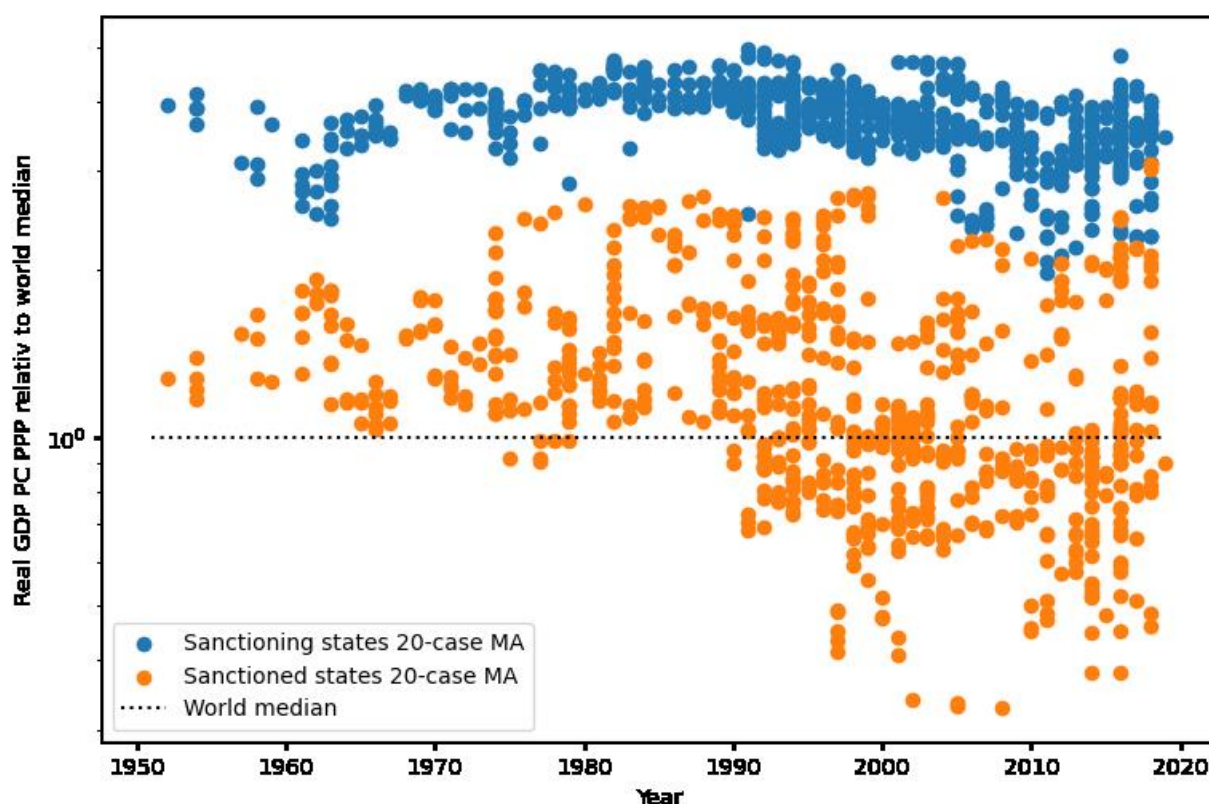
Source: GSDB V2 and IPW dataset (see appendix)

The difference between the figures is that Figure E.1 shows the raw case averages while Figure E.2 smooths the raw case averages with a moving average of 20 cases. The raw data in Figure E.1 reveal substantial heterogeneity in the per capita GDP data of countries involved in either side of sanctions cases. A few stylized facts suggest themselves. Heterogeneity increases with time and affects both sides of sanctions cases. Sanctioned countries, at least initially, seem to be equally present above and below the world median, but with the years, the share of countries below the median increases. On the other hand, the larger share of sanctioning countries is above the median, even though they are below. These stylized facts are confirmed by looking at the same data smoothed with a 20-case moving average. We now clearly see a level difference in the per capita GDP of sanctioning and sanctioned countries. Sanctioning countries, on average,

clearly have higher per capita GDP than sanctioned countries, and as a group, they are more homogeneous than these.

Figure E.3: Real GDP per capita for sanctioning and sanctioned countries (annual averages)
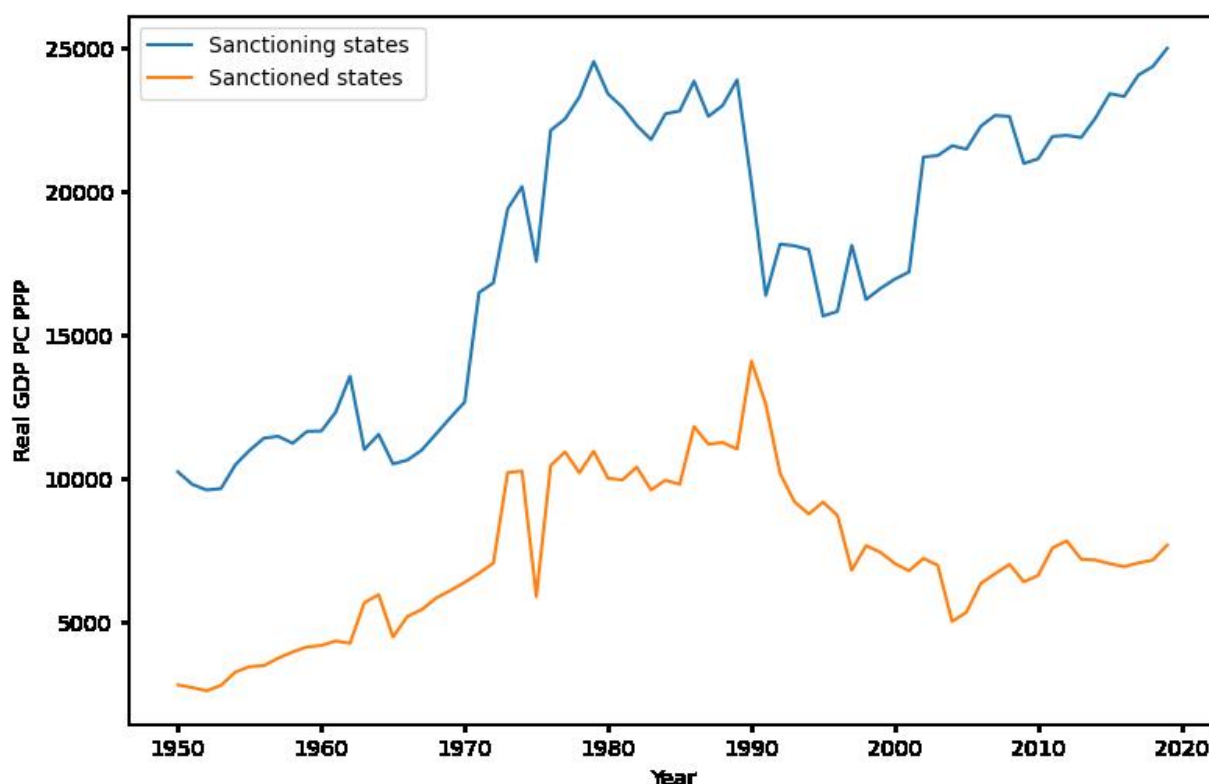
Source: GSDB V2 and IPW data

To crosscheck the stylized facts from these two figures, Figure E.3 presents per capita GDP data from a country-oriented perspective (as opposed to the case-oriented perspective just discussed). Our approach here is to identify all sanctioning-sanctioned country pairs in a given year, regardless of what case they belong to, and compare the two countries' GDPs. The results are then averaged each year. Since we do not average the duration of each case (which may span decades), we do not detrend the GDP data. So the data shown are per capita GDP in PPP USD. Figure E.3 confirms the stylized facts of the previous two figures and adds new insights. First, countries' per capita GDP imposing sanctions is higher than sanctioned countries. This result holds in all years. In 1990 we saw the two lines approaching each other, only to diverge again in the following years. The convergence in 1990 is probably due to the expansion in multilateral sanctioning

activity, particularly sanctions issued by the United Nations. This then counts all UN member countries among the sanctioning countries. Since most of them lacked at the time, this resulted in a drop in the average income of sanctioning countries. After 1990 this effect disappeared again, and the GDP gap between sanctioning and sanctioned countries widened again. While per capita GDP in sanctioning countries continues to grow, per capita GDP in sanctioned countries stagnates at a low level.

F   Appendix: Quantiles of case duration per last years of cases

Figure F.1: Quantiles of case duration per last years of cases
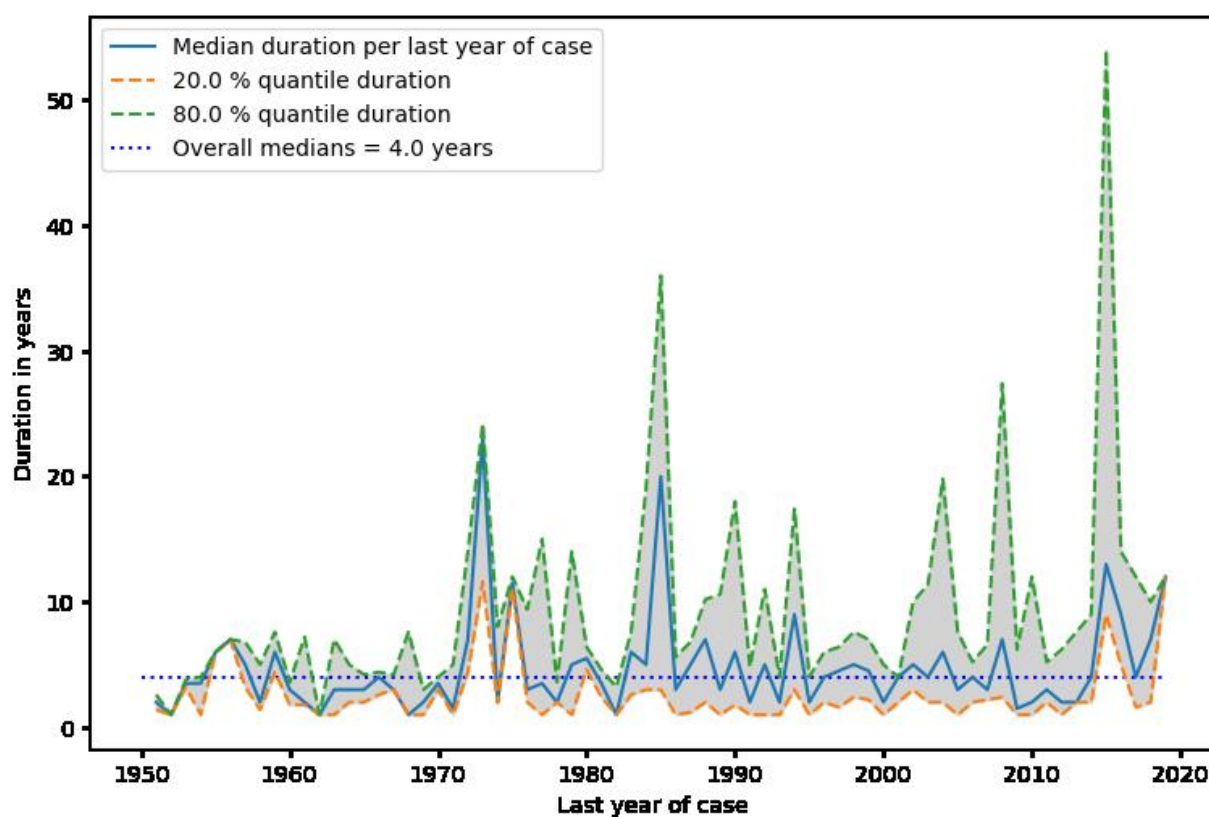
Source: GSDB V2, case-oriented file

Figure F.1 presents basic statistical information on the duration of cases. We see that the median duration hovers around four years, while the 20 per cent quantile is close to 1 year for most cases. The 80 per cent quantile increases with the years, reflecting the expanding period at which observed duration are truncated.

G Appendix: smooth hazard function

In this chapter is our goal to understand the process of a sanction. To do this, we use the hazard history of sanctions. We distinguish between four different possibilities for a sanction to end:

(a) The positive event when a sanction ends successfully.

(b) The counterpart if a sanction fails as a harmful elimination of a sanction.

(c) Sanctions that are eliminated because the result is still open, but negotiations between the participating countries were started.

(d) As a last neutral option, we include all ended sanctions, so they no longer run regardless of their positive or negative outcome.

We consider the first option (d). As shown in Figure G.1, the probability that a sanction will end is not constant over time. For a sanction, it will most likely finish in the first 15 to 20 years, with the highest probability after around ten years at 9%. After that, the probability decreases progressively.

Figure G.1: Smoothed hazard estimate - ended sanctions
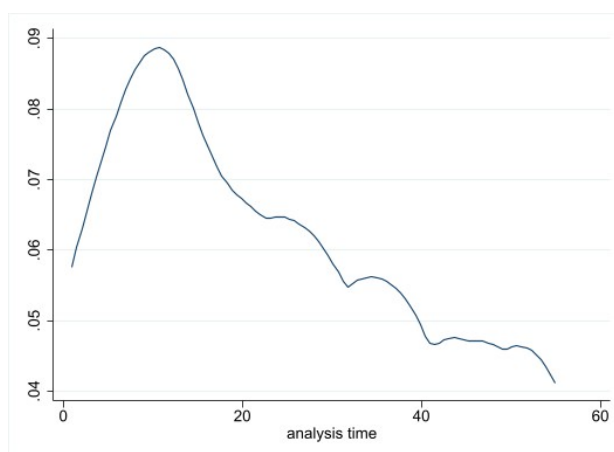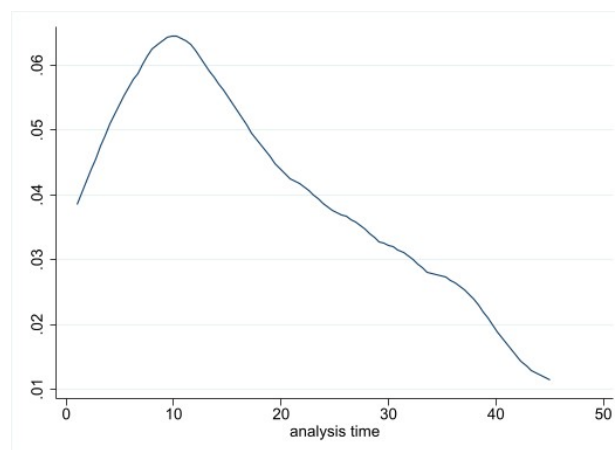

Source: Own estimation on the GSDB

Figure G.2: Smoothed hazard estimate - failed sanctions

Figure G.2 displays the probability that a sanction will end with a failure. We see that failed sanctions have a higher probability of ending in the first couple of years, like all sanctions in general. It is evident, however, that the probability is higher after the first 40 years the sanction has been placed. A possible reason for this higher probability may be that after such a long time, the sanction may be unlikely to be successful. Hence, the sanctioning countries cancel it accordingly.

Figure G.3: Smoothed hazard estimate - successful sanctions

Figure G.3 displays the hazard of successful sanctions. Here an adverse trend of the probability can be seen compared to the trend of failed sanctions. According to this, it is most likely

that sanctions end successfully in the first 10 to 15 years; after that, the probability decreases continuously.

Figure G.4: Smoothed hazard estimate - sanctions under negotiation
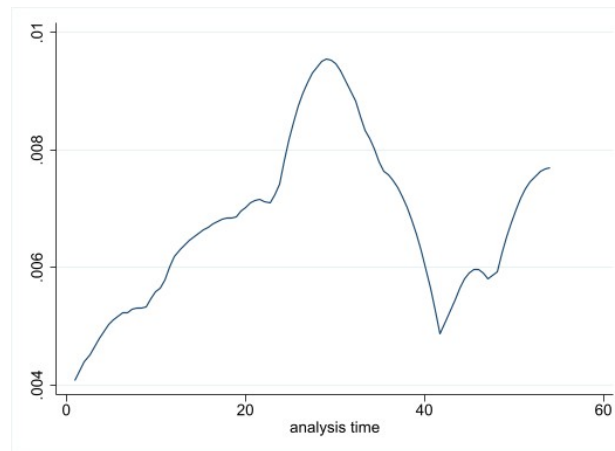
Source: Own estimation on the GSDB

At last, we look at the hazard for option (c). It is initially unclear to us if the initiated negotiation will lead to the sanction's success or failure. Figure G.4 shows that it is most likely that negotiations will start after 30 years the sanction has been in place. This is a relatively late point in time compared to successful sanctions.

In summary, we state that sanctions generally end within the first 10 to 20 years. During this period, most sanctions succeed; only after 40 years does the probability of a sanction failing to surpass the probability of success. Only a few sanctions have the status of "Negotiations Started", as these negotiations aim to achieve either a positive or negative result.

References

Allen, S. H. (2005). The determinants of economic sanctions success and failure. ." *International Interactions*, 31(2):117–138.

Allen, S. H. (2008). Political institutions and constrained response to economic sanctions. *Foreign Policy Analysis*, 4(3):255–274.

Bapat, N. A., Heinrich, T., Kobayashi, Y., and Morgan, T. C. (2013). Determinants of sanctions effectiveness: Sensitivity analysis using new data. *International Interactions*, 39(1):79–98.

Bapat, N. A. and Morgan, T. C. (2009). Multilateral versus unilateral sanctions reconsidered: A test using new data. *International Studies Quarterly*, 53(4):1075–1094.

Blanchard, J.-M. and Ripsman, N. (1999). Asking the right question: When do economic sanctions work best? *Security Studies*, 9(1):219–253.

Bolks, S. M. and Al-Sowayel, D. (2000). How long do economic sanctions last? examining the sanctioning process through duration. *Political Research Quarterly*, 53(2):241–265.

Bond, I., Odendahl, C., and Rankin, J. (2015). *Frozen: The politics and economics of sanctions against Russia*. Center for European Reform.

Brooks, R. A. (2002). Sanctions and regime type: What works, and when? *Security Studies*, 11(4):1–50.

Cortright, D. and Lopez, G. A. (2002). Smart sanctions: Targeting economic statecraft. *Ethics and International Affairs*, 16(2).

Dizaji, S. F. and van Bergeijk, P. A. G. (2013). Potential early phase success and ultimate failure of economic sanctions: A var approach with an application to iran. *Journal of Peace Research*, 50(6):721–736.

Drezner, D. W. (1999). The sanctions paradox: Economic statecraft and international relations. *Cambridge Studies in International Relations*.

Drury, C. A. (1998). Revisiting economic sanctions reconsidered. *Journal of Peace Research*, 35(4):497–509.

Felbermayr, G., Kirilakha, A., Syropoulos, C., Yalcin, E., and Yotov, Y. V. (2020). The global sanctions data base. *European Economic Review*, 129.

Fenwick, C. G. (1934). The arms embargo against bolivia and paraguay. *The American Journal of International Law*, 28(3):534–538.

Fine, J. P. and Gray, R. J. (1999). A proportional hazards model for the subdistribution of a competing risk. *Journal of the American Statistical Association*, 94(446):496–509.

Galtung, J. (1967). On the effects of international economic sanctions, with examples from the case of rhodesia. *World Politics*, 19(3):378–416.

Hufbauer, G. C., Schott, J. J., Kimberly, A. E., and Oegg, B. (2007). *Economic Sanctions Reconsidered: History and Current Policy*. Peterson Institute for International Economics, 3 edition.

Jing, C., Kaempfer, W. H., and Lowenberg, A. D. (2003). Instrument choice and the effectiveness of international sanctions: A simultaneous equations approach. *Journal of Peace Research*, 40(5):519–535.

Kaempfer, W. H. and Lowenberg, A. D. (1999). Unilateral versus multilateral interna- tional sanctions: A public choice perspective. *International Studies Quarterly*, 43(1):37–58.

Krustev, V. L. and Morgan, T. C. (2011). Ending economic coercion: Domestic politics and international bargaining. *Conflict Management and Peace Science*, 28(4):351–376.

Lektzian, D. and Souva, M. (2007). An institutional theory of sanctions onset and success. *Journal of Conflict Resolution*, 51(6):848–871.

Marinov, N. (2005). Do economic sanctions destabilize country leaders? *American Journal of Political Science*, 49(3):564–576.

Martin, L. (1993). Coercive cooperation: Explaining multilateral economic sanctions. *Princeton University Press*.

Miers, A. C. and Morgan, T. C. (2002). Multilateral sanctions and foreign policy success: Can too many cooks spoil the broth? *International Interactions*, 28(21):117–136.

Moret, Erica an Biersteker, T. J., Giumelli, F., Portela, C., Veber, M., Bastiat-Jarosz, D., and Bobocea, C. (2016). *The new deterrent?: international sanctions against Russia over the Ukraine crisis: impacts, costs and further action*. Geneva, The Graduate Institute of International and Development Studies, Programme for the Study of International Governance.

Morgan, T. C. and Schwebach, V. L. (1996). Economic sanctions as an instrument of foreign policy: The role of domestic politics. *International Interactions*, 21(3):247–263.

Nelson, R. M. (2017). *U.S. Sanctions and Russia's Economy*. United States Congressional Research Service.

Pape, R. A. (1998). Why economic sanctions still do not work. *International Security*, 23(1):66–77.

Schneider, H. C. (1997). *Wirtschaftssanktionen*, volume 16. Thomas Bruha and Armin Hatje, Meinhard Hilf, Hans Peter Ipsen †, Rainer Lagoni, Gert Nicolaysen und Stefan Oeter.

Smeets, M. (2018). Can economic sanctions be effective? WTO Staff Working Paper No. ERSD-2018-03.