



Economic sanctions: a tool of the past or the future?

A study of the effects of sanctions on international trade

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Abstract

In order to gain a better understanding of the effects of economic sanctions I study the effect that sanction episodes in the period of 1962 till 2000 have had on international trade. With the use of the gravity model and a database compiled from data on sanction episodes and their characteristics, international trade flows and country features, I find a negative effect of sanctions on trade. The negative effect is strongest when sanctions are implemented through the International Monetary Fund or the United Nations. Furthermore sanctions only had a significant effect on trade relative to a situation in which no sanction was imposed, when they were imposed by governments or international institutions. The largest impact I found when a total economic embargo was imposed on the target country. There is no effect of the sanction on the exports of the target state to countries not involved in the sanction.

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1. Introduction

In the globalizing world that we live in today, it is often said that borders are disappearing and that people, goods and services are travelling the world more frequently and freely than ever before. Many people go on holiday to another continent, we have our products imported from all around the world, and much of our national assets are owned by foreigners, while we own their assets. In such a globalizing world, one could easily think that sanctions are an international policy tool that has seen its best time. Some actions that have been taken in the past years do indeed point in that direction. The United States has restored diplomatic relationships with its decades-long enemy Cuba on the 20th of July 2015. And when it is up to President Obama, this is only the beginning of the resumption of normal relations with Cuba, that is to completely replace the failing policy of economic and political sanctions (Lee & Orsi, 2015). A confirmation of this intention was given when Obama was made a historical visit to Cuba to meet with its president Raul Castro in March 2016. Another important event in the international community is the nuclear deal that the United States, China, Russia, France, Germany and the United Kingdom made with Iran on the 15th of July 2015 after years of talks between government officials. The deal involves the gradual abolishment of the sanctions against Iran that have been in place for years (Gordon & Sanger, 2015). On Saturday 16 January 2016, the first set of sanction was indeed lifted after the International Atomic Energy Agency had declared that Iran had complied with all the nuclear measures agreed upon in the nuclear deal. Nevertheless we have also seen the imposition of sanctions on a large scale against one of the world's most powerful countries, Russia, following the annexation of the Crimea and their involvement in the separatist movement in the Eastern part of Ukraine. The Russian reaction to these sanctions has been to impose counter sanctions against the West.

The examples of recent sanctions episodes show that sanctions are still an important tool in international politics, as they have been for many years. Understanding the effects and the effectiveness of sanctions is important for policymakers when deciding whether or not to impose sanctions. Furthermore, the impression that policy makers and the general population have of the successfulness of a sanction greatly influenced whether or not to continue a sanction and its popularity in the imposing country. Past experience and research

show a highly diverse picture when it comes to the effectiveness of sanctions. It thus remains difficult to predict what the effects of a certain sanction will be and whether the goal of the sanction will be reached. It therefore comes as no surprise that the opinions within politics about whether or not sanctions should be used as a policy tool to move other countries into the desired direction are divided.

In some cases however, it is clear that sanctions do not only have noticeable effects of the desired kind, but also unwanted effects. An unwanted consequence can be that innocent people feel the effects; not the government in power, but ordinary citizen. Severe problems arose due to shortages in medicine, food and fuel in countries such as Iraq, Cuba and Haiti during times in which they were targeted with sanctions (Allen & Lektzian, 2012). Another unwanted effect of sanctions arises when it provides opportunities for the higher class in a society to profit from shortages in many goods, by smuggling them across the border and asking vastly increased prices.

The considerations above show the importance of thorough research into the effects and effectiveness of sanctions as a tool in international politics. Taking into consideration the different aspects such as type of sanction, the objective to be achieved and the countries involved, is necessary to be able to make general conclusions about sanctions as well as to be able to assess specific sanction cases. One of the most important and noticeable effects is that of sanctions on trade. When trade is restrained this prevents a country from earning on their exports, acquiring goods and services that cannot be produced domestically from abroad and from obtaining investments that are necessary to make production grow. Moreover is the limitation of trade often seen by the sender as a way to hurt the country and to move the government to make the envisioned policy changes.

In this thesis I will therefore try to answer the following main research question: 'What is the effect of sanctions on trade' in order to provide more insight into the effect that sanctions have on trade. This will provide policy makers with more knowledge about the consequences that their sanctions have had in the past and might give us some insight into the consequences that will occur in the future. In order to be able to determine the best strategy to follow when implementing a sanction, I have formulated the following sub-research questions. 'What is the effect of a sanction on trade of the target country with third

countries?' , 'How does the involvement of different international institutions influence the effect that sanctions have on trade?', 'How does the manner in which a sanction is implemented influence the effect that sanctions have on trade?', 'What effect do different types of sanctions have on trade?', 'What is the effect with respect to trade of issuing a threat before the imposition of a sanction?'. This thesis is structured as follows. Firstly I introduce the topic of sanction in terms of definition, history, different types, reasons and goals in Section 2. Then I give an overview of the literature on the impact and effectiveness of sanctions and the theoretical models that are used to explain them in Section 3. Section 4 explains the focus of this thesis more extensively, while in Section 5 I describe the theoretical model that I use, the Gravity Model, and the problems that are commonly associated with it. Subsequently, I provide insight into the database that I have constructed for the purpose of this thesis in Section 6. Next, in Section 7 the results of the regressions are presented and interpreted. Section 8 then finally gives a conclusion of the research done in this thesis.

2. An introduction to sanctions

When you speak about sanctions, most people will be able to mention a case in which sanctions were used. The chances are high that they live a country that has imposed sanctions on other countries, or that has been subject to sanctions. We hear people talk about the motives, results and implications of sanctions often in the media and in the world of international politics it is a very powerful tool. When you talk about sanctions however, you can be talking about many different things. Therefore, this section gives an introduction into the topic of sanctions and its various aspects within the scope of this thesis. Firstly I discuss the definition of sanctions and its history. Secondly I discuss the different types of sanctions that countries have at their disposal. Lastly I present the different reasons that countries could have to impose sanctions, as well as the goals that they try to achieve.

2.1 The long history of sanctions

Sanctions in the context of this thesis are defined as: 'Measures taken by a state to coerce another to conform to an international agreement or norms of conduct, typically in the form of restrictions on trade or official sporting participation'¹. We often talk about a sender and a target country, where the sender is the country that imposes the sanction, either or not in cooperation with other countries, and the target is the country (or countries) on whom the sanction is imposed. Sanctions have been used by countries all throughout history. An example of an early recorded instance in which a sanction was used by one nation on another was by Athena on Megara in the 5th century B.C.. Athena limited the import of Megarian products as a punishment for an attempt to conquer land and the abduction of three women. Since then, sanctions have known periods of relative popularity, while in other periods countries relied on other methods of intervention. Before World War I sanctions were often used in combination with military action and it was not until after World War I that countries considered sanctions as an alternative to military intervention (Hufbauer, Schott, Elliott, & Oegg, 2007). Often when sanctions are imposed, the initiator will look for other countries to support their case, by also sanctioning the target. Sometimes cooperation is sought through the United Nations Security Council, as this organ has the power to impose sanctions on behalf of all of its members. These sanctions will focus on the people responsible for the actions that the international community condemns, while limiting the impact on the other citizens and the economy. When sanctions are imposed, the Security Council also creates a Working Group or Sanctions Committee that monitors the measures in place (United Nations Security Council).

2.2. Types of sanctions

In the history of sanctions, many different types have appeared. The two main categories of sanctions are import and export sanctions (also trade sanctions) and financial sanctions. Trade sanctions can be imposed on a country, while financial sanctions can also be imposed on individuals. Depending on the situation (a combination of) either of these sanctions can be used. Export sanctions refer to a situation in which the sender's firms and individuals are not allowed to export goods and services to the target country, while import sanctions

¹ According to Oxford Dictionaries www.oxforddictionaries.com (accessed in March 2015)

forbid the import of goods and services by the sender from the target country. Often these sanctions will be used simultaneously. In recent years there has been much debate about the negative effects that trade sanctions can have on the general population of a country. Trade sanctions can lead to shortages in important provisions and cause suffering to the citizens of a country, while the responsible officials can easily avoid the sanctions from affecting them personally. Financial sanctions on the other hand are often found more effective at targeting the elite that is responsible for the policies that the sender wants to change. One way to impose financial sanctions is to withhold foreign aid that is highly important to the target. Another option is to forbid investment in the target country and to make it difficult to borrow from international institutions such as the World Bank or the International Monetary Fund or to hinder the access to other international financial market opportunities. This is especially powerful when several countries cooperate; since it is difficult to hinder such access and possibilities on one's own (Hufbauer, Schott, Elliott, & Oegg, 2007).

Partly due to discussions about the righteousness of trade sanctions that can adversely affect the vulnerable citizens within a country instead of hurting the powerful, targeted sanctions are a popular tool nowadays. Targeted sanctions can focus on specific institutions within a country, or even on individuals that are part of or associated with those in power. Measures can include the freeze of foreign assets, travel bans or the interdiction for the sender's companies and individuals to engage in certain financial dealings with individuals or companies from the target. A recent example in which such targeted sanction are extensively being used, is in the case of the European Union against Russia as a reaction on the annexation of the Crimea and its role in the destabilization of Eastern-Ukraine (European Union, 2015).

2.3. Goals and reasons

According to the Oxfordian definition of sanctions the goal is to 'coerce another to conform to an international agreement or norms of conduct'. Several researchers have tried to distinguish different goals that are related to sanctions. Hufbauer et al. (2007) distinguish five categories: 'Induce a modest change in policies, change the country's regime, disrupt a

military adventure, damage the country's military abilities and induce another major change in target-country policies'. Dashti-Gibson, Davis and Radcliff (1997) distinguish between sanctions that are mainly meant to destabilize the target country, and all other sanctions which are often intended to bring about a specific change in policy. The United States, one of the main users of sanctions as a foreign policy tool, states the goal of sanctions as follows: 'to counter threats to national security posed by particular activities and countries' (U.S. Department of State, 2015). The European Union describes the goal as 'to bring about a change in policy or activity by the target country, part of a country, government, entities or individuals'. Also 'The measures should target those that are responsible for these policies or actions. Such targeted measures should minimize adverse consequences for those not responsible' (European Union External Action, 2015).

The reasons for choosing to impose sanctions are very diverse and not easily determined. In any case a country undertakes actions that are in disagreement with national or international rules, beliefs, standards or practices. The actions that prompt a reaction of others to impose sanctions can be of geopolitical nature, as in the case of the annexation of the Crimea by Russia, or it can also be a policy practice, for example the sanctions against South Africa to end apartheid. Another example is giving support to terrorists, which is the case with the sanctions on Palestine because of the election of Hamas. Also, the decision to engage in sanctions will depend on the other options available, such as military intervention or diplomatic pressure. Politicians will weigh the costs and benefits of sanctions and make an estimation of the likelihood of success. Political support both at home as well as internationally and characteristics of the potential target also play a role. Whether or not to impose a sanction and what goals to achieve with it, is different in every case.

3. Literature review

Often when we hear about sanctions, it is in the media when we hear politicians discuss them. When we base our opinion on the effect and success of sanctions on the small pieces of information that politicians provide it is difficult to judge the effectiveness of sanctions. It often depends on which side the spokesperson is on how the facts are presented. Sanctions

are a strategic tool that is being used to change the unwanted behavior of the receiver of the sanction. The sender might feel threatened by the behavior of the target, which makes the imposition a sensitive matter that touches the lives or beliefs of those in the sender country. Therefore it is important to look at sanctions in an objective way when we estimate the effects or try to establish the degree of effectiveness in attaining its goal. It is important to make a distinction between the effects of sanctions, which in this thesis will be mainly studied as economic effects and the effectiveness in attaining its goal, which is judged by a large number of different criteria.

In this literature review, different aspects of the research field of sanctions in an economic context are discussed. Firstly I look at the measurement of the effect of sanctions, which has been done in different ways throughout the years. I pay attention to literature that focuses on measuring the effects in the recipient country as well as on literature that focuses on the effects in the sender country. Given that it becomes difficult to persist in the imposition of sanctions when support for them is waning, the effects that sanctions have on the sender (whether or not because of countersanctions) influence the effects in the target country. In the second part of this section I look at the successfulness of sanctions. Authors have tried to identify what aspects lead to the successful application of sanctions. When governments are aware of the aspects that could improve the efficacy of their measures they could use this in their advantage. Also this knowledge can be used to predict the successfulness of a potential sanction. Thirdly I will discuss the different theoretical models that can be used to gain insight into the mechanisms through which sanctions work and that serve as a basis for the empirical estimations.

3.1. Impact of sanctions

The standard work in the field of sanctions in the economic context is probably the book 'Economic Sanctions Reconsidered' by Hufbauer, Schott, Elliott and Oegg (2007). This extensive text considers a large set of cases in which sanctions were imposed. Their dataset of the modern world starts with United Kingdom's sanctions on Germany after World War I in 1914 and continues to include many examples of post 2000 sanction. Even some ancient cases of sanctions have been included. Before addressing the estimated impact of sanctions

on the target country, Hufbauer et al. also provide an elaborate overview of the different types of sanctions, various policy goals of sanctions and they identify a large set of variables that influence the effect and successfulness. The authors estimate the trade loss as a percentage of GDP with the use of a Gravity Model that estimates trade of countries with the US as well as with all of its trading partners in 1999. 28 cases of economic sanctions that were still in place in 2000 were included. Several models are estimated that either include all trade, exports only or imports only. Furthermore, within these models dummies are included that indicate whether a country experienced any type of sanctions at all or whether it experienced a certain kind of sanctions. This kind of sanction can be differentiated with respect to intensity; low or high, or type; financial only, financial and export only or financial, export and import sanctions. The results of these OLS regressions are then used to estimate the difference between the expected without-sanctions trade, and the with-sanctions trade of countries with the United States and with all trading partners. The estimated losses for target countries' trade with the United States is about 7% of actual trade or \$13 billion, while the estimated loss of trade with all trading partner is 5%, which amounts to \$41. An interesting finding is that the losses in exports to recipient countries are much smaller than the losses in imports from these countries, indicating that the target countries are more affected than the sender of the sanctions.

Trade is one of the aspects that is often most affected by economic sanctions. Often however, trade sanctions are accompanied by financial sanctions that can also have a significant impact on the welfare of the target country. In his paper on the impact of US financial and trade sanctions on Iran, Torbat (2005) estimates the welfare loss of both types of sanctions. Firstly, the author draws an image of the trade relations between Iran and the United States before the sanctions, after which he estimates a sanctions multiplier that represents the relation between the loss in economic welfare and the loss in value of trade. These sanctions multipliers are roughly estimated for non-oil imports and non-oil exports at 0.25, while that of oil exports is 0. Because of financial sanctions, Iran has had difficulty borrowing on the international financial markets and attracting Foreign Direct Investment, mainly for projects in the oil sector. The results show that the short term economic effects due to trade sanctions were large, while the long term effects are minimal as Iran adapted and found new trading partners.

Likewise, Askari (2001) argues that estimating losses to targets and senders of sanctions solely by looking at the effects on trade is too narrow a view. Firstly he argues that direct trade losses might not reflect actual losses to the country, since trade can take place through a third country and countries might adapt to the sanctions and find new trading partners. Secondly, Askari takes other costs into account that were caused by reduced export financing, shrunken availability of commercial financing, difficulty in rescheduling debt, diminished FDI and costs due to opposition to a oil pipe line through Iran and the possibility of oil swaps. In all these causes of exchange losses, the damage to international relations and reputation is also taken into account. Askari argues that the actual costs of sanctions are much higher than what is usually estimated, often based only on the reduction in bilateral trade. The author also offers the opinion that policies and actions of target countries change because of international political circumstances, not because of sanctions. Askari's research is based on the specific case of U.S. sanctions against Iran, but his attention to other costs than those flowing directly from a reduction in bilateral trade is valuable in other sanctions episodes as well.

Contrary to the paper by Askari, Farmer (2000) focuses on the costs to the sender of a sanction instead of on the target. This is an interesting approach since the (estimated) costs to the sender could influence the decision to impose or continue sanctions. Farmer compares the foreign-trade multipliers that indicate what the loss in welfare would be for a one unit decrease in trade that other authors have estimated. He does not only look at papers that have focused on the costs of sanctions such as (Hufbauer, Elliott, Cyrus, & Winston, 1997), but also takes the reverse of the results of papers that focus on the gains from trade liberalization such as (McKibbin, 1998) and (Ho & Jorgenson, 1994). The lowest multiplier of 0.05 is found in Hufbauer at al. (1997) for the long term, while Ho and Jorgenson (1994) find values between 0.15 and 0.35 for the short run and values as high as 0.70 till 0.85 for the long run, indicating extremely high costs of sanctions to the sender. These large differences are due to differences in a partial or general equilibrium approach, the focus on a single or the complete set of industries within a country, whether or not financial costs are taken into account and the assumptions with regards to the market power of firms. According to the author, all measures of costs of sanctions to the sender in the reviewed papers overstate the actual costs of most sanctions. This can be explained by the

fact that sanctions are often limited to a few goods for which substitutes can easily be found and that sanctions against developing countries are often unilateral and are not accompanied by retaliations.

While the effects of sanctions on trade have been investigated by several authors, the effects on Foreign Direct Investment (FDI) were only first estimated by Biglaiser and Lektzian in 2011 for the investments of United States firms in targeted countries. The authors constructed a regression with U.S. FDI/GDP as the dependent variable, several control variables and the variables of interest: start year, whether sanctions have high or low costs on target, whether an international organization was involved in the imposition of the sanction, whether the target was a democracy and whether the sanction was imposed to attain a major policy goal or not. The evidence suggests that especially in the year before sanctions are imposed, FDI strongly decreases. In the year that sanctions are imposed, FDI is still lower, though not significantly. It is after 2 years of sanctions that FDI has rebounded and is even at higher level in sanctioned countries than in unsanctioned countries. Reasons for these evolutions in FDI are that the threat of sanctions cause the most uncertainty for investors, while once the sanctions are in place the exact restrictions have become clear. As the target country might be more willing to offer favorable terms for investment such as tax deals, or the country might be forced to conduct 'fire sales' in order to find the necessary investment when facing sanctions, this can lead to a higher level of FDI in targeted countries than in non-targeted countries. When the costs to the target of the sanction are high or when an international organization is the sender group, the decrease in FDI is larger than when this is not the case. This result holds in all estimated models. The authors also hypothesized that when sanctions are imposed on a democratic target or when the objective was is a minor policy goal, the decline in FDI would be less significant. The estimated models provide less robust confirmations for these hypotheses however.

In addition to effects on the economic and financial performance of a country, sanctions can also have an effect on very different aspects of life in the target country. Allen and Lektzian (2012) investigate the effects of sanctions on public health and compare the results to the effects of military conflict on these same public health effects. The reason to compare the results of sanctions and military conflict on several measures of public health is because often countries argue that sanctions are more humane and less costly than military action.

The authors however wonder whether this is true. The four mechanisms through which policies affect the health situation are; exposure to risk of death and disease, the amount of resources available, the allocation of these resources and the efficiency of the use of these resources. As dependent variables, different measure of public health(care) are used. These are: government expenditures on healthcare, available food supply, immunization rates, life expectancy at birth and health adjusted life expectancy. In order to see the separate as well as combined effects of sanctions and military conflict on these measures, three models are estimated for every regression. One model that includes all cases in which there were at least sanctions, one model that includes all cases in which there was at least a military conflict and one model that includes all cases. The results of the regressions are that sanctions do indeed have a negative effect on health outcomes, as was expected by the authors. Furthermore sanctions on their own hardly have an effect on food supplies and life expectancy. They do decrease immunization rates, especially in combination with a military conflict and the health adjusted life expectancy is negatively affected. In general the authors conclude that sanctions usually have a smaller effect than military conflict on public health, especially because the direct effect of military conflict on the risk of death and disease.

3.2. Effectiveness of sanctions

When a sanction is imposed on a country, or on individuals in a country, this will have an effect on them, but to what extent will this effect actually change the behavior of the target in the direction envisioned by the sender of the sanction? In other words: how successful or effective is a sanction? One possibility to estimate this, is by performing a binary regression with the outcome after a period of sanctions as the dependent variable and a large matrix of explanatory variables among which the economic costs of the sanction to the target as mentioned in Section 3.1 (Hufbauer, Schott, Elliott, & Oegg, 2007). In order to account for possible correlation problems between the contribution of sanctions to the success of a sanction and the successfulness of the sanction, three different regressions with each a different dependent variable are estimated. These variables are policy result, a measure of the contribution of sanctions to the policy result and the success of economic sanctions, the last one being an interaction term of policy result and contribution of sanctions. While the

explanatory power of the test is not high (R^2 between 0.15 and 0.24) and many independent variables are not significant, a few key explanatory variables stand out as having a significant influence on the success of sanctions. These variables are a dummy of whether a major change in the target country's policy is aimed for, costs of the sanctions to the target, and the target country's type of regime. Results indicate that the more modest the attempted policy change, the larger the costs of sanction to the target and the more democratic a target country is, the higher are the chances that after a period of sanctions the envisioned outcome will be achieved.

A paper that has built on previous work of Hufbauer et al. (1990) is by Bonetti (1998), who investigates what characteristics contribute to absolute failure or success of a sanctions period. Bonetti takes a set of sanction cases and divides them into cases of failure (1= absolute failure, 2= marginal failure) and of success (3= marginal success, 4= absolute success). Two logit regressions are estimated that measure the influence of the independent variables on the likelihood that a sanctions episode was an absolute success, given that it was successful and the likelihood that sanctions failed marginally when they were a failure. The regressions are constructed in this particular manner to be helpful in policy making. Since the paper shows the characteristics that have led to absolute successful outcomes, sanctions can perhaps be designed in such a way as to maximize their chances of success. Results show that the most important factor that can lead to failure is the presence of a third party that supports the target, also sometimes called 'a black knight'. A larger pre-sanctions trade link between sender and target country however, reduces the chances of absolute failure. When we look at the variables that influence the likelihood of absolute success, we find a positive sign for the relationship between the sender and the target before sanctions were imposed. Surprisingly, when a policy goal is scored as being modest, this has a negative effect on the chances of absolute success. This is explained by noting that when a policy objective is modest, the sender might attach less value to the change and might be more willing to make a compromise, i.e. to remove the sanctions in exchange for a partial change in the target's behavior.

Another paper that uses the Hufbauer et al. (1990) database is by Dashti-Gibson, Davis and Radcliff (1997), who find results that also indicate that the goal of sanctions matters. They make a distinction in the data between sanctions that are mainly meant to destabilize the

target country, and all other sanctions which most often have the intention of achieving a specific policy change. The two separately estimated binary regressions show that when the goal is to destabilize a country, the initial stability matters most, while when the goal is to influence the target's policies it is best to use financial sanctions (and not export/import sanctions) and that a shorter period of sanctions is related to better chances of success.

In spite of, or perhaps because of the fact that the various versions of Hufbauer et al. are the standard works in the field of economic sanctions, many have criticized the methods employed and the results obtained and suggested alternative modeling. An example of such a critique is by Lam (1990), who points to problems with the dependent variable success, which is the product of a score for results and the contribution of the sanctions to this result. Not only are the values biased towards a lower score, the value of contribution of the sanctions towards a positive outcome is highly arbitrary. Moreover, Lam omits certain cases of what he considers double counting, or where no actual sanctions were implemented but only threatened with. The author then constructs a more extensive and a parsimonious model that both predict around 75% of the outcomes correctly. Results show that a sanction on imports positively affects the chances of success. Furthermore the author is not able to reject the hypothesis that sanctions and the economic effects of sanctions do not have an influence on the outcome, indicating that sanctions might have a positive effect.

In Hufbauer et al. (2007) the authors respond to the critiques of other researchers, but continue using success (product of a score for results and the contribution of the sanctions to this result) as a dependent variable, since they consider it to be the variable in which policy makers are most interested.

Another critique by Nooruddin (2002) is aimed at the selection bias. Because only cases in which sanctions have actually been enforced are included in the selection, cases in which the sender threatened to impose sanctions are excluded. Hereby the selection becomes biased, because the decision of the sender to impose a sanction is most likely related to the chances of success. Nooruddin therefore constructs a new dataset, focusing on sanctions with the US as sender, in which he includes all other possible countries that the US could have imposed sanctions on. The author constructs a censored probit model with as the two dependent variables sanction imposition (first stage) and sanction success (second stage), which are

assumed to be correlated. Both dependent variables are also modeled individually, with as independent variables for model 1 whether the target is in the Western Hemisphere, the share of trade with the US, whether the target is a major force, military actions against target, whether target was a member of the Soviet Bloc and what the type of political system was. Results show that sanctions are more likely to be directed against a country in the Western Hemisphere and when the share in trade with the U.S. is low, when they are small and when there is already a military conflict. Model 2 with sanction success as dependent variable uses costs to the target as % of GDP, relative power, share of trade with the US, target countries' stability, alliance with the U.S., previous cordial relations, military actions against target, third party assistance to target, multilateral sanctions and goal as independent variables. The results show that sanctions are more successful when directed against a democracy and when costs are high. While having had cordial relations, being engaged in military action and imposing sanctions multilaterally have a negative impact on the success of sanctions.

The critique of Nooruddin (2002) largely focuses on the dataset, and the fact that cases in which sanctions were considered but not implemented are not included. This is the reason why Morgan, Bapat and Krustev (2009) constructed a new dataset of sanction episodes in the period 1971-2000, which was later extended to the period 1945-2005. This results in a dataset with 1412 episodes of sanctions, of which 40% only concerned a threat, while in the other cases sanctions were implemented. Compared to the dataset of Hufbauer et al. (2007) which only includes 174 cases, this is a substantial extension. The inclusion of cases of threats of sanctions is done because the authors believe that threatening to impose sanctions plays an important role in the process. When a sender threatens to sanction a country, the potential target could already adjust its actions to avoid the costs associated with being sanctioned. In these cases (the threat of) sanctions are highly effective, but they do not appear in the dataset by Hufbauer et al. and are thus not considered in most research. This could drastically change the idea that we have of the successfulness of sanctions.

A different method to investigate the results of sanctions is through the use of a Vector Autoregressive model as Dizaji and Bergeijk (2012) have done for the case of Iran. They investigate the effect of sanctions on a set of important macroeconomic variables as well as the impact on the political system. The authors find that sanctions only have an effect in the

short run, while in the long run the country adjusts its economic structures to overcome the effect. Firstly this is shown theoretically in a neoclassical trade model, after which a VAR model is constructed in two steps to estimate the actual effects. The authors find that sanctions do indeed have a negative effect on a set of important economic variables in the short run, which however dwindles as the sanction period lasts longer. Moreover they find evidence that there is sometimes a positive impact on the political system (towards more democratic) in the short run, but that this effect disappears in the long run. These results clearly show that persistent sanctioning will not bring about intended changes.

3.3. Theoretical models

Besides empirical studies, many authors have also tried to explain why sanctions fail or succeed by means of theoretical frameworks only. In this thesis I will perform an empirical analysis and thus the focus of this literature overview is therefore mainly on these types of studies, but it would be negligent not to devote some attention to the work that has been published on pure theoretical models. Furthermore it is these theoretical models and mechanisms that serve as the basis for the construction of empirical models, and allow us to distinguish the causal relations that help to explain the results.

Game theory is one economic tool that is used to gain a better understanding of sanctions and their successfulness. Examples of papers that use game theory to predict what variables influence success of sanctions are Eaton and Engers (1992) and Tsebelis (1990). Morgan and Bapat (2003) use the affected countries' firms as the players in their game instead of the country, for they state that it is not the countries that carry the burden of a sanction but the companies whose trade or financial flows are restricted. The interaction between the sender's government and domestic firms is modeled, in order to determine when firms are more likely to violate the sanction law. From the model the following results are obtained that show the relationship between different variable and the possibility of violation of the law by firms. The more dependent a firm is on the exchange with the target country, the lower the possibilities of being investigated for violation of the law, the lower the fine in case the firm is prosecuted for violation, the higher the amount of the exchange the firm can keep in case it is being detected, the larger the chance that the firm will break the law. This

is an interesting approach to the subject of whether economic sanctions will fail or succeed as it focuses on deviation from the law by domestic firms, instead of on characteristics of the target country.

Moreover, Drezner (1999) in his book on economic sanctions constructs a model that simulates the decision of the sender whether to impose sanctions and the decision of the target and subsequently the sender again whether to back down or to endure. Drezner concludes that the higher the opportunity costs to the target in case that both countries stand strong and a deadlock situation arises, the more effective sanctions will be. When the opportunity costs of a deadlock situation to the sender rise however, sanctions are less favorable and less likely to be implemented. The strategy of the countries also depends strongly on the expectations about future conflict. The results are contradictory in that when expectations about future conflicts are high, the sender is more likely to use economic sanctions as a policy tool, while the target will be less likely to make (major) concessions.

Contrary to previously discussed papers, Eyler (2007) uses the New Open Economy Macroeconomics (NOEM) model to estimate changes due to sanctions. Firstly a basic model with three countries (sender, target and a third country that is either an ally to the sender or the target), two goods and one financial asset is constructed. Prices of both goods and assets are assumed to be somewhat sticky. Firms' profit functions and households' budget constraints are affected when sanctions are implemented. The effects on welfare due to a shock to this macroeconomic model, caused by the imposition of a sanction, is not always unambiguous. Export sanctions increase welfare of sender households as they lead to more supply on the domestic market and thus lower prices, whereas import sanction increase the price of the imported products and decreases household welfare. Financial sanctions on the other hand, have an ambiguous effect on the sender, while they have an unambiguously negative effect on the target's welfare. Furthermore, the availability of substitutes of the banned product, through a high elasticity, indicates that the target country won't suffer much as it can easily find alternative products. Also sanctions are similar in many aspects to other macroeconomic policies and exchange rate movements can occur after the measure has been taken.

4. Focus of the thesis

In Sections 2 and 3, I discussed the basic concepts within the world of sanctions and elaborated somewhat on the important role that sanctions have in foreign politics. The topic of economic sanctions is a relevant topic for two reasons. Firstly they are currently being used in important international conflicts, but also being reconsidered in some long-lasting cases. As a response to the annexation of the Crimea and its alleged role in the continuous destabilization of Eastern-Ukraine, the European Union and the US have imposed targeted sanctions on Russia with which they hope to incentivize Russia to stop its interference in Ukraine. In the cases of Cuba and Iran, 2014 was the year in which moves were made after many decades of severe sanctions, imposed especially by the US, to remove these sanctions. During his State of the Union on the 20th of January 2015, President Obama told the US Congress that 'In Cuba, we are ending a policy that was long past its expiration date. When what you're doing doesn't work for 50 years, it's time to try something new.' (Secretary, 2015). The topic of sanctions is thus a highly relevant one.

Furthermore sanctions can have far-reaching consequences on the sender but especially on the target country. The assumption that sanctions are less harmful than military intervention might be a correct one, but sanctions still have the power to do severe damage. Often it is difficult beforehand to estimate the effect that sanctions will have on a country and its citizens. But weighing the benefits and the costs is an important part of the decision to impose sanctions or not.

In this thesis I hope to contribute to a better understanding of the effects of sanctions. I will focus on the economic effects that sanctions have on the target country, by looking at effects on bilateral trade between the target and the sender, as well as trade of the target with other countries. The results of this analysis will hopefully lead to more knowledge about the effects that sanctions have. It will help policy makers to better assess the consequences of their policies. Because only if we understand what has happened in the past, can we effectively use the tool of economic sanctions in the future. Even though the effects of sanctions on trade are only a small part of the total impact, it is a very important part, as it is widely believed to be one of the determining factors of the successfulness of sanctions. It also offers the opportunity to investigate how important the black knight

principle, where a third country supports the target, is. When the losses incurred by the target country are completely or to a large extent mitigated because an ally steps in to support, the sanctions might have an effect on bilateral trade between the sender and the target, but a much smaller effect overall.

I am of the opinion that there is still a lot of room for research in the field of sanctions and that my research will fill part of the gap in the current literature. The availability of constantly improving analytical tools and datasets, offers the opportunity to provide policymakers with useful insights on the effects of a very powerful tool in international relations; sanctions.

In order to gain more insight into the effect of sanction on trade I use a main research question as well as several sub-research questions. As mentioned in the introduction, my main research question is:

'What is the effect of sanctions on trade?'

Based on past research and theory I expect that the effect will be negative. After all this is often one of the main goals of a sanction and successfulness of the sanction is expected to be dependent for a large part on the extent to which trade is obstructed. The sub-research questions that will give us more insight into the dynamics of sanctions are as follows.

'What is the effect of a sanction on trade of the target country with third countries?'

From the literature one could expect a positive, negative or no effect. A positive effect on exports to other countries might be caused by a 'black knight' effect where befriended nations aid the country targeted by a sanction, for example because they consider the sender an enemy. This would result in an increase in export to these nations. A negative effect might also occur because other countries feel insecure in trading with the targeted country, or even because they have been threatened with sanctions themselves if they do not reduce their own trade with the target country. I suspect however that both effects work at the same time, and that I will not be able to find a significant effect of a sanction on trade with third countries.

'How does the involvement of different international institutions influence the effect that sanctions have on trade?'

I expect that only the involvement of large institutions that have the power to include many countries in the imposition of the sanctions will have a significantly negative impact on trade. An example of such an institution is the United Nations, while other institutions might be too small or have too limited influence to affect trade. The reason that I expect only large institutions to have an effect lies in the fact that countries often strive to include as many countries as possible in the sanction.

'How does the manner in which a sanction is implemented influence the effect that sanctions have on trade?'

In order for a sanction to have a significant negative effect on trade I expect that full support of the executive power in the country, i.e. the government is necessary. Since this is also the case when a sanction is implemented through an international institution, I expect these two manners to have a significant influence on trade.

'What effects do different types of sanctions have on trade?'

In order to have an effect on trade a sanction must in some way have a direct or indirect effect on the exports and imports of a country. The most direct effect can be expected for full or partial trade embargoes. Export or import restrictions are also likely to influence trade directly, as do I expect that a physical blockade would.

'What is the effect with respect to trade when a threat is issued before the imposition of a sanction?'

In the literature overview in Section 3 I refer to the paper of Nooruddin (2002) in which he signals the selection bias that occurs when testing the effectiveness of sanction only with cases in which sanctions were implemented. He argues that imposing a sanction plays an important role in the course of the sanctions. A threat might trigger a country to adjust its policy as to avoid a sanction altogether. In a case where a threat is issued and a sanction still follows this might indicate a situation in which a targeted nation is particularly committed to hold on to their own convictions. Thus I expect sanction cases in which a threat was issued beforehand to have a larger negative effect on trade, because of a more intensive conflict between the countries involved.

5. Theoretical Framework

5.1 The Gravity Model: History and current form

In order to investigate the effect that sanctions have on trade I use a Gravity Model as the basis for my research. The Gravity Model, based on Newton's Law of Gravitation was first used by Jan Tinbergen (1962) to explain trade flows, and has also been used to explain for example flows in Investment or Migration patterns (Anderson, The Gravity Model, 2011) . Only in the last decade has the Gravity Model started to appear in text books and is it being taught next to more conventional models such as the Heckscher-Ohlin model and Ricardian models of trade. The most basic form of the equation regresses bilateral trade flows of the relative sizes of the country's output and divides that by the distance between countries. The basic formula is as follows.

$$F_{ij} = G \frac{M_i^\alpha M_j^\beta}{D_{ij}^\theta}$$

Where F_{ij} stands for the flow of goods from origin i to destination j , where $M_i^\alpha M_j^\beta$ are usually denoted by the country's GDP, and D_{ij}^θ is the distance between the countries. Usually the logs are taken from this equation to obtain a linear equation, which can be estimated using OLS. Most empirical estimation models are based on the following basic regression (Head, Gravity for Beginners, 2003).

$$\ln F_{ij} = \alpha \ln M_i + \beta \ln M_j - \theta \ln D_{ij} + \epsilon_{ij}$$

The distance between countries, D_{ij}^θ , is usually measured as great circle distance between the capitals or the main economical cities of the countries. At first instance the great circle distance does not seem to accurately capture the distance of transportation by for example shipping, and does not represent other costs related to the exchange of good such as insurance costs, freight or loading costs. However, empirical research has shown that there is often a high negative correlation between great circle distance and trade. Reasons that have been put forward to support the idea that distance matters for trade are the following. Transportation costs are proxied by distance, and time of transportation, communication

costs, transaction costs, synchronizations costs and cultural distance are associated with distance (Head, Gravity for Beginners, 2003).

Even though the model was from the start very well able to explain the observed trade flows between countries in empirical applications, it took some years before the theoretical foundations of the model were fully put forward and until full-scale application in policy making started. The research by Anderson (1979) is often seen as the first theoretical explanation of the gravity model based on General Equilibrium. It assumes a 'perfect world' in which countries completely specialize in the production of a good, preferences of consumers are identical and there are no trade barriers. Anderson extended this basic version of the model to include barriers, different utility functions and more sectors (Bergstrand & Egger, 2011).

In the years that followed the first use of the gravity model to explain trade flows, many additions have been made to the model's design. An important publication by Trefler (1995) introduced the idea of 'missing trade', pointing to the fact that the traditional Heckscher-Ohlin models predicted vastly higher levels of trade than the levels that were being observed. Research mainly by Anderson and van Wincoop (2003) led to the inclusion of a comprehensive multilateral resistance term, that measures a country's general resistance to trade. A now generally accepted manner in which to capture this multilateral resistance term is by the inclusion of country fixed effects, both importer fixed effect, exporter fixed effects as well as country-pair fixed effects. By doing so factors that influence trade such as whether two countries share a border, use a common language or have belonged to the same colonial empire. Some factors influence the trade of a country with all other countries in the world, such as when a country is landlocked or the size of the country. There are many more possible variables that are included in some empirical research, while they are left out of other regressions. Depending on what is suitable a selection of variables is used to explain the variation in trade levels between countries.

In most empirical research that looks at trade between countries, especially when using historical data, the aggregate level of (merchandise) trade is being used as a proxy for trade. In recent years there has however been a debate about the appropriateness of this variable. The explanatory variables in the regression might have a different impact on the trade of

various goods. In order to solve this problem one would have to disaggregate the trade data, a task that is often not feasible for many countries and especially for trade data of the past.

5.2 Common problems with Gravity Models

According to Head and Mayer (2014) there are two problems that are common when using gravity models that are also relevant for the empirical estimations in this thesis. The first problem is how to correctly model the errors, i.e. how to deal with heteroskedasticity of the error term. The second problem is the presence of many zero's in the dependent variable. In large datasets that span many countries and years it is common to find that a large part of the bilateral trade data takes the value of zero. The next section will describe the presence of this problem in my dataset as well. Head and Mayer(2014) discuss several solutions to these problems and compare the outcomes of different estimation models using a Monte Carlo simulation. I will briefly summarize the different solutions that they propose and how they can be applied.

In order to estimate the gravity equation while taking into account the possibility of an estimation bias due to heteroskedastic error terms, the author propose to estimate the equation assuming different distributions of the data. Next to the normal OLS estimation, one could use a Poisson pseudo-maximum likelihood estimator or a Gamma pseudo-maximum likelihood estimator. Since it depends on the data which estimator is most appropriate, it is advised to use them all and to compare the results.

Perhaps even more troubling is the value of zero for many of the observations for bilateral trade. When using the general OLS model, making use of the natural logarithm, the observations with a value of zero for bilateral trade will drop out of the sample. Considering that this could mean that 50% or more of the observations would be omitted, and considering the fact these omitted observations would not be a random part of the data, this poses a problem. The omitted observations, for which trade is reported as zero, could be correlated with dependent variables in the regression. The first quite blunt solution that has been used in some literature is to add a 'one' to the trade observations and subsequently take logs; $\ln(F_{ij} + 1)$. Related to this is the second solution where one adds a number ' α ' to the trade observations, that resembles a certain amount of trade that is just not recorded in

official records, after which the log is taken; $\ln(F_{ij} + a)$. The third related solution assumes that there is a certain level below which it is just not profitable to trade, resulting in a trade level of zero, while all other reported figures are accurate. Furthermore, this solution assumes that there is a minimum level of trade for every country. In this case of the observations with a trade value of zero, the zero will be replaced by the minimum level of trade. This method is referred to as EK Tobit. The fourth possible solution is a two-stage approach that has been put forward by Helpman, Melitz and Rubinstein (2008), in which in the first stage the probability that two countries trade with each other is estimated. This probit estimation is incorporated into the second stage, in which a gravity equation is constructed for those country-year pairs that have a positive trade flow. The difficulty with this solution is finding a variable that satisfies the exclusion restriction, i.e. that does explain whether there is trade or no trade at all, but that does not explain the level of trade. The authors use an index of common religion as their instrumental variable. A fifth estimation method that is mentioned is to use the Multinomial PML estimator which attributes less importance to the largest trade flows because the share of trade is divided by the total expenditure of the country. Lastly the Poisson and Gamma pseudo-maximum likelihood estimators that are also helpful in dealing with heteroskedastic error terms, can be used to deal with a large number of zero's in the trade data. One should notice however, that previous papers, in which the Poisson and Gamma estimators were used, show mixed results.

In order to compare the different methods to estimate a gravity model in the presence of many zero's in the dependent variable, Head and Mayer (2014) perform a Monte Carlo simulation. They firstly construct their own database using a structural gravity model and use it to perform the different estimation methods on. Subsequently they compare the extent of approximation of the original coefficients that the authors used in the Monte Carlo simulation. Which estimation method gives the best unbiased results, depends on the assumption about the distribution of the trade variable. When the data on trade is assumed to have a homoskedastic log-normal distribution it is best to use the third proposed solution; EK Tobit. When the data on trade is assumed to be heteroskedastic, with a constant variance to mean ration, it is best to use the Poisson or Multinomial pseudo-maximum likelihood estimator.

5.3 Methodology

In the current literature and when we look at recent empirical results, there is no consensus on how the gravity model can best be estimated, especially in the presences of many zero's among the dependent variable. In Section 5.2 I discussed several estimators that can be employed to calculate the effect of sanctions on trade. In this section I present the different regression that I use to estimate the effect and that can be put next to each other to see which estimator is the best.

The regression that I use as the bases for the different estimations methods looks as follows.

$$\ln T_{ie} = \theta \ln D_{ie} + \rho X_{ie} + \epsilon_{ie}$$

Where T_{ie} represents the trade flow of the exporter to the importer. D_{ie} stands for the distance in kilometers between the two most populated cities. ρX_{ie} is a vector of control variables that have an influence on trade. In the basis specification I use the following control variables: regional trade agreement in place and common currency. Many other variables that could be included in the regression are captured by the importer-year, exporter-year and country-pair fixed effects. Examples of such control variables are common language, if the countries were ever in a colonial relationship, the distance between the main economic centers. The reason for eliminating the countries' GDP's from the regression is explained in Section 7. In that section I also show the results of various robustness checks, in which other control variables are added to the regression. The standard errors will be clustered at the country pair level, as is also done by for example Helpman, Melitz & Rubinstein (2008). Regression (3) will serve as the basis for some of the different estimation methods that I mentioned in Section 5, and will repeat briefly below.

The first approach is to estimate the regression as a linear model with three types of fixed effects. These are importer-year, exporter-year and country-pair fixed effects. The importer-year fixed effect absorbs the part of the data that does not vary for a certain exporter in a certain year between the different importers, while the exporter-year effect captures the unchanged of every exporter-year combination. The country-pair fixed effects takes out the part of every country-pair that does not vary over the years. A disadvantage of this approach is that due to the presence of many zero's in the data for trade and the usage of natural logarithms, a large part of the observations will drop out of the regression.

The second approach is to manipulate the data for trade in such a way that it is possible to take the natural logarithm and still maintain all observations. In order to achieve this I take the natural logarithm of $(T_{ie} + 1)$, while keeping the rest of the regression similar to regression (3) and including the same three types of fixed effects.

$$\ln(T_{ie} + 1) = \theta \ln D_{ie} + \rho X_{ie} + \epsilon_{ie}$$

A problem that remains is however the non-normal distribution of the data on trade. The many zero's cause the data to be severely skewed to the right. One solution to deal with this problem is to use a Poisson distribution to fit the data. This non-linear approach has been used extensively in the literature on the effects on trade, although it has sometimes also provided biased results as for example in Martin and Pham (2011). Due to the complexity and size of the panel dataset, the computational problems become too large to apply this method to the data. The only solution would be to use cross sectional data, and abandon the use of fixed effect, while this has become the standard in gravity equation modeling and is thus undesirable. Heckmann's two stage model, another estimation method, that has been used, mainly in theoretical papers to solve gravity equations with many zero's among the dependent variable, does not easily adapt to the use of fixed effects either. Regression (3) and (4) will therefore be used to test the effect that sanctions have on trade.

6. Data

In this thesis I make use of three already existing databases that together provide insights into the effect of sanctions on trade. The first database is a database of sanctions episodes in the period 1945 till 2005 by Morgan, Bapat and Kobayashi called the 'Threat and Imposition of Economic Sanctions (TIES) database'. Secondly I use the database of World Import and Export Data from 1962 till 2000 from The Center for International Data by Feenstra, et al.. Thirdly I use the country pair gravity data for the years 1948 till 2006, from the French CEPII (Centre d'études prospective et d'informations internationales). I will discuss all three databases and the combined database that they provide together in more detail in this section.

The starting point concerning the data is the TIES database that was first published in 2009 by Morgan, Bapat and Krustev and included 888 cases in which sanction were either threatened, imposed or both. This was a great improvement from the dataset that had been commonly used before, that of Hufbauer, et al. The first version of the dataset by Hufbauer and his colleagues appeared in 1990 and prompted a bulk of empirical research on the effects and effectiveness of sanctions. The most recent version, published in 2007 contains 174 cases of sanctions, starting in 1914. Until the TIES dataset was published, the Hufbauer, et al. dataset was the most comprehensive one that could be used to study sanctions, something that was done extensively. One drawback of the database is however that it is mainly focused on sanction episodes in which Western countries were involved. There is much attention for those cases in which the United States was the sender (and in some cases the target). Cases of sanctions between non-Western countries, which are quite common, are only rarely included. The number of cases included in the database is an underestimation of the true number of instances in which sanctions have been used as a political tool in international relations.

The TIES database is already an improvement on the database by Hufbauer, et al. for the inclusion of many more cases of sanctions. The number of 888 was increased even further to 1412 in the most recent publication by Morgan, Bapat and Kobayashi in 2014. The number of cases in the TIES database is not only much higher than in the work by Hufbauer, et al. because of the inclusion of many cases between non-Western countries, but also because cases in which only a threat to impose sanctions was made are included. In the literature critique has been issued against the inclusion of only cases in which sanctions were actually imposed (Nooruddin, 2002). The decision whether or not to impose sanctions might be correlated with the expectations about the success they will have. One could imagine that in some cases only the mere threat of a sanction is enough to direct the target's behavior in the desired direction, thus making the cases in which the target endures the sender's threat and sanctions have to be imposed, less likely to succeed. Supposing that researchers and politicians would like to know about the effect of sanctions and the threat of sanctions in an unbiased way, the inclusion of episodes of threats of sanctions is essential. In this thesis I will not look at the effects of only threatening with sanctions, since I am not interested in whether the attempted policy change was achieved, but what the effects of actual sanctions

are on trade. Using only the cases in which sanctions were imposed (either with or without a threat beforehand), leaves 845 episodes in the database, while when all sanctions episodes are removed that completely took place before 1962 or after 2000, 610 unique sanctions episodes remain.

Unfortunately there were several limitations to the data on sanctions. Firstly, only up to five senders of sanctions were reported, while in reality there were often many more. I manually investigated all sanction episodes in which five countries were listed as the sender to verify whether more countries should be listed. Especially in the cases in which the United Nations, European Union or other institutions were involved in the implementation of the sanctions, was it necessary to add sender countries. In the cases in which the European Union or one of its predecessors was the sender of a sanction, I considered all the member states to be senders during the entire period of the sanction, unless they joined the EU during the sanction episode in which case they are considered to be a sender from the moment of accession. In those cases in which the United Nations was the sender of the sanction, again all member states are considered to be senders. When a country joined during the sanction episode it is considered not to take part in the sanction, unless it individually stated that it imposed sanctions. The difference between the cases in which the European Union or the United Nations was the sender, comes from the different nature of the organizations. The European Union is a much closer cooperation between nations where more value is attached to common action, while the United Nations attempts to coordinate action but is often dependent on the willingness of countries to oblige. Secondly, the end date for a part of the sanction episodes was missing. For those sanctions for which a date was known for 'ongoing as of', I took this year as the end year. In those cases where such information was not available either, I manually investigated the sanctions only to find an end date. When there was no information on the sanction, I assumed it was an insignificant and short lasting sanction which started and ended in the same year. The third adjustment that I made to the database on sanctions was to record the start and ending dates of a sanction, as there being a sanction during the entire year. Fourth, in some cases several sanctions were in place at the same time. This can be the case when a country has already individually imposed sanctions on a country, while at a later stage an international institution and thereby all its members, also imposed a sanction. In order to be able to measure the effect of sanctions on

trade correctly, I have only kept the observation with the most rigorous sanction, i.e. the lowest score on sanction type.

In addition to the data on sanctions, I have a large amount of data on the bilateral trade flows between most countries in the world, over a period of 1962 till 2000. These data have been compiled by Feenstra, et al. and are available on his website 'The Center for International Data'. Feenstra and his colleagues have put a lot of effort in combining data from the United Nations Comtrade and other UN databases, the United States trade database and many other national government statistical agencies. The result is an exhaustive database that contains much information on the different volumes of merchandise trade between all countries of the world. Still, for many country pairs and years data on the volume of trade is missing. As I mentioned in Section 5, this is a problem that troubles much empirical research, and is difficult to overcome. It is important to be aware of the fact, that missing data or the account of zero trade does not always mean that there has been no legal trade between those countries. It could be that the actual amount is so small, that statistical agencies report it as zero, but it could also be the case that the recording of such information was not sufficiently done. Regardless of its shortcomings, the database on bilateral trade is one of the most detailed and complete available.

Moreover, I make use of a database that contains information on most country pairs in the world, which is necessary to construct a gravity equation. The data from the CEPII stretch from 1948 till 2006 and every country pair-year observation contains information on no less than 35 variables. This allows me to construct a gravity equation with the control variables that are relevant to the situation. The database has been constructed by Head, Mayer and Ries, who used it to write a paper on the developments in trade between former colonies and their colonizers (Head, Mayer, & Ries, The erosion of colonial trade linkages after independence, 2010). Information was taken from the World Bank's World Development Indicators, the WTO, other CEPII databases and publications of other authors such as Baier and Berstrand (2007), Glick and Rose (2002) and Andrei Shleifer.

Since the database of Feenstra, et al. encompasses the shortest time period of the three databases, namely from 1962 till 2000, the database that I have constructed and which contains all the information described in this section, will also stretch from 1962 till 2000. It

is thus not possible to make any conclusions based on the most recent episodes of sanctions. I do have a lot of information about past episodes that will be able to tell us what, in general, the effects of sanctions on trade are. The dataset in which all information has been joined together, contains 782.964 observations. Summary statistics on the appearance of countries in the database can be found in Table I in the appendix. Unsurprisingly, the country that has most often imposed sanctions on another country is the United States. Countries that have most often been the target of sanction are South Africa, Haiti and Cambodia. When we look at only those observations in which a sanction took place, we see that the database contains 10.596 such observations. In Table II in the appendix, the summary statistics of the observations in which a sanction was present show that when an institution was involved in the imposition of a sanction, this was most often the European Union or one of its predecessors, or the United Nations. Other institutions that can play a role in the imposition of sanctions are the Commonwealth Secretariat, the International Atomic Energy Agency, the International Bank for Reconstruction and Development (World Bank), the International Monetary Fund, the League of Arab States, the North Atlantic Treaty Organization (NATO), the Organization for African Unity, the Organization of Arab Petroleum Exporting Countries (OAPEC), the Organization of the Islamic Conference (OIC), the Pan American Union (OAS) and the World Trade Organization (WTO).

Furthermore, the most common type of sanction is a partial economic embargo, followed by a total economic embargo. In this dataset the other options are import restrictions, export restrictions, blockade, asset freeze, the termination of foreign aid, a travel ban, the suspension of an economic agreement or protocol and others.

The primary part of government that is involved in the imposition of a sanction, represented in the table as sanction identity are international institutions, followed closely by national governments. Other possibilities are bureaucratic, legislative, judicial and executive.

7. Results

Now that I have discussed the theoretical background, empirical methods and data, it is time to have a look at the results of the analyses that I perform with my dataset. The results of

regressions (3) and (4), where a panel data approach with fixed effects is taken can be found in columns (1 till 3) and (4 and 5) of Table III. Let us first take a look at the regression in column (1) and at the coefficient that we are mainly interested in, that of the sanction dummy. It has the expected minus sign, indicating that when a sanction is imposed this has a negative effect on the trade between the target and sender countries. Since I take the natural logarithm of trade, we can either interpret the coefficient approximately, leading to a conclusion that a sanction approximately decreases trade with 23%. A more precise interpretation where we perform the following calculation; $\frac{Sanction\ Dummy_1}{Sanction\ Dummy_0} - 1 = e^{Coefficient} = e^{-0.224} = 0.7993 - 1 = -0.20$, leads to the conclusion that the presence of sanctions leads to a 20% decrease in trade. When we take a look at the other coefficients in the regression, we see that they all have the sign that we would expect from the literature, except for the product of the GDP's. The presence of a regional trade agreement increases trade with 52%² and the use of a common currency increases trade with 80%³. Because of the counter intuitive results for the product of GDP, I have performed a regression including the log GDP's of the exporter and importer separately, while keeping the other variables identical. Furthermore I have performed a regression without any measure of GDP. We can see from column (2) that including the GDP's of the countries separately does not lead to significant coefficients. Quite the opposite, they are highly insignificant. What stands out from column (3) is that excluding any measure of GDP does not alter the estimations of the other coefficients much. The signs stay the same and the estimates continue to be significant. Furthermore, the fit of the model does not decrease greatly when a measure of GDP is excluded (from 0.8218 or 0.8214 to 0.8206). The main reason not to include any measure of GDP as an independent variable, is that it is already captured by the importer-year and exporter-year fixed effects, since GDP does not vary over these observations. The model used in Helpman, Melitz and Rubinstein (2008) is an example of a regression where no measure of GDP is included in the gravity equation either.

In the fourth and fifth column of Table III, the regressions where the natural logarithm of trade + one is the dependent variable, are shown. We can see that the results in column (5) are mostly similar to those in column (1), while the number of observations has almost

² $e^{Coefficient} = e^{0.421} = 1.5235 - 1 = 0.5235$

³ $e^{Coefficient} = e^{0.586} = 1.7968 - 1 = 0.7968$

doubled. The sign and significance of the coefficients is the same for all variables, except for Regional Trade Agreement, which is no longer significant. A reason for this might be that in the equation in column (2), many more countries have been included that have reported a trade flow of zero. This will often be trade between less developed countries. These countries can be in a regional trade agreement but still report zero trade, while more developed countries that are not in a regional trade agreement with each other might trade more. The World Bank recognizes that regional trade agreements can have positive but also negative effects. They claim that the implementation of a regional trade agreement often fails because of a lack of accompanying consistent broader reforms (The World Bank, 2005). Furthermore, the effect that sanctions have on trade is higher than in the previous regression, as it is now between 33% and 36%⁴.

I will take the regression in column (3) as the basis for further investigations of the effect of sanctions.

Now that we are familiar with the general effect of sanctions on bilateral trade between the sender and target, we can have a closer look at the effect that a sanction has on the trade with other nations. In the regression in Table IV we can see the effect that a sanction has on the exports of the target state to other countries that have not imposed a sanction. In Section 4 I stated that my hypothesis is that there will be no effect of sanctions on trade with third countries because the cases where trade with a country not involved in the sanction episode increases and the cases where we see a decrease in such trade will cancel each other out. This expected results is exactly what I find in my database, as we can see in table IV that either no effect of sanctions on trade with nations not engaged in the sanction exists, or that the two effects cancel each other out. We can thus not draw a general conclusion that exports to other trading partners is either positively or negatively affected. This confirms my hypothesis that no effect on trade with third parties would be found.

7.2 Differentiating between different sanctions

⁴ $e^{Coefficient} = e^{-0.398} = 0.6717 - 1 = -0.3283$
 $e^{Coefficient} = e^{-0.452} = 0.6364 - 1 = -0.3636$

In Section 2 of this thesis I extensively discussed the different types, motivations for and methods of imposition of sanctions. In real life every sanction case is different of course, and this is also reflected in the database. This variation offers an opportunity to test the effect that different types or methods of implementation of sanctions have on trade. In Tables V, VI and VII the effects of imposing a sanction through different institutions, the effects of different identities of sanctions, different types of sanctions and imposing a sanction in combination with a threat beforehand, respectively are presented. When we look at Table V we can see that it matters a lot through which institution a sanction is imposed. At the 5% confidence level the coefficients of the interaction terms of the sanction dummy with institutions 2400(World Bank), 3700(NATO) and 4400(United Nations) are significant. The coefficient of the sanction in which institution 2880(International Monetary Fund) is involved is significant at the 10% confidence level. All coefficients can be interpreted as the effect relative to a situation in which no sanctions are imposed. A sanction by the International Monetary Fund as well as by the United Nations has a strong negative effect on trade. The decrease in trade when a sanction is imposed through the United Nations is about 45%⁵, which is larger than the overall effect that sanctions have on trade as reported in column (3) of Table III. A significant positive effect is found for sanctions imposed by the World Bank or the NATO. This is a counterintuitive result for we would not expect sanctions to increase trade. When we have a closer look at the data, we can see that in almost every case in which a sanction was imposed by the World Bank, another institution such as the European Union or the International Monetary Fund was also involved. While the combined effort of the institutions often has a negative effect on trade, the strong negative effect of the sanctions by the International Monetary Fund leads to the calculation of a positive sole effect of the World Bank. Also for sanctions imposed by the NATO we see the same combination of institutions involved in the imposition of the sanction, leading to the same effect of a positive sole effect. All in all, the hypothesis that a large institution such as the United Nations would be able to significantly and negatively influence trade is partly confirmed. The United Nations indeed showed the expected effect, but also the International Monetary Fund, the NATO and the World Bank have a significant effect in the regression.

⁵ $e^{\text{Coefficient}} = e^{-0.604} = 0.5466 - 1 = -0.4534$

Subsequently, I investigated the effects that the identity of the sanction, i.e. in the manner in which it was implemented, has on trade. The results of this regression are shown in column (2) of Table V. We can see that only those sanctions that have been imposed by governments (identity 5) or international institutions (identity 6) have a significant effect on trade relative to a situation in which no sanction has been imposed, albeit at different significance levels. They both have negative effects and are also among the most used methods of implementing a sanction. The coefficients for sanctions imposed in any other manner do not have a significant impact on trade on their own. We can thus conclude that it is most effective to impose a sanction via the government of an international institution when one wants to create a negative impact on trade, which is exactly what I expected.

Moreover the possibility exists to impose different types of sanctions. These types differ for example in their intensity, can be focused on the whole country or on specific sectors or people. For the full list of sanction types, see Table II. In Table VI, the effect of different types of sanctions is tested against the situation where no sanctions are imposed. The following types of sanctions are significant at the 5% confidence level in the regression: 1(total economic embargo), 2(partial economic embargo), 7(termination of foreign aid), 8(travel ban) and 9(suspension of economic agreement/protocol). The largest negative effect on trade happens when a total economic embargo is imposed, a result that does not come as a surprise. A partial economic embargo and the termination of foreign aid are also effective methods to decrease trade. Imposing a travel ban or suspending an economic agreement or protocol might be effective in achieving the goal of the sanction, but it certainly does not lead to a decrease in trade. Rather it seems to lead to an increase in trade. When we take a somewhat deeper look into this phenomenon, we can see that sanctiontype 8 is only imposed as unique sanctiontype in 46 out of 3531 cases, where sanctiontype 9 is only imposed solely in 101 out of 3723 cases. The fact that most of the time the travel ban and the suspension of economic an agreement or protocol are imposed in combination with other types of sanction, could have lead to the calculation of a negative sole effect, while the combination of types does lead to a reduction in trade. Comparing the outcome to the hypothesis leads us to conclude that while the total and partial economic embargo do indeed influence trade negatively, the export and import ban and blockade do not. The

termination of foreign aid, the travel ban and the suspension of economic agreement/protocol do have a significant effect on trade.

In Table VI the effects of issuing a threat in combination with a sanction is depicted. We can see that the effect on trade of a sanction when a threat has been issued before is smaller than when no threat has been issued. This is relative to the situation in which no sanction and no threat are issued. The Wald test that I performed to test whether the coefficients of $\text{sanction dummy} * \text{threat}$ and $\text{sanction dummy} * \text{no threat}$ differ significantly from each other gives a value of 0.9748, indicating that we cannot reject the null hypothesis of equality. The effect of issuing a threat in combination with a sanction is thus not significantly different from the effect of sanction episodes without a threat. The hypothesis that the cases in which a threat preceded a sanction have a larger effect on trade than case in which no threat was issued is thus rejected.

7.3 The impact over the years

We are all familiar with some examples of very long-lasting sanctions. One striking example is the sanction of the United States against Cuba, which has been in place for more than 50 years. A common heard rational behind (extremely) long-lasting sanctions, is that the targeted states will continue to bear decreases in trade and see worsening economic circumstances, which will eventually force the target to succumb. The sender is wearing the target out, as it were. However, there are also indications that as a sanction continues, the targeted country is able to find alternative markets to trade with, finds new sources of finance and that the citizens adept to the new situation. Whether the effect of sanctions increases over time depends partly on the degree to which the sender is able to successfully isolate the target country. In some cases the target manages to stabilize or decrease the damage from the sanction after some time. Either because third countries actively seek to help the target country, also known as the 'black knight' principle, an example of which is the Soviet Union coming to the aid of Cuba during the Cold War, or simply because third countries are drawn to the opportunity of higher profits (Hufbauer, Schott, Elliott, & Oegg, 2007). This is also referred to as the sanctions-busting argument. In other cases the effects of sanctions increase after some time because the sender country is able to include other

countries as senders. An example are the sanctions against Iran, which did more harm when the European Union imposed sanction next to the United States (Early, 2015). When such a situations arises it is sometimes describes as the negative spillover effect perspective. The effect that sanctions have over time is thus related to the trade it is able to conduct with countries not involved in the sanction.

In this section of the thesis I investigate whether any of these effects can be found in the data. Table VIII shows the results of the effect that sanctions have on trade in different periods after the implementation of a sanction. The results for the first 10 years are significant, either at the 10, 5 or 1% confidence level. For the cases in which sanctions lasted at least 15 or 20 years after the implementation, the coefficients are not significant. We can clearly see a trend of increasing negative impact that sanctions have on trade. However, this effect stops after it has been in place for between 10 and 15 years. Then there no longer seems to be an effect of the sanction on trade. A possible cause for this could be that there are not many cases in which a sanction lasted for 15 or even 20 years, thus making it difficult to draw significant conclusions. There are 240 observations in the data in which a sanction had been in place for 15 year. This selection of the database is dominated by the sanctions on Libya, South Africa and Zimbabwe, thus giving us a very undiversified dataset. When we look at sanctions that lasted for at least 20 years, we are left with even fewer observations; 139, dominated by Libya.

7.4 Robustness and sensitivity checks

In order to ensure that the results of the regressions in the beginning of this section are not driven by a specific small part of the data or the selection of the control variables, I perform several robustness and sensitivity checks in this section.

Firstly I test whether the estimations are mainly based on a small part of the data. As I mentioned before, the country that is one of the best represented in the database considering import and export data and the most often involved in the imposition of sanction is the United States. It is important to test whether the results still hold up when the United States are removed from the sample. Another sensitivity check is done on the length of sanctions. A part of the data concerns very short term sanctions that started and

ended within the same year. I check what happens to the results when these sanctions are left out of the sample. The estimations of the regression, when the restricted sample is used, can be found in Table IX, columns (2) and (3). The results indicate that taking the United States out of the sample, has little impact on the coefficients. They all keep the same sign, order of magnitude and significance level. The coefficient for sanction dummy increases only slightly. Leaving the shortest sanctions, with the duration of less than a year, out of the sample, does have a small impact on the estimation of the model. The effect that a sanction has on trade decreases somewhat, and is now significant at the 5% confidence level. The estimations of the other variables stay close to the baseline regression that is depicted in column (1).

Secondly, I test whether including other control variables into the basic regression, changes the estimations. Due to the large number of variables in the database I show only a selection of additional control variables in Table X, to show that the results are robust to additional control variables. In column (1) the basic regression is shown to be able to easily compare it to the robustness checks. In columns (2), (3), (4) and (5) the regression is shown while including respectively sharing a border, common language, colony, area (land) of exporter and area (land) of importer. These are all variables that are for the most part already accounted for by the country-pair fixed effects in the model, and we do indeed see that they have no influence on the estimation of the coefficient for the sanction dummy. Even though all the added coefficients are significant, they not alter the fit of the model of the other estimated coefficients. Since we are mainly interested in the sanction dummy coefficient, incorporating the variables of $\ln(\text{distance})$, sharing a border, common language and whether the countries were ever in a colonial relationship would not improve the model. In column (5) the area's in terms of land of both countries are included, which does not have a significant effect, also because this is already accounted for by the importer and exporter year effects.

The third type of control that I perform on the data is to test what the effect of a sanction is on whether two country trade at all. In order to do that, I create a dummy variable for trade which is zero if there is no trade and one when there is trade. In Table XI the results of a logit regression with the dummy for trade as the dependent variable and including importer-year and exporter-year fixed effects are shown. From the sign of the coefficient for the sanction

dummy we can already tell that the effect that sanctions have on whether or not two countries trade is negative. When we look at the numbers in more detail we can see that the presence of a sanction decrease the odds of trade between the two countries involved with 60%⁶. This confirms the finding that sanctions have a negative effect on trade.

Overall, the regression is robust to various changes to the sample as well as the inclusion of different control variables. We can rest assure that the effect that I find of sanctions on trade is a robust effects that holds in various situations.

8. Conclusion

The presences of sanctions as a policy tool in international relations for many centuries as well as the current focus on both the abandonment of long-lasting sanctions as well as on the imposition of new restrictions on powerful nations, shows the relevance of this research into the effects of sanctions on trade. The focus on trade is useful because it is often the main target of the sanction and the effects are expected to force the government in place to change its policy.

We have seen that sanctions can take many forms and I have distinguished different types of sanctions as well as different goals and reasons to impose sanctions. An analysis of past research shows that different orientations within the research into the effects of sanctions can be distinguished. Firstly researchers are interested in the effectiveness of sanctions. The question of whether the goal that was set when the sanction was issued is actually reached and thus whether the sanction was successful, is a question that is of great importance to researchers and policy makers alike. This line of research does however suffer from problems with collinearity and subjectivity for it is often difficult to construct an independent measure of success that is not related to any of the independent variables. A second stream within this field of research is into the effects that sanctions have on economic factors such as trade and FDI. This is also where the focus of my thesis lies. Furthermore there is research that focusses more on the humanitarian side of sanctions.

⁶ $e^{\text{Coefficient}} = e^{-0.923} = 0.3973 - 1 = -0.6027$

Effects of sanctions on for example healthcare or human well-being are central in this type of research.

The theoretical framework that I have used throughout this thesis and that is a common tool in the literature about sanctions is the gravity model. It uses country pair specific characteristics such as GDP, distance but also aspects such as common language and currency and whether countries share a border or currencies as predictors of the amount of trade that takes place between two countries. A sanction can be seen as a disturbance of the status quo that leads to a deviation from the level of trade that would be realized under normal circumstances. By combining data from three existing sources into a new database I have been able to provide insights into the effects of sanctions world-wide. The conclusions of this thesis can be applied to the whole range of sanctions that we see in the world. Not only because the database spans almost four decades but also because it does not focus solely on sanctions in which western nations were involved as is the case with the database by Hufbauer and his colleagues and all the research that used their database.

Our knowledge of sanctions and the intention to damage trade, leads us to expect a negative effect of sanctions on trade. And the results that various regressions show do indeed point to the same conclusion, that sanctions diminish the amount of trade between the sender and the target of the sanction. In the basic regression the effect is an approximate decrease of trade with 23% in the presence of a sanction. This result is robust to various changes in the regression and the data.

Furthermore I have tested different aspects and points of variation between the sanction cases. Firstly, I have tested whether a country that is the target of a sanction changes its levels of trade with other countries not involved in the sanction. This does not appear to be the case, as no significant effect can be found on the export of products to third countries. Secondly, I tested the difference in impact when different institutions were involved in the imposition of the sanction. It turns out that a sanction imposed by the International Monetary Fund or the United Nations has a very strong negative effect, while a sanction imposed by the World Bank or the NATO seems to influence trade in a positive way. This counterintuitive result can however be explained by the fact that when the World Bank or NATO is involved in the imposition of a sanction there are almost always other institutions

involved as well. The large negative effect of those institutions leads to the calculation of a sole positive effect of involvement of the World Bank or the NATO. Thirdly, I looked at the manner in which a sanction was implemented. Implementation by the government or international institutions has a sole negative effect on trade and seems to be the most effective way of imposing a sanction. Fourthly, I have shown that the type of sanction in place matters for the effect it has on trade. Unsurprisingly, a total economic embargo leads to the largest decrease in trade, while a partial economic embargo and the termination of foreign aid decrease trade to a somewhat lesser extent. Fifthly, I was interested in the effect that the issuance of a threat beforehand has on the effect of the sanction. As it turns out there is no significant difference between imposing a sanction with a threat beforehand or without such a threat.

Moreover, a point of interest was what the effect of sanctions on trade is over time. Does the effect decrease or increase when a sanction is kept in place for a long period of time? The theory provides evidence for both directions, but from my dataset it became clear that for the first ten year sanctions have an increasingly negative impact on trade. In the 15th and 20th year of a sanction the effect on trade is no longer significant, although this could be caused by the small number of cases in which a sanction lasted as long as 15 or 20 years and the dominance of a few countries in the remaining cases.

Robustness checks have shown that the inclusion of various control variables, even though in some cases significant, does not change the estimation of the variable of interest, namely the sanction dummy. Nor does omitting part of the data from the dataset lead to any different conclusions. Also, the effect that a sanction has on the presence of trade, points into the same direction, namely that sanctions influence trade negatively. All in all one can say that the results in this thesis are robust.

The results in this thesis can hopefully contribute to a better understanding of the effect that sanctions have on trade. When the objective is to decrease trade maximally, a policy maker could draw lessons from this paper not only about the type of sanction, but also about which international institutions to involve, what manner to use to impose a sanction and what the optimal duration of a sanction is. Of course the result in the paper can never lead to an exact prediction of what will happen when a sanction is imposed, but nonetheless it gives a clear

insight into the considerations to the policymaker. Even though my thesis provides new insights into the matter of sanctions, there are also some limitations and suggestions for further research. One limitation is that the most recent data on sanctions and trade has not been included in the dataset due to limited availability. Even though the timespan of the data is almost 40 years, no data on sanction in the 21st century is included. The world is changing constantly and trade has increased considerably, and thus results might be somewhat different when the most recent data are included. Furthermore it is unfortunate that due to the complexity of the data and the inclusion of many fixed effects, is it not possible to use different estimation methods such as Heckman 2-stage or to use an alternative distribution such as Poisson to verify the results. As is often the case, the answers in this thesis lead to new questions. It would be exciting to investigate how the decreases in trade caused by sanctions effect the country on meso and micro level. Who suffer the most from the changes in trade and what sectors undergo the largest changes? Another extension could be not to look at the effect of sanctions on trade but on FDI, since cutting off the stream of finances to a country is often also part of the goals of a sanction.

Appendices

Table I

Country name	Frequency as importer	Frequency as exporter	Years as sender of sanction	Years as target of sanction
Afghanistan	3.198	4.251	39	11
Albania	2.691		35	9
Algeria	6.201	5.499	95	10
Angola	3.588	3.861	35	
Argentina	5.616	6.357	73	114
Armenia	1.872	1.287		5
Australia	6.474	6.708	130	12
Austria	6.630	6.630	120	40
Azerbaijan	1.950	1.716		9
Bahamas	3.159	3.822		
Bahrain	5.187	4.485	39	
Bangladesh	4.641	5.421	39	
Barbados	4.797	4.134	39	
Belarus	1.755	1.950		30
Belgium	6.630	6.669	202	77
Belize	2.652	3.276		
Benin	4.329	3.705		
Bermuda	4.836	3.744		
Bolivia	3.666	3.627	54	6
Bosnia and Herzegovina	1.638	1.872		
Brazil	6.240	6.474	74	24
Bulgaria	5.421	6.006	54	2
Burkina Faso	4.953	3.588	54	
Burundi	3.744	3.120	24	80
Cambodia	3.471	4.056	52	228
Cameroon	5.148	5.070	54	
Canada	6.591	6.630	299	78
Central African Republic	4.056	3.744	25	1
Chad	4.173	3.315	36	1
Chile	5.499	6.084	54	10
China	6.513	6.591	115	84
Colombia	6.162	6.162	60	6
Congo	4.602	4.641	50	
Costa Rica	4.953	4.836	54	6
Coted'Ivoire	5.655	5.655	54	
Croatia	2.145	2.301		1
Cuba	3.354	4.797	35	187
Cyprus	5.226	5.226	50	

CzechRepublic	5.811	6.357	60	
Denmark	6.513	6.708	180	78
Djibouti	3.315	3.003	36	
DominicanRepublic	4.095	4.251	39	3
Ecuador	5.499	5.187	140	23
Egypt	5.460	5.577	130	119
El Salvador	4.251	4.095	39	7
Equatorial Guinea	2.418	2.613	24	
Estonia	1.911	2.184		
Ethiopia	4.719	4.875	67	14
FalklandIslands	1.170	1.404		
Fiji	3.939	3.354	11	27
Finland	6.513	6.669	146	36
France	6.669	6.708	276	105
French Guiana	4.641	2.964		
Gabon	4.329	4.680	58	
Gambia	3.627	2.964	35	
Georgia	1.755	1.755		
Germany	6.591	6.669	263	119
Ghana	4.953	4.641	57	
Gibraltar	3.003	3.198		
Greece	6.630	6.591	179	68
Greenland	2.418	2.457		
Guadeloupe	5.304	4.212		
Guatemala	4.329	4.524	123	21
Guinea	3.549	3.159	24	
Guinea-Bissau	2.925	2.886		
Guyana	4.290	4.329	39	
Haiti	3.471	3.471	31	386
Honduras	4.251	4.290	40	3
Hong Kong	6.396	6.357		
Hungary	6.084	6.435	55	12
Iceland	4.914	5.304	54	
India	6.318	6.669	129	105
Indonesia	6.357	6.591	88	44
Iran	5.967	6.045	85	203
Iraq	4.485	4.992	78	1.340
Ireland	6.591	6.669	188	95
Israel	5.577	6.123	58	74
Italy	6.630	6.669	222	89
Jamaica	4.953	4.914	87	
Japan	6.669	6.708	165	53
Jordan	5.304	4.251	70	48
Kazakhstan	4.407	4.680	11	
Kenya	4.719	5.109	40	
Kiribati	2.535	2.691		

Kuwait	5.226	5.187	99	
Kyrgyz Republic	1.677	1.365		1
Laos	3.354	2.886	11	22
Latvia	1.872	2.184		
Lebanon	4.953	4.953	39	1
Liberia	4.797	4.446	54	2
Libya	5.070	4.485	74	2.877
Lithuania	2.028	2.184		
Macao	3.003	4.797		
Macedonia	1.638	1.521		2
Madagascar	4.953	5.265	54	
Malawi	3.939	5.031	50	
Malaysia	6.240	6.708		14
Mali	4.368	3.783	52	1
Malta	5.343	5.421	55	
Mauritania	3.939	3.510	36	
Mauritius	4.446	3.978	35	
Mexico	6.240	6.201	163	22
Moldova	1.599	1.794		
Mongolia	1.872	2.379		
Morocco	6.162	6.162	83	3
Mozambique	3.744	4.251	39	
Myanmar	3.783	4.602	50	8
Nepal	2.691	3.432	35	5
Netherlands	6.630	6.669	191	81
Netherlands Antilles	4.992			
New Caledonia	5.109	3.822		
New Zealand	5.967	6.591	59	12
Nicaragua	3.744	4.095	54	19
Niger	4.992	4.134	50	1
Nigeria	6.006	5.343	71	39
North Korea	3.315	4.641	9	18
Norway	6.474	6.669	54	1
Oman	4.758	4.485	36	
Pakistan	6.474	6.591	86	128
Panama	4.563	4.524	123	11
Papua New Guinea	3.510	3.471	39	
Paraguay	3.978	4.212	39	
Peru	5.733	6.045	54	15
Philippines	6.123	6.045	54	
Poland	6.396	6.552	55	37
Portugal	6.591	6.669	156	131
Qatar	4.173	3.978	53	
Reunion	5.304	3.822		
Russia	4.251	4.953	79	106
Rwanda	2.769	2.535	28	

Saint Helena	1.443	1.404		
Saint Kitts and Nevis	3.627	4.017		
Saint Pierre and Miquelon	1.833	2.028		
Samoa	2.496	1.833	11	
Saudi Arabia	6.357	5.889	103	12
Senegal	5.421	5.304	54	
Seychelles	3.627	2.886	35	
Sierra Leone	4.251	3.627	50	
Singapore	6.045	6.591	56	2
Slovak Republic	5.070	5.499	60	
Slovenia	5.499	5.265	10	
Somalia	3.939	4.017	55	
South Africa	6.123	6.552	54	624
South Korea	6.513	6.669	22	25
Spain	6.630	6.669	158	84
Sri Lanka	5.265	5.811	54	4
Sudan	4.368	4.680	35	103
Suriname	2.886	3.666	4	
Sweden	6.552	6.669	146	38
Switzerland	6.591	6.630	2	16
Syria	4.641	4.485	73	51
Taiwan, Province of China	6.513	5.655	7	16
Tajikistan	1.560	1.677		
Tanzania	4.212	4.797	54	1
Thailand	6.513	6.552	54	13
Togo	4.797	3.861	54	126
Trinidad and Tobago	5.187	5.655	54	1
Tunisia	5.850	5.616	55	
Turkey	6.474	6.552	184	30
Turkmenistan	1.755	1.833		
Uganda	3.666	4.056	39	65
Ukraine	2.145	2.340		1
United Arab Emirates	5.070	3.861	53	
United Kingdom	6.630	6.669	261	146
United States	6.669	6.708	981	124
Uruguay	3.900	4.836	54	5
Uzbekistan	1.872	1.911		1
Venezuela	6.006	5.733	71	14
Viet Nam	4.485	4.407	39	201
Yemen	2.106	1.911		
Zambia	4.953	4.758	54	10
Zimbabwe	2.964	3.861	10	1.223
Total	782.964	782.964	10.596	10.596

Table II

Institutional involvement		
Institutionid	Name of Institution	Frequency
1240	Commonwealth Secretariat (ComSec)	31
1653	European Economic Community/ European Community	4.023
1830	European Union (EU)	798
2370	International Atomic Energy Agency	140
2400	International Bank for Reconstruction and Development (World Bank)	461
2880	International Monetary Fund	410
3450	League of Arab States	88
3700	North Atlantic Treaty Organization (NATO)	260
3760	Organization for African Unity	1.381
3800	Organization of Arab Petroleum Exporting Countries (OAPEC)	307
3850	Organization of the Islamic Conference (OIC)	2
3900	Pan American Union (OAS)	478
4400	United Nations	3.551
4580	World Trade Organization (WTO)	375

Sanction identity		
Identity		Frequency
1	Bureaucratic	3.852
2	Legislative	742
3	Judicial	58
4	Executive	4.149
5	Government	6.042
6	International Institution	6.849

Sanction type		
Type		Frequency
1	Total Economic Embargo	3.775
2	Partial Economic Embargo	5.755
3	Import Restriction	1.966
4	Export Restriction	3.572
5	Blockade	480
6	Asset Freeze	788
7	Termination of Foreign Aid	1.847
8	Travel Ban	3.496
9	Suspension of Economic Agreement/Protocol	3.640
10	Other	13

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table III

	Dependent variable is ln(trade)			Dependent variable is ln(trade+1)	
	(1)	(2)	(3)	(4)	(5)
Sanction dummy	-0.224*** (0.057)	-0.216*** (0.058)	-0.235*** (0.057)	-0.398*** (0.086)	-0.452*** (0.087)
ln(gdp product)	-0.664*** (0.072)			-0.300*** (0.063)	
ln(gdpimporter)		2.220 (41807.37)			
ln(gdpexporter)		2.456 (34035.76)			
Regional Trade Agreement	0.421*** (0.057)	0.428*** (0.058)	0.436*** (0.060)	-0.110 (0.085)	0.005 (0.089)
Common currency	0.586*** (0.117)	0.692*** (0.122)	0.718*** (0.114)	0.383*** (0.129)	0.342*** (0.113)
Importer-year FE	Yes	Yes	Yes	Yes	Yes
Exporter-year FE	Yes	Yes	Yes	Yes	Yes
Countrypair FE	Yes	Yes	Yes	Yes	Yes
Number of obs.	336,516	336,516	363,397	627,822	781,443
Adjusted R ²	0.8196	0.8189	0.8179	0.7968	0.7929

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table IV

	Dependent variable is ln(exports by targeted nations)
Sanctioned by other nation	13.732 (29602.37)
Regional Trade Agreement	0.403*** (-0.058)
Common currency	0.657*** (0.112)
Importer-year FE	Yes
Exporter-year FE	Yes
Countrypair FE	Yes
Number of obs.	335,629
Adjusted R ²	8.208

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table V

	Dependent variable is ln(trade) (1)		Dependent variable is ln(trade) (2)
Sanction dummy* Institution 1240	0.288 (0.556)	Sanction dummy* sanctionidentity 1	0.173 (0.128)
Sanction dummy* Institution 1653	0.116 (0.200)	Sanction dummy* sanctionidentity 2	0.214 (0.187)
Sanction dummy* Institution 1830	0.236 (0.206)	Sanction dummy* sanctionidentity 3	-.003 (0.267)
Sanction dummy* Institution 2370	0.149 (0.289)	Sanction dummy* sanctionidentity 4	0.052 (0.129)
Sanction dummy* Institution 2400	0.717** (0.318)	Sanction dummy* sanctionidentity 5	-0.226*** (0.075)
Sanction dummy* Institution 2880	-0.723* (0.411)	Sanction dummy* sanctionidentity 6	-0.146* (0.087)
Sanction dummy* Institution 3450	-1.516 (1.054)		
Sanction dummy* Institution 3700	0.680** (0.291)		
Sanction dummy* Institution 3760	0.143 (0.471)		
Sanction dummy* Institution 3800	0.087 (0.343)		
Sanction dummy* Institution 3850	0.090 (0.408)		
Sanction dummy* Institution 3900	0.962 (0.722)		
Sanction dummy* Institution 4400	-0.604*** (0.223)		
Sanction dummy* Institution 4580	-0.196 (0.231)		
Sanction dummy* No Institution	-0.253 (0.191)		
Regional Trade Agreement	0.440*** (0.060)	Regional Trade Agreement	0.437*** (0.060)
Common currency	0.720*** (0.114)	Common currency	0.720*** (0.114)
Importer-year FE	Yes	Importer-year FE	Yes
Exporter-year FE	Yes	Exporter-year FE	Yes
Countrypair FE	Yes	Countrypair FE	Yes
Number of obs.	363,397	Number of obs.	363,397
Adjusted R ²	0.8179	Adjusted R ²	0.8179

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table VI

	Dependent variable is ln(trade)
Sanction dummy*Sanctiontype 1	-0.661*** (0.205)
Sanction dummy*Sanctiontype 2	-0.316** (0.147)
Sanction dummy*Sanctiontype 3	-0.076 (0.070)
Sanction dummy*Sanctiontype 4	0.011 (0.131)
Sanction dummy*Sanctiontype 5	-0.377 (0.338)
Sanction dummy*Sanctiontype 6	-0.395 (0.246)
Sanction dummy*Sanctiontype 7	-0.242** 0.118
Sanction dummy*Sanctiontype 8	0.739*** (0.239)
Sanction dummy*Sanctiontype 9	0.849*** (0.143)
Sanction dummy*Sanctiontype 10	-0.081 (0.545)
Importer-year FE	Yes
Exporter-year FE	Yes
Countrypair FE	Yes
Number of obs.	363,397
Adjusted R ²	0.8179

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table VII

	Dependent variable is ln(trade)
Sanction dummy*Threat	-0.234*** (0.065)
Sanction dummy*No threat	-0.238** (0.103)
Regional Trade Agreement	0.436*** (0.060)
Common currency	0.718*** (0.114)
Importer-year FE	Yes
Exporter-year FE	Yes
Countrypair FE	Yes
Number of obs.	363,397
Adjusted R ²	0.8179

Wald-test statistic Sanction dummy*Threat= Sanction dummy*No threat
F = 0.9748

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table VIII

	Dependent variable is ln(trade)							
Year 1 of sanction	-0.082* (0.047)							
Year 2 of sanction	-0.114** (0.054)							
Year 3 of sanction	-0.164** (0.067)							
Year 4 of sanction	-0.206** (0.082)							
Year 5 of sanction	-0.335*** (0.095)							
Year 10 of sanction	-0.422*** (0.156)							
Year 15 of sanction	0.221 (0.267)							
Year 20 of sanction	-0.068 (0.261)							
Regional Trade Agreement	0.442*** (0.060)	0.442*** (0.060)	0.442*** (0.060)	0.442*** (0.060)	0.442*** (0.060)	0.443*** (0.060)	0.443*** (0.060)	0.443*** (0.060)
Common currency	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)	0.720*** (0.114)
Importer-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countrypair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	363,397	363,397	363,397	363,397	363,397	363,397	363,397	363,397
Adjusted R ²	0.8178	0.8178	0.8178	0.8178	0.8178	0.8178	0.8178	0.8178

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table IX

	Dependent variable is ln(trade)		
	(1)	(2)	(3)
Sanction dummy	-0.224*** (0.057)	-0.263*** (0.066)	-0.149** (0.061)
Regional Trade Agreement	0.421*** (0.057)	0.442*** (0.060)	0.436*** (0.060)
Common currency	0.586*** (0.117)	0.677*** (0.113)	0.719*** (0.113)
Importer-year FE	Yes	Yes	Yes
Exporter-year FE	Yes	Yes	Yes
Countrypair FE	Yes	Yes	Yes
Restricted Sample	No	Yes ^a	Yes ^b
Number of obs.	336,516	352,262	358,786
Adjusted R ²	0.8196	0.8110	0.8165

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. a is the restricted sample where the United States are dropped. b is the restricted sample where sanctions that stated and ended within the same year are dropped.

Table X

	Dependent variable is ln(trade)					
	(1)	(2)	(3)	(4)	(5)	(6)
Sanction dummy	-0.224*** (0.057)	0.247*** (0.056)	-0.236*** (0.057)	-0.235*** (0.057)	-0.237*** (0.057)	-0.235*** (0.057)
Regional Trade Agreement	0.421*** (0.057)	0.336*** (0.053)	0.414*** (0.059)	0.428*** (0.058)	0.435*** (0.060)	0.436*** (0.060)
Common currency	0.586*** (0.117)	0.604*** (0.090)	0.708 (0.107)	0.602*** (0.102)	0.716*** (0.118)	0.718*** (0.114)
Ln(distance)		-1.207*** (0.0917)				
Sharing a border			2748*** (0.407)			
Common language				1.405*** (0.216)		
Colony					1.523*** (0.526)	
Area (land) of exporter						0.000 (0.040)
Area(land) of importer						0.000 (0.026)
Population of exporter						
Population of importer						
Involved in conflict						
Importer-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Countrypair FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	336,516	363,397	363,397	363,397	363,397	363,397
Adjusted R ²	0.8196	0.8202	0.8186	0.8185	0.8180	0.8179

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Table XI

Dependent variable is dummy trade	
Sanction dummy	-0.923*** (0.041)
Regional Trade Agreement	0.408*** (0.040)
Common currency	0.304*** (0.040)
Importer-year FE	Yes
Exporter-year FE	Yes
Countrypair FE	No
Number of obs.	657696

***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

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