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**Economic Sanctions: Embargo on Stage. Theory
and Empirical Evidence.**

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Abstract

Economic sanctions appear to be a common and recurring tool of international relations. Indeed, sender country or more generally, the international community, resorts to economic sanctions in order to punish and attempt to change a target country's objectionable policy behavior. However, economic sanctions imply costs, especially in terms of trade. This thesis provides an overview of the literature on this topic, in describing the historical and institutional law framework of economic sanctions and in presenting models and empirical works. The first part describes the history, the institutional law framework related to economic sanctions and essential notions. The second part presents fundamental models and insights to explain the phenomenon of economic sanctions. Trade's theoretical impacts will be reviewed before discussing the implementation of sanctions, in both domestic and single-rational actor methodologies. The final section will introduce empirical studies on the impact of economic sanctions on trade.

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Introduction

The United States, followed by the European Union, adopted economic sanctions against Syria in spring 2011. The Arab League and Turkey followed several months later by imposing sanctions too. Such cases of economic sanctions appeared on a regular basis in the news during the last months. Indeed, international economic negative sanctions are a common and recurring tool used in order to influence another state's behavior without resorting to a military conflict. They have been used for thousands of years and grew in popularity since the end of the Cold War. The study of sanctions tends to focus on sanctions' effectiveness. Indeed, many scholars (Ann Elliott, Kaempfer, Lowenberg, Pape and Whang) have concentrated on the characteristics of degrees of success and failure of economic sanctions.

This thesis addresses the economic sanctions phenomenon, notably by describing their effect on trade. Indeed, economic pressure is one way through which influence might be brought. Economic sanctions are supposed to work by inducing some kind of pain on the target country. From this perspective, trade sanctions and more particularly embargoes should deprive the target country of some gains of trade and provoke a lower social economic welfare. However, in a globalized world, it is interesting to see how economic sanctions really affect trade between the different actors involved. Moreover, given the costs that economic sanctions imply, it is interesting to review processes leading to their imposition.

This thesis provides some theoretical insights as well as empirical evidence on the economic sanctions phenomenon. Its objective is to better apprehend the economic sanctions phenomenon by explaining and, then, confronting their theoretical effect on trade and their imposition to empirical evidence. It is divided into three sections. The first section introduces the subject by presenting the history of economic sanctions, the institutional law framework from which they stem from and key notions about sanctions. The second part introduces models and the related literature insights to understand the imposition of economic sanctions and the effect of an embargo on trade. Finally, the final section of this

thesis introduces empirical studies on the effect of economic sanctions. Two types of studies are discussed: econometric studies and case studies. The cases studies describe the effect of economic sanctions based on descriptive statistics.

1 Historical and Institutional Framework

The first section of this thesis describes the background to economic sanctions, going from history to the essential notions about economic sanctions, without forgetting the institutional law framework. The first chapter reviews the history of economic sanctions by highlighting striking facts. The content of the second chapter gives some insight about the institutional law framework from which economic sanctions result from. Finally, the third chapter reviews essential notions about economic sanctions in order to give to the reader main tools for understanding the future developments of this thesis.

1.1 History

Economic sanctions, in one form or another, have been used for thousands of years. Already in the Greek empire, Athens sanctioned Megara, by imposing a trade embargo thanks to the Pericles' decree of 432 BC which finally led to the Peloponnesian War (431-404 BC) (Eaton and Engers, 1999, p.409). During colonialism in America, the British put pressure on the colonists, in order to weaken trade between the colonists and the West Indies (McGee, 2004, p.53). As Renwick observed, "States since time immemorial had interrupted commercial relations or sought to withhold essential supplies when in a state of war or near war with one another." (Renwick, 1981, p.4). Since the 18th century, embargoes were used in order to settle trade rivalry between great powers (Ferrand, 2004, p.55). For instance, during Napoleonic Wars, in response to the British naval blockade, Napoleon used a large-scale embargo, beginning in 1806 and well-known as the Continental System or Continental Blockade. The latter consisted in a prohibition of trade with the United Kingdom of Great Britain and Northern Ireland. In view of the dangers to American shipping, Thomas Jefferson and the Congress of the United States followed by imposing a general embargo based on the Embargo Act of 1807 against Great Britain and France. In the 19th century, "economic sanctions consisted primarily of *pacifist blockades* – blockades that involved the deployment of a naval force by a country or coalition of countries to interrupt commercial intercourse with certain ports or coasts of a state, with which these countries were not at war." (Davis and Engerman, 2003, p.188). Even

though most naval blockades implicated wars, pacific blockades developed into a coercive tool over time, intended to coerce recalcitrant states to pay off their debts, often reparations, and to adjudicate other international disputes. Powers that had much stronger armed forces than those of the targeted nations were generally the initiators of such blockades. In total, 21 pacific blockades were deployed from 1827 until the outbreak of World War I. These blockades were generally activated by powerful European nations against smaller, less powerful or even underdeveloped nations in Europe, Latin America and Asia (Renwick, 1981, pp.5-6 and Davis and Engerman, 2003, pp.188-189).

The 20th century sounds the death knell for the resort to armed force, except for self-defense practiced on a temporary basis, through Article 2, paragraph 4 of the Charter of the United Nations (Ferrand, 2004, p.60). The modern theory of economic sanctions stems from the creation of the League of Nations (Renwick, 1981, p.4). Within this organization allowing the use of coercive measures, non-military measures included as an alternative to the use of force, a formal legal discussion of the legitimacy of pacific blockades started (Majlessi, 1999, p.7 and Davis and Engerman, 2003, p.189). Article 16 of the League's Covenant constituted the root of power for deploying sanctions in the case of the League of Nations. Four collective sanctions episodes were undertaken under the League of Nations against Yugoslavia in 1921, Greece in 1925, Paraguay and Bolivia between 1932 and 1935 and Italy in 1935-1936 (Davis and Engerman, 2003, p.189). After World War II, the United Nations took over the League of Nations. Since the 1970s, economic statecraft won back its popularity as a tool of foreign policy (Lenway, 1988, p.397). Today, international economic sanctions are used as a common and recurring feature of international relations. More precisely, since the Berlin Wall fell, economic sanctions have become a usual instrument of the United Nations Security Council (Caruso, 2003, p.2). As an illustration, the UN Security Council approved only two mandatory sanctions prior to 1990 (Cold War period): against Rhodesia and South Africa. Then, the 1990s became the decade of sanctions. Indeed, no less than 15 cases were registered, as for instance, against Iraq, the former Yugoslavia, Libya, Haiti, Somalia, and Liberia, the UNITA faction in Angola, Rwanda and Sierra Leone. The collapse of the Soviet Union

allowed the United Nations to act more aggressively in international affairs and led to an increasing use of economic sanctions (Elliott and Hufbauer, 1999, p.403). The end of tension between East and West allowed the United Nations to play actively its role within the international community.

1.2 Institutional Law Framework

In an increasing globalisation framework, issues related to public international law and international relations become more important but also more complex. The news reminds us of this every day. As regards economic sanctions, the marked increase over the last few decades in the rhythm with which they have been imposed suggests that a main institutional shift in international relations has taken place (Davis and Engerman, 2003, p.196). The aim of this chapter is to understand better the actual situation, by reviewing the public international law, but also the history leading to the actual institutional framework.

First, subchapter 1.2.1 addresses the public international law framework. This step allows us to understand better the basic principles regulating states' relations worldwide. Second, subchapter 1.2.2 analyzes in more depth the evolution from war to the prohibition of the threat or use of force at the international level. Thirdly, subchapter 1.2.3 returns to the international organizations framework issued from public international law and its role. Lastly, subchapter 1.2.4 comes back on the creation and the implementation of the League of Nations and then the United Nations.

1.2.1 Public International Law¹

Public international law is defined as the body of restrictive rules in force at the international level. The public international law's prime function is an ordering function. It essentially governs relations between States, simplifies international cooperation and makes international cooperation predictable due to the restrictive rules that it establishes. Nowadays, it is considered as the law of the international community with its main aim being to ensure peace and stability. Public international law has been created by States for States. It comprises the

¹ Subchapter mainly inspired from Ziegler, (2011).

international customary, general principles of international law and treaties closed either between States, international organizations or between States and international organizations (Ziegler, 2011, p.3). In the public international law's view, each State, great or small, rich or poor, is considered as sovereign and set on an equal footing of equality towards other States. Therefore, States are independent of each other. At the international level, the democratic element lies in the equality between states' principle. Each State is free to decide without appeal to accede or not, to a negotiated treaty.

Concerning rules, it is important to notice that once rules are enacted, sanctions have to be defined. The notion of sanction refers to the penalty that is imposed on rule's violators. Thus, in public international law, sanction constitutes "the range of reactions adopted unilaterally or collectively by States against the author of an internationally illicit fact in order to ensure the respect and the execution of a right or an obligation."² Sanctions are based on a collective responsibility notion, because of the fact that applied sanctions affect all individuals within the targeted state (Gagné, 2005, p.25). Regarding collective security, mechanisms have been elaborated in order to sanction a threat against peace or collective security. One of the norms issued from public international law formulates the interdiction to resort to armed force. Indeed, governments have to settle their disputes with peaceful means.

1.2.2 From War to the Prohibition of the Threat or Use of Force

States' territorial sovereignty has been recognized for centuries but its absolute protection is safeguarded only since the prohibition of the use of force. As well, international sanctions implemented against a State are admitted for centuries by the international customary. However, until the end of the 19th century, States preferred wars before they adopted another position. The aim of this subchapter is to review the process behind the prohibition of the threat or use of force, in order to understand how states switched from wars to economic sanctions.

² Salmon, (2001); in Gagné, (2005), p.9; we translate.

Blockades and embargoes have been used in the 17th and 18th centuries. Until the 20th century, States could engage in war under particular circumstances (*jus ad bellum*).³ However, from the 19th century, a movement started, trying to restrict eligibility of wars (*bellum justum*).⁴ Nevertheless, the first enacted rules concerned the diminution of acts of violence and penalties issuing from the conflict itself (*jus in bello*).⁵ This process has been pursued at the end of the 19th century with the introduction of the Hague Convention for the Pacific Settlement of Disputes (1899) which has been revised at the Second Hague Peace Conference in 1907 (Ziegler, 2011, p.37 and Sohn, 1981, p.155). Moreover, several decades later, on the initiative of non-aligned member countries of the United Nations, the Manila Declaration on the Peaceful Settlement of International Disputes (1982) was elaborated and then adopted by consensus by the General Assembly. Thanks to this declaration, constituting a normative text, a complete scheme and a consolidation of the legal framework of peaceful settlement of international disputes had been developed.⁶ Then, the 20th century has been marked by the concepts of collective security and war's prevention. The concept of collective security, that belongs more to the international relations' discipline, refers to "a system, regional or global, in which each state in the system accepts that the security of one is the concern of all, and agrees to join in a collective response to threats to, and breaches of, the peace." (Lowe and others, 2008; in De Wet and Wood, 2012, p.316). The 20th century, with the creation of the League of Nations and the United Nations, marked time for legal and institutional discussions about collective security and sanctions in modern times (Davis and Engerman, 2003, p.189). Before turning to the League of Nations and the United Nations in details, the role of international organizations in the sanctioning process will be discussed.

³ *Jus ad bellum* defines the acceptable justification to engage in war.

⁴ *Bellum justum* is also called the just war theory.

⁵ *Jus in bello* defines the limits to acceptable wartime conduct.

⁶ Source : <http://untreaty.un.org/cod/avl/ha/mdpsid/mdpsid.html>

1.2.3 Role of International Organizations⁷

As Drezner wrote: “Even though norms and principles may exist without an institutional reference, they are more likely to be embedded within international organizations; indeed, international organizations are often created with the expressed purpose of promoting specific norms.” (Drezner, 2000, p.82). Coming into existence in the 19th century, it is only since the second part of the 20th century that the number of international organizations grew rapidly. Since then, they have been assuming a role being more and more important what led to the recognition of international organizations as subjects of law (derived subjects of international law since they exist, thanks to the desire of two or more States). In addition, States accept to delegate a part of their sovereignty to the international organizations within which they are members. Thus, the international organizations’ law became a full-fledged branch of international law. International organizations’ law comprises constitutive treaties and legal acts⁸ linking organizations and/or States together (Ziegler, 2011, pp.4-5). They have been created by States for a set purpose, ones that they cannot achieve on their own means. International organizations play an important role in the public international law framework because they take more and more often responsibility for tasks that States had always assumed solely in the past. The total or almost all legal multilateral instruments are negotiated in the framework of international organizations. The latter have become the cradle of public international law.

International institutions such as international organizations take on a significant role in the process of multilateral sanctions. As Drezner noticed in the case of multilateral sanctions: “International organizations play a decisive role in sustaining cooperation over time; they also suggest the mechanism through which this is accomplished. International organizations maintain cooperation not through the *ex post* punishment of defectors but through the *ex ante* reassurance of actors by developing common conjectures and blunting domestic pressures to defect.” (Drezner, 2000, p.75). It is important to notice that multilateral sanctions that are

⁷ Subchapter mostly inspired from Ziegler, (2011).

⁸ As they are based on constitutive treaties of international organizations, these legal acts are considered as secondary law or derived law.

sustained by international organizations are significantly more effective than unilateral sanctions. Again, as Drezner explained: “Members of the sanctions coalition are forced to add the costs and benefits of supporting the organization to the payoffs involved in sanctioning. States that value the existence and maintenance of international organizations will be less willing to violate a previous commitment.” (Drezner, 2000, p.98). Wavering States find means for resisting domestic pressures in the international organizations framework. An international organization through its presence and its support can improve the situation linked with defection problems. Indeed, international organizations raise the flow of information that diminishes monitoring costs and helps to identify free riders (Drezner, 2000, p.86 and p.99). Moreover, international organizations prevent backsliding by reassuring member States that a cooperative equilibrium will be maintained; more specifically in reassuring States about each other’s aims owing to the development of shared mutual conjectures and the palliation of domestic political pressures on States’ leaders. As a result, institutionalized cooperation should induce greater concessions by diminishing the likelihood of backsliding and by forestalling free riding (Drezner, 2000, p.87). Lastly, thanks to these former elements, international organizations diminish the interest that States have about the probability of other States defecting what implies a reinforcement in the common conjecture of continued cooperation. Consequently, the support of international organizations can transform frail cooperation equilibrium into a more robust one. As regards targeted countries, the latter will make concessions in response to institutionalized sanctions, while they will be more tempted to wait out ad hoc coalitions.

Nevertheless, the creation of international organizations or agencies very often follows the adoption of agreements. They constitute the institutional framework by providing tools for the implementation of the previously adopted conventions or treaties to the organization’s member states. In order to understand better how it works, some relevant agreements as well as organizations linked with the non-proliferation of weapon of mass destruction, one of the motives mentioned above for the imposition of economic sanctions, can be found in the Appendix.

Lastly, the League of Nations and its successor, the United Nations, probably the two most well-known international organizations worldwide with respect to peacekeeping and their respective institutional frameworks related to economic sanctions are presented below.

1.2.4 The League of Nations and the United Nations

The League of Nations, established in 1919, being the first organ that dealt with international affairs in an institutional way, had been created following the First World War. It resulted from the desire of various countries to find an alternative to the use of unilateral force in order to implement peacekeeping. Its vocation was universal, even though only 28 States were members; the United States not being one of those members.⁹ This organization pursued the following goals: disarmament, prevention of war through collective security, setting of disputes between countries through negotiations, diplomacy, arbitration, and judicial settlement of international disputes, and improvement of global welfare (De Wet and Wood, 2012, p.317). The League of Nations has been a pioneer in the development of multilateral economic sanctions. The objectives of its sanctions were to isolate a State that would have violated rules issued from the Pact in depriving it from every commercial and financial means. The organization tried to introduce a partial interdiction to war through Articles 12 to 25 of its Pact. The latter made provision for decentralized and collective sanctions, being either military or non-military, in order to ensure a behavior complying with the established standards (Gagné, 2005, pp.36-39). However, several weaknesses appeared. First, the League Covenant did not endeavor to banish the unilateral use of force. Second, it lacked a system for central decision-making and for the enforcement of sanctions (De Wet and Wood, 2012, p.317). Indeed, the League Covenant acted as an advisor that could only express recommendations and notifications. In addition, members had the responsibility to determine whether the preliminary conditions of Article 16 were fulfilled. Therefore, if a State considered that no act of war took place, it was not forced to implement the

⁹ It is interesting to notice that Woodrow Wilson (US president from 1913 to 1921 and Nobel Peace Prize in 1919) instigated the League of Nations' creation but that the United States was not a member of the latter. Indeed, the Congress refused the membership in the League of Nations.

sanctioning measures enounced under Article 16. The implementation of this Article was left to the subjectivity and to the unilateral interpretation of the League of Nations' members. That is the reason why this system was considered as horizontal (no central decision-making organ). Nevertheless, the Locarno Pact (1925) and then the Kellogg-Briand Pact (1928) were adopted in order to supplement the existing provisions and, particularly for the second, to prohibit the use of force. Notwithstanding, the League of Nations has been disbanded in 1946. The horizontal system could not get through national interests; this made international cooperation and the sanctioning system much less effective (De Wet and Wood, 2012, p.317; Gagné, 2005, pp.40-41 and Majlessi, 1999, pp.32-34).

The system governing international relations since 1945 must be understood as a reaction to the failure of the League of Nations and as an effort, in order to protect themselves against a repetition of the multiple wars that had been witnessed. The objective in creating the United Nations and in establishing its Charter (1945) was not to repeat the errors of the past and, more particularly, to maintain international peace (Ziegler, 2011, p.41). As a result, the decentralized system of the League of Nations was totally removed. Indeed, the founders of the UN Charter wanted to create a legal regime that would bind States. In order to achieve their objectives, they centralized the decision power into one organ, the Security Council. In fact, substantial enforcement powers are given to the Security Council via many provisions in the UN Charter. As enounced in the UN Charter, the primary responsibility of the Security Council is “the maintenance of international peace and security.”¹⁰ Thanks to this process, the solidarity notion should prevail over the individualities of sovereignties (Gagné, 2005, p.45 and Majlessi, 1999, pp.32-34).

The recognition of a true interdiction of the use of force has been done through the adoption of Article 2, paragraphs 3 and 4 of the United Nations Charter. The UN Charter proclaims under Article 2, paragraph 4: “All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner

¹⁰ Source: <http://www.un.org/en/mainbodies/index.shtml>

inconsistent with the Purposes of the United Nations.”¹¹ This Article forms a part of the customary law and has an *erga omnes*¹² characteristic nowadays. The Articles 2(4), 39, 41, 42, 43 and 46 of the UN Charter (1945) as well as the Uniting for Peace Resolution (1950) constitute the two sources of powers for implementing and enforcing sanctions, with armed forces if necessary, for the United Nations (Davis and Engerman, 2003, p.189). In practice, “the Security Council can call for collective economic sanctions under Article 41 of the UN Charter if it has first been determined, under Article 39, the existence of a threat to the peace, breach of the peace, or act of aggression, and if the sanctions are imposed to maintain or restore international peace and security.” (Segall, 1999, p.763). Moreover, measures taken by the Security Council (Art. 41) are mandatory. It means that member states have the obligation under Article 25 to implement the Security Council decisions. Most of the time, resolutions indicate recommendations that Members should use in order to settle their disputes (Chapter VI, Art. 36 and 37). Lastly, the Security Council can use regional agreements (Chapter VIII) such as the Organization for Security and Co-operation in Europe (OSCE), the North Atlantic Treaty Organization (NATO) or the International Security Assistance Force (ISAF)¹³ in order to implement sanctions. Nevertheless, the United Nations system does demonstrate some weaknesses. First, as de Wet and Wood explain, the Chapter VII mechanism is extremely contingent: not all obvious violations of fundamental principles of international law activate it as well as other motives can activate it. Furthermore, even when it is triggered, member states are not always willing to sanction a violating state. It happens that the violating state is one of their political allies. Two situations can happen here: either, the mechanism is interrupted by a lack of majority of 9 out of 15 votes (Article 27(2)) or by 1 of the 5 permanent members that would use its veto power (Article 27(3)) (de Wet and Wood, 2012, p.5 and Gagné, 2005, p.55). Some recent examples illustrate the latter case. For instance, Russia and China used their veto power when the Security Council was deliberating taking action on

¹¹ Charter of the United Nations. Source: <http://www.un.org/en/documents/charter/>

¹² An *erga omnes* right or obligation is owed toward all.

¹³ For more information about OSCE, NATO and ISAF : <http://www.osce.org/>, <http://www.nato.int/cps/en/natolive/index.htm> and <http://www.isaf.nato.int/>

Syria in February 2012.¹⁴ Despite the states' equality principle and Article 27 that provides a vote's right for every member state being in the Security Council, there is a *de jure*¹⁵ inequality between small and great powers. Indeed, Article 27(3) institutionalizes the preferential status of the permanent states by the recognition of a veto power. Indeed, victors of World War II wanted to administer peace on their own. That is the reason why they decided to give this veto power to themselves and to some Allies such as the Soviet Union (now Russia), the United States and China. Therefore, the five permanent members (United States, United Kingdom, China, Russia and France) own a veto power on all matter of substance (Gagné, 2005, pp.57-58). Moreover, under Article 27(3), it is written that: "[...] provided that, in decisions under Chapter VI and under paragraph 3 of Article 52, a party to a dispute shall abstain from voting."¹⁶ Thus, whether a permanent state is party to a dispute, because of its mandatory abstention (Article 27(3)), no decision can be taken and no sanction can ever be implemented against this state. During the Cold War period (1947-1991), the Security Council was mainly paralyzed by the veto power and could only decide upon sanctions in situations where none of the five permanent members, particularly United States and USSR, or their protégés were involved (Gagné, 2005, pp.57-63). This explains on the one hand the frequent unilateral use of sanctions from the United States at that time and on the other hand the increasing use of sanctions within the United Nations framework since 1990, after the fall of Berlin Wall (1989). Lastly, the number of states sitting in the Security Council has been strongly criticized in recent years. Effectively, the 15 members (included the 5 permanent members) have been representatives as the United Nations was composed of 50 member states. Nevertheless, now that this number reaches 193, the question concerning the number of members in the Security Council, and particularly its increase, is relevant.¹⁷

¹⁴ Source: http://www.letemps.ch/Page/Uuid/3cb3360a-4f61-11e1-b918-64dce5760e8a/La_Russie_et_la_Chine_bloquent_une_r%C3%A9solution_sur_la_Syrie

¹⁵ *De jure* means « concerning law ».

¹⁶ Source : <http://www.un.org/en/documents/charter/chapter5.shtml>

¹⁷ Source: http://www.letemps.ch/Page/Uuid/8dee0992-8cb4-11e1-8339-b73853b1489c/La_Suisse_sactive_pour_r%C3%A9former_le_Conseil_de_s%C3%A9curit%C3%A9

To conclude this section, even if an official institutional framework exists, the divergent national interests, the political influence and the search for influence in a multi-polar world are no doubt problematic in achieving cooperation among states and, therefore, constitute the roots of the problem. Nevertheless, if the Security Council and the United Nations want to win back their credibility and have a proper-working and transparent system of sanctions, they need to change some elements of their system. First, they need to abolish the veto power that has no reason to exist anymore nowadays. Second, they should increase the number of members sitting in the Security Council. Finally, they need to be more transparent and to let emerging countries as well as other small countries having the opportunity to exercise their rights and power within the Security Council.

1.3 Essential Notions about Sanctions

Now that we have some insights about the history of economic sanctions and the institutional legal framework from which they stem from, let us turn to the essential notions about sanctions.

In the literature, scholars distinguish two types of sanctions used in international relations: positive and negative sanctions. Positive sanctions¹⁸ take the form of actual or promised rewards (humanitarian aid, tariff's reduction or tariff's abolition and so on) whereas negative sanctions are the use or threatened use of punishments. As Baldwin noticed in his book *Economic Statecraft*, both types of sanctions constitute means to exercise power and particularly to foster cooperation among countries (Baldwin, 1985, p.20). We will focus on negative sanctions in this thesis.

¹⁸ The notions of positive and negative sanctions come from sociology. A positive sanction rewards or promise to reward someone (a state, a group, etc.) for following a norm and serves to promote the initiation and continuation of a certain type of behavior. On the contrary, a negative sanction, threatened or already implemented, is a tool to express somebody (society, regime, etc.) the non-approval of its particular behavior. As Baldwin explains, although the definitions appear simple enough, there are conceptual and empirical difficulties in distinguish them. Positive sanctions are actual or promised improvements of an actor's value position relative to his expectations' baseline. On the contrary, negative sanctions constitute actual or threatened deprivations relative to the expectations' baseline. (Baldwin, (1971) "The Power of Positive Sanctions", *World Politics*, 24(1), pp.19-38).

There are three main strategies of international economic pressure: economic sanctions, trade wars and economic warfare¹⁹ (Garoupa and Gata, 2002, p.43 and Pape, 1997, p.93). Economic sanctions constitute an indispensable instrument of United Nations efforts in order to maintain international peace and security. Indeed, they constitute tools of foreign policy that is somewhere on a continuum between totally unrestricted international exchange and war at the other end of the spectrum (Spindler, (1995); in Eyler, (2007), p.10). As Pape defines, “economic sanctions seek to lower the aggregate economic welfare of a target state by reducing international trade in order to coerce the target government, this to change its political behaviour.” (Pape, 1997, pp.93-94).

Sanctions can coerce either directly or indirectly. In the first case, the sanctions’ goal will be, to convince the target country that the issues at stake are not worth the price. In the second case, sanctions can induce popular pressure to force the government to concede or lead to a popular revolt that topples the government, resulting in the establishment of a new government that will make the concessions. Sanctions can be used against countries, political parties, non-profit organizations, companies and individuals. In the empirical section, we will focus on relations between states or countries. The expressions “sender” and “target” denote respectively “the country that imposes sanctions and the country that receives the economic punishment” (Caruso, 2003, p.4). We can look at economic sanctions in regard to: the kind of sanctions, the objective and the actors involved (Caruso, 2003, p.4).

We distinguish three types of economic sanctions: trade sanctions in the forms of total or partial embargoes²⁰; investment or financial sanctions and more narrowly-targeted sanctions, so-called “smart sanctions” (Kaempfer and Lowenberg, 2007, p.869). Interdictions of transport and communication can be added to this last

¹⁹ “A trade war is when a state threatens to inflict economic harm or actually inflicts it in order to convince the target state to agree to terms of trade more favourable to the coercing state. [...] Economic warfare seeks to weaken an adversary’s aggregate economic potential in order to weaken its military capabilities, either in a peacetime arms race or in an ongoing war”. (Pape, (1997), p.94).

²⁰ It is interesting to note that the distinction between a boycott and an embargo in juridical terms comes from the fact that a boycott will be imposed on the initiative of private and non-state actors while an embargo is a disposition of the state. (Osieja H., *Economic Sanctions as an Instrument of U.S. Foreign Policy: The Case of the U.S. Embargo against Cuba*, USA, 2006, p.61).

category of measures. Analyzing more precisely trade sanctions, both an import and an export embargo implemented against a target country restrict the volume of specific imported and exported products by setting a maximum amount of goods authorized for import and export. This illustrates the case of a partial embargo such as on military equipment, diamonds or weapons of mass destruction. In the most extreme case, such as a total embargo, they prohibit the complete importation and exportation of goods (Bonarriva, Koscielski and Wilson, 2009, p.2 and Davis and Engerman, 2003, pp.190-191). The literature denotes the use of selective and comprehensive sanctions. Selective sanctions refer to restrictions on particular goods or financial flows such as partial trade embargoes whereas comprehensive sanctions are global sanctions. Finally, as regards export restrictions, a last distinction can be made. Indeed, we can distinguish export quotas, exposed above, from export licenses. The latter “establish that an application or other documentation should be submitted as a condition for exportation and depending on whether license acquisition is automatic, the requirements may affect the volume of exports.” (Kim, 2010, p.6).

Box 1 Methods of Administering an Export Embargo and an Import Quota.

Export embargoes, usually enforced through a licensing system, the so-called export control regimes, create a rent that can be distributed to either the government or the exporters of the sender country. The method of administering a quota can make a great deal of difference as to its effects. This will depend on the behavior of the government. If the latter would auction off the export licenses for their premium value, then it would benefit from the rent. On the other hand, in case of free issuing of export licenses, the rent would be got by the sender country’s exporters.

Whether the allocation is administered on a political basis, then potential firms will have an incentive to spend resources in competing for these rents. As a result, the rent’s existence generates incentives for rent-seeking behavior: interest groups lobbying for sanctions (Czaga, 2004, p.29 and Kim, 2010, p.12).

Senders use import embargoes to lower the demand for some particular products from the target country. Furthermore, the idea is to attempt to decrease the target’s foreign exchange earnings and thus its capacity to purchase goods. Moreover, it is also used to provoke damage to a specific sector or industry of the target state.

This type of measures is commonly criticized for its ineffectiveness. In fact, target countries are able to adapt and find alternative markets or organize triangular purchases to bypass import controls. On the contrary, the export embargo constitutes the most common technique. The exports can be prohibited partially or totally. Embargoes are normally enforced by a system of export licenses and supporting measures. At last, investment or financial sanctions take the forms of restrictions on capital flows, in other words, they “restrict or suspend lending and investing into target economy” and, sometimes, can be in the form of mandatory disinvestment (Caruso, 2003, pp.4-5). Moreover, foreign assets of the target country may be frozen. In order to forestall sanction-busting, financial sanctions also impose subsidiary restrictions on international payments (Caruso, 2003, pp.4-5). In addition to these quoted measures, other sanctions, part of the so-called “smart sanctions” or “targeted sanctions” are used. Examples from the practice are “freezing the offshore assets of individual members of the target nation’s ruling elite, or travel bans on government officials and party cadres” (Kaempfer and Lowenberg, 2007, p.869). Smart sanctions will be review more deeply in Box 2.

Table 1 Definitions and Types of Sanctions.

Economic sanctions		
<i>Means to express power and to foster cooperation among countries.</i>		
	Positive sanctions	Negative sanctions
	<i>Actual or promised rewards</i>	<i>Actual or threatened punishment</i>
Trade sanctions	- Tariff’s reduction - Tariff’s abolition	- Partial embargo - Total embargo
Investment or financial sanctions	- Financial or investment aid from different entities such as the International Monetary Fund, the World Bank or countries	- Restriction on capital flows (restrict or suspend lending) - Mandatory disinvestment - Restrictions on international payments - Freezing of assets
Targeted sanctions	- Humanitarian aid	- Interdiction of transports - Interdiction of communication - Travel bans

When looking at the objective of the sanctions, the US government gives the following grounds as reasons for the imposition of sanctions: boycott activity, communism, transition to democracy, environmental activity, expropriation,

harboring war criminals, human rights, market reform, military aggression, narcotic's activity, proliferation of weapons of mass destruction terrorism and worker's rights (McGee, 2004, p.55). One more objective that can be set out is the freeing of captured citizens (Davis and Engerman, 2003, p.190).

Finally, regarding to the number of actors involved, we can distinguish unilateral from multilateral sanctions (the notions "collective" sanctions is used in law).²¹ In the case of unilateral sanctions, usually only one country imposes sanctions against a target country, whereas in the case of multilateral sanctions, more than one country imposes sanctions against a targeted nation. In this case, other countries (secondary senders) may follow a "promoter" country, called a primary sender, or the choice of an economic sanction is promulgated by the international organization itself and adopted within its framework (Caruso, 2003, p.4). However, notions are a bit different in the law's point of view. As Majlessi noticed, "they [unilateral sanctions] may be implemented by international organizations (as in the case when an international organization with limited membership imposes sanctions against a non-member state) or by a group of states through intergovernmental cooperation [often through regional organizations]" (Majlessi, 1999, p.8). In these special cases, when a group of States is acting as a single unit, the sanctions would be defined as "organized unilateral sanctions" (Kuyper, 1990, *supra* note 13 at 145; in Majlessi, 1999, p.8). The Arab oil embargo adopted in 1973 was an example of such a unilateral sanction. Likewise, centralized sanctions are sanctions "decided upon by the competent organ of an international organization" (i.e. Security Council) (Majlessi, 1999, p.10). Lastly, most of the time, the initiative in imposing international sanctions is initiated by one government or association of governments such as the European Union.

²¹ In international law, sanctions can be distinguished through their decentralized (or horizontal) characteristic or their centralized (or institutionalized or vertical) characteristic. In the first case, each state, member of an organization, is free to implement or not the sanctions while, in the second case, member states of an organization have the obligation to implement sanctions, once they have been decided by the organization's decision-making organ. Gagné, (2005), p.24.

Box 2 Smart Sanctions.

Nowadays, after the different criticisms against comprehensive sanctions, because of their humanitarian effects on the civilian populations, and more particularly after the comprehensive sanctions episode against Iraq in the early 1990s, the trend is to use smart sanctions. Smart sanctions, also defined as targeted sanctions, are “the precision-guided munitions of economic statecraft” (Drezner, 2010, p.2). There is a variety of actors, a range of legal entities included, that are targeted by smart sanctions. They can be individuals as for instance key decision makers, government officials or family members of these individuals, military organizations going from conventional armed forces to guerillas, political organizations, corporate entities from both, private and public sectors, and other non-state entities. These targeted entities can be targeted by smart sanctions simply because of their exercise of some activity prohibited by the UN Security Council or their suspected relationships with terrorist organizations (Drezner, 2011, p.97 and Watson Institute for International Studies (WIIS), 2006, p.21). Moreover, they can also be targeted because of their support for primary targeted entities.

The aim of smart sanctions is to alter the behavior of precise actors (Wallenstein, Eriksson and Staibano, 2003, p.91). Defenders of targeted sanctions claim that “economic coercion has had such a poor past record of success because they have often missed the locus of the target state’s offending policies: the policy elite.” As a consequence, smart sanctions’ objective is to hurt elite supporters of the targeted regime as well as the targeted regime itself, while imposing minimal damage on the population (Drezner, 2010, p.2). In this perspective, they are directed not only against the above-referred entities but also against resources that are indispensable for the targeted regime’s rule. The focus on specific actors and specific resources constitute the key features of targeted sanctions (Wallenstein, Eriksson and Staibano, 2003, p.iii and p.91).

Smart sanctions consist of arms embargoes, targeted financial sanctions, travel bans, restrictions on flight connections, representation restrictions, asset’s freezes and restrictions on particular good and services notably certain natural resource and processed commodities such as diamonds, timber, oil, arms, spare parts of particular products (Drezner, 2010, p.4 and Wallenstein, Eriksson and Staibano, 2003, p.91). They should be used only when the domestic political economy of the target country is conceivable. Moreover, smart sanctions are commonly used either as incentives to change behavior or as preventive measures. It is argued that by affecting the material inducements of powerful supporters, the latter will eventually press the targeted authorities into making

concessions. Indeed, smart sanctions should increase the target country's costs of noncompliance while averting the collateral hardship that comprehensive trade embargoes imply (Drezner, 2010, pp.2-4).

Finally, smart sanctions have been the subject of a dialogue at the international level between 1998 and 2003. Indeed, a series of conferences on smart sanctions, where delegates from the United Nations, government and the private sector regrouped, started in 1998. This series of conferences, whose aim was to determine methods of applying sanctions in a more efficient and targeted way, constituted a period of reflection on smart sanctions. In total, three so-called processes took place: the Interlaken Process, the Bonn-Berlin Process and the Stockholm Process. Each process focused on an aspect of smart sanctions. The Interlaken Process dealt with issue of targeted financial sanctions while the Bonn-Berlin Process concentrated on arms embargoes, travel bans and aviation sanctions. Finally, the Stockholm Process focused on practical feasibility of implementing and monitoring targeted sanctions. Thanks to the development and the use of targeted sanctions, many politic problems that had been created previously because of the use of comprehensive trade sanctions have been solved. Targeted sanctions serve now as a key instrument for policy coordination among the medium and great powers as well as for the global civil society (WIIS, 2006, pp.5-6). Their performance can be evaluated by looking at the humanitarian costs and state compliance's results obtained with the use of smart sanctions compared to the use of comprehensive sanctions (Drezner, 2010, p.6). Moreover, as Drezner noticed: "The evidence provides moderate support for smart sanctions being more humane but less effective than more comprehensive measures. Recent research on the impact of economic coercion in the target country would appear to support the humanitarian arguments in favor of smart sanctions." (Drezner, 2010, pp.6-7). However, smart sanctions owe their specific problems. First, the imposition of targeted sanctions has proven to be arduous in practice. One example is the difficulty that both the American Government and the United Nations had to confiscate the personal assets held by Saddam Hussein and his family before the second Gulf War (Major and McGann, 2005, p.341). As well, Wallenstein, Eriksson and Staibano enumerated the following key problems in targeting the targeted actors: "[...] the identification of the actor, determining which resources should be subject to sanctions, the counter-reactions of the targeted actor, and the ability and willingness of third states to make the sanctions effective." (Wallenstein, Eriksson and Staibano, 2003, p.92). Moreover, the increasing use of targeted sanctions during the past years generated new issues linked to the rights and standing of parties that might be listed wrongly. In addition, several member states

pointed out the lack of due process and the absence of transparency associated with listing and delisting (WIIS, 2006, pp.5-6). Besides, as Drezner wrote: “[...], there is no systematic evidence that smart sanctions yield better policy results vis-à-vis the targeted country. Indeed, in many ways, the smart sanctions framework has been *too* successful.” (Drezner, 2011, p.97). Effectively, the accuracy of targeting determines the solidity of the entire chain of implementation measures. Likewise, requests for more comprehensive and more coercive sanctions are likely to arise if smart sanctions do not achieve their objectives (Wallensteen, Eriksson and Staibano, 2003, p.92). Lastly, recent research suggests that alternatives other than targeted sanctions should be considered in some cases. In conclusion, scholars and policymakers should analyze the smart sanctions framework and determine the conditions under which different types of economics statecraft should be used (Drezner, 2011, p.97).

2 The Theory of International Economics: an Application to Economic Sanctions

The second part of this work presents models in order to understand the whole sanctioning process from the implementation of economic sanctions to the effects of an embargo on trade. Chapter 2.1 explains the effects of an embargo on trade by presenting both a surplus analysis and an international trade perspective based on an offer curves modeling system. Chapter 2.2 presents a public choice model from Kaempfer and Lowenberg (1988) describing, on the one hand, the sender domestic decision of implementation of an embargo, and, on the other hand, the target domestic decision of adopting a deviant policy behavior. Chapter 2.3 focuses on the sanctioning process itself. First, the reason why a coalition of countries implements sanctions against a target country is overviewed thanks to results from game theory. Second, the formation of a coalition of sender countries and related problems are presented. Third, a common phenomenon in economic sanctions, the sanction-busting trade, is presented. Early (2009) examines this phenomenon by confronting realism and liberalism theories.

2.1 Effects on an Embargo on Trade: an International Economics Perspective

Since economic sanctions are trade barriers, models from international economics provide the needed insight to understand their effects. More precisely, economic sanctions are nontariff barriers to trade, in the form of import and export restrictions (voluntary export restraints – VERs) used for changing another state's political choices. Trade sanctions in the forms of bans, quotas and licensing requirements constitute exogenous shocks that depress trade. They are characterized by a phenomenon of rent-seeking and are confronted to market incentives such as trade diversion. As Kaempfer and Lowenberg noted, terms-of-trade effects mirror the trade sanctions' economic impacts on the target. These effects are theoretically larger in case of multilateral sanctions than unilateral ones.

Additionally, the extent of pre-sanctions bilateral trade²² between the sender and target states constitutes a main component in defining the ease with which the target state can get other sources of supply and alternative markets for its domestic goods, and consequently, in defining the terms-of-trade effects of the sanctions (Kaempfer and Lowenberg, 2007, pp.868-872). This chapter presents economic sanctions' impact on trade thanks to a surplus analysis (subchapter 2.1.1) and an offer curves analysis (subchapter 2.1.2).

2.1.1 A Surplus Analysis²³

The model presented here provides a basic background. It describes the markets of both target and sender countries. After reviewing the initial situation, cases of an export embargo and of an import embargo, both implemented by the sender country, will be analyzed. Despite their differences, these two types of measures have the same objective: deprive the target of the gains from trade (Kirschner, 1997, p.36).

Figure 1 presents the initial situation. The following hypotheses are made:

(H1) There are two countries engaged in trade of the given good: a sender country and a target country. Target's import market mirrors the sender's export market and vice versa.

(H2) The world market dictates prices. Sender and target countries are both small economies, so-called price-takers. As a result, under autarky, supply curves are expressed by lines S and demand curves by lines D . Once trade openness occurs, demand curves are unchanged whereas supply curves are given by lines P_W .

(H3) There is perfect competition.

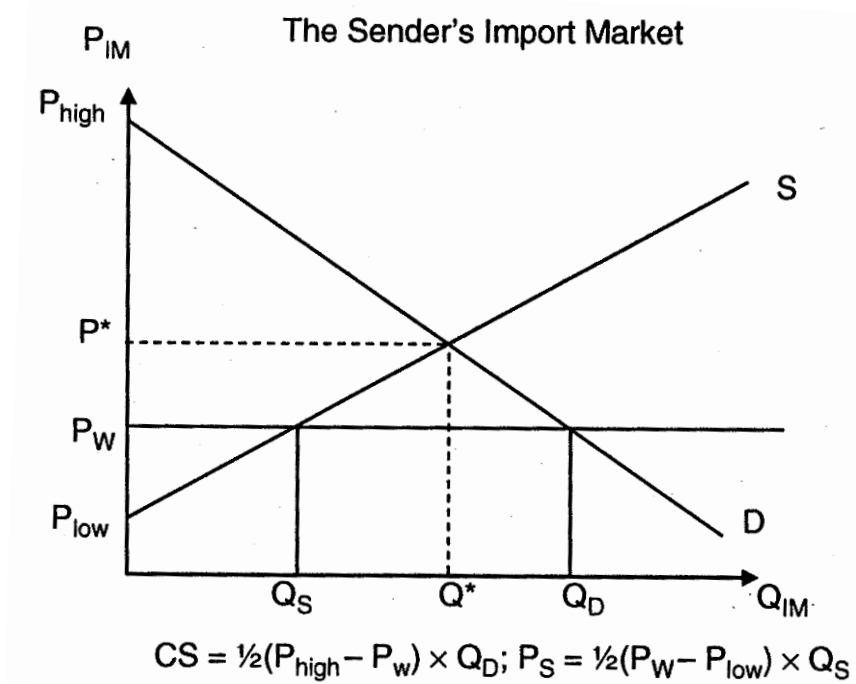
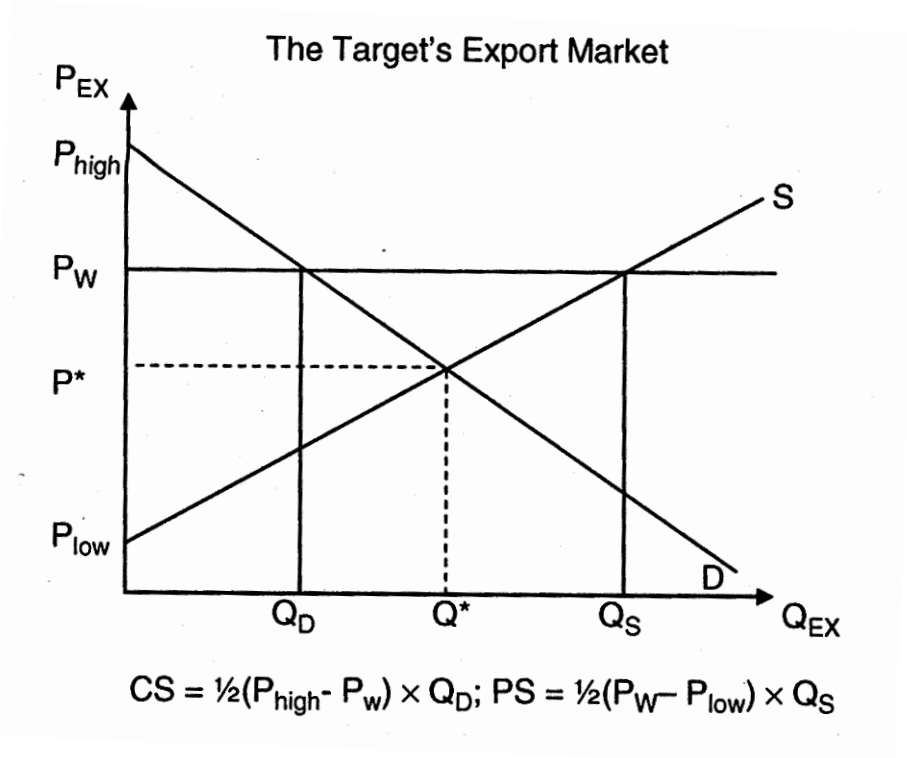
(H4) There are no transportation costs and no impediment.

In case of autarky, we see that consumers of target and sender countries would be willing to purchase the quantity Q^* of the offered good at a price P^* (variables with asterisks in the following graphs express domestic equilibrium values). Once, trade openness occurs, the initial world equilibrium happens at world price P_W .

²² Bilateral trade here represents trade between a sender country and a target country or between a coalition of sender countries against a single target country as this is often the case in reality.

²³ This subchapter is inspired from Eyler, (2007), pp.9-19.

Figure 1 Target's Export Market and Sender's Import Market.



Source: Eyler (2007), p.13.

The considered good²⁴ becomes exportable for the target, respectively importable by the sender as the world price, P_W , is higher than the target's domestic price, respectively lower than the sender's domestic price. In the opposite situation, the target would have imported the good while the sender would have exported it. The quantity supplied, Q_S , and demanded, Q_D , at the world price P_W define the market surplus, ($Q_S > Q_D$), or shortage, ($Q_S < Q_D$), at the current world price vis-à-vis the situation of autarky. As the world price, P_W , is higher than the equilibrium price resulting from autarky, P^* , on the target's export market, the target country is a net exporter of the good. Indeed, at price P_W , producers are willing to sell a larger amount of the good, ($Q_S > Q^*$), while domestic consumers are willing to consume a smaller amount, ($Q_D < Q^*$). The market surplus is consequently sold to foreign purchasers. The situation is the opposite for the sender country. As world price, P_W , is under the sender's domestic price, the sender country is a net importer, importing the market shortage from the target country.

The target and sender consumer surplus (triangle CS) and producer surplus (triangle PS) formula are given in the respective graphs. The consumer surplus corresponds to the difference between the consumer's willingness to pay and the effective price they pay for the given good while the producer surplus equals the difference between the price at which producers would be willing to sell their good and the price they effectively receive for it. The sum of the consumer and producer surplus gives the economic social welfare in terms of surplus of the country. We see that the target's consumers ($P_{high}\widehat{Q}_D P_W < P_{high}\widehat{Q}^* P^*$) and sender's producers ($P_W\widehat{Q}_S P_{low} < P^*\widehat{Q}^* P_{low}$) are worse off with trade openness in this situation whereas target's producers ($P_W\widehat{Q}_S P_{low} > P^*\widehat{Q}^* P_{low}$) and sender's consumers ($P_{high}\widehat{Q}_D P_W > P_{high}\widehat{Q}^* P^*$) are better off. However, in total, for each country, the social welfare increases with trade openness, gains exceeding losses. The target net gain equals to the triangle determined by the intersection of coordinates $P_W Q_D$; $\widehat{P}^* \widehat{Q}^*$; $P_W Q_S$ while for the sender country, its gain equals to the triangle $P_W Q_S$; $\widehat{P}^* \widehat{Q}^*$; $P_W Q_D$.

²⁴ We use the term 'good' for simplicity.

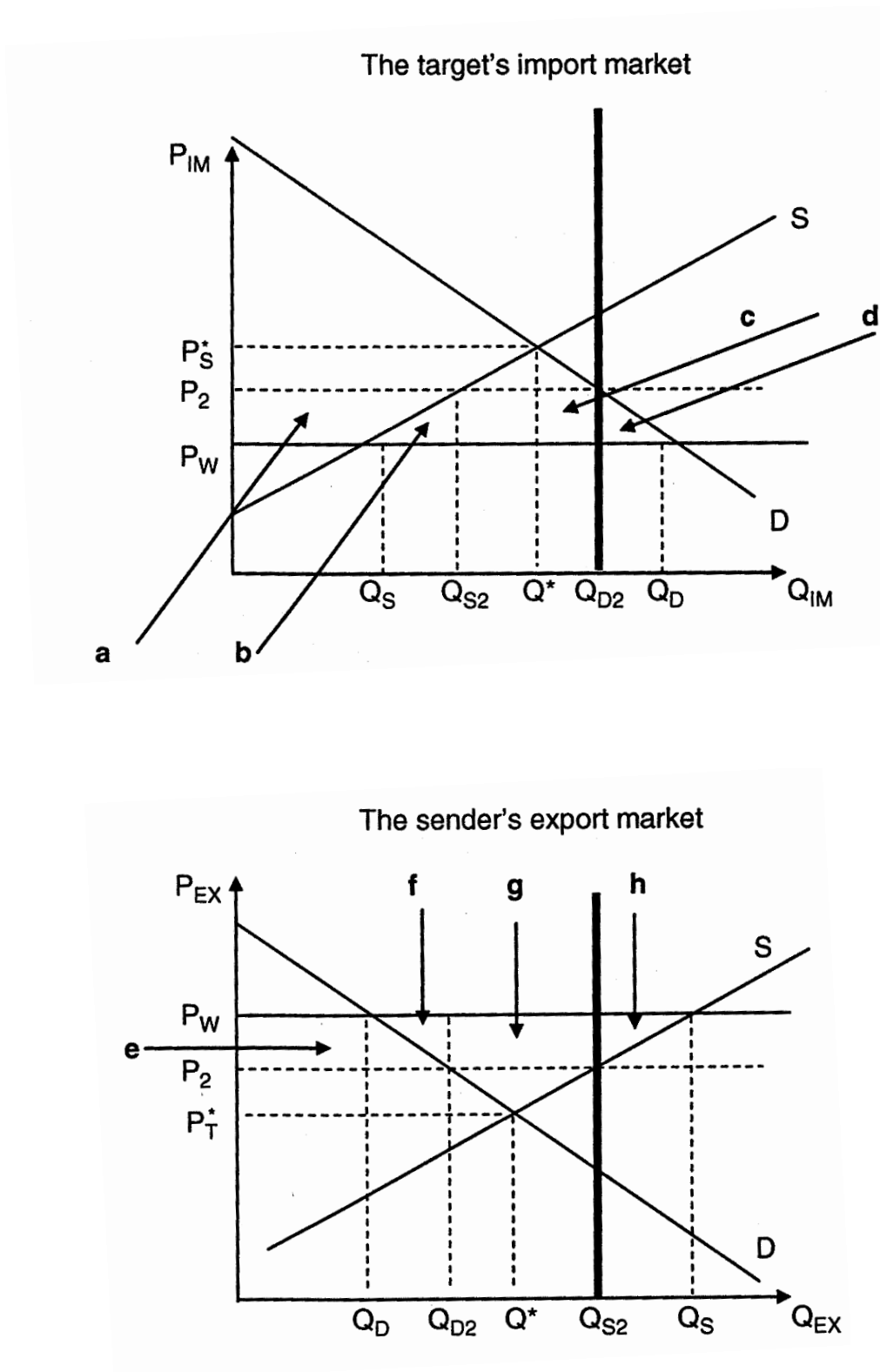
2.1.1.1 Effects on an Export Embargo

In our model, under free trade, consumers purchase the amount Q_D at the world price P_W at the equilibrium.²⁵ Assume now that the sender state imposes a partial export embargo (the terms embargo, quota and ban will be commonly used here) on exports normally destined for the target state. Figure 2 illustrates the export sanctions effects. The amount of exports results from the difference of the quantity supplied by domestic producers and the quantity purchased by the domestic consumers on the domestic market for a given price. In the graph, the dark vertical line corresponding to the limited quantity supplied, Q_{S2} , represents the export quota. Indeed, by fixing this maximal saleable quantity, the trade surplus exportable by the sender country diminishes going from the amount $(Q_S - Q_D)$ to the amount $(Q_{S2} - Q_{D2})$. As a consequence, the price in the sender exporting country will fall until it is equal to the quota conditioned corresponding supplied level, Q_{S2} . It will reach P_2 , lower than P_W , the price under free trade. The partial embargo's implementation results in lower revenues for producers.

Because of the export quota, target's consumers purchase the amount Q_{D2} at the price P_2 . They face higher prices for lower quantities. The net impact on both sender and target countries' welfare is negative in comparison with the free trade situation. Target's producers gain area a thanks to additional revenues induced by the sender's export embargo, which, in turn, corresponds to consumers' loss. Areas b, c and d constitute consumer loss of welfare corresponding to the net welfare loss in the target country. On the sender's side, area e is the gain in consumer surplus and the loss in producer surplus while areas f, g and h represent the losses in producer surplus. f, g and h constitute the net welfare loss in the sender economy. On the target's import side, the partial embargo reduces the maximum amount that can be consumed to Q_{D2} . Since the export quota reduces the global exported supply, it also raises the import price from P_W to P_2 in the importing targeted state.

²⁵ Note that if you want to compare the graphs below with the initial situation's graphs, you need to reverse the initial situation's graphs in order to get the sender's export market and the target's import market.

Figure 2 Export Sanctions Effects.



Source: Eyler (2007), p.18.

Lastly, variables with asterisks design initial situations' equilibrium. P_S^* and Q^* in the graph on the top are equilibrium price and quantity for the sender's import market while P_T^* and Q^* in the graph at the bottom are equilibrium price and quantity for the target's export market. This illustrates that with partial embargoes' enforcement, the situation breaks up with free trade situation. However, in terms of net social welfare, it is still better than the autarky situation that would be obtained by a total embargo's imposition.

2.1.1.2 Effects on an Import Embargo

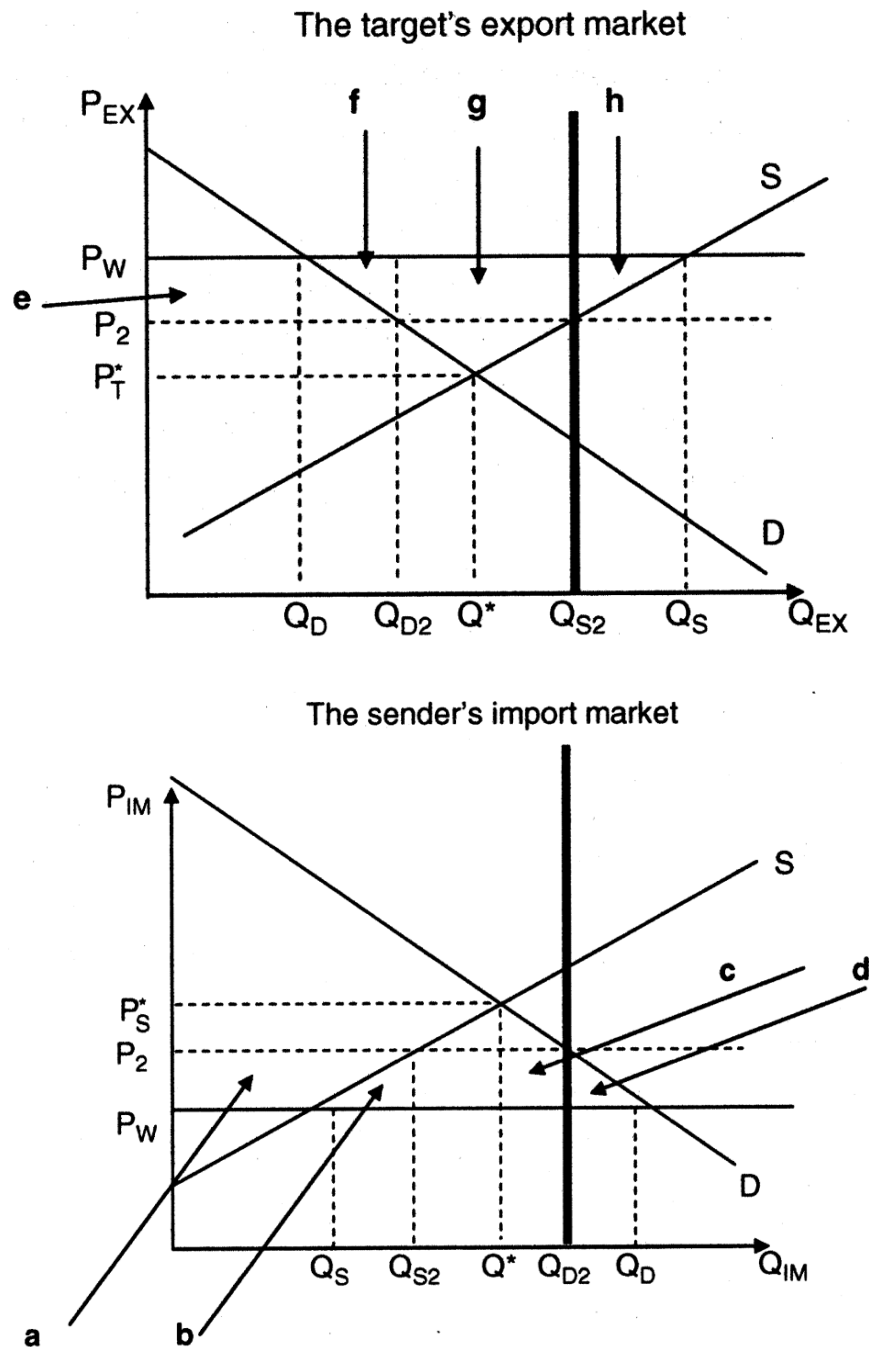
A restriction of the imports coming from the sender country intends to diminish the target's financial ability to purchase goods by reducing its income via a diminution of its gains from trade (Davis and Engerman, 2003, pp.190-191).²⁶ We present here the effects of an import quota. Figure 3 shows the effects of import sanctions. We assume that if import sanctions are enforced by a sender country, it will diminish the target's exports demanded amount. Indeed, this type of sanctions prevents the sender domestic economy to import as much as before from the target country.

Under free trade, target's consumer purchases the amount Q_D at price P_W . Producer supplies Q_S and the difference between Q_D and Q_S constitutes the amount exported by the target domestic economy. Now assume that the partial embargo is imposed. The import embargo is meant to restrict specific imports such as oil from Iraq or Iran or all imports from a targeted country such as Cuban goods, tourism and so on. We assume that the sender country imposes an import quota corresponding to the dark vertical line against the target country. It reduces worldwide demand for the same amount, resulting in a shift in the quantity demanded from Q_D to Q_{D2} . As the target's export market mirrors the sender's import market, quantity supplied in the target corresponds to Q_{S2} now. Figure 3 presents the effects of import sanctions. As a consequence, this import quota has two effects. First, it restricts the possible exportable amount of goods in the target. In addition, the price in the target country decreases up to P_2 , the price

²⁶ Moreover, in reality, it will more or less intensively benefit its competitors by eliminating a part of the competition on the world market, the target's competition, depending upon its market share.

corresponding to the maximal saleable quantity Q_{S2} . Price P_2 is lower than P_W , the price under free trade. As a result, its exports' sales diminish, reducing its revenues. Effectively, the amount exported after the sanction's imposition equals $(Q_{S2} - Q_{D2})$ whereas it was equal to $(Q_S - Q_D)$ prior to the quota ($(Q_{S2} - Q_{D2}) < (Q_S - Q_D)$).

Figure 3 Import Sanctions Effects.



Source: Eyler (2007), p.15.

Second, on the sender side, the price rises from P_W to P_2 , reducing its market shortage from $(Q_D - Q_S)$ to $(Q_{D2} - Q_{S2})$. At this price, sender's producers supply more whereas sender's consumers will see their consumption constrained to Q_{D2} . On the sender's side, consumer surplus diminishes, losing the area a . This area is transferred to sender's producers. We notice that even in the case of an import embargo, sender's consumers are better off than in the autarky's case. However, we also notice that the sender country, in fixing an import quota, has to do a trade-off between quota's effects of the target and its domestic induced effects. Indeed, areas b, c to d correspond to the sender's net welfare reduction induced by sanctions. If the import quota restricts all imports coming from the target country, the situation will be analytically comparable to the administration of a total embargo and lead to the autarky's equilibrium (Ekengard, 2006, pp.10-11). As regards to consumer and producer surplus in the target country, consumer gains the area e , which is a part of the losses of the producers. In addition to area e , producers loss areas f, g and h . These three last areas represent the net welfare loss of the target.

2.1.1.3 Conclusions

First, we saw in the initial situation that countries benefit from free trade as international economics theories suppose. Both sender and target countries increases their economic social welfare. Second, both target and sender countries are worse off in case of embargoes than under free trade. Their total economic social welfare reduces. Under an export embargo, target consumers face higher prices for lower quantities. Indeed, their maximum consumable amount is constrained by the export embargo. Sender producers face lower prices for the maximum allowed supplied quantity. Under the import embargo, the situation reverses and target producers face lower prices for lower quantities while sender consumers face higher prices corresponding to a lower constrained quantity. The price differential between the world price and the domestic price corresponds to the rent. Third, partial embargoes where the maximum importable/exportable quantity implies a maximum possible demanded/supplied quantity lying between Q^* , the quantity under autarky, and Q_D or Q_S reached under free trade, provoke less welfare losses than a total embargo in which countries return in autarky

situations. However, it is important to notice that the closer the quota moves to the amount corresponding to the autarky's quantity equilibrium of the target, Q^* , the higher will be the social welfare's losses of the target. Lastly, the good's elasticity of demand in the target country and the quantity fixed by the export embargo are the two factors that will dictate how much target welfare is finally lost. The exact price change is determined by the price-elasticity of the restricted good (Mitra and Josling, 2009, p.8).

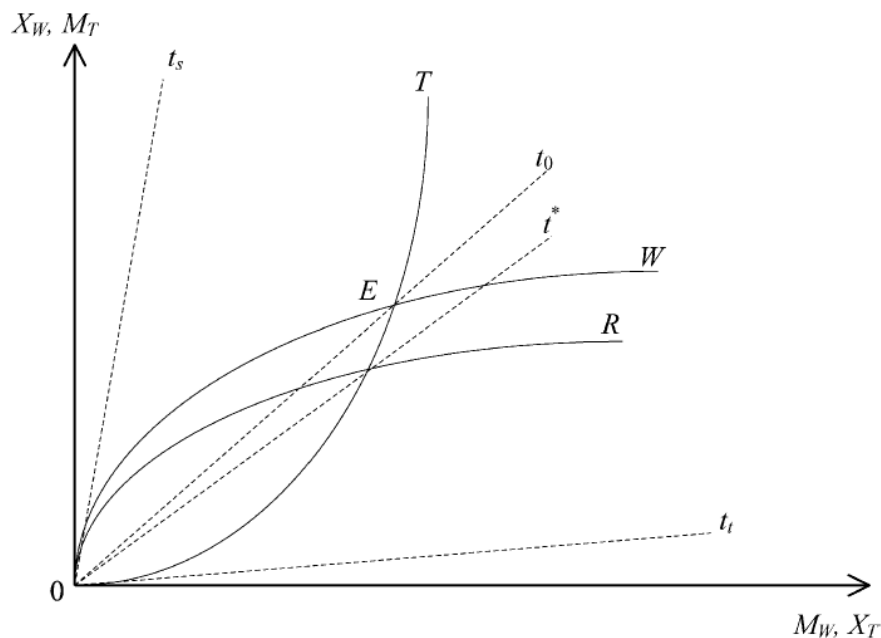
2.1.2 An Offer Curves Analysis

Let us now turn to an offer curves modeling system presented by Kaempfer and Lowenberg (2007). This model is helpful in analyzing the effects of trade sanctions on relative prices of imports and exports. Offer curves, also called reciprocal demand curves, express the level of trade of imports for exports that some state would like to purchase at different prices. Offers curves modeling system allows us not only to show the impact on the terms of trade of the implementation of sanctions but also to make inferences about the welfare effects of sanctions (general equilibrium context).

Figure 4 presents international trade equilibria with sanctions. In Figure 4, the initial offer curve equilibrium is obtained at the intersection of curves T and W . Curve T represents the potential targeted country by multilateral economic sanctions while the curve W represents its current trade partners that are all other countries in the world. Amounts of the export good of country T , X_T , are measured on the horizontal axis whereas quantities of target's T import good, M_T , are expressed on the vertical axis. As Kaempfer and Lowenberg explain, "any point along T 's offer curve shows some specific international trade equilibrium for country T , which is a welfare maximizing quantity of imports that would be acquired at the cost of a certain quantity of exports at some specific price ratio. That price ratio, or the terms of trade, is merely the ratio of exports to imports as represented by the slope of a ray from the origin to a point on the offer curve. In general, as country T moves out from the origin along its offer curve it is able to buy more imports for a lower cost in terms of exports per import, i.e., its terms of

trade improve, movement from the origin along a country's offer curve is welfare enhancing for that country." (Kaempfer and Lowenberg, 2007, p.872).

Figure 4 International Trade Equilibria with Sanctions.



Source: Kaempfer and Lowenberg (2007), p.873.

Let turn to curve W now. This curve is the composite offer curve for all other countries, i.e. the rest of the world. It represents all world trade, net of the trade of the target state. As a result, the rest of the world exports the good that the target state imports corresponding to the good on the vertical axis ($X_W = M_T$). Inversely, the rest of the world imports the export good of the target state, good ($M_W = X_T$) illustrated on the horizontal axis. We assume that the target state owes a worldwide comparative advantage in the good on the horizontal axis, X_T . It means that the targeted state, at least at the beginning, is the lonely supplier of X_T on the world market, and the rest of the world is a potential importer of this good and exporter of the other good, M_T . W and T curves' intersection, E , represents the international trade equilibrium in the two-good offer curve model. At the intersection, the given terms of trade, t_0 , equate supply and demand, i.e., exports and imports, in the world market for both goods.

2.1.2.1 Situation of Multilateral Sanctions

Suppose now, that the rest of the world, W , implements multilateral sanctions against a target country T . We assume that the sanction used is a total embargo on trade between W and T . This assumption simplifies at most the analysis. Such an embargo cancels the opportunity for trade between the rest of the world, W , and the target state, T . As a consequence, T goes from the equilibrium E , a situation of international trade, to the origin, 0 , a situation of autarky. This worsens the terms of trade of T going from t_0 to t_t . Moreover, this model not only shows the effects on the target state but also on the rest of the world that is the sender coalition. Thus, by implementing a total embargo against its trading partner T , the sender coalition is also imposing autarky conditions on itself, vis-à-vis T . This leads to a deterioration of its terms of trade, going from t_0 to t_s . Indeed, the shift in its terms of trade represents an increase in the price of its net importable goods. For the target, the opposite phenomenon occurs. The shift in its terms of trade reduces the price of its net exportable goods. Nevertheless, it is important to notice that within the sender coalition, there will be considerable differences in the extent to which countries of the coalition individually suffer. Effectively, certain states members of the coalition might become net exporters of the goods previously imported from the target state, benefiting from the imposition of the sanction. As a result, the global terms of trade of W will decrease while the heterogeneous redistribution within the coalition will imply better terms of trade, respective worse terms of trade, for countries members of this coalition. Lastly, it is important to notice that this model consider t sender coalition countries acting as a unit without any free rider. In real world, this is usually not the case.

The terms of trade change in a given situation is determined by the amount of curvature in the offer curves. The latter is a function of the price-elasticity of the offer to trade and the size of the trading countries. Indeed, “very large countries are self-sufficient enough to not reap very substantial gains from trade, but conversely they do not suffer extensively from abstaining from trade, following sanctions. Thus, large-country offer curves have very little curvature, almost resembling linear rays from the origin. Small countries, however, tend to be much more dependent on trade. Their demands and supplies of trading goods are price-

inelastic and these countries can suffer greatly from the imposition of sanctions. Thus, small countries tend to have much more curvature in their offer curves than do large countries.” (Kaempfer and Lowenberg, 2007, p.874). This element helps us to understand the reason why in real-life cases, most cases involved great sender countries against small economies. Moreover, this model considers trade in general. However, certain types of goods, for instance high-technology goods, are price-inelastic goods provoking higher effects on both actors involved in the sanctioning process.

2.1.2.2 Situation of Unilateral Sanctions

Consider now a situation of unilateral sanctions. First, we analyze the implications of a situation where a single sanctioning country, S , implements sanctions against a target country. As a result, in Figure 4, the rest of the world’s offer curve is reduced by the corresponding sanctioning country’s offer at each terms of trade and is now R . Moreover, the residual offer curve’s elasticity is also diminished by the sanctioning country’s withdrawal what implies that the new offer curve, R , must have a greater degree of curvature than the initial offer curve, W .²⁷ Because just one sender country implements sanctions against the target country, the latter is not reduced to autarky as in the case of multilateral sanctions. Indeed, it has always the opportunity to continue trading with non-sanctioning countries. Naturally, in the situation with one sanctioning country, S , target’s terms of trade, t^* , is worsened in comparison with the initial international trade equilibrium, t_0 . More precisely, trade elasticities and the extent of the shift from W to R determine the degree of deterioration in the terms of trade of the target country. The greater bilateral pre-sanctions trade between the target and the sender country (or coalition), or the larger the number of sender countries relative to non-sanctioning countries, the larger is the extent of the shift from W to R . As the number of sender countries rises, we move from the unilateral case to the multilateral case, the terms of trade going from t^* to t_t , the latter corresponding to the extreme case

²⁷ The rest of the world offer curve is obtained by adding the import and export totals for all countries minus the target country along each ray. When the sender country’s offer curve is withdrawn from the rest of the world offer curve, the resulting residual offer curve lies closer to the origin at each terms of trade and is less price-elastic.

of autarky. Moreover, as Kaempfer and Lowenberg write, “the less elastic is the rest-of-the-world offer curve, R , the greater the extent of the deterioration of the target’s terms of trade.” (Kaempfer and Lowenberg, 2007, p.874). At last, the terms of trade’s deterioration of the target is also greater the more inelastic the target’s offer curve (Kaempfer and Lowenberg, 2007, p.874).

Second, looking at the effects of the unilateral sanctioning process on the sender country itself, we see that the results are the same as in the case of multilateral sanctioning. The sanction implementation implies the elimination of an inexpensive source of imports for the sender country, S . Moreover, in the extreme case where the sender country would have no alternative market among the rest of the world, the latter would end in a situation of autarky. As a result, the sender country, unable to get its desired import, finds itself far worse off following the imposition of sanctions than does the target, which still has the opportunity to trade with the rest of the world at worsened terms of trade. This result assumes no transshipment of target’s imports or exports through third non-sanctioning countries. Moreover, whether the goods exchanged among these states were all perfectly fungible, then the embargo would have almost any impact. Only higher transaction costs due to transshipment would appear. In addition, if both the sender and target countries were members of larger groups of countries, such as trade blocs, which are active on either side of the market, then the sanctions would not interfere with either country’s ability to engage in trade. Lastly, Harkness (1990) analyzes the case of partial sanctions that affect just a part of trade flows between sender and target countries. He shows that the impact of such sanctions on the sender country terms of trade and trade balance depend on the elasticities of demand for its imports and exports (Kaempfer and Lowenberg, 2007, p.875).

2.1.2.3 Conclusions

To sum up, as the trade model outlined in Figure 4, both sender and target countries are made worse off by trade embargoes. As Kaempfer and Lowenberg describe, “the degree to which the sanctions impose costs on these nations depends on the number and size of other countries willing to continue trading and on the elasticities of the trade offers of those countries.” (Kaempfer and Lowenberg, 2007, p.875). The more inelastic are offer curves, the more dependent

on bilateral trade are actors involved. The imposition of an embargo, total or partial, will have a higher impact on the terms of trade of small economies specialized in what they export. Lastly, multilateral sanctions involve a greater deterioration in the target's terms of trade than unilateral ones.

Any distortion of prices of traded goods induced by sanctions ineluctably creates opportunities for third countries not members of the sanctioning coalition, transshippers and smugglers to capture rents by carrying on trade with the target country. Indeed, they purchase target's exports below the world price and they sell target's imports above the world price. The extent of the rents and, thus, the incentive to enter into sanctions-busting activities, increases with the severity of the sanctions as expressed in their terms-of-trade effects and is, therefore, greater in situation of multilateral sanctions than unilateral sanctions. Under unilateral sanctions, most of the rents go to traders in non-sanctioning countries. Under multilateral sanctions, traders from the target country itself engage in sanctions-busting activity. Whether target's rulers are able to enter into sanction-busting activities, they will benefit from rents and enrich themselves.

2.2 The Domestic Decision of Implementation of an Embargo: the Game of Interest Groups

The sanctioning behavior can be analyzed from two standpoints: the interest group theory and the single-rational actor methodology. These two concepts are not inevitably inconsistent with each other. Rather, they focus on different questions. According to the interest group theory, observed policies in international relations and their implications are perceived as outcomes of the set-ups of domestic interest group politics within sender and target countries. In other words, it expresses how national policy choices mirror the interests of constituency groups within the polity. In this approach, embargo's objective and more generally sanctions' objective is to serve the interests of pressure groups within the sender country. National governments have no independent policy preferences or agendas. They are considered as arbiters of competing domestic interest groups, acting in a more or less impartial manner. While some pressure groups might derive pecuniary benefits (income effects) from the implementation

of economic sanctions, others get utility directly from taking a moral stance against some other country's deviant policy. The first situation is expressed as the instrumental motive while the second case is well-known as the expressive motive developed by Per Lundborg (1987) and Johan Galtung (1959) (Kaempfer and Lowenberg, 1988, p.786).

The public choice approach is based on the fact that policy markets exist, where the policy constitutes the good. Both sender and target states owe such markets. Interest groups play a decisive role in national policy decisions by putting pressure on politicians. They seek maximum net gain from policy as every citizen. The relative effectiveness of the interest groups in producing political pressure leads to the public policy outcomes. These pressures are the results of private utility maximization from individual members of interest groups involved. Even if these groups are defined by commonality of interests, each member of the group sees its political participation tempered by a propensity to free ride. Effectively, policies are public goods (Eyler, 2007, p.62 and Kaempfer and Lowenberg, 1988, pp.786-787).

The basic narrative says that the government of the sender country supplies economic statecraft for an amount greater than zero. This is due to the fact that the sender country's interest groups demand sanctions, bidding up what they are willing to pay. On the one hand, the price reflects the cost of engaging the government to take action. On the other hand, the quantity constitutes the level of action that the government is willing to undertake. Target countries face the same policy market. However, as the target government supplies deviant policy that it knows, will spark off economic sanctions as a reaction, it engages in that policy with an expected cost. This expected cost is an imported cost that needs to be added to the domestically produced policy cost resulting of supplying the deviant policy. Once sanctions are initiated, sanctions pursue if both states' policy market clear at a nonzero quantity of actions.

Kaempfer and Lowenberg (1988) are two famous scholars who contributed to the study of economic sanctions by elaborating public choice models. In their model, they analyze sender agents that have specific interests in initiating economic sanctions. "Utility is assumed to be maximized by agents of both economies,

where it is based on an agent's income." (Eyler, 2007, p.65). Using an equilibrium model of interest group competition, they explain how public policy outcomes are a function of the relative effectiveness of interest groups in producing political pressure.

2.2.1 The Game of Interest Groups in the Sender Country

Kampfer and Lowenberg (1988) explain that the level of economic sanctions is the result of pressures of different objective-oriented interest groups in the political system. These pressures result from private utility maximization of individual members of the interest groups implied. These interest groups are led by commonality of interests although each member's participation is tempered by a desire to free ride.

Consider some individual i a member of the population I of some state. His utility is maximized according to

$$\begin{aligned} \text{Max } U^i &= U^i(Y^i), & U_i^i &> 0, & U_{II}^i &< 0 \\ \text{Subject to } Y^i &= Y^i(S), Y^i(0) = E^i, & Y_I^i &\neq 0, & Y_{II}^i &= 0, \end{aligned} \quad (1)$$

Where Y denotes the income, E is an initial endowment and S is a nonnegative, continuous variable measuring the level of sanctions implemented against some target country.

The following assumptions are made:

(H1) The polity of both sender and target countries is compounded of two primary interest groups J and K .

(H2) Sanctions increase or decrease individual income at a fixed rate as sanctions constitute interventions that provoke distortions, $\sum_i Y_I^i < 0$. Sanctions increase the income of specific interest groups at the expense of others. Moreover, they are inefficient.

(H3) There are no output deadweight losses induced by sanctions, $(\sum_i Y_I^i = 0)$.

(H4) The marginal utilities of all individuals in the neighborhood of $S = 0$ are similar. Thus, for an infinitesimally small level of sanctions, since the income

gain of group J is assumed exactly equal to the loss of group K (H1), it follows that the willingness to pay of group J for more sanctions is equal to the willingness to pay of group K for fewer sanctions. Therefore, the political market clears at $D^K = D^J \rightarrow S = 0$.

The change in utility provoked by a modification of the level of sanction is

$$\delta U^i / \delta S = U_i^i \times Y_i^i \neq 0 \quad (2)$$

Let $I = \{J, K, L\}$ such that for all $j, k, l \in J, K, L$ respectively, $Y_i^j > 0, Y_i^k < 0, Y_i^l = 0$. Doing so, we can specify separate demand functions for sanctions as certain group benefit from sanctions while others suffer from their imposition. For the group J , benefiting from sanctions, all members' willingness to pay for more sanctions can be summed to get

$$P_S = D^J(S) = \sum_j \delta U^j / \delta S = \sum_j U_i^j \times Y_i^j, D_i^J < 0, \quad (3)$$

where P_S is the unit price of sanctions. This represents the dollar amount that members of group J are willing to pay to get a given level of utility-enhancing sanctions through the political market. This demand curve follows a downward sloping because of specification made in equation (1).

In regard to the individuals of group K , they are willing to pay to avoid sanctions as they suffer from them. Their demands reflect a demand for reduced sanctions which is, when exposed as a function of an increasing level of sanctions

$$P_S = D^K(S) = - \sum_k \delta U^k / \delta S = - \sum_k U_i^k \times Y_i^K, D_i^K > 0. \quad (4)$$

The previous two demand functions express the maximum willingness to pay of individuals of groups J and K . Nevertheless, individuals have an incentive to reveal a lower willingness to pay in order to free ride on other interest group individuals. The political effectiveness of a certain interest group determines the extent to which this capacity to free ride reduces its demand. As a result, demands need to be adapted as follow

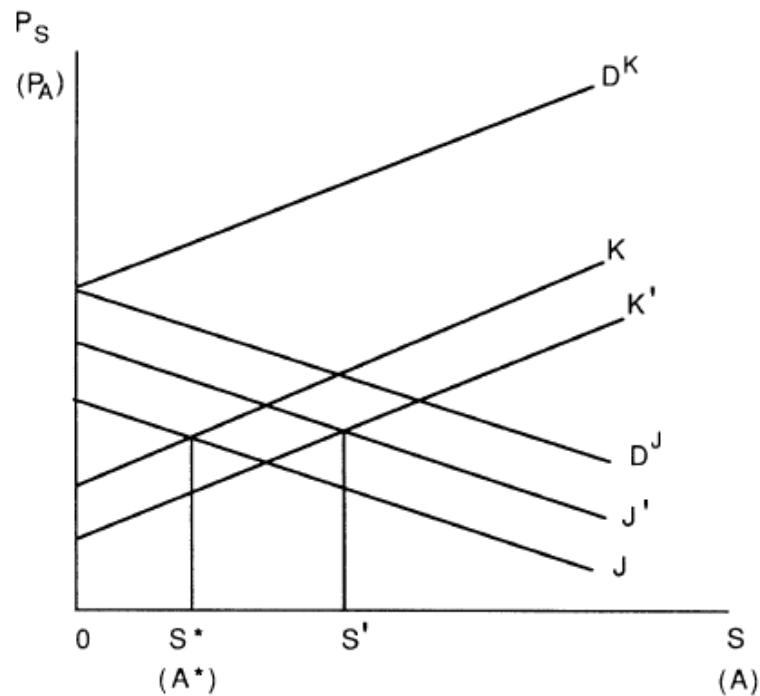
$$P_S = J(S, E^J), \quad J_1 < 0, \quad J_2 < 0 \quad (5)$$

$$P_S = K(S, E^K), \quad K_1 > 0, \quad K_2 < 0, \quad (6)$$

Where E^J and E^K denote shift parameters expressing the degrees of free riding in groups J and K which define the capacities of the two groups to generate political influence. The magnitude of E^J and E^K increases with the severity of the free rider problem. Indeed, as Kaempfer and Lowenberg note on the base of Buchanan and Tullock work (1962), “free riding is a function of the size of the group and other factors which influence organization and enforcement costs.” (Kaempfer and Lowenberg, 1988, p.788).

Figure 5 describes the political market for sanctions. The political market equilibrium is obtained by equating the demand for more sanctions (3) and (5) with the demand for less sanctions (4) and (6). The government increases the level of sanctions until the pressure for fewer sanctions offsets pressure for more sanctions. Figure 5 shows such a political market for sanctions.

Figure 5 Political Market for Sanctions.



Source: Kaempfer and Lowenberg (1988), p.788.

In the presence of deadweight costs (relaxing assumption H3) and in the case of administrative costs, an equilibrium would appear for a negative level of sanctions (excluded by the assumption of non-negativity of S).

In respect for the political effectiveness of respective interest groups, whether it was identical for all interest groups, no sanction would be implemented by the government. Effectively, as Gary Becker stated (1985), "...no policy that lowered social output would survive if all groups were equally large and skillful at producing political influence..." (Becker, 1985, p.344; in Kaempfer and Lowenberg, 1988, p.789). Nevertheless, because of the free riding problem, it decreases the political effectiveness of respective groups, demand curves move below D^J and D^K . Assuming that J is a small group, each individual within this group benefits from a significant part of the increased income induced by an increase in sanctions. This makes J much more politically effective than K , ($E^J < E^K$), implying a smaller shift of $J(\cdot)$ below D^J than $K(\cdot)$ under D^K in Figure 5.

Moreover, a second element influences utility: sanctions. Consider sanctions as a public good that directly benefits, respectively diminishes, individual utility through its symbolic effect. The new specified utility function is given by

$$U^i = U^i(Y^i, S) \quad (7)$$

A direct and an indirect effect on utility is obtained by differentiating the above utility function with respect to S

$$\delta U^i / \delta S = \delta U^i / \delta S|_{Y_1^i=0} + U_1^i \times Y_1^i. \quad (8)$$

Assuming that the direct effect, $\delta U^i / \delta S|_{Y_1^i=0}$ is positive, group J 's pressure will increase, moving their demand for sanctions to J' in Figure 5. Whereas group K lowers its income because of sanctions, the latter increases the direct utility of members of the group. As a result, group K 's demand curve shifts to K' . Finally, all individual part of I get a positive utility from the imposition of sanctions and so the level of sanctions increases to S' . Nevertheless, sanctions could imply greater utility for certain members while they would reduce the utility of other members. Assuming a third interest group is being constituted of such

benefiting/suffering individuals, political strategies and alliances would occur between groups J and K and parts of members of group L . At the end, the level of sanctions of the market would depend on the relative intensities of preference and political inefficiencies in the pro- and anti-sanctions parts of L .

Kaempfer and Lowenberg (1992) found out that the entire political struggle for sanctions implementation will be won by agents earning marginal income greater than zero. This group of agents will pressure the government to pursue its sanctions as long as it derives benefits from the sanctioning process and asks to cease its sanctions as soon as gains will disappear. Other authors argue that interest groups ask for sanctions because they will gain a large part of policy's wealth gains resulting from the sanctions, in a similar way to trade barriers. Lastly, in terms of trade, Bonetti writes that: "[...] the incentive to devote resources to lobbying against trade sanctions will be greater the larger is the trade linkage. This in turn means the larger the trade linkage the greater are the domestic political costs of imposing trade sanctions." (Bonetti, 1997, p.729; in Eyler, 2007, pp.65-66). Therefore, the public choice approach expects an inverse relationship between the pre-sanction trade linkage and the likelihood of implementing trade sanctions.

2.2.2 The Game of Interest Groups in the Target Country

The model used in this section is similar to the one developed above, except that the endogenous policy outcome is the level of policy package A , which is judged as a deviant policy by sender country's interest groups, instead of the level of sanctions. This policy package is income decreasing.

Again, we assume that population I have two main interest groups: J and K for which the income increases, respectively decreases, with higher levels of A . Likewise, group J is still assumed to be more effective for politically pressuring the government than group K . Equations (1) to (4) describe the political market-clearing mechanism in the target country for the deviant policy A (instead of S) in Figure 6. At the equilibrium, the optimal policy outcome will be A^* .

Now, assume that economic sanctions implemented by the sender country decrease income for individuals of both interest groups. The individual budget constraint is now given by

$$Y^i = Y^i(A, S), \quad Y_1^i \neq 0, \quad Y_2^i < 0. \quad (9)$$

Utility is decreased indirectly by sanctions via their negative impact on income

$$\delta U^i / \delta S = U_1^i \times Y_2^i < 0. \quad (10)$$

Moreover, we assume that economic sanctions are a determinant of the political ineffectiveness of groups J and K

$$\begin{aligned} E^J &= E^J(S), & E_1^J &\neq 0, \\ E^K &= E^K(S), & E_1^K &< 0. \end{aligned} \quad (11)$$

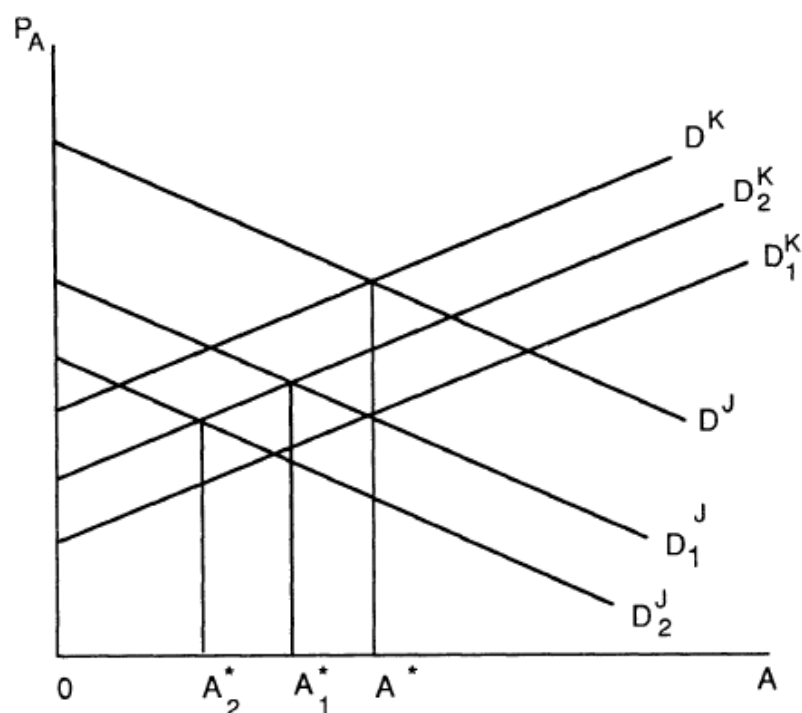
This latter expression captures the different individuals' perceptions of the signal sent by sanctions. Partisans of the target government, individuals of a group J , might perceive economic sanctions as an interference with target national sovereignty. In this perspective, they will "rally around the flag" and increase resources devoted to the policy package A ($E_1^J < 0$). But, if the income-reducing consequences of sanctions discourage them, their incentive to free ride in the production of pro- A pressure will rise ($E_1^J > 0$). For the opposition group, sanctions might indicate a signal of foreign support for their struggle against the deviant policy. Thus, members of group K will be less tempted to free ride and become more efficient in producing political pressure ($E_1^K < 0$).

Figure 6 illustrates the possible consequences of sanctions on the optimal level of deviant policy package A . Demand functions D_1^J and D_1^K reflect income effects of sanctions. Both interest groups are confronted to a decrease in income that lowers their respective willingness to pay for (J) or against (K) policy package A . The relative shift's magnitudes in both demand curves will determine the new policy equilibrium, A^* . In Figure 6, the level of the deviant policy rests unchanged.

As Kaempfer and Lowenberg denote, "if sanctions signal the support of foreigners for the struggle against A , the parameter E^K will decrease and the demand schedule of group K will shift up to D_2^K , leading to a fall in A^* to A_1^* ". As Gordon

Tullock (1971) has pointed out, anything which increases the probability of successful political resistance or lowers the expected costs to individuals of political participation will lead to an increase in resistance activities.” (Kaempfer and Lowenberg, 1988, p.791). This foreign signal resulting from sanctions should diminish incentive to free ride for the opponent interest group K . Deepening this reflection, whether sanctions are implemented incrementally, holding out the threat of further sanctions, members of group J will be discouraged and more entailed to free ride. As a result, E^J will rise, leading demand curve D_2^J to move downward and resulting in a lower outcome, A_2^* .

Figure 6 Possible Effects of Sanctions on the Optimal Level of Deviant Policy Package A.



Source: Kaempfer and Lowenberg (1988), p.791.

Lastly, only sanctions that affect differently partisans and opponents of A are able to induce policy change in the target country. Indeed, as we saw before, even a large negative income impact, which would result in a downward shift, would not change the policy outcome if both interest groups were hurt with the same proportion. Kaempfer and Lowenberg conclude that the sanctioning strategy

should be developed according to its signal and threat consequences rather than just its straightforward income impact.

2.2.3 Conclusions

To conclude, the actual level of economic sanctions results from the composition of interest groups and their respective political effectiveness. If interest groups all had the same political effectiveness, no economic sanction would be enforced. Economic sanctions take the form of trade restrictions that reduce wealth in aggregate but are redistributive in nature. Economic sanctions reduce income in the sender country but do not necessarily imply that they will induce the maximum economic damage in the target country. Interest groups within the target country struggle for a deviant policy package. This deviant policy will be the object of sanctions. Only economic sanctions that affect differently partisans and opponents of the policy package will be able to induce policy change. For this reason, economic sanctions should be developed according to their signal and threat consequences. As a result, this model supports the smart sanctions strategy.

2.3 Sanctioning Process and Formation of a Coalition of Sender Countries

In the single-rational actor methodology, the relevant unit of analysis is the state. Indeed, this standpoint considers that states are the prime players on the international stage. The aim of this methodology is to explain how one state's international policy decisions both influence and are influenced by other states' decisions. Governments decide about whether and how to apply sanctions and whether to comply with or resist sanctions. The sanctions' objective is to engender policy change in the target state through inflicting the severest possible economic harm. These decisions are ordinarily strategic and that is the reason why game theory is often used for analyzing states' behaviors (Kaempfer and Lowenberg, 2007, pp.889-90).

2.3.1 The Sender-Target Relationship: Why the Coalition of Countries Implement Sanctions?

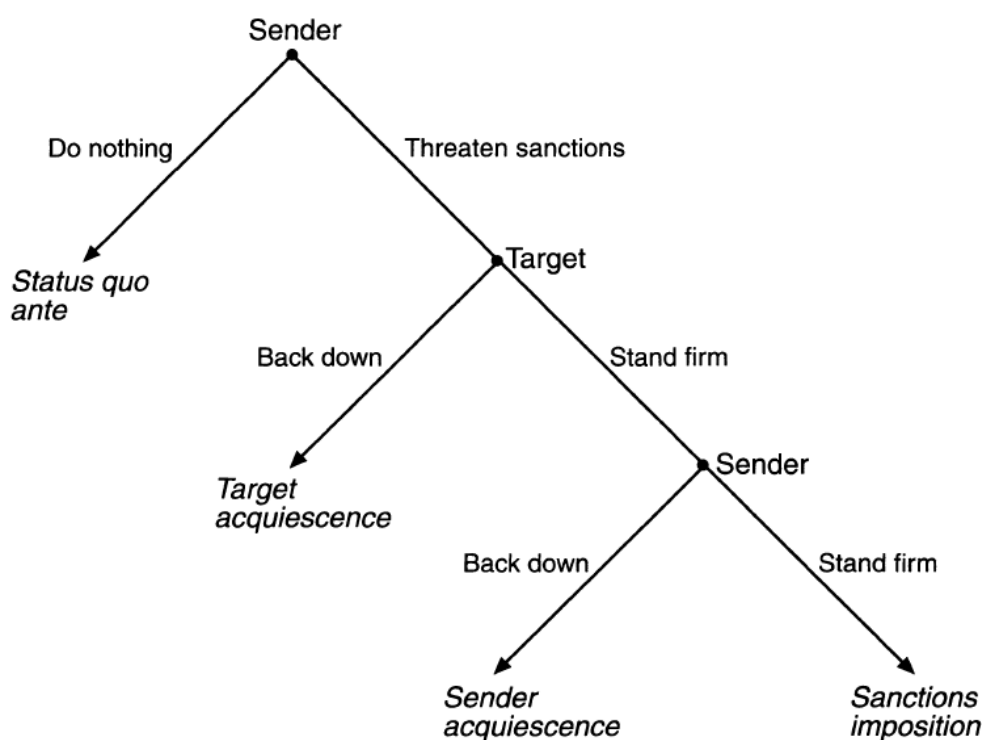
Economic sanctions work like wars of attrition (Eyler, 2007, p.35). The sender country tries to influence the target country's income and wealth so that the target country complies and gives up its initial contradictory policy. Once embargoes are used, costs accrue for both, sender and target states, what diminishes the benefits of respective policies: the sender's state economic statecraft and the deviant policy behavior of the target state. Effectively, the imposition of sanctions constitutes a deadweight loss of utility for all members of a sanction's episode because of the disrupted economic exchange they imply. This provides the sender and target countries an incentive to reach an agreement before the imposition of economic sanctions. In a situation where the sender country prefers the status quo to the use of economic sanctions, then there should be no coercion attempt. On the other hand, whether the target country prefers conceding to risking the costs of economic sanctions, it has an incentive to comply before the initiation of economic sanctions. At this stage, there would have no sanction's episode, only the threat of imposing sanctions would have been dissuasive (Drezner, 2003, p.644 and Eyler, 2007, p.35).

As Drezner explains, a "basic narrative", that follows, is common to most theories and modeling of coercion: "the sender threatens to interrupt the status quo and block a stream of economic exchange with the target unless the sanctioned country acquiesces to a specific demand made by the sender. If the target complies, sanctions are not imposed. If the target stands firm, the sender faces a choice between backing down or carrying out its threat and imposing sanctions." (Drezner, 2003, p.645).

Game-theoretic models of coercion in which the sender and target states are supposed to be rational unitary actors, seeking individual benefit maximization through their actions, conclude on a common prediction: successful examples of economic coercion have a high likelihood to end at the threat stage than at the initiation stage. This intuition comes from the economic literature on bargaining (Rubinstein 1982). Indeed, deadweight costs are linked with the sanctions'

initiation and they never occur for both the sender and target states if they conclude an agreement before the initiation of the sanctions. For rational utility maximizers, this option constitutes a more efficient solution. Finally, under assumptions of full information, rational utility maximizers and perfectly divisible demands, only two equilibrium outcomes appear: either the sender country abandons the threat of coercion or the target country agrees on the sender's threat of coercion. As a result, in this situation, economic sanctions should never be implemented (Drezner, 2003, pp.645-646). Figure 7 presents a model of economic coercion.

Figure 7 A Model of Economic Coercion.



Source: Drezner (2003), p.646.

Nevertheless, in reality, economic sanctions are relatively frequently used. Reasons for their initiation can be found in explanations for why rational, unitary actors go to war (use of force) rather than achieve an incentive-compatible bargaining before the use of force. James Fearon (1995) presents three foreseeable explanations: “(1) private information about an actor’s resolve combined with an incentive to misrepresent such information, (2) an inability for one or both states to credibly commit to mutually preferable bargains, and (3) a disputed issue that is

inherently indivisible.” (Drezner, 2003, p.646). Models explaining economic sanctions’ imposition are based on these three foreseeable explanations, combining them in different manners. Instead of presenting a specific model here, part of the literature on model coercion is reviewed below.

First, Drezner (1998, 1999) explains how the implementation of economic sanctions combines issue indivisibility and the inability to commit credibly. His model assumes complete information and that the target county “will make concessions if the sender prefers a deadlock outcome of sanctions imposition to backing down.” (Drezner, 2003, p.647). Both countries incorporate expectations of future conflict and short-run opportunity costs of economic coercion into their decisions (Kaempfer and Lowenberg, 2007, p.890). According to Drezner, sanctions enforcement can become an equilibrium outcome if the following conditions are met: the demand is indivisible and expectations of future conflict are high. Indeed, under the second condition, both sender and target countries “fear that any concessions made in the present will leave them in a weakened bargaining position in future conflicts, making credible commitments more difficult to achieve.” (Drezner, 2003, p.647). As a result, sender countries expect that frequent conflicts with the target country are more inclined to enforce sanctions than countries expecting fewer future conflicts, while target countries anticipate to be in conflict with the sender country in the future are less likely to comply with the sender country’s demands (Kaempfer and Lowenberg, 2007, p.890). The model foretells that when sanctions occur, the outcome is a sustained deadlock between the sender and target countries. In case of concessions, the game would end at the threat stage.

Second, three models combine imperfect information and issue indivisibility. Morgan and Miers (1999) and Smith (1996) propose models with one-sided incomplete information and get similar empirical predictions. “In both models, the sender does not know whether the target prefers to stand firm or prefers to acquiesce to the sender’s demands rather than suffer the cost of sanctions.” (Drezner, 2003, p.647). Morgan and Miers use a discrete one-shot game whereas Smith adopts a continuous time modeling. For Morgan and Miers, sanctions implementation can result from “the sender’s lack of information about the

target's resolve, and the target's incentive to signal a high degree of resolve (...)." (Drezner, 2003, p.647). Likewise, Smith predicts that the target would only concede at the threat stage, if conceding at all. In regards to Lacy and Niou's model (2000, 2004), incomplete information is assumed to affect both sides. Again, indivisibility constitutes the second assumption. Anew, Lacy and Niou get similar conclusions.

To conclude, all four models explain the imposition of sanctions providing various explanations but all conclude that "a target that prefers conceding to deadlock and believes that the sender will carry out its threat will acquiesce before imposition to avoid incurring the costs of sanctions." (Drezner, 2003, p.648). Lastly, based on a similar game structure, these four models all empirically predict that "sanctions should yield more concessions at the threat stage than at the implementation stage." (Drezner, 2003, p.648). The robustness of this prediction among the different information's distribution is striking.

Other famous game-theoretic models are those of Eaton and Engers (1992, 1999). The authors use a theory of bargaining under incomplete information. They demonstrate that "success is more likely when the cost of a threatened sanction to the sender country is low relative to the gain to the sender from changing the target's behavior, while the cost of the sanction to the target is high relative to the costs to the target of complying with the sanctioner's demands." (Kaempfer and Lowenberg, 2007, pp.890-891). They found out that in a world of perfect information, economic sanctions would never be imposed. Indeed, whether a threatened sanction was sufficiently effective, the targeted country would acquiesce to the sender's demands, whether the sanction was not effective, the sanctioner would not threaten it. Therefore, the fact that economic sanctions are enforced results from two possible situations: either the sender country underestimated the target's costs of compliance or the target country underestimated the sender country's resolve. In the first situation, the sanctions fail whereas in the second situation they succeed.

2.3.2 The Formation of a Coalition between Sender Countries: What tell us Game Theory?

The previous subchapter concentrated on the sanction's imposition process assuming that the sender country was acting alone or that the coalition of senders would have acted as a unitary actor without any free rider. Let us turn to the particular sender-sender relationship now.

During their economic sanctions' study, analysts noticed the importance of acquiring international cooperation if sanctions are to work. Indeed, countries planning to use export sanctions seldom have unilateral control over the products they want to forbid the target country from having. As well, concerning import sanctions, only a monopsonist would be capable to deny a market to the target country without international cooperation. Unilateral economic sanctions may make the target country to bear some transition costs because of the search of new trading partners. Likewise, the target may have to purchase its imports at higher prices or sell its exports at lower prices. Unless countries reach a significant level of international cooperation, natural market forces tend to make these effects temporary and relatively small in size (Martin, 1993, p.408).

Multilateralism, according to Ruggie's definition (1992) and quoted by Martin, "requires that states sacrifice substantial levels of flexibility in decision making and resist short-term temptation in favor of long-term benefits." (Martin, 1992, p.768). Effectively, international cooperation is often described as a product of national self-interest in an increasingly interdependent world. Stable cooperation depends on the following elements: perceptions of interdependence, the ability to monitor and react to other collaborating countries' compliance, a long enough shadow of the future and reasonable differences in payoffs for cooperation and defection (Dittmeier, 2009, p.2).

Multilateral economic sanctions are exposed to a collective action problem. Because benefits of certain cooperative efforts are public goods, such as security, there is an incentive to free ride. Thus, some nations will attempt to free ride, accruing the benefits of sanctions without suffering the costs of their implementation (Coase 1960 and Martin 1992). As Dittmeier (2009) rightly

explains, “multilateral sanctions are thus torn between two mutually-exclusive characteristics: the efficacy of universality and the inefficiency of large groups.” (Dittmeier, 2009, p.4). The important terms-of-trade distortion creates incentives for circumvention and noncooperation. Countries that defect from a sanctions regime or that do not cooperate on the sender side, benefit from arbitraging between the world price and the terms of trade resulting from the sanctions enforced against the target country (Kaempfer and Lowenberg, 1999, 44).

In terms of games, four problems related to cooperation appear: coordination games, collaboration games, suasion games and assurance games. On the one hand, coordination and collaboration games assume symmetrical interest. On the other hand, suasion and assurance games share asymmetric interests.

Table 2 Simple Four-category Typology of Cooperation Problems.

Symmetrical interests	Asymmetrical interests
Coordination games	Assurance games
Collaboration games	Suasion games

Source: Martin (1992), p.768.

First, collaboration games describe a situation where states face “dilemmas of common interests”, the collective action problem. In this situation, states need to specify actions that they will undertake in order to get a specific outcome. The prisoners’ dilemma is a typical collaboration game. Defection in this type of game implies immediate payoffs. As a result, this sort of games involves strong incentives to defect and, therefore, an enforcement mechanism is required in order to maintain cooperation. More precisely, two elements in particular promote cooperation in collaboration games: information on other countries behavior, since undetected defection adds costs for those who keep cooperation and extensive monitoring and assessment of compliance from successful cases of collaboration games. Countries will exchange information retrospectively. Moreover, the shadow of the future should be extended in order to assure that immediate costs resulting from cooperation would be offset by the long-term gains. As Martin (1992) explains, “the solution to collaboration problems in the absence of a state acting as an entrepreneur and in the presence of large numbers

of players requires centralization” such as formal organizations can provide (Martin, 1992, p.770).

Second, coordination games describe situations where states face “dilemmas of common aversions”. Two typical examples are the chicken game and the battle of the sexes. This game has two possible outcomes and no dominant strategy exists. Therefore, the central dilemma is determining which of the two equilibria will predominate. As Martin (1992) comments, “the two players disagree on this and bargaining over the outcome might be quite intense, especially if players expect the result to hold far into the future. Coordination games can have major distributional implications, which sometimes make cooperative solutions difficult to achieve.” (Martin, 1992, p.775). Nevertheless, once equilibrium has been reached, none of the players has an incentive to defect. For this type of problem, it will be easier to reach a cooperation outcome if structures that facilitate bargaining and help state to identify a focal point are implemented.

These two first types of problems assumed symmetry of interests. Let us turn now to the opposite situation, condition of asymmetry. Indeed, in real life, often states experience asymmetry of interests. Moreover, a hegemonic country, such as the United States, is willing to supply public goods on unilateral way because of its dominant strategy for cooperation. Therefore, in suasion game, small countries have a strong incentive to free ride. Indeed, they know that with or without their cooperation efforts, the public good will be provided. On the other hand, the hegemon prefer third country cooperation rather than the unilateral situation. Therefore, the hegemon country must convince or coerce other countries to cooperate. It has two options: threaten to act irrationally in the short run or use tactical issue linkage in forms of threats or promises. In the first case, a problem linked with credibility’s establishment appears. In the second case, the hegemon acts on other player’s payoff. By using threats, it may diminish the payoff resulting from unilateral defection of the smaller sender. At the opposite, by promising rewards (side payments for instance), the dominant sender increase the payoff linked with mutual cooperation. Again, in this situation, a credibility problem appears: applying threats or promises that are costly for the sender country. Often, the hegemon will decide to opt either for unilateral or multilateral

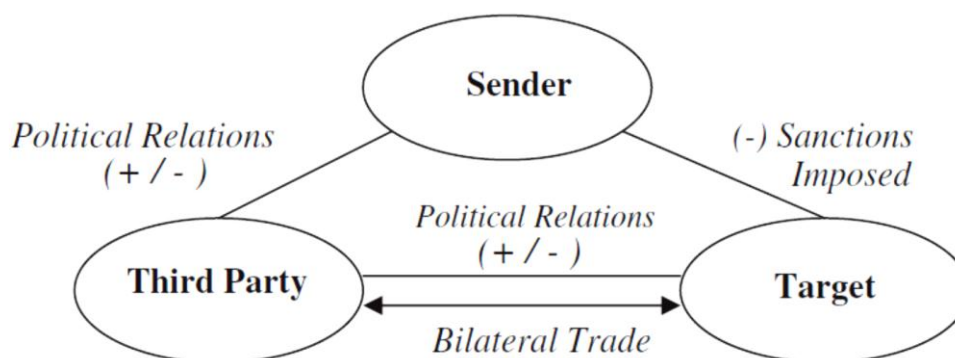
sanctions based on its discount rate. In other words, the longer the horizon, the more attractive multilateralism for the dominant state (Martin, 1992, pp.778-786). Lastly, the last game is an assurance game for which the lonely possible outcome is mutual cooperation. Indeed, under assumptions of rational states with complete information, states will cooperate. This equilibrium is Pareto-superior knowing that no additional gain can be obtained from defecting.

2.3.3 Explaining the Sanction Busting Trade Phenomenon²⁸

Once sanctions are imposed against a target country, sanctions-busting trade's opportunity appears. Sanction busting behavior is defined as "a significant increase in a third-party's trade with the target following the imposition of sanctions, constituted in high enough levels so as to have a salient impact upon the economic costs the sanctions would otherwise impose." (Early, 2009, p.50). In an operational point of view, two elements are primordial in determining it: a significant rise in bilateral trade between the third country and the target country and an absolute threshold for which the third country become a significantly important trade partner for the target. Sanctions-busting trade occurs in a model made up of three actors: the sender country, the target country and the third-party countries or so-called rest of the world. All these countries are connected together with interdependent relations as Figure 8 shows. States' trade and conflict conducts might be influenced by these indirect connections whose characteristics determine how likely countries may become sanctions busters (Early, 2009, pp.51-52).

²⁸ This subchapter is inspired from Early's article (2009).

Figure 8 States' Interdependent Relations Model.



Source: Early (2009), p.52.

Indeed, while the sender country attempts to forestall third-party countries from impeding the sanctioning process or even try to persuade them to join it, target countries endeavor to obtain third-party support in order to weaken the sanctions' effects. Support is provided by either aid or trade. The response of third countries depends on their relations with both sender and target countries as well as economic constituencies. Effectively, economic constituencies in both third-party countries and even sender state are interested in entering potentially lucrative trade with the target state and its domestic companies. The aim of this subchapter is to review the two main paradigms explaining such sanctions-busting behaviors and empirical evidence based on Early's findings.

Two opposite theories, appearing from international relations' field, attempt to explain sanctions-busting trade behavior: realism and liberalism. Realism and liberalism theories differ from each other regarding international trade. The core of the divergence is located in the assumptions formulated, more precisely in the "governments' capacity to constraint theirs states' trade flows and whether state trade behavior is driven primarily by security or profits." (Early, 2009, p.50). Indeed, "realism argues that third-party states' trade with sanctioned target states should reflect their state-based security concerns. In turn, liberalism contends that third-party states' trade with the target is driven primarily by profit-seeking firms and individuals." (Early, 2009, p.49).

First, from the realist perspective, the world is constituted of unitary states, all members of an anarchical, self-help international framework. In this context,

states are continuously interested in the relative gains realized by potential rivals. Realists' core concern of international trade is its consequences on security. Indeed, realists link together international trade and its potential positive externalities on national power. In the realist's view, states trade in a strategic manner, trading in a greater extent with their allies and states sharing analogous interests than their rivals. Still in this view, some scholars have gone further explaining that the following dictums, "the enemy of my friend is my enemy" and "the enemy of my enemy is my friend", can affect bilateral trade. The assumption postulating that governments lead the national trading behaviors, for both public and private sectors, constitutes the key element of this theory. As a result, realists go by third-party countries' security ties with the sender and target countries in order to explain sanctions-busting behaviors (Early, 2009, p.52).

Second, the liberal perspective is based on economic considerations of the parties involved in trade in order to explain sanctions-busting behavior. In the liberal perspective, individuals and private entities constitute the main actors in international politics. They are rational, risk averse actors that constitute prime determinants of trade flows. For liberalists, "international trade is thus explained by the profitability of trading opportunities available to individual firms and their capacity to capitalize on them." (Early, 2009, p.54). Multilateral trade implies transaction costs, which increase with uncertainty. Therefore, rational companies led by profitability and notably constrained by uncertainty, need to express and continuously revise their expectations of future returns and adapt trade in consequence. Therefore, they are in a perpetual pursuit of economic opportunities, trying to identify and profit from them, while avoiding losses (Early, 2009, p.54).

Both security interests and private sectors' economic interests determine third-party states' responses. Indeed, Early found that "the highest probability of busting occurs when both the state's security interests and economic interests align in favor of sanctions-busting." (Early, 2009, p.65). However, the evidence provides strong support for the liberal perspective. Indeed, Early finds out the following counter-intuitive finding: "having a defense pact with the United States had a significant positive effect on third-party states' general trade flows with sanctioned states." (Early, 2009, p.65). This last result was also found by Yang

and al. (2004). Indeed, historically, the U.S. sanctions had significant, positive effects on Japanese and European Union trade with U.S. sanctioned countries. The realist perspective would explain this finding in contradicting its own theory. It would explain that countries, that run their indirect ties with other countries in an intricate manner, would break their alliance partners' policy choices because of complex strategy of balancing. On the contrary, the liberal perspective provides much greater insight and explains that responses of the firms located within the sender, target and third-party countries need to be considered in order to figure out why a third-party defense pact with the sender country could help do sanction-busting. Indeed, when the sender imposes sanctions on the target, sanctions will also have negative consequences on its own national firms. Domestic actors located in the sender state must give up the gains from trade with the target state because of the sender's ban of exchange. Because of the substantial costs that a change in trading partners, going from the best to the second-best trading partner, would imply, companies within the sender country will be tempted to continue trading with their target country's partners by looking for other means of doing so. One of these means comprises re-exportation. Companies within the sender state send their cargo via other states, often states with which they already have close relations, from where they will then re-export their cargo to the target state. Another way includes transferring their business to a third-party state from where they can continue to trade with the target state. At last, these alternatives represent the least expensive manner to continue exchanging with the target for the firms within the sender state. For instance, many U.S. commercial activities were re-routed through proxies or relocated to Canada by U.S. companies as a result of the imposition of U.S. economic sanctions against Cuba (Early, 2009, p.66). Finally, Early's study results related to the explanatory variable *Cost* reinforce this interpretation: "as the costs to the sender rise in imposing sanctions, so does the likelihood of sanctions-busting. The greater the economic disruption within the sender state, the larger the incentives are for their own firms to find other states in which or through which to continue trading with the target." (Early, 2009, p.66). Early identifies several features that influence positively sanction busting trade behavior. He explains that certain third countries may capture a disproportionate

part of the potential gains to be realized in trading with the target due to the cross-national disparity in political and economic factors between third countries. As a result, the size and trade openness of third countries matters. Effectively, it will be easier to absorb surplus exports coming from the target as well as adapt the production in order to meet the increased demand of the target for large third-party economies. Moreover, as economic sanctions generate transactions costs because of the uncertainty they imply, political and economic linkages that contribute to the improvement of transparency provide companies more confidence in bilateral trade with the target state. Social linkages, as for instance past colonial relationships, constitute a factor influencing positively bilateral trade, giving confidence to companies as regard the stability of those states' relations. Lastly, another factor affecting bilateral trade is international trade's share in the third country's economy. As Early denotes, "the greater the extent to which international trade comprises a significant proportion of the economic and commercial activity of the third-party state, the larger the size and power of the commercial interests available to pressure the governments toward maintaining the openness of the state's economy." (Early, 2009, p.56). Kaempfer and Lowenberg and Bonetti demonstrated similar results.

In conclusion, Early finds out that sender country's closest allies are more likely to adopt sanction busting activities than its rivals. Liberalism, based on economic considerations of the parties involved in trade, provides an explanation for such a behavior. Moreover, factors that influence third country sanction busting trade behavior at most are third country GDP, trade openness and strong pre-existing commercial relationship with the target country. This result is not surprising and corresponds to what international trade theory predicts.

3 Empirical Evidence

The last part of this work presents empirical studies on the effect of economic sanctions on trade from two basic research methods: econometric estimations and case studies. Generally, the aim of econometric studies is to estimate the impact (costs) of economic sanctions in terms of trade. For case studies, usually, the impact on the whole domestic targeted economy is observed. The case studies presented here are based on descriptive statistics.

Chapter 3.1 presents results of econometric studies from Yang et al. (2004) and Slavov (2007). Chapter 3.2 describes results from two study cases. The first case study, taken from Losman (1974), introduces the effect of the embargo on Cuba. The second case study presents effects of economic sanctions against Iran. Torbat (2005) is the author of this second case study.

3.1 What do Econometric Models predict?

One famous study in economic sanctions, serving as pioneer in this area notably for their dataset and their econometric estimates, is the works of Hufbauer et al. (1997).²⁹ Their many works serve as references in this field. Nevertheless, we will not present their results here but more recent econometrical studies led by Yang, Askari, Forrer and Teegen (2004) and Slavov (2007). The study of Yang et al. (2004) focuses on the impact of US economic sanctions on US trade with target countries and on third countries. Slavov (2007) analyzed the effects of UN sanctions on neighbor countries. These two studies should give us some insights of the effects of economic sanctions on trade between sender and target countries as well as on the effects on third-countries.

The model used by the different authors is the gravity model. The gravity model is based on Newton's theory of gravitation stating that the gravitational pull between two celestial bodies is positively related to the product of their masses and inversely related to their distance apart. Likewise, the gravity model, in its elementary form, predicts that the volume of bilateral trade between two countries

²⁹ Their first results were published in 1985. From this moment, they have published three editions of their book *Economic Sanctions Reconsidered*, in 1985, 1990; the last version being edited in 2007.

will be positively related to the product of their outputs (GDP), and negatively related to the distance between them (commonly measured by the distance between the two capital cities). The reason is that countries with a greater economy tend to trade more in absolute terms, while geographical distance that constitutes a proxy for transportation costs should push down bilateral trade. Other explanatory variables and dummy variables such as the share of a common border or a common language, the membership in a trade bloc and so on can be added to the basic model. The use of dummy variables allows the authors to refine the analysis by specifying specific characteristics of the bilateral trade relationship that interest them. Lastly, this model is of particular use for the analysis of bilateral trade flows because of the empirically tractable framework that it provides (Yang et al., 2004, p.26).

Now that the general framework is given, we will look in details at the results of the different works mentioned above. In a first phase, we will review the results obtained by Yang et al. (2004) on the impact of US economic sanctions on US trade with target countries and third countries. Then, we will present the study of Slavov (2007) which analyzes the impact of UN sanctions on neighbor countries.

3.1.1 US Economic Sanctions' Impact on US Trade with Target Countries and Third Countries

Yang et al. (2004) have two objectives: study the impact of US economic sanctions on the sender country that is the United States (three dependent variables are analyzed: total bilateral trade calculated by adding exports and imports, exports and imports) and examine the third-country effects of US unilateral economic sanctions. Third countries selected by the authors are the European Union and Japan, owing to the fact that both represent alternate trading partners and main US competitors in many sectors.

The basic gravity model used by Yang et al. (2004) estimates the following dependent variable: bilateral trade between country i and country j ($TRADE_{ij}$). This variable will finally result in three different measures: export from country I to country j , import in country i from country j and total trade between country i and country j . The model includes the following explanatory variables: the

economic size($GDP_i * GDP_j$), the income effect in international trade ($GDPPC_i * GDPPC_j$) and the geographical distance($DIST_{ij}$). Two dummy variables³⁰ are used in order to estimate the impact of economic sanctions ($SANO$) and ($SANX$); the first estimates the impact of comprehensive sanctions while the second estimates the impact of selective sanctions. Each country is classified in one of the following categories:

- 1) Target countries targeted by selective US sanctions ($SANX = 1$),
- 2) Target countries subject to comprehensive US sanctions ($SANO = 1$), and
- 3) Countries that are not targeted by US sanctions ($SANX = SANO = 0$).

Three different samples are used in order to specify the variable $SANX$. $SANN$ constitutes the first sample issued from *Sanctions.Net* and the U.S. State Department's Embargo Reference Chart. The second sample, $SANH$, is the list used by Hufbauer et al. (1997). Finally, the third sample, $SANC$, includes all "controlled countries" determined by the US president as required by the Export Administration Act of 1979. These countries have often been referred as former planned economies or, in other words, "economies in transition". The authors regressed the model on all three samples. As a result, the basic empirical model takes the following form:

$$\begin{aligned} \ln(TRADE_{ij}) = & \alpha + \beta_1 \ln(GDP_i * GDP_j) + \beta_2 \ln(GDPPC_i * GDPPC_j) \\ & + \beta_3 \ln(DIST_{ij}) + \beta_4 SANO + \beta_5 SANX + \varepsilon_{ij} \end{aligned} \quad (12)$$

The logarithmic form of the model allows us to interpret the estimated coefficients as elasticities. Elasticities are defined as ratios of the percentage change in the dependent variable for each one per cent change in the explanatory variable. The time period comprises 19 years of annual data (1980-1998) for US export, imports and bilateral trade. The sample size for each year consists of all 225 countries whose trade statistics are available in the IMF's *Direction of Trade Statistics*. Lastly, an ordinary-least-squares (OLS) regression is applied to the model in order to estimate the gravity equations. The main advantage of the OLS regression is

³⁰ A dummy variable indicating whether a country belongs to a trade bloc with the United States was initially added but then removed because of multicollinearity problems with the explanatory variable distance.

that it can be used to estimate the independent effect of each factor, holding constant the effect of the other variables. The following table reviews all variables used in the model:

Table 3 Review of Variables used in the Model of Yang et al. (2004).

Variable	Description	Coefficient and Expected Sign
$TRADE_{ij}$	Bilateral trade between country i and j	-
$GDP_i * GDP_j$ ³¹	Product of GDP of countries i and j	β_1 ; positive
$GDPPC_i * GDPPC_j$ ³²	Product of GDP per capita between countries i and j	β_2 ; positive
$DIST_{ij}$ ³³	Distance between countries i and j	β_3 ; negative
$SANO$	Overall or comprehensive sanctions	β_4 ; negative
$SANX$	Selective sanctions	β_5 ; negative

For all three dependent variables, the explanatory power of the empirical models, determined thanks to the coefficient of determination R^2 , indicates a good fit of the model. It ranges mostly above 0.80 for the total trade dependent variable, what indicates that the explanatory variables used in the model explain more than 80 per cent of change of the dependent variable. Both results of $GDP_i * GDP_j$ and $DIST_{ij}$ get the expected signs and are highly significant statistically (≥ 99 per cent confidence level; except a ≥ 90 per cent confidence level for imports' results for the variable $DIST_{ij}$) throughout the samples. They confirm the former hypotheses. It is interesting to notice that US exports distance's estimates are higher than those obtained for bilateral trade, indicating that US exports are more distance-sensitive

³¹ Data are gotten from *World Development Indicators* (World Bank) and are in current US dollars. The change from foreign currencies to US dollars is made by using single year official exchange rate. We think that the use of the purchasing power standard (PPS) would have been better (spatial comparison) in order to isolate price-level differences.

³² Data are taken from *World Development Indicators* (World Bank) and are based on purchasing power parity (PPP). As Yang et al. (2004) explain, "trade tends to rise at a faster rate than GDP as a country becomes richer, and at a slower rate than GDP if the driving force behind a larger economy is simply an increase in population." Indeed, while per capita income rises, consumers purchase a wider variety of goods and services. The demand for differentiated goods increases. The intra-industry trade theories explain also the reason why industrialized or rich countries, owing similar factor endowments, trade more among themselves. (Yang et al., (2004), p.33).

³³ Greater distance tends to reduce trade because of transport costs. The distance corresponds to the geographical distance between capital cities. Data comes from John A. Byers, Swedish University of Agricultural Sciences at Alnarp.

than total US bilateral trade. As regards to the product of GDP per capita, $GDPPC_i * GDPPC_j$, estimates are positive and significant statistically at the 90 per cent confidence interval or better for the dependent variables total trade and exports. For the dependent variable imports, estimates are all positive but only about half of the cases are statistically significant at the 90 per cent confidence level or better. The positive estimates confirm the hypothesis that richer countries trade more with the United States than poorer ones.

3.1.1.1 Impact of US Economic Sanctions on US Bilateral Trade

Let us turn now to the estimates of the two dummy variables, β_4 and β_5 , which are supposed to capture the direct effect of US economic sanctions on bilateral trade between the United States and the targeted countries. First, with respect to selective sanctions (*SANX*), the corresponding coefficient, β_5 , are never significant statistically using the *SANN* and *SANH* samples and their signs are not coherent either within the series or with the hypothesis that selective sanctions depress bilateral trade. As a result, based on these two samples, Yang et al. “conclude that selective economic sanctions imposed by the United States have no noticeable impact on the bilateral trade flows (...)” (Yang et al., 2004, p.41).

As the authors noticed, these results indicate that results depend crucially on the identification of the target countries, their classification and the datasets being used. On the other hand, they also express the minor impact that selective sanctions have on total bilateral trade. Nevertheless, this does not imply that these types of sanctions have no effect at all. At the opposite, they can produce great damages on specific sectors linked with the selective sanctions and that cannot be observable in the total bilateral trade impact.

Box 3 Method of Calculation required getting Trade's Reductions in Percentages.

The following calculation needs to be made to get the diminution in trade flows induced by sanctions: take the exponent of the coefficient value for the sanction dummy and subtract 1.

For instance, the coefficient β_4 of year 1995 = -1.3169. $e^{-1.3169} - 1 = -0.7320$. This indicates that comprehensive sanctions were responsible for a reduction of 73.20% of bilateral trade volume in 1995. In other words, because of comprehensive sanctions, bilateral trade was 73.20% smaller than otherwise.

Concerning comprehensive sanctions *SANO*, its estimates, β_4 , are consistent across samples. They are all negative and statistically significant (except for 1987 and 1992 for the two first samples – estimates that we cannot see in Table 4 presented above). These estimates indicate a severe impact on bilateral trade. Several estimates indicate a reduction of total trade reaching more than 85 per cent for instance for the year 1998 in the two first samples' results: less than 86 per cent and less than 86.25 per cent. For the third sample, total trade losses vary between 72.18 per cent and 81.30 per cent for years exposed in the Table 4. This result is not surprising as the objective of a total trade embargo is to reduce trade to zero or in other words to cancel bilateral trade. In the case where results would not go in this direction, then there would have an enforcement problem or the sanction would be wrongly identified as a total embargo. All the results can be found in Table 4, on the next page.

Table 4 US Economic Sanctions on US Total Trade.³⁴

Table I
U.S. Economic Sanctions on U.S. Total Trade
(Exports + Imports)

Panel A: <i>SANN</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-25.0768	0.8680	0.4174	-0.8097	-1.4937	0.3398
	0.0000	0.0000	0.0030	0.0002	0.0070	0.3456
1985	-24.6037	0.8839	0.2843	-0.7364	-1.2030	0.1625
	0.0000	0.0000	0.0073	0.0000	0.0037	0.5657
1990	-25.3515	0.8951	0.3316	-0.8951	-1.1461	0.5436
	0.0000	0.0000	0.0036	0.0000	0.0302	0.1103
1995	-27.8545	0.9572	0.2191	-0.7878	-1.1399	0.1525
	0.0000	0.0000	0.0541	0.0000	0.0176	0.5897
1998	-28.4613	0.8968	0.3525	-0.6308	-1.9659	0.2014
	0.0000	0.0000	0.0025	0.0009	0.0000	0.5024
Panel B: <i>SANH</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-24.6555	0.8745	0.3795	-0.8183	-1.5422	0.0826
	0.0000	0.0000	0.0059	0.0002	0.0056	0.8288
1985	-24.6373	0.8992	0.2466	-0.7429	-1.2781	-0.1965
	0.0000	0.0000	0.0182	0.0000	0.0021	0.5171
1990	-25.1418	0.9085	0.2873	-0.9031	-1.2426	0.1348
	0.0000	0.0000	0.0105	0.0000	0.0199	0.7034
1995	-27.7290	0.9608	0.2029	-0.7873	-1.1676	0.0333
	0.0000	0.0000	0.0665	0.0000	0.0149	0.9167
1998	-28.1768	0.8949	0.3416	-0.6276	-1.9844	0.1827
	0.0000	0.0000	0.0027	0.0009	0.0000	0.5889
Panel C: <i>SANC</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-24.9218	0.8894	0.3524	-0.8203	-1.5827	-0.6529
	0.0000	0.0000	0.0080	0.0002	0.0042	0.4456
1985	-24.8882	0.9030	0.2460	-0.7355	-1.2794	-0.9600
	0.0000	0.0000	0.0143	0.0000	0.0018	0.1571
1990	-25.5822	0.9237	0.2590	-0.8757	-1.3644	-1.5305
	0.0000	0.0000	0.0142	0.0000	0.0078	0.0022
1995	-27.7240	0.9659	0.1709	-0.7349	-1.3169	-0.9445
	0.0000	0.0000	0.1012	0.0000	0.0043	0.0004
1998	-28.3785	0.8880	0.3623	-0.5991	-1.6763	-0.5564
	0.0000	0.0000	0.0014	0.0020	0.0003	0.0596

Note: Numbers in first row for each year are estimated coefficients; numbers in second row represent levels of statistical significance (e.g., 0.01 corresponds to a 99% significance level).

Source: Yang et al. (2004), p.38.

³⁴ The authors chose to present these years although they regressed their model on 19 years.

3.1.1.2 Impact of US Economic Sanctions on US Exports

As regards dummy variables, again, the estimates obtained with the samples *SANN* and *SANH* for selective sanctions *SANX* are not significant and the signs change from year to year. On the contrary, with the sample *SANC*, signs are coherent (all negative) and estimates become significant at 90 per cent confidence level or better since 1987. Estimates range from -0.67 in 1996 to -2.25 in 1989, corresponding to an export diminution of 49 per cent for 1996 and 89 per cent for 1989 from what they should have been without selective US sanctions. Again, the choice of the dataset is crucial. In respect to comprehensive sanctions, all estimates were at least statistically significant at a 90 per cent confidence level or more for the three samples and signs of the estimates were all negative as expected.

Table 5 US Economic Sanctions on US Exports.

Panel A: <i>SANN</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-26.6336 0.0000	0.9354 0.0000	0.3449 0.0085	-0.9867 0.0000	-1.9496 0.0002	0.2077 0.5374
1985	-23.4069 0.0000	0.9270 0.0000	0.1615 0.1279	-0.9997 0.0000	-1.0814 0.0096	0.1027 0.7196
1990	-23.0540 0.0000	0.8607 0.0000	0.3640 0.0008	-1.1127 0.0000	-0.9371 0.0617	0.2444 0.4481
1995	-25.4805 0.0000	0.9369 0.0000	0.2347 0.0327	-1.0643 0.0000	-0.9654 0.0368	0.0486 0.8584
1998	-24.7769 0.0000	0.8679 0.0000	0.3748 0.0007	-1.0285 0.0000	-1.9733 0.0000	-0.0406 0.8862
Panel B: <i>SANH</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-26.3393 0.0000	0.9354 0.0000	0.3304 0.0101	-0.9905 0.0000	-1.9648 0.0002	0.1297 0.7163
1985	-23.5557 0.0000	0.9448 0.0000	0.1232 0.2377	-1.0066 0.0000	-1.1595 0.0055	-0.2751 0.3694
1990	-23.0209 0.0000	0.8699 0.0000	0.3392 0.0015	-1.1168 0.0000	-0.9945 0.0476	-0.0111 0.9735
1995	-25.5722 0.0000	0.9447 0.0000	0.2196 0.0395	-1.0666 0.0000	-0.9969 0.0306	-0.1374 0.6538
1998	-24.8168 0.0000	0.8674 0.0000	0.3782 0.0005	-1.0289 0.0000	-1.9660 0.0000	-0.0176 0.9560
Panel C: <i>SANC</i>						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-26.4547 0.0000	0.9442 0.0000	0.3131 0.0118	-0.9937 0.0000	-1.9925 0.0002	-0.1143 0.8866
1985	-23.5824 0.0000	0.9389 0.0000	0.1377 0.1738	-0.9995 0.0000	-1.1288 0.0064	-0.5866 0.3942
1990	-23.2616 0.0000	0.8765 0.0000	0.3250 0.0014	-1.0932 0.0000	-1.0685 0.0281	-1.2155 0.0103
1995	-25.4161 0.0000	0.9421 0.0000	0.1997 0.0471	-1.0124 0.0000	-1.1170 0.0116	-0.9245 0.0003
1998	-24.7576 0.0000	0.8684 0.0000	0.3565 0.0005	-0.9818 0.0000	-2.0954 0.0000	-0.8039 0.0027

Source: Yang et al. (2004), p.44.

Yang et al. (2004) illustrates the estimated loss of US Exports to the 20 targets included in the *SANC* sample in Table 19 and Table 20 in the Appendix. The method of estimation is included in Table 20. These estimated losses rely on the *SANC* sample for which estimates of selective sanctions were statistically significant. The total losses vary a lot, going from \$4.3 billion in 1987 to \$20.5 billion in 1989. US exports losses have been the largest as Russia and China were targeted. For comprehensive sanctions, total export losses range from \$1.8 billion in 1992 to \$5.6 billion in 1997. US exports initially destined to Iran and Cuba saw the largest losses. Nevertheless, these estimates should be interpreted with caution. First, some countries do not appear in the entire time series due to missing values for instance. Therefore, their export losses are distributed among other countries. Second, the estimated coefficient variables are averages that involve caution when interpreting the country-by-country results.

Table 6 Estimated Loss of US Exports due to Comprehensive and Selective US Economic Sanctions.

Table V
Estimated Loss of U.S. Exports to U.S. Economic
Sanctions (Millions of U.S. Dollars)

Year	Due to Comprehensive Sanctions	Due to Selective Sanctions	Total
1987	2,012	4,328	6,340
1988	1,912	5,276	7,188
1989	2,698	20,469	23,167
1990	1,839	14,099	15,938
1991	2,655	11,704	14,359
1992	1,750	14,784	16,534
1993	3,148	8,649	11,797
1994	2,243	10,392	12,635
1995	2,526	11,460	13,986
1996	4,484	9,116	13,600
1997	5,607	12,491	18,098
1998	5,238	10,278	15,516
Average	3,009	11,087	14,097
Average since 1989	3,219	12,344	15,563

Source: Yang et al. (2004), p.49.

Lastly, Table 6 provides a summary of the US export losses due to both types of sanctions. As the table indicates, the average annual loss of US exports since 1987 is more than \$14 billion.³⁵ We see that selective sanctions impact is large. This is due mainly to US export losses induced by selective sanctions against Russia and China.

3.1.1.3 Impact of US Economic Sanctions on US Imports

Again, as the two first samples are used, the dummy variable of the selective sanctions does not provide consistent signs and statistically significant estimates. The situation changes with the third sample, where all estimates are negative and statistically significant at a 90 per cent confidence level or better except for 1991. For the third sample, estimates vary from -0.69 in 1997 to -2.60 in 1992. They demonstrate that US imports from the targeted countries were only 50 per cent and less than 8 per cent of what they would have been without any selective sanctions' imposition. Finally, with respect to comprehensive sanctions, the estimates for the *SANO* variable are all negative and statistically significant at the 99 per cent confidence level for most years. Concerning sample *SANC*, estimates indicate reduction of US imports going from 86.36 per cent for the year 1985 (1980 being statistically not significant we leave it out) to 65.95 per cent in 1998.

³⁵ It is interesting to notice that these results are very similar to the results obtained by Hufbauer et al. (1997) despite the differences in the datasets used and the time periods considered in the two econometric studies. Indeed, the former predicted that US exports were \$15 billion to \$19 billion lower than they should have been theoretically in 1995.

Table 7 US Economic Sanctions Impact on US Imports.

Table VI
U.S. Economic Sanctions on U.S. Imports

Panel A: *SANN*

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-26.5216	0.9436	0.2302	-0.8147	-0.7553	-0.2835
	0.0000	0.0000	0.2395	0.0050	0.3561	0.5688
1985	-33.5853	0.9552	0.4701	-0.5989	-1.9651	-0.0802
	0.0000	0.0000	0.0081	0.0284	0.0068	0.8631
1990	-31.4791	0.9971	0.2733	-0.7848	-1.8158	0.7284
	0.0000	0.0000	0.0859	0.0016	0.0215	0.1200
1995	-31.8469	1.0637	0.1071	-0.8450	-1.4730	0.0125
	0.0000	0.0000	0.5054	0.0009	0.0441	0.9750
1998	-37.9399	1.0522	0.2946	-0.4720	-0.9211	0.2493
	0.0000	0.0000	0.0540	0.0645	0.1467	0.5291

Panel B: *SANH*

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-27.0356	0.9508	0.2372	-0.8131	-0.7581	-0.3054
	0.0000	0.0000	0.2138	0.0050	0.3544	0.5586
1985	-33.7796	0.9617	0.4627	-0.5999	-1.9809	-0.1719
	0.0000	0.0000	0.0083	0.0280	0.0064	0.7299
1990	-31.0551	1.0099	0.2200	-0.7944	-1.8994	0.2953
	0.0000	0.0000	0.1605	0.0015	0.0171	0.5440
1995	-31.5821	1.0504	0.1262	-0.8388	-1.4332	0.2981
	0.0000	0.0000	0.4193	0.0010	0.0491	0.5035
1998	-37.4014	1.0403	0.2957	-0.4647	-0.9069	0.4355
	0.0000	0.0000	0.0469	0.0683	0.1503	0.3282

Panel C: *SANC*

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-27.4352	0.9624	0.2221	-0.8058	-0.7654	-1.7174
	0.0000	0.0000	0.2225	0.0050	0.3435	0.1386
1985	-34.1217	0.9693	0.4561	-0.5921	-1.9924	-1.1329
	0.0000	0.0000	0.0070	0.0293	0.0056	0.3093
1990	-31.6820	1.0344	0.1735	-0.7596	-2.0601	-1.9676
	0.0000	0.0000	0.2407	0.0018	0.0075	0.0042
1995	-31.7738	1.0658	0.0780	-0.7888	-1.6310	-0.9205
	0.0000	0.0000	0.6046	0.0017	0.0229	0.0148
1998	-37.7870	1.0612	0.2506	-0.4374	-1.0775	-0.5367
	0.0000	0.0000	0.0844	0.0861	0.0861	0.1569

Source: Yang et al. (2004), p.51.

3.1.1.4 Impact of US Economic Sanctions on European Union and Japan

The authors logically focus on the results of the *SANC* sample because of its statistical significance for their analysis of the impact of US economic sanctions on the European Union (EU) and Japan. Both estimates coefficients for product of GDP and geographical distance are statistically significant and have the expected signs, respectively positive and negative. Estimates for the *GDP* variable are larger for Japan than EU, indicating that the economic size of trading partners has a relatively greater influence on Japan's trade than on European trade.

Regarding the distance variable, Japan and EU differ significantly. For Japan, estimates for the three dependent variables that are total bilateral trade, exports and imports, are all greater than 1 in absolute terms. This shows that distance has a major impact on Japan's trade. On the other hand, the EU's estimates range from (-0.50) corresponding to a diminution of 39.35 per cent to (-0.70) respectively 50.34 per cent, illustrating that European trade is relatively less affected by geographical distance with its trade partners.

The second objective of Yang et al. (2004) study is to see if US economic sanctions have implied a shift in trade from the United States to Japan and European Union. Yang et al. (2004) results support that trade has shift from the United States to the European Union and Japan because of sanctions. Since the 1980s, estimates of selective sanctions, *SANX*, are mainly consistent for both the EU and Japan and across all trade measures: total trade, exports and imports. Indeed, they are all negative and statistically significant at the 90 per cent confidence level or better (with some exceptions). Moreover, the magnitudes of the estimates are comparable with those obtained for the United States. For the comprehensive sanctions variable, *SANO*, signs are not consistent and estimates are mostly not statistically significant for both Japan and the European Union. In fact, estimated coefficients are significantly positive for some years. This indicates that US comprehensive economic sanctions have some positive spillover effects on its main competitors. Trade has been diverted to EU and Japan.

Table 8 US Economic Sanctions Impact on EU Trade.

Table VII
U.S. Economic Sanctions on EU Trade

Panel A: Total Trade						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-16.5583	0.7546	0.2063	-0.5690	-0.1868	-0.6808
	0.0000	0.0000	0.0048	0.0000	0.5646	0.1848
1985	-16.6754	0.7852	0.1602	-0.6669	-0.3971	-0.5716
	0.0000	0.0000	0.0172	0.0000	0.1733	0.2461
1990	-18.0218	0.8015	0.1357	-0.6197	0.0097	-1.2552
	0.0000	0.0000	0.0102	0.0000	0.9677	0.0000
1995	-19.1285	0.8230	0.1111	-0.6271	0.0885	-0.5665
	0.0000	0.0000	0.0462	0.0000	0.7068	0.0002
1998	-20.8360	0.8146	0.2001	-0.5647	-0.3828	-0.2092
	0.0000	0.0000	0.0011	0.0000	0.0812	0.1868
Panel B: Exports						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-14.5891	0.7465	0.1405	-0.7266	0.0648	-0.5616
	0.0000	0.0000	0.0886	0.0000	0.8609	0.3367
1985	-15.2527	0.7649	0.1460	-0.7789	-0.3115	-0.1727
	0.0000	0.0000	0.0352	0.0000	0.3005	0.7339
1990	-15.6501	0.7687	0.1079	-0.7286	-0.0693	-1.1348
	0.0000	0.0000	0.0456	0.0000	0.7780	0.0000
1995	-18.7106	0.7919	0.1694	-0.6912	0.0462	-0.5137
	0.0000	0.0000	0.0059	0.0000	0.8582	0.0018
1998	-19.8531	0.7950	0.2222	-0.6969	-0.4470	-0.1998
	0.0000	0.0000	0.0011	0.0000	0.0669	0.2560
Panel C: Imports						
Year	α	β_1	β_2	β_3	β_4	β_5
1980	-21.9727	0.8249	0.2172	-0.4624	-0.7165	-0.8354
	0.0000	0.0000	0.0272	0.0000	0.1043	0.2288
1985	-20.8063	0.8430	0.1509	-0.5970	-0.5684	-1.1157
	0.0000	0.0000	0.0883	0.0000	0.1413	0.0884
1990	-23.9583	0.8806	0.1426	-0.5122	0.0606	-1.4124
	0.0000	0.0000	0.0545	0.0000	0.8577	0.0000
1995	-22.6935	0.9088	-0.0061	-0.5935	0.1765	-0.5447
	0.0000	0.0000	0.9360	0.0000	0.5838	0.0076
1998	-25.2788	0.8774	0.1617	-0.4449	-0.3187	-0.1862
	0.0000	0.0000	0.0437	0.0000	0.2724	0.3750

Source: Yang et al. (2004), p.53.

These results illustrate two situations. First, the selective sanctions observed in the dataset have been often enforced through multilateral agreements in which the European Union and Japan have also participated. Even if, EU and Japan have lifted most of these sanctions since the end of the Cold War, bilateral trade between EU and Japan with the targeted countries have not met their normal levels as suggested by the gravity model. Second, comprehensive sanctions have been mostly enforced unilaterally by the United States such as in cases of Cuban or Iranian embargoes, allowing for positive spillover effects on main US competitors.

Table 9 US Economic Sanctions Impact on Japan's Trade.

Table VIII
U.S. Economic Sanctions on Japan's Trade

Panel A: Total Trade

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-19.2477	0.9322	0.1307	-1.2577	-0.4294	-1.2728
	0.0000	0.0000	0.2437	0.0000	0.4035	0.1251
1985	-16.9761	0.8438	0.2892	-1.3506	-0.7285	-0.6524
	0.0000	0.0000	0.0045	0.0000	0.1045	0.3991
1990	-12.1581	0.7719	0.2997	-1.5730	-0.5429	-1.8257
	0.0000	0.0000	0.0006	0.0000	0.1743	0.0000
1995	-16.3625	0.8632	0.1600	-1.4275	-0.3622	-2.2009
	0.0000	0.0000	0.1561	0.0000	0.4522	0.0000
1998	-18.1237	0.8207	0.3280	-1.3119	-0.9571	-2.0308
	0.0000	0.0000	0.0021	0.0000	0.0161	0.0000

Panel B: Exports

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-17.8642	0.8886	0.1564	-1.2750	-0.4040	-1.0974
	0.0000	0.0000	0.1392	0.0000	0.3995	0.1560
1985	-14.7959	0.7907	0.3221	-1.4206	-0.4930	-0.3135
	0.0000	0.0000	0.0007	0.0000	0.2326	0.6603
1990	-11.0698	0.7385	0.2945	-1.5547	-0.6377	-2.1243
	0.0000	0.0000	0.0002	0.0000	0.0806	0.0000
1995	-17.5160	0.8675	0.1283	-1.3269	-0.5658	-2.6707
	0.0000	0.0000	0.2705	0.0000	0.2564	0.0000
1998	-20.4974	0.8259	0.3148	-1.1043	-1.1633	-2.1480
	0.0000	0.0000	0.0021	0.0000	0.0024	0.0000

Panel C: Imports

Year	α	β_1	β_2	β_3	β_4	β_5
1980	-22.4158	1.0057	0.0124	-1.2371	-0.7800	-1.3051
	0.0002	0.0000	0.9403	0.0013	0.3003	0.2820
1985	-22.6261	1.0044	0.0840	-1.3804	-1.8901	-1.2828
	0.0001	0.0000	0.5966	0.0003	0.0073	0.2861
1990	-20.5714	0.9588	0.2510	-1.7840	-1.1962	-1.2508
	0.0006	0.0000	0.1495	0.0000	0.1389	0.1305
1995	-23.2124	0.9744	0.2106	-1.5701	-0.9769	-1.6131
	0.0000	0.0000	0.2163	0.0000	0.1777	0.0013
1998	-23.5616	0.9509	0.3038	-1.5832	-1.0275	-1.7320
	0.0000	0.0000	0.0659	0.0000	0.0939	0.0005

Source: Yang et al. (2004), p.54.

3.1.1.5 Conclusions

To conclude, the effect of US economic sanctions on all three measures of trade apprehended is very sensitive to the way that targeted countries are identified and selected. This is particularly the case for those countries targeted by selective sanctions. Only the third sample gets statistically significant results for this type of sanctions. For the two other samples, explanations can be found in the fact that targeted countries were subject to specific US export controls (arms control for instance). Effects were presumably too weak for having an overall impact on the dependent variables considered. However, results from the third sample regression indicate that US selective economic sanctions have an important impact on US exports, imports and bilateral trade.

US comprehensive sanctions have a significant negative impact on US bilateral trade, exports and imports. Iran and Cuba have both been severely harmed by US economic sanctions. Moreover, the persistent negative effect of US economic sanctions on the “economies on transition” (*SANC* sample) and on target countries subject to comprehensive sanctions indicates a strong lingering effect on bilateral trade.

For the third-country effects, different results arose. For most cases, US economic sanctions affected bilateral trade between target countries and European Union or Japan in a similar manner as bilateral trade between the target countries and the United States. Indeed, these cases illustrated cases of multilateral sanctions, where Japan and EU were parts of the sender coalition. In the case of comprehensive sanctions, US economic sanctions have not significantly affected negatively bilateral trade between the target and third-country. On the contrary, some cases appear where the opposite effect happened: US economic sanctions have promoted bilateral trade between the targeted country and its main competitor. In these cases, trade diversion occurred.

3.1.2 Effects of UN Sanctions on Target and Neighbor Countries

Slavov (2007) analyses the effects of UN sanctions on target and neighbor countries as these types of sanctions have multiplied since the end of Cold War. Moreover, they are well-known for their spillover effects, affecting third countries, neighbors or major trading partners (Slavov, 2007, pp.1703-1704).

3.1.2.1 Claims and hypotheses

Slavov develops three sets of claims (C1 to C3) on how total trade embargoes influence the target country's neighbors:

(C1) Conforming to the neoclassical model of trade with two goods and three countries, sanctions will profit third countries whether, in free trade equilibrium, they exported and imported similar types of goods as the target country. Consequently, supposing that most target countries have similar trade patterns than their neighbors (maybe because of similar resource endowments), sanctions will benefit neighbors by relocating the world terms of trade in their favor. A criticism of this hypothesis is that most target and neighbor countries are small countries that have very little influence on the world terms of trade. Therefore, this claim seems unlikely, with the famous exception of sanctions against Iraq and their significant impact on world oil prices.

(C2) Sanctions supposedly hurt neighbor countries by breaking up trading routes, by rising transportation and other transaction costs, and by disrupting established trading ties with suppliers and/or customers. Therefore, a drop is expected to appear in neighbors' trade with the rest of the world succeeding the implementation of a UN trade embargo. Under the assumption of a fixed vector of world prices (since most target and neighbor countries are price-takers in world markets), increased transportation costs increase the price of imports neighbor countries have to pay, and diminish the price they earn for their exports.

(C3) Sanctions allegedly profit neighbor countries by enabling them to undertake sanction-busting activities. As Slavov writes: "Anecdotal evidence on the involvement of neighbor countries in smuggling is overwhelming." (Slavov, 2007, p.1705). The problem with smuggling is that it is difficult to observe, if possible,

and quantify. Moreover, official statistics do not measure it directly. The smuggling hypothesis assumes that neighboring countries will trade more intensely with the rest of the world during the sanction episode, because they trade on behalf of the target country (which is officially in situation of autarky), and then smuggle goods back and forth across the border. We cannot observe how much smuggling is taking place, but we can deduce something about it from the extra bilateral trade between the rest of the world and the neighbor country that appears during years with UN sanctions.

As a result, two hypotheses follow from these three claims:

(H1) The ‘disrupted trade’ (-) hypothesis says that neighbor countries should trade less with the rest of the world during UN trade embargoes.

(H2) The ‘smuggling’ (+) hypothesis assumes that neighbor countries trade more with the rest of the world during UN trade embargoes.

Theoretically, the net impact is ambiguous, depending on which effect takes the advantage.

3.1.2.2 Method and variables

Slavov uses a modified gravity equation. His data set includes 82 countries in the time period 1989-2000. The dataset includes 7 targets of UN sanctions and 33 neighbor countries to 11 different target countries. Slavov had to exclude countries that had no page in the IMF’s *International Financial Statistics*.³⁶ Since Slavov disposes of annual data, he considers sanctions being applied for the entire year, even if in reality this was not necessarily the case. Slavov proceeds in three steps. First, he estimates the following ‘benchmark gravity equation’:

$$\begin{aligned} Exports_{i,j,t} = & \beta_{0,t} + \beta_1 GDP_{i,t} + \beta_2 GDP_{j,t} + \beta_3 PerCapGDP_{i,t} \\ & + \beta_4 PerCapGDP_{j,t} + \beta_5 Distance_{i,j} + \beta_6 Contiguity_{i,j} \\ & + \beta_7 Langugae_{i,j} + \varepsilon_{i,j,t}. \end{aligned} \tag{13}$$

³⁶ Slavov used this source for incomes, exchange rates (especially dollar exchange rates (period averages) in order to convert all numbers into constant 1997 US dollars) and populations data. Trade data are taken in Statistics Canada’s *World Trade Analyzer*. Slavov used US Producer Price Index (source: US Bureau of Labour Statistics) as well for converting numbers. Then, he used the online edition of the *CIA’s World Factbook* for information related to languages, national capitals and contiguity. Lastly, he calculated distances thanks to the website www.indo.com/distance.

$Exports_{i,j,t}$ corresponds to the natural log of exports from country i to country j during year t , in constant 1997 US dollars. $\beta_{0,t}$ is the constant term and is time-varying. $GDP_{i,t}$ and $GDP_{j,t}$ correspond to the logs of national incomes of countries i and j during year t and are measured in constant 1997 US dollars. $PerCapGDP_{i,t}$ and $PerCapGDP_{j,t}$ denote the natural logs of per capita incomes in year t . Coefficient on incomes and per capita incomes should be positive, demonstrating that trade rises with the size of the countries and with their level of economic development. $Distance_{i,j}$ is the log of distance between capitals (or major economic centers) of countries i and j , in miles.³⁷ This explanatory variable is expected to have negative coefficients as it proxies for transportation costs. Using the natural logs allow us to interpret estimates as elasticities. Lastly, the final two variables of the equation, $Contiguity_{i,j}$ and $Langugae_{i,j}$ are both dummy variables, taking value 1 if the two countries share a common land border or a common language. Languages considered are: English, Spanish, Chinese, Arabic, French, German, Japanese, Dutch and Portuguese. Dummy variables' expected signs should be positive as these two factors influence positively bilateral trade.

Second, he adds four dummy variables to the previous equation for measuring the effect of economic sanctions. 'Importing country is a target' and 'Exporting country is a target' take the value 1 for all trading pairs in which the importing/exporting country was a target of UN sanctions, only for years with UN sanctions. Coefficients signs are expected to be negative for both dummies since they capture the increase in the bilateral trade barrier t_{TR} between target countries (T) and the rest of the world (R). 'Importing country is a neighbor' and 'Exporting country is a neighbor' are set to 1 for all trading pairs in which the importer/exporter is a neighbor country to a target country, only for years with sanctions. These dummy variables capture anything special in bilateral trade flows between neighbor countries and the rest of the world during years of UN sanctions. Due to the two contradictory effects of hypotheses ventured, no assumption can be made about coefficients' signs. Indeed, these dummies capture the net effect on

³⁷ For instance, Chicago has been selected over New York, Los Angeles or Washington due to its central location.

trade from the rise in bilateral trade barrier t_{NR} and from the mis-measurement of y_N caused by smuggling.

Table 10 Review of Variables used in the First Step Model of Slavov (2007).

Variable	Description	Coefficient and Expected Sign
$Exports_{i,j,t}$	Exports from country i to country j during year t , in constant 1997 US dollars.	-
$GDP_{i,t}$ and $GDP_{j,t}$	National incomes of countries i and j during year t ; are measured in constant 1997 US dollars.	β_1 and β_2 ; positive
$PerCapGDP_{i,t}$ and $PerCapGDP_{j,t}$	Per capita incomes in year t	β_3 and β_4 ; positive
$Distance_{i,j}$	Distance between capitals (or major economic centers) of countries i and j , in miles.	β_5 ; negative
$Contiguity_{i,j}$	Take the value 1 if countries share a common border.	β_6 ; positive
$Langugae_{i,j}$	Take the value 1 if countries share a common language.	β_7 ; positive
‘Importing country is a target’	Take the value 1 if the importing country was a target of UN sanctions.	Negative
‘Exporting country is a target’	Take the value 1 if the exporting country was a target UN sanctions.	Negative
‘Importing country is a neighbor’	Set to 1 for all trading pairs in which the importer is a neighbor country to a target country, only for years with UN sanctions.	No assumption on coefficients’ signs.
‘Exporting country is a neighbor’	Set to 1 for all trading pairs in which the exporter is a neighbor country to a target country, only for years with UN sanctions.	No assumption on coefficients’ signs.

Third, Slavov replaced the dummy variable ‘Importing country is a neighbor’ and ‘Exporting country is a neighbor’ with 22 dummy variables such as ‘Importing country is neighbor to Angola’. As a consequence, these 22 dummy variables capture the net effect on trade in each of the 11 episodes of UN sanctions from the rise in the bilateral trade barrier t_{NR} and from the mis-measurement of y_N caused by smuggling.

3.1.2.3 Results

Results of the first step are shown in Table 11. Slavov estimated the equation once for total trade and once for trade without oil and oil products.³⁸ He dismissed all observations where trade was equal to zero since the natural logarithm is undefined in those cases. Moreover, he added time-fixed effects (11 dummy variables corresponding to the years from 1990 to 2000) due to the pooled nature of the data.

All variables have the expected signs and are very highly statistically significant. The two specifications give a reasonably good fit to the data: in the first case, the R-squared meets 0.72, while in the second case, it attains 0.66.

Results of the second step are shown in Table 12. As regards the target dummy, in both specifications, coefficients gotten with the OLS estimator are negative, relatively large and statistically significant at a 99 per cent confidence level or better. Therefore, UN sanctions lower bilateral trade between target countries and the rest of the world.

Coefficients of neighbor dummy variables are negative and statistically significant at a 95 per cent confidence level or better. These results show that, on a net basis, neighbor countries are ‘innocent bystanders’, being affected by negative spillover effects. Indeed, UN sanctions break up trading routes, rise transportations and other transaction costs and disrupt established trading ties for this category of countries. Nevertheless, it is interesting to notice that coefficients on the neighbor dummies are always smaller in magnitude than coefficient on target dummies. As a result, the UN sanctions hurt both the target and neighboring countries, but they hurt targets more intensely.

³⁸ Slavov justifies the second specification namely: “Oil trade fits awkwardly with theories of intra-industry trade, sometimes used to justify the gravity model. We rarely observe two countries buying each other’s oil ‘for love of variety’. Furthermore, above it was noted that oil is one of the few commodities in which even otherwise small countries (like Iraq) might be able to influence world prices. As a robustness check, it is interesting to see how much of a difference the inclusion or exclusion of oil is going to make.” (Slavov, (2007), p.1714).

Table 11 Benchmark Gravity Equation's Results.

TABLE 2
Benchmark Gravity Equation

	(1)	(2)
<i>Dependent Variable</i>	<i>All Exports</i>	<i>Non-oil Exports</i>
<i>Estimator</i>	<i>OLS</i>	<i>OLS</i>
<i>Independent Variables</i>		
GDP of exporter	1.05*** (0.014)	1.04*** (0.015)
GDP of importer	0.95*** (0.014)	0.92*** (0.015)
Per capita GDP of exporter	0.18*** (0.017)	0.21*** (0.018)
Per capita GDP of importer	0.08*** (0.018)	0.08*** (0.019)
Distance	-0.96*** (0.025)	-0.90*** (0.027)
Contiguity	0.72*** (0.121)	0.81*** (0.126)
Language	0.87*** (0.056)	0.93*** (0.059)
Number of observations	59,207	59,096
R^2	0.72	0.66

Notes:

This table reports regression estimates of equation (9) in the main text. Both regressions include constants and time-fixed effects (coefficients not reported). Standard errors are reported in parentheses, and are heteroscedasticity-consistent, as well as robust to clustering by country pairs. Both regressions exclude all observations where exports were zero. Column (2) further excludes oil exports (SITC category 33).

***, **, * denote statistical significance at the 1, 5, 10 per cent level, respectively.

Source: Slavov (2007), p.1714.

Slavov also estimated the two specifications with ‘fixed effects’ (‘within’) and ‘random effects’ (GSL) estimators since the dataset is a panel in which the cross-section unit is the country pair. The ‘fixed effects’ method assumes that differences across cross-section units have specific effects that are captured by different intercept terms. These different intercept terms capture a non-observable heterogeneity and are assumed to be correlated to the regressors. The ‘random effects’ method assumes that each cross-section unit has an intercept which is randomly drawn from a common distribution. Intercepts are here assumed not to be correlated with the regressors. Coefficients resulting from these two methods are all negative and are statistically significant except for the dummy variable, ‘Importing country is a neighbor’, for the second specification. Moreover, coefficients are smaller than those estimated with the OLS estimator. The results confirm the ‘disrupted trade’ hypothesis. Lastly, in percentages, results indicate us that the diminution of the ‘all exports’ dependent variable varies between 36.87

per cent (GLS estimator)³⁹ to 43.45 per cent (OLS estimator) for ‘Importing country is a target’ and between 34.95 per cent (GLS estimator) and 51.80 per cent (OLS estimator) for ‘Exporting country is a target’. When discussing the neighbor dummies, the OLS estimator indicates that for all exports, the reduction reaches 13.93 per cent for ‘Importing country is a neighbor’ and 42.31 per cent for ‘Exporting country is a neighbor’.

Table 12 Impact of UN Sanctions on Trade Flows Involving Targets or Their Neighbor Countries and the Rest of the World.

TABLE 3
The Impact of UN Sanctions on Trade Flows Involving Targets or Their Land Neighbours and the Rest of the World – Part I

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	All Exports	All Exports	All Exports	Non-oil Exports	Non-oil Exports	Non-oil Exports
Estimator	OLS	Fixed Effects (Within)	Random Effects (GLS)	OLS	Fixed Effects (Within)	Random Effects (GLS)
Importing country is a target	-0.57*** (0.094)	-0.54*** (0.038)	-0.46*** (0.037)	-0.56*** (0.096)	-0.51*** (0.044)	-0.43*** (0.043)
Exporting country is a target	-0.73*** (0.122)	-0.47*** (0.041)	-0.43*** (0.040)	-1.35*** (0.146)	-0.50*** (0.048)	-0.53*** (0.047)
Importing country is a neighbour	-0.15*** (0.041)	-0.03** (0.017)	-0.03* (0.017)	-0.11** (0.044)	-0.03 (0.020)	-0.02 (0.020)
Exporting country is a neighbour	-0.55*** (0.048)	-0.04*** (0.017)	-0.06*** (0.017)	-0.76*** (0.052)	-0.05** (0.020)	-0.09*** (0.020)
Number of observations	59,207	59,207	59,207	59,096	59,096	59,096
R ²	0.72	0.36	0.71	0.67	0.37	0.66

Notes:

All regressions include the gravity equation variables from Table 2, as well as constants and time-fixed effects (coefficients not reported). Standard errors are reported in parentheses. OLS regressions report standard errors which are heteroscedasticity-consistent, as well as robust to clustering by country pairs. ***, **, * denote statistical significance at the 1, 5, 10 per cent level, respectively. Regressions exclude all observations where exports were zero. Columns (4)–(6) also exclude oil exports (SITC category 33).

Source: Slavov (2007) p.1716.

The third step results from a criticism stipulating that the dummy variables estimate only the average impact of UN trade embargoes on target and neighbor countries. Since UN sanctions differ significantly in their breath and intensity, going from total embargoes to partial embargoes on limited specific goods (arms or diamonds for instance), the impact of sanctions on neighbor countries might vary substantially depending on the characteristics of each sanctions regime. Therefore, Slavov replaced the 4 former dummy variables by 22 dummy variables (11 sanctions episodes). Table 13 and Table 14 show the results. Coefficients signs broadly reinforce the ‘disrupted trade’ hypothesis. By analyzing the 11 sanctions episodes separately, we can see which of the two hypotheses dominates for each UN sanctions regime. As a result, we observe that neighbor countries of

³⁹ Percentages are obtained namely : $1 - \exp(-0.46) \times 100 = 36.87\%$.

Libya, Rwanda and former Yugoslavia both exported and imported less with the rest of the world during the sanctions episode. For these three sanctions episodes, all 12 coefficient estimates were negative and 11 of them were statistically significant at the 90 per cent confidence level or better. On the contrary, neighbor countries of South Africa both exported and imported more with the rest of the world during years of UN sanctions. All 12 coefficients were positive and statistically significant.

Table 13 Impact of UN Sanctions on Trade Flows Involving Target or Neighbor Countries and the Rest of the World – 22 dummy variables.

TABLE 4
The Impact of UN Sanctions on Trade Flows Involving Targets or Their Land Neighbours and the Rest of the World – Part II

Independent Variables	Dependent Variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	All Exports	All Exports	All Exports	Non-oil Exports	Non-oil Exports	Non-oil Exports
	OLS	Fixed Effects (Within)	Random Effects (GLS)	OLS	Fixed Effects (Within)	Random Effects (GLS)
Importing country is a target	-0.57*** (0.094)	-0.55*** (0.038)	-0.47*** (0.038)	-0.56*** (0.096)	-0.51*** (0.045)	-0.45*** (0.044)
Exporting country is a target	-0.69*** (0.122)	-0.50*** (0.042)	-0.45*** (0.041)	-1.30*** (0.148)	-0.54*** (0.049)	-0.56*** (0.048)
Importing country is neighbour to Afghanistan	-0.47*** (0.134)	-0.08 (0.071)	-0.18** (0.073)	-0.43*** (0.130)	-0.04 (0.084)	-0.15* (0.086)
Importing country is neighbour to Angola	-0.11 (0.134)	-0.12* (0.067)	-0.05 (0.063)	-0.11 (0.134)	-0.02 (0.079)	0.04 (0.073)
Importing country is neighbour to Ethiopia and Eritrea	0.14 (0.196)	0.10 (0.126)	0.06 (0.129)	0.20 (0.200)	0.21 (0.148)	0.18 (0.151)
Importing country is neighbour to Haiti	0.29 (0.184)	0.14 (0.105)	0.15 (0.107)	0.20 (0.194)	0.09 (0.123)	0.10 (0.125)
Importing country is neighbour to Iraq	-0.18** (0.076)	0.03 (0.053)	-0.05 (0.046)	-0.08 (0.079)	-0.03 (0.063)	-0.04 (0.054)
Importing country is neighbour to Liberia	0.07 (0.136)	-0.03 (0.064)	-0.03 (0.062)	-0.09 (0.176)	-0.04 (0.075)	-0.07 (0.073)
Importing country is neighbour to Libya	-0.40*** (0.084)	-0.15*** (0.039)	-0.08** (0.037)	-0.32*** (0.088)	-0.15*** (0.045)	-0.06 (0.043)
Importing country is neighbour to Rwanda	-0.24** (0.105)	-0.22*** (0.051)	-0.29*** (0.048)	-0.20* (0.106)	-0.22*** (0.059)	-0.27*** (0.056)
Importing country is neighbour to Federal Republic of Yugoslavia	-0.19*** (0.064)	-0.09*** (0.030)	-0.08*** (0.029)	-0.17** (0.067)	-0.08** (0.035)	-0.07** (0.034)
Importing country is neighbour to Somalia	0.35*** (0.127)	0.05 (0.061)	0.17*** (0.059)	0.38*** (0.129)	0.10 (0.071)	0.22*** (0.068)
Importing country is neighbour to South Africa	0.58*** (0.150)	0.37*** (0.057)	0.34*** (0.057)	0.55*** (0.156)	0.34*** (0.067)	0.31*** (0.067)

Source: Slavov (2007), p.1719.

Table 14 Impact of UN Sanctions on Trade Flows Involving Target or Neighbor Countries and the Rest of the World – 22 dummy variables (2nd Part).

TABLE 4 Continued

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	All Exports	All Exports	All Exports	Non-oil Exports	Non-oil Exports	Non-oil Exports
Independent Variables	Estimator OLS	Fixed Effects (Within)	Random Effects (GLS)	OLS	Fixed Effects (Within)	Random Effects (GLS)
Exporting country is neighbour to Afghanistan	0.18 (0.118)	0.15** (0.068)	0.02 (0.069)	0.18* (0.109)	0.36*** (0.080)	0.20** (0.081)
Exporting country is neighbour to Angola	0.14 (0.157)	-0.38*** (0.072)	-0.12* (0.066)	-0.13 (0.157)	-0.53*** (0.085)	-0.28*** (0.077)
Exporting country is neighbour to Ethiopia and Eritrea	0.18 (0.151)	-0.09 (0.125)	-0.08 (0.128)	0.20 (0.151)	-0.03 (0.147)	-0.04 (0.150)
Exporting country is neighbour to Haiti	-1.84*** (0.270)	-0.13 (0.115)	-0.18 (0.117)	-1.78*** (0.274)	-0.15 (0.135)	-0.20 (0.137)
Exporting country is neighbour to Iraq	-1.19*** (0.099)	-0.14** (0.055)	-0.42*** (0.047)	-1.66*** (0.095)	0.06 (0.065)	-0.46*** (0.055)
Exporting country is neighbour to Liberia	0.36** (0.178)	-0.12* (0.066)	-0.04 (0.064)	0.25 (0.209)	-0.22*** (0.078)	-0.19** (0.075)
Exporting country is neighbour to Libya	-1.11*** (0.096)	-0.20*** (0.041)	-0.12*** (0.039)	-1.57*** (0.128)	-0.29*** (0.049)	-0.27*** (0.046)
Exporting country is neighbour to Rwanda	-0.25* (0.132)	-0.24*** (0.053)	-0.29*** (0.050)	-0.11 (0.133)	-0.18*** (0.062)	-0.25*** (0.058)
Exporting country is neighbour to Federal Republic of Yugoslavia	-0.29*** (0.053)	-0.06** (0.029)	-0.05* (0.029)	-0.23*** (0.055)	-0.06* (0.034)	-0.03 (0.033)
Exporting country is neighbour to Somalia	0.05 (0.142)	-0.23*** (0.065)	-0.03 (0.062)	0.12 (0.142)	-0.24*** (0.077)	-0.05 (0.073)
Exporting country is neighbour to South Africa	0.93*** (0.136)	0.59*** (0.058)	0.45*** (0.058)	1.01*** (0.137)	0.58*** (0.068)	0.48*** (0.067)
Number of observations	59,207	59,207	59,207	59,096	59,096	59,096
R ²	0.73	0.29	0.71	0.69	0.30	0.66

Notes:
All regressions include the gravity equation variables from Table 2, as well as constants and time-fixed effects (coefficients not reported). Standard errors are reported in parentheses. OLS regressions report standard errors which are heteroscedasticity-consistent, as well as robust to clustering by country pairs.
***, **, * denote statistical significance at the 1, 5, 10 per cent level, respectively. Regressions exclude all observations where exports were zero. Columns (4)–(6) also exclude oil exports (SITC category 33).

Source: Slavov (2007), p.1720.

3.1.2.4 Conclusions

To conclude, the general impact of sanctions on bilateral trade was shown to be negative. Target neighbor countries' trade with the rest of the world tends to diminish during UN sanctions episodes. As a result, neighbor countries stand as 'innocent bystanders'. Net effects indicate that the 'disrupted trade' hypothesis dominates the 'smuggling' one. Indeed, increased transportation and other transactions costs as well as trade disruptions seem to play an important role. These costs will tempt neighbor countries to cheat or enter in sanction-busting activities (smuggling) without any doubt.

Lastly, this study concentrates on UN sanctions, leaving out unilateral sanctions. UN sanctions have to be implemented by all member states and, thus, in theory, compliance with them should be universal. Moreover, the author chose to concentrate his study on neighbor countries, leaving out major trading partners. The reason behind this choice is the wish of objectivity in the definitions.

3.2 What do Case Studies tell us? The Cases of Cuba and Iran

While Chapter 3.1 presented the results of two econometric studies from Yang et al. (2004) and Slavov (2007), this chapter reviews results of two case studies based on descriptive statistics. Subchapter 3.2.1 presents the first case study from Losman (1974) which is on Cuba. Indeed, the embargo implemented against Cuba is a reference concerning economic sanctions. Subchapter 3.2.2 introduces a case study from Torbat (2005) on Iran that is a more recent and actual case. Both subchapters introduce case studies with a small historical situation.

3.2.1 Case Study on Cuba: the Reference as regards Economic Sanctions

Cuba historically has been connected both commercially and politically with its mainland neighbor, the United States. Cuba was a supplier of goods such as sugar and nickel while United States was exporting in a variety of sectors. United States was Cuba's major supplier and market as well as the largest investor in Cuba prior to the embargo. However, opponent political ideologies divided them. The 1959

overthrowing of the Batista regime by revolutionaries led by Fidel Castro precipitated these political divergences. As Cuba was getting closer to the Soviet Union, commercially and politically, United States reacted by initiating a series of policies acting as a near-total embargo. Unilateral economic sanctions implemented by the United States against Cuba are broad-reaching in scope and duration, during more than four decades.

In October 1960, the United States implemented an official embargo on exports to Cuba. Medical supplies and food products were officially not included in the embargo. The American Export Control Act was binding upon resident as well as non-resident Americans and overseas American subsidiaries if they had American officers or directors. Everything possible has been undertaken in order to isolate Cuba economically. For instance, diplomatic representations and pressures upon American allies have been used. Whereas United States supplied approximately 70 per cent of Cuba's total imports in 1958 and about 68 per cent in 1959, the figure had dropped to less than 4 per cent by 1961. On the exports' side, more than 60 per cent of Cuba's exports went to the United States in the 1950s. In 1961, less than 5 per cent of the total exports went to the American market. Since 1962, bilateral trade between Cuba and the United States (restrained to vital medical supplies or purchases by international organizations) has been nearly zero.

Table 15 Geographical Distribution of Cuba's Foreign Trade from 1949 to 1958.

TABLE 1
GEOGRAPHICAL DISTRIBUTION OF CUBA'S
FOREIGN TRADE: 1949 to 1958

Annual Averages
(Thousands of Dollars)

	<i>Imports</i>		<i>Exports</i>	
	Amount	%	Amount	%
United States of America ¹	\$450,368	75.4	\$415,469	62.5
Canada	14,333	2.4	9,101	1.4
Latin America	26,549	4.4	17,896	2.7
Europe (non-communist) ²	69,708	11.6	141,109	21.4
Soviet Union	3	—	10,826	1.5
Communist Europe ³	1,361	0.2	1,417	0.2
Japan	2,536	0.4	32,566	4.9
Communist China ⁴	52	0.1	1,079	0.2
Other countries	32,759	5.5	34,636	5.2
	<u>\$597,669</u>	<u>100.0</u>	<u>\$664,279</u>	<u>100.0</u>

Source: Cuban Economic Research Project, *Stages and Problems of Industrial Development in Cuba*, Coral Gables: University of Miami Press, 1965, p. 188.

1. Not including Puerto Rico.

2. Europe, excluding the Soviet Union and countries included in note (3).

3. Albania, Bulgaria, Czechoslovakia (90 percent of imports), Estonia, Hungary, Latvia, Lithuania, Poland, Rumania, East Germany and Yugoslavia.

4. Includes Manchuria.

Source: Losman (1974), p.98.

Table 15 shows the geographical distribution of Cuba's foreign trade for the period 1949-1958, prior to the Castro regime. Cuba was clearly consuming Western products rather than communist ones. Western Europe was the major non-Western Hemisphere trading partner, purchasing 21.4 per cent of Cuba's exports (mainly sugar) while supplying 11.6 per cent of Cuba's total imports. The Soviet Union was importing much more from Cuba (1.5 per cent) than it was exporting to Cuba (percentage approximating zero). The United States clearly appears to be the leading trading partner: 75.4 per cent of Cuba's total imports were coming from the United States whereas 62.5 per cent of its exports were destined to it. As a consequence, once sanctions have been imposed by the United States, Cuba had to restructure its trade patterns.⁴⁰

Table 16 Composition and Value of Cuba's Imports in 1954.

TABLE 2
COMPOSITION AND VALUE OF
IMPORTS, 1954
(in millions of U.S. dollars)

<i>Item</i>	<i>Value</i>	<i>%</i>
Consumer goods:	226.4	46.4
Clothing	1.5	.3
Household articles	34.7	7.1
Automobiles	25.6	5.2
Luxury	2.1	.4
Foodstuffs	139.9	28.6
Medicines	11.1	2.2
Tobacco	1.1	.2
Beverages	6.2	1.2
Other	4.2	.8
Producer goods:	261.5	53.5
Sugar industry	2.6	.5
Other industries	51.2	10.4
Agriculture	13.4	2.7
Transport	12.8	2.6
Construction goods	17.7	3.6
Fuels	33.7	6.9
Raw materials	130.1	26.6
Total	487.9	100.0 *

Source: Adapted from U.S. Department of Commerce, Bureau of Foreign Commerce, *Investment in Cuba*, July 1956, p. 140.

* Total does not exactly equal 100 due to rounding.

Source: Losman (1974), p.99.

⁴⁰ On the other hand, Cuba was just a small part of US trade, less than 5% of US exports and imports, prior to the embargo (Askari et al., (2003), p.6).

Table 16 illustrates the typical composition and value of Cuba's imports prior to the Castro regime. Consumer goods account for 46.4 per cent of the total imports while producer goods account for 53.5 per cent. Foodstuff is the largest category of imports with 28.6 per cent. Raw materials' category appears in second place with 26.6 per cent, accounting for roughly half of the producer goods imports.

According to these typical trade patterns, it is logical to presume that trade adjustments implied by the embargo's imposition would have resulted in an important rise in Cuban trade with Western non-sanctioning countries. Indeed, Cuba would have import goods from sources relatively close as for instance Canada and Western Europe, minimizing transportation costs. Moreover, Cuban consumption patterns and technological needs required goods produced by Western nations and Japan at that time. For instance, from a technical point of view, machinery and tractors supplied by Canada, Britain and Spain were more likely to suit Cuban industrial and technological needs. Finally, from the language point of view, English and Spanish were two languages mastered by Cuban traders on the contrary to Russian and other Eastern European languages. As Losman sums up, "in the absence of special circumstances, Cuba's trade patterns would naturally have gravitated toward a major expansion with the non-boycotting [non-sanctioning] "Western" nations." (Losman, 1974, p.100).

Nevertheless, these expected trade patterns' adjustments never happened. Cuban imports from non-sanctioning Western nations rose until 30 per cent of Cuban total imports for the year 1961. On average, in the time period 1961-1967, the percentage attained is 25 per cent, not much more than before embargo's imposition. On the exports' side, in the same time period, Cuba exported about one-fourth of its total exports to these countries. As regards the Soviet bloc, the situation differs significantly. Indeed, the Soviet Union became Cuba's major trade partner. In 1966, Cuba imported 79.8 per cent of its total imports from Soviet Union and exported 81.4 per cent of its exported goods' total to the socialist bloc. In 1988, around 85 per cent of Cuban bilateral trade was made with the socialist bloc; by 1992, almost 66 per cent (Askari et al., (2003), p.1).

The reason for this diversion of trade towards the least likely group of nations, and not the "second-best" trade partners is found in the inability of Cuba to

accumulate hard currency earnings. Effectively, without important hard currency reserves, meaningful import increases from non-sanctioning western nations were almost excluded. Confronted to rapid declining export revenues, Cuba had to cut in its imports expenditures. That is the reason why, at that moment, Cuban political and ideological considerations led the government to work with the Soviet Union that, in addition, was offering large-scale grants and aid.

Table 17 Cuban Foreign Trade over the Period 1959-1967.

TABLE 3
CUBAN FOREIGN TRADE
1959-1967

	1959	% of Total	1960	% of Total	1961	% of Total	1962	% of Total	1963	% of Total	1964	% of Total	1965	% of Total	1966	% of Total	1967	% of Total
<i>Exports to:</i>																		
Nonbloc nations ¹	\$623.9	97.8	\$468.3	75.8	\$166.6	26.7	\$ 93.9	18.0	\$177.3	32.6	\$291.4	40.8	\$148.0	21.6	\$110.0	18.6	\$134.0	18.8
Socialist nations	13.9	2.2	149.9	24.2	458.3	73.3	426.8	82.0	366.5	67.4	422.4	59.2	538.0	78.4	482.0	81.4	581.0	81.2
Total	\$637.8	100.0	\$618.2	100.0	\$624.9	100.0	\$520.7	100.0	\$543.8	100.0	\$713.8	100.0	\$686.0	100.0	\$592.0	100.0	\$715.0	100.0
<i>Imports from:</i>																		
Nonbloc nations ²	\$673.0	99.7	\$518.7	81.3	\$211.0	30.0	\$130.5	17.2	\$163.6	23.2	\$331.6	32.5	\$208.0	24.0	\$187.0	20.2	\$207.0	21.9
Socialist nations	1.8	0.3	119.2	18.7	491.6	70.0	629.0	82.8	703.7	76.8	687.2	67.5	657.0	76.0	739.0	79.8	783.0	79.1
Total	\$674.8	100.0	\$637.9	100.0	\$702.6	100.0	\$759.5	100.0	\$867.3	100.0	\$1,018.8	100.0	\$865.0	100.0	\$926.0	100.0	\$990.0	100.0
<i>Trade Balance</i>																		
With nonbloc nations	-50.9		-50.4		-44.4		-36.6		13.7		-40.2		-60.0		-77.0 ³		-73.0 ⁴	
With Socialist nations	12.1		30.7		-33.3		-202.2		-337.2		-264.8		-119.0		-237.0		-202.0	
Overall	-38.8		-19.7		-77.7		-238.8		-323.5		-305.0		-179.0		-334.0 ³		-275.0	

1. U.S. included through 1962.

2. U.S. included through 1963.

3. Official Cuba data from JUCEPLAN differ from IMF data, the Cuban figure being \$99 million. The overall trade deficit would then increase to \$356 million.

4. Official Cuban data from JUCEPLAN differ from IMF data, the Cuban figure being \$105 million. The overall trade deficit would then increase to \$307 million.

Sources: «Cuba's Foreign Trade,» *Panorama Económico Latinoamericano*, No. 185, 1967, pp. 4-9; United Nations, *Yearbook of International Trade Statistics 1961*, pp. 180; JUCEPLAN, *Boletín Estadístico*, 1966, pp. 124-125; JUCEPLAN, *Compendio Estadístico de Cuba*, 1968, p. 26; International Monetary Fund, *Direction of Trade, Annual 1961-1965*, pp. 308-309, and *Annual 1963-1967*, pp. 377-378; Economic Commission for Latin America, *Economic Survey of Latin America*, 1963, p. 278; International Monetary Fund, *International Financial Statistics: 1963, 1969*, January 1963 and July 1969.

Table 17 demonstrates that since 1961, Socialist nations became Cuban first trading partner. Cuba has beard broad and continuous trade deficits with the socialist bloc, financed by a various grants and credit schemes. Because of the shift from scanty trade surplus to important deficits, Cuba has been confronted to serious balance of payments problem. As supposed, the embargo had several negative impacts on Cuba. First, Cuban tourism lost its high-spending American tourists, thus enlarging the payments deficit. The diversion of tourism by the United States reached a great level, as other Caribbean countries have similar natural endowments. Second, transportation costs increased enormously because Cuba did not divert its trade to its second-best trading partners located nearer than the Soviet Union but also because of supplier's availability. For instance, Cuba was importing rice from the American Gulf states prior to the embargo. However, it then had to import rice from China. Besides, Western vessels, which carry shipments to or from Cuba, were blacklisted by the United States. Knowing that the Caribbean area consists of well-established shipping networks and that most shipments go through the Caribbean basin prior to arrival in the United States, the largest trading partner in the area (measure taken for taking advantage of economies of scale in freight), this blacklisting's decision played a decisive role. Indeed, larger companies declined deals with Cuba by fear of loss of US trade. As a result, Western companies too were experiencing higher transportation costs essentially due to:

- a) The more frequent utilization of smaller, high-cost operators,
- b) The need to pay a profit premium to induce shippers to risk loss of U.S. cargoes, and
- c) Higher average costs resulting from the frequent inability to utilize carrying capacity fully.

Castro quickly reacted by implementing exchange control, restricting luxury imports for instance, in order to lighten the balance of payments problems. Despite measures taken, the enormous balance of payments deficits led to constrain import volumes what had important consequences on Cuban domestic consumption and production.

The new trade relationship with the Soviet Union implied many problems due to lack of complementarity between Cuban imports needs and Soviet Union bloc export abilities. Often, imports' quality was unsuitable because of poor production processes or inappropriate production to the Cuban climate, methods of use or technological needs. One typical example concerns vehicles. Usually, they were designed for cool climate and, therefore, they were overheating as well as rusting in the humid Cuban climate. Likewise, the type of wheat sent to Cuba was less suitable to Cuban mills, thus, implying less output. Besides, many pieces of Soviet farm material were aimed at continental crops, which are planted in rows of other spans than Cuban practices. As a consequence, they were thrown away. There were also problems related to the changeover of the metric system and the language as well as cultural barriers. Moreover, as Losman describes: "there have been very serious spare parts shortages, both for bloc-supplied goods and for those items produced in the U.S. for which parts can only be obtained via smuggling." (Losman, 1974, p.106).

As Cuba's capital stock came almost wholly from the United States prior to the embargo, the latter had two main consequences in terms of economic impacts on the production side. First, the scarcity of replacement parts disrupted production. In disrupting production, components of the latter that are land, labor and capital have been either underemployed or unemployed at all. Second, because much capital material was made unusable because of shortage of parts or specific material inputs, the production frontier moved inward. Indeed, the embargo has rendered capital equipment economically useless. In relation to the transportation industry, in 1961, one quarter of the Cuban buses were out of order because of lack of replacement parts and by 1962, only one half of the Cuban railroad passenger carriages were running. Regarding cars, an active black market was operating for years in order to get spare parts and accessories. Automobiles' parts have been so valuable that cars were cannibalized. Concerning the sugar industry, the deficiency of the transport system and the mill failures loomed large on this industry. By 1965, nine sugar mills had been cannibalized and only 115 sugar mills were still functioning in April 1972 although there were 161 functioning in 1959. Moreover, the embargo prevented Cuba to trade with its natural partner, the

United States, a large and wealthy market. As a result, Cuban producers could not benefit from scale economies that the access to a large market such as the US market would have allowed. Consequently, their costs of production increased.

As regards the consumption side, a main characteristic resulting from the embargo was the general decrease in output's quality. This deterioration was mainly due to three factors: (1) the great rates of import substitution induced by the embargo, (2) the necessary domestic economizing and (3) the lack of complementarity with new supplies. Indeed, Cuba was clearly dependent on the United States and on its sugar industry prior to the embargo's imposition. Losman quoted Lary in his study: "Import substitution may therefore soon spread a country's resources too thin over numerous small and inefficient enterprises, and extend to types of production ill-suited to its conditions, with the unfortunate result of raising costs even in industries in which it should otherwise be able to compete." (Losman, 1974, pp.112-113. Quotation from: Hal B. Lary, *Imports of Manufactures from Less Developed Countries*, (New York: National Bureau of Economic Research, 1968), p.10.). This was typically the case in Cuba, where many goods knew a sharp deterioration in terms of quality. Besides, the Soviet Union, Cuban's new trading partner, was unable to supply some specific raw material inputs or supplied badly suitable substitutes or insufficient quantities. Such types of problems appeared for every type of products, going from soaps (shortage, fragrances' problems, etc.) to glass bottles (color often caramel rather than clear) or still toothpaste, soft drinks (especially Coca Cola), food and so on. As a result, in March 1961, general food rationing was implemented.

Trade with the Soviet Union bloc implied changes in Cuba's consumption patterns. Indeed, Cuba has traditionally been an important consumer of lard. Once the embargo was imposed, changes in the Cuban diet were required. In order to overcome shortages, the Cuban domestic production of lard and vegetable oils was intensified. On the other hand, Castro campaigned against the consumption of lard, explaining that it was bad for health. Cuban people were also heavy eaters of rice, which was imported from the United States. With the embargo, Cuba turned to China, which was supplying rice in insufficient quantities. After political troubles between Cuba and China, the latter decided to reduce its supplies

drastically. Consequently, again Castro reacted. He proposed to give up rice from the diet and to replace it with more nutritional foods being available from its new trade partner, the Soviet Union.

To conclude, at least three factors have been strongly affected by the embargo. First, the capital stock has been strongly deteriorated leading to annual growth rates probably lower by 2 points or more. Moreover, growth of output has been seriously slowed down by the underemployment or unemployment at all of all factors of production. Second, the terms of trade worsened, essentially due to economic costs implied by getting supplies from sources that are more distant. Third, the quality of new imports as well as their usefulness has been unsatisfactory. Moreover, the support of the Soviet Union bloc resulted in an enormous amount of foreign indebtedness and a dependence upon its new trade partner. On the long run, the embargo's impact diminished because the proportion of infrastructure and capital goods that were American-made fall over the time.

In conclusion, the embargo induced important economic damages. The Soviet Union has absorbed some of these damages by helping Cuba financially and by becoming its new major trade partner. Politically, the embargo provoked no change apart from a rapid reinforcement of the Cuban relationship with the Soviet bloc. Indeed, in the absence of the embargo, it is not sure that these bilateral economic relations would have been so important.

3.2.2 Case study on Iran

The United States was one of the major trading partners of Iran prior to the Iranian revolution (1979). In fact, in 1978, a year before the Iranian revolution, the United States was the second largest exporter to Iran. The largest exporter was Germany with 19 per cent share of Iranian total imports, United States following with 16 per cent share of Iran's imports. However, after the revolution and more particularly after a group of students detained 52 American hostages in the US Embassy during 444 days starting from 4 November 1979, relations between Iran and United States deteriorated. A breakdown of diplomatic relations between the two states resulted from this crisis on 7 April 1980. As a result, the United States initiated a succession of economic measures and sanctions against the Iranian

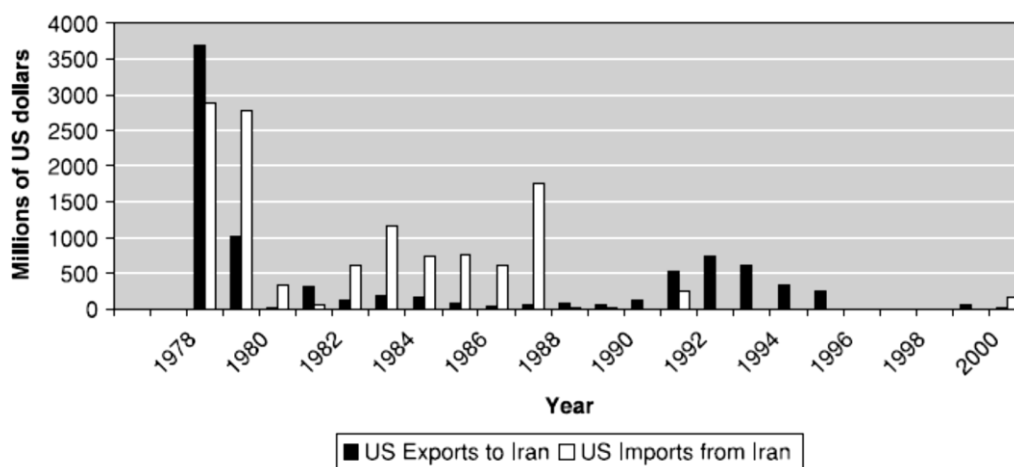
state for freeing the American hostages. In 1992, the United States became worried about the Iranian development of military means. Indeed, they thought that this development could endanger American interests in the Persian Gulf. As a consequence, they implemented measures in order to prevent Iran from producing conventional arms, ballistic missiles, nuclear bombs as well as chemical and biological weapons (Torbat, 2005, pp.408-409). Table 22 that can be found in the Appendix and issued from Torbat's article illustrates the historical timeline of the US sanctions on Iran from 1979 up to 2002.

In implementing sanctions, the United States expected its allies to follow its process by boycotting purchase of Iranian oil. None of United States' allies reacted as wished: they did not want to change their commercial relationship with Iran. The sanctions policy being ineffective, President Clinton decided in 1995 to strengthen the sanctions policy by cutting off all trade and investment ties with Iran, including purchase of Iranian oil. As a result, a full embargo against Iran was implemented by the United States. Nevertheless, US allies did not join the sanctioning process. As Torbat describes, "They had too much at stake for not doing business with Iran." (Torbat, 2005, p.409). Effectively, their bilateral trade volume with Iran was considerably higher than US bilateral trade with Iran. For instance, in 1994, Germany exported four times more than the US to Iran. In regards to Japan, Italy and France, they exported more than the US to Iran: Japan and Italy twice as much while France only slightly more than the US. In addition, these different countries were not convinced that economic sanctions would change the Iranian political behavior. That is the reason why, in 1992, the European Union implemented the so-called "critical dialogue" policy. This policy consisted of critics on the Islamic regime's behavior while pursuing diplomatic and economic relations. As a result, the United States imposed sanctions in a unilateral manner. Therefore, in order to gain cooperation of other states worldwide, United States had to take more measures, one of them being the Iran Libya Sanctions Act (ILSA). This act consists of extra-territorial measures that allow to United States to punish foreign people who exported petroleum products as well as natural gas or related technology to Iran. US economic sanctions imposed against Iran broke the relationship United States – Iran but not only. On

the other side, they deteriorated the relationship with Europe and Japan. Indeed, Europe pursued its business with Iran without being afraid of extra-territorial sanctions taken by the United States while Japan agreed to invest in the development of Iran's largest oil field in spite of American opposition. Finally, to cap it all, Iran decided to change currency for its oil exchanges, demanding euros instead of dollars for its future oil sales. The respective reactions of Europe and Japan challenged the supremacy of the United States (Torbat, 2005, pp.410-412).

Now the economic impact of trade sanctions in the Iranian case will be discussed. As Torbat study relies on the period 1978-2000, we are going to review trade impacts on this period. We can observe the historical pattern of bilateral trade volume between the United States and Iran from 1978 to 2002 here below. It is important to notice that this graph illustrates official bilateral trade statistics what does not include diverted trade implying third actors and non-observable trade resulting from smuggling, underground economy and so on.

Figure 9 US Trade with Iran.



Source: Torbat (2005), p.414.

After the Iranian revolution in 1979, US exports to Iran diminished radically as a consequence of the US export embargo. Moreover, Iran was boycotting US-made products on the same period. In 1991, Iran lifted its boycott, implying a rise in Iranian imports from the United States. A peak was reached in 1992 with about \$750 million of US Exports to Iran. In 1995, the comprehensive sanctions were implemented, implying zero US export to Iran the following years. As a result, the United States' exporter position went from the top of the list of main exporters to

the bottom, Germany being the prime exporter in 1994, with around \$1.740 million of exports corresponding to 13.7 per cent of Iran's total imports.

Prior to the imposition of US sanctions, machineries and electronics constituted the major category of US exported goods to the Iranian economy. United States were if not the best, one of the best quality producers of this type of products at that time. As a consequence, Iran was forced to import similar products of lower quality and at higher prices from other countries. The second category of imported products was foodstuffs. This category was easily substitutable and imported from other countries. The remaining categories were mostly made of industrial goods comprising oil drilling and oil field equipment. These types of products were generally essential goods for the Iranian economy, characterized by being price inelastic. US exports to Iran were highly essential goods with little or no substitutes. As a result, Iran's demand for such goods was relatively inelastic in the short run. Nevertheless, in the long run, once competitors were able to make similar products, these products became progressively elastic. The welfare loss estimated by Torbat is based on a sanction multiplier of 0.25.⁴¹ He estimated that the welfare loss total was around 25 per cent of US exports to Iran before the comprehensive sanctions' imposition. As Iran imported \$329 million goods from the United States in 1994 and zero in 1996, the welfare loss equals \$82.25 million ($0.25 \times \$329 = \82.25). As Torbat explains, "based on this conjectural estimation, Iran suffers \$82.25 million loss annually for not being able to import the needed goods from the US." (Torbat, 2005, p.415). This amount represented 1.23 per cent of Iran GDP of year 1994 expressed in US dollars.⁴²

As regards to Iranian imports, the United States represented a major importer of Iranian oil prior to the revolution. In 1987, the United States notably prohibited the import of Iranian oil. However, American companies were still purchasing

⁴¹ Torbat calculated his sanction multiplier as follow: "Since in the long run both demand and supply curves gradually become elastic, it is reasonable to assume that both elasticities are in absolute terms between 1 and ∞ . Substituting these limits for the elasticities in the formula will give a lower and upper limit for the sanctions multiplier, which are the lower limit = $1/\infty = 0$ and the upper limit of $1/(1 + 1) = 0.50$. Using the average of the two limits will give a multiplier equal to 0.25. This value is reasonably close to the multipliers that have been empirically found by Hufbauer and Schott (1985), which are in the range of 0.10 to 0.50 for this kind of case." (Torbat, (2005), p.415).

⁴² Source for the GDP : <http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx>

around 20 per cent of Iranian oil destined for exports via other states, although official figures indicated that no direct Iranian oil exports to the United States were taking place. Another main Iranian export was Persian carpets. Because of the imposition of comprehensive sanctions, their demand decreases forcing their prices lower in the world market. As a result, their production falls, increasing the already high rate of unemployment in Iran. In 1996, Iran's total rug exports reached one-third of its pre-sanctions year.

With respect to oil trade, in 1994, Iran exported 2.6 million barrels per day, around \$13 billion per year. Of this, 600,000 barrels per day were sold to the American companies. This amount represented around \$3.5 to 4.0 billion per year at that period. With the imposition of comprehensive sanctions in 1995, no more Iranian oil was allowed to be imported. Iran suffered temporarily small storage costs. Indeed, thanks to the quality of its oil, Iran found relatively quickly new purchasers. As a result, the oil embargo was ineffective both in the short and long terms. In terms of estimated costs, adding up Torbat's estimated loss from interdiction of US exports to Iran (\$82 millions) and imports from Iran (\$58 millions), trade sanctions' costs reached \$140 million per year.

In conclusion, embargo's short-term main effect was the disruption of Iran's oil exports. It temporarily diminished Iran's revenues issued from oil exports, by raising tanker chartering costs and crude oil storage costs. Moreover, new purchasers had to be found. On the other side, the long-term effects of trade sanctions are minimal. Iran has to find new suppliers in order to replace goods previously produced by US companies. However, due to its geographical location, between Europa and Asia, and its former trade partner (its largest trade partner was Germany), this was relatively easy to do. Moreover, it is interesting to notice that the Iranian boycott of US products, enforced as a reaction of the first US sanctions, reduced Iranian dependence vis-à-vis the United States. Lastly, the unilaterally manner of sanctioning (just Israel joined the embargo), was the root of the relatively small costs suffered by Iran due to sanctions. This is not surprising either, that the United States decided to implement the Iran-Libya Sanctions Act.

Conclusion

This thesis proposed an overview of the economic sanctions' phenomenon based on theoretical and empirical evidences. The first part described the economic sanctions' background by reviewing elements of history, explaining the institutional law framework from which economic sanctions stem from and by defining essential notions about economic sanctions. It gave the historical and institutional environment in which the economic sanctions phenomenon takes place. This section pointed out that economic sanctions, aimed at changing an objectionable behavior policy, result from the wish of countries not to resort to armed force.

The second part focused on mechanisms surrounding economic sanctions. First, it described economic sanctions and more particularly partial and total embargoes' impact on trade. It pointed out that partial and total embargo are welfare reducing. They distort prices, provoking rent-seeking behaviors. Moreover, they have redistributive implications. Embargoes have a higher impact on the terms of trade of small economies. Likewise, multilateral sanctions involve a greater deterioration in the target's terms of trade than unilateral ones. Moreover, the extent of the rents and the incentive to enter into sanction-busting activities increases with the severity of the sanctions as expressed in their terms-of-trade effects. Second, the domestic implementation of sanctions and adoption of objectionable behavior have been explained using a public choice approach. Results indicated that the level of economic sanctions and deviant policy result from the composition of interest groups and their respective political effectiveness in both sender and target countries. If interest groups had all the same political effectiveness, no economic sanctions would be implemented according to the interest groups' approach. Likewise, only economic sanctions that affect differently partisans and opponents of the deviant policy would be able to induce policy change. Third, the sanctioning process itself has been described as well as different countries interactions related to the imposition and effects of sanctions. This time a single-rational actor methodology has been used. Reasons for economic sanctions' initiation could be found in explanations for the use of force. Related models concluded that sanctions are implemented only when the outcome

is a sustained deadlock between the sender and the target. In case of concessions, the game ends at the threat stage. Likewise, the formation of a coalition of sender countries could be modeled thanks to games. Studies in this field concluded that cooperation among potential sender fails in cases of coordination, collaboration and suasion games. Finally, Early (2009) confronted realism and liberalism theories in order to explain sanctions-busting trade. His results provided strong evidence for the liberalism perspective, supporting that individuals and private entities that constitute the main actors in international politics, are driven by profitability of trading opportunities.

The last part of this thesis introduced empirical studies on the impact of economic sanctions on trade. It first described results of two econometric studies from Yang et al. (2004) and Slavov (2007). The first authors focused their study on the impact of US economic sanctions on bilateral trade and on third country trade. They found that comprehensive sanctions have a significant negative impact on US bilateral trade, exports and imports. Third countries effects were more difficult to detect. However, it appeared that, in some cases, US economic sanctions have promoted bilateral trade between the target country and its main competitor. Slavov described results of UN economic sanctions on bilateral exports and on neighbor countries of targeted countries. He got similar results for bilateral trade. Besides, he showed that target neighbor countries' trade tends to be negatively affected by sanctions implemented against the target. Second, two case studies on Cuban and Iran from Losman (1974) and Torbat (2005) have been presented. These two case studies based on descriptive statistics provided support for econometric results.

To conclude this thesis, it is essential to come back on its objective: describing the economic sanctions' effect on trade. We can definitely conclude that economic sanctions have a large negative impact on bilateral trade between the sender country or coalition and the target country. Both the sender and the target countries are deprived from gains of bilateral trade because of embargoes. Empirical results corroborate the theory. Nevertheless, it must not be forgotten that the theory is simplifying reality and that it rests upon many hypotheses. Likewise, empirical results concentrate on specific economic sanctions episodes,

which differ from each other and have their own characteristics. As a result, even if bilateral trade decreases between the sender country and the target country, each target, depending on economic sanctions implemented, its trade openness, its economic structure, its political relations and so on, is affected in a different manner and a different intensity by economic sanctions. Finally, the globalization and the evolving world trade patterns influence indirectly the effects of economic sanctions on the target country. Even if economic sanctions constitute an impressive and remarkable phenomenon, multilateral sanctions and, more particularly, multilateral targeted sanctions, enforced within the international organization, will be, no doubt, the best alternative to sanction target countries effectively in terms of trade in the future years.

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All websites have been last visited on 14th of January 2013.

Appendix

Agreements Related to the Non-Proliferation of Weapon of Mass Destruction

Nowadays, we frequently hear about the International Atomic Energy Agency (IAEA), especially when the news is relating information about Iran or North Korea. Indeed, States have concluded several conventions and treaties in response to weapons of mass destruction, which constitute one of the most dangerous threats against peace and security worldwide. However, the preoccupation related to weapon of mass destruction is not new. The discussion began after World War II. As a result, already in the 1970s, States were adopting multilateral treaties for this purpose.

The first adopted treaty linked with weapons of mass destruction was the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) also well-known as the Non-Proliferation Treaty. It is a multilateral treaty that has been signed in 1968 and that came into force in 1970. This Treaty is almost universal and its objectives are “to prevent the spread of nuclear weapons and weapons technology, to foster the peaceful uses of nuclear energy, and to further the goal of disarmament.” A safeguard system has been instituted under the responsibility of the IAEA. In addition, the Treaty provides for the IAEA a key role in domains of technology transfer for peaceful purposes. The IAEA is an independent international organization linked with the United Nations. A specific agreement regulates the relation between the IAEA and the UN. In addition, the IAEA relates annually to the UN General Assembly and to the Security Council as regards non-compliance by States with their safeguarded obligations and on issues concerned with international peace and security.

The second multilateral agreement adopted was the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, well-known as the Biological Weapons Convention (BWC). This Treaty has been adopted in 1972 and came into force in 1975. This Treaty has been created in order to supplement the Geneva Protocol (1925) that prohibited the use but not the possession or the development of chemical and biological weapons. The BWC “bans the

development, production, stockpiling, acquisition and retention of microbial or other biological agents or toxins, in types and in quantities that have no justification for prophylactic, projective or other peaceful purposes. It also bans weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.”

Lastly, the third multilateral agreement was the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention (CWC)). The aim of the CWC is “to eliminate an entire category of weapons of mass destruction by prohibiting the development, production, acquisition, stockpiling, retention, transfer or use of chemical weapons by States Parties.” The Convention entered into force in 1997. The implementation of the Convention is ensured by the Organisation for the Prohibition of Chemical Weapons (OPWC).

The Security Council adopted the Resolution 1540 in 2004, which asks all States to “refrain from providing any form of support to non-State actors that attempt to develop, acquire, manufacture, possess, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, and requires all States to adopt and enforce appropriate effective laws to this effect.” Following this resolution’s adoption, the United Nations created a special office concerned with disarmament affairs, the so-called United Nations Office for Disarmament Affairs (UNODA), as well as an institute for disarmament research, named United Nations Institute for Disarmament Research (UNIDIR). The motto of UNODA is to “...strengthening peace and security through disarmament.” Concerning UNIDIR, its objective is “to assist the international community in developing the practical, innovative thinking needed to find solutions to the challenges of today and tomorrow.”

In addition to these treaties and conventions, several export control regimes and related arrangements have been instituted. These arrangements help to the prevention of the proliferation of weapons of mass destruction. The following arrangements provide their expertise for the implementation of the export control regimes: the Australia Group (AG), the Missile Technology Control Regime (MTCR), the Nuclear Suppliers Group (NSG), the Wassenaar Arrangement and

the Zangger Committee (Kazeki, 2005, p.211). Most of these regimes are informal arrangements. First, the Australia Group, established in 1985 following a United Nations investigation of Iraq during the Iran-Iraq war, attempts “to ensure that exports do not contribute to the development of chemical or biological weapons” thanks to the harmonization of export controls. It brings together 40 members along the European Commission. Second, the aim of the MTCR’s members is the “non-proliferation of unmanned delivery systems capable of delivering weapons of mass destruction.” In order to achieve its goals, the MTCR endeavors to coordinate national export licensing efforts undertaken to prevent the propagation of such systems. This regime has been constituted in 1987 because of the growing proliferation of weapons of mass destruction and brings together 34 member countries. Thirdly, the Nuclear Suppliers Group was created in 1974 and its Guidelines were published in 1978. The purpose of this group is “to contribute to the non-proliferation of nuclear weapons through the implementation of Guidelines for nuclear exports and nuclear related exports.” The NSG Guidelines are enforced by each member State in line with its respective national laws and practices. It is important to notice that “decisions on export applications are taken at the national level in accordance with national export licensing requirements.” 46 States are members of the NSG. Fourthly, the Wassenaar Arrangement aims “to contribute to regional and international security and stability, by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilising accumulations.” In other words, this Arrangement controls exports of conventional weapons and dual use products. It was established in 1996 as a follower of the Coordinating Committee for Multilateral Export Controls (COCOM) and brings together 41 states. Finally, the last export control regime is the Zangger Committee also known as the ‘NPT Exporters Committee’ and constituted in 1971. 38 members form this Committee that aims to contribute to the interpretation of Article III, paragraph 2 of the Nuclear Non-Proliferation Treaty (NPT) and thus provides guidance to all parties to the Treaty. Indeed, Article III, paragraph 2, of the NPT provides: “Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or

prepared for the processing, use, or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article.” The Zangger Committee’s main mission within the NPT’s framework is to take into consideration the changes in terms of security and to adjust export control condition and criteria periodically and in line with the needs.

One could think that these export control regimes go against the General Agreement on Tariff and Trade (GATT). Indeed, the GATT constitutes a multilateral agreement regulating international trade and that seeks to reduce substantially tariffs and other barriers to trade as well as to eliminate discriminatory treatments in international commerce. Notwithstanding, the GATT allows export restrictions for non-economic as well as economic reasons (see Table 18 in the Appendix). As a consequence, all export control regimes mentioned above and UN Security Council Resolutions are authorized under the GATT (Kazeki, 2005, p.211). In the same way, many international and regional organizations are concerned with economic sanctions and measures taken in order to implement them. For instance, many organizations going from the International Monetary Fund (IMF) to the League of Arab States (LAS) or the European Union (UE) deal with economic sanctions.

Table 18 List of Several Types of Export Restrictions.

Box 6.1. Illustrative list of rationales for export restrictions in TPRs
<p><i>1. Export restrictions for non-economic reasons: security:</i></p> <ul style="list-style-type: none"> • The United Nations Security Council Resolutions (e.g. sanctions against particular countries). • The Convention on Chemical Weapons. • The Treaty on Nuclear Non-Proliferation. • Multilateral export control arrangements: the Australia Group (to prevent the spread of chemical and biological weapons); the Missile Technology Control Regime; the Nuclear Suppliers Group; the Zangger Committee (control of nuclear materials and related high technology); the Wassenaar Arrangement (control of exports of conventional weapons and dual use products). <p><i>2. Export restrictions for non-economic reasons: other international treaties or arrangements, and life, public health, safety, social and religious reasons:</i></p> <ul style="list-style-type: none"> • The Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal. • The Convention on International Trade in Endangered Species of Fauna and Flora (CITES). • The Montreal Protocol on Substances that Deplete the Ozone Layer. <p><i>3. Export restrictions for economic reasons but in accordance with international or bilateral agreements or arrangements:</i></p> <ul style="list-style-type: none"> • The Agreement on Textile and Clothing. (All restrictions under this agreement were eliminated at the end of 2004.) • International commodities agreements on sugar, coffee and petroleum. • General System of Preferences and other arrangements related to preferential treatment. • In the process of counteracting countervailing duties of an importing country. <p><i>4. Export restrictions for food security reasons (prevention of critical shortage):</i></p> <ul style="list-style-type: none"> • Staple products such as maize to cope with drought in particular in LDCs (including seasonal regulations). <p><i>5. Export restrictions: for environmental reasons; for conservation of exhaustible natural resources; to maintain an adequate supply of essential products; or to promote downstream industries (either non-economic or economic reasons):</i></p> <ul style="list-style-type: none"> • Forestry products (such as log, timber). • Fishery products (including seasonal restraint for a biological rest period of fish). • Mineral products, metals, precious stones. • Hides and skins and leather. • Other agricultural products (seasonal measures are introduced in some cases). <p><i>6. Export restrictions for quality controls and regulatory aspects:</i></p> <ul style="list-style-type: none"> • Patent- or copyright-infringing products. • Sanitary quality controls or standards assurance to meet importer's demands or to maintain international reputation (e.g. SPS quality of foods, quality of diamonds, etc.). <p><i>7. Export restrictions: others:</i></p> <ul style="list-style-type: none"> • Gold (financial security). • Exchange control related. • Heritage goods (to protect national treasures). • Statistical and monitoring purposes.

Source: Kazeki (2005), p.211.

Table 19 Estimated Losses of US Exports to Targets of Selective Sanctions (Millions of US Dollars).

Table III
Estimated Loss of U.S. Exports to Targets of Selected Sanctions (Millions of U.S. Dollars)

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Albania	—	—	—	39	17	17	17	29	34	32	30	44
Azerbaijan	147	163	213	142	112	99	42	37	30	26	34	41
Belarus	446	492	809	641	541	686	365	314	269	223	292	352
Bulgaria	456	364	477	353	159	229	144	147	188	117	131	177
Cambodia	7	9	9	8	10	19	12	17	19	15	17	17
China, P.R.	1,640	1,620	2,761	1,862	2,129	3,081	2,117	3,829	4,821	3,498	5,294	4,774
Estonia	—	—	—	172	115	126	69	72	85	71	84	113
Georgia	—	—	—	1	115	87	36	31	35	43	55	62
Kazakhstan	575	663	977	768	509	634	353	309	302	253	314	324
Kyrgyz Repub.	49	59	84	41	30	38	40	33	32	15	16	19
Lao People's Rep.	—	5	7	7	7	12	9	12	13	11	11	10
Latvia	144	163	246	215	142	125	63	71	61	55	66	91
Lithuania	187	228	339	—	—	—	97	98	112	110	147	190
Moldova	—	—	—	—	—	64	57	37	40	19	23	22
Mongolia	—	—	—	—	—	—	6	7	9	8	8	11
Romania	632	624	889	625	389	504	323	398	455	354	443	499
Russia	—	—	12,273	8,067	6,566	7,428	4,069	4,186	4,255	3,671	4,870	2,980
Tajikistan	45	52	67	55	40	42	24	19	17	12	14	17
Ukraine	—	834	1,318	1,103	823	1,328	643	556	492	440	460	380
Uzbekistan	—	—	—	—	—	265	163	190	191	143	182	155
Total	4,328	5,276	20,469	14,099	11,704	14,784	8,649	10,392	11,460	9,116	12,491	10,278

Note: See description of calculation at end of Table IV.

Source: Yang et al. (2004), p.47.

Table 20 Estimated Losses of US Exports to Targets of Comprehensive Sanctions.

Table IV
 Estimated Loss of U.S. Exports to Targets of Comprehensive Sanctions
 (Millions of U.S. Dollars)

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Afghanistan	—	—	—	—	—	—	—	—	—	160	186	158
Angola	67	81	124	92	156	56	73	42	54	94	96	97
Cuba	—	—	—	—	—	—	919	690	838	1,153	1,483	1,099
Iran	1,173	1,136	1,682	1,044	1,368	982	1,125	734	783	1,230	1,606	1,547
Iraq	—	—	—	—	—	—	—	—	—	147	325	623
Libya	345	352	515	460	717	469	610	415	446	683	733	615
North Korea	—	—	—	—	—	—	—	—	—	225	237	188
Sudan	142	114	166	91	129	49	90	73	67	85	124	118
Syria	119	127	156	132	201	137	216	178	196	259	265	268
Vietnam	166	102	55	20	84	57	115	111	142	198	244	232
Yugoslavia	—	—	—	—	—	—	—	—	—	250	308	293
Total	2,012	1,912	2,698	1,839	2,655	1,750	3,148	2,243	2,526	4,484	5,607	5,238

Note: Calculation of losses of U.S. exports due to U.S. economic sanctions. Using the predicted values and parameter estimates, we can calculate the losses of U.S. exports due to U.S. economic sanctions as follows:

$$LE_{i,t} = NE_{i,t} - PE_{i,t} = e^{N_{i,t}} - e^{P_{i,t}} = e^{P_{i,t}} \left(\frac{1}{e^{\beta_{SANC,t}}} - 1 \right)$$

where:

$LE_{i,t}$: Estimated loss of U.S. exports to country i in time t ;

$NE_{i,t}$: Estimated U.S. exports to country i in time t if no sanctions were in place;

$PE_{i,t}$: Predicted value of U.S. exports to country i in time t based on regression with sanctions;

e : The base for natural logarithm;

$N_{i,t}$: Estimated value in logarithm of U.S. exports to country i in time t if no sanctions were in place;

$P_{i,t}$: Predicted value in logarithm of U.S. exports to country i in time t from regressions with sanctions; and

$\beta_{SANC,t}$: Parameter estimate for $SANC$ variable for time t .

Source: Yang et al. (2004), p.48.

Slavov's reasoning

Slavov starts its reasoning by presenting the following equation of Anderson and van Wincoop (2004):

$$X_{ij} = \frac{Y_i Y_j}{Y^W} \left(\frac{t_{ij}}{\pi_i P_j} \right)^{1-\sigma}$$

where X_{ij} denotes exports from country i to country j ; Y_i and Y_j are respective country incomes; Y^W is world income; t_{ij} denotes bilateral trade barrier broadly defined; σ is the elasticity of substitution among different goods. Finally, π_i and P_j are the 'multilateral resistance' terms for the exporting and the importing country, defined as:

$$P_j^{1-\sigma} = \sum_i \pi_i^{\sigma-1} \theta_i t_{ij}^{1-\sigma} \text{ for all } j,$$

$$\pi_i^{1-\sigma} = \sum_j P_j^{\sigma-1} \theta_j t_{ij}^{1-\sigma} \text{ for all } i,$$

Where $\theta_i \equiv Y_i/Y^W$ is country i 's share in world income. The ratio $t_{ij}/\pi_i P_j$

constitutes a key term in the equation as it expresses the 'relative trade resistance' that is the bilateral trade barrier relative to the two multilateral resistance terms.

As regards the impact of UN trade embargoes on trade flows, suppose we consider trade between a country subject to UN sanctions (denoted by T) and any other country in the rest of the world (denoted by R). Bilateral trade flows between the two countries will be given by:

$$X_{TR} = \frac{Y_T Y_R}{Y^W} \left(\frac{t_{TR}}{\pi_T P_R} \right)^{1-\sigma}$$

$$X_{RT} = \frac{Y_R Y_T}{Y^W} \left(\frac{t_{RT}}{\pi_R P_T} \right)^{1-\sigma}$$

Bilateral trade barriers t_{TR} and t_{RT} raise, relative to the product of the multilateral resistance terms $\pi_T P_R$ and $\pi_R P_T$ and, as a result, bilateral trade should diminish.

Now, in respect to bilateral trade between a land neighbor (denoted by N) to a target country and any other country in the rest of the world (denoted by R), bilateral trade flows will be given by:

$$X_{NR} = \frac{Y_N Y_R}{Y^W} \left(\frac{t_{NR}}{\pi_N P_R} \right)^{1-\sigma}$$

$$X_{RN} = \frac{Y_R Y_N}{Y^W} \left(\frac{t_{RN}}{\pi_R P_N} \right)^{1-\sigma}$$

As Slavov writes, “under smuggling hypothesis, country R is trading with a larger economic area than captured by Y_N . As a result, its trade with country N should go up. Country R will import more from country N during years with UN sanctions (but those extra goods have been produced in country T and have been smuggled from T into N). Country R will export more to country N during sanctions (but those extra exports will ultimately be smuggled from country N into country T and consumed there).” (Slavov, 2007, p.1711). On the contrary, under the ‘disrupted trade’ hypothesis, UN sanctions increase the level of the ‘relative trade resistance’ to country N . As a result, bilateral trade should depress. Effectively, UN sanctions imply that trade barriers between neighbor countries and the rest of the world raise because of an increase in transaction costs (as for instance, transportation costs and insurance) and because of the disruption in established trading ties between suppliers and customers.

Taking natural logs of the gravity equation (1), we get:

$$\begin{aligned} \ln(X_{ij}) = & -\ln(Y^W) + \ln(Y_i) + \ln(Y_j) + (1 - \sigma) \ln(t_{ij}) + (\sigma - 1) \ln(\pi_i) \\ & + (\sigma - 1) \ln(P_j) \end{aligned}$$

Overview of US Unilateral Economic Sanctions against Cuba from 1917 to 2000

Table 21 Overview of US Unilateral Economic Sanctions against Cuba from 1917 to 2000.

<i>Date</i>	<i>Policy Actions</i>	<i>Nature of Sanctions</i>
1917	Passage of Trading with the Enemy Act. This act authorizes the US president to “prohibit, limit, or regulate trade with hostile countries in time of war.”	Financial sanctions.
1960	Imposition of sanctions under Export Control Act.	Export sanctions. Unsubsidized foodstuffs and medical supplies exports were allowed.
1961	Passage of Foreign Assistance Act.	Total trade embargo.
1962	Passage of Tariff Classification Act.	Suspension of reduced and most-favored-nation (MFN) duty rates.
1963	Imposition of Cuban Assets Control Regulation.	Freezing of all private and public Cuban assets in the United States. Prohibition of all unlicensed American financial and commercial transactions with Cuban and Cuban citizens. Prohibition of direct and indirect US exports to and imports from Cuba. Publications, telecommunications services, informational materials were exempt of interdiction.
1973	Establishment of Bilateral Anti-Hijacking Agreement.	Negotiations to normalize relations. Anti-hijacking agreement.
1975	Amendment to Cuban Assets Control Regulations.	Loosening of the regulation aimed to restrict subsidiaries of US companies operating in third countries from conducting business with Cuba. Replacement by a specific trade license.
1977	Lapse of Travel Restrictions/Agreement on Maritime Issues/Bilateral Opening of “Interest Sections”	Lapse of travel restrictions. Accord on fishing rights and maritime boundaries.
1982	Reinstatement of Travel Restrictions.	Travel restrictions.
1992	Passage of the Cuban Democracy Act also known as the “Torricelli Act”.	Codification and expansion of many of the existing US sanctions. Implementation of new sanctions.
1996	Passage of the Cuban Liberty and Democratic Solidarity Act, the so-called “Helms-Burton Act”.	Stark expansion of US sanctions.
1998	Passage of the Omnibus Appropriations Act.	Sanctions on trademarks.
1998	Implementation of Humanitarian Policies.	Relaxing of humanitarian medical and export medical supplies and equipment licenses’ acquisition.
2000	Passage of the Trade Sanctions Reform and Export Enhancement Act.	Relaxing of unilateral sanctions. It allowed conditional sales of food, medicine and some medical equipment.

Source: Askari, Forrer, Teegen and Yang (2003), pp.2-5.

Historical Timeline of the US Sanctions on Iran

Table 22 Historical Timeline of the US Sanctions on Iran.

<i>Date</i>	<i>Stated Reasons for Sanctions</i>	<i>Policy Actions</i>	<i>Nature of Sanctions</i>
4 November, 1979	60 American hostages are taken in the US embassy in Tehran by a group of students who are followers of Ayatollah Khomeini	President Carter invokes section 232 of the Trade Expansion Act of 1962.	US embargoes oil import from Iran.
13 November, 1979		US House of Representatives vote.	Aid and military assistance to Iran are prohibited.
14 November, 1979		President Carter invokes International Emergency Economic Power Act.	\$12 billion Iranian deposits in the US banks and foreign subsidiaries are frozen.
7 April, 1980			US embargoes exports (except food and medicine) to Iran.
19/20 January, 1981		US signs agreement with Iran in Algiers, Algeria.	US transfers part of the Iranian assets to an escrow account in exchange for release of the US hostages.
19 January, 1982		President Ronald Reagan lifts trade sanctions.	Business contracts and commercial agreements resume between the two countries.
13 January, 1984	Iran is accused of being involved in bombing of the US Marine Barracks in Lebanon in October 1983.	Iran is added to the list of countries accused of supporting international terrorism.	US prohibits foreign aid, grants, use of credit or financial assistance and restricts transfer of weapons and ammunition.
30 March, 1984		US Department of Commerce imposes anti-terrorism controls on Iran.	Export of aircraft and related parts and components are prohibited, except with valid licences.
1985-1986	None	Iran-Contra deal	Little control over exports to Iran.
28 February, 1987	Iran is accused of not taking adequate actions to control narcotics production, trafficking and money laundering.	President Reagan invokes section 481 of the Foreign Assistance Act of 1961.	Financial assistance to Iran by Export-Import banks and the Overseas Private Investment Corporation is prohibited. US representatives in international banks are instructed to vote against loans to Iran.
23 September, 1987	Iran's attitude against peaceful settlement in the Iran-Iraq War and on-going support of international terrorism.	Department of Commerce restricts exports to Iran and requires validated licences.	Export and re-export of self-contained underwater breathing apparatus and related equipment to Iran are prohibited.
23 October, 1987			Prohibition expands to include 15 high-tech products.

29 October, 1987	Supporting terrorism and unlawful military action against US flag vessels.	President Reagan issues an executive order invoking section 505 of the International Security and Development Cooperation Act of 1985.	US imposes ban on import of Iranian goods and services, mainly crude oil. Exceptions are petroleum products refined from Iranian crude oil.
1989-1991	Iran obtains substance for manufacturing chemical and biological weapons.	Department of Commerce imposition of foreign policy export control.	Export to Iran of substances which can be used in manufacturing of chemical and biological weapons is prohibited.
23 October, 1992	Iran's effort to access sophisticated technology with military application.	President George Bush signs Congress's National Defence Authorisation Act.	Export of dual-use items to Iran is prohibited.
5 May, 1995	Iran's opposition to Middle East peace, terrorism and acquiring weapons of mass destruction.	President Clinton issues an executive order invoking sections 202/203 of the International Emergency Economic Power Act.	US imposes comprehensive sanctions on all bilateral trade and investment in Iran.
5 August, 1996	Sponsoring terrorism.	Extra-territorial sanctions: Iran-Libya Sanctions Act.	US penalises any foreign company that invests more than \$20 million in Iran's oil sector.
August 2001	Harbouring terrorism.	Following Congress, President G.W. Bush extends ILSA for another five years.	
January 2002		President George W. Bush labels Iran as 'an axis of evil'.	

Source: Torbat (2005), pp.410-411.