LUND UNIVERSITY
Department of Economics

The European Union as a User of Economic Sanctions: Patterns and Effects on Trade

Arvid Ekengard

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Supervisors: Yves Bourdet
Joakim Gullstrand

Abstract

This study estimates the trade effects of economic sanctions used by the European Union 1990-2000. The EU has used economic sanctions frequently since the early nineties. These sanctions are compiled into a comprehensive list for the period 1990-2000, and classified as limited or extensive. Then, a gravity model is used to estimate how sanctions have affected trade between the EU and target countries. The regressions are run on both cross-sectional data and panel data, with a sample of 163 developing countries. The main result is that economic sanctions have had ambiguous effects on trade. The magnitude of the trade effect is greater on EU imports than on EU exports, which is consistent with theoretical predictions. Limited sanctions have become more trade-suppressing during the latter half of the nineties, while extensive sanctions have become less trade-suppressing.

Keywords: EU, trade, economic sanctions, gravity model

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Contents

Abbreviations

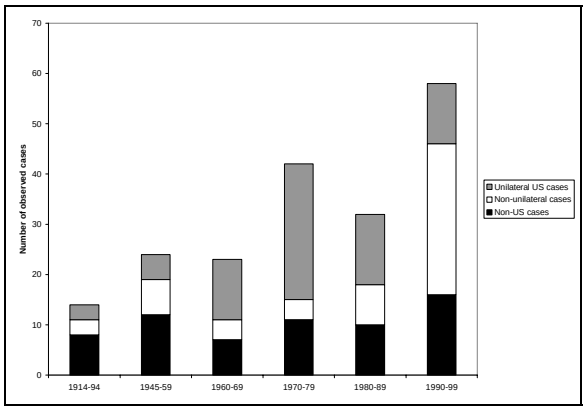
ACP	The African Caribbean and Pacific Countries under the Cotonou Agreement
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
EU	The European Union
GDP	Gross Domestic Product
GSP	The Generalized System of Preferences
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
PDK	Party of Democratic Kampuchea (Khmer Rouge)
SIPRI	Stockholm International Peace Research Institute
UN	United Nations
UNSC	United Nations Security Council
UNSTAT	United Nations Statistics Division
VER	Voluntary Export Restraint

1 Introduction

Economic sanctions are controversial. Today, the humanitarian and economic effects of more than a decade of UN-initiated sanctions against Iraq are being unraveled in academic and journalistic writings. At the same time, the UN Security Council is contemplating on which measures to employ against Iran's unwillingness to give in to international pressure on its nuclear research, and the European Union is introducing new sanctions against the leadership in Belarus. In this setting, this essay aims to investigate the trade effects of the sanctions initiated by the European Union. [1]

During the last century, economic sanctions have been used with increased frequency. The end of the Cold War meant that the UN could take a more aggressive stance in international politics, since the Security Council no longer was paralyzed by the struggle between the two superpowers. At the same time, the US has continued to use unilateral sanctions, though less often than in the seventies. The big change in the nineties, however, was the rise of non-unilateral cases, which include EU and mandatory UN sanctions (Elliott 2005, p. 3-6)

Figure 1. Trends in the use of economic sanctions 1914-1999



Source: Elliott 2005, p. 5

[1] Even though the legal entity of the "European Union" did not exist until the Maastricht Treaty entered into force in 1993, "EU" will, for reasons of convenience, be used also for its predecessors.

Another notable development in the nineties was the focus on making sanctions “smart”. Since comprehensive sanctions had proved costly in humanitarian terms (Iraq being the most obvious example), academics as well as official wanted to fine-tune the sanctioning measures in order to avoid harm to civilian populations. Through a number of reform processes led by Germany, Switzerland, and Sweden, a range of guidelines for targeted sanctions were developed (Biersteker et al 2005, p. 15-27). Europe, or at least the EU, has consequently been a keen user of targeted sanctions.

Sanctions influence relations between target and sender countries in a number of ways. Among the economic effects of sanctions, their influence on trade has often been regarded as the most important aspect. Therefore, this essay will investigate how economic sanctions applied by the European Union have affected trade between the EU and target countries.

The structure of the essay is as follows: in chapter 2, sanctions are defined and their economic effects are discussed. A survey of the literature on the topic is also presented. Chapter 3 deals with the European Union’s use of economic sanctions from an institutional and historic point of view. I present a list of all EU sanctions 1990-2000. Chapter 4 contains a description of the two empirical models used, as well as a discussion on data. The results of the estimations are presented and analyzed in chapter 5. The essay is brought to an end with conclusions in chapter 6.

2 Sanctions: definitions, effects, and earlier studies

2.1 Defining international economic sanctions

Initially, the term economic sanctions appears to be straightforward, however there is considerable disagreement among scholars on the proper definition. Since these scholars repeatedly are called on to give policy advice, diverging definitions could negatively affect the quality of this policy advice.[2] Robert A. Pape (1997) identifies three categories of international economic pressure: trade wars, economic warfare, and economic sanctions. A trade war is, according to Pape, the process of one state trying to persuade another state to agree to terms of trade that are more favorable to the coercer. Economic warfare aims to weaken the economic potential of an enemy state in order to weaken its military capabilities. These two concepts should not be included under the heading economic sanctions, Pape (1997, p. 93-94) argues quite reasonably. This definition is not entirely compatible with the one used by Hufbauer et al (1990, p. 10-12), since Hufbauer et al also includes sanctions used in concert with military action, something that Pape would rather describe as part of economic warfare. Askari (2003a, p. 81) concludes that contemporary definitions of economic sanctions share four attributes:

1. A sender country (one or more) restricts commercial activity
2. The reason for restricting commercial activity is to bring about economic deprivation
3. Economic deprivation is aimed at a target country (one or more)
4. The goal is to modify the target country or countries' behavior

I find it appropriate to revise Askari's definition for two reasons: first, the increasing use of targeted sanctions (see chapter 1) means that not only states can be the target of sanctions, but also individuals or groups of individuals. Second, targeted sanctions (like travel restrictions) often do not aim at inflicting economic pain, but rather at causing general inconveniences or expressing the opinion of the sender. Since the EU has been

[2]For instance, in 1990 Gary Hufbauer and Jeffrey Schott testified before the US Congress on the probable effects of sanctions against Saddam Hussein (Pape 1997, p. 92)

particularly keen on using targeted measures, I will for this study employ the following modified version of Askari's characteristics of economic sanctions:

1. A sender country (one or more) restricts commercial activity
2. The reason for restricting commercial activity is to bring about deprivation of some type
3. Deprivation is aimed at a target country (one or more), or individual(s) outside the sender country/countries
4. The goal is to modify the target's (country/countries or individual) behavior

2.2 The philosophy, means, and mechanisms of sanctions

Following the definition of sanctions stated above, the goal of a sanction is to inflict deprivation on target, thereby causing the target to change its objectionable behavior. This seemingly simple last step, to bring about change on the part of the target, is in reality a complex political-economy process. While an interesting topic in itself, there is no room here for such a discussion.[3] Since the aim of this study is to investigate how the sanctions used by the European Union have affected bilateral trade, I will instead focus on discussing the economic mechanisms through which sanctions may influence trade.

Askari et al (2003a, p. 91) list 14 mechanisms which alone or combined could constitute a sanction:

1. Capital flow controls
2. Asset freeze
3. Export controls
4. Import controls
5. Commercial policy restrictions(tariffs, trade relations etc)
6. Reduction of financing from international and multilateral organizations
7. Travel restrictions
8. Restrictions on air links
9. Restrictions on technology transfers

[3] See Allen 2005 for a survey of the literature on this

10. Restrictions on tax credit and guarantees
11. Restrictions on foreign aid
12. Limitations on data and technical data transfers
13. Immigration controls
14. Restrictions on transfer of management expertise

This list should not be regarded as exhaustive; only the imaginative skills of the designers limit the number of possible measures. I shall comment on a few of these measures, especially those that have been used by the European Union (see chapter 3).

Capital flow controls are designed to restrict international lending, investment, and payments. These measures can obviously impede trade even if not accompanied by export or import limitations. One theoretical exception could be that a ban on investment could be imagined to increase trade, supposing that it is possible to choose between supplying a foreign market through exports or through establishing production facilities in the foreign country.

Export controls aim to reduce, or completely bar, the exports of the sender country to the target country. This is usually achieved though a system of export licenses. A common example is embargoes on arms or dual-use equipment.[4] As Caruso (2003, p. 4-6) notes, export controls are analytically indistinguishable from the Voluntary Export Controls (VERs) frequently used in trade policy. Thus, an export control reduces the volume of trade and raises the price of the export good in the target country. It also creates a rent, which accrues to either the exporting firms or the sender government, depending on the type of licensing system.

The trade effects of import controls can also be analyzed using trade theory tools. Suppose the sender country bans all imports from the target country. This is analytically equivalent to introducing a country-specific zero import quota. Accordingly, it will reduce income in the target country, raise the prices of the sanctioned goods in the sender

[4] Dual-use equipment refers to objects that have both civilian and military uses. Nuclear technology is an example.

country, and create a rent for import-competing producers in the sender country (Markusen et al 1995, p. 269-273, 278).

The presence of rents creates incentives for rent-seeking behavior. Interest groups may lobby for sanctions, purportedly for laudable political reasons, but in reality in order to be able to capture the rents. This makes implementation and surveillance mechanisms very important for a credible sanctions regime. The bribery scandal connected to the Oil for Food program, a part of the UN sanctions against Iraq, illustrates this point vividly. [5]

These trade effects of import and export controls stem from a two-country, partial equilibrium analysis. In a real world of many countries and general equilibrium, the effects are somewhat more complex. The crucial factor for welfare effects considerations is the extent to which sender and target countries can shift trade to third countries, thereby limiting the negative effects of the sanction. Considering this, globalization could potentially change the prospects for economic sanctions, however in an ambiguous way. [6] The greater proportion of trade in a country's economy, the greater the potential harm that could stem from reducing the trade. From this reasoning, globalization could increase the economic deprivation caused by sanctions. However, the very same globalization could also make it easier for the target country to shift trade from the sender country to other trading partners, making sanctions less painful. Which of these two globalization-induced changes that dominates, will probably be determined by the trade and production structure of the individual target and sender countries.

Restricting development assistance has been something of a favorite sanctions tool of the EU. The most obvious way in which this could influence trade is when the aid is used to purchase goods, like capital equipment, from the donor country. Restricting aid would naturally decrease sender country exports to the target country. Nilsson (1997, p. 52-67) notes that a large share of EU overseas development assistance is tied, meaning that it is given on the condition that it at least in part is used to purchase goods or services from

[5] See Hsieh & Moretti 2005.
[6] Globalization is loosely defined here as increased integration of the world economy.

the donor country. In 1992, about 62 per cent of the development assistance coming from the EU member countries was tied. Nilsson also estimates that "the average return to aid of EU exports is roughly two and a half dollars increase of exports for every dollar spent" (Nilsson 1997, p. 62). This means that suspending development assistance could be rather expensive for the sender in terms of forgone export earnings.

The measures discussed above are the ones that affect trade most directly. The other measures in Askari et al's (2003) list are of a more targeted, or smart, type in so far as that they are not directly aimed at reducing the overall economic wellbeing of the target country. Still, their application could restrict trade through a process of decreasing links and contacts between target and sender. An important aspect here is how the sanctions affect the credibility and trustworthiness of sender country firms. However, this impact is expected to be fairly small.

2.3 Earlier studies on the subject

Economic sanctions have been studied rather extensively. However, this research seems to have come mainly from academic disciplines such as political science, international law, and peace studies. Furthermore, the bulk of the research has taken the form of case studies (Askari et al 2003b, p. 1), and has focused on U.S sanctions. Hufbauer et al (1985, 1990) is among the few studies that cover a large number of observations. The 1990 edition surveys 116 cases of economic sanctions in the period 1914-1990. Through scrutinizing the specific circumstances, each case is assigned a score of success. Their most important finding was that sanctions seem fairly efficient: 34 per cent of the 116 cases where considered successful.

Not surprisingly, Hufbauer et al received a fair amount of criticism, most notably from Pape (1997). Pape argues that Hufbauer et al have underestimated the role of military force, or threat of use of force, in many of their listed cases. Therefore, he argues that only 5 out of Hufbauer's 40 reported cases of success should properly be regarded as successes, yielding an overall success rate of less than five per cent.

Using a gravity-type model, Hufbauer et al (1997) also performed the first large-N econometric study on the trade effects of U.S economic sanctions. They concluded that extensive sanctions tended to reduce bilateral trade flows by around 90 per cent. The study also estimated that sanctions employed by the U.S. in 1995 caused a loss of 200 000 American jobs. The critique by Askari et al (2003a, p 129-131) focuses on the econometric shortcomings of Hufbauer et al (1997). They point to the sensitivity of the results to the sanctions classification, that Hufbauer et al investigate a short time period, and that there may be serious problems of multicollinearity. Askari et al's own study (2003) uses the same basic methodology, but draw lessons from the critique against their predecessors. It covers the whole period of 1980-1998, and includes trade statistics for 225 countries. Furthermore, it also estimates the effects of U.S. sanctions on third parties, chosen as the EU and Japan. While recognizing that their model is highly sensitive to how the list of sanctioned countries is designed, they conclude that comprehensive U.S. sanctions reduce bilateral trade with the sanctioned country by up to 90 per cent. The broad picture given by Askari et al seems to be consistent with the results of Hufbauer et al.

3 The European Union as a user of economic sanctions

3.1 Institutional framework for EU-initiated sanctions

Considering the special institutional and legal foundations of the European Union, a few remarks on these and how they shape the preconditions for EU sanctions are needed.

Before the Maastricht Treaty entered into force, foreign policy initiatives were handled as part of the European Political Cooperation. Measures that involved restricting trade required decisions from both the member states and the common institutions, while other measures were legally introduced by the member states legislative bodies (Anthony 2002, p. 210).

Today, the main factor that shape how EU uses sanctions is the division of competence between member states, the Commission, and various General Directorates of the European Commission. Since there is no space available here for in-depth legal discussions, a simplified version will have to suffice. When implementing UN Security Council (UNSC) sanctions, which are not automatically binding for EU member states, existing member state legislation creates the legal base for implementing arms embargoes and travel restrictions. Especially since 1990, EU legislation is used to implement UNSC sanctions on financial relations, payments, investment, and trade in goods and services (de Vries & Hazelzet 2005, p. 96-98).

When the EU adopts sanctions independent of the UN, the Council must initiate the process through a Common Position or a Joint Action, both which must be taken unanimously. The Commission then prepares a detailed suggestion for regulation, which is adopted by the Council through qualified majority voting. Thus, the regulation becomes Community law, binding to all members. (Anthony 2002, p. 210-212). Whether this has to be complemented with national implementing legislation depends on the type of sanction in question, according to the competencies listed above. In theory, member

states could introduce autonomous sanctions. However this is in practice ruled out since member states have committed themselves to that they "should not impede, or otherwise undermine the common foreign and security policy of the Union" (Hazelzet 2001, p. 83). One should also note that EU sanctions are often implemented not only by the member states, but also by applicant countries and Switzerland (Hazelzet 2001, p. 56)

Another way for the EU to introduce economic sanctions is to make use of the "essential elements" clauses found in many of the bilateral trade and aid treaties which the EU has signed, mostly with the developing world. These clauses allow the EU to suspend aid or trade preferences in case of violations against democracy, human rights, rule of law, and good governance (de Vries & Hazelzet 2005, p. 98-99). This option has been used frequently; Hufbauer & Oegg (2003, p. 560) lists 23 such cases in the 1990's.

3.2 Sanctions employed by the EU

In order to get a clear picture of how the EU has used the sanctions instrument, I have compiled a list of economic sanctions employed by the European Union. It is based on the set of sanctions listed in Hazelzet (2001), Council of the European Union (2004), and European Commission (2006a). It includes UNSC-mandated sanctions adopted by the EU as well as independent EU sanctions. For a number of cases, additional sources have been used. The many instances of suspension of development aid proved somewhat problematic, since these decisions generally do not require any EU level legislation. Therefore, it proved difficult to trace additional information, and especially to determine when the sanction ended. Where it was not possible to determine the end date, SourceOECD International Development Statistics data on total development aid flows from EU and member countries were used as a proxy. The sanction was regarded as terminated when total development aid from the EU and the member countries reached 75 per cent of the average of the three years preceding the year when the sanction entered into force. Even though my list entails some instances of sanctions from the 1970's and 1980's, it should only be regarded as comprehensive for the period 1990-2000, since the main sources only overlap for this period.

Table 1. Sanctions employed by the European Union.

Target country	Period and type of sanction	Classification
Afghanistan	1999-2002: Financial sanctions, flight ban	extensive
Algeria	1998-2001: Deference of Co-operation Agreement	limited
Angola	1993-2002: Arms embargo	limited
Austria	2000-2000: Diplomatic sanctions	limited
Belarus	1998-1999: Travel restrictions against certain individuals	limited
Bosnia	1991-1996: Comprehensive sanctions, 1996-2006: Arms embargo	extensive
Burma/Myanmar	1996-ongoing: Arms embargo- ban on exports of equipment for internal repression- ban on certain services - freezing of funds and economic resources, with certain exemptions- restrictions on admission - suspension of certain aid and development programmes- suspension of high level bilateral governmental visits – reduction of diplomatic relations	extensive
Burundi	1993-1993: Suspension of development aid, 1997-2000: Suspension of development aid	limited
Cambodia	1992-1993: Oil embargo against PDK	limited
Central African Republic	1991-1997: Suspension of development aid	limited
China	1989-ongoing: Embargo on arms, cancellation ministerial meetings	limited
Comoros	2002-2003: Suspension of development aid	limited
Croatia	1991-1996: Extensive sanctions 1996-2001: Arms embargo	extensive
Djibouti	1991-1998: Suspension of development aid	limited
Equatorial Guinea	1992-1997: Suspension of development aid	limited
Eritrea	1999-2001: Arms embargo	limited
Ethiopia	1999-2001: Arms embargo	limited
Fiji	2000-2003: Suspension of development aid	limited
Gambia	1994-1997: Suspension of development aid	limited
Guinea-Bissau	1998-1998: Suspension of development aid	limited
Haiti	1991-1994: Suspension of development aid	limited
Indonesia	1999-2000: Arms embargo	limited
Iraq	1990-2003: Extensive sanctions 2003-ongoing: arms embargo	extensive
Ivory Coast	2000-ongoing: Suspension of development aid	limited
Kenya	1991-1997 Suspension of development aid	limited
Congo, Democratic Republic of	1993-ongoing: Arms embargo, visa restrictions	limited
Congo, Republic of	1997-2001 Suspension of development aid	limited

Liberia	1990-1994: Suspension of development aid, 1992-2001: Arms embargo	limited
Libya	1992-2004: Arms embargo, financial sanctions, travel restrictions	extensive
Macedonia	1996-2001: Arms embargo (case-by-case review)	limited
Moldavia	2003-ongoing: Travel restrictions against leaders in Transnistria	limited
Morocco	1996-1996: Deference of Co-operation Agreements	limited
Niger	1999-2000: Suspension of development aid	limited
Nigeria	1993-1999: Arms embargo, suspension of development aid, visa restrictions	limited
Pakistan	1999-2001: Deference of Co-operation Agreement	limited
Romania	1989-1990: Suspension of development aid	limited
Russia	1995-1995: Deference of Co-operation Agreement	limited
Rwanda	1994-ongoing: Arms embargo	limited
Serbia	1991-1996: Comprehensive sanctions, 1996-2001: Arms embargo, 1998-1999: Embargo on equipment for repression, freezing of funds, prohibition of new investment, ban of flights	extensive
Sierra Leone	1997-ongoing: Arms, oil and travel related sanction	extensive
Slovenia	1996-2001: Arms embargo (case-by-case review)	limited
Somalia	1992-ongoing: Arms embargo	limited
South Africa	1977-1992: Extensive sanctions 1992-1994: Arms embargo	extensive
Sudan	1994-ongoing: Arms embargo, travel restrictions	limited
Syria	1986-1994: Arms embargo 1992-1993 Deference of Co-operation Agreement	limited
Tajikistan	1997-1997: Suspension of development aid	limited
Togo	1992-1998: Suspension of development aid	limited
Turkey	1995-1995: Deference of Co-operation Agreement	limited
Zimbabwe	2002-ongoing: Arms embargo, travel restrictions, freezing of assets	limited
Sources: Buchet de Neuilly (2001), Council of the European Union (2004), Hazelzet (2001), European Commission (1999), (2001), (2006a), OECD (2006), UNSC (1993), (1996), (2006a), (2006b), UN Office of the Spokesman for the Secretary General (2006), Official Journal of the European Union (various issues)		

When the EU deferred cooperation agreements, the sanction is considered to have ended once the relevant agreement finally was signed. There are of course other factors, apart from the will of the EU to express its dissatisfaction, which may influence when these agreements eventually were signed.

The list contains 49 targeted countries, all of which are developing countries, except Austria.[7] 57 instances of sanctions are recorded, however this number is somewhat ambiguous since it is difficult to determine what should count as a modification of an existing sanction, and what should count as a new one. 26 of these 57 cases involve suspended development aid and/or deferred cooperation agreements. This is obviously EU's most popular measure. For analytical purposes, all cases are classified as limited or extensive. Cases that include trade embargoes or broad financial sanctions are classified as extensive. However, cases with a combination of several minor measures applied simultaneously are also labeled extensive. All other cases are classified as limited. This is a subjective classification, but for the econometric analysis it is necessary to distinguish between different types of sanctions.

[7] "Developing countries" is to be interpreted as low- or middle income countries according to the World Bank definition.

4 The empirical model

4.1 About the gravity model in international economics

The notion that two bodies attract each other with a force that is proportional to the product of the masses of the two bodies and is negatively proportional to the square of the distance between the bodies is generally known as the law of gravity, and attributed to Isaac Newton. It is commonly stated as

$$F = G\frac{Mm}{r^2}$$

Where F denotes the gravitational force, G the gravitational constant, M and m the respective masses of the bodies, and r the distance between the bodies. Social scientist first borrowed this concept in the 1850's, applying it on social flows such as migration (Askari 2003b, p. 2)

In international economics, gravity models have been employed with some success, often yielding statistically robust findings. Even though rather different models have been labeled 'gravity type', they share the common assumption that bilateral trade is proportional to the product of the economic masses (usually interpreted as the GDP) of the trading countries, and negatively proportional to the distance between the countries. Tinbergen (1962) is generally considered the pioneer study. However, the early studies suffered from a lack of theoretical foundations: the model worked fine empirically, but could not be explained with accepted economic theory (Bergstrand 1985, p. 474). Lately, it has been shown that quite a few theories could be used to derive the gravity model. In addition, this includes contradictory ideas like Ricardian theory, Hecksher-Ohlin, and increasing returns to scale theory (Evenett & Keller 2002, p. 282). This, of course, is not a desirable situation, since the model therefore cannot be used to reject or support underlying theory. Settling the dispute of which theory best explains the apparent empirical success of the gravity model is however outside the scope of this study.

4.2 The empirical models: design and data

I use two methods for estimating the trade effects of the economic sanctions employed by the EU. First, the regression is run for each year in the sample period 1990-2000. Then, I use panel data to get an overall picture of the impact on trade, and include an interaction to see if this impact varies over time.

Hitherto, quite a few different designs of the gravity model have been used by economists. I have chosen to follow Askari et al (2003) to a large extent in designing my model, in order to achieve comparable results. The model used to estimate the trade effects for each year takes the following form:

$$\ln(TRADE_{EU-it}) = \alpha + \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDPPC_{EUt} * GDPPC_{it}) + \beta_3 \ln(DIST_{EU-i}) + \beta_4 COLON_i + \beta_5 BLOC_{it} + \beta_6 SANL_{it} + \beta_7 SANX_{it}$$

Where

$TRADE_{EU\text{-}it}$ is bilateral trade between EU and country i in year t. In order to separate the effects of sanctions on EU exports and imports, two estimations are to be done: first with $TRADE_{EU\text{-}i}$ as EU imports, then with $TRADE_{EU\text{-}i}$ as EU exports. The data is gathered from the March 2006 CD edition of IMF Direction of Trade Statistics. For 1990-1994, EU is interpreted as EU-12 and for 1995-2000 as EU-15. This definition also applies to the other variables in the model.

α is a constant

$GDP_{EUt}*GDP_{it}$ is the product of the gross national products of EU and country i in year t, expressed in constant 1990 dollars. This data is gathered from the UNSTAT National Accounts Main Aggregates Database, 2006 online edition. It is expected to bear a positive sign, since increasing economic mass would suggest both increased import demand and increased export supply.

$GDPPC_{EUt}$*$GDPPC_{jt}$ is the product of GDP per capita in EU and country i in year t, expressed in constant 1990 dollars. This data is gathered from the UNSTAT National Accounts Main Aggregates Database, 2006 online edition. The coefficient is expected to be positive, since increased per capita income would tend to increase import demand.

$DIST_{EU-i}$ is the distance between Essen, Germany and the most important city or agglomeration (in terms of population) in country i, computed following the great circle formula. [8] This data is gathered from the CEPII Distances database. Its coefficient would be expected to be negative, since increasing distance in general would imply increased trading costs and thus reduced trade.

BLOC is a dummy variable, assuming the value 1 if the country belongs to a trade block with the EU and 0 otherwise. Belonging to a trade bloc is defined as fulfilling one these three criteria: Having signed the Lomé/Cotonou agreements, being eligible for GSP treatment, or having a free trade agreement with the EU. This data is collected from Persson & Wilhelmsson (2006) and from the country pages of the European Commission External Relations (2006b) website. The coefficient will probably be positive, since trade preferences act to increase trade.

COLON is a dummy variable, assuming the value 1 for countries have been colonies of any of the EU member states and 0 otherwise. This data is collected from the CEPII Distances database. Its coefficient is expected to be positive, since colonial ties work to increase contacts in general and trade in particular.

SANL is a dummy variable, assuming the value 1 if the country in question was a target of EU sanctions classified as limited in year t. The sample, fetched from the list presented in chapter 3.2, holds a rather diverse set of measures, ranging from diplomatic sanctions to arms embargoes. Considering this diversity, it is difficult to predict the sign of the

[8] According to the CEPII distances database, the Essen region is the most important agglomeration in Germany, which in this study is considered the economic heart of the European Union

coefficient. Note that Austria is excluded from sample, since it for part of the sample period was part of the EU.

SANX is a dummy variable, assuming the value 1 if the country was a target of EU sanctions classified as extensive in year t. Also here, the data is fetched from my sanctions list in chapter 3.2. It is expected to decrease trade.

This model is similar to the ones used by Hufbauer et al (1997) and Askari et al (2003), differing mainly in the choice of included dummy variables. Askari et al chose a minimalist design with no dummies except for two groups of sanctions. Hufbauer et al used dummies for adjacency and common language. Of course, these could also have been included in the model applied here, together with many more factors that certainly influence bilateral trade. However, a trade-off between analytical simplicity and predictive power on the one hand, and realism on the other hand, is necessary.

For the panel data arrangement, the following model is estimated:

$$\ln(TRADE_{EU-it}) = \alpha + \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDPPC_{EUt} * GDPPC_{it}) + \beta_3 \ln(DIST_{EU-i}) + \beta_4 COLON_i + \beta_5 BLOC_{it} + \beta_6 SANL_{it} + \beta_7 SANX_{it} + \beta_8 * T_{1991} + \beta_9 * T_{1993} + \beta_{10} * T_{1994} + \beta_{11} * T_{1995} + \beta_{12} * T_{1996} + \beta_{13} * T_{1997} + \beta_{14} * T_{1998} + \beta_{15} * T_{1999} + \beta_{16} * T_{2000} + \beta_{17}(T_{1996-2000} * SANL) + \beta_{18}(T_{1996-2000} * SANX)$$

The variables and data sources are the same as in the cross-sectional model, except that time dummies and two interactions are added. The T_{1991}-T_{2000} variables are dummies indicating if the observations belong to a certain year. They are included to capture exogenous effects that change over time. This could be structural changes in EU trade or exchange rate effects. Note that there are no time dummies for 1990 and 1992. Besides dropping the dummy for one of the periods (1990) as customary, the 1992 dummy had to be dropped since its inclusion caused the model to display signs of multicollinearity. This means that any time-specific effects for 1990 and 1992 are captured by the constant.

$T_{1996\text{-}2000}$ is a time dummy, assuming the value 1 if the observations belong the period 1996-2000 and 0 otherwise. Interacting this dummy with the sanctions variables means

that the effect of sanctions in the period 1990-1995 is measured by β_6 for limited sanctions and β_7 for extensive ones. The effect of sanctions in the period 1996-2000 is measured by $(\beta_6 + \beta_{17})$ and $(\beta_7 + \beta_{18})$, respectively.

4.3 The question of zero trade

Both models are estimated using Ordinary Least Squares. Using OLS makes it possible to compare the results with the previous studies. There are, however, some problems with using OLS on a log-linear model as the one used here. For lack of statistics, or that some countries just do not trade with each other, it is probable that there will be zeros in the trade sample. This is a problem since the natural logarithm of zero is not defined. This problem has generally been solved in one of two ways: either the zero observations are simply dropped from the sample, or a small number is added to the zero trade observations. I have applied the former method. Westerlund & Wilhelmsson (2006, p. 3-5)) argue that any of these methods will give rise to misleading inference, and suggests using a Poisson maximum likelihood estimator instead. While it may still be preferable to use this method, I note that my sample contains less than half the proportion of zero trade observations, 4.4 per cent for exports and 4.5 per cent for imports. This should be compared to Westerlund & Wilhelmsson's sample, which contained 10 per cent zero observations. The difference should at least make the bias of my results considerably lower than suggested by Westerlund & Wilhelmsson.

5 Econometric results

5.1 The year-wise impact of sanctions on EU imports

For all the studied years, the model's predictive power is high: the R^2-value varies between 0.73 and 0.85, with a mean of about 0.8. The adjusted R^2 is almost as high. The coefficient for the product of GDP's is significant at the 1 % level for all years.[9] It is stable around 1.0, and is positive as expected.

The coefficient for the product of GDP per capita is significant at the 1 % level only for 1999 and 2000. At the 5 % level, also the value for 1997 is significant. It is consistently positive, but varies between 0.03 and 0.24. One possible reason for this variation is that the variable partly contains the same information as $GDP_{EUt} * GDP_{it}$, since

$$\beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(\frac{GDP_{EUt} * GDP_{it}}{POPEUt * POPit}) = \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDP_{EUt} * GDP_{it})$$
$$- \beta_2 \ln(POP_{EUt} * POP_{it}) = (\beta_1 + \beta_2)(GDP_{EUt} * GDP_{it}) - \beta_2 \ln(POP_{EUt} * POP_{it})$$

While the population probably changes in a constant pace for most countries, the relatively large variation in β_2 could be variation in GDP that spills over to the GDP per capita variable. Thus, including GDP per capita in the model is somewhat unsatisfactory, but is done in order to be able to compare the results with previous studies.

β_3, the coefficient for distance, is significant at the 1 % level for all years except for 1992, where it is almost significant at that level. It bears the expected negative sign. No time trend is distinguishable, and the 1992 distance effect is abnormally small (a lower absolute value).

The coefficient for COLON is only significant 1900-1996. As expected, it is positive, but shows a clear diminishing trend. This could possibly be explained by that Eastern enlargement of the Union and a general rise in global trade has made the EU import less

[9] Unless otherwise stated, coefficients will be defined as significant if they are significant at the 1 % level.

from its former colonies. Another possible explanation is that the former colonies have shifted their exports to other markets than the EU.

The BLOC coefficient is significant at the 1 % confidence level only for 1992, 1997, 1998, and 2000. As anticipated, it is steadily positive. The importance of belonging to a trade bloc with the EU shows an increasing trend.

The estimations of the sanctions variables coefficients are somewhat surprising. For SANL, the coefficient is not significant at the usual levels for any year. Furthermore, it is unexpectedly positive during 1990-94 and 1998. However, it changes towards the expected negative sign during the latter half of the sample period. The level of insignificance also increases with time. The significance of SANX is higher; it is significant at the 1 % level for 1994, 1995, and 1996. At the 5 % level, β_7 is significant for eight years: 1990, 1992-97, and 2000. For seven of the sample years, it is positive.

It is difficult to believe that extensive sanctions would tend to increase EU imports from the sanctioned country. The overall picture from the imports estimations is that it is difficult to say something general about how sanctions have influenced EU imports.

Table 2. Estimation results, year-wise, EU imports

$$\ln(TRADE_{EU-it}) = \alpha + \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDPPC_{EUt} * GDPPC_{it}) + \beta_3 \ln(DIST_{EU-i}) + \beta_4 COLON_i + \beta_5 BLOC_{it} + \beta_6 SANL_t + \beta_7 SANX_t$$

	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7
1990	-39.79938	0.962070	0.078946	-0.802422	0.983626	0.413237	1.201518	1.834682
	0.0000	0.0000	0.3187	0.0000	0.0025	0.1630	0.0375	0.0250
1991	-41.75762	0.967994	0.117803	-0.689480	0.833288	0.577910	0.292035	0.642274
	0.0000	0.0000	0.1097	0.0001	0.0060	0.0566	0.4702	0.4000
1992	-48.65315	1.030947	0.130928	-0.486016	1.407095	1.676538	0.213891	2.008039
	0.0000	0.0000	0.1557	0.0160	0.0001	0.0000	0.6166	0.0130
1993	-43.31178	1.014642	0.032722	-0.637791	0.849974	0.437835	0.147364	-1.414557
	0.0000	0.0000	0.6712	0.0000	0.0018	0.1068	0.6317	0.0116
1994	-40.25129	0.973094	0.065364	-0.792084	0.822117	0.478968	0.295822	-2.492406
	0.0000	0.0000	0.4018	0.0000	0.0041	0.0956	0.3553	0.0000
1995	-39.44383	0.969289	0.053575	-0.825788	0.765210	0.577418	-0.191830	-2.055456
	0.0000	0.0000	0.4489	0.0000	0.0035	0.0273	0.5389	0.0003
1996	-39.08801	0.943842	0.082646	-0.775686	0.709369	0.666369	-0.147677	-1.324085
	0.0000	0.0000	0.2341	0.0000	0.0064	0.0137	0.6285	0.0099
1997	-41.83588	0.958019	0.127717	-0.615610	0.323835	0.783443	0.216068	1.129231
	0.0000	0.0000	0.0261	0.0000	0.1133	0.0002	0.3439	0.0166
1998	-40.69272	0.975903	0.055693	-0.710131	0.355378	0.694700	-0.317849	0.634662
	0.0000	0.0000	0.3314	0.0000	0.0909	0.0015	0.2107	0.1469
1999	-41.56976	0.940154	0.208574	-0.687503	0.440265	0.500750	-0.402253	0.300098
	0.0000	0.0000	0.0015	0.0000	0.0428	0.0461	0.1359	0.4986
2000	-44.58550	0.995794	0.248651	-0.760570	0.277206	0.659215	-0.364729	1.043416
	0.0000	0.0000	0.0001	0.0000	0.1862	0.0065	0.1472	0.0245

Trade is EU imports. For each year, the estimated value of the coefficients are presented with the corresponding p-value below

5.1 The year-wise impact of sanctions on EU exports

The estimations based on EU exports are comparable to those based on EU imports. They also show high R^2-values, varying between 0.73 and 0.85 with a mean of about 0.8. However, there are some important differences.

The GDP coefficient is significant at the 1 % level for all the years in the sample period. Its value is stable, and shows the expected positive sign. The coefficient for GDP per capita also performs as anticipated, though just barely not significant for 1991 and 1993. It more stable than its import counterpart, with a standard deviation of 0.03 (0.06 for imports).

The DIST coefficient is significant for all years. It is constantly negative between -0.80 and -1.10, except for an anomaly of only -0.56 for 1992.

The effect of being a former colony of an EU country is statistically significant for all years except 1997, 1998, and 2000. It bears the expected positive sign. It is interesting to note that this effect is diminishing, just like the case with the imports estimation.

The BLOC variable only has significant coefficients for 1992. It has the expected positive signs, but shows great variance. The explanation for this is probably the same as for the imports estimation; the BLOC variable accommodates a wide range of trade preferences. Dismissing the high value for the odd year 1992, it follows the import estimation in showing increasing importance.

Turning to the focal point of this study, the estimations of the sanctions variables are equally surprising as for the imports case. The SANL coefficient is significant at the 5 % level only in 1990, 1991, 1993, and 1994. Its value varies between 0.86 to -0.3. However, while still insignificant, it shows a clear trend of becoming more negative towards the end of the sample period.

SANX is significant at the 1 % level during four years: 1990, 1993, 1994, and 1995. Relaxing the significance level to include the 5 % level makes also 1996 significant. For nine of the sample years, it bears the expected negative sign. Of these years, the trade-suppressing effect is the largest for 1993-1996.

From inspecting figure 2, it is clear that the estimations from the two samples, imports and exports, follow a similar development over time. However, the fluctuations are greater for the impact on EU imports. This can be interpreted as a sign of that sanctions design is working, given that the sender country generally can be expected to aim for reducing the exports of the target country while limiting the impact on sender exports.

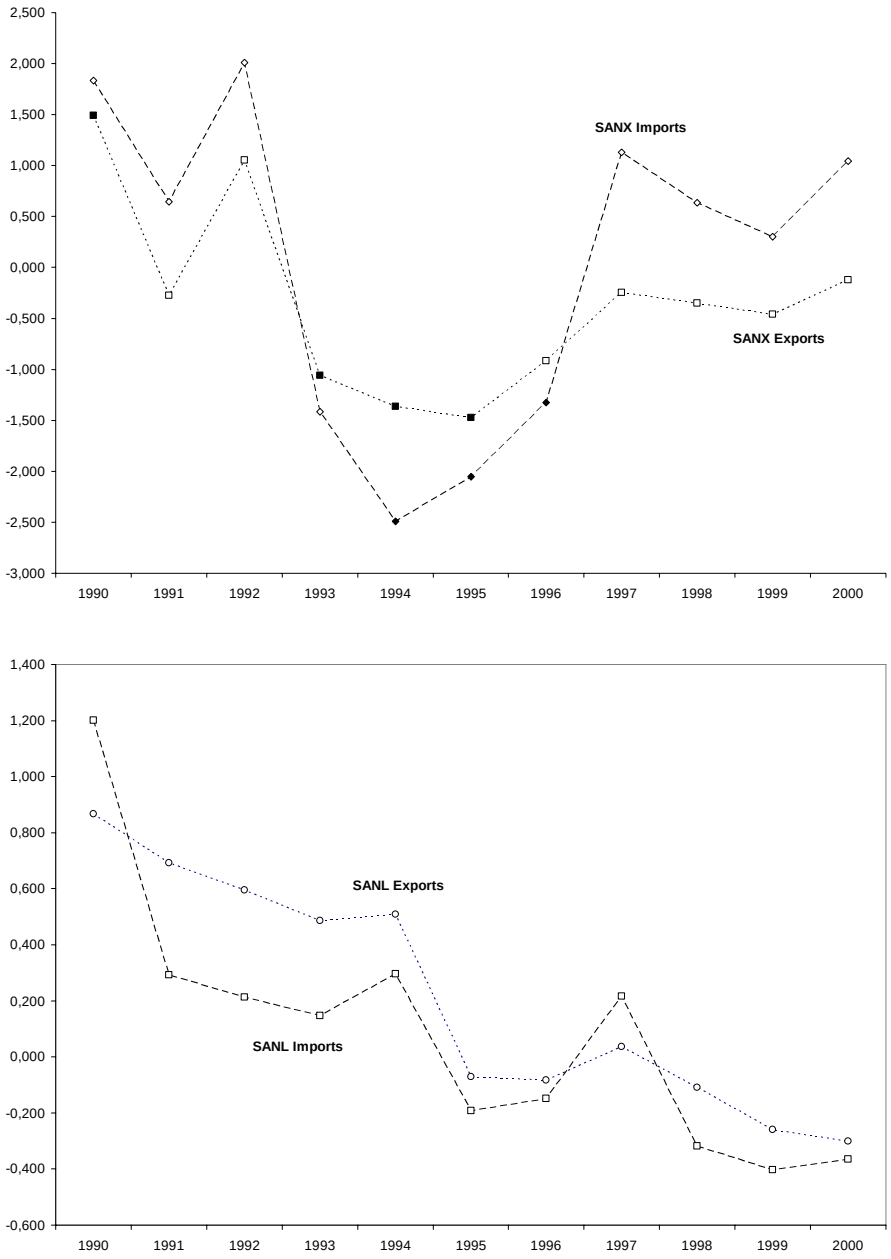
Table 3. Estimation results, year-wise, EU exports

$$\ln(TRADE_{EU-it}) = \alpha + \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDPPC_{EUt} * GDPPC_{it}) + \beta_3 \ln(DIST_{EU-i}) + \beta_4 COLON_i + \beta_5 BLOC_{it} + \beta_6 SANL_t + \beta_7 SANX_t$$

	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7
1990	-28.29666	0.766041	0.138363	-1.004739	0.836071	0.170847	0.866519	1.489701
	0.0000	0.0000	0.0113	0.0000	0.0002	0.3972	0.0282	0.0079
1991	-30.46568	0.792677	0.201065	-1.042520	0.940610	0.073746	0.692469	-0.274376
	0.0000	0.0000	0.0002	0.0000	0.0000	0.7330	0.0182	0.6162
1992	-37.91015	0.825977	0.205346	-0.556485	1.305007	1.163444	0.595450	1.052151
	0.0000	0.0000	0.0123	0.0019	0.0000	0.0002	0.1157	0.1376
1993	-32.53095	0.786402	0.213321	-0.803794	0.801573	0.295938	0.486128	-1.060919
	0.0000	0.0000	0.0002	0.0000	0.0000	0.1276	0.0283	0.0082
1994	-32.60572	0.804673	0.220835	-0.897251	0.724204	0.141350	0.509468	-1.363170
	0.0000	0.0000	0.0000	0.0000	0.0001	0.4300	0.0117	0.0004
1995	-30.50010	0.792093	0.177889	-0.957092	0.713670	0.165997	-0.069879	-1.470860
	0.0000	0.0000	0.0006	0.0000	0.0002	0.3715	0.7541	0.0003
1996	-31.37008	0.813901	0.170440	-0.966786	0.600620	0.187893	-0.082071	-0.915915
	0.0000	0.0000	0.0005	0.0000	0.0010	0.3143	0.6993	0.0104
1997	-33.97228	0.836917	0.223758	-0.910125	0.391019	0.232086	0.036325	-0.243516
	0.0000	0.0000	0.0000	0.0000	0.0239	0.1880	0.8501	0.5363
1998	-31.73895	0.810147	0.220409	-1.003247	0.421254	0.228803	-0.109138	-0.348429
	0.0000	0.0000	0.0000	0.0000	0.0214	0.2223	0.6196	0.3576
1999	-33.60635	0.843963	0.244575	-1.066997	0.509767	0.280923	-0.258720	-0.461315
	0.0000	0.0000	0.0000	0.0000	0.0064	0.1891	0.2609	0.2245
2000	-33.69047	0.850513	0.244551	-1.109219	0.484396	0.341963	-0.300295	-0.121280
	0.0000	0.0000	0.0000	0.0000	0.0106	0.1129	0.1831	0.7688

Trade is EU exports. For each year, the estimated value of the coefficients are presented with the corresponding p-value below

Figure 2. Estimations of coefficients for SANL and SANX over time



Black, filled dots indicate that the coefficient is significant at the 1 % level

5.3 Overall impact: panel data estimations

The coefficients for GDP, GDP per capita, distance, trade block, and colonial heritage are all highly significant and show the expected signs for the impact on EU imports as well as on EU exports. The time dummies are negative, and in most cases very insignificant.

For EU imports, the coefficient for limited sanctions for 1990-1995 is significant only at the 10 % level, which still is considerably better than in the cross-sectional estimations. However, it is unexpectedly positive at 0.26. However, the trade effect of limited sanctions for 1996-2000 is measured by

$\beta_6 + \beta_{17} = 0.26 - 0.49 = -0.23$

This means that limited sanctions did impede EU imports during the period 1996-2000.

The impact of limited sanctions on EU exports shows the same pattern. Statistically significant, it shows a trade-increasing effect (0.41) for 1990-1995 and a trade-reducing effect for 1996-2000. The effect during the latter period is

$\beta_6 + \beta_{17} = 0.41 - 0.53 = -0.12$

Turning to extensive sanctions, the picture given from the panel data estimation is different. With all estimations significant at the 5 % confidence level, the effect on imports is strongly negative (-1.22) for 1990-1995, but positive (-1.22 + 1.45 = 0.23) for 1996-2000. The effect on exports is -0.99 for 1990-1995. For 1996-2000, it is still negative but considerably smaller (-0.99 + 0.58 = -0.41).

The message from this analysis is that the trade effects of both limited and extensive sanctions have changed over time. In the early nineties, limited sanctions seem to have increased trade, while during the latter half of the decade it seems to have reduced trade. Extensive sanctions seem to have undergone a reverse change: initially strongly trade-suppressing and later less so. It is difficult to determine the underlying causes of this. The most probable explanation is that each sanctions episode has a unique character which is not fully captured by the limited-extensive classification.

Another possible explanation of these time trends is that the pattern of EU bilateral trade with the sample countries have changed due to factors not included in the model. Multilateral trade liberalization and developing countries striving to diversify their exports are examples of such factors.

Table 4. Results from panel data regression.

$$\ln(TRADE_{EU-it}) = \alpha + \beta_1 \ln(GDP_{EUt} * GDP_{it}) + \beta_2 \ln(GDPPC_{EUt} * GDPPC_{it}) + \beta_3 \ln(DIST_{EU-i}) + \beta_4 COLON_i + \beta_5 BLOC_{it} + \beta_6 SANL_{it} + \beta_7 SANX_{it} + \beta_8 * T_{1991} + \beta_9 * T_{1993} + \beta_{10} * T_{1994} + \beta_{11} * T_{1995} + \beta_{12} * T_{1996} + \beta_{13} * T_{1997} + \beta_{14} * T_{1998} + \beta_{15} * T_{1999} + \beta_{16} * T_{2000} + \beta_{17}(T_{1996-2000} * SANL) + \beta_{18}(T_{1996-2000} * SANX)$$

	EU Imports			**EU Exports**	
Coefficient	Estimated value	p-value		Estimated value	p-value
α	-41.43084	0.0000		-32.03188	0.0000
β_1	0.971700	0.0000		0.811267	0.0000
β_2	0.110751	0.0000		0.211135	0.0000
$\beta 3$	-0.702715	0.0000		-0.961300	0.0000
β_4	0.564698	0.0000		0.587927	0.0000
β_5	0.609540	0.0000		0.248207	0.0000
β_6	0.262970	0.0674		0.414317	0.0001
β_7	-1.224236	0.0000		-0.988009	0.0000
β_8	-0.046501	0.7100		-0.092600	0.3244
β_9	-0.336461	0.0057		-0.178596	0.0506
β_{10}	-0.218317	0.0723		-0.177299	0.0521
β_{11}	-0.103314	0.3940		-0.017767	0.8453
β_{12}	-0.101929	0.4033		0.003220	0.9720
β_{13}	-0.050449	0.6794		-0.096780	0.2913
β_{14}	-0.140967	0.2484		-0.115032	0.2099
β_{15}	-0.187682	0.1253		-0.260530	0.0046
β_{16}	-0.205945	0.0928		-0.326588	0.0004
β_{17}	-0.490469	0.0082		-0.525708	0.0002
β_{18}	1.449129	0.0000		0.575412	0.0164

For EU Imports: N = 1549, Adjusted R^2 = 0.80
For EU Exports: N = 1551, Adjusted R^2 = 0.86

5.4 Estimating the costs of sanctions

An interesting characteristic of log-linear equations, such as the ones used here, is that the coefficients of the explanatory variables can be interpreted as elasticities. As stated by Wooldridge (2003, p. 187-189), if

$$\log(y) = \alpha + \beta_1 \log(x_1) + \beta_2 x_2$$

Then the percentage change in the dependent variable y from increasing x_2 one unit while holding x_1 constant is given by

$$\%\Delta y = 100 * (e^{\beta_2} - 1)$$

This means that the estimated coefficients for the sanctions dummy variables give us a handy way of estimating the trade-suppressing effect of sanctions. For instance, the coefficient for the effect of limited sanctions on EU imports for 1995 was estimated as -0.19. This means that limited sanctions caused EU imports from sanctioned countries to change by

$$100 * (e^{-0.19} - 1) = -17\%$$

Both Hufbauer et al (1997) and Askari et al (2003) used this method to estimate the costs of the sanctions in terms of lost exports and imports earnings. Hufbauer et al even used the obtained trade volumes to estimate how sanctions may have contributed to the loss of jobs and export sector wage premiums. However, given the low significance and sometimes positive values of my sanctions variables' coefficients, I abstain from such ventures as the validity of the results would be questionable.

6 Conclusions

Economic sanctions have been an increasingly popular foreign policy instrument in the twentieth century. The European Union is no exception to this. Parallel to the rise of the Union as an actor on the international scene, the EU has become a fond user of economic sanctions. I have found 57 instances of EU-initiated economic sanctions, targeting 49 different countries.

Some of the sanctions instruments used by the EU are readily analyzed with traditional trade theory. These instruments, like arms embargoes and imports controls, are likely to decrease the volume of trade between the sender and target countries. However, also less traditional instruments like travel bans can be expected to curb trade through more subtle mechanisms.

Since sanctions, from a theoretical point of view, are expected to decrease trade between target and sender, the empirical results obtained from cross-sectional analysis are problematic. The model generally performs well; it shows high explanatory power, and the traditional variables like GDP perform as expected at high levels of significance. Conversely, the sanctions variables show low levels of statistical significance. For several years, the estimations indicate that sanctions seem to have *increased* bilateral trade between the EU and target countries. For most years, the effect of sanctions was found to be greater on EU imports than on EU exports. Limited sanctions impeded trade to greater extent towards the end of the sample period, while extensive sanctions became less trade-suppressing during the late nineties.

From an econometric perspective, the regressions run on panel data perform better. The relevant coefficients are considerably more significant. Also here sanctions seem to have increased trade occasionally. Both extensive and limited sanctions present the same trend over time as in the cross-sectional analysis.

The most likely explanation for the unexpected results is that the model is sensitive for how sanctions are classified. This was also the experience of Askari et al (2003), who performed their analysis on several sets of sanctioned countries.

From comparing my results with those of Askari et al (2003) and Hufbauer et al (1997), which both studied the impact of US economic sanctions, the impression is that American sanctions have had a greater impact on trade. Hufbauer et al consistently reached the conclusion that limited sanctions reduced trade by around 27 per cent, and extensive sanctions reduced trade by roughly 90 per cent. Askari et al concluded that the effects of limited sanctions were ambiguous and sensitive for classification, but comprehensive sanctions were thoroughly trade-depressing. The difference in results between these studies and mine can be interpreted as evidence of that the US and the EU uses sanctions differently. This seems even more probable when considering the EU fondness of targeted sanctions, and the US habit of applying lasting overall trade embargoes against foreign foes like Cuba and Iran.

There are several directions for further economic research into EU-initiated economic sanctions. As stated above, it would probably be rewarding to investigate how the results change when applying different classifications of sanctions. Particularly, it would be interesting to focus specifically on the trade effects of suspending EU aid for political reasons. Since sanctions often target certain goods, a possibly worthwhile path would be to use more disaggregated trade data in a future study.

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