The Impact of International Trade on The Success of Economic Sanctions:

A Meta Regression Analysis

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List of Acronyms

ACQ	Acquiescence
AU	African Union
BP	Blackwell Publishing
CDA	Cluster Data Analysis
CNTS	2008 Cross-National Time-Series Data Archive
CFAT	Cumulative Funnel Asymmetry Test
ESS	Economic Sanctions Success
ECOWAS	Economic Community of West African States
FAT	Funnel Asymmetry Test
GETS	General to Specific
GNP	Gross National Product
GDP	Gross Domestic Product
ISS	Institute for Social Studies
IC	Intrastudy Correlation
LN	Natural Logarithm
MAER	Meta regression for Economics Research
MEM	Mixed Effect Multilevel Model
MIDS	Militarized Disputes
MRA	Meta Regression Analysis
MST	Meta Significance Test
NFP	Netherland Fellowship program
Obs	Observations
OLS	Ordinary Least Square
PET	Precision Effect Test
PEESE	Precision Effect estimation with considering standard error
PR	Policy Result
QRM	Quasi-Military Force
SLE	Sanction Length Episode
TIES	Treat and Imposition of Economic Sanctions
UN	United Nations
VIF	Variance Inflation Factor
WLS	Weighted Least Square

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Abstract

Scholars disagree about the size and significance of trade linkage for the success and failure of economic sanctions. In order to find out whether trade is important, I organized the 22 empirical studies published in 1985-2017 that deal with the effect of trade on the success of economic sanction by applying the weighted mixed-effect multilevel model and cluster data analysis of meta regression analysis. I conducted a quantitative review of the international trade estimates reported on the economic sanction success and estimated the genuine effect size and investigated how the findings which are reported in the primary studies are influenced by publication bias, the size of genuine effect and the source of heterogeneity.

The meta regression analysis shows that the sample of literature suffers from publication bias and that on average trade linkage has a positive and statistically significant impact on the success of economic sanction with the sample of literature which includes the interaction terms, but it has negatively and statistically significant impact with literature that does not have interaction terms. The genuine effect results of meta significant test, funnel asymmetry and precision effect test and precision effect test considering standard error indicate that the need to investigate the sources of heterogeneity by using multivariate MRA approach. Publication bias, data characteristics and specification characteristics strongly impact on the results of success of economic sanction on the primary studies indicating the need for researchers to consciously consider in the selection of data, time span and other control variables

Relevance to Development Studies

Sanctions are imposed as an economic and political decisions by any countries or organizations to protect security interests, to protect national or international law, to protect peace and to improve human rights. Economic sanctions enable to modify the countries policies like policies on environment prolusion which may be harmful for living conditions for the society. And economic sanctions expose countries which directly or indirectly support terrorism and let the people know what is going on in their country that lets the people aware of terrorist attacks and other insecurity issues. Furthermore, economic sanctions are imposed as a tool to protect countries from exploitative employments which violates basic human rights.

African regional organizations such as African Union (AU) and the Economic Community of West African States (ECOWAS) have been actively engaged in sanctions to promote democracy and good governance against unconstitutional changes of government (Charron and Portela 2015:1369-1375). Therefore, African organizations impose sanctions to protect regional peace and security, to foster democracy and to develop democratic principles.

Keywords

Economic Sanctions Success, International Trade, Genuine Effect, Meta Regression Analysis, Publication Bias

Chapter 1 | Theoretical Framework

1.1 Success of Economic Sanctions and International Trade

Economic sanctions have been exercised strongly as a foreign policy instrument as an economic weapon without putting any type of military force starting from the end of the "Cold War" as we observe in the UN and other international organizations and it has increasingly been applied after the end of the "Cold War" (Van Bergeijk 1995:443). Sanctions have been used from century to century by different countries and currently it has reached its peak of usage. But scholars could not provide a common and conventional definition for economic sanction yet. Sanctions are policy tools which have been used by governments to impact other nations, firms, governments and citizens in other countries. As Hufbauer et al (2007: 3) define "economic sanction is the deliberate, government-inspired withdrawal, or threat of withdrawal, of customary trade or financial relations". Thus, as Kozhanov stated that economic sanctions are "restrictions on commercial relations between citizens and firms of at least two countries" (Kozhanov 2011:144). Most of the time in a diplomatic conflict between any countries, the sender country proposes to provoke a change in the policies of the target country by exerting pressures and even damaging their economy.

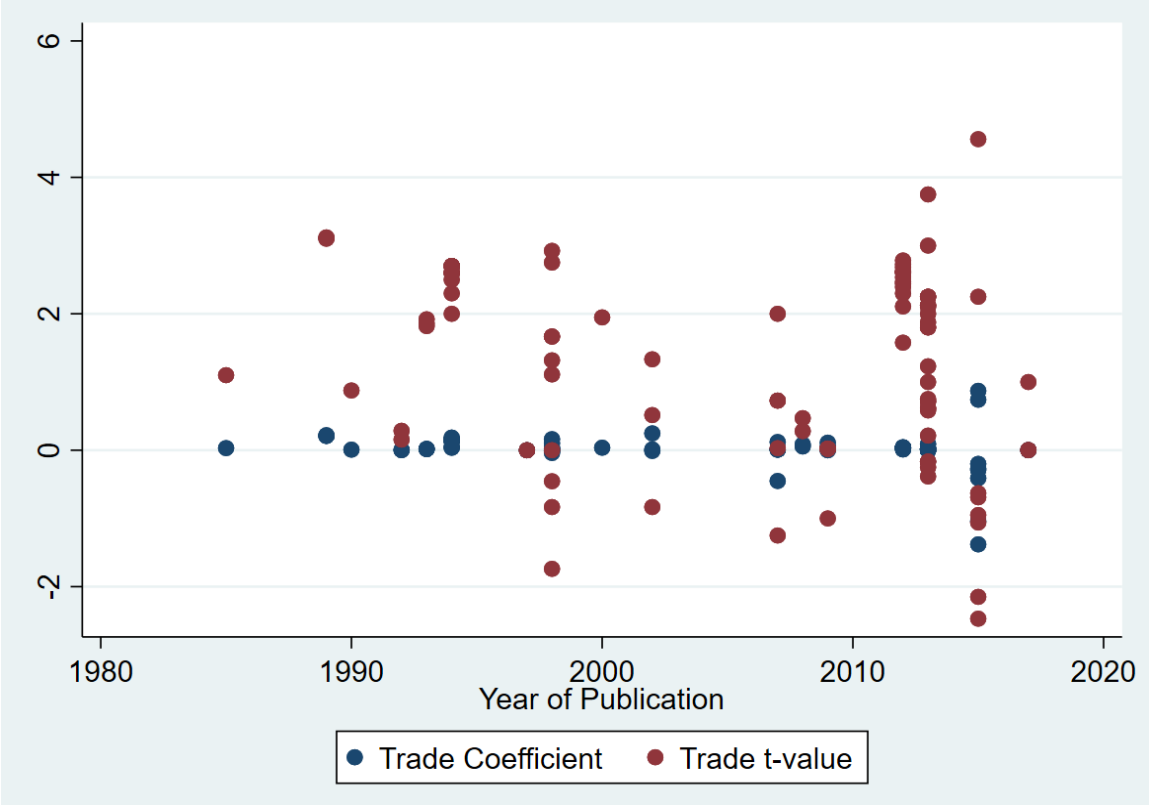
However, economic sanctions also have a cost for the sending country's economy, in which firms of both domestic and foreign countries who are already engaged in business activities with the target countries exposed to economic damages particularly in export losses. On the other hand, the country's economic integration with the global market may be a powerful estimator of how that country can be subjected to economic sanctions, as sanctions on target countries with high trade levels are costlier for economic sanction senders than those countries which have few economic integration (Von Soest and Wahman 2015:966). In the current era, global leaders have been using these economic sanctions heavily as a strong economic instrument to exert pressure on the target nations which do not accept their interests, or countries which violate international standards. These tools of economic statecraft have been carried out through a ban on economic activities such as international trade, but it can come in different forms like export and import limitations, embargoes, prohibition on importation, exportation, foreign assistance reductions and cut-offs which are the major economic sectors for the target country.

Regarding economic sanctions success, Hufbauer et al (2007:49) state that from the view of the perspective of the sender country, the "foreign policy success of an economic sanction" has two parts which are the "policy result sought by the sender" and the contribution to success by sanctions. To know whether an economic sanction will succeed or fail, must be based on opinions and judgments of several viewers where the difference in observers' opinion is obvious. For example, Hufbauer and Schott (1985:32) acknowledge that "as far as the objectives of foreign policy evolve over time and the sanctions contribution to the policy outcome is often murky, judgment plays a significant role in assigning a single number to each element for the equation of the sanction success".

Most scholars in their study of the success of economic sanctions and trade found that the trade linkage between the sender and target countries has a significant impact on the success of economic sanctions. Hence, the closer the presanction trade relationship between the sender-target, the higher the probability of economic sanctions success since if the sender has closer ties with the target, it has the power of damaging the target's economy. Therefore, according to the international "conventional wisdom", the higher the economic cost the more successful the economic sanction is. For example, in their study, (Van Bergeijk (1989:397), Kim (2013:93-95), Major (2012:90-100), Bonetti (1998:810)) analysed the impact of international trade linkage on the success and failure of economic sanctions and they found that the coefficients of prior trade linkage variables are positive and significant in all the logit and probit models they employed.

However, other scholars (Drury 1998, Nooruddin 2002, Kim 2009) in their studies found that trade linkage doesn't have a significant impact for the success of economic sanctions. Hence, we can understand that there is a disagreement among these studies findings and conclusions about the impact of trade on the success of economic sanctions. Figure1.1 presents the two-way scatter graph of international trade coefficients and their t-values (significance) by the year of publication. It illustrates the extent of empirical estimates difference of the reported effect size and level of significance for the 22 empirical studies which I collected by following the MAER-prescriptions (Stanley et al 2013:391-393). In my sample of literature all scholars interpret and used the international trade differently based on different trade theoretical mechanisms they applied into their studies. Therefore, their expected trade coefficients are also different. We can also see these differences in the following graph.

Figure 1.1: Trade coefficients and t-values (level of significance) by the studies year of publication 1985-2017: (N=100)



Note: I divided the trade coefficient values of primary studies (van Bergeijk 2009:131) and (van Bergeijk 1994:84-90) which are measured in ratio by 100 to make the coefficients comparable with other coefficients.

As we can see from Figure 1.1, most of the parameter estimates of international trade t-values (level of significance) are distributed between values of -5 and +5, their standard errors are also distributed between -2 and +2 but the distribution of the effect size is different in all studies. The higher and the lowest trade coefficients effect sizes (trdcoef = 0.87 and trd-coef = -1.3.8) and the highest and the lowest level of significance (t = 4.56 and t = -2.47) all are recorded by Lektzian and Patterson (2015:54). The median trade coefficient and t-value are 0.018 and 1.621 respectively. Therefore, we can observe that there is a clear difference between the individual empirical studies effect size and level of significance throughout the studies year of publication.

Table 1.1 reports the average values of all studies trade estimate coefficients, t-statistics and their precisions to observe their differences across time trends where the higher average values of t-statistics are recorded by Whang et al (2013) and the lower is recorded by Lektzian

and Souva (2007). Regarding coefficients, the higher mean values are recorded by Van Bergeijk (1994) because he used ration for estimating trade effects whereas the lower value is recorded by Lektzian and Souva (2007). Again, we observed that there is a disagreement between the average trade effect size, level of significance and precision among the empirical studies across different publication years.

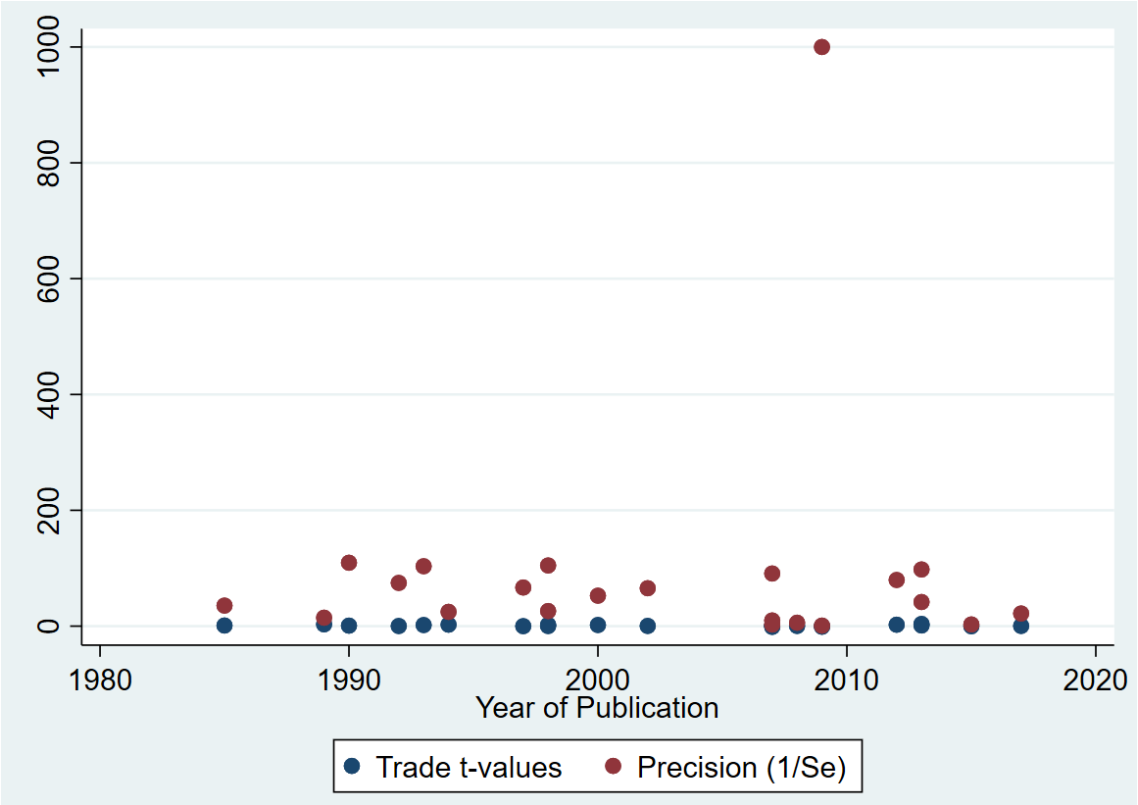
Table 1.1: The mean values of studies coefficients, t-statistics and standard errors by the year of publication

Study Author(s)	Year of Publication	Mean Values			
		Coefficients	t-values	Standard errors	Precision (1/Se)
Hufbauer and Schott	1985	0.031	1.100	0.028	35.484
Van Bergeijk	1989	0.213	3.110	0.069	14.585
San Ling LAM	1990	0.008	0.876	0.009	109.500
Dehejia and Wood	1992	0.003	0.221	0.013	74.625
Elliott and P. Uimonen	1993	0.018	1.867	0.010	103.434
Van Bergeijk	1994	0.132	2.555	0.518	24.697
Dashti-Gibson et al	1997	0.000	0.000	0.020	66.667
Shane Bonetti	1998	0.101	2.331	0.042	26.025
Cooper Drury	1998	-0.003	0.203	0.013	104.768
Robert A. Hart	2000	0.037	1.947	0.019	52.632
Irfan Nooruddin	2002	0.083	0.339	0.167	65.511
Lektzian and Souva	2007	-0.451	-1.250	0.361	2.772
Ang and Peksen	2007	0.008	0.727	0.011	90.909
Shagabutdinova & Berejikian	2007	0.065	1.015	0.197	9.833
Hannah Allen	2008	0.070	0.375	0.211	5.918
Van Bergeijk	2009	0.042	0.022	1.820	0.906
Hyung Min Kim	2009	-0.001	-1.000	0.001	1000.000
Solomon Major	2012	0.034	2.461	0.014	79.747
Hyung Min Kim	2013	0.011	1.210	0.011	97.906
Whang et al	2013	0.090	3.750	0.024	41.667
Lektzian and Patterson	2015	-0.248	-0.143	0.370	2.963
Van Bergeijk & Siddiquee	2017	0.002	0.335	0.254	21.875

Source: Authors compilation from the empirical studies collected.

In addition to Table 1.1, Figure 1.2 reports the average values of the level of significance and their precisions based on the studies year of publication.

Figure 1.2 The average level of significance (t-values) and precision (1/Se) of empirical studies trade estimates

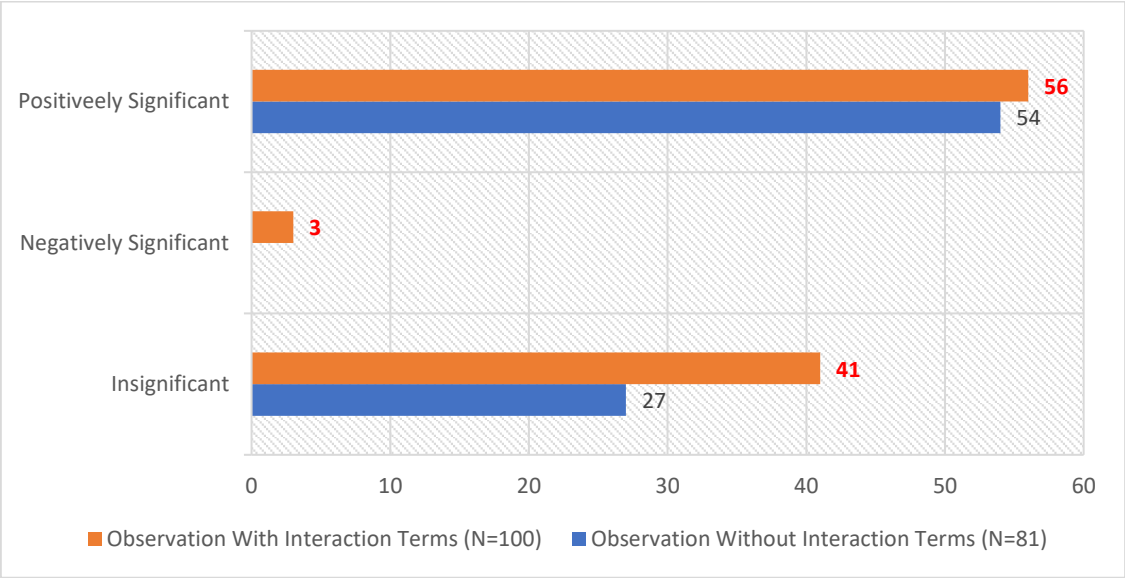


Source: Author's elaboration

We can see that there is one outlier of precision in the study conducted by Kim (2009:39-40) that has a precision value of 1000 which is different from other studies precision values because in his study he used level to calculate for the "economic difference" effect size which is a proxy for trade link variable.

Figure 1.3 presents the comparison between the size, magnitude and significance of the international trade effect of the 22 primary empirical studies for both samples with and without the interaction terms. As we can see from the graph, 56% and 67% of the parameter estimates validate positive and statistically significant findings for the large sample (N=100) and small sample (N=81) respectively. Regarding negative but statistically significant findings, only 3% of the large sample estimates of international trade effects found that negative and statistically insignificant contributions for the success of economic sanctions. Lastly, approximately 41% and 33% of the parameter estimates have insignificant effect for the success of economic sanctions in the literature with and without interaction terms available on hand respectively. Based on Figure 1.3 we can observe that most of the observations are positive and statistically significant in both samples.

Figure 1.3: The level of trade significance reported in empirical studies published between 1985-2017



Source: Author's compilation from two samples parameter estimates of trade linkage

In general, from the above trade and economic sanction success discourse we can understand that both the level and the average values of the effect size and the level of significance tell us there are variations in the empirical studies' findings published on the area. As a result, the parameter estimates of these studies are different in magnitude, direction and significance. In another case, economists tend to report that they need to have a certain amount of trade, but other researchers found that it is not significant, sometimes even being negative. Within the economic profession, economic sanctions are not an effective foreign policy instrument and many economists believe that in practice economic sanctions are ineffective. At the same time, this policy instrument is found to be rather significant in theoretical foundations.

Because of the variations in the study's findings, I am motivated to explore, examine and explain these disagreements among researchers' findings who worked on the same research topic, methodology and hypothesis. To do this I use 'meta-analysis' which is a method which can combine different study findings, to investigate studies' publication bias, to estimate the overall genuine effect across similar studies and to investigate and explain the sources of research heterogeneity.

1.2 Why Meta-Analysis?

Different methodologies can be used to find an answer for the scholar's debate (disagreement on the findings of sanction success on trade linkage) such as narrative literature review and best-evidence synthesis. The former is a traditional method that can be used to collect and summarize several primary studies on a coherent issue to make conclusions and inform theory of analysis (Slavin 1995:9). It is more flexible and can include mathematical models, quantitative and qualitative analysis, incomplete studies and has the power to identify methodological differences (van Bergeijk and Lazzaroni 2015:1067). However, the traditional narrative review has many limitations like it cannot include the calculated effect size, focused on easily available studies, it cannot provide the primary studies quantitative synthesis and it does not increase the statistical power, reviewers bias when selecting primary studies, it cannot examine the moderator effect and does not apply any systematic review method whereas meta analysis is preferred than those methods because it solves many of the above-mentioned problems and issues.

Meta-analysis is the regression analysis of primary studies analysis that tries to bring the studies together and explain about their specific parameter estimates (Stanley and Jarrell 1989:163). Meta-analysis is a type of research investigation where many empirical study's reports are collected and analysed by statistical methods. Meta analysis is the process of collecting, gathering, combining and evaluating empirical data which are important to a study's research question. Over the past years many scholars discuss about the methodology and specification of meta regression analysis that can be applied on the empirical studies and the amount of studies published on meta-analyses has become increased. Meta-analysis has a great advantage for researchers conducting meta study like me, by indicating how to select relevant empirical studies, how to code the primary studies characteristics, features and quantitative results and more importantly it helps us how to analyse and describe the primary studies' combined findings in an effective and systematic way. Nowadays, many statistical methods are applied to combine individual primary study results and many researchers used meta-analysis to estimate an overall effect across several similar studies.

Meta analysis is a new method in the field of economics, but in the fields of medicine and psychology it has been well exercised and accepted. As Higgins and Green stated that meta-analysis creates and develops knowledge, increases the precision and power of regres-

sion results, it explains heterogeneity and corrects publication bias results (quoted in Lazzaroni and van Bergeijk 2014:334). Meta analysis in the fields of economics is completely a meta regression analysis due to its different statistical method used than how it is applied in other fields of study (Stanley and Doucouliagos 2012:3). Hence, for economic and policy-analyses, meta analysis helps in "modelling of the research process", it can help in testing of economic related issues and it provides indications to future empirical investigations (Stanley and Doucouliagos 2012: 13-15). It is helpful to recognize the sources of research heterogeneity (between-study variation) across the primary studies by modelling the outcome of interest in terms of features of the international trade studies that is 'meta-regression analysis'.

It is the methodical evaluation and quantitative collection of primary economic findings based on specified situation, hypothesis, or effect that is intended to assimilate econometric estimates, typically regression coefficients (Stanley et al 2013:391). I use meta regression analysis to study the impact of trade variables on the success of economic sanctions by using different regression-based techniques. Moreover, we need meta analysis to summarize, analyse and explain the difference which continuously found among reported empirical studys' findings (Stanley et al 2013:392). In my sample of literature, the parameter estimates of international trade empirical studies effect size varies from study to study, therefore I must use meta analysis to investigate the sources for variations in the trade effect size. Meta analysis has three main functions: the above two mentioned main functions (examining the genuine trade effect and explaining the sources of research heterogeneity) and it helps to investigate the studies publication bias.

Publication bias is a problem in the interpretation of all empirical studies including economic sanction success literature which is the phenomenon where every empirical study with positive and statistically significant findings have higher probability for publication than other empirical studies which have statistically insignificant findings. Any significant or insignificant empirical studies conducting in all areas of study are exposed to publication selection bias and could possibly be deceptive. Researchers, editors and reviewers are predisposed more favourably to treat statistically significant results hence, they have higher chance to publish their papers but studies that have small and statistically insignificant effects can stay in the 'file drawer' (Stanley 2005:310). Such publication biases make the effects of primary studies look higher than what actually are, but by using meta-regression analysis we can identify and accommodate these biases by employing different statistical methods.

To identify publication bias and mitigate its negative consequences, nowadays, economists have begun applying meta regression analysis in their meta studies, but they don't understand well how to investigate the publication bias among the collected literature and even there is misunderstanding about identifying the relationships between publication bias and the absence of true effect of the given interest of variables (Stanley 2005:311). Therefore, to explore whether there is a publication bias in my sample of literature, I should employ the statistical test which can help in modelling publication selection that includes the simple meta regression analysis between the international trade reported effect and its standard error.

1.3 Study Contribution

Meta regression analysis allows me to syndicate the findings from different area of studies or disciplines where international trade is gaining ground. This is important because the topic of economic sanction success or failure is studied from a multidisciplinary point of view. The contributions of this paper are it is the first meta regression analysis on economic sanctions success and trade linkage and I present the relevance of conducting robustness checking (sensitivity analysis) in meta regression analysis for interdisciplinary areas like international trade.

1.4 Research Questions

The key research questions of this paper are: -

- Does the impact of international trade on economic sanction success literature suffer from publication bias? if yes to what extent?
- Does the average genuine meta estimation effect of international trade have significant effect on the success of economic sanctions?
- What are the potential sources of between study variation (across sources of heterogeneity) among the existing empirical literature?

To address these questions, I will look at recent developments in meta-regression analysis and these research questions will be investigated, examined and analysed in this paper.

1.5 Research Objectives

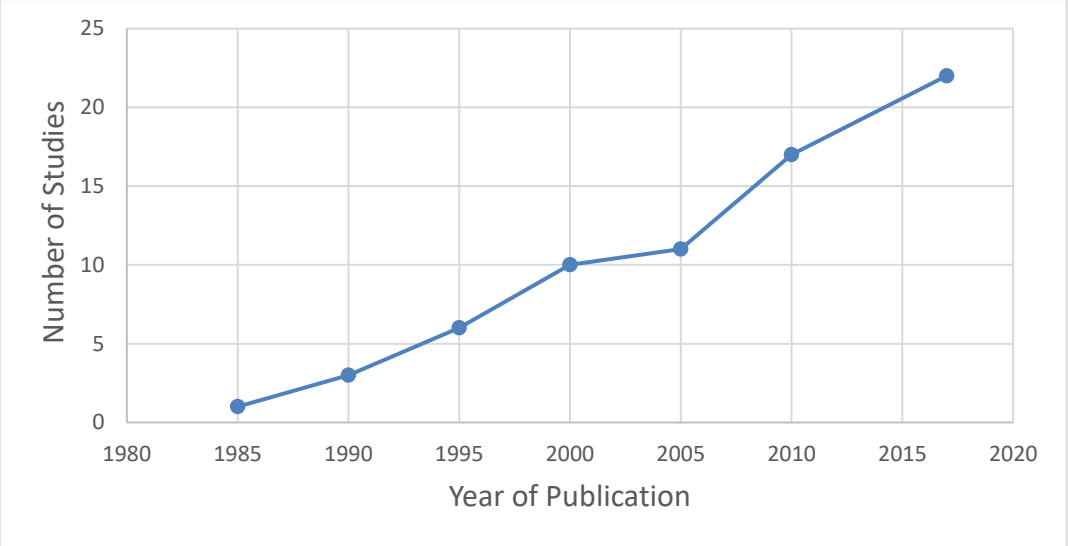
The general objective of this study is to investigate whether the economic sanctions success literature is contaminated by publication bias, examining the potential of publication bias, examining the average genuine trade estimates and investigating the potential sources of research heterogeneity. To do this I conduct meta significant test (MST), the weighted least square of funnel asymmetry test and precision effect test (FAT-PET), precision-effect estimate with standard error (PEESE) and multivariate meta regression analysis on the existing empirical studies available on hand.

1.6 Risks and Limitations

As we know that meta-analysis is a detailed process of identifying, selection, analysing and interpretation of multiple empirical studies, it needs more time (time limitation) and it asks to employ new techniques or skills of new program like comprehensive meta-analysis. In addition, there is data limitations in HSEO (2007) empirical study in which the regression table does not have either t-values or standard errors and in HSE (1990) study there is also no regression tables at all that indicate coefficients, t-values and standard errors. In another case, I found studies conducted by McLean and Whang (2007) and Whang et al (2010) which have both success and failure outcome regression tables which is difficult to take data from the regression tables because of the success has a binary value of 0 or 1 and in Bapat et al (2013:88-92) study, the t-values and trade coefficients are reported in graphs which makes difficult to take the exact t-values and trade coefficients.

There is a limitation of systematic empirical research which have been done on the impact of international trade on economic sanctions success. Regarding the limitation of empirical studies, the number of empirical studies which are conducted on international trade and the success of economic sanctions in every five-years period are very slow. On average the published studies are increased by 3 in every five-years of publication period which is very few in amount. We can observe this process in the following figure.

Figure 1.4: The cumulative empirical studies published between 1985-2017 in each five years



Source: Author's elaboration

As we can see from Figure 1.4 between 1985 and 1995, 6 papers (3 papers each five years) are published respectively, and between 1995 and 2005 only 5 papers are published of which 1 is published between 2000-2005 which is very slow. However, between 2005-2010 and 2010-2017, 6 and 5 papers are published respectively. In general, the graph indicates that there is study limitation on international trade and success of economic sanction. However, it is helpful conducting the meta regression analysis based on the existing empirical studies available on hand to provide indications for future studies. Due to time limitation, I did not convert the primary studies original trade coefficient values which are measured in ratio in to levels in the main regression.

The paper is structured as follows. Section 2 presents the literature review, Section 3 presents the data construction, hypothesis and the meta dataset that discusses the process of selecting and rejecting empirical studies to be included in the meta regression analysis and the properties of the data, Section 4 presents the MRA methodology and specification used to detect and correct for publication bias. Finally, Section 5 presents results and discussions and Section 6 presents the conclusion of the paper.

Chapter 2 | Literature Review

I follow the meta analysis of economics research (MAER) systematic review protocol of reviewing the meta empirical literature that provides answers for research questions by gathering and summarizing empirical evidence based on the protocol (Stanley et al 2013: 392-393). There are few numbers of literature that consider the two-way interactions between international trade and economic sanction success. There are twenty-two empirical studies that dealt with the impact of international trade on the success of economic sanctions. From all the empirical studies I have collected, most of them suggest that trade relationship between the sender and the target countries increases the success rate of economic sanctions.

I manage and organize all the relevant literature based on decades where the studies have been published, the number of sanction cases the studies used to explain trade and sanction success, the source of the data the studies employed, and the econometric method employed to explore the changes in the effect of international trade on economic sanctions success results over time. Table 2.1 presents detail report about the list of empirical studies, the period of study and the average, median, the number of positive and negative t-values.

Table 2.1: Summary Statistics for Reported t-values and List of primary Studies Used in the Meta Regression analysis

Author(s)	Proxy for International Trade	Period of Study	Sample size	No. of t-values	Average t-statistics	Median t-statistics	Min t-statistics	Max t-statistics	Pos/Neg	Sign/Insign
HSE (1985)	The average of pre-sanction target country export to sender and imports from sender	1946-1984	108	1	1.100	1.100	1.100	1.100	1/0	1/0
Van Bergeijk (1989)	The sender's trade flows to the target as a percentage of the target's GNP	1946-1983	80	3	3.110	3.100	3.100	3.120	3/0	3/0
Lam (1990)	The average of presanction target country export to sender and imports from sender	1946-1984	98	1	0.876	0.876	0.876	0.876	1/0	0/1
Dehejia and Wood (1992)	Pre-sanctions trade linkage between sender-target as a percentage of target's total trade	1914-1990	115	2	0.221	0.221	0.156	0.285	2/0	0/2
Elliott and Uimonen (1993)	The average of presanction target country export to sender and imports from sender	1914-1991	90	3	1.867	1.860	1.820	1.920	3/0	3/0
Van Bergeijk (1994)	The sender's trade flows to the target, as Percentage of the target's GNP in the year prior to the sanction	1946-1989	92	11	2.555	2.600	2.000	2.700	11/0	11/0
Dashti-Gibson et al (1997)	The average of presanction target country export to sender and imports from sender	1914-1989	55	2	0.000	0.000	0.000	0.000	2/0	0/2
Bonetti (1998)	Pre-sanction trade linkage between the target and the sender, as a percentage of the target's total trade	1944-1989	100	3	2.331	2.751	1.318	2.923	3/0	2/1
Dury (1998)	Percent of Pre-sanctions imports plus exports	1914-1990	108	7	0.202	0.000	-1.739	1.667	4/3	1/6
Hart (2000)	The average of the percentage of imports and exports the sender country represents	1914-1989	81	1	1.947	1.947	1.947	1.947	1/0	1/0
Nooruddin (2002)	Trade between the US and the target	1945-1990	71	3	0.339	0.516	-0.833	1.333	2/1	0/3
Lektzian and Souva (2007)	Dyadic trade divided by GDP	1948-1990	654	1	-1.250	-1.250	-1.250	-1.250	0/1	0/1
Ang and Peksen (2007)	Flow of two-way trade between sender and target a percentage of target's total trade	1914-1990	99	2	0.727	0.727	0.727	0.727	2/0	0/2
Shagabutdinova and Berejikian (2007)	Trade linkage between the target and the sender as percentage of pre-sanction target country's total trade	1914-1990	92	2	1.015	1.015	0.030	2.000	2/0	2/0

Note: Pos/Neg and Sign/insign in the last columns represent the number of positive and negative values of t-statistics and the number of significant and insignificant values of the estimation effect of trade at least at 10% confidence level respectively.

Table 2.1 Continued

Author(s)	Proxy for International Trade	Period of Study	Sample size	No. of t-values	Average t-statistics	Median t-statistics	Min t-statistics	Max t-statistics	Pos/Neg	Sign/Insign
Hannah Allen (2008)	The trade relationships between the sender and the target countries	1915-1990	109	2	0.375	0.375	0.280	0.470	2/0	2/0
Van Bergeijk (2009)	The Potential Cost Variables of Absolute and proportional Trade Linkage	1946-2000	181	5	0.022	0.022	0.018	0.024	5/0	5/0
Kim (2009)	Target's total bilateral trade as a percentage of the target's total trade	1914-1990	100	1	-1.000	-1.000	-1.000	-1.000	0/1	0/1
Major (2012)	Average of the pre-sanction exports and imports between the target- sender as a percentage of the target country's total trade	1914-1990	87	14	2.461	2.567	1.577	2.781	14/0	14/0
Kim (2013)	level of trade relationships between sender and target before sanction imposition	1950-1990	116	24	1.210	1.115	-0.385	3.000	20/4	11/13
Kuberski et al (2013)	(Export + imports) target's GDP per capita	1971-2000	88	1	3.750	3.750	3.750	3.750	1/0	1/0
Lektzian and Patterson (2015)	Trade open (Target trade open represents (exports + imports)/GDP	1971-2000	2021	8	-0.073	-0.820	-2.470	4.560	2/6	4/4
Van Bergeijk and Siddiquee (2017)	Percentage of total trade or percentage of export plus Import	1914-1990	110	3	0.002	0.002	0.000	0.003	3/0	0/3

Source: Author's elaboration

Note: The weighted average and weighted median t-statistics of the empirical studies estimates are 0.99027 and 0.8016 respectively for all observations included.

2.1 1980s Studies: Methodology, Sanction Cases and Level of Significance

In my sample there are only two studies published on the success and failure of economic sanctions in the 1980s which are Hufbauer and Schott (1985) and Van Bergeijk (1989). They used international trade as one of the determinants of economic sanction success. Both studies define the estimates of international trade in different ways. In the first primary study, the parameter estimate of international trade is interpreted as "the average of presanction target country exports to the sender country (as a percentage of total target country exports) and imports from the sender country (as a percentage of total target country imports". In the second primary study it is interpreted as the sender's trade flows (export and import) to the target as a percentage of the target's GNP in the year prior to the sanction. Moons and Bergeijk (2016) stated that due to low computational power and limited data, until the mid-1990s, the methodology that studies employed was somewhat simple when we compare from. Both studies used ordinary least square (OLS) and logit models (logit model which is the most advanced methodology in those days) to analyse the cross-sectional data respectively.

Both studies covered different number of sanction cases, HSE (1985) used 108 and Van Bergeijk (1989) used 103 sanction cases to explain the effect of international trade on the success and/or failure of economic sanction. Both studies used HSE (1985) data set because it is the first and most comprehensive data set ever compiled. However, the study of Van Bergeijk (1989:391) did not used all observations and variables collected in the HSE (1985) datasets because of the less data suitability, the limited data availability for the first World War and the second World War and the interwar observations and the less analytical power of more independent variables used. The studies used different success score values to define the success and failure of economic sanction. The first study used index of success score scaled from 1 to 16 whereas the second used the binary variable "yi = 1 if the ith sanction is a success and yi = 0 if the ith sanction is failure". The studys' finding indicate that the trade coefficients are positive and statistically significant on the 99% confidence interval which assert that international trade positively and statistically significantly affects the outcome of the success of economic sanctions.

2.2 1990s Studies: Methodology, Sanction Cases and Level of Significance

In the 1990's there are seven empirical studies that have 29 observations which have been published on the potential effect of trade on the effectiveness of economic sanction success. These studies used only probit and logit model and they were depending on the data source of HSE (1985) and HSE (1990). 84% of the studys' observation used logit estimation method and the rest 16% used probit estimation model to analyse the effect of trade on economic sanction success. The studies covered 92 to 115 sanction cases with 29 to 115 observations. All the seven studies used international trade as one of the determinants of economic sanctions success among the different explanatory variables. Policy result and sanction success or failure are the expected outcome variables they employed.

The studies interpret the parameter estimates of trade in different ways, the common parameter estimates of international trade is interpreted as "The sender's trade flows to the target, as a percentage of the target's GNP in the year prior to the sanction" and "Percent of Pre-sanctions imports plus exports". Most estimates of trade linkage have been presented in "published academic journals" but there are other estimates of international trade that come from other publishing institution like Edward Elgar (e.g. Van Bergeijk 1994). I have cited many of these type of studies in the literature and included in the meta-analysis.

These seven studies employed policy result and sanction success as the outcome variables and used 1-4 outcomes for policy result variable and 1-16 success score values to define the success of economic sanction. 60% of the studys' observations report positive and statistically significant trade coefficients (Elliott and Uimonen 1993, Van Bergeijk 1994, Bonetti 1998). The studys' result indicate that the trade coefficients are positive and statistically significant both on the 99% and 95% confidence interval which assert that the trade variable has a positive and statistically significant impact for the success of economic sanctions where as 36% of the observation showed a positive but statistically insignificant result and only 4% of the observation have negative and insignificant results.

2.3 2000s Studies: Methodology, Sanction Cases and Level of Significance

The studies of the 2000s used both probit and logit regression methods to analyse their data set which have observation between 71-654 and include 81 minimum and 174 maximum

sanction cases. All the studies are sourced in academic journals, Blackwell Publishing (BP), Peterson Institute for International Economics and Institute for Social Studies (ISS). Most of the studies in this decade utilized the common probit and logit regression methods to explain the effect of international trade on the success or failure of economic sanction. In my sample literature there are eight empirical studies which have been published in 2000s. All the eight studies used international trade as one of the determinants of economic sanctions success among the different explanatory variables used in their paper. The studies interpret the parameter estimates of trade in different ways, the common parameter estimates of international trade is interpreted as "average of presanction target-country exports to sender country (as percent of total target-country exports) and imports from the sender country (as percent of total target-country imports) and the potential cost variables of absolute and proportional trade linkage".

Most estimates of trade linkage have been reported in "published academic journals" but there are other estimates of international trade that come from other publishing institution like Edward Elgar (Van Bergeijk 2009) and Blackwell Publishing (Hannah Allen 2008). I have cited many of these kinds of studies in the literature and included them in the meta regression analysis. They employed policy result and success and/or failure as their main outcome variables which used a four-point scale (1-4), binary outcomes for policy result variables and a 1-16 indexed success score values for success variables to define the success and failure of economic sanctions. Most of the trade coefficients reported statistically significant results for the success of economic sanction. Of the studies which have statistically significant results, 65% reported positive and significant trade coefficients (Hart 2000, HSEO 2007, Shagabutdinova and Berejikian 2007, Allen 2008, and Van Bergeijk 2009) and the other 35% of the trade coefficients have statistically insignificant outcomes for the success of economic sanctions (HSEO 2007, Ang and Peksen 2007 and Nooruddin 2002).

The highly statistically significant trade linkage coefficients at the 1% and 5% confidence level are robust in many instances of variability of specifications which indicate the importance of the trade relationship between the sender and target countries that show the conventional wisdom of the larger the trade linkage before sanction imposition, the higher the probability of the success of economic sanctions.

2.4 2010s Studies: Methodology, Sanction Cases and Level of Significance

In this decade there are only five studies published on the effectiveness of international trade on the economic sanction success and all the three estimation methods of OLS, logit and probit regression methods are applied in their studies to explain the effect of international trade on the success or failure of economic sanction. Like other studies in my sample, they used international trade as one of the determinants of economic sanction success. These studies define the estimates of international trade instruments from different angles in different ways. Among the interpretations of the parameter estimate of international trade is, as "the target's total bilateral trade (exports to and imports from the sender) as a percentage of the target's total world trade" and "trade open (target trade open) represents (exports + imports)/GDP" but Lektzian and Patterson (2015) in their primary study they interpreted the estimates of trade as "the total value of imports and exports by each sender-target dyad (in million Dollars) and divided by the target's per capita GDP". All the five empirical studies have been published in the academic journal and their sources of identity are International Interactions, Australia Journal of Political Science and International Studies Quarterly.

These studies used economic sanction success and acquaintances as the outcome variables and used a binary variable of 1 for success and 0 for failure and a 1-16 success score values, 1 for sanction success (success score 9, 12, 16) and 0 for failure (1, 2, 3, 4, 6, 8) to measure the success of economic sanction. By using the HSE (1990), HSEO (2008) Ties (2006, 2009) and mixed data sources with different number of sanctions cases ranging from 105 to 888, (Major (2012), Kim (2013), Whang et al (2013), Lektzian and Patterson (2015) and Van Bergeijk and Siddiquee (2017)) test the factors that affect the success of economic sanctions. The studies have 50 observations and most of them reported statistically significant results for the trade effects on the success of economic sanctions. Of these observations, 56% reported that the estimates of international trade have a positive and statistically significant impact on the success of economic sanctions. These findings show that the trade coefficients are positive and statistically significant at least on the 90% confidence interval that indicate the trade variable has a statistically significant effect for the success of economic sanctions where as 24% of the studys' observation indicate positive but statistically insignificant results, only 16% and 4% of the observations have positive and significant and negative and insignificant results respectively. Table 2.2 presents the trade and success of economic sanctions measure.

Table 2.2: Summary table of the trade and economic sanctions success measures

Author (s)	Year of Publication	N	Sanction Cases	Measure of Sanction Success	Measure of Trade Linkage
Hufbauer and Schott	1985	108	108	Index of Success scaled from 1 to 16	The average of presanction target country exports to the sender country (as a percentage of total target country exports) and imports from the sender country (as a percentage of total target country imports)
Van Bergeijk	1989	80	103	The binary variable yi = 1 if the i-th sanction is a success, yi = 0 if not.	Trade linkage is defined as the sender's trade flows to the target as a percentage of the target's GNP in the year prior to the sanction
Lam	1990	98	98	The measure takes the value of 1 (Success) when there is clearly positive outcome (policy result values of 3 and 4) and 0 (Failure) otherwise (when the policy result value of 1 and 2).	The average of presanction target country exports to the sender country (as a percentage of total target country exports) and imports from the sender country (as a percentage of total target country imports)
Dehejia and Wood	1992	115	115	PR=1 when Result = 3 or 4, for successful policy outcomes (Success), PR = 0 when Result = 1 or 2, for unsuccessful policy outcomes (Failure)	Measures the pre-sanctions trade linkage between sender and target as a percentage of the target's total trade;
Elliott and P. Uimonen	1993	92	115	PRESULT was adopted as 1 indicates a successful case - a case that takes the value 3 or 4 on the HSE policy outcome index (modest or significant policy success); 0 corresponds to a failed case (HSE index value 1 or 2).	The average of presanction target country exports to the sender (as a percentage of total target country exports) and imports from the sender country (as a percentage of total target country imports)
Van Bergeijk	1994	103	103	The Dependent variable yi = 1, if the i-th sanction is a success (success score 9, 12, 16) and yi = 0, if the i-th sanction is a failure (success score 1, 2, 3, 4, 6, 8). Estimation is for the determinant of success and failure.	It is the bilateral trade flow between sender and target to the target's total trade flow
Dashti-Gibson et al	1997	29	115	The measure takes the value of 1 (Success) if the policy variable result is 3 or 4, and 0 (Failure) otherwise (policy result 1 or 2).	import/export between target and sender, expressed as the mean "pre-sanction target-country exports to the sender (as a percentage of total target-country's exports) and imports from the sender (as a percentage of total target-country's import
Bonetti	1998	60	104	Success Score is assigned as a 16 scaled index of the product of Policy Result and Contribution. P.R from 1 (failure) to 4 (success). unclear but possibly positive outcome=2 and a positive outcome=3. Contribution is ranked from 1 (none) to 4 (significant). Minor contribution=2 and Modest contribution=3.	The pre-sanction trade linkage between the target and the sender, as a percentage of the target's total trade.
Drury	1998	108	108	Index of policy result scaled from 1-4	Percent of pre-sanctions imports plus exports
Hart	2000	81	81	Index of Success scaled from 1 to 16 (Policy Result*Contribution). Success>=9	Trade is the average of the percentage of imports and exports the sender country represents for the target state.
Nooruddin	2002	71	115	Index of Success scaled from 1 to 16 (Policy Result*Contribution). Success>=9	Dyadic trade levels between the United States and target: the higher the presanction trade level the greater the leverage for the sender.

Table 2.2 Continued

Author (s)	Year of Publication	N	Sanction Cases	Measure of Sanction Success	Measure of Trade Linkage
DLMS	2007	654	115	success occurs when the target changes policies	Smaller trade dependence divided by larger trade dependence. Trade dependence equals dyadic trade divided by GDP.
Ang and Peksen	2007	99	115	The measure value of 1 (Success) when there is clearly positive outcome (policy result values of 3 and 4) and 0 (Failure) otherwise (when the policy result value of 1 and 2).	The flow of two-way trade between sender and target and expressed as a percentage of the target's total trade.
Shagabutdinova and Berejikian	2007	92	92	Concession size is a 5-point scale modified the PR where 0 = no concession (Failure); 1 = minor concession to a minor demand; 2 = minor concession to a major demand or major concession to a minor demand; 3 = full concession to a minor demand or major concession to a major demand; and, 4=full concession (Success) to a major demand and PR is HSEO policy Result.	Trade linkage between the target and the sender as percentage of pre-sanction target country's total trade
Allen	2008	109	109	Policy Result of 4 as success or successful outcome and all other outcomes are Failure	The trade relationships between the sender and the target countries
Van Bergeijk	2009	181	172	yi = 1, if the i-th sanction is a success and yi=0 if not.	Potential Cost Variables of Absolute and proportional Trade Linkage
Kim	2009	100	116	Policy Result scaled 1-4. "policy result" variable of HSE by taking the value of 1 (success) when there is a successful outcome (the values of 3 and 4 from HSE) and of 0 (failure) otherwise.	This variable is measured as the target's total bilateral trade (exports to and imports from the sender) as a percentage of the target's total world trade
Major	2012	87	203	16-point scale that is the product of a four-point policy success score and a four-point score of sanctions contribution to that success. Here, this 16-point scale is collapsed to 11 points as certain numbers (such as seven) are not possible as a product of two four-point scales Models for sanctions and international crisis.	Tradelink is the average of the pre-sanction exports and imports between the target and sender as a percentage of the target country's total trade.
Kim	2013	116	116	success (observed) if sanction onset= 1, failure (unobserved) if sanction onset= 0. Models for Sender/Target Power Balance	The level of trade relationships between sender and target before sanction imposition.
Whang et al	2013	88	88	ACQ (Success) = 1 when the Final Outcome variable takes the value of 1,2, or 5, ACQ=0 if the outcome is failure.	The total value of imports and exports by each sender-target dyad (in million Dollars) and divided by the target's per capita GDP
Lektzian and Patterson	2015	3658	888	Success = 1 when the Final Outcome variable takes the value of 1,2, or 5 otherwise 0 if the outcome is zero.	Trade open (Target trade open) represents (exports + imports)/GDP
Bergeijk and Siddiquee	2017	78	105	yi = 1, if the i-th sanction is a success (success score 9, 12, 16) yi = 0, if the i-th sanction is a failure (success score 1, 2, 3, 4, 6, 8)	Percentage of total trade or the percentage of export plus Import

Source: Author's elaboration from the empirical studies

2.5 The Empirical Studies Data Source

Almost all empirical studies used data from the post-1990 period except Van Bergeijk and Siddiquee (2017), Lektzian and Patterson (2015) and Van Bergeijk (2009). From the 22 empirical studies I collected only three studies HSE (1985), van Bergeijk (1989) and Lam (1990) that used the compressive HSE (1985) dataset to analyse the relations between international trade and the success of economic sanctions. These studies used the same dataset which is HSE (1985) to collect data for trade, economic sanctions success and other moderator variables used for regression analysis. Even if these studies used the same dataset, their findings are different. For example, Lam (1990) found that trade coefficient has positive but statistically insignificant impact for the success of economic sanctions but the other two studies HSE (1985) van Bergeijk (1989) found that trade linkage is positive and statistically significantly affects the success of economic sanction.

From all the 22 empirical studies collected, 50% of the studies (Elliott and P. Uimonen 1993, van Bergeijk 1994, Dashti-Gibson et al 1997, Drury 1998, Hart 2000, Nooruddin 2002, Ang and Peksen 2007, Shagabutdinova and Berejikian 2007, Allen 2008, Kim 2009 and Kim 2013) used the HSE(1990) dataset source for the outcome variable which is economic sanction success, for explanatory variable which is trade and for other control variables, to explain and analyse the link between trade and success of economic sanctions. Although, these studies used the same dataset for the outcome and explanatory variables their study findings are different. Among the 11 studies 55% (6 studies) have found that trade has a positive and statistically significant impact on the success of economic sanctions and the rest 45% of them (5 studies) found that trade has both statistically insignificant and negative and statistically significant impact on the economic sanctions success.

On the other hand, Bonetti (1998) used only one data source which is HSE (1985, 1990) to explain the relations between trade and success of economic sanctions and found that one positive and insignificant and two positive and statistically significant findings. Lektzian and Patterson (2015) also used only one dataset of Ties (2006, 2009) to analyse the impact of trade on economic sanction success and found a positive but statistically insignificant results. However, Van Bergeijk (2009) in his study employed only one data source which is HSEO (2008) that can be used to analyse the link between sanction success and trade. And he found positive and statistically significant findings for all the 5 observations.

Finally, there are five studies which used mixed data source for their data analysis which are (Lektzian and Souva (2007), Dehejia and Wood (1992), Major (2012), Whang et al (2013) and Van Bergeijk and Siddiquee (2017)). Whang et al (2013) employed Ties (2006, 2009) data source to collect the outcome variable and used war project trade data set,1870-2006 to collect trade data. Even if the data sources for the explanatory and outcome variables are different the trade result is positive and statistically significant. Major (2012) used HSEO (2008), CNTS 2008 and BANKS 2010 data sources and found that all the 14 observations of trade estimates are positive and statistically significant. On the other hand, in their study Lektzian and Souva (2007) took the economic sanction success data from HSE (1990) dataset and international trade from Gleditsch (2002) dataset and their results indicate that trade has a negative and statistically insignificant impact for the success of economic sanctions.

In the end, Dehejia and Wood (1992) in their study used the HSE (1985) and Lam (1990) data sources to take data for both the dependent and explanatory variables. Hence, they found that trade does not have a statistically significant effect for the economic sanction success.

2.6 The Econometric Methods of the Studies Employed

All the empirical studies collected employed different econometric methods and the findings are also different. From all the 22 empirical studies 12 of them (55% of the total studies on hand) have 47 observations and they employed logit econometric method to analyse the effect of international trade on the success of economic sanctions (Van Bergeijk 1989, Dehejia and Wood 1992, Van Bergeijk 1994, Dashti-Gibson et al 1997, Bonetti 1998, Drury 1998, Ang and Peksen 2007, Shagabutdinova and Berejikianvan 2007, Kim 2009, Bergeijk 2009, Whang 2013, and Lektzian and Patterson 2015). The findings of these empirical studies indicate that 26 trade estimates (55%) and 3 trade estimates (7%) have positive and negative impact and statistically significantly increases and decreases the success of economic sanctions respectively. However, the rest of the 18 observations (38%) are statistically insignificant effect on the outcome of the sanction success.

Regarding probit estimation method, 8 empirical studies which have a total of 48 trade estimates used probit methods to explain and analyse their data to observe the effect of trade on the success of economic sanction (Lam 1990, Elliott and P. Uimonen 1993, Hart 2000, Nooruddin 2002, Allen 2008, Morgan 2012, Kim 2013 and van Bergeijk and Siddiquee 2017).

From the total observations 28 of trade estimates (58%) have a positive and statistically significant impact on the success of economic sanctions whereas 20 trade estimates (42%) do not have a statistically significant impact on the sanction success outcome. Only Hufbauer and Schott (1985) and Lektzian and Souva (2007) used ordinary least square (OLS) method to analyse the impact of international trade on the success of economic sanction. Even if the number of trade estimates in these three empirical studies are very few (5 trade estimates), 4 of them have a positive and statistically significant effect on the outcome of the economic sanction success. Table 2.3 presents the empirical studies, data source and the econometric methods that the empirical studies employed to observe the effect of predictor variables on the success of economic sanction.

Table 2.3: Empirical studies, the data source they used, and the econometric methods employed

	Types of Data Source						Econometric Estimation Methods		
Empirical Studies	HSE (1985)	HSE (1985, 1990)	HSE (1990)	HSEO (2008)	TIES (2006, 2009)	Mixed (more than two sources)	OLS	Logit	Probit
	Hufbauer and Schott (1985)	Bonetti (1998)	Elliott and P. Uimonen (1993)	Van Bergeijk (2009)	Lektzian and Patterson (2015)	Lektzian and Souva (2007)	Hufbauer and Schott (1985)	Van Bergeijk (1989)	Lam (1990)
	Van Bergeijk (1989)	-	Van Bergeijk (1994)	-	-	Dehejia and Wood (1992)	Major (2012)	Dehejia and Wood (1992)	Elliott and P. Uimonen (1993)
	San Ling Lam (1990)	-	Dashti-Gibson et al (1997)	-	-	Major (2012)	Whang et al (2013)	Van Bergeijk (1994)	Hart (2000)
	-	-	Drury (1998)	-	-	Whang et al (2013)		Dashti-Gibson et al (1997)	Nooruddin (2002)
	-	-	Hart (2000)	-	-	Van Bergeijk Siddiquee (2017)		Bonetti (1998)	Lektzian and Souva (2007)
	-	-	Nooruddin (2002)	-	-	-		Drury (1998)	Allen (2008)
	-	-	Ang and Peksen (2007)	-	-	-		Ang and Peksen (2007)	Major (2012)
	-	-	Shagabutdinova and Berejikian (2007)	-	-	-		Shagabutdinova & Berejikian (2007)	Kim (2013)
	-	-	Allen (2008)	-	-	-		Van Bergeijk (2009)	Van Bergeijk and Siddiquee (2017)
	-	-	Kim (2009)	-	-	-		Kim (2009)	
	-	-	Kim (2013)	-	-	-		Lektzian and Patterson (2015)	

Source: Author's elaboration

Chapter 3 │The Data and Hypothesis

3.1 Data Construction and Protocol

The first step in our meta analysis is the preparation of data construction and protocol guideline and we develop the meta data protocol which indicates the inclusion and exclusion criteria of the primary studies. To expand clarity, transparency and increase the value of meta regression analysis, the meta-analysis of economics research-network ("MAER-Net") created report guidelines that shows what to search, how to collect and how to code empirical data and we will follow these protocol tools prescribed in the Journal of Economics Surveys (Stanley et al 2013:391). Since it is a meta study, economic activities like trade linkages, the effectiveness of economic sanctions success, embargoes, import and export restrictions, bilateral and multilateral trade flows and other related economic concepts from multiple empirical studies are assessed, gathered and arranged by using meta regression systematic review protocol. To collect the empirical studies, we do not use any restrictions on the primary studies year of publication in our independent search query. Regarding the empirical studies control variables which may have an impact on the success of economic sanctions, we decided to code[1] variables that appeared in two and more than two empirical studies. Every individual coder (Alex, Gabriela and Kimararungu) has searched, read and coded the search items independently and the final dataset was reviewed by one of the members of the team as a second coder to check the consistency of the data, wrong values and missing information (the group data collection process report is available in Appendix 7).

While empirical studies only written in the English language were selected, we do not expect this selection to be a source of selection bias in my meta regression analysis. To use recent methods of meta regression analysis and accurate for publication bias, it is necessary to have the standard errors, or the t-statistics of each parameter estimates of international trade. To econometrically analyse whether the source of heterogeneity and the overall meta genuine estimation effect of trade on economic sanctions success, we must review the existing primary empirical studies and multiple meta-analysis by using general searching engine like Google Scholar, Scopus, Bibliographies from other studies and "gray" literature sources. we also used a technique of carefully checking through the references of the relevant studies

[1] Variables that appeared only in one or two studies may not have a significant impact on the regression results. Excluding this kind of issue is one of this meta-analysis study protocol.

published in most recent years. Therefore, in our search of the primary studies, we used some broad keywords and we have listed them with the following terminologies: economic sanctions, economic coercion, sanction threat, success, failure, work, sanction outcomes, episodes, determinant, cost and result. This searching query provides me several published articles, working papers, Books and conference papers that investigated the impact of international trade on the success of economic sanctions.

3.2 The Meta Data

The collection of relevant empirical studies is the second step in this meta regression analysis. To collect the relevant empirical studies, we used the meta regression analysis model (3.1) where all the empirical studies used to explain and analyse the impact of international trade on the success economic sanctions literature and can be simply expressed as follows:

$$\text{Economic Sanctions Success } (ESS_i) = \beta_0 + \beta_1 Trd_i + \alpha_1 Z_i + \varepsilon_i \text{ ---------- } \textit{(3.1)}$$

Where β_0 represents the average value of economic sanction success in study i when all the explanatory variables are zero, β_1 represents the coefficient for trade estimates in study i, α_1 denotes the coefficient for other exogeneous variables that may have an impact on the success outcome and ε_i represents the usual disturbance term in study i.

My initial search provided me with several primary studies that used OLS, logit and probit models to estimate the relationship between international trade and the success of economic sanctions. In specification 3.1, the outcome variable economic sanction success is a binary variable having a 1-4 and 1-16 success score measures in which the meta regression analysis is focused in estimating the change in the economic sanction success. Even if there is methodological differences across the empirical studies, to consider and treat these differences, we have included other studys' characteristics that may have an impact on the economic sanctions success outcome, such as, year of publication, peer reviewed journals, journal rank, the number of sanction cases and observations used for regressions, trade linkage before or after sanction imposition, the econometric method, the source of the data, the number of citations in google scholar, and the time span (the period of study under investigation) and other moderator variables.

Initially we have gathered 88 empirical studies which are published titled on "impact of trade on economic sanctions and impact of trade on economic sanctions success", but we did not consider all the empirical studies included in our sample. We only considered studies which are directly related to our search for the impact of international trade on the success of economic sanctions. Our dataset comprises of evidences on the impact of international trade on economic sanctions success from various countries reported in all independent empirical studies; the list of the studies used in the meta regression analysis and excluded from the meta regression analysis are available in Table 2.1 and Appendix 6 respectively. In addition, from all the empirical studies collected, we have coded 65 control variables which may have an impact on the success of economic sanctions and based on the protocol mentioned above we remain with 36 control variables and based on the search query I employed, the oldest primary study in my sample was published in the year 1985 and the most recent one was in 2017.

All empirical literature investigated the effect of proxies of international trade, using for potentially relevant explanatory variables including target's political and economic instability, GNP ratio, target-sender prior relation, sanction length episode, economic and military assistant to the target, international cooperation with the sender, target GNP cost, sender cost, modest policy, export, import and financial sanctions, US sender and time. The meta dataset has three book chapters and twenty peer-reviewed Journal articles. Our database consists of 100 coefficients (estimates) and t-values of the effect of international trade including with interaction terms. In addition, we have coded the outcome variable of all the empirical studies, that is economic sanction success or policy outcome and acquiescence (a proxy for economic sanction success), and the different proxies of international trade studied in the empirical studies. Moreover, after coding our meta dataset independently, Kimararungu has checked the dataset as second coder and we corrected one missing value in Google Scholar citation. The data collection and extraction process have been conducting from June 01 to August 31, 2018 for a three-month period. Finally, this meta regression analysis comprises all reported and available observations in economic sanctions success and international trade literature which can be taken as the first inclusive version of a meta regression analysis dataset.

3.3 The Research Hypothesis

This paper has the following key hypotheses that are going to be tested and explained by using the meta regression analysis model:

Hypothesis 1. There is no publication bias in the effect of international trade on the success of economic sanctions empirical literature.

Hypothesis 2. There is positive and significant overall genuine effect of reported empirical studies.

Hypothesis 3. There are no methodological differences between the empirical studies outcomes.

Chapter 4 | MRA Methodology and Specification

4.1 Funnel Plots

The most common and simplest technique of measuring and detecting publication bias is a traditional investigation which is called funnel plot (Sutton et al 2000:1574). The funnel plot shows the estimated effect on the "X axis" with the inverse of the standard error (precision) of the estimates of international trade on the "Y axis". If the literature is not contaminated by publication bias the trade plot will be symmetrical about the highest trade precision values since all other imprecise estimates of trade linkage can have the same probability of being described. Even though funnel plot is important, proper econometric techniques must be employed to estimate exactly the genuine parameter estimation of international trade beyond publication bias. I am using a meta regression analysis design which combines many empirical studies that has different research design and methodology and I will investigate the consistencies and discrepancies of individual empirical results. According to Bradburn et al (1998:4), the core of conducting meta-analysis study is to get a single and unique estimate of the effect of variable of interest from some observed descriptive statistic in each of empirical literature.

The meta regression analysis methodology is well established in several academic fields, among which medicine, psychology and increasingly also in the field of economics. Most methods of meta regression analysis estimate the overall average effect by using a weighted average of the individual study estimate effects. This meta-analysis approach can provide re-examined interpretations and analysis of researches which have done in early periods that is useful and has a significant importance for researchers and students to help indicating potential priorities. Generally, there are three types of econometric techniques identified in the meta regression analysis literature; simple OLS regression, fixed effect and random effects meta regression or a combination of fixed effect and random effect model which is mixed-effect multilevel model (MEM).

For my meta regression analysis, I am using the mixed effect multilevel model and cluster data analysis model and employ the following meta-regression specifications; meta significance testing (MST), Funnel Asymmetry test (FAT), precision effect testing (PET), precision effect estimates with standard errors (PEESE) and multivariate analysis for heterogeneity to explain the impact of international trade on the success of economic sanctions.

4.2 Meta Significance Testing: MST

Meta significant testing is one of the methods that investigates whether the primary studies are contaminated by publication bias. The MST method indicates that the presence of the genuine effect between the international trade and economic sanctions success which can be expressed with the positive association of the observation size and the absolute value of the t-statistics in natural logarithms (Stanley 2005:328, Lazzaroni and van Bergeijk 2014:337). Hence, the MST can show that in the presence of the genuine international trade effect, the absolute value of the trade t-value in natural logarithm will have positive and statistically significant relations with the logarithms of the size of the trade observation, because the parameter estimates of large sample studies have more precision values. However, the relationship between the size of the observation and the t-values is inaccurate in case of publication selection (Stanley and Doucouliagos, 2013:66-67). The MST meta regression equation testing for publication bias is as follows.

$$\ln \left| t_{ij} \right| = \beta_0 + \beta_1 \ln ObS_{ij} + \varepsilon_{ij} \text{ ---------- (4.1)}$$

Where i and j denotes the parameter trade estimates and the empirical study respectively. tij and ObSij represents the t-statistics and size of observation from i estimates of study j. The reason behind this specification is when the size of the observation increases the precision of trade estimates rises which means the standard error of the trade estimation falls and hence the value of t-statistics increases. As Stanley (2005:328) states that the slope of the coefficient in specification (4.1) which is β1 gives information on the presence of the true effect and publication bias or both, see also (Doucouliagos 2005:375). Therefore, what matters is that if β1, the slope of the trade observation in natural logarithm, >0, there is a genuine international trade effect from the success of economic sanction, since the value of trade t-statistics increase in the absolute value as the size of the trade observation increases. However, if β1, the slope of the trade observation in natural logarithm, <0, the empirical trade literature is suffered by publication bias because the t-values of the estimated trade effects decrease when the size of the observation increases. If β1, the slope of the size of the trade observation is between 0 and 0.5 (that is if 0 < slope of trade observation ($\beta_{1)}$ < 0.5), there is a true effect of international trade on the success of economic sanctions and publication bias in the empirical trade and success of economic sanctions literature.

4.3 Genuine Effect: FAT-PET

The simple meta regression analysis model can be simply expressed as follows:

$$\text{Effect}(e_i) = \beta_0 + \beta_1 S_{ei} + \varepsilon_i \quad \text{---------- (4.2)}$$

In specification (4.2), effect e_i represent regression coefficients, β_0 measures the underlying overall average trade effect, β_1 represents the size and significance of publication bias, and Sei denotes the standard error but the random estimation error ε_i are possibly heteroscedastic (the independent variable is a sample parameter estimate of the standard deviation of the dependent or outcome variable) because ordinary least square method assumes that the error terms have the same variance, so that in practice the study's precision could be best measured by using weighted least square that considers the precision ($1/Se_i$) which can be used for FAT-PET in specification (4.3). The predictor variable Sei is the standard deviation sample estimate of the meta-regression error terms. When we divide equation (4.2) by the heteroscedasticity standard error (Se_i), we get the following weighted least square meta regression estimation:

$$t_i = \beta_1 + \beta_0(1/Se_i) + \nu_i \quad \text{---------- (4.3)}$$

Due to its relation to funnel graphs, specification (4.3) for detecting publication bias is called a funnel-asymmetry test (FAT) (Stanley 2005:321). In this case t_i denotes the t-statistics for the reported international trade effect and specification (4.3) allows me to observe the magnitude and significance of primary studies publication bias ($\beta 1$) and the trade genuine effect beyond publication bias (β_0). If the researcher requires statistically significant effects but has few observations, he or she needs to run and re-run a specification model until getting a statistically significant results and until the parameter estimate of the independent variable becomes large enough to balance the standard errors (Se). However, studies with smaller precision (1/Sei) which have more precise results, will need less searching and selection of literature to get significant results.

4.4 Precision Effect Testing with Standard Errors (PEESE)

To examine the magnitude of the genuine effect of international trade, Stanley and Doucouliagos (2007:12) suggest an improved form of specification (4.3). If there is publication bias, the relationship between the observed estimation effect and its standard error will be non-linear. This augmented estimation method (specification 4.4) is also supported by a meta

regression analysis techniques published in the Journal of British Medical Science as the preferred technique for correcting publication selection bias (Moreno et al 2009: 495) and also by (Lazzaroni and van Bergeijk 2014:337). To estimate the genuine overall average international trade effects exactly, I have to apply the Heckman meta-regression equation which is firstly proposed by Stanley and Doucouliagos (2007:12) which can reach by estimating specification (4.4). When both between-study heterogeneity and heteroscedasticity are considered, the augmented specification estimation assumes the following meta regression equation:

$$t_i = \beta_0(1/Se_i) + \beta_1 Se_i + v_i \quad \text{----------(4.4)}$$

In specification (4.5), β_0 measures the magnitude of the overall trade genuine effect corrected for publication bias in which testing $\beta_0 = 0$ for both all studies and peer-reviewed studies. Meta-regression has been employed as a technique to derive improved parameter estimates that are of direct use to policy makers. Meta-regression provides a framework for replication and offers a sensitivity analysis for model specification. Several approaches have been applied to identify and code the empirical data and the meta-regression statistical techniques can be further used for modelling, excess heterogeneity, study variations and publication selection (Stanley and Jarrell 1989:299).

4.5 Multivariate Meta Regression Analysis

After dividing specification 4.2 by the standard error and including other study characteristics and other exogeneous variables in specification 4.3, we get specification (4.5) that considers the sources of potential heterogeneity. To test the intensity of publication bias if it depends on other study features, I estimate specification (4.5) and the multivariate regression findings are reported in Table 5.7. Publication bias, in this circumstance is not explained by the constant terms in the regression only, it can be explained by the moderator variables listed in the regression table but the precision. The trade precision coefficient is still representing the genuine effect adjusted for publication bias, and the findings recommend that after controlling several variables corrected estimates are changed both in direction and magnitude in Table 5.7 when we compare the results to the meta regression analysis in Table 5.2.

$$t_{ij} = \beta_0 + \beta_1(1/Se_{ij}) + a_i Z_{ij}/Se_{ij} + v_{ij} \quad \text{---------- (4.5)}$$

Z_{ij} represent moderator variables (exogeneous variables) which may affect the outcome variable and vij is the usual error term for each study which is the between study variation (other factors that may influence the effect size). To check whether there is variation in studies outcome (between study heterogeneity) in my sample of literature.

In general, the sources of within study variation cannot be analysed by the simple regression model and the fixed effects econometric method also cannot investigate the sources of the between study variation. The mixed effect multilevel model (random effects) model is the preferred model to apply in several applications which allows to investigate the within and between study differences. Whether there is excess heterogeneity or between-study differences can be verified under the hypothesis that the variable magnitudes are homogeneous. If the assessment indicates that the magnitude of coefficients has excess heterogeneity, the mixed effect multilevel meta-regression technique is preferable.

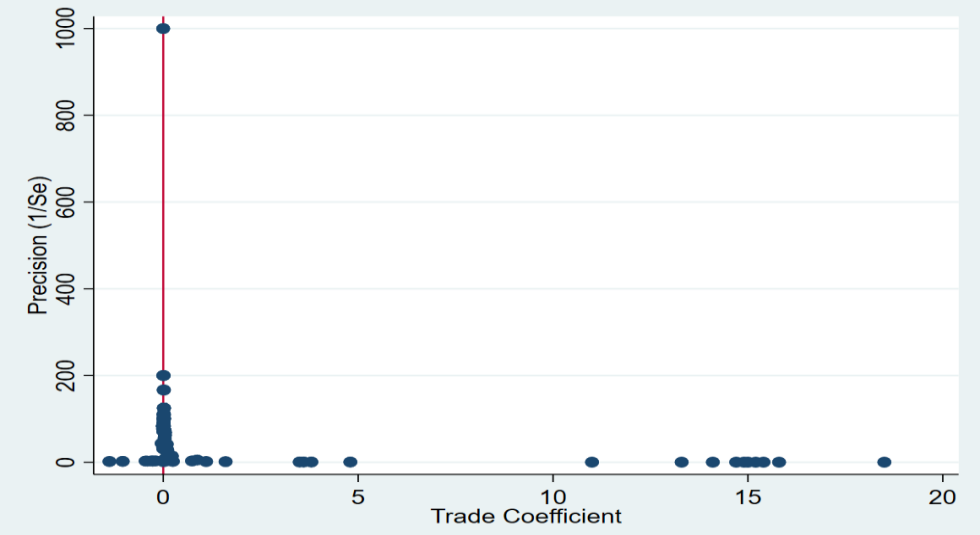
Chapter 5 | Results and Discussions

5.1 Funnel Plots

The funnel graph plots the inverse of the standard error or precision (1/Se), against the reported parameter estimation effects which in my case is international trade. It is a scatter graph of the reported empirical parameter estimate and its precision. To make the graphic images more visible, I used the logarithm of the precision which is derived from the inverse of the standard error with the trade estimation effects. Figure 5.1 and 5.2 plots the international trade estimate effect and the precision and international trade estimate effects and the logarithm of the precision respectively. In the absence of publication selection bias, parameter estimates will differ randomly about the 'true' effect in which the funnel will be symmetrical.

Hence, the key to identifying publication selection bias is the funnel plot graph's asymmetry (Stanley 2008:107). As we can see from both figures, most of the trade coefficients are concentrated on the vertical line and some of them are positive and skewed to the right which indicate publication selection bias is positive for trade effects. Hence, the asymmetry of the trade effect funnel plot graph is clearly visible in both figures. Studies which have less precision and high standard errors will be shown at the bottom of the graph and parameter produce estimates that are more spread out. As we can see from both figures the plots have heavier midsection at the value of zero but a slightly distributed on the right-hand side of the plots, indicating that many positive estimates are reported in the literature comparing to other estimates. The top of the graph represents the high precision empirical effect of international trade. However, visual inspection of the funnel plot is subjective and somewhat ambiguous, we need the formal statistical test of meta regression analysis such as FAT.

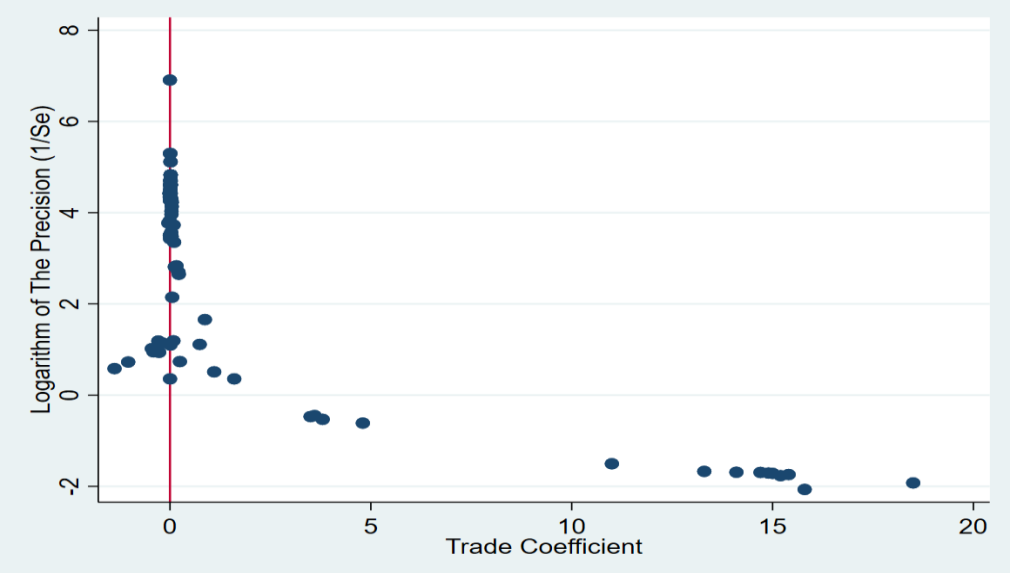
Figure 5.1: Funnel Plot of the precision and the trade effect (N =100).



Source: Author's elaboration

We can use the logarithm of the precision that can be derived from the inverse of the standard error of the reported international trade empirical estimates to make the graphic image more visible and illustrating the spread of data points between the trade effect[2] size and the measure of the precision (1/Se)[3].

Figure 5.2: Funnel Plot of the Logarithm of the precision and the trade effects



Source: Author's elaboration

[2] We can see the international trade effect size, the level of significance and their precisions for all studies observation in detail which is reported in appendix 2.

[3] I also tried to observe the funnel plot data points by removing the high precision value (outlier) from the sample of literature and I didn't find any different result, the graph is almost similar with graph 5.2 that includes outliers. See the graph in appendix 1.

From Figure 5.2, we can observe that more than half of the data points are distributed to the right indicating that t-statistics are over reported. The highest precision value(1/Se) is recorded in the study which is published by Kim (2009:39-40) because of the economic difference which is the proxy for trade linkage variable coefficient estimate is calculated as level.

5.2 Meta Significance Testing MST

We need a powerful MRA statistical method when the reported empirical estimates are contaminated with publication bias, which means in the case where the slope of the coefficient in (specification 4.1) $\beta 1 < 0$ or if $0 < \beta 1 < 0.5$. As we can see from Table 5.1 in both CDA and MEM estimates are not statistically significant that indicates there is no genuine empirical relationship between trade and the success of economic sanctions. The logarithm of the trade t-statistic in the absolute value does not rise as the size of the observation increases. Table 5.1 presents the bivariate MST-MRA[4] results. When we consider all studies the slope coefficients both in the CDA ($\beta 1 = 0.405$) and MEM ($\beta 1 = 0.006$) are less than 0.5 which indicate the presence of publication bias in the sample literature but not in the case of peer reviewed data set because as we can see the peer reviewed slope coefficients are greeter that 0.5. I also checked the dataset that excludes interaction terms and the result also asserts that the empirical studies are suffered from publication bias.

Table 5.1: MST-MRA, Publication bias in trade effects on success of economic sanctions

Variables $\ln \lvert t_{ij} \rvert$	Cluster Data Analysis (CDA)		Mixed effect multilevel Model (MEM)	
	All Studies	Peer-reviewed	All Studies	Peer-reviewed
$\ln \lvert obs \rvert$	0.405	1.196	0.00600	1.142
	(0.486)	(1.366)	(0.368)	(0.712)
Constant	-2.047	-5.673	-0.565	-5.848*
	(2.574)	(6.571)	(1.812)	(3.335)
Observations	100	91	100	91
Number of Studies	22	20	22	20

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regarding the logarithm of the absolute value of trade t-statistics, I must exclude observations which have zero t-values, since there is no value for the logarithm of the absolute value of zero (ln|0| doesn't exist).

[4] I converted and corrected the original trade coefficient values in to levels, dividing by 100, which were originally measured in ratio to observe whether there is different finding in the main regression. I checked the MST, FAT-PET, PEESE and Multivariate regressions for the corrected coefficient values and the findings are similar in direction and significant with the regression values of the original coefficient values. The regression tables are available in appendix 2 and 3.

We need a powerful statistical method that takes into account publication bias and the presence of a true effect by using FAT and PET methods. The funnel asymmetry test measures whether the literature suffer from publication selection bias using the testing method of $\beta_1 = 0$, and the precision effect testing evaluates whether true trade effect is present beyond publication bias by testing $\beta_0 = 0$ using MRA of specification (4.3). Before running the multivariate regression analysis, I run the weighted least square of cluster data analysis and mixed-effect multilevel method for the 19 observations of interaction terms to observe whether they have significant impact for the success of economic sanctions. Hence, in both CDA and MEM specifications I found negative and statistically insignificant[5] results.

5.3 Genuine Effect: FAT-PET

To provide greater weight for more precise trade estimates, I apply inverse variance weights and I run the bivariate PET-MRA for both all studies and peer reviewed studies to see whether studies published by peer reviewed journals have significant effect than other studies.

Table 5.2: Bivariate FAT-PET: MRA for genuine trade effects: (N=100)

Variables	Cluster Data Analysis (CDA)		Mixed Effect Multilevel Model (MEM)	
t-statistics	All Studies	Peer Reviewed	All Studies	Peer Reviewed
Precision (1/Se)	-0.00188	-0.00287	-0.000844	0.00908***
	(0.00133)	(0.00401)	(0.00138)	(0.00259)
Constant (Bias)	1.494***	1.706***	1.229***	0.827***
	(0.333)	(0.406)	(0.271)	(0.314)
Observations	100	91	100	91
Number of Studies	22	20	22	20
Likelihood-ratio test (χ2)			29.13***	50.72***

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Null hypothesis for the likelihood-ratio test: The MEM model has no benefit over OLS (there is no between-study heterogeneity).

[5] Stanley (2012:153) stated that if the meta regression analysis shows the interaction terms or the squared terms of independent variables are not statistically significant or if the effect size is very small, we can ignore the interaction terms and continue with the linear one. However, in my case, I do not ignore them because when I include them into the linear specification, the precision and publication bias result come to positive and statistically significant both in CDA and MEM model at 1% confidence level (see Table 5.6 multivariate MRA for precision and source of heterogeneity).

I have checked the intrastudy correlation (IC) or the within study variation and I found the result of 0.4699 which is between 0 and 1 where if the IC approaches zero we can run simple regression and when it approaches 1, then there is no variance to explain in the individual study level. Table 5.2 presents the meta regression analysis results based on specification (4.3), the cluster OLS and the mixed-effect multilevel weighted-least-square version of specification (4.3). Likelihood-ratio versus Linear model test rejects the "null hypothesis", that recommends the substantial between-study heterogeneity, indicates the mixed-effects weighted least square model is more reliable than OLS. Therefore, my analysis is depending on the findings of the mixed-effect multilevel model. After examining the funnel plot of Figure 5.2, as expected the meta regression analysis investigates upward publication bias which is significant at 1% confidence level for both specifications in all the four columns for both all studies and peer reviewed observations.

Therefore, in my sample of literature publication bias has the potential to produce average significant estimate of the trade linkage effect in my preferred MEM model considering for peer reviewed studies but insignificant average estimate of trade effect in case of all studies considered. As it can be seen the findings of the precision is positive and statistically significant at the 1% confidence level for the preferred mixed effect multilevel model (MEM) specification only for peer reviewed studies in column 5 but the precision effect testing in the rest of the columns (column 2, 3 and 4) are negative and statistically insignificant indicating the absence of genuine effect. In meta-analysis, publication selection bias is an important concern and considered as another challenge to empirical economics (Stanley 2005:310) "Many other commentators have addressed the issue of publication bias. . .. All agree that it is a serious problem, and several have suggested new techniques for dealing with aspects" (Begg and Berlin 1988: 421). However, in their study, Mebrate and van Bergeijk (2013:64) didn't find any evidence for the publication bias in 30 studies having 156 observations in developing and emerging economics.

However, my findings assert that publication selection bias is significant at the 1% confidence level in both the cluster data analysis (CDA) and mixed-effects multilevel model (MEM) which indicate that the trade effects are suffering from statistically significantly and meaningfully both in magnitude and direction. The sizes of the publication bias are 1.494 and 1.706 in column two and column three in cluster dada analysis (CDA) and, 1.229 and 0.827 in column five and column six in mixed effect multilevel model (MEM) respectively. We can observe that the sizes of the publication bias in the preferred mixed effect multilevel

model are less than the bias in the cluster data analysis model. However, from both specifications, we can observe that the power of publication bias, β1 is not higher than 2 in the absolute value which indicate that the biases are not severe, and the selection effort was not serious (Doucouliagos and Stanley 2008:321). After due allowance for publication bias[6], the meta regression average effect of no statistically significant effect for our preferred MEM model cannot be rejected in the case of peer reviewed studies.

5.4 Cumulative Funnel Asymmetry Test (CFAT)

In meta regression analysis, the need for powerful statistical tests for funnel asymmetry plot is common. Therefore, this section describes whether the publication bias identified in FAT specification is different through time or has the publication bias often affected my sample of empirical studies literature. The CFAT explores whether the publication bias alters in relation to the studies publication year. As Doucouliagos states, we can conduct cumulative publication bias analysis (bias significance and size of bias) to observe the movement of publication bias and to detect the point it appears and disappears from the sample of literature (2005:381). To do this, I follow recursive procedures using meta regression significance analysis, by starting with the earliest empirical study that can allow the minimum observation for meta regression and successively adding each empirical result one by one in chronological order as per the year and month the studies published and then in each step of the regression I have to re-estimate the FAT-MRA (specification 4.3). Table 5.3 reports the results of this process and Figure 5.3 plots the parameter estimates of the size of publication bias and its significance values of t-statistics.

[6] I have also checked the publication bias and the significance of the genuine effect by using logit and probit estimation methods to observe whether the findings are different. However, the results are similar in direction and significance for publication bias of the cluster data analysis, but the genuine effect is insignificant in the case of logit and probit methods. In all WLS, logit and probit methods the publication bias is significant at 1% confidence level.

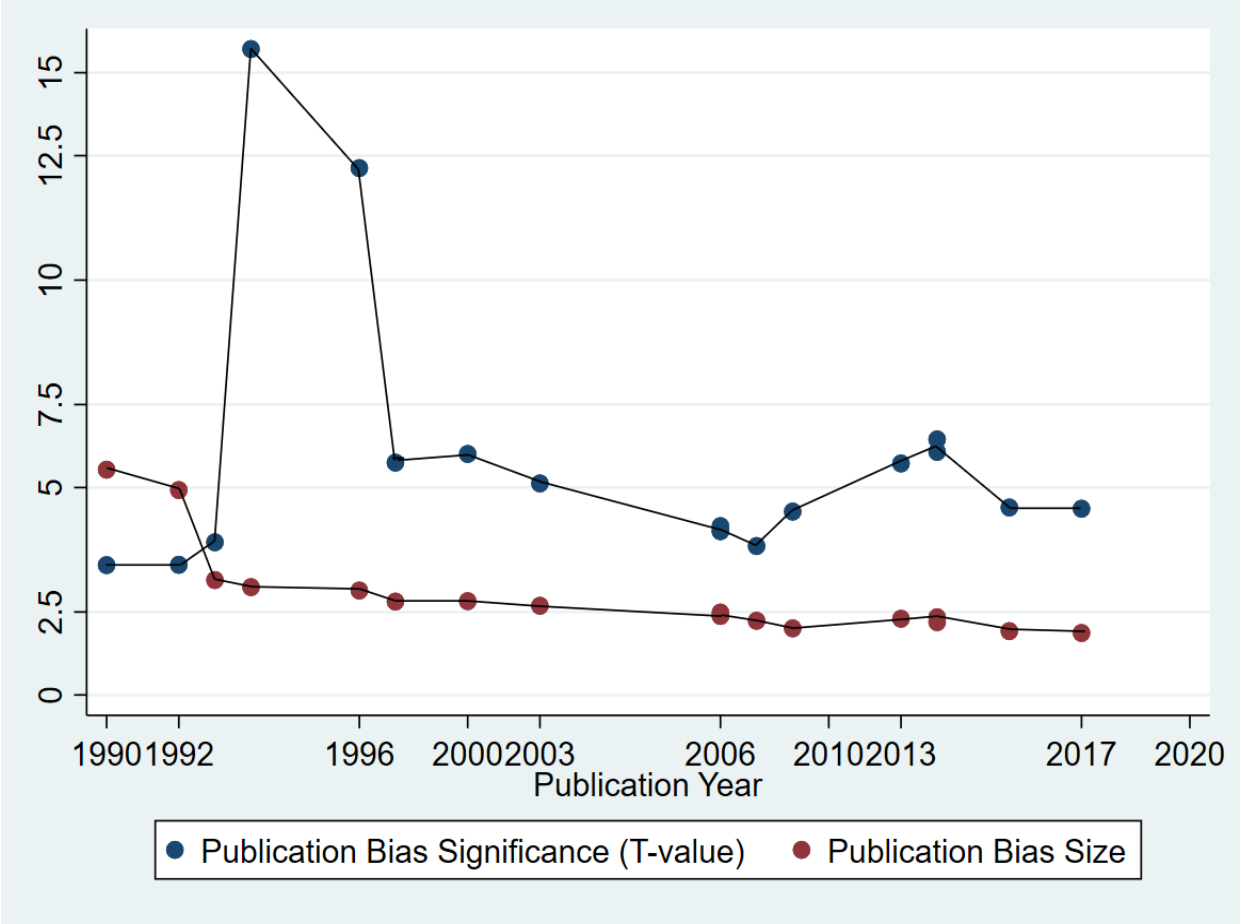
Table 5.3: Cumulative Funnel Asymmetry Test (N=100)

Study's Year of Publication	t-value (Bias significance)	Publication Bias (Magnitude)	P-value (5% Confidence level)
1985-1990	3.130	5.430	0.032
1985-1992	3.137	4.94	0.016
1985-1993	3.680	2.77	0.021
1985-1994	15.570	2.599	0.000
1985-1997	12.700	2.518	0.000
1985-1998	5.600	2.251	0.001
1985-2000	5.810	2.261	0.000
1985-2002	5.10	2.15	0.000
1985-2007	4.07	1.987	0.002
1985-2007	3.95	1.908	0.002
1985-2007	3.95	1.906	0.002
1985-2008	3.59	1.788	0.003
1985-2009	4.42	1.605	0.000
1985-2012	5.58	1.837	0.000
1985-2013	5.86	1.872	0.000
1985-2013	6.16	1.756	0.000
1985-2015	4.52	1.539	0.000
1985-2017	4.49	1.494	0.000

Note: The cumulative size of publication bias for funnel asymmetry statistical test in Table 5.3 the last row in column 2 is similar with the value of the FAT publication bias in Table 5.2 at column 2.

Figure 5.3 reports that up until 2017 that is the 100th reported estimate, the estimated coefficients of the publication bias are statistically significant at 95% confidence interval. In terms of the magnitude of the bias, it reached a maximum of 5.43 in the year 1990, a minimum of 1.494 in the year 2017 which indicates through time trend the bias becomes decreasing and reached to 1.494 and has a median value of 1.948 recorded in 2007. However, the minimum publication bias significance value of t-statistics is 3.13 in the year 1990, the maximum is 15.57 in the year 1994 and the median value of the bias significance is 4.505 in 2007. As we can see from the figure the size of the publication bias goes up and down through time but has never become statistically insignificant and not less than 1, indicating that the findings of publication bias in my sample of literature is robust. From 1994 to 1997 the cumulative level of significance is higher because of the higher trade t-values reported in those publication years.

Figure 5.3: Cumulative FAT plots in Chronological order of studies publication year (N=100)



Source: Author's elaboration

5.5 Correcting Publication Selection Bias (PEESE)

If the precision effect test (PET) recommends a true effect (which means if β_0 in specification 4.4, is statistically significant), the further precision effect testing that considers the standard error of the estimates (PEESE) gives a better and best trade estimates, because the "PEESE-MRA corrects for non-linear relationships between the reported effect size and standard errors" (Doucouliagos and Stanley, 2009: 34). The PEESE trade coefficients are positive and greater than PET trade coefficients but they are not significant in all studies case. However, in the case of peer reviewed the PEESE trade coefficients are positive, significant and greater than PET trade coefficients. Table 5.4 presents the genuine international trade effect beyond publication bias.

Table 5.4: Test of the genuine effect beyond publication Bias, PEESE

Response Variable: t-statistics	Clustered Data Analysis (CDA)		Mixed-effect Multilevel Model (MEM)	
	All Studies	Peer Reviewed	All Studies	Peer Reviewed
Genuine Effect (1/SE)	0.00447	0.0142***	0.00205	0.0119***
	(0.00417)	(0.00299)	(0.00158)	(0.00243)
Standard Error (SE)	0.462***	0.466***	0.108	0.0985
	(0.0335)	(0.0358)	(0.131)	(0.0941)
Observations	100	91	100	91
Number of Studies	22	22	22	22
Likelihood-ratio test (χ2)			54.04***	60.92***

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in parentheses. Null hypothesis for the likelihood-ratio test: The MEM model has no benefit over OLS (there is no between-study heterogeneity).

After correcting for publication bias, the precision effect testing that considers the standard error (PEESE) estimates of international trade indicates that the average trade effect changes its sign to positive and reaches 0.00205 and 0.0119 (significant at 1% confidence level) which are as expected larger in magnitude than the precision coefficients of -0.000844 and 0.00908 (significant at 1% confidence level) in Table 5.2 for all studies and peer reviewed studies respectively. The corrected magnitude for the standard error in cluster data analysis are statistically significant which is not in the preferred mixed effect multilevel model.

Before running multivariate MRA, it is advisable to test the presence of between-study heterogeneity and within study variation by employing both the Q-test and I^2 test. The value of the "Q-test" for the between-study heterogeneity is 346.61 on N-1 "degrees of freedom" having p-value of 0.000 and I^2 statistics (the difference in international trade ascribable to heterogeneity) is 71.4 percent which means that the reported trade effect size variation because of sampling error is 28.6%. And to quantify heterogeneity an estimate of between-study variance is calculated with Q-test and I^2 test, so that the tau-squared value is 0.0003. This variation in the studies outcome encourages me to consider other sources of research heterogeneity in the sample of literature available of hand.

5.6 Heterogeneity Concern

5.6.1 Sources of Heterogeneity

The above MST, FAT, PET and PEESE parameter estimates encourages the meta regression analyses indicating that we need a multivariate meta regression method to take into account sources of heterogeneity. Table 5.5 presents the descriptive statistics and the significance source of heterogeneity of the empirical studies which has observation, mean, standard deviation and the variable description columns. The publication bias measure which is estimated in specification (5.3) is average across all studies and estimation techniques in all empirical studies in various countries. I go through all the relevant empirical literature on hand and observe that it is important to realize if some characteristics of empirical studies are more related with publication bias than others. From the start we saw there is a clear disagreement between the empirical studies trade estimates effect size and the level of significance and this disagreement may be due to the sources of publication, data, estimation and specification characteristics.

Publication Characteristics:

I control the studys' year of publication, peer reviewed journals, journal rank and citations in Google Scholar to test whether these characteristics have systematically an impact on the reported international trade estimates on the success of economic sanctions.

Data Characteristics

I create dummy variables for the time span, the number of observation and sanction cases and the source of the dataset like HSE (1985), HSE (2007, 2008), HSE (1990) Ties (2006, 2009) and mixed data sources. I consider both the number of observation and sanction cases of the data to test for any variation in the statistical significance on the economic sanction outcome between studies due to different sanction cases the studies used.

Estimation Characteristics

In my sample of literature, most of the studies parameter estimate of international trade used logit and probit estimation methods. To observe the potential source of heterogeneity, it is valuable to control all the econometric methods employed by the empirical studies. Therefore, I include dummies for the international trade estimation techniques which are (OLS, Logit, Probit) and maximum likelihood and I used logit estimation method as a base.

Specification Characteristics

The empirical studies of international trade estimates used several proxy measures to explain the international trade effect on economic sanction success, like trade openness, the average of presanction target country export to sender and imports from sender, (export + import) trade flow as % of target's GDP per capita and so on. I include trade lagged, interacting variables and trade link before sanction imposition dummy variables to observe the trade link effect lagged by one year, to see the impact of variables interacting with trade and to observe the trade linkage effect before sanction imposition on the success of economic sanction. Finally, I include the most significant control variables as dummies to observe any systematic difference in the sanction success outcome.

Table 5.5: Descriptive statistics and description of explanatory Variables

Variable	N	Mean	Std. dev.	Variable Description
Precision (1/Se)	100	66.628	106.260	Precision of parameter estimation of Trade
Publication Characteristics				
Year of Publication	100	1.770	1.145	Studies year of publication (base 1985)
Journal Rank	100	0.370	0.485	=1 if the study is published in high journal rank (Rank A), 2017 ISI impact factor
Google Scholar	100	56.076	73.923	Study citations in google scholar per age of the study is used by the study
Data Characteristics				
HSE 1990	100	0.580	0.496	The source of the data the study used in the regression
N Observations	100	198.49	504.755	The number of observations the study used in the regression
Time Span	100	54.210	18.079	The number of years of the data used by the study
Estimation Characteristics				
Logit	100	0.470	0.502	=1 if the study used Logit (as a base) method of estimation in the regression
Specification Characteristics				
Sanction Imposition	100	0.95	0.22	=1 if the study used trade linkage before sanction imposition
Interaction Terms	100	0.19	0.39	=1 if trade coefficient comes from the interaction terms
GNP Ratio	100	0.330	0.470	=1 if GNP ratio is used by the study
Prior Relation	100	0.510	0.500	=1 if the prior relation is used by the study
Sanction Length Episode (SLE).	100	0.540	0.500	=1 if the study used sanction length episode
Cooperation with the sender	100	0.62	0.49	=1 if cooperation by other countries with the sender is used
Target GNP Cost	100	0.550	0.500	=1 if target GNP Cost is used by the study
Sender Cost	100	0.60	0.492	=1 if the study used sender cost variable
Militarized Dispute	100	0.340	0.476	=1 if the study used MID variable
Time	100	0.220	0.416	=1 if sanction time is used by the study
Quasi-Military Force	100	0.060	0.239	=1 if the variable QRM is used by the study
International Institution	100	0.140	0.349	=1 if the study used International Institution in the sender coalition

Variable	N	Mean	Std. dev.	Variable Description
Disruption	100	0.260	0.441	=1 if disruption is used by the study in the regression
National Security	100	0.310	0.465	=1 if national Security is used by the study
Regime type	100	0.110	0.314	=1 if target's regime type is used by the study
Target Democracy	100	0.020	0.141	=1 if the target democracy used by the study
Relative Power	100	0.290	0.456	=1 if relative power is used by the study
Reputation	100	0.040	0.197	=1 if reputation is used by the study in the regression

Source: Author's elaboration

5.6.2 Dealing with Heterogeneity

In order to mitigate the insignificant moderator variables systematically from the multivariate model, I follow the MAER-net reporting guideline considering the general to specific approach (GETS) that can help to reduce the correlation between explanatory variables. Other scholars used the general to specific approach to deal with potential sources of heterogeneity (Mekasha and Trap 2013:576) and (Demena and Bergeijk 2017: 555). Specification 4.5 is estimated by using the so called general to specific approach. I start with inserting all the moderator variables in the general specification 4.5. Then, in each re-estimating regression the highest statistically insignificant variables are removed until I remain with a specific specification that contains only statistically significant variables. I also observe that many moderator variables involved in the multivariate specification are statistically insignificant which indicate a trade-off between including all the 36 moderator variables to explain the sources of heterogeneity, multi-collinearity and loss of "degrees of freedom" which is also don by Mekasha and Trap (2013:576).

Table 5.6 presents the results of the multivariate meta regression analysis using four different specifications to observe the difference in findings by using general to specific approach. Before running the meta regression analysis I removed the variables which are appeared only in one study since the variables are too many and it is dealing with the average of the variables. After running the meta regression model including all the moderator variables, I observed that most of the variables are not statistically significant and some of them generate omitted values. However, overall the variables have statistically significant impact on the outcome variable which is the trade estimates of t-statistics (p-value=0.000). Therefore, I understand that all the control variables have not equal contribution in explaining the

source of heterogeneity. In so doing, I exclude 9 moderator[7] variables which are not found to be significant in explaining source of heterogeneity. Finally, I remain with 16 moderator variables which are found to be statistically significant at least at 10% confidence level. In all the four specifications the outcome variable is the t-value of international trade estimates.

To explain the within and between study correlation, the specific OLS model is re-estimated by using MEM model and to check the robustness of the model and to make comparisons the OLS use robust standard error and clustered data analysis respectively. Column 2 presents the specific OLS specification, column 3 reports the clustered data analysis or study level clustered standard error and column 4 and 5 reports the mixed-effect multilevel model by using maximum likelihood and robust standard error respectively.

Table 5.6: Multivariate MRA for precision and sources of Heterogeneity (N=100)

Variables	(Specific) t-value	(CDA) t-value	(MEM) t-value	(Robust) t-value
Precision (1/Se)	0.00519**	0.00519***	0.00519***	0.00519***
	(0.00197)	(0.00143)	(0.00178)	(0.00150)
Constant (Bias)	2.859***	2.859***	2.859***	2.859***
	(0.412)	(0.163)	(0.373)	(0.233)
Year of Publication	-0.506***	-0.506***	-0.506***	-0.506***
	(0.103)	(0.0423)	(0.0934)	(0.116)
Journal Rank	-0.977***	-0.977***	-0.977***	-0.977***
	(0.305)	(0.142)	(0.277)	(0.324)
Logit	0.899***	0.899***	0.899***	0.899***
	(0.329)	(0.157)	(0.298)	(0.232)
Interaction Terms	-1.530***	-1.530***	-1.530***	-1.530***
	(0.321)	(0.141)	(0.290)	(0.226)
GNP Ratio	0.641**	0.641***	0.641**	0.641**
	(0.300)	(0.184)	(0.272)	(0.256)
Prior Relations	-1.150***	-1.150**	-1.150***	-1.150**
	(0.423)	(0.522)	(0.383)	(0.504)
Sanction Length	-1.280***	-1.280***	-1.280***	-1.280***
	(0.364)	(0.190)	(0.329)	(0.272)
Cooperation	-2.042***	-2.042***	-2.042***	-2.042***
	(0.535)	(0.370)	(0.484)	(0.449)
Target Cost	1.981***	1.981***	1.981***	1.981***
	(0.396)	(0.214)	(0.359)	(0.283)
Militarized Dispute	1.711***	1.711***	1.711***	1.711***
	(0.551)	(0.327)	(0.499)	(0.419)

[7] The highest insignificant variables which are excluded from the general to specific MRA model are listed from the lest significant results: Observation, Time Span, HSE 1990, National Security, Target GNP Cost, Google Scholar, Disruption, Time and trade linkage before sanction imposition variables.

Variables	(Specific)	(CDA)	(MEM)	(Robust)
	t-value	t-value	t-value	t-value
Quasi-military Force	-0.943*	-0.943***	-0.943**	-0.943**
	(0.518)	(0.284)	(0.469)	(0.396)
Institution	-3.619***	-3.619***	-3.619***	-3.619***
	(0.725)	(0.489)	(0.657)	(0.943)
Target's Regime Type	-0.885*	-0.885**	-0.885**	-0.885**
	(0.469)	(0.406)	(0.425)	(0.406)
Target Democracy	-6.970***	-6.970***	-6.970***	-6.970***
	(1.675)	(1.326)	(1.517)	(1.408)
Relative Power	1.611***	1.611***	1.611***	1.611***
	(0.421)	(0.201)	(0.382)	(0.290)
Reputation	4.615***	4.615***	4.615***	4.615***
	(0.793)	(0.480)	(0.718)	(0.529)
Observations	100	100	100	100
Number of Studies	22	22	22	22

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Based on the rule of thumb, there is no evidence of high multicollinearity in the MRA model reported in Table 5.7. All the variables have ten and less than ten variance-inflation. The average variance inflation factor is 5.27. The general and reduced specification correlation matrix are available in appendix Table 4 and 5.

Controlling for between study variation the CDA and MEM columns present 16 variables that explains the sources of heterogeneity in the primary reported studies of trade estimates, which means that the trade estimate effects in the primary empirical studies are methodically influenced. The results in Table 5.6 asserts that publication, estimation and specification characteristics are the sources of research heterogeneity in our sample of literature. From all the moderator variables; reputation, logit, GNP ratio, target GNP cost, relative power and militarized dispute variables are associated with positive and statistically significant findings for the reported trade effect in the preferred mixed effect multilevel model. We compare and check the robustness of the findings in column 3 and 5 by using parameter estimates with clustered standard errors and robust standard errors. Column 3 reports almost similar results except the estimates standard error clustered in parenthesis which are different in magnitude. In addition, in the robust standard error analysis column the statistical significance reduces for GNP ratio and quasi-military force variables from 1% to 10% confidence level.

Regarding publication characteristics, the year of publication and journal quality variables used by the study affect the reported trade estimates statistically significantly and reduce the size by 0.506 and 0.977 respectively. The year of publication findings suggest that on average the recent studies lower the trade estimates report by 0.506. We can also see that the

high-ranked journals on average decreases the trade estimates report by 0.977 per studies publication. However, citations in Google Scholar, Web of Science and all data characteristics variables do not have any impact on the empirical studies trade estimates. From the estimation methods the studies employed the logit method has a positive and statistically insignificant impact for trade estimates in all the four specifications and increase the size by 0.899.

Lastly, from all the 13 variables in the specification characteristics five of them (reputation, GNP ratio, target GNP cost, relative power and militarized dispute) positively affect the reported trade estimates and significantly increase the effect size whereas the rest 7 moderator variables (prior relation, sanction length, cooperation, quasi-military force, institution, target's regime type and target democracy) negatively affect the reported trade estimates and significantly reduce the effect size. Variables interacting with trade affect the trade estimate negatively and significantly reduce the effect by the size of 1.53. The sender cost and reputation variables are more associated with less publication bias[8], while the use of target democracy and institution (international organization) variables are associated with more bias.

Table 5.7 reports the variance inflation factor that detects the multicollinearity in the trade regression analysis. If there is correlation between the moderator variables in the multivariate model, then there is multicollinearity. If there is multicollinearity in the model, it affects the meta regression results.

Table 5.7: Variance Inflation Factor (VIF) for Multicollinearity

Variables	General Specification		Specific/Reduced Specification	
	VIF	1/VIF	VIF	1/VIF
Militarized Dispute	62.850	0.016	10.040	0.100
Cooperation	68.360	0.015	9.940	0.101
Institution	26.130	0.038	9.340	0.107
Target Democracy	31.760	0.031	8.110	0.123
Prior Relation	12.790	0.078	6.600	0.152
Precision (1/Se)	23.970	0.042	6.390	0.157
Sender Cost	55.360	0.018	5.560	0.180
Relative Power	30.280	0.033	5.390	0.186

[8] Publication selection bias produces an upward bias among international trade estimates, therefore a higher positive estimated moderator coefficient between reputation and standard error tells us that there is high upward bias but a less negative estimated moderator coefficients between target democracy and standard error tells us that there is less downward bias

Variables	General Specification		Specific/Reduced Specification	
	VIF	1/VIF	VIF	1/VIF
Sanction Length	9.400	0.106	4.850	0.206
Logit	10.860	0.092	3.970	0.252
Reputation	10.540	0.095	3.560	0.281
Journal Rank	42.870	0.023	3.200	0.312
Target's regime type	9.810	0.102	3.170	0.315
GNP Ratio	13.140	0.076	2.930	0.341
Interaction Terms	3.050	0.328	2.330	0.429
Quasi-military Force	9.110	0.110	2.240	0.447
Year of Publication	24.540	0.041	2.030	0.492
National Security	46.530	0.021		
Google Scholar	35.200	0.028		
Disruption	28.330	0.035		
Target GNP Cost	20.220	0.049		
HSE1990 Dataset	19.750	0.051		
Time Span	13.110	0.076		
Time	10.290	0.097		
Sanction imposition	5.130	0.195		
Observation	1.970	0.508		
Mean VIF	**24.05**		**5.27**	

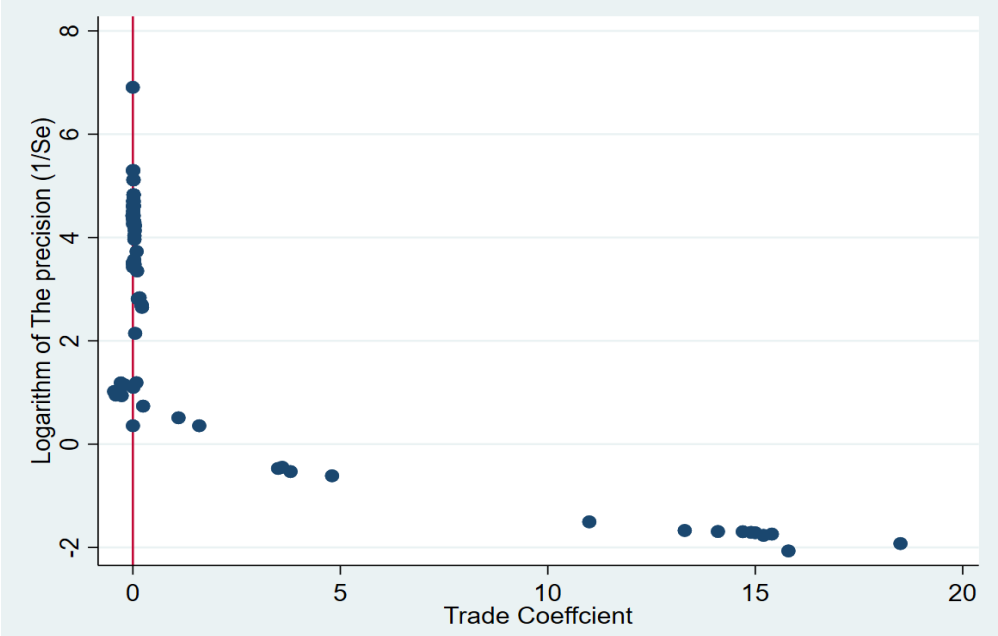
Source: Stata output of the variance inflation factor after doing the correlation matrix

As we can see from Table 5.7 of the variance inflation factor for the general and reduced specification, the general to specific approach reduced the multicollinearity between predictor variables in my sample of literature. If the VIF is greater than 10, the predictor variables can tell us they are highly corelated each other. Therefore, based on the results of variance inflation factor in Table 5.7 and by the rule of thumb we can understand that the predictor variables in my sample of literature are not highly corelated each other.

5.7 Robustness Checking Excluding Interaction Terms

5.7.1 Funnel Plot

Figure 5.4: The Logarithm of the precision and the trade effect (N=81)



Source: Author's elaboration

The funnel plot in Figure 5.4 looks similar with the non-linear specification funnel plot in Figure 5.2. Both figures indicate that some of the effect sizes are distributed to the right of the vertical reference line which indicates that there is a positive and upward publication bias in the literature. Therefore, we can understand that the t-statistics are overreported in the sample of literature.

5.7.2 Bivariate and Multivariate MRA

I run the bivariate and multivariate meta regression analysis to check further robustness by excluding the parameter estimates of interaction variables. If a researcher uses interaction terms in his/her econometric specification, the covariance and the sample mean of the interaction term variables are needed to compute the effect size of the "specification"[9]. Rather

[9] "When the meta regression analysis specification uses interaction terms with the independent variable and/or with other control variables: The effect size and standard error specification looks as follows. logY=$\alpha + \beta Xi + \theta Xi * Zi + \delta Zi + \cdots$.Effect size(e)=100 ($\beta + \theta\bar{x}$).
Se = $100\sqrt{(var(\beta) + 4\bar{x}i * \bar{z}i\ var(\theta) + 4\bar{x}covar(\beta,\theta))}$".

than omitting these interaction terms from the MRA sample, researchers use sample means to observe their effect on the outcome variable. However, in my sample of empirical studies three of them used interaction terms having 19 observations (Drury 1998, Kim 2013 and Lektzian and Patterson 2015), but the mean and covariance of the interaction terms are not provided. Therefore, I follow a different method to evaluate the effect of the interaction terms, as Lazzaroni and Van Bergeijk (2014:342) and (Demena and Van Bergeijk 2017:561) used binary variable to treat the interaction terms in their sample of literature, by including the binary variable in my meta regression dataset (if the parameter estimate of trade is coming from the interaction terms 1, otherwise 0).

Table 5.8: Bivariate PET-MRA for Trade effects: Excluding observations from regressions including interaction terms and un-published studies

Response Variable t-statistics	Cluster Data Analysis (CDA)		Mixed-effect Multilevel Model (MEM)	
	All Studies	Peer Reviewed	All Studies	Peer Reviewed
Genuine effect (1/SE)	-0.00208*	-0.00172	-0.00171	-0.000401
	(0.00121)	(0.00366)	(0.00115)	(0.00218)
Constant (bias)	1.790***	1.916***	1.322***	1.394***
	(0.315)	(0.336)	(0.281)	(0.284)
Observations	81	76	81	76
Number of Studies	22	22	22	22
Likelihood-ratio test (χ2)			86.5***	63.21***

Note: Standard errors are in parentheses at the study level. Null hypothesis for the likelihood-ratio test: No between-study heterogeneity (the MEM model has no benefit over OLS). *** p<0.01, ** p<0.05, * p<0.1.

Before I run the multivariate MRA, it is better to check the presence of between-study heterogeneity and variation in sampling error by applying both the Q-test and I^2 test. The value of the "Q-test" for the between-study heterogeneity is 302.02*** on N-1 "degrees of freedom" having p-value of 0.000 and I^2 statistics (the difference in international trade ascribable to heterogeneity) is 73.5 percent. Which means, the variation in the reported trade effect size because of sampling error is 26.5%. And the trade estimate of between-study variance, Tau-squared is 0.0003. This variation in sampling error and the presence of heterogeneity encourages me to consider other sources of heterogeneity in the literature. Table 5.8 reports the precision effect testing meta regression analysis excluding the interaction terms. The clustered data analysis result for the genuine effect is negative and significant for all studies but not for peer reviewed studies (column 2 and 3). When we see the preferred mixed effect multilevel model both in all studies and peer reviewed studies the precision is negative

and statistically insignificant (column4 and 5). However, with the interaction terms the mixed effect multilevel meta regression analysis of peer reviewed result is positive and statistically significant (Table 5.2) but the precision is negative and statistically insignificant without the interaction terms (Table 5.8). But the bias is positive and statistically significant at the 1% confidence level for both with and without the interaction terms.

In the case of bivariate PET-MRA in mixed effect multilevel model for both all studies and peer reviewed studies meta regression analysis, the precision is negative and statistically insignificant, but we have to consider that this result is an average across all empirical studies. Therefore, I have to run a multivariate meta regression analysis as the findings may also depend on other moderator variables which may be the potential source of heterogeneity like we did in multivariate model with the interaction terms in Table 5.6. Table 5. 9 presents the results for multivariate meta regression analysis for precision and sources of research heterogeneity excluding the interaction terms to compare the findings with the interaction terms specification.

Table 5.9: Multivariate MRA for precision and sources of Heterogeneity (N=81)

Variables	(Specific) t-value	(CDA) t-value	(MEM) t-value	(Robust) t-value
Precision (1/Se)	-0.00409***	-0.00409**	-0.00409***	-0.00409**
	(0.00131)	(0.00148)	(0.00114)	(0.00164)
Constant (Bias)	3.817***	3.817***	3.817***	3.817***
	(0.820)	(0.815)	(0.717)	(1.100)
Year of Publication	0.554***	0.554***	0.554***	0.554***
	(0.113)	(0.0713)	(0.0984)	(0.144)
Peer-Reviewed	-6.515***	-6.515***	-6.515***	-6.515***
	(1.560)	(1.670)	(1.365)	(1.724)
Journal Rank	0.688**	0.688***	0.688***	0.688*
	(0.278)	(0.190)	(0.244)	(0.383)
Google Scholar	0.0313***	0.0313***	0.0313***	0.0313***
	(0.00430)	(0.00401)	(0.00376)	(0.00405)
HSE1990 dataset	-1.009***	-1.009***	-1.009***	-1.009***
	(0.181)	(0.0899)	(0.158)	(0.146)
Time Span	0.0355***	0.0355***	0.0355***	0.0355***
	(0.0119)	(0.0111)	(0.0104)	(0.0116)
Logit	-4.141***	-4.141***	-4.141***	-4.141***
	(0.535)	(0.468)	(0.468)	(0.512)
Sanction Imposition	4.608***	4.608***	4.608***	4.608***
	(0.456)	(0.357)	(0.399)	(0.307)
Sanction Length	-1.273***	-1.273***	-1.273***	-1.273***

Variables	(Specific) t-value	(CDA) t-value	(MEM) t-value	(Robust) t-value
	(0.207)	(0.119)	(0.181)	(0.271)
Cooperation	2.384***	2.384***	2.384***	2.384***
	(0.523)	(0.531)	(0.457)	(0.571)
Sender Cost	-1.702***	-1.702***	-1.702***	-1.702***
	(0.317)	(0.235)	(0.278)	(0.289)
US Sender	1.777***	1.777***	1.777***	1.777***
	(0.283)	(0.119)	(0.247)	(0.230)
Militarized Dispute	-6.835***	-6.835***	-6.835***	-6.835***
	(0.779)	(0.763)	(0.682)	(0.738)
Time	-2.578***	-2.578***	-2.578***	-2.578***
	(0.316)	(0.309)	(0.277)	(0.348)
Quasi-military Force	-2.665***	-2.665***	-2.665***	-2.665***
	(0.308)	(0.129)	(0.269)	(0.149)
Issue Salience	3.604***	3.604***	3.604***	3.604***
	(0.521)	(0.326)	(0.456)	(0.350)
Target's Regime type	-2.995***	-2.995***	-2.995***	-2.995***
	(0.223)	(0.126)	(0.195)	(0.292)
Observations	81	81	81	81
Number of Studies	22	22	22	22

Note: standard errors are clustered in parentheses. *** p<0.01, ** p<0.05, * p<0.1. And CDA and MEM denote cluster data analysis and mixed-effect multilevel model respectively. CDA and MEM mean Cluster Data Analysis and Mixed-effect Multilevel model.

In order to check if the extent of the bias is depend on study characteristics (data, publication, estimation and specification characteristics), I estimate specification (4.5) and report the multivariate MRA results in Table 5.9 for 81 sample observations. Just like the non-linear specification of multivariate MRA, the publication bias in this case is not denoted by the constant term in the regression outcome only but it is also captured by the moderator variables except the precision (1/Se). But, the coefficient for the precision still represent the genuine trade effect corrected for publication bias. As we can see from Table 5.9 because of controlling study aspects, the precision comes to statistically significant which indicates that the control variables have significant impact on the result of the precision (1/Se).

On average year of publication, journal quality, Google Scholar, time span, trade linkage before sanction imposition, cooperation, US is sender and issue salience variables are positively affecting the trade estimates and significantly increase the magnitude of trade estimates, whereas peer-reviewed journals, time (defined as the last two digits the economic sanctions imposed and began in the sanction year), target's regime type, quasi-military force, military dispute, sender cost, sanction length episode, logit method and HSE1990 dataset variables

are negatively affecting the trade estimates and significantly reduce the size of the estimates. The peer-reviewed journals and military dispute variables are more associated with less publication bias[10], while trade linkage before sanction imposition and issue salience variables are associated with more publication bias.

In both with and without the interaction terms the precision and the publication bias are statistically significant which assert that the impact of trade on the success of economic sanctions literature are suffered from publication bias, but the genuine effect shows that trade has significant impact on the success of economic sanctions.

[10] In Table 5.9 publication selection bias produces an upward bias among international trade estimates, so a large negative estimated coefficient on the interaction between additional policies and standard error tells us that there is less downward bias but a large positive estimated coefficient on the interaction between reputation and standard error tells us that there is high upward bias.

Chapter 6 | Conclusion

There are limited number of primary studies on the area of economic sanctions success and trade linkage and recent studies have witnessed that the number of studies published on this area are very few. This paper takes the international trade literature on the impact of success of economic sanctions that covers from 1985 to 2017. These primary studies are heterogeneous in terms of findings, the number of economic sanction cases used and methodological characteristics. In this paper, I discussed the meta regression analysis by providing the detail descriptive statistics and other econometric synthesis of the empirical studies. The main meta regression findings are summarized as follows:

The meta regression findings show that publication bias is positive and statistically significant in all cases of funnel plots, MST, FAT-PET, PEESE and multivariate analysis which seem relevant and indicated that the literature is suffering from positive publication bias. Regarding genuine effect, the meta regression analysis indicates that on average trade linkage has a positive and statistically significant impact on the success of economic sanctions in terms of the large sample that has other interaction variables with trade but negative and statistically significant in terms of small sample without interacting variables with trade. Regarding sources of heterogeneity; estimation, specification and publication characteristics are identified in the large sample with interaction terms, but data, estimation, specification and publication sources of heterogeneity are identified in the small sample without interaction terms and these variables have strong effect on the findings of the primary studies.

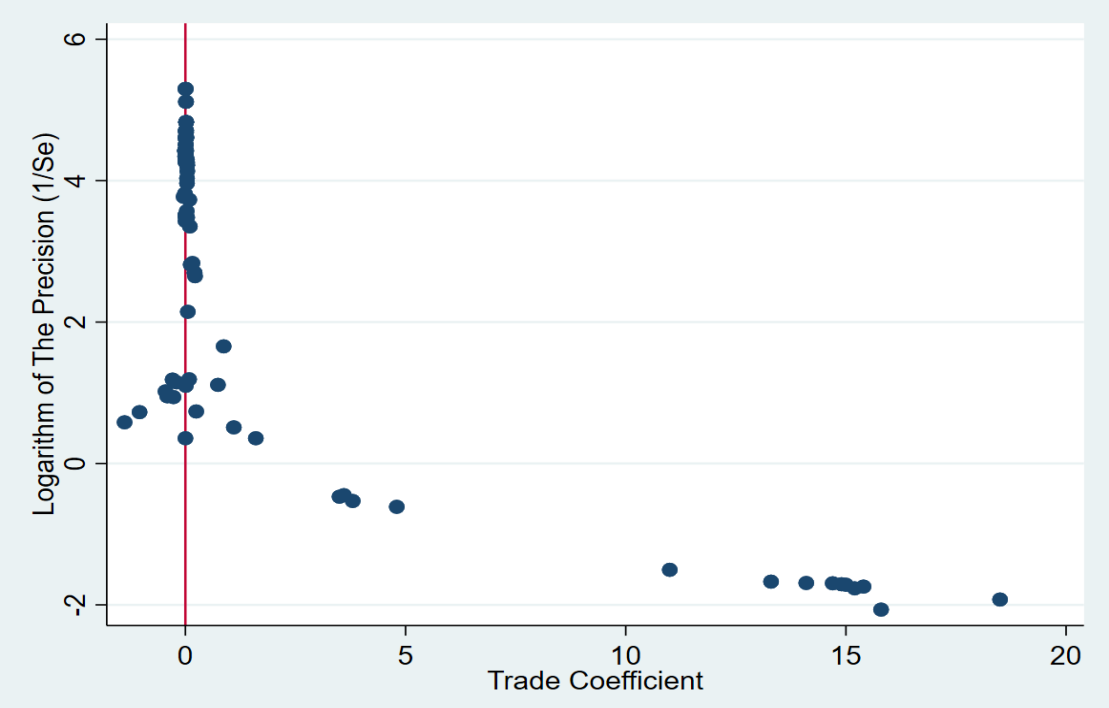
It is worth importance to consider that some of the empirical studies must be excluded from the main regression due to missing values of t-statistics and standard errors in the studies (HSEO 2007 and HSE 1990) and some control variables are also excluded because of the number of observations trade coefficient in the regression tables are missed and other primary studies are excluded due to the complicated nature of taking the trade effect coefficients and t-values from regression tables and from the reported graphs (Whang and McLean 2010, Whang 2010, Bapat et al 2013 and Early 2011).

6.1 Future Research Suggestions

This study can suggest that future researchers must identify and carefully select all the primary studies variables listed in the main regression so that it all the exogenous variable that may affect the outcome variables will be easily known. This paper can also help for future researchers to focus on the different measurement of the main explanatory variables in the primary studies so that before running the main regression, he/she has to check the coefficients measurement and put with the same measure so that, it is easy to compare the results. Furthermore, this paper can provide indications to future empirical investigations of the possible sources of research heterogeneity and conducting more research on the area is necessary. Future studies should focus on the selection of study characteristics such as data estimation and specification characteristics to give accurate findings on the impacts of trade linkage on the success of economic sanctions.

Appendix

Appendix 1: Funnel Plot of the Logarithm of the precision and the trade effect without outlier



Source: Author's elaboration

Appendix 2: MST, FAT-PET and PEESE MRA results for corrected coefficient values

Variables	Cluster Data Analysis (CDA)		Mixed effect multilevel Model (MEM)	
$\ln\lvert t_{ij}\rvert$	All Studies	Peer-reviewed	All Studies	Peer-reviewed
		MST-MRA		
$\ln\lvert obs\rvert$	0.405	1.196	0.00600	1.142
	(0.486)	(1.366)	(0.368)	(0.712)
Constant	-2.047	-5.673	-0.565	-5.848*
	(2.574)	(6.571)	(1.812)	(3.335)
		FAT-PET		
Precision (1/Se)	-0.00135	-0.000440	-0.000686	0.00703***
	(0.00156)	(0.00413)	(0.00137)	(0.00239)
Constant (Bias)	1.469***	1.559***	1.220***	0.891***
	(0.350)	(0.481)	(0.276)	(0.300)
Likelihood-ratio test ($\chi 2$)			30.07***	49.55***
		PEESE		
Precision (1/Se)	0.00528	0.0151***	0.00196	0.00985***
	(0.00444)	(0.00280)	(0.00160)	(0.00228)
Constant (Bias)	0.502	2.026	-2.380**	0.314

	(1.381)	(1.671)	(1.131)	(0.955)
Likelihood-ratio test (χ2)			78.17***	77.78***
Observations	100	91	100	91
Number of Studies	22	20	22	20

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix 3: Multivariate analysis for sources of heterogeneity for corrected coefficients

Variables	(Specific) t-value	(CDA) t-value	(MEM) t-value	(Robust) t-value
Precision (1/Se)	0.00261**	0.00261***	0.00261**	0.00261***
	(0.00116)	(0.000686)	(0.00106)	(0.000582)
Constant (Bias)	4.892***	4.892***	4.892***	4.892***
	(0.753)	(0.502)	(0.690)	(0.561)
Year of Publication	-0.652***	-0.652***	-0.652***	-0.652***
	(0.151)	(0.0756)	(0.138)	(0.120)
HSE1990	0.483*	0.483***	0.483**	0.483**
	(0.265)	(0.127)	(0.243)	(0.235)
Sanction Imposition	-1.520**	-1.520***	-1.520**	-1.520***
	(0.671)	(0.397)	(0.615)	(0.526)
Interaction Terms	-1.457***	-1.457***	-1.457***	-1.457***
	(0.237)	(0.334)	(0.218)	(0.353)
Prior Relation	-0.827***	-0.827***	-0.827***	-0.827***
	(0.203)	(0.251)	(0.186)	(0.195)
Sanction Length Episode	-0.709**	-0.709***	-0.709**	-0.709*
	(0.306)	(0.180)	(0.280)	(0.395)
Financial sanction	-2.532***	-2.532***	-2.532***	-2.532***
	(0.547)	(0.243)	(0.501)	(0.309)
Time	1.216*	1.216***	1.216**	1.216**
	(0.633)	(0.306)	(0.580)	(0.470)
Institution	-3.482***	-3.482***	-3.482***	-3.482***
	(0.678)	(0.276)	(0.621)	(0.561)
Military Impairment	1.064*	1.064***	1.064**	1.064**
	(0.536)	(0.321)	(0.491)	(0.509)
Disruption	0.892*	0.892***	0.892**	0.892*
	(0.464)	(0.240)	(0.425)	(0.533)
Target's Regime Type	-1.117***	-1.117***	-1.117***	-1.117**
	(0.400)	(0.268)	(0.367)	(0.495)
Sender's Democracy	-2.847***	-2.847***	-2.847***	-2.847***
	(0.663)	(0.228)	(0.607)	(0.386)
Reputation	2.995***	2.995***	2.995***	2.995***
	(0.633)	(0.247)	(0.580)	(0.307)
Observations	100	100	100	100
Number of studies	22	22	22	22

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix 4: The General Specification MRA result (N=100)

Variables	Coef.	Std. Err.	t-values	P>t	[95% Conf. Interval]	
Precision (1/Se)	0.0039	0.0039	1.0000	0.3220	-0.0039	0.0118
Year of Publication	-0.7474	0.3696	-2.0200	0.0470	-1.4841	-0.0108
Journal Rank	-0.6287	1.1526	-0.5500	0.5870	-2.9257	1.6684
Google Scholar	-0.0031	0.0069	-0.4600	0.6480	-0.0168	0.0105
HSE1990 Dataset	-0.3713	0.7652	-0.4900	0.6290	-1.8964	1.1538
Observation	-0.0003	0.0002	-1.1300	0.2600	-0.0007	0.0002
Time Span	0.0143	0.0171	0.8400	0.4040	-0.0197	0.0484
Logit	1.2511	0.5613	2.2300	0.0290	0.1325	2.3696
Sanction Imposition	-0.0168	0.8835	-0.0200	0.9850	-1.7777	1.7440
Interaction Terms	-1.5635	0.3783	-4.1300	0.0000	-2.3174	-0.8095
GNP Ratio	1.0383	0.6553	1.5800	0.1170	-0.2677	2.3443
Prior Relation	-0.8516	0.6079	-1.4000	0.1660	-2.0632	0.3600
Sanction Length	-1.6856	0.5228	-3.2200	0.0020	-2.7275	-0.6436
Cooperation	-1.4324	1.4477	-0.9900	0.3260	-4.3176	1.4529
Target GNP Cost	-0.3608	0.7682	-0.4700	0.6400	-1.8918	1.1702
Sender Cost	0.9444	1.2908	0.7300	0.4670	-1.6281	3.5170
Militarized Dispute	1.5912	1.4223	1.1200	0.2670	-1.2435	4.4259
Time	-0.0432	0.6582	-0.0700	0.9480	-1.3549	1.2686
Quasi-military Force	-1.3751	1.0804	-1.2700	0.2070	-3.5283	0.7782
Institution	-3.5387	1.2521	-2.8300	0.0060	-6.0340	-1.0433
Disruption	-0.1093	1.0312	-0.1100	0.9160	-2.1645	1.9459
National Security	0.7704	1.2534	0.6100	0.5410	-1.7277	3.2684
Target's Regime Type	-1.5296	0.8507	-1.8000	0.0760	-3.2251	0.1659
Target Democracy	-6.4748	3.4211	-1.8900	0.0620	-13.2931	0.3435
Relative Power	1.8442	1.0306	1.7900	0.0780	-0.2097	3.8981
Reputation	4.4829	1.4078	3.1800	0.0020	1.6772	7.2885
Constant	2.9970	1.0008	2.9900	0.0040	1.0024	4.9915

Source: STATA output

Appendix 5: Correlation Matrix of Coefficients of Regress Model (General Specification): N= 100

Variables	Precision	Year of Publication	Journal Rank	Google Scholar	HSE1990	Observation	Time Span	Logit Method	Sanction Imposition	Interaction Terms	GNP ratio	Prior relation	Sanction Length	Cooperation	Target GNP cost	sender cost	MIDS	Time	QRM	Institution	Disruption	National Security	Regime Type	Target Democracy	Relative Power	Reputation	Constant
Precision (1/Se)	1.000																										
Year of Publication	0.233	1.000																									
Journal Rank	-0.786	-0.451	1.000																								
Google Scholar	-0.109	0.231	0.245	1.000																							
HSE1990	-0.150	0.338	-0.086	-0.517	1.000																						
Observation	0.131	0.039	-0.178	-0.052	0.067	1.000																					
Time Span	0.465	-0.353	-0.440	-0.153	-0.519	0.106	1.000																				
Logit Method	-0.166	-0.701	0.276	-0.464	0.058	-0.032	0.207	1.000																			
Sanction Imposition	-0.057	0.672	-0.158	-0.114	0.429	0.039	-0.273	-0.413	1.000																		
Intraction Terms	0.399	0.098	-0.112	0.195	-0.239	0.052	0.238	-0.148	0.029	1.000																	
GNP ratio	0.380	-0.565	-0.153	-0.255	-0.564	0.014	0.660	0.295	-0.414	0.239	1.000																
Prior relation	-0.062	-0.103	0.384	0.416	-0.289	-0.322	0.059	0.031	-0.054	0.499	0.105	1.000															
Sanction Length	-0.085	0.247	-0.141	-0.240	0.586	0.055	-0.371	-0.094	0.094	-0.242	-0.475	-0.362	1.000														
Cooperation	-0.891	-0.481	0.880	0.096	-0.041	-0.116	-0.340	0.259	-0.114	-0.274	-0.096	0.165	-0.070	1.000													
Target GNP cost	0.789	0.057	-0.791	-0.315	-0.086	0.157	0.541	-0.005	-0.218	0.188	0.409	-0.277	0.118	-0.767	1.000												
sender cost	0.479	0.685	-0.729	-0.241	0.544	0.224	-0.173	-0.294	0.400	-0.091	-0.390	-0.531	0.442	-0.726	0.416	1.000											
MIDS	0.759	0.087	-0.792	-0.467	0.167	0.087	0.447	0.190	-0.127	0.129	0.298	-0.206	0.228	-0.793	0.827	0.540	1.000										
Time	-0.311	-0.273	0.343	0.538	-0.455	-0.077	0.042	0.004	-0.333	-0.070	0.064	0.229	-0.171	0.388	-0.342	-0.428	-0.436	1.000									
QRM	-0.368	0.508	0.157	0.140	0.553	-0.011	-0.694	-0.180	0.376	-0.280	-0.837	-0.179	0.450	0.104	-0.437	0.389	-0.206	-0.240	1.000								
Institution	-0.475	0.330	0.209	-0.236	0.497	-0.050	-0.540	-0.282	0.518	-0.418	-0.525	-0.423	0.335	0.322	-0.410	0.200	-0.418	-0.402	0.581	1.000							
Disruption	-0.357	-0.529	0.624	0.609	-0.546	-0.148	0.003	0.110	-0.551	0.094	0.168	0.458	-0.260	0.537	-0.348	-0.742	-0.550	0.691	-0.265	-0.363	1.000						
National Security	-0.629	-0.549	0.834	0.419	-0.391	-0.213	-0.115	0.326	-0.414	-0.095	0.062	0.491	-0.362	0.752	-0.638	-0.838	-0.613	0.492	-0.021	-0.131	0.742	1.000					
Regime Type	-0.298	0.364	-0.009	-0.123	0.577	0.177	-0.589	-0.199	0.389	-0.398	-0.628	-0.595	0.589	0.129	-0.266	0.509	-0.207	-0.073	0.617	0.643	-0.292	-0.334	1.000				
Target Democracy	-0.928	-0.111	0.771	0.312	-0.002	-0.117	-0.515	-0.043	0.098	-0.337	-0.396	0.047	0.024	0.860	-0.826	-0.472	-0.876	0.400	0.373	0.494	0.431	0.605	0.344	1.000			
Relative Power	0.481	-0.142	-0.387	0.265	-0.753	0.096	0.667	-0.051	-0.278	0.128	0.546	-0.106	-0.461	-0.393	0.411	-0.048	0.213	0.276	-0.523	-0.495	0.184	-0.122	-0.364	-0.340	1.000		
Reputation	0.747	-0.270	-0.469	0.008	-0.375	0.101	0.620	0.170	-0.486	0.320	0.542	0.093	-0.233	-0.598	0.662	0.087	0.614	0.017	-0.540	-0.727	0.104	-0.187	-0.499	-0.771	0.583	1.000	
Constant	-0.257	-0.567	0.450	-0.040	-0.219	-0.164	-0.217	0.230	-0.650	-0.216	0.240	-0.083	-0.208	0.408	-0.166	-0.428	-0.272	0.120	-0.156	0.032	0.374	0.445	-0.130	0.259	-0.058	-0.009	1.000

Source: Author's elaboration

Appendix 6: Correlation Matrix of Coefficients of Regress Model (Reduced Model): N= 100

Variables	Precision	Year of publication	Journal Rank	Logit	Interaction terms	GNP ratio	Prior relation	Sanction Length	Cooperation	Senfder Cost	Militarized Dispute	QRM	Institution	Regime type	Target Democracy	Relative power	Reputation	Constant
Precision(1/Se)	1																	
Year of Publication	-0.062	1.000																
Journal Rank	-0.212	-0.178	1.000															
Logit	0.139	-0.322	0.110	1.000														
Intraction Terms	0.371	0.104	0.185	0.068	1.000													
GNP ratio	0.490	0.087	-0.355	-0.144	0.294	1.000												
Prior Relation	0.443	0.116	0.172	0.100	0.606	0.346	1.000											
Sanction Length	-0.345	0.046	0.141	-0.120	-0.167	-0.392	-0.178	1.000										
Cooperation	-0.717	0.017	0.213	-0.290	-0.231	-0.298	-0.367	0.308	1.000									
Sender Cost	0.169	-0.093	-0.369	0.387	-0.256	-0.105	-0.310	-0.051	-0.555	1.000								
Militarized Dispute	0.534	-0.199	-0.354	0.398	0.220	0.355	0.392	0.121	-0.610	0.294	1.000							
QRM	-0.337	-0.043	-0.038	0.249	-0.292	-0.517	-0.388	0.440	0.114	0.296	0.080	1.000						
Institution	-0.621	0.188	0.097	-0.471	-0.539	-0.472	-0.674	0.345	0.602	-0.076	-0.723	0.280	1.000					
Target's regime type	-0.424	-0.188	-0.073	0.075	-0.445	-0.472	-0.680	0.417	0.399	0.275	-0.224	0.500	0.547	1.000				
Target Democracy	-0.891	0.124	0.173	-0.215	-0.384	-0.472	-0.536	0.330	0.750	-0.230	-0.599	0.319	0.699	0.462	1.000			
Relative power	0.090	-0.157	-0.175	0.412	-0.381	0.073	-0.420	-0.297	-0.353	0.458	0.179	0.233	-0.025	0.138	-0.061	1.000		
Reputation	0.712	-0.296	-0.152	0.253	0.219	0.344	0.294	-0.331	-0.705	0.375	0.511	-0.162	-0.532	-0.257	-0.776	0.264	1.000	
Constant	-0.067	-0.203	-0.028	-0.485	-0.125	0.023	-0.167	-0.526	0.106	-0.255	-0.492	-0.385	0.189	-0.188	0.099	-0.069	-0.057	1.000

Source: Author's elaboration

Appendix 7: Detail reports about all the excluded studies based on the study's inclusion and exclusion criteria of data protocol

S. No	Author(s)	Title of the Study/Paper/Book	Year of Publication	Why is the study excluded?. (Justification for exclusion).
1	Hufbauer et al	Economic Sanctions Reconsidered	2007	Based on the exclusion criteria in the systematic review protocol the book does not have either t-statistics or standard error.
2	Bapat et al	Determinants of Sanctions Effectiveness: Sensitivity Analysis Using New Data	2013	The study has both t-statistics and the trade coefficients but in the form of figures which is difficult to take the exact data from figures.
3	Taehee Wang	Structural estimation of economic sanctions: From initiation to outcomes	2010	The study has both compliance (success) and deadlock(failure) outcomes and the success outcome is binary (1 and 0) which means there is no either t-statistics or trade coefficients to take.
4	Bryan R. Early	Unmasking the Black Knights: Sanctions Busters and Their Effects on the Success of economic sanctions	2011	The study does not have trade variables to explain the economic sanctions success.
5	Bryan R. Early	Sleeping with Your Friends' Enemies: An Explanation of Sanctions-Busting Trade	2009	The study used sanction busters as the dependent variable which is not economic sanctions success.
6	DAN G. COX and A. COOPER DRURY	Democratic Sanctions: Connecting the Democratic Peace and Economic Sanctions	2006	The study used whether economic sanctions are used as the dependent variable which is not economic sanctions success
7	Jing et al	Instrument Choice and the Effectiveness of International Sanctions: A Simultaneous	2003	The economic sanctions success dependent variable specification does not have trade link variable.
8	Hafner-Burton and Montgomery	Power or Plenty How Do International Trade Institutions Affect Economic Sanctions?	2008	The study used economic sanctions as the dependent variable in the sanctions model.
9	Nooruddin and Payton	Dynamics of influence in international politics: The ICC, BIAs, and economic sanctions	2010	The stud employed defense pact, exemptions and sanction imposition as the dependent variables which are not economic sanctions success
10	Nicholas L. Miller	The Secret Success of Nonproliferation Sanctions	2014	The study used trade link as the independent variable bust used Nonproliferation Sanctions success as the dependent variable which is not economic sanctions success
11	Dizaji and van Bergeijk	Potential early phase success and ultimate failure of economic sanctions: A VAR approach with an application to Iran	2013	The study economic sanctions as the independent variable and imports, government consumption, investment and income as the dependent variables. The independent and dependent variables are reverse.
12	Raul Caruso	The Impact of International Economic Sanctions on Trade	2003	The study used trade as a dependent variable and sanction types as independent variable. There is a causality problem of interest. Success or sanction should be the dependent variable to be included into the relevant study literature.
13	Selwyn J. V. Moons and Peter A. G. van Bergeijk	Does Economic Diplomacy Work? A Meta-analysis of Its Impact on Trade and Investment	2016	The study investigates the impact of economic diplomacy on international economic flows (trade and Foreign direct investment) and it is a meta-analysis study which is a meta study and even there is a causality issue of sanction and trade.
14	Matthias Neuenkirch and Florian Neumeier	The impact of UN and US economic sanctions on GDP growth	2015	The study investigates the impact of UN and US economic sanctions on the sanctioned state's economic performance (GDP Growth). The Dependent variable is the annual growth rate of GDP per capita, it is not economic sanction success.
15	Crozet, Matthieu; Hinz, Julian	Friendly fire - the trade impact of the Russia sanctions and counter-sanctions	2016	The study used trade performance and total exports as the dependent variables in different estimations and post sanction is the independent variable interacted with the RUS exporter which is not the variable of interest that this study protocol includes.
16	Daniel W. Drezner	Serious about sanctions - positive and negative aspects of economic sanctions	2004	The study is all about the positive and negative aspect of qualitative economic sanctions and doesn't have econometric estimation of dependent and independent variables of interest.
17	Peter A.G. Van Bergeijk	The Impact of Economic Sanctions in the 1990s	1995	The study focused on the history of the number of economic sanction initiated, successful sanction initiated, success rate and the sanction cost. It doesn't have an econometric estimation of sanction success as dependent variable and trade/export/import as independent variable which is one of my study's studies inclusion criteria.
18	Nikolay Marinov	Do Economic Sanctions Destabilize Country Leaders?	2005	The study investigated whether economic sanction destabilized leaders and the main dependent variable the study used is leadership change which is not economic sanctions success.
19	Jonathan Kirshner	The micro-foundations of economic sanctions	1997	The study is entirely focused on qualitative study of micro-foundations of economic sanctions. It does not have the econometric estimation for dependent and independent variables.
20	Dursun Peksen	Coercive Diplomacy and Press Freedom: An Empirical Assessment of the Impact of Economic Sanctions on Media Openness	2010	The study investigated the impact of coercive diplomacy (in the form of economic sanction) on media openness or press freedom. The paper used status of press freedom as the dependent variable, but economic sanctions and trade variables are independent variables in the study.

Appendix 7 Continued

S. No	Author(s)	Title of the Study/Paper/Book	Year of Publication	Why is the study excluded?. (Justification for exclusion).
21	Amy Pond	Economic Sanctions and Demand for Protection	2015	The paper assesses the impact of sanctions on market protection in which it used tariff rate as the dependent variable and trade sanction as the independent variable.
22	Abel Escriba`-Folch and Joseph Wright	Dealing with Tyranny: International Sanctions and the Survival of Authoritarian Rulers	2010	This study examines whether economic sanctions destabilize authoritarian leaders in different types of regimes. The paper used RulerExit as the binary dependent variable and sanctions and trade as a % of GDP as independent variables which is not this study's data protocol of interest which assumes success as a dependent variable.
23	Susan Hannah Allen and David J Lektzian	Economic sanctions: A blunt instrument?	2012	The paper examines the generalizability of all sanctions have extensive public health consequence conclusions in a quantitative cross-national study of sanctions and their public health effects and it demonstrates how smart sanction and humanitarian exemptions is important in sanctions policy. The paper used health care allocation, food supply, immunization, life expectancy and HALE as dependent variable and sanctions as independent variable.
24	Dursun Peksen	Economic Sanctions and Human Security: The Public Health Effect of Economic Sanctions	2011	The study focuses cross-national empirical research that examines the human cost of economic sanction and investigates the quantitative analysis of the effect of economic sanctions on public health conditions in target countries. The study used the natural log of child mortality rate as the dependent variable and economic sanction as one of its independent variables.
25	Taehee Whang	Playing to the Home Crowd? Symbolic Use of Economic Sanctions in the United States	2011	The paper investigated the symbolic use of economic sanctions for political gain in the US and examines the impact of sanction imposition on US presidential approval ratings. The study used the approval rating difference and sanction initiation as the study's dependent variable but there is no trade and proxy for trade variables as independent variables in the sanction initiation estimation model.
26	PETER ANDREAS	Criminalizing Consequences of Sanctions: Embargo Busting and Its Legacy	2005	The study identified the potential criminalizing effect of sanctions within and across targeted country and time during and after the sanction period and applied an in-depth evaluation for the case of Yugoslavia. The paper is qualitative study, it does not have an econometric estimation of dependent and independent variables to explain the study.
27	Arash Saghafian	Sanctions and Income Inequality: How Economic Sanctions Affect Income Inequality	2014	The paper investigated the effect of declining trade openness on income inequality because of economic sanction, war and natural disaster on 113 countries. The study focused only on the effect of US sanctions on target countries. The study used income inequality (measured by GINI coefficients) as dependent variable and trade openness and sanctions are used as independent variables.
28	Yong Suk Lee	Friends by Sanctions: The Unequal Impact of International Relations on Trade and Welfare	2015	The study examined the impact of economic sanctions on trade and assessed how international relations influence the sanctions welfare implication. The paper used trade as dependent variable and sanction as independent variable to explain the impact of sanction on trade which has reverse causality for my study's data protocol of interest and even sanctions is not economic sanctions success.
29	Arvid Ekengard	The European Union as a User of Economic Sanctions: Patterns and Effects on Trade	2006	The paper examined the trade effects of economic sanctions (the impacts of economic sanctions on trade) by the European Union covering from 1990 to 2000. The study used gravity model to explain how economic sanctions affected trade between the EU and target countries. The paper used trade as the response variable and sanction as one of the dependent variables which indicates that there is a causality problem.
30	Anna Ekstam	A gravity analysis of the adverse effects of U.S. Sanctions and their after-life	2018	The paper investigated the impact of economic sanctions on the US exports even after the sanctions have been lifted. The study used the Augmented gravity model to explain the impact of sanctions on exports and export is the dependent variable, but sanctions is used as independent variable.
31	Melody Splinter	Economic sanctions and growth decelerations: they maybe work	2016	This paper investigated the impact of sanction periods on the growth decelerations and used logit and fixed effect models to explain it. It has used panel data from the World Bank ranging from 1960 - 2012. Growth deceleration is the study's dependent variable and economic sanction is the main
32	Olena Ogrokhina	Analysis of Sender's Behavior and Its Ramifications In International Economic Sanctions	2008	The study used outcome of international economic sanction as the dependent variable and there is no trade link in the explanatory variables.
33	Morgan et al	Threat and Imposition of Sanctions (TIES) Data 4.0 Users. Manual Case Level Data	2013	The paper is user's manual case level data for Threat and Imposition of Sanctions (TIES) Data.
34	Daniel W Drezner	Serious about sanctions	1998	The paper is all about the qualitative analysis of economic sanctions success. It does not have econometric estimation.
35	William Hutchins Seitz	The Effects and Determinants of Coercive Economic Statecraft, Commodity Certification Programs, and Sanctions	2001	The paper used both the use and threat of economic sanction as the dependent variable which are not economic sanctions success
36	Sean M. Bolks and Dina Al-Sowayel	How Long Do Economic Sanctions Last? Examining the Sanctioning Process through Duration	2000	The study used sanction duration as the dependent variable and economic sanctions health of the target the proxy for trade linkage as explanatory variable.
37	David J. Lektzian and Christopher M. Sprecher	Sanctions, Signals, and Militarized Conflict	2007	The paper used the existence of a dyadic militarized interstate dispute as the primary dependent variable and economic sanction as the dependent variable.
38	Daniel W. Drezner	Bargaining, Enforcement, and Multilateral Sanctions: When is Cooperation counterproductive?	2000	Even if the study used economic sanction as the dependent variables there is no trade variables that predicts the economic sanctions success.
39	Morgan et al	The Threat and Imposition of Economic Sanctions, 1971–2000	2009	The paper explained the economic sanctions success data set of the threat and imposition of economic sanctions.
40	Abel Escribà-Folch	Economic sanctions and the duration of civil conflicts	2010	The paper used civil war end as the outcome variable which is not economic sanctions success.

Appendix 7 Continued

S. No	Author(s)	Title of the Study/Paper/Book	Year of Publication	Why is the study excluded?. (Justification for exclusion).
41	Valentin L. Krustev And T. Clifton Morgan	Ending Economic Coercion: Domestic Politics and International Bargaining	2011	The duration of an economic coercion case is the dependent variable in the study which is not economic sanctions success.
42	Nikolay Marinov	An Elusive Statistic: Estimating the Relationship Between Sanctions and Success_	2005	The study used policy result as the dependent variable and types of sanctions as the independent variables.
43	Bruce Bartlett	What's Wrong with Trade Sanctions	1985	The study explained the qualitative analysis of economic sanctions success and failure
44	Sylvanus Kwaku Afesorgbor and Renuka Mahadevan	The Impact of Economic Sanctions on Income Inequality of Target States	2016	The study used income inequality as the dependent variable and trade openness as the independent variable
45	T. Clifton Morgan and Valerie L. Schwebach	Fools Suffer Gladly: The Use of Economic Sanctions in International Crises	1997	Dispute outcome of war is used as the study's dependent variable which is not economic sanctions success
46	Reed M. Wood	"A Hand upon the Throat of the Nation": Economic Sanctions and State Repression, 1976-2001	2008	State repression is used as the study's dependent variable and sanctions episode is used to predict state repression. The dependent variable is not economic sanctions success
47	Mélanie Marilyne Golliard	Economic Sanctions: Embargo on Stage. Theory and Empirical Evidence.	2013	The study use trade as the dependent variable and economic sanction as independent variable. There is a causality problem.
48	Sylvanus Kwaku Afesorgbor	The Impact of Economic Sanctions on International Trade: How do Threatened Sanctions Compare with Imposed Sanctions?	2016	In this study export and import are used as the dependent variable and types of economic sanctions are used as independent variable. There is also causality problem.
49	Shin et al	Do economic sanctions impair target economies?	2016	The study used terms of trade foreign direct investment and portfolio investment as the dependent variables and all types of sanctions are used one of the independent variables. The dependent variable is not economic sanctions success
50	Lisa Hultman1 and Dursun Peksen	Successful or Counterproductive Coercion? The Effect of International Sanctions on Conflict Intensity	2017	A count of the number of fatalities is used as the dependent variable and sanction threats as the predictor variable. The dependent variable is not economic sanctions success and trade is not the independent variable
51	Dursun Peksen & A. Cooper Drury	Coercive or Corrosive: The Negative Impact of Economic Sanctions on Democracy	2010	The study used democracy to explain the dependent variable which is immediate impact of economic sanction which is not economic sanctions success and trade is also not there as independent variable
52	A. Cooper Drury	Sanctions as Coercive Diplomacy: The U. S. President's Decision to Initiate Economic Sanctions	2001	The study used economic sanctions initiations as the dependent variable which is not economic sanctions success
53	Dorussen and Jorngryn Mo	Ending Economic sanctions. Audience costs and rent-seeking as commitment strategies	2001	The study explains the economic sanctions episode and ending sanctions as its main dependent variable. All about uncertainty. Does not talk about the economic sanction's success and trade
54	Peter A.G. van Bergeijk	On target? EU sanctions as security policy tools. Sanctions against Iran – a preliminary Economic assessment	2015	The Paper explained the academic and policy debates on the economic sanctions against Iran. It is qualitative analysis of economic sanctions.
55	Soest and Wahman	Are democratic sanctions really counterproductive?	2015	The study used the level of democracy and trade as the dependent and explanatory variables respectively and economic sanctions success is not the dependent variable.
56	Clayton Webb	Power Politics or Public Pandering? An Empirical Investigation of Economic Sanctions and Presidential Approval	2018	Presidential approval and economic sanctions are used as the dependent and independent variable. Economic sanctions success is not the dependent variable and trade is also not in the list of independent variables
57	EMRE HATIPOGLU	A Story of Institutional Misfit: Congress and US Economic Sanctions	2014	The dependent variable in this study is the duration of an imposed sanction episode and trade is not in the list of independent variables. Economic sanctions success is not the dependent variable
58	Gary Clyde Hufbauer and Jeffrey J. Schott	Economic Sanctions and U. S. Foreign Policy	1985	The study analyzed the economic sanctions and the US foreign policy, and it is entirely qualitative study. There is not empirical model that explained economic sanctions success as the dependent variable and trade as the explanatory variable.
59	Johan Galtung	On the Effects of International Economic Sanctions: With Examples from the Case of Rhodesia	1967	The study analyzed the effectiveness of economic sanctions and it is qualitative study of economic sanctions.
60	Richard D. Farmer	Costs of Economic Sanctions to the Sender	2015	The study explained the effectiveness of economic sanctions and analyzed the economic sanctions costs to the sender
61	Lektzian et al	Making Sanctions Smarter: Are Humanitarian Costs an Essential Element in the Success of Sanctions?	2003	The study used sanctions success as the dependent variable, but it did not use trade as its explanatory variable.
62	Jones and Portela	Evaluating the "Success" of International Economic Sanctions: Multiple Goals, Interpretive Methods and Critique	2014	It is a qualitative analysis of the evolutions of the success of international economic sanctions evaluation in the view of sender goals and system related goals. Therefore, there is no econometric model explaining the economic sanctions success and trade variables
63	Geoffrey PR Wallace	Regime type, issues of contention, and economic sanctions: Re-evaluating the economic peace between democracies	2013	The study used the sanctions onset as the dependent variable which equals 1 for the first year of sanctions usage, and 0 otherwise which is not economic sanctions success
64	Paolo Spadoni	Failed Sanctions: Transnational Players and the U.S. Embargo against Cuba	2009	The book is a qualitative analysis of the failed economic sanctions of embargo against Cuba by the United States.
65	Lektzian and Biglaiser	The effect of foreign direct investment on the use and success of US sanctions	2013	The study used sanctions onset and sanctions success as the main dependent variables, but trade is not in the explanatory variables list in the model
66	Escriba`-Folch and Wright	Dealing with Tyranny: International Sanctions and the Survival of Authoritarian Rulers	2010	Ruler exit, and all types of sanctions are used as the dependent and explanatory variables in the regression. Economic sanctions success is not the dependent variable and trade or the proxy for trade is not the independent variables

Appendix 8: Report on the description of data collection

Meta- analysis on the success of economic sanctions

Coders:

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The Meta Data Collection Process

We follow the Meta-analysis of economics research network (MAER-Net) guidelines listed in section 2.2 of Stanley (2013) to search, collect, code and analyse empirical studies. Electronic databases such as Google Scholar and ISI web of knowledge were checked. However, only Google Scholar responded to our search queries. The search included all potentially relevant published and unpublished empirical studies without any specific span. We have different broad keywords with different terminology based on individual interest of variables (duration, trade and prior relations) as specified in the individual study. The multiple search process took us 3 months (June-August 2018).

Primary Studies were included if they satisfied the following selection criteria for detailed review: English language, empirical investigations that are conducted on the success of economic sanctions and individual variables of interest such as trade duration, or prior relation (for a full report of excluded studies see every coder's paper) and report regression-based coefficients, sample size, t-statistics, or standard errors.

Every individual coder searched, read and coded the research literatures independently. The dataset was reviewed by at least one of the members of the team as a second coder to check the consistency of the data: wrong values, missing information, etc. (for a full report of the disagreements see every coder's paper). Benalcazar reviewed Kimararungu, Kimararungu reviewed Reta, and Reta reviewed Benalcazar. At minimum the information coded was the one specified by Stanley et al. (2013) (a complete list of the information coded for each study or estimate can be found in every coder's dataset).

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