Peace Economics, Peace Science and Public Policy

Volume 14, *Issue* 2 2008 *Article* 2

Measuring the Effectiveness of Arms Embargoes

Michael Brzoska*

*IFSH, University of Hamburg, brzoska@ifsh.de

Measuring the Effectiveness of Arms Embargoes*

Michael Brzoska

Abstract

Arms embargoes are often said to be ineffective but mandated fairly often. A sample of 74 arms embargo cases between 1990 and 2005 is analysed in order to assess effectiveness. The analysis shows that such embargoes had notable effects on arms import patterns in about 30 percent of all cases. However, effects on targeted policies are much more limited. The link between arms embargoes and targeted policy change grows stronger over the lifetime of arms embargoes. The paper also uses a third measure of arms embargo success, initiator satisfaction. Arms embargoes are comparatively cheap for senders, and thus even only partially enforced embargoes may be seen as a success by the initiators of such a sanction. The analysis confirms the hypothesis that multilateral arms embargoes are more successful than unilateral ones. Multilateralization increases supplier satisfaction with an embargo, it raises the likelihood that there are significant changes in arms import patterns and even increases the possibility that there is policy change in the target. Related to multilateralization is arms embargo implementation. A higher degree of participation of countries and a stronger effort at implementation by participants increase the effectiveness. Arms embargoes are more effective when they are embedded in consistent policy packages. Arms embargoes in and of themselves will rarely affect target policies.

KEYWORDS: sanctions, arms trade, United Nations

---

*This paper is an outgrowth of a joint project with George Lopez, University of Notre Dame. Financial support by the Fritz Thyssen-Stiftung is gratefully acknowledged. A publication of the major results of the project is forthcoming. The paper was originally presented at the Annual Convention of the International Studies Association 2007, Chicago, February 28-March 3. I thank panelists, as well as Marc von Boehmcken, Wolf-Christian Paes and Kyle Atwell for their comments.

1. Introduction

Arms embargoes have been heavily utilized in the last ten to fifteen years by international governmental organizations and individual countries alike. The UN has regulated the flow of arms in almost all of its sanction regimes. Similarly, the European Union, the United States and other nations have listed countries to which they will not sell arms.

The apparent popularity of arms embargoes contrasts with a generally very negative assessment of their effectiveness. There is a widespread agreement in the literature that they do not have much effect on arms flows or the behavior of those targeted. One explanation of this paradox is that arms embargoes are particularly 'cheap' for those mandating them and therefore are, in many cases, the most cost-effective course of action available to governments wanting to 'do something' about the behavior of a target but stop there (Baldwin, 1997; Drezner, 1999). A second explanation is that arms are a particular commodity. At least since the beginning of the 20th century, arms sales and transfers have attained a moral dimension. Stopping the flow of arms thus might have less to do with attempting to change a target's behavior than with dissociation from that behavior (SIPRI, 1973). A third explanation is that arms embargoes are not as ineffective as is often portrayed in the literature.

In this paper I present the results of a quantitative study of the effectiveness of arms embargoes which was part of a larger study on the effectiveness of arms embargoes. The quantitative analysis is based on a model of the factors influencing arms embargo effectiveness. Various forms of 'success' are considered and success is allowed to be partial. Much of the data used in the analysis is qualitative and based on expert judgment. Still, some interesting results are obtained, which allow for some conclusions about the salience of the three explanations mentioned above.

The paper proceeds in four steps. First, the literature on arms embargoes is reviewed briefly with respect to criteria for effectiveness. Second, an argument is made to broaden the perspective on effectiveness to include considerations related to sender 'satisfaction' with an arms embargo. Three, several key components of arms embargo success are identified, including the willingness and capability of actors implementing the embargoes, the process of such implementation, and the reaction of those targeted by the embargo. The bulk of the paper provides empirical data on arms embargo effectiveness. The paper concludes with a discussion of the results.

2. Measures of success in the arms embargo literature

Academic studies on arms sanctions generally confirm the bad reputation of arms embargoes. Studies on the Tripartite Agreement on the Middle East or the arms embargo against South Africa reported many violations of the embargoes, and concluded that they had not been properly implemented (Harkavy, 1975, Wulf, 1986, Landgren, 1989; but see also Brzoska, 1991). More recent analysis of the various cases of UN arms embargoes of the 1990s come to similarly sobering conclusions (Cortright and Lopez, 2000, 2002; Bondi, 2002; Control Arms, 2006; Fruchart et al. 2007).

Arms embargoes have a reputation for being ineffective and poorly designed and implemented. Some analysts maintain that this is a structural phenomenon in a market where illegal dealers will substitute law-abiding arms suppliers (Sampson, 1978), while a majority sees limitations in execution of arms sanctions that can be overcome if sufficient political will is mustered (Ohlson, 1987). The experience beyond arms embargoes, such as with the COMECON (Stent, 1985) during the Cold War, or export control regimes in the fields of nuclear, biological and chemical weapons (Krause, 1995; Beck, 2003) suggest that it is possible to successfully restrict the export of weapons, while acknowledging that no regime is watertight. The main conclusion drawn from the literature is that arms embargoes can be effective if supplier governments want to make them effective, but that supplier governments generally are not willing to enforce the implementation to the necessary degree (Bondi, 2002; Control Arms, 2006).

The analysis of arms embargoes uses two measures of success, namely the end of arms transfers to a target and policy change by the target in a rather particular way. Even more so than in the rest of the sanctions literature, the measure of success is often limited to the attainment of the full degree of intended output and impact, that is a stop of arms flows to a target and/or the end of the target's incriminated policy (Baldwin, 1997). This sets a high standard for arms embargoes, higher than standards of success in other policy areas, from trade policy to employment policy, where partial success in obtaining policy goals is analyzed. One example of a measure of partial success is the "Oslo-Potsdam criterion" developed for the assessment of the success of international environmental regimes (Hovi, Sprintz and Underdal, 2003). It has a scale from 0, equaling no change in identified measures of environment degradation, to 100 for change corresponding to the agreed objective for the environmental regime, also called the "social optimum".

As outlined above, analysis of arms flows should extend beyond the question of whether any arms 'get through' and also include questions about rising costs for imported arms and whether the financing of imports takes different forms. In the case where the targeted group or state is involved in a war, changes in the way the armed forces are operating may also be an effect of arms embargoes.

It is argued here that the effects of arms embargoes should be analyzed broadly, using criteria similar to the ones proposed for environmental regimes. When considering the attainment of an impact on the targeted policy, here called effectiveness level I, relevant considerations should include:

- Change in the targeted policy
- Change in the conduct of sanctioned policy, for instance different type of warfare
- Change in the preparedness to negotiate the targeted policy with outside countries
- Change in the political power structure of the targeted country.

The analysis of changes in the arms flows to a target, here called effectiveness level II, should include consideration of:

- Level of imports of arms: constant level of imports, significantly lower level of imports, almost no imports, rising imports
- Supplier structure: change in the patterns of supply, identification of post-embargo suppliers versus pre-embargo suppliers

DOI: 10.2202/1554-8597.1118

- Composition of imports: no change in types of weapons transferred, less sophisticated weapons transferred
- Mode of arms transfer: unchanged, changed with increased importance of brokers and middlemen
- Funding mode of arms imports: importance of purchases on credit versus deliveries paid for in cash and kind
- Costs of weapons procurement: cost of imported arms higher, costs of domestic production higher
- Change in the conduct of war: different types of weapon used, different tactics.

The high standards of success in the sanctions literature are easily justified by the rhetoric of those deciding on the imposition of sanctions. Few, if any, arms embargoes have been adopted with the argument that they are cheap or just symbolic measures. At a minimum, they are rather justified as measures to stop the flow of arms from the country imposing the arms embargo to the target. At maximum, arms embargoes are claimed to change the behavior of a target, in particular to stop it from continuing to fight a war which the sanctions sender wants to end. While it makes sense politically to hold governments to the standards they publicly pronounce, it is overly restrictive to analyze arms embargo effectiveness solely with such measures.

3. Broadening arms embargo objectives beyond output and impact

In addition to not allowing for partial measures of success, much of the analysis of arms embargoes is also overly restrictive in another direction. It limits success to the attainment of two objectives. While many empirical studies also focus on output and impact on target policies, sanctions have additional objectives ranging from showing 'action' to deterring others from following the incriminated policy. In a useful early analysis of sanctions, Barber (1979: 370) developed three groups of objectives. 'Primary' objectives are concerned with the actions and behavior of the targets. 'Secondary' objectives are related to the status, behavior and expectations of the sender. 'Tertiary' objectives are concerned with broader international considerations, related to the structure and operation of regional constellations or the international system as a whole. Baldwin (1997) argued that sanctions must primarily be seen in terms of sender politics. Decision-makers in sender states had a broad perspective on the success or failure of sanctions, including but going beyond impact. The customary emphasis on impact in the sanctions literature missed that point.

The analysis of decision-making on arms embargoes in implementing countries confirms that a multitude of objectives are important, in addition to stopping arms flows and changing targeted policy behavior:

- *Dissociation from the target*. Decision-makers may not care whether weapons are reaching the target or not, and may also not be primarily concerned with policy change in the target. They are rather addressing, through the arms embargo, other actors, such as third party countries or domestic audiences, whom they want to convince that they are not supporting the target's policies. Governments can have

many motives to seek to signal dissociation with a target's policies, such as the fact of seeing them as a threat to peace and security, or the wish to satisfy domestic lobbying groups. Arms transfer relationships, which have been called 'diplomacy writ large', are generally seen as signaling political collusion between supplier and recipient (Pierre, 1982). Even though a good part of arms trade is dominated by commercial considerations, most governments do operate control systems where political criteria are crucial for the licensing process. Arms export restrictions are therefore among the first and most obvious ways to signal criticism of the policies of a potential recipient of weapons, with dissociation requiring the total end of arms flows. In order to be credible, however, it is important that there are no arms flowing from the sender to the target. In this scenario, the priority in arms embargo implementation is to prevent arms from reaching the targeted state from the own territory. A government can claim success when no arms transfers are reaching the target from its own jurisdiction. The change of policies by the target would be a nice result to achieve. However the more realistic objective of success of an arms embargo is not to be implicated in supplying arms to a target.

- *Efficiency of sanctions*. Decision-making on sanctions, including implementation, may be guided by a cost-benefit analysis rather than the attainment of certain levels of policy output. Measures to reduce arms supplies to a target are comparatively easy to implement nationally. It can be very difficult to achieve a complete end of arms imports by a target, unless there is a full-scale cooperation by other arms suppliers and countries surrounding the target. The benefit of achieving the desired policy change in the target may be sufficient to justify the expenditure of a certain level of effort in implementing and managing a major reduction of arms exports to the target. However, it may not be beneficial to attempt the much larger operation that is needed to stop all arms flows to the target, efforts which include convincing other suppliers to also stop arms flows, monitoring of borders etc. As a result, effectiveness measured by the degree of achieving the given objective, such as policy change in the target, may be low. But efficiency – measured in terms of the relations between effectiveness and the costs to achieve that level of effectiveness – may be high.
- *The costs of alternative measures*. Cost-benefit considerations are particularly important in selecting a specific policy measure. Some policies that can be assumed to induce change in the target's policies include comprehensive economic sanctions and military interventions. Arms embargoes are often seen as comparatively cheap in terms of costs for national economies and national governments.
- *Broadening national decisions*. The decision by a government to stop arms flows from national arms suppliers will often have little effects on the target's availability of arms, because of supplies from other countries, let alone on the targeted policies. At the same time, there will be some costs for national arms suppliers and, indirectly (for instance through taxes etc.), for governments from the loss of arms sales to the targeted countries. National arms suppliers will be particularly loathsome of these costs, if other arms suppliers step in and even increase their arms sales to the target. Governments who have decided on a national ban in order to dissociate themselves from a target will thus have a strong incentive to broaden the

DOI: 10.2202/1554-8597.1118

> arms embargo to many arms suppliers. Thus, the broadening of an arms embargo to include additional arms suppliers can already be a success for countries which have made a prior decision to stop national arms sales. Additional effects of the interaction of governments are important. For instance, if the first supplier country to stop flows from its national suppliers is a powerful country, the expression of dissatisfaction may have more effect on decision-making than the reduction of arms imports to a trickle. For states which control only small shares of the arms markets, multilateral action is inevitable if the goal is to have an effect on the arms flows to the target. Moreover, dissociation will be even more credible if other governments are also willing to stop supplying weapons. This places a new focus on the cooperation of states and international bodies in implementing arms embargoes next.

The complexities in arms embargo decision-making go a long way towards indicating why the arms embargo paradox comes about. The discussion indicates that, in addition to dissociation from a target's policy, the way in which arms embargoes propagate through the interstate system is important. It indicates that governments may view the internationalization of their own decision to stop arms exports to a country as a measure of success in its own right.

Sanctions may already be successful in the view of those deciding on them, if their political capital is rising because of that decision (Baldwin 1997). The symbolism of invoking an arms embargo in itself may suffice to improve the standing of decision-makers in the eye of their political constituents or the outside world. The "happiness" of initiating governments with arms embargoes is, however, likely to increase if others also observe them (Barber 1979). Multilateralization of an arms embargo strengthens the signal of dissociation sent to a target. This will likely also be cherished by national audiences, particularly by those groups that have to bear the costs of an embargo. They do not have to fear that others will gain from their losses.

In most cases, there will be a strong incentive for governments who have stopped arms deliveries to a specific country or group in that country to try to get others to follow their example. The achievement of a multilateral agreement on an arms embargo will likely be a negotiating process between initiating, willing and reluctant parties. What will these negotiations entail? One important element is to what extent the objective of changing a target's policies is shared among governments. A common understanding of the dangers of a target's policies for international peace and security, or whatever other legal or moral obligation judged to be violated by the target, will make the imposition of a joint action more likely. But there are also possibilities to link policies in order to bring states 'on board.' Governments interested in building a coalition of support for arms embargoes may also put pressure or provide incentives for other states to join in. A strong power committed to obtaining and maintaining an arms embargo will likely stand a better chance to bring other states to implement an arms embargo than a weak power. In addition, if an arms embargo is supported by a coalition of countries, action by the multilateral organization becomes an element of implementation. The multilateral organization itself can become an actor that puts pressure on or provides incentives for states to implement an arms embargo.

Objectives beyond the impact on targeted policies, such as national dissociation and its broadening to other countries, are here considered as a third level of success of arms embargoes corresponding to the suggestion by Baldwin (1997) and the 'secondary' and 'tertiary' objectives of Barber (1979).

4. Factors influencing the effectiveness of arms embargoes

The literature on sanctions in general and arms embargoes specifically contains a host of factors which are hypothesized to influence the rates of success of arms embargoes. These are sorted here into two groups of variables. The first group is directly related to the type and nature of arms embargoes, while the second group, consisting in turn of seven clusters of variables, concerns variables external to arms embargoes.

The following characteristics of an arms embargo can change its rate of success:

- *Objectives of arms embargo*. The objectives of arms embargoes can be narrow or broad. Arms embargoes mandated to end wars are more likely to be successful than, for instance, arms embargoes mandated to influence human rights policies because of the role of arms in wars (Hufbauer et al 2007; Fruchart 2007).
- *Type of sanction*. Multilateral sanctions are generally assumed to be more likely to succeed than sanctions imposed by only one or a few countries (Doxey 1987, Hufbauer et al 2007, but see also Drezner 2000). Stand-alone arms embargoes are less likely to have impact than arms embargoes which are part of a larger sanctions package (Lopez and Cortright 2000). Related to this is the proposition that comprehensive embargoes have considerably stronger effects than limited ones (Caruso 2003; Hufbauer et al 2007).
- *Type of target*. Non-state actors can generally be assumed to have fewer possibilities to counter an arms embargo than governments (Lopez and Cortright 2000).
- *Time period*. The sanctions reform efforts of the late 1990s and early 2000s aimed at improving the effectiveness of sanctions, so success rates should have grown over time (Cortright and Lopez 2002).
- *Length of sanction period*. Sanctions take time to have effects. On the other hand, sanctions that are not successful may continue over long periods of times without much chance of ever being successful (van Bergeijk et al 1995, Bolks and Al-Sowayel 2000).

The seven clusters of external variables used in the following analysis are:

A: Cost-benefit calculations in the target

In good rational choice tradition, sanctions are supposed to influence the cost-benefit calculations of targets, by raising the costs of incriminated policies (Doxey 1987; Baldwin 1995 but see Galtung 1967). The first cluster of variables thus reflects the importance of arms imports for the target, either to conduct the incriminated policy or morein general, as well as the relation between the targeted behavior and arms imports.

DOI: 10.2202/1554-8597.1118

B: Decision-making structure in the target

A rational choice argument based on the comparison between the benefits of an incriminated policy to a target and the costs imposed by an external power through sanctions may, however, be too simple and miss the important point of group interests, as well as partial, or personal interests of those actually making the decision (Kaempfer and Lowenberg 1992, Brooks 2002; Allen 2005; Kaempfer and Lowenberg 2007). The second cluster thus contains variables reflecting the type of government and its way of making policy decisions, as well as the importance of the incriminated policy for those in power and their perception of the senders' resolve to change the incriminated policies. The second cluster is thus supposed to add a 'reflexive' element to the rational choice argument.

C: Evasion capacity/activity of the target

The third cluster is supposed to measure the opportunities of the target for domestic counter-policies against the arms embargo (Wallensteen et al, 2003). One element, important in particular in more industrialized target countries, is the domestic arms production capacity. The better developed the industry of the target country already is, the more likely it is for the target to be able to compensate for the loss of arms importance. However, even in those cases, targets will need time to develop appropriate domestic structures, which is much easier during periods of no or badly enforced arms embargoes than during a well enforced arms embargo.

D: Multilateralization of arms embargo

The fourth cluster of variables addresses the senders and the likelihood that they will enforce an arms embargo. Based on the proposition that an arms embargo starts with a few suppliers stopping national arms sales and then propagating that decision, an important variable for the success of arms embargoes is who is initiating it (Drezner 1999). The propagation will be easier if the objectives are shared among suppliers. Finally, the degree to which arms embargoes are made mandatory for how large a group of suppliers can be surmised to influence arms embargo success rates.

E: Implementation of arms embargo

The fifth cluster contains variables addressing issues related to the implementation of an arms embargo (Lopez and Cortright 2000; Wallensteen et al 2003). The implementation is influenced by the capacity of crucial supplier countries, but also neighboring countries, to enforce the arms embargo. At least some suppliers have deficient export control systems and many countries close to targeted countries have weak border control systems. But, in addition to a lack of capabilities to enforce arms embargoes, there may also be a lack of willingness to do so. This can be partly impacted by pressure from those countries supporting the arms embargo. Such pressure may also come about through effective monitoring of arms embargoes which makes it possible to 'name and shame' those violating an arms embargo.

F: International countermeasures by targets
As senders of an arms embargo have means to influence the behavior of governments and other actors, so do at least some targets (Baldwin 1995; Wallensteen et al 2007). They can try to built alternative arms relationships, and tap black and grey arms markets. They will be more likely to succeed in this if they are economically potent or have allies who are willing to support them.

G: Importance of embargo objectives for initiators
The seventh cluster addresses issues related to internal politics of the sender countries, in particular those governments initiating and propagating arms transfer restrictions, including how important the arms embargo is for the foreign policy objectives of the sender countries, how strong the lobbying power behind an arms embargo is and to what extent arms transfer restrictions to a problematic country are more or less a regular feature of foreign policy (Barber 1979, Hufbauer et al 2007).

5. Methodology

The analysis presented here uses the three levels of effectiveness as dependent variables and seven independent, composed variables identified above (see also appendix 1 for list of variables).

The variables have been standardized so that all variables have scores which range from 0 to 3. Scoring is based on data collections for the respective cases, but is ultimately subjective. Criteria for scoring are given in the attached list of variables. Most of the scores for variables used in the quantitative analysis are calculated by adding the value for the sub-variables which make up the variables used in the analysis. The exception is the calculation of the score for effectiveness level I, which is multiplicative (score for 'policy changed' times 'cause for policy changes'). Only integers are allowed as scores, with the exception of the sub-variable 'cause for policy change' which can attain the values 0, 0.5 and 1.

For the three variables measuring the effectiveness of arms embargoes, high scores indicate embargo success. For the independent variables hypothesized to have an influence on embargo effectiveness, scores are set in such a way that a high score indicates higher probability of sanctions success. In line with the general sanctions literature (Brooks 2002; Lektzian and Souva 2003; Allen 2005) it is assumed, for instance, that an autocratic government will show more resistance to outside interference than a pluralistic one. Therefore, an autocratically ruled target is scored at 1, while one with a pluralistic decision-making system receives a score of 0.

Both independent and dependent variables are summed for various analytical purposes. In addition, for much of the data presented below, scores for independent and dependent variables have been recalculated for a range from 0 to 1. This is done for practical reasons - there is no further mathematical manipulation involved. Using the range from 0 to 1 is simply more intuitively interpretable than scores from 1 to 3.

The main reason for the simplification of variables and the simple rules for scoring are the limitation of the data collection and analysis. While some of the

DOI: 10.2202/1554-8597.1118

dependent and independent variables used here could, in theory, be scored numerically on the basis of quantitative data, such as the variable indicating a reduction in arms flows, such data are hard to locate. Other data are subjective to start with, such as scoring for level III effectiveness. The scoring rules are designed to combine the various types of data used in one common scale.

The data used for this analysis comes from a large data base on arms embargoes. In particular, the number of cases of arms embargoes utilized for this study is a simplified version of a longer list of arms embargo regimes implemented by international organizations, the European Union and the United States. Independent from that list, the basic unit used here is not the arms embargo regime, but rather the arms embargo case. Arms embargo cases are defined by sender, target and time period, regardless of the measures set by the sender or senders of an arms embargo.

Changes in these measures, even if major, do not constitute, in the analysis of this study, a new case of arms embargo. Scoring for independent variables is for late stages of the arms embargo. These rules lead to a set of 74 cases of arms embargoes (see appendix 2). Some of these are contained within one comprehensive sanction regime. The selection of variables, the scoring rules and scoring procedure combine to yield variable values which only allow for fairly simply and robust quantitative analysis. Scores for variables in individual cases can be often debated. Therefore, this analysis can only supplement the more differentiated analysis of case studies.

6. Success rates of arms embargoes

As was to be expected from the earlier discussion, the rates of success for the three measures of effectiveness differ markedly. Based on the scoring performed for this analysis, the highest rate of success of arms embargoes is found for level II effectiveness (reduction of arms imports) at almost 40 percent, followed by 31 percent for level III effectiveness (satisfaction with the arms embargo by the initiator). Level I effectiveness (targeted policy change) is low: on average, there was only an 8 percent chance of inducing policy change in the target through an arms embargo (Table 1).

All arms embargoes in sample

The results for level I effectiveness express here the lack of discernible effects on target policy in the overwhelming number of sanction regimes. For the sample of 74 arms embargo regime cases, no effect on policy change was recorded in 57 cases. The 17 cases where there was some effect on target policies (see also Table 2) range from strong effects in Angola (UN sanctions 1993-2003) to some effects in Haiti (UN sanctions in 1994), Burundi (regional sanctions 1996 1999), Sierra Leone (UN sanctions 1998-2002), Liberia (UN from 1992), Sierra Leone (UN 1997-1998), Libya (UN 1992-2003), South Africa (UN 1977-1993), DR Congo (regionally limited; UN from 2003), and minor effects in Yugoslavia (UN 1992-1995), Iraq (UN 1990 2003), Sudan (UN from 2004), Indonesia (EU sanctions 1999-2000) and Indonesia (US sanctions from 1999).

Compared to the rate of success in terms of policy change desired by the sanction senders, the rate of success in terms of reducing arms inflows to target is rather high. For this second level of effectiveness the rate of success is 39 percent. Arms transfers were completely, or almost completely, stopped in nine cases, very significantly in another 14 cases, and significantly in another 23 cases. No significant reduction was noted in 28 cases. While the nature of the data used here does not allow for more than a preliminary interpretation, data indicate that arms embargoes did have, on average, notable effects on arms flows.

Table 1: Average scores of dependent and independent variables

Variable	Score (0-1)	
	All arms embargoes (74)	Arms embargoes ending prior to 2005 (34)
Effectiveness level I (policy change)	0.08	0.14
Effectiveness level II (Impact on arms flows)	0.39	0.60
Effectiveness level III (initiator satisfaction)	0.31	0.47
Average score for arms embargo effectiveness	0.26	0.40
Cost/benefit calculation over arms	0.41	0.41
Political cost-benefit calculations	0.27	0.31
Evasion capacity of target	0.62	0.69
Multilateralization of arms embargo	0.51	0.63
Implementation of arms embargo	0.29	0.39
Countermeasures by target	0.40	0.52
Importance of embargo for initiators	0.64	0.69
Average score for independent variables	*0.45*	*0.52*

This is somewhat in contrast to a good part of the literature on arms embargoes mentioned earlier, and even more to the general perception of the ineffectiveness of arms embargoes. It demonstrates the mixed results of arms embargoes with respect to their ability to cause a change in arms flows. The result is neither supportive of the view that arms embargoes are generally ineffective, nor of the view that arms embargoes are a powerful instrument to reduce the flow of arms.

The political satisfaction of suppliers with an arms embargo is also comparatively high. As stated above, this dependent variable has been designed to primarily capture the domestic considerations of suppliers as well as of countries other than the target. In many cases, suppliers realized that a reduction of arms flows could not be achieved, often because the target was allied to a major arms supplier, but were still content in signaling their discontent with the targets policies.

DOI: 10.2202/1554-8597.1118

Arms embargoes which ended by 2005

A majority of arms embargo cases included in the data set used here were still active at the time of writing in early 2005. Obviously, these embargoes had not achieved the objectives desired by the senders. Does this mean that there are systematic differences between embargo cases closed by 2005 and those still active at that time?

The average values of variables for closed embargo cases are indeed about 50 percent higher than for all arms embargoes in most cases. Closed arms embargoes have been more effective with respect to changes in arms import patterns, initiator satisfaction and targeted policy change. However, even for closed arms embargoes, targeted policy change is a fairly rare event, with an average score of about 0.14.

Unfortunately, the partial success of arms embargoes in reducing arms flows and with respect to narrow political supplier objectives only rather seldom translated into policy change. But when was the link between changes in arms inflows and policy change of targets strong and when was it weak?

Arms embargo success cases

The three measures of effectiveness can be combined into one measure of success. On this basis, a ranking of sanctions success can be established (Table 2). A number of points emerge from this ranking. One is that comprehensive arms embargoes are very high on the list, as are arms embargoes linked to other types of sanctions. Another point is that arms embargoes with the objective to end hostilities or bring about regime change are the most frequent type of arms embargoes. Other frequent objectives of arms embargoes, such as ending support for terrorism or human rights concerns, are of lesser importance.

7. Differentiating arms embargo effectiveness by sanction characteristics

In this section, the data set is disaggregated in various ways. The objective is to see whether there are differences in embargo effectiveness with respect to sender, targets, types of embargoes, and so forth.

Sender

The first issue taken up here is whether there is a difference in effectiveness between arms embargoes by the US, the EU or the UN. As discussed above, broader participation in arms embargoes is generally hypothesized to lead to better implementation. However, because of the dominant process of arms embargo initiation, a powerful champion of sanctions, such as the US, may be able to make a formally unilateral embargo effective.

The data presented in Table 3 confirms the hypothesis that a higher degree of multilateralism improved embargo effectiveness. Among the 74 arms embargo cases included in our sample, 29 were US sanctions (independent of UN sanctions). Only two cases of minor success with respect to level I effectiveness (targeted policy change, Libya and Indonesia) were recorded. Some reductions in arms imports by the target

(effectiveness level II) occurred in 15 of these 29 cases. However, this was mostly not very significant (the only case of significant reduction was the arms embargo against Ethiopia). After weighing the significance of changes in arms import patters, we arrive at a score of 23 percent of success for US arms embargoes. This is well below the level of 39 percent for the whole sample. A similar result is obtained for our third level of effectiveness, initiator satisfaction. Here the score is 16 percent for US arms embargoes compared with 16 percent for the overall sample.

Table 2: The most successful arms embargoes

Country	Sanctions by	Begin Year	End Year	Type of sanctions	Target	Sanctions objective
Ethiopia	UN	2000	2001	UN arms embargo	Government	End of hostilities
Eritrea	UN	2000	2001	UN arms embargo	Government	End of hostilities
Haiti	UN	1994	1994	Comprehensive economic sanctions	Government	Regime change
Sierra Leone	UN	1998	2002	UN arms embargo	Rebels	End of civil war
Yugoslavia	UN	1992	1995	UN comprehensive sanctions	Government	End of hostilities
Liberia	UN	1992		UN arms embargo	Government	End of civil war
Yugoslavia	UN	1991	1996	UN arms embargo	Government	End of hostilities
Sierra Leone	UN	1997	1998	UN arms embargo	Government	Regime change; end of civil war
Libya	UN	1992	2003	UN arms embargo	Government	End support of terrorism
Yugoslavia	EU	1991	2001	EU arms embargo	Governm ent	End of hostilities
South Africa	UN	1997	1993	UN arms embargo	Governm ent	Regime change

Success rates for the 15 EU sanction cases in the sample are higher than the scores for US arms embargoes. For both effectiveness levels I and II they are about the average for the whole sample, for targeted policy they are below that average. The success rate for change in arms import patterns for EU sanctions was 42 percent. This includes three cases of major impact on arms flows (Eritrea, Ethiopia, Yugoslavia), two cases of major changes (weight at score 2, Afghanistan and Iraq) and six cases with minor changes in arms import patterns. No change was recorded in five cases.

UN arms embargoes have the best record in terms of effectiveness as measured here. Still, the success rate in terms of policy change is rather low, at 15 percent. The result obtained here are somewhat lower than what Fruchart et al. (2007: 33) report in their study on UN arms embargoes. They find improvements in target behavior in 25

DOI: 10.2202/1554-8597.1118

percent of all their observations, defined as years of UN arms embargoes. Their criterion of improvement in target behavior is obviously less demanding than the one used here.

Table 3: Average success rates of arms embargoes, by sender

	Policy impact (1evel 1)	Significant change in arms import patterns (level II)	Initiator satisfaction (level III)	Number of sanction cases
UN sanctions	15%	57%	48%	27
EU sanctions	7%	42%	31%	15
US sanctions	2%	23%	16%	29
Other senders				3

The most successful cases have already been mentioned above (Table 2) but they remain few and far between. The score for effectiveness level II (reductions in arms import patterns) are much higher, at 57 percent. This includes 8 cases of significant changes in arms import patterns (Eritrea, Ethiopia, two sanction cases in Haiti, Iraq, three sanction cases in Yugoslavia), 8 cases of major changes (Afghanistan, Angola, Liberia, Libya, South Africa, two cases in Sierra Leone, Sudan), minor changes in 6 cases, and no changes in five cases.

Objectives

Arms embargoes differ with respect to their objectives. In the data set used here, the identification was limited to major objectives. Many arms embargoes are designed to serve a host of objectives, some of them openly espoused and others less obvious. However, in most cases, one objective stands out. For classification purposes, all objectives found in looking at arms embargo cases were aggregated into six groups and assessed, as listed in Table 4. The sanctions objectives evaluated are as follows: human rights, end of hostilities in interstate wars, end of support of terrorism, end of civil war, regime change and change in nuclear policies.

There are notable differences in the success rates among objective, as illustrated in Table 4. Yet these variations need further analysis. For instance, there are only 3 examples of arms embargoes purporting to change nuclear policies, which in themselves have low scores. Another interesting finding is that arms embargoes with the objective to end civil wars have had the highest rate of success with respect to targeted policy change – that is peace. But this rate of success is still low at 12 percent. The link between effects on arms flows and policy impact, which is weak for the whole sample of arms embargo cases, is somewhat stronger than for other objectives, but still weak. This is at least a conclusion one can draw from the comparatively high success rate for effectiveness level I in contrast to the comparatively low rate for effectiveness level II (impact on arms

flows). Possibly linked to this fact is the comparatively high level of initiator satisfaction (level III effectiveness).

Among the objectives identified in Table 4, the end of hostilities in interstate wars has the highest score for impact on arms flows. The success of the various arms embargoes in the cases of the war in the former Republic of Yugoslavia and between Eritrea and Ethiopia are the major causes for this result. This relative success, however, did little to change policies in the target. The former Republic of Yugoslavia (FRY) and Eritrea and Ethiopia are good examples. While it is debatable whether the comprehensive sanctions against the FRY induced the government of President Milosevic to negotiate and agree to the Peace Accords of Dayton in 1995 (Cortright and Lopez 2000), there is no indication that the fact that these sanctions also included arms had any effect. In the case of Eritrea and Ethiopia, both sides were well armed when the arms embargoes began to bite, and they ended the war before there were any notable shortages.

Table 4: Average success rates of arms embargoes, by sanctions objective

	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
Human rights	6%	22%	28%	12
End of hostilities in interstate wars	8%	52%	32%	20
End support of terrorism	10%	40%	30%	10
End of civil war	12%	37%	38%	20
Regime change	4%	48%	30%	9
Change in nuclear policies	0%	11%	0%	3

Type of sanction

Six of the cases analyzed here were voluntary arms embargoes, with the UN and the OSCE as senders. These had very low success rates. 45 of the 74 cases were mandatory stand-alone arms embargoes. These had success rates similar to the average rate – which is not surprising considering that the mandatory arms embargoes constitute the majority of cases.

The two other types of sanctions distinguished here are comprehensive economic sanctions (Burundi (Regional), Cuba (US), Haiti (UN), Iran (US), Iraq (UN), North Korea (US), Sudan (US), Vietnam (US) and Yugoslavia (UN)) and targeted sanction packages, in which arms embargoes were supplemented with other types of sanctions, such as financial sanctions or commodity sanctions (three embargoes cases against Afghanistan, Angola, Belarus (US), Haiti (US), Liberia, three embargo case against Libya, Sierra Leone, and US and EU embargoes against Zimbabwe).

Both comprehensive sanctions and targeted sanction packages have higher rates of success with respect to significant changes in arms import patterns, 48 and 50 percent respectively. While they were more than twice as likely to produce the desired policy

DOI: 10.2202/1554-8597.1118

change, effectiveness level I results are still rather low, with 13 and 17 percent. This again confirms the observation that even in cases where arms imports are significantly reduced, policy changes do not necessarily follow.

Table 5: Average success rates of arms embargoes, by sanctions type

	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
Voluntary arms embargo	0%	11%	11%	6
Mandatory arms embargo	6%	38%	29%	45
Comprehensive sanctions	13%	48%	30%	9
Arms embargo element in targeted sanctions package	17%	50%	48%	14

Type of target

Traditionally, arms embargoes were aimed at governments. Increasingly, they have been targeted at rebels, or, in particular in civil war situations, at both rebels and governments. In the sample of 74 arms embargo cases used here, rebels were the sole target in 8 cases (later cases of Afghanistan sanctions, Angola, Congo DR, later cases of Rwanda sanctions and Sierra Leone). Success rates on all three levels of effectiveness are significantly higher than the average. This result has to be qualified, however, because of the low number of cases, and also because most of the cases have been fairly recent.

Table 6: Average success rates of arms embargoes, by type of target

	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
Government	8%	33%	28%	41
Rebels	15%	54%	46%	8
All parties	6%	45%	31%	25

Arms embargoes aimed at governments have had low rates of sanctions success. The analysis presented here cannot answer the question whether low scores are caused by the fact that targets were governments – who could have stronger capabilities to evade sanctions and to ignore arms restrictions – or whether the reasons for lower scores lie elsewhere, for instance in the objectives of arms embargoes. Arms embargoes with governments as targets were mostly aimed at ending hostilities in interstate wars, or at achieving policy change with respect to the observation of human rights in targets, objectives where success rates where low.

Time periods

The number of arms embargoes active at one time has continuously grown over time, if measured in a five-year period. In the years 2000-2004 62 arms embargoes were active, compared to 56 in the period between 1995 and 1999 and 45 in the period 1990-1994. A total of 15 arms embargo cases prior to 1990 are contained in the data base. This should not be construed to imply that there were not more arms embargoes prior to 1990, as the data base used here is not comprehensive with respect to US arms embargoes adopted prior to 1990.

Success rates of arms embargoes have not changed much over the three five-year periods after 1990 contained in the data base. There is some increase in the scores for effectiveness level II, however the difference is not large.

Table 7: Average success rates of arms embargoes, by time period

	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
Prior to 1990	10%	27%	20%	15
1990-1994	9%	31%	28%	45
1995-1999	10%	33%	28%	56
2000 and later	7%	35%	27%	62

'Old' and 'new' arms embargoes

The results look somewhat different if, instead of time periods in which embargoes were active, the time periods in which an arms embargo was begun are analyzed, at least with respect to significant changes in arms import patterns.

Arms embargoes begun in more recent five-year periods have consistently higher rates of success with respect to level II effectiveness than arms embargoes begun in earlier five-year periods. Effectiveness with respect to significantly changing arms import patterns has increased markedly. However, this has had no effect on targeted policy change. Here the rates have actually gone down in the new century, confirming the proposition, mentioned above, that arms embargoes need time to take effect.

Obviously, this result is influenced by many factors, including types and objectives of sanctions, as well as the characteristics of targets and senders. Still, it seems safe to state that arms embargoes have increasingly had "teeth", in the sense of leading to significant changes in arms import patterns.

DOI: 10.2202/1554-8597.1118

Table 8: Average success rates of arms embargoes, by year of begin of sanction cases

	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
Prior to 1990	8%	23%	21%	13
1990-1994	9%	33%	30%	31
1995-1999	11%	47%	35%	19
2000 and later	2%	61%	39%	11

Success rate by length of sanctions

These considerations lead to the question whether long-running arms embargoes are more successful than those with shorter life spans. The data presented in Table 9 indicate that this is indeed the case for effectiveness level I, targeted policy change, but not for the other two measures of arms embargo success used here. Obviously, changes in arms import patterns, which are present in a majority of cases of closed arms embargoes, take time to have effects that influence policy making in targeted countries. For arms embargoes which are implemented for less than 3 years the success rate for targeted policy change is low. Success rates are considerably higher for closed arms embargoes which ran for more than 5 years, with the highest rates of success noted for the longest running arms embargoes (Libya/EU 18 years, South Africa 16 years, Iraq/UN 13 years, Libya/UN 11 years).

Table 9: Average success rates of arms embargoes, by their duration

Success rates by length of sanction	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Number of sanction cases
0 years	0%	100%	100%	1
1 year	8%	53%	50%	10
2 years	0%	67%	22%	3
3 years	14%	78%	33%	6
4 years	17%	50%	67%	2
5 years	11%	56%	44%	3
6 to 10 years	25%	50%	42%	4
11 to 15 years	28%	56%	44%	3
16 to 20 years	33%	50%	83%	2
Still active	3%	22%	18%	40

However, even for long-running arms embargoes, success in changing target policies is far from guaranteed. Success rates for effectiveness level I are still low, even for the longest-running arms embargoes. And, even more importantly, there are a good number of arms embargoes that have been active for 10 years and more without any

discernible effect on target policies. Significantly, these are all US embargoes (North Korea, Cuba, Libya first embargo case, Iran Vietnam, Myanmar/Burma, China) plus the EU arms embargo against China. China, in fact, is one of the biggest arms importers in the world. As the EU embargo was adopted prior to the introduction of a proper legal basis at EU level, member states have allowed the transfer of certain military equipment to China arguing that it was outside the scope of the embargo (Kreutz 2004).

8. Correlates of arms embargo success

The search for explanations of arms embargo success in this section focuses on the seven clusters of independent variables (see Appendix 1) introduced earlier. In order to establish the strength of association with the variables measuring arms embargo effectiveness, bivariate correlations were estimated (see Table 10, complete data in Appendix 2). Bivariate estimations cannot, for instance, establish relative weights of independent variables. However, in view of the data set used here and the rough data it contains, a fairly robust way of data estimation seemed appropriate. The following discussion reports on the results of this exercise.

Targeted policy change (effectiveness level I)

As mentioned above, policy change in the direction desired by the sanction sender and related to an arms embargo was a rather rare event. Among all the variable clusters which potentially could lead to targeted policy change, only one, namely decision-making structure in the target, is statistically significantly different from zero. About 34 percent of the variance in the dependent variable is explained by this independent variable. The variable decision-making structure also pushes up the explanatory power of the combined average of all independent variables above the threshold of 95 percent (see Table 10). Another variable hypothesized to be important for targeted policy change, 'cost-benefit calculation in target', is not statistically significant. The variable either is not catching what it was designed to catch, namely the value of a policy to a target in comparison to the costs of an arms embargo, or such cost-benefit calculations are not important for decision-making in the target.

Changes in arms import patterns (effectiveness level II)

Contrary to the results for policy change, some of the independent variables chosen for this analysis are powerful in explaining the variance in the scores of effectiveness level II, reductions in arms imports. Significant regression coefficients were found for variable clusters D (multilateralization of arms embargoes), E (implementation of arms embargoes), F (countermeasures by targets) and G (importance of embargo objectives for initiators). The correlation coefficients for these four clusters of independent variables are significant at the 99 percent level. A lower, but still notable, degree of explanation of the variance of the independent variables is associated with variable cluster B (decision-

DOI: 10.2202/1554-8597.1118

making structure in the target). Not significant are the variable clusters A (cost-benefit calculation in target) and C (evasion capacity of target).

Table 10: Statistically significant correlation coefficients

Correlations coefficients of independent variables significant at 95% level in bivariate regression

Level of effectiveness/ Independent variable clusters	Policy impact (1evel 1)	Impact on arms flows (level II)	Initiator satisfaction (level III)	Overall effectiveness measure (Average levels I-III)
Average of scores of independent variables	0.499	1.514	1.155	0.890
Cost-benefit calculation in target (A)				
Decision making structure in target (B)	0.351			
Evasion capacity/activity of target (C)				
Multilateralization of arms embargo (D)		0.782	0.702	0.495
Implementation of arms embargo (E)		0.624		0.355
Countermeasures by targets (F)		0.653t		0.340
Importance of embargo objectives for initiators (G)		0.638		

Source: Appendix

The variables used in this quantitative analysis explain the success of arms embargoes in reducing arms flows rather well. Multilateral arms embargoes, with a high level of implementation and limited availability of countermeasures to a target, and which are high on the agenda of the initiators, have the best chances to lead to actual reductions of arms flows. The capacity of the target to find alternative suppliers as well as whether arms are of high importance to the target are not statistically significant.

Looking at the actors who shape embargo success at this level, the analysis implies that the reduction of arms flows is primarily determined by the outside world, not the target. If the initiators are successful in promoting the embargo to other countries, and in particular in getting them to implement it, then arms flows are significantly reduced. This even seems to be true in cases where targets are economically powerful.

Initiator satisfaction (effectiveness level III).
Only one of the clusters of independent variables has a high level of explanatory power for this dependent variable, D (multilateralization of arms embargoes) with more than 40 percent of variance explained. Other variables with notable regression coefficients are B (decision-making structure in target**)**, E (implementation) and F (countermeasures by target), though these are too low for any firm conclusions. Coefficients are very close to zero for independent variables A (cost-benefit calculations in target), C (evasion capacity of target) and G (importance of arms embargoes for initiators), indicating no statistical relation between independent and dependent variables.

The low level of variance explained for this type of sanctions effectiveness can result from a number of factors. One is that the scoring of this variable is particularly difficult and therefore the data are not reliable. A second factor is that the list of independent variables is not appropriate. Additional variables are possibly needed. However, it is not obvious which additional variables should be included. A third factor explaining the weak relationship between the scores of initiator satisfaction and the independent variables listed here is the low level of policy change induced in targets. Multilateralization of sanctions, the only significant independent variable, may be seen at least as opening the opportunity for effective sanction implementation. Besides this variable, much of the success in reaching the sender's objectives seems to be determined by particular situations in sender countries which are difficult to capture with structural variables of the kind used here.

Overall sanctions success

Strong associations are found for the combined index of arms embargo effectiveness and a number of the clusters of independent variables. Regression coefficients are high for D (multilateralization of arms embargoes) and E (implementation of arms embargoes). F (countermeasures by target) is still within the bounds of 95 percent significance. G (importance of embargo objectives for initiators) is close to the 95 percent level of significance. No statistically significant correlation is found for variable clusters A (cost-benefit calculations in target), B (decision-making structure in target) and C (evasion capacity/activity of target). All in all, a higher number of independent variables is found to be significant for the average of the three indicators of sanction effectiveness used here than for each single indicator. While this is not surprising, as the variables were chosen in order to reflect explanations for all three types of sanctions effectiveness, it still indicates that the broad approach to explaining sanctions chosen here yields good results. Although not significant in many cases when measured against one of the three measures of sanction success, the explanatory power accumulates in the combined measure of sanctions success.

Similarly to the results for level II effectiveness, factors shaped by external actors are more important than those internal to the target. Multilateralization, implementation of arms embargoes and sender interest in sanctions emerge as three of the four clusters having the strongest explanatory power. F (countermeasures by target) is also strongly related to the outside world, as it catches the economic and political power of targets to find suppliers for arms. Among the other factors primarily reflecting domestic situations

DOI: 10.2202/1554-8597.1118

in targets, B (decision making structure in target) explains a fairly high, though not statistically significant, share of variance in the dependent variable. The other independent variables have very little explanatory power. Taken together, however, the variable clusters are significantly correlated to these measures of effectiveness.

Independent variables

We now turn to the examination of the various clusters of independent variables and their explanatory power.

Cost-benefit calculations in target (variable cluster A) cannot contribute in a statistically significant way to the explanation of the variances in any of the measures of sanctions success. Variable cluster A, as a reminder, attempts to measure the likelihood that a target will yield to an arms embargo. If the target puts little value to the sanctioned behavior, but attaches high importance to arms imports, and if there is a notable relation between the targeted behavior and arms imports, then, so it is generally assumed, arms embargoes have a higher chance to succeed.

Why do we not find this pattern in the analysis presented here? Several explanations are possible. First, again, is the issue of data. Scores for the variables in cluster A are rather subjective estimates. The second point is that this independent variable is inherently linked to targeted policy change, a rather rare event. The third is that the variables chosen here may not properly reflect cost-benefit relations and the corresponding decision-making in the targets. The variables chosen, besides being very rough, may not reflect the dynamics of target behavior under sanctions, particularly the "rallying round the flag" effect. As emphasized in the sanctions literature, the hardening of sanctioned policies by targets is a frequent outcome of sanctions (Galtung 1967; Doxey 1987). Targets have invested political capital, are afraid of loss of 'face' and domestic legitimacy and so on. Finally, the result obtained in this analysis strengthens the view that sanctions affect costs and benefits in targets in more complex and dynamic ways than it can be described with the simple variables chosen here.

Variable cluster B (*decision-making structure in target*) is also weak in explaining variance in the level of effectiveness of arms embargoes, with the exception of effectiveness level I (targeted policy change) being the only statistically significant at the 95 percent level for this dependent variable.

Evasion capacity/activity (independent variable cluster C) is another variable which was hypothesized earlier to primarily have an effect on political decision-making with respect to arms embargoes, by measuring domestic arms production and the lead time between first discussions of an arms embargo and the time of actual implementation. The coefficients for this variable carry the expected sign in all estimations, but the explanatory power is small, never much above the 50 percent level of significance. Why this outcome? Again, as in the case of the other two variables already discussed, data issues, the low incidence of policy change, as well as the 'rally around the flag' effect may be important.

Variable cluster D *(multilateralization of arms embargo)* has the highest level of statistical significance in almost all the estimations, the exception being for policy change in target, where this variable is not statistically significant. The variable cluster explains

more than 50 percent of the variance in overall sanctions success, around 40 percent each of the variances in reductions in arms flows (level II effectiveness) and initiator satisfaction with arms embargoes (level III effectiveness). This variable cluster is not only a measure of whether an embargo actually is a multilateral one, but also whether the initiator is a powerful state (the US and the EU), with the highest scores and thus hypothesized sanctions success, in case of multilateral arms embargoes initiated by powerful states. The analysis provides strong support for the hypothesis that in these cases arms embargoes have a high probability of resulting in reductions of arms transfers, and that this is seen by embargo senders as a satisfactory course of sanctions. However, even where this variable cluster attains a high value, the effect on policy change is small, below standard levels of statistical significance.

Implementation of arms embargoes (variable cluster E) is almost as strong in explaining arms embargo success as variable cluster E (multilateralization of arms embargoes). This is not very surprising, as these two variables are somewhat complementary, with E measuring the capability of senders to enforce an arms embargo, their pressures on states which are not among the initiators of an arms embargo, and the level of monitoring of an arms embargo. The correlation coefficient for variable cluster E is significant for level II effectiveness (reductions of arms flows) as well as the overall measure of sanction success, and comes close to 95 percent significance for the level III measure (sender success). Even for level I effectiveness (policy change) it is not completely irrelevant, explaining about 17 percent of variance.

Countermeasures by targets (independent variable cluster F) is composed of measures of the financial and political means available to the target to evade arms embargoes. This variable is explaining a high share of variance in effectiveness measure II (reductions in arms transfers) as well as overall sanctions success. It corresponds to both variable clusters D (multilaterializaton) and E (implementation) in valuing the political alliances of targets. In addition, this variable cluster is designed to address the economic power of targets to evade embargoes. The analysis indicates that it is an important factor in avoiding reductions in arms embargoes, but not powerful enough to give this independent variable cluster more explanatory power than the variable clusters D (multilateralization) and E (implementation). Again, data issues may determine this outcome. But it may be the result of a general conclusion which can be drawn from the analysis presented here: factors which can be influenced by sanction senders are more important than those influenced by targets in the analysis of level II effectiveness of arms embargoes (reductions of arms flows).

Importance of embargo objectives for initiators (independent variable cluster G). This variable cluster, designed to measure sender-related issues around arms embargoes, including the strength of domestic lobby for arms embargoes in sender states, the foreign policy importance of arms embargoes for initiators and the type of arms supplier initiating the embargo, is only yielding statistically significant correlation coefficients when measured against level II effectiveness.

DOI: 10.2202/1554-8597.1118

9. Conclusion

The analysis of a sample of 74 arms embargo cases yields some interesting results. Among the most important results are that arms embargoes have had, on average, notable effects on arms import patterns. While no arms embargo has had 100% effectiveness, the majority has induced at least some change in arms import patterns, with many having some or even significant effects. This fact tends to get lost in many case studies of arms embargoes, where a very high standard of success is set, usually the total end of imports of arms and ammunition.

However, changes in arms import patterns, whether major or minor, have had, on average, rather little effect on targeted policies. Targets have continued to pursue policies which senders wanted to end, or they changed policies for reasons other than external manipulation of arms flows.

Obviously, the link between arms supplies and policy changes in the target is weak. Targets adapt their military forces and styles of war to the level of arms and ammunition available. Arms embargoes often come very late in the game. A more timely reaction might increase the likelihood that sanctions have some effect on policy change.

The data analysis confirms that the effects of arms embargoes on target policies increase over time. The success rates of long-running arms embargoes are significantly higher than those of short-lived ones. Arms embargoes take time to have effects on policy change. As stocks of arms and ammunition are depleted, concerns over decreases in firepower grow and with them, at least in a number of cases, the willingness to change policies.

The data also confirm the hypothesis that multilateral arms embargoes are more successful than unilateral ones. Multilateralization increases the supplier's satisfaction with an embargo, raises the likelihood of significant changes in arms import patterns, and even increases the chance of policy change in the target. Related to the multilateralization is arms embargo implementation. A higher degree of participation of countries and a stronger effort at implementation by participants increase the effectiveness of arms embargoes with respect to arms imports by the target.

Arms embargo implementation has improved over time, at least with respect to the change of arms import patterns. Senders have become smarter in terms of multilateralization of arms embargoes and improving implementation. However, there has not been a corresponding improvement in the success rate of targeted policy change.

Finally the success of arms embargoes remains limited when policy change is the ultimate objective. Senders can reduce and stop arms flows, but they have little power over policy change in the target. However, policy change is not the only goal senders pursue when adopting sanctions. Multilateralization of national restrictions and success in significantly changing arms import patterns also seem to be valued by sanction initiators. Arms embargoes are comparatively cheap for senders, and thus even partially enforced embargoes may be efficient. They are signals of disapproval in particular for countries with restrictive arms export policies.

Not much can be pulled from the analysis presented here for the question why targets do not react to decreases in arms flows. It seems that neither the importance of a particular policy to a target, nor countermeasures nor decision-making structure in the

target can explain much of the variance in the rate of success in influencing target policies. In combination, all these factors have some effect, even if not very strong.

Arms embargoes are clearly more effective when they are consistently embedded in other measures. In fact, this may be the most important policy lesson from this study: arms embargoes in and of themselves will seldom affect target policies. They are instead most effective when utilized as a consistent element of larger policy packages. In addition, there need to be a long time period allotted for the implementation in order to increase the possibilities of success. Arms embargoes have very seldom had effects on targeted policies prior to their fifth year of implementation.

The analysis indicates that several factors may be responsible for the arms embargo paradox. Arms embargoes are somewhat more effective, at least with respect to arms flows, if measures of success are allowed to fluctuate between no effect and full attainment of the social objective. However, they are not a strong instrument to change incriminated policies**.** In summary, no single explanation gets strong support, but all seem to contribute.

Appendix 1: List of dependent and independent variables and descriptions of variable scores

Dependent variables:

EL I: Effectiveness Level I:

Targeted policy change

0 No detectable change with respect to targeted policy
1 Some change with respect to targeted policy
2 Major change with respect to targeted policy
3 Targeted change occurring within reasonable period of time

Causes of target policy change (multiply with factor for targeted policy change)

0 no relation to arms embargo
0.5 some relation to arms embargo
1 arms embargo major factor in policy change

EL II: Effectiveness Level II:

Arms supplies to target

0 No change in arms supplies to target
1 Some reduction in arms imports by target, some change in supplier composition, some increase in price of weapons, some change in military behavior necessary because of reduced arms imports
2 Major reduction in arms imports by target, major change in supplier composition, major increase in price of weapons, major change in military behavior necessary because of reduced arms imports
3 No significant arms imports post arms embargo

DOI: 10.2202/1554-8597.1118

EL III: Effectiveness Levels III:

Satisfaction of initiator of arms embargo

0 None of objectives of initiators met
1 Some of objectives of initiators met, some initiators satisfied
2 Objectives of initiators mostly reached
3 Objectives of initiators fully reached

Independent variables

A: Cost-benefit calculations in target (variables 1-3 additive)

Importance of sanctioned behavior to target

0 Importance high
1 Importance low

General importance of arms imports to target

0 Importance low
1 importance high

Relation between behavior and arms imports

0 No relation
1 Notable relation

B: Decision making structure in target (variables 4-6 additive)

Decision making structure

0 Autocratic decision making
1 Participatory decision making

Symbolic dimension of arms embargo for target

0 Low symbolic importance of arms embargoes
1 High symbolic importance of arms embargoes

"Embeddedness" of arms embargo in other sender policies

0 Little relation between arms embargoes and other policies
1 Arms embargoes consistent with other sender policies/additional (targeted) sanctions in place

C: Evasion capacity/activity of target (variables additive)

Domestic arms production

0 Major and growing arms production
1 Some domestic arms production
2 No significant domestic arms production

Lead-time to arms production/length of preparation prior to arms embargo

0 Long lead time
1 Insignificant lead time

D: Multilateralization of arms embargo (variables additive)

Power/importance of initiator(s)
- 0 Less important state(s)
- 1 Major power(s)

Type of arms embargo
- 0 US or EU, voluntary multilateral
- 1 Multilateral (UN)

Objectives of arms embargo shared by senders and additional important states?
- 0 Differing, or unclear, objectives
- 1 Common objectives

E: Implementation of arms embargo (variables additive)

Capability of senders to implement/enforce arms embargo
- 0 Low capabilities in some important countries (neighbors, arms suppliers)
- 1 Overall good capability

Pressure on/support for non-initiators
- 0 Little pressure, support for non-initiators
- 1 Strong pressure, support for non-initiators

Effectiveness of monitoring of arms embargo
- 0 No effective monitoring
- 1 Effective international monitoring

F: Countermeasures by targets (variables additive)

Economic power/financial means of target
- 0 Target able to muster substantial finance for arms importation
- 1 Target limited in its financial means
- 2 Target seriously financially constrained

Power/influence of non-participants
- 0 Target with strong and important allies
- 1 Target widely isolated or without major allies

G: Importance of embargo objectives for initiators (variable 17-19 additive)

Domestic constituency in initiating state(s)
- 0 Weak domestic constituency, lobbying groups
- 1 Strong domestic lobby

Foreign policy importance of arms embargo objectives for initiator(s)
- 0 Importance low
- 1 Importance high

DOI: 10.2202/1554-8597.1118

(Dominant) initiator(s) type of arms supplier
0 "Restraint" supplier
1 Economic or hegemonic supplier

Appendix 2 Correlation tables

EL= Level of effectiveness

Average of EL I- to III scores	Average of scores of independent variable	EL I/A	EL I/B	EL I/C	EL II/D	EL II/E	EL II/F	EL III/G
Correlation coefficient	*0.890*	0.095	0.266	0.230	*0.495*	*0.355*	*0.340*	0.320
r-square	0.555	0.011	0.120	0.080	0.511	0.363	0.291	0.172
Standard error	0.136	0.203	0.192	0.196	0.143	0.163	0.172	0.186
F-Test	0.131	0.429	0.025	0.083	0.002	0.000	0.000	0.027

EL I	Average of scores of independent variable	EL I/A	EL I/B	EL I/C	EL II/D	EL II/E	EL II/F	EL III/G
Correlation coefficient	*0.499*	0.126	*0.351*	0.048	0.213	0.233	0.071	0.197
r-square	0.284	0.031	0.341	0.006	0.154	0.255	0.021	0.106
Standard error	0.136	0.158	0.130	0.160	0.147	0.138	0.158	0.151
F-Test	0.579	0.005	0.000	0.000	0.000	0.000	0.000	0.000

EL II	Average of scores of independent variable	EL I/A	EL I/B	EL I/C	EL II/D	EL II/E	EL II/F	EL III/G
Correlation coefficient	*1.514*	0.037	0.405	0.363	*0.782*	*0.624*	*0.653*	*0.638*
r-square	0.513	0.001	0.089	0.063	0.408	0.358	0.342	0.219
Standard error	0.252	0.361	0.345	0.350	0.278	0.290	0.293	0.320
F-Test	0.000	0.000	0.010	0.002	0.085	0.721	0.349	0.009

EL III	Average of scores of independent variable	EL I/A	EL I/B	EL I/C	EL II/D	EL II/E	EL II/F	EL III/G
Correlation coefficient	*1.155*	0.248	0.391	0.328	*0.702*	0.441	0.368	0.321
r-square	0.357	0.028	0.100	0.062	0.394	0.215	0.130	0.066
Standard error	0.265	0.325	0.313	0.320	0.257	0.293	0.308	0.319
F-Test	0.000	0.001	0.068	0.019	0.339	0.678	0.868	0.062

Italic: Correlation coefficient significant at 95 percent level

Appendix 3: List of arms embargo cases (as of 2005)

Country	Sanctions by	Begin Year	End Year	Type of sanctions	Target	Sanctions objective
Afghanistan	UN	1996		Voluntary UN arms embargo	All parties	End of civil war; human rights
Afghanistan	UN	2000		UN arms embargo	Taliban	End of support for terrorism; extradition of Usama bin Laden
Afghanistan	EU	1996	2001	EU arms embargo	All parties	End of civil war
Afghanistan	EU	2001		EU arms embargo	Taliban	End of support for terrorism
Afghanistan	US	1996	2001	US arms embargo	All parties	End of civil war
Afghanistan	US	2001		US arms embargo	All non-government groups	End of support for terrorism
Angola	UN	1993	2003	UN arms embargo	UNITA	End of civil war
Armenia	OSCE	1992		Voluntary OSCE arms embargo		End of hostilities
Armenia	UN	1993		Voluntary UN arms embargo		End of hostilities
Armenia	US	1993		US arms embargo		End of hostilities
Azerbaijan	OSCE	1992		Voluntary OSCE arms embargo		End of hostilities
Azerbaijan	UN	1993		Voluntary UN arms embargo		End of hostilities
Azerbaijan	US	1993		US arms embargo		End of hostilities
Belarus	US	1993		US arms embargo		Regime change
Burundi	Regional	1996	1999	Comprehensive economic sanctions		End of civil war
China PR	EU	1989		EU arms embargo		Human rights
China PR	US	1989		US arms embargo		Human rights
Congo DR	UN	2003		UN arms embargo	Ituri and Southern Kivu	End of civil war
Cuba	US	1958		US arms embargo		Regime change
Cuba	US	1962		US comprehensive sanctions		Regime change
Cyprus	US	1992		US arms embargo		End of hostilities

DOI: 10.2202/1554-8597.1118

Eritrea	EU	1999	2001	EU arms embargo	End of hostilities
Eritrea	UN	1999	2000	Voluntary UN arms embargo	End of hostilities
Eritrea	UN	2000	2001	UN arms embargo	End of hostilities
Ethiopia	US	1998	2001	US arms embargo	End of hostilities
Ethiopia	EU	1999	2001	EU arms embargo	End of hostilities
Ethiopia	UN	1999	2000	Voluntary UN arms embargo	End of hostilities
Ethiopia	UN	2000	2001	UN arms embargo	End of hostilities
Georgia	UN	1993		Voluntary UN arms embargo	End of hostilities
Haiti	US	1991	1994	US arms embargo	Regime change
Haiti	UN	1993	1994	UN arms embargo	Regime change
Haiti	UN	1994	1994	Comprehensive economic sanctions	Regime change
India	US	1998	2001	US arms embargo	Change in nuclear policies
Indonesia	EU	1999	2000	EU arms embargo	Human rights
Indonesia	US	1999		US arms embargo	Human rights
Iran	US	1984		US arms embargo	End support of terrorism
Iran	US	1995		US comprehensive sanctions	End support of terrorism, change nuclear policies
Iraq	UN	1990	2003	UN comprehensive sanctions	End of occupation of Kuwait, verification of WMD disarmament
Iraq	EU	2003	2004	EU arms embargo	Containment of hostilities
Liberia	UN	1992		UN arms embargo	End of civil war
Libya	UN	1992	2003	UN arms embargo	End support of terrorism
Libya	EU	1986	2004	EU arms embargo	End support of terrorism
Libya	US	1978		US arms embargo	End support of terrorism
Myanmar/-Burma	EU	1991		EU arms embargo	Human rights
Myanmar/-Burma	US	1988		US arms embargo	Human rights
Nigeria	EU	1995	1999	EU arms embargo	Human rights
North Korea	US	1950		US comprehensive sanctions	Regime change
Pakistan	US	1979	1981	US arms embargo	Change in nuclear policies

Pakistan	US	1990	2001	US arms embargo		Change in nuclear policies
Rwanda	UN	1994	1995	UN arms embargo		End civil war, stop human rights violations
Rwanda	UN	1995		UN arms embargo	Hutu groups	End hostilities
Rwanda	US	1994	2003	US arms embargo		End hostilities
Rwanda	US	2003	2004	US arms embargo	Non-governmental forces	End hostilities
Sierra Leone	UN	1997	1998	UN arms embargo		Regime change; end of civil war
Sierra Leone	UN	1998	2002	UN arms embargo	Rebels	End of civil war
Somalia	UN	1992		UN arms embargo		End of civil war
South Africa	UN	1977	1993	UN arms embargo		Regime change
Sudan	UN	2004		UN arms embargo		Human rights, end of civil war
Sudan	EU	1994		EU arms embargo		Human rights, end of civil war
Sudan	US	1992		US arms embargo		Human rights, end of civil war
Sudan	US	1997		US comprehensive sanctions		Human rights, end of civil war
Syria	EU	1986	1994	EU arms embargo		End support of terrorism
Syria	US	1991		US arms embargo		End support of terrorism
Vietnam	US	1984		US arms embargo		Regime change
Yemen	UN	1994		UN voluntary arms embargo		End of hostilities
Yemen	US	1992		US arms embargo		End of hostilities
Yugoslavia	UN	1991	1996	UN arms embargo		End of hostilities
Yugoslavia	UN	1992	1995	UN comprehensive sanctions		End of hostilities
Yugoslavia	UN	1998	2001	UN arms embargo		End of hostilities
Yugoslavia	EU	1991	2001	EU arms embargo		End of hostilities
Zaire	US	1993		US arms embargo		Human rights
Zaire	EU	1993		EU arms embargo		Human rights
Zimbabwe	EU	2002		EU arms embargo		Human rights
Zimbabwe	US	2002		US arms embargo		Human rights

DOI: 10.2202/1554-8597.1118

References

Allen, Susan H. 2005. The Determinants of Economic Sanctions Success and Failure. *International Interactions*, vol. 31, no. 2, pp. 117-138.

Baldwin, David. 1997. The Sanctions Debate and the Logic of Choice. *International Security*, vol. 24, no. 3, pp. 80-110.

Barber, James. 1979. Economic Sanctions as a Policy Instrument. *International Affairs*, vol. 55, no. 3, pp. 367-384.

Beck, Michael D., ed. 2003. *To Supply or to Deny. Comparing Nonproliferation Export Controls in Five Key Countries*. Amsterdam: Kluver.

Bolks, Sean M., and Dina Al-Sowayel. 2000. How Long Do Economic Sanctions Last? Examining the Sanctioning Process Through Duration. *Political Research Quarterly*, vol. 53, no. 2, pp. 241-265.

Bondi, Loretta. 2002. Arms Embargoes. In Name Only? In David Cortright and George Lopez, 2002, pp. 125-144.

Brooks, Risa. 2002. Sanctions and Regime Type: What Works, and When? *Security Studies*, vol. 11, no. 44, pp. 1-50.

Brzoska, Michael. 1991. Arming South Africa in the Shadow of the UN Arms Embargo. *Defense Analysis*. vol. 7, no. 1, 1991, S. 21-38.

Caruso, Raul. 2003. The Impact of International Economic Sanctions on Trade. An Empirical Analysis. *Peace Economics, Peace Science and Public Policy*, vol. 9, no. 2.

Control Arms. 2006. *UN arms embargoes: an overview of the last ten years*. Briefing Note, London, March 16.

Cortright, David and George A. Lopez with Linda Gerber. 2002. *Sanctions and the Search for Security*. Boulder: Lynne Rienner.

Cortright, David and George Lopez. 2000. *The Sanctions Decade: Assessing UN Strategies for the 1990s*. Boulder: Lynne Rienner.

Doxey, Margaret P. 1987. *International Sanctions in Contemporary Perspective*. London: The Macmillan Press.

Drezner, Daniel W. 1999. *The Sanctions Paradox: Economic Statecraft and International Relations*. Cambridge University Press.

Drezner, Daniel W. 2000. Bargaining, Enforcement and Multilateral Sanctions: When is Cooperation Counterproductive? *International Organization*, vol. 54, no. 1, pp. 73-102.

Fruchart, Damien, Paul Holtom, Siemon T. Wezeman, Daniel Strandow and Peter Wallersteen. 2007. *United Nations Arms Embargoes. Their Impact on Arms Flows and Target Behaviour*, Stockholm: SIPRI.

Galtung, Johan. 1967. On the Effects of International Economic Sanctions: With Examples from the Case of Rhodesia. *World Politics*, vol. 19, no. 3, pp. 378-416.

Harkavy, Robert. 1975 *The Arms Trade and International Systems*. Cambridge, MA: Ballinger, 1975.

Hovi, John, Detlef F. Sprinz and Arild Underdal, 2003. The Oslo-Potsdam Solution to Measuring Regime Effectiveness: Critique, Response, and the Road Ahead. *Global Environmental Politics*, vol. 3, no. 3, pp. 74-96.

Hufbauer, Gary C., Jeffrey J. Schott, Kimberly A. Elliott and Barabra Oegg. 2007. *Economic Sanctions Reconsidered*, 3rd ed. Washington: Institute for International Economics.

Kaempfer William H. and Anton D. Lowenberg. 1992. *International Economic Sanctions. A Public Choice Perspective*, Boulder: Westview Press.

Kaempfer William H. and Anton D. Lowenberg. 2007. The Political Economy of Economic Sanctions. In: Keith Hartley and Todd Sandler, *Handbook of Defense Economics, Vol II*, Amsterdam: North Holland, pp. 867-911.

Krause, Keith. 1995. *Arms and the State*. Cambridge, UK: Cambridge University Press.

Kreutz, Joakim. 2004. Reviewing the EU Arms Embargo on China: the Clash between Value and Rationale in the European Security Strategy. *Central European Review of International Affairs*, no. 22, pp. 43-58.

Landgren, Signe. 1989. *Embargo Disimplemented*. Oxford, UK: Oxford University Press.

Lektzian, David and Mark Souva. 2003. The Economic Peace Between Democracies: Economic Sanctions and Domestic Institutions. *Journal of Peace Research*, vol. 40, no. 6, pp. 641-660.

Ohlson, Thomas, ed. 1987. *Arms Transfer Limitations*. Oxford University Press.

Pierre, Andrew. 1982. *The Global Politics of Arms Sales*. Princeton: Princeton University Press.

Sampson, Anthony. 1978. *The Arms Bazaar*. New York: Bantam Books, 1978

SIPRI. 1973. *The Arms Trade with the Third World*. Almquist and Wicksell.

Speier, Richard H. Brian G. Chow, S. Rae Starr. 2001. *Nonproliferation Sanctions*. Santa Barbara: RAND.

Stent, Angela. 1985. *Economic Relations with the Soviet Union: American and West German Perspectives*. Boulder: Westview Press.

Van Bergeijk, Peter A. G: and Charles Marrewijk. 1995. Why do sanctions need time to work? Adjustment, learning and anticipation. *Economic Modelling*, vol. 12, no.2, pp. 75-86.

Wallensteen, P., Carina Staibano und Mikael Eriksson, eds. 2003. *Making Targeted Sanctions Effective. Guidelines for the Implementation of UN Policy Options*. Uppsala: Department for Peace and Conflict Research.

Wulf, Herbert. 1986. Arms embargoes. In: Saadet Deger and Robert West, *Security and Development*. New York, NY: St. Martin's Press.

DOI: 10.2202/1554-8597.1118