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Economic Sanctions and Corporate Compliance
A Game-Theoretic Model

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A Thesis Submitted
In Partial Fulfillment of the
Requirements for the Degree

Master of Arts

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May, 1999
ABSTRACT

Economic Sanctions and Corporate Compliance: A Game-Theoretic Model

By

Paula E. Losey

This paper examines the question of when economic sanctions will be effectively instituted by states by looking at the role of the multinational corporation in the sanctioning process. Although governments have resources at their disposal with which to enforce their policies, the amount of resources that they are willing to devote to this enforcement are a function of their own cost/benefit calculations. They are also influenced by their predictions of the level of compliance of their private firms that conduct business in the target state. A game-theoretic model of the interaction between a sanctioning government and a private firm is offered and used to derive hypotheses on the conditions affecting a government's willingness to expend monitoring costs to enforce a sanctions policy. These hypotheses are then applied to the cases of the South African and Rhodesian oil embargoes.
ACKNOWLEDGEMENTS

I wish to thank Cliff Morgan for his guidance and support on this project. In addition, I would like to acknowledge Richard Stoll and Sherry Bennett, without whom this thesis would have not been successfully completed.
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I. INTRODUCTION

On September 30, 1997, the US Department of Commerce Bureau of Export Administration announced in a press release that it had fined Lockheed Martin $45,000 after finding that the company had exported materials used for missile systems to South Korea, despite the fact that the materials were controlled "for reasons of national security, foreign policy, nonproliferation and short supply." This is but one example of the hundreds of civil judgments issued against US firms attempting to evade (knowingly or unknowingly) export controls and sanctions imposed by the US government against other states.

The first obstacle to the study of economic sanctions is defining exactly what they are and what measures and purposes they encompass. Whereas some scholars emphasize the tactics used in economic sanctions, others are more interested in the goals they are employed to accomplish. In the realm of tactics, Huffbauer et al. (1990) define economic sanctions as "the deliberate, government-inspired withdrawal, or threat of withdrawal, of customary trade or financial relations (2)." Carter (1988) provides a far more specific definition in his study of the US sanctions regime, grouping the economic measures into five major categories, comprised of limits on government programs (i.e. foreign aid), exports, imports, private financial transactions, and international financial institutions. In a more goal-oriented
conception of economic sanctions. Kaempher and Lowenberg (1992) differentiate between earlier episodes, which primarily served collective security goals, and later episodes, which were increasingly focused on achieving "national strategic or economic objectives (1)."

Similarly, Doxey (1987) draws a distinction between sanctions and mere "economic warfare" based upon the goals that they are employed to accomplish, although the tactics of each are the same. Whereas sanctions are used to dissuade the target from pursuing some policy that is against established rules or norms of international law, economic warfare may complement the use of force and have objectives that are strategic or economic, as opposed to moral or legal.

**History of Sanctions:**

In recent years, economic sanctions have played an increasingly important role in many states' foreign policies. Their roots can be traced back to ancient Greece, when Pericles limited imports of Megaran goods to Athens in response to Megara's territorial expansion and the kidnapping of three Athenian women (Carter 1988). However, since we are concerned primarily with the modern uses of sanctions, it would be more fruitful to explore their development as foreign policy tools over the course of the twentieth century.

As has been previously noted, Doxey (1980) distinguishes between economic warfare and sanctions, asserting that, although economic
measures can be used as sanctions. They can also be used in other ways or concurrent with other tactics. For example, in the early part of the 20th century, economic measures were used during periods of warfare to diminish the target's ability to fight, thus hastening its defeat, as well as to decrease the target's morale and willingness to fight. Although these measures are characterized as "sanctions" by some (Carter, 1988), others, like Doxey, exclude these types of applications, implying that sanctions encompass not only method, but purpose.

The idea of economic sanctions as tools in and of themselves gained prominence with the birth of the League of Nations. Article 16 of the charter stated that members were to cease all economic intercourse with aggressors. This lost a great deal of credibility, however, when the League's sanctions failed to have any effect on Italy after it invaded Ethiopia (Carter, 1980). Despite this, the use of blockade tactics was perceived to be quite effective during the first and second world wars. The naval blockade of Germany in W.W.I has been deemed particularly effective, as it greatly limited essential supplies of raw materials and food necessary to support the war effort as well as the general population. These blockades managed to limit imports to Germany from non-European sources as well as other European countries. Japan was even more vulnerable to Germany during W.W.II. as it had no adjacent neutrals with which to trade, thus making the use of air and sea blockade tactics very effective (Doxey, 1980).
In the half century since the end of W.W.II, economic warfare has undergone changes in implementation and purpose. During the Cold War, boycotts and embargoes played a strategic role in the ideological struggle between West and East. Under NATO, a coordinating committee (COCOM) for the control of trade with the Communist bloc was formed, and a system of export controls was implemented to prevent Communist countries from gaining access to strategic materials or weapons (Bergsten et al., 1978). Later, CHINCOM, a similar committee dealing with communist China, was also formed (Doxey, 1980). Although the Cold War is over, this system of controls is still in place in the US and other developed countries, as many developing countries are considered unstable or potentially threatening to national security.

Another particularly noteworthy use of sanctions during this period is the series of boycotts and embargoes instituted by the Arab world against Israel and its allies. This is difficult to characterize as an accepted legal or moral basis for sanctions, as the actual grounds for this embargo are questioned by some. In 1951, the Arab League established a Boycott Office in Syria that was given the task of imposing and enforcing a total ban on any type of commerce between the Arab states and Israel. In addition, a secondary boycott was adopted and prohibits trade between Arab states and any foreign firm with connections to Israel. This has also evoked a response on the part of Israel's allies. The US and Canada, for instance, have instituted
sanctions against firms that have complied with the Arab boycott, making the conduct of business in the Middle East quite difficult for many companies (Doxey. 1980). This demonstrates the ambiguity encountered by defining sanctions in terms of international rules and norms— who defines them?

Since W.W.II. sanctions have been used more and more often by themselves, in lieu of military hostility. They have taken on new goals and are being employed more frequently on a unilateral basis, especially by the United States. This leads us to the question of why sanctions are used today. What foreign policy purposes are they employed to address? For the US, roughly 31 percent of the new unilateral sanctions adopted in the period between 1993 and 1996 were for human rights and democratization. This is the largest category, the next largest being anti-terrorism (20 %)." Even if we can determine the stated goals of a sanctions policy, it is quite possible that these are secondary to the actual underlying goals. For instance, Huffbauer et al. (1990) discuss the domestic political purposes of sanctions, noting that "the desire to be seen acting forcefully...can easily overshadow specific foreign policy goals." Kaempfer and Lowenberg (1992) also note that the application of a public choice model to a sanctions process suggests that a government often chooses sanctions that are relatively unimportant or low in cost merely to appease interest groups that are demanding that the government "do something (7)." Many scholars note
the importance of sanctions as a symbol or a statement of morality to the domestic population of the sender as well as to the international community (Galtung. 1971; Doxey. 1987). Others contend that sanctions are actually more effective when they are intended to serve symbolic purposes than when their primary objective is target state compliance (Eland. 1955. 29: Lindsay. 1986).

Due to this increasing focus on symbolic value, the implementation of sanctions has become an important concern, because the level of implementation can provide some insight as to the type of goals for which the sanctions were adopted (domestic symbolic versus foreign policy). The same holds true for the type of sanctions that are adopted (Carter. 1980; Kaempfer and Lowenberg. 1992). Interestingly, this is not the focus of a great deal of concern on the part of scholars, who seem to be more preoccupied with studying the effectiveness of sanctions at achieving the policy goals for which they were nominally adopted (Huffbauer et al. 1990). However, in order to determine the effectiveness of sanctions at achieving their goals, we must first determine those goals. If the primary goals are not always stated, foreign policy goals, it is possible that sanctions may be "successful" far more often than conventional wisdom dictates. Another problem encountered in the study of sanctions effectiveness is that scholars have tended to assume that the state is a unitary actor with complete control over its sanctioning agents, which include private
multinationals, financial institutions, and importer/exporters that have business interests with the target state. However, we cannot ignore the fact that private firms may (and in fact, usually do) have interests that are at least somewhat at-odds with those of the government (Nathan and Oliver. 1994). For these reasons, we should consider a new view of the sanctions process that takes into account these conflicting interests.
II. REVIEW OF LITERATURE

As has been previously noted, most of the economic sanctions literature concentrates on sender/target state interaction in explaining sanctions success. In addition to this, success is almost always conceived of as the ability of sanctions to achieve the desired policy changes in the target state (Wallensteen, 1983; Huffbauer et al., 1983). Political scientists are first and foremost concerned with answering the questions "Do sanctions work?" and "When do they work?" These questions have been approached from many angles, but the research on this topic can be grouped into three major schools of thought: state or sanctions attributes, domestic cost distribution, and international cooperation. The first of these concentrates on the sender and target states as a whole, or the characteristics of the sanctions themselves, to explain policy success. The second concentrates on how the costs of sanctions are distributed among groups in the sender and/or target states, and the third is concerned with the ability of states to coordinate their policies to achieve the desired changes in the target's behavior.

We will begin by discussing the largest area of research, state/sanctions attributes. In one example of this type of study, Simon (1996) presents a Bram's Theory-of-Moves (TOM) game that is designed to determine the conditions under which the target state will comply with
the sender state's requirements. Instead of focusing only on the economic costs of the sanctions on sender and recipient states. Simon determines the preference orderings of the states and finds a general pattern of preferences within the target state which seems to produce a high level of compliance. This "soft" preference ordering makes recipient states vulnerable to costs imposed on them due to trade dependence or economic dependence on the sender state. Thus, he notes that a major implication of the model is that "states can successfully use sanctions if they choose recipients with favorable preference orderings." Although this discovery has importance to the further study of sanction success. Simon notes that sender states with "soft" preference orderings may be vulnerable to domestic forces, among which are commercial interests whose business and trade would be negatively affected. This is a potentially far-reaching problem which his Theory-of-Moves game does not address.

Although Simon notes the general focus of the literature on the primarily economic costs of sanctions as determinants of their success, he finds the significance of these costs somewhat questionable within the framework of his study. This finding is in contradiction to Hufbauer, et al. (1990), which provides a quantitative study of 116 sanctions cases since World War I and finds that they can be quite effective provided the costs imposed on the target state are high enough. Doxey (1987) argues that, while sanctions are not without their effects, the specific
political, economic, and psychological damage which they inflict upon the target state, the sender state, and third parties in the international system are extremely difficult to detect and measure.

A good deal of the conventional wisdom about sanctions derives from this body of work. For example, Hufbauer et al. (1990) find that target states with unstable political regimes are more likely to succumb to sanctions. They also find that the longer sanctions are in place, the less likely they are to achieve the desired policy goals. In addition, their study concludes that the differential in size between sender and target matters. These types of findings have been the focus of a number of further studies.

The second vein of research looks at the specific nature and distribution of costs within the target state as a factor explaining the policy success of economic sanctions. For example, Morgan and Schwebach (1997) provide a game-theoretic model designed to investigate the affects of domestic political factors within states on the success of sanctions. They note that viewing states as unitary actors in the sanctions process is somewhat problematic due to the fact that costs are not distributed evenly among groups or individuals within the state and, as a result, this may greatly affect the success of the policy. To this end, they adapt their earlier spatial model of the process to reflect the internal "game" of the target state and find that, when costs are distributed narrowly among domestic political elites in the society of the target
state, they are more likely to produce the desired outcome.

Similarly, Kaempfer and Lowenberg (1992) present a social choice conceptualization of the sanctioning process and its impact on the political economy of the target state. They note that the policy is a product of a diverse variety of interest groups within the sender state and that, as a result, the policy output is often inefficient at attacking the economic weak points of the target. Instead of isolating and hurting the groups responsible for the offensive policy, sanctions often end up hurting the innocent masses. Further enlightenment may be provided by adapting Bueno de Mesquita's and Siverson's (1997) idea of the impact of selectorate and minimum winning coalition (MWC) size on policy goals to this question. Although Bueno de Mesquita and Siverson focus mainly on distribution of benefits among MWC members, the same idea holds for the distribution of costs. If sanctions are targeted at a narrow selectorate, they can have a high impact on the target state's policy. In sum, the largest area of interest in this body of literature is concerned with the role of domestic forces within the sender state and the target state on the effectiveness of economic sanctions in achieving their policy goals. Since private firms are probably the most strongly-affected groups within the sender state and have the duty of carrying out the sanctions, it follows logically that we should study the conditions under which they comply and the mechanisms of control that governments may have over multinationals in order to induce this compliance.
The third approach, which necessitates turning to the realm of interstate relations, allows us to study the question of sanctions effectiveness from a new perspective. For example, Martin (1992) looks at cooperation problems between several sender states in multilateral sanctions. She uses a model to delineate three main types of cooperation problems and then derives seven hypotheses designed to explain cooperation between states. One of her hypotheses relates to hegemonic stability theory and says that, due to the declining relative power of the US in the international system, we should find less cooperation between sender states when the US is the leading sender. This is an interesting idea, as it relates to the possible conflicts that may arise between the US and other states which are hosts to subsidiaries of US-based multinational corporations. Doxey (1980) provides another, more historical study of multilateral cooperation in sanctions enforcement from the League of Nations period through the 1970's, in which she notes the "immense difficulties in controlling corporate behavior" as a major reason for the difficulty in achieving multilateral cooperation.

So far, we have looked at economic sanctions from an international relations perspective. However, those who approach the problem from a private sector perspective tend to focus on the effects of sanctions on firms, trade and investment relationships, and the general populations of sender and target states. Scholars who study multinational corporations (MNC's) note that they are partly autonomous, partly constrained by
their home country's policies, and as time goes on, more and more constrained by their host country's policies (Nathan and Oliver, 1994). The goals of MNC's are often depicted as being at-odds with the national interests of their home countries (Sauvant and Lavipour, 1976). Although they are not always in conflict, in the words of Labor Secretary Robert Reich, "...corporate decisions...are driven by the dictates of global competition, not by national allegiance (quoted in Nathan and Oliver, 1994)."

Rodman (1995) has explored the growth of the multinational corporation and its relationship to the increasing difficulty of states in employing economic instruments, using as the basis of his study the hegemonic decline model. He offers the hypothesis that the decline of United States as a hegemonic power has undermined the capacity of its government to extend its sanctions to the foreign operations of American-based multinational corporations. Rodman then goes on to explore the perceived declining level of compliance of MNC overseas subsidiaries with US government policies, arguing that these subsidiaries no longer find value in complying with US interests. In the first few decades after W.W.II, it was in the interests of US-based MNC's and their subsidiaries to comply with US policy, as government contracts were their most profitable areas. In addition to this, Cold War ideology provided a strong impetus to adhere to US interests, as MNC's which did business in the Communist bloc discovered when faced
with organized boycotts and loss of government contracts. However, this all changed in the 1970's, when private international lending exploded in Europe and US MNC's became far more global in scope, which enabled companies like Ford to begin trading openly with Cuba through its foreign subsidiaries, despite the adoption of an embargo by the US government. The consequences of all of this is that the hegemonic decline of the United States in the interstate system, combined with the end of the Cold War and the globalization of business, have succeeded in allowing increasing levels of autonomy on the part of MNC's, who will continue to act as "profit-maximizing transnational actors, pursuing their global objectives in ways that may work at cross-purposes with public strategies of economic statecraft" (Rodman, 1995).

In a related idea, Shambaugh (1996) looks at the ability of the United States to control the export of its technology through cooperation with foreign subsidiaries and business partners. Among the cases he uses to illustrate his hypotheses, Shambaugh discusses the construction of the Siberian oil pipeline. In this case, in the US failed to successfully control several European firms with contracts to build the pipeline, despite threats of sanctions and other penalties. While at the same time managing to influence several other firms to change their policies and cease work on the pipeline. His two major hypotheses are. first (like Martin), that the US's hegemonic decline is related to its inability to control foreign firms and subsidiaries, and second, that the willingness
of a firm to comply is related to its dependence on its amount of business in a given state. Shambaugh finds evidence to support both of these findings, providing support for the idea that firms are entities which act to maximize their expected utilities, though they may sometimes conflict with the government.

Each of these perspectives on economic sanctions provides information on how public and private interests view the policy process and on what questions are most interesting to them. Scholars who approach the topic from a public policy angle are interested in the adoption process and the success of the sanctions at achieving their stated goals. Those who approach the topic from a private sector perspective are interested in the effects of sanctions on the business and financial environment itself. It is my contention that it would be not only possible, but fruitful, to bring these two perspectives together in a model of the sanctions process. Such a model could tell us a great deal about how private sector interests influence government decisions and how government policies in turn influence the actions taken by private firms.
III. THEORY

**Determinants of Governmental Policy and Corporate Compliance:**

The factors that affect the level of corporate compliance with sanctions are many and varied. However, several studies of sanctions cases throughout history have identified a few of the most influential of these factors. In the model which is presented later in the paper, the interaction of several of these variables with decisions made by governments and private firms is explored. In the model, a government will base its decision to sanction and the level of monitoring and enforcement costs it will pay on its expectation of whether or not the private firms which would be affected are likely to comply with the sanctions, which indirectly determine its own cost and benefit calculations. Private firms, on the other hand, will determine the expected utility of complying or not complying with their home government's policy and will base their decision to cooperate on these calculations.

For a government which is deciding whether or not to impose sanctions, the policy value \( (\pi_g) \) of the sanctions must first be determined. The governmental decision-making body must define the goals of the policy and their relevance and importance to national interests. Secondly, a government must determine the symbolic value \( (\sigma_g) \) of the
policy and whether or not it coincides with the stated foreign policy objectives and ideological views of the state. Smith (1996) notes that politically popular sanctions have high value for leaders in the sender state, making them more willing to accept large costs. Also, the cost of monitoring or enforcing the sanction policy ($\mu_g$) comes into play in the calculation. The government may find it necessary to pay high monitoring costs in order to ensure a certain level of compliance by its multinational corporations which trade and do business in the target state. Depending on whether or not a state deems the policy as symbolically valuable, it must decide how much it wishes to expend on monitoring (Doxey, 1980). For instance, if the government merely wishes to express disapproval with some policy or condition in the target state, it will find little policy value for the sanctions. Thus, as Klinghoffer (1989) notes, sanctions "habitually fail to achieve their political aims because...considerable laxity characterizes their implementation (87)." However, if the success or failure of the sanctions will greatly affect the national security, status, or material condition of the sender state, it will have a higher stake in the outcome and will be more likely to pay higher costs to ensure compliance on behalf of its firms.

A fourth variable is the cost of punishing companies ($\epsilon_g$) which fail to comply and are caught. These costs can be far-reaching and difficult to detect. They can include direct material costs, such as legal action
or bureaucratic red tape, or less tangible effects, such as loss of governmental support by the company, lower investment by firms in the home country, or the failure of policy goals due to the companies' lack of compliance, among other possibilities. However, there may be some gain by the government in terms of fines and penalties levied against the firm (which will be denoted as $\phi_g$). In looking at the methods that the United States, for one example, employs to dissuade private firms from attempting to evade sanctions, we can determine the type of benefits the sanctions are designed to achieve. The US Department of Commerce often employs sophisticated intelligence mechanisms to gather information on possible smuggling, publishing a list of known offenders that are currently being punished so as to dissuade others from doing business with them. In addition, there is a complex system of laws, one of the most important being the Export Administration Act, that are designed to set up the system of punishment (Carter, 1988). The penalty of evading export controls can be extremely high, and can include, for "knowing violations," a fine of $50,000 or five times the value of the exports involved and for "willful violations," $1 million or five times the value of the exports involved. The penalty to individuals can be even greater, resulting in up to ten years imprisonment."

In addition to these costs and benefits that a government determines in making the decision to sanction, each firm must make
similar assessments in its decision to comply with the government's policy, if it is adopted. Multinationals often take careful pains in dealing with host countries to demonstrate that they are not merely agents of foreign public or private interests (Vernon, 1977). Perhaps the most important variable is the profitability of the company's business with the target state ($\beta_r$). A firm with an extremely profitable, well-established branch in the target state that relies upon its business in the target state for a significant proportion of its profits will most likely have a different reaction to sanctions than a firm which relies on the target state for only a small or negligible amount of its total profit. Also, a company will take into account the value which the sanctions policy may have for its business ($\pi_r$) and the symbolic value of the sanctions ($\sigma_r$). It is often good public relations to be seen as the "company that cares" about human rights, and it is possible that the sanctions will yield a more stable business environment or more favorable policies on the part of the host government. For example, Polaroid voluntarily withdrew from South Africa despite the lack of official restrictions, to the accolade of many church groups and consumers (de Villiers, 1995). If the firm makes a decision to attempt to circumvent the sanctions, however, it will take into account the benefit it can acquire through this evasion ($\delta_r$), even if it does eventually get caught. Finally, a company must take into account the possible penalties which it
may be forced to pay if it fails to comply with the policy and is caught \( (\phi_r) \).

**Process:**

In creating a model which will accurately reflect the utilities to be gained by governments and private firms in the sanctioning process, we must first take into account the costs and benefits associated with the various possible outcomes for each actor, many of which are enumerated above. The government \( (G) \) has the choice of whether or not to apply the sanctions and, depending on its choice, a private firm \( (F) \) which is affected has the choice of whether or not to comply with these sanctions. Following this, the government, unaware of whether or not the firm has decided to comply or evade the sanctions, chooses to monitor at a high level or a low level. If the firm has evaded, the final move is made by Nature \( (N) \), which determines the probability at which the firm is caught and punished. We will assume that the probability of being caught is higher under high levels of monitoring than under low levels. The model of the process which is described above is represented by figure 1.

If the firm bases its decision of whether or not to comply in enforcing the sanctions adopted by its home country solely on the profit which it receives in the target country \( (\beta_r) \) and the value of the sanctions to the firm \( (\pi_c + \sigma_r) \), then it will receive the value associated
with the sanctions minus the profit it would have made had the sanctions not been adopted. On the other hand, if the company decides not to comply with the sanctions, it will receive the profit minus the value the sanctions may have brought the company. This simplistic calculation predicts that firms will never comply with sanctions, because the value of compliance will always be less than the value of noncompliance for companies doing business in the target state (as one of our assumptions is that $\beta_r > \pi_c + \sigma_r$). Indeed, many scholars and policy-makers have noted that "commerce has too many benefits to be so easily snuffed out by political fiat" (Gladwin and Walker, 1980, 175). The only time in which compliance would produce a greater utility for a company would be when the value of the sanctions policy is greater than the profit—which may be the case in rare instances. For example, sanctions which are initiated in response to nationalization or a threat of nationalization of corporate assets within the target state may prove beneficial to a firm. However, these instances are relatively infrequent and uninteresting in terms of the model offered.

Despite this prediction that companies will never comply with sanctions imposed by their home country, we often see quite the opposite in reality. This leads us to question whether or not this story takes into account all of the important variables affecting the process. In the decision of whether or not to comply with sanctions, a firm takes
into account the possible penalties it would have to pay for not complying. Thus, another variable is brought into the picture—that of punishment for noncompliance. The fear of being caught and penalized must play an important role in a company's decision to comply. Therefore, in order to add a greater element of realism to the model, we add another possible outcome—that of being caught and punished. This, of course, presupposes some level of monitoring on the part of the sanctioning government. Without some kind of enforcement, no company would ever be caught. For example, as Klinghoffer (1989) notes with regard to the South African oil embargo, sanctions were ineffective because they are difficult, if not impossible, to monitor, and none of the sender governments is willing to finance a full-scale naval blockade. a requirement if the policy is to be successfully implemented.

A possibly significant oversimplification of this model lies in its treatment of "monitoring" as a dichotomous variable. In reality, there exists a vast continuum of levels of monitoring associated with a vast array of costs. In order to address this more fully, the monitoring variable is generalized into "high" and "low" categories. When this is done, we associate a probability of getting caught under high levels of monitoring (p) and a probability of getting caught under low levels of monitoring (q). Since higher costs reflect the level of enforcement and the importance of the policy value to the sanctioning state, p will be greater than q, all else being equal.
In order to use this model to determine outcomes, we must begin by determining possible preference orderings of each actor over the outcomes. Several reasonable assumptions can be made that will allow us to determine some restrictions on preferences. For instance, we can assume that there is a positive value associated with the sanctions policy itself to the government \((\pi_g + \sigma_g > 0)\). In addition, we can assume that \(\mu_g^2 > \mu_g^1\) (high monitoring is more costly to the government than low monitoring). As far as the firm is concerned, we can assume that the costs of punishment are greater than the benefit of delay by evading \((\phi_r > \delta_r)\) so that a firm that prefers sanctions will not have an incentive to evade in the hopes of being caught. Finally, it is assumed that, if the firm complies with the sanctions, they will be successful.

Now that these assumptions have been made, we can look at their effects on preferences. Outcomes will be denoted by letters 'a' through 'g', for the sake of simplicity (see figure 2). We can establish three types of firms, only two of which are interesting in the context of the model. For the first, the firm has the following preferences: Outcomes e and g are most preferred, a is second, b and c are third, and d and f are least preferred. Thus, the firm prefers to evade and not get caught over no sanctions at all (due to the symbolic value to be gained). However, the "no sanctions" outcome is preferred to compliance, which is preferred to being caught. For the second type, the firm again prefers
the outcome associated with evading and not getting caught. The second preference is to comply with the sanctions, the third is no sanctions, and last is being caught cheating. The third type, which will always comply with sanctions, has a dominant strategy, due to the fact that its most preferred outcome is associated with compliance. We can assume that the government prefers to get what it wants at the lowest possible cost. Therefore, $c > a$ and $c > b$. Also, the government prefers to catch the firm cheating (provided the firm has evaded the sanctions), so $d > e$ and $f > g$. All else being equal, the government prefers paying low monitoring costs to paying high ones, so $f > d$ and $g > e$. Finally, the government prefers to expend monitoring costs and achieve compliance to expending the same costs while the firm successfully evades the sanctions, so $b > e$ and $c > g$.

The mixed strategy subgame-perfect equilibrium is determined in appendix A. The government will choose a strategy, $s$, that will make the firm indifferent between compliance and evasion. The firm will choose a strategy, $r$, that will make the government indifferent between high-level monitoring and low-level monitoring. Appendix B contains the comparative statics associated with the mixed strategy equilibrium, which were obtained by differentiating $s$ and $r$ with respect to each of their cost/benefit components.
Implications and Hypotheses:

This model of corporate compliance with sanctions yields a number of hypotheses that may be enlightening and empirically testable. First, we will focus on a firm’s decision of whether or not to comply with sanctions. The model predicts that, as the policy value of the sanctions to the government (\( \pi_q \)) increases, the firm will comply more in equilibrium. As the costs of punishing the firm increase, the firm’s compliance will increase. This finding, in itself, is counterintuitive. One would expect that increasing the costs of punishing the firm would make the government less willing to pay them. On the other hand, willingness to pay higher punishment costs is also an indicator that the government places high value on the sanctions policy, which may in turn induce more compliance.

Increasing the penalty on the firm if it is caught always corresponds to an increase in compliance, which is logical. If this is the case, why doesn’t the government merely increase the penalty to an extremely high level? One reason may be that there are diminishing marginal returns to increasing the penalty (which would be reflected in the second derivative of the function). Another reason may be that increasing the penalty on the firm has negative consequences for the government. In other words, the costs (in policy terms) of punishing the firm may rise.
As far as monitoring costs are concerned, there is a conditional effect. If we assume that the policy value of the sanctions to the government plus the penalty it receives from the firm is greater than the costs of punishing the firm \((\pi_g + \phi_g > \varepsilon_g)\), then an increase in the cost of high-level monitoring will correspond to a decrease in compliance. However, if the opposite is true, then an increase in cost of high-level monitoring will lead to an increase in compliance. This threshold point provides another thought-provoking conclusion. A government for which \(\pi_g + \phi_g < \varepsilon_g\) is not likely to monitor at all because it cannot benefit from catching the firm. However, if the symbolic value of the sanctions is high enough, this government will still adopt the policy. The same condition holds true for the company's probability of being caught. If we assume that \(\pi_g + \phi_g > \varepsilon_g\), then an increase in the probability of being caught under high monitoring will correspond to an increase in compliance. Under the same condition, however, an increase in the probability of being caught under low monitoring corresponds to a decrease in compliance. This is a seemingly strange, counterintuitive finding. It is possible that the monitoring costs and probabilities are interacting in the model so as to produce these odd results, especially considering the fact that the payment of high monitoring costs on the part of the government is associated with a higher probability of being caught. Perhaps it is the case that, as the
probability of being caught under low monitoring increases, the government monitors less and the firm cheats more. These odd results should definitely be scrutinized more closely.

Turning to effects on the government's monitoring strategy, it is apparent that, as the policy value of the sanctions to the firm increases, monitoring will decrease. This is true given our initial assumption that $\delta_r < \phi_r$ (the benefit a firm can receive by evading until it is caught is outweighed by the penalty of being caught). Given this assumption, an increase in the symbolic value of sanctions to a firm will also correspond to a decrease in high monitoring. This is also interesting. If a firm can signal a government that its symbolic value for sanctions is higher than it actually is, then the government will respond by monitoring less, at which point the firm will be better able to evade the sanctions, enabling it to more easily receive its symbolic benefits (as the probability of being caught decreases.) If $\delta_r < \phi_r$, an increase in the firm's benefit of doing business with the target state will correspond to an increase in monitoring. This makes sense, as a firm which has a high stake in its business with the target will attempt to evade sanctions more than a firm with a smaller amount of interaction with the target, all else being equal.

It was assumed at the beginning of this discussion that a firm would only consider evasion if the value of doing business were greater
than the benefit it could receive from successfully-implemented sanctions ($\beta_r > \pi_r + \sigma_r$). Assuming this is the case, as the benefit to the firm of delay by evading increases, the government's level of monitoring will increase. In addition, as the penalty on the firm increases, the government will monitor less.
IV. CASES: SOUTH AFRICA AND RHODESIA

The above model explores the concept that sanctions have varying goals for the sender governments that adopt them, and these goals range from the purely symbolic to the primarily policy-oriented. Thus, these governments should be willing to pay fewer monitoring and enforcement costs on symbolic sanctions, as it is less important that they be successfully implemented. Governments may increase costs to themselves merely by punishing and alienating the businesses that are headquartered in their states, which would also tend to decrease their willingness to monitor heavily. Despite this, sender governments often have an incentive to signal to firms that sanctions are more important in a policy sense than they actually are, which may lead to higher compliance with sanctions.

For the purposes of clarity and simplicity, this study will focus on two very particular and related cases—sanctions against Rhodesia (1966-1979) and those against South Africa (1963-1993). To narrow the cases even further, the oil embargoes against both countries will be the main focus of concern. Although this only provides insight with regard to one specific commodity and one area of possible sanctions (export controls), it is done for ease in comparison as well as to facilitate a relatively brief, yet in-depth, look at how sender
governments used strategies to induce corporate compliance in some cases but were either unsuccessful or unwilling to commit the necessary resources in others.

Although the economic sanctions imposed on Rhodesia (now Zimbabwe) differed slightly from those on South Africa in terms of time period, goals, and costs, they are also related in many significant ways. First of all, both countries were in the same geographical region and even shared a common border. Second, many of the same companies did business with both governments (oil companies in particular). Neither country had its own oil reserves, which meant that both relied totally on foreign supplies. Both managed to evade sanctions at significant cost (Bailey, 1995). Finally, the reasons for the imposition of sanctions were similar, which will be explored in greater detail with a discussion of the general history behind the adoption of sanctions against each country.

As the histories of economic sanctions (and the oil embargoes in particular) against Rhodesia and South Africa are somewhat intertwined, it is easiest to discuss them both at once. The origins of the Rhodesian embargo date to 1965, when Britain threatened the Ian Smith regime with sanctions after it adopted its Unilateral Declaration of Independence (UDI) from Britain. This was in response to Britain's pressure on the Rhodesian government to move towards full participation of blacks as well as whites in the political realm. The UDI, in effect,
reinforced white control of the political system and sent a signal to Britain that its influence in Rhodesian affairs would not be tolerated. The Organization for African Unity (OAU) pressured Britain into adopting an oil embargo against Rhodesia in 1966. Other countries with oil companies in Rhodesia followed suit (including the US), but the governments of these countries initially did little to nothing to prevent their companies from violating the sanctions (Hengeveld and Rodenburg, 1995). Indeed, oil trade continued freely between Rhodesia and South Africa, which was sympathetic to the Ian Smith regime, via Mozambique (Bailey, 1995). At the time of its adoption, the major oil companies doing business in Rhodesia were Shell/BP, with 52% of the market, Caltex with 20%, Mobil with 22%, and Total with 6%. Shell/BP were British companies. Despite the British oil embargo, South African subsidiaries of its two largest oil companies were also the largest sanctions-busters (Klinghoffer, 1989, 87). A UN sanctions committee was established in 1968 due to the failure of the sender states to control the implementation of Rhodesian sanctions. However, the main weapon in the UN’s arsenal against sanctions evaders was only negative publicity. It could only encourage home governments to punish their firms—it could not punish them itself (Doxey, 1980, 104).

Although it was well-known that there was oil smuggling going on between South Africa and Rhodesia in the late 60’s and early 70’s, most believed that the smugglers were small companies and individual
profiteers. This changed in 1976, when the Center for Social Action of the United Church of Christ published a pamphlet charging Mobil for conspiring to supply the Rhodesian government with oil. In 1978, Bernard Rivers and Martin Bailey, two British researchers, published a book on the rampant sanction busting which had occurred with the knowledge and implicit consent of the British government ever since the adoption of the embargo. Other exposés of the secret oil trade between European companies and Rhodesia followed, bringing to light an elaborate "paper chase" consisting of false billing, dummy corporations, and phony mail-drops, among other methods (Gladwin and Walker, 1980).

These reports resulted in Senate Foreign Relations Subcommittee on African Affairs hearings in 1976, in which Mobil's legal officer argued that, since a subsidiary of the US-headquartered company had supplied the oil, and that the subsidiary was located in a country that had not adopted the sanctions, the company had not broken any laws. This argument held up, and the US Treasury Department concluded that no action could be taken against Mobil Corporation. Other legal action included a lawsuit by Lonrho Trading Company against the major oil companies for loss of profit, because Lonrho had ceased trade with Rhodesia while the others continued. This also resulted in no action against the sanctions-busting companies. Finally, the UN recommended that official action be taken against violators of the Rhodesian oil
embargo. However, not a single government acted on the recommendation, giving the oil companies no incentive to comply with the sanctions (Klinghoffer, 1989). The Rhodesian embargo ended in 1979, after a constitutional settlement was reached between Great Britain and Rhodesia and elections were held under universal suffrage. Sanctions may or may not have had an impact on the settlement, but it was concluded that they definitely imposed some financial costs on the Smith regime (Doxey, 1996).

Although the embargo against Rhodesia had been widely-adopted by the host governments of the major oil companies by 1966, the embargo against South Africa, which was nominally adopted by the Organization for African Unity (OAU) and the United Nations in 1963, did not really take effect until 1973, when Arab states coordinated an embargo against exports to South Africa. Western powers did not begin to support these resolutions calling for sanctions until the late 70's and early 80's, when the large oil companies began to withdraw. As with the Rhodesian embargo, the goals were related to the South African government’s political stance regarding blacks (the policy known as apartheid). The only OPEC country to openly defy the embargo was Iran, due to a prior-existing friendly relationship between the Shah and the South African government. However, this changed in 1979 after the Islamic Revolution removed the Shah from power (Klinghoffer, 1989). Despite the embargo, South Africa continued to support not only its own oil needs, but
Rhodesia's as well, without having to resort to rationing. The oil companies doing business in South Africa were the same companies that sold to Rhodesia. However, after the Rhodesian "paper chase" was exposed in the late 1970's, the large oil companies took special pains to disguise their dealings in South Africa, using oil traders and middle men to handle their business deals (Bailey, 1995).

Examples of sanctions evasion abounded during the 1970's and 1980's. The monitoring system that was put into place had many shortcomings and loopholes, which made it only slightly more difficult for business to continue as usual. A 1978 UN report discussed the use of Lloyd's shipping data as well as aerial reconnaissance data in order to determine those oil tankers which had violated the embargo (Hengeveld et al., 1995). Shipping companies often went to great lengths to circumvent sanctions. The story of the tanker Salem is one of the most dramatic of these cases. In 1980, a British ship rescued the crew of the Salem after the tanker went down off the South African coast. Although the crew had enough time to pack suitcases and food, they managed to lose the ship's log in the wreckage. An investigation of the mishap revealed that the tanker had unloaded its oil cargo in South Africa and the crew had scuttled the ship, having left just enough oil in the hold to appear as though it had lost its entire cargo. The tanker's "owner" had stolen the ship and the oil and was attempting to
collect insurance money for the lost tanker and cargo.

In another incident, the tanker *Mobil Hawk* was known to have stopped in South Africa, but no one could prove the ship had unloaded oil there. After twelve years, information surfaced that the ship had carried its cargo from the Middle East to the Caribbean and back to South Africa merely to throw those monitoring the embargo off track (Hengeveld et al., 1995). This was an extremely lucrative business for the shipping companies, which were able to use the oil embargo against South Africa as an excuse to raise prices. In this way, sanctions may have actually encouraged a desire to do business with the target, due to the potential for enormous profits.

In the early 1980's, the Saudi Arabian government announced that it was adhering to the embargo, but issued an official statement declaring that "the Government of the kingdom of Saudi Arabia does not maintain a list of oil companies or tanker companies that have violated the contracts of sale or shipping by supplying or shipping oil and petroleum products to South Africa (Klinghoffer, 1989, 42)." This was essentially an announcement to oil companies and other governments that Saudi Arabia was doing nothing to monitor or enforce the embargo (Klinghoffer, 1989). Although Rhodesian sanctions had no central monitoring body established, the UN sponsored a conference in Amsterdam in 1980 to determine steps for implementation and monitoring of the
embargo against South Africa. The Norwegian Shipping Research Bureau was created in 1980 with the sole purpose of monitoring tanker movements to the region (Bailey, 1995).

Although monitoring of sanctions was quite difficult, many governments agreed that the enforcement, and not the monitoring or the legislation of sanctions, is what proved to be especially difficult. A 1981 report of the Shipping Research Bureau on South African sanctions stated that “clear penalties were laid down to be imposed on embargo breakers.” Not all sender states were “equally interested in rigorous enforcement of their embargoes (Hengeveld et al., 70). Several governments were more effective than others at enforcing sanctions. The more successful of these governments managed to make it risky or unprofitable for oil companies to trade with South Africa.

For example, Nigeria was very successful at enforcing the embargo. The government seized ships in Nigerian ports that were carrying oil to South Africa and confiscated their cargo, closed its ports to ships that had violated the sanctions, and nationalized the Nigerian holdings of British Petroleum, a major sanctions buster. Kuwait, another very successful enforcer of the embargo, terminated contracts with embargo violators. Other countries, such as Liberia, were extremely active in circumventing the sanctions. Liberia’s commissioner for maritime affairs stated that “if there was a conflict between business and political considerations, we will put business first (Hengeveld et al..
US-based firms debated what to do in order to stay in business in South Africa. In March of 1977, a group of businesses that included the oil companies Caltex and Mobil adopted the Sullivan Principles, which called for desegregation, fair employment practices, promotion of blacks into management positions, and improvement of living conditions in their South African subsidiaries. This move was designed to assuage the public's and the policy-makers' concerns over human rights issues (de Villiers, 1995). These methods appear to have had some success, as the US had participated in the embargo in name only until 1986, when the Comprehensive Anti-Apartheid Act was adopted over President Reagan's veto. Amendments to this act that were adopted in 1987-88 imposed heavy penalties on US oil companies refusing to disinvest in South Africa. Throughout these enforcement mechanisms, firms like Mobil continued to profit from trade with South Africa. However, the Rangel amendment of 1988 changed all of this by enforcing double taxation for US firms in South Africa (Hengeveld et al., 1995). This would cost Mobil millions of dollars, as it would not be able to deduct taxes paid to South Africa, and was cited as the major reason for Mobil's decision to leave South Africa in 1988. During this period, US direct investment in South Africa decreased by half: from $2.3 billion to just over $1 billion (Knight, 1990). Still other instances of successful embargo enforcement involve local governments, as opposed to national governments. For
example, the city of Los Angeles threatened to terminate its contracts with Ashland Corporation because of its refusal to disinvest in South Africa. When faced with this possibility, Ashland's corporate attorney stated that its contract with Los Angeles, amounting to $12 million, "was clearly more important than our small and somewhat limited relationship in South Africa (Knight, 1990, 75)."

The US removed its sanctions against South Africa in 1991, a full two years before the United Nations saw fit to do the same. In 1994, general elections were held under international supervision and brought black majority rule under newly-elected President Nelson Mandela (Doxey, 1996, 25). As with the case of Rhodesia, the effectiveness of the sanctions in bringing about policy change in South Africa was a matter of debate. Many scholars and policy-makers point out the fact that, in both cases, sanctions were circumvented and neither country suffered economic paralysis. However, as Martin Bailey (1995) notes, "although Rhodesian and South African embargoes were circumvented, this was only done at a substantial cost (225)."

**Analysis:**

As has been previously noted in the discussion of the cases of both Rhodesian and South African sanctions, the major policy goals of the sender states were in the domain of human rights. Therefore, we can conclude that the value of the sanctions was primarily symbolic to the
sender governments. and not policy-related. Although there had been some public outcry against apartheid since before the 1960’s, it was not significant enough to strongly alter payoffs for governments or firms until years later, or in some cases not at all. Many accounts of the Rhodesian and South African oil embargoes note that "western states often condemn apartheid, but their economic and strategic interests lead them to apply sanctions loosely (Klinghoffer, 1989, 49)."

As far as monitoring costs were concerned, there is a great deal of consensus that effective enforcement of the oil embargoes against both Rhodesia and South Africa would have been extremely costly, if at all possible. It is also apparent that sender governments were either unwilling or unable to pay these costs. Klinghoffer (1989) notes that an effective oil embargo against South Africa would necessitate a full naval blockade, and none of the sender states were willing to pay such costs. In the case of Rhodesia, effective sanctions would have been even more difficult, due to the fact that South Africa was friendly to the Rhodesian government and could easily send oil across their common border (Hengeveld et al., 1995).

It is also apparent from the above discussion that different governments had varying payoff structures. Interestingly, in the case of the United States, the costs and benefits seem to have shifted both for firms and for the US government over the course of the 1980’s. For many firms, the benefit of doing business with the target state
decreased due to several factors. One was the downturn that the South African economy took in the early 80's. By the late 1980's, many companies had disinvested from South Africa simply because dwindling profits no longer justified the hassle of evading sanctions. A second major reason for the withdrawal of business interests from South Africa was due to the increasingly negative and increasingly vocal public opinion against sanctions-busters, which took the form of protests, consumer boycotts, and vandalism. Polaroid had been the first US firm to disinvest, citing the "cost in time, money, and energy dealing with protesting Black and other pressure groups in the United States (de Villiers, 1995, 55).

By the mid-1980's, scenes of violent protests and riots in South Africa were prevalent in the evening news, causing more and more people to demand that Congress do something. Consumer boycotts were launched in the United States against US companies and even against foreign companies like Shell Oil that continued to trade with South Africa. Media campaigns were launched, and anti-apartheid activists vandalized Shell gas stations, causing tens of thousands of dollars in damage. Shell countered by paying over $100,000 to implement a strategy designed to control the spread of the boycott by negotiating with religious and activists groups—a strategy which eventually proved to be quite ineffective (Hengeveld et al., 1995). All of these factors decreased the profit of doing business with the target of the sanctions. Although
Shell never completely withdrew from South Africa. The US-based companies Mobil and Exxon both eventually sold all of their holdings in the country. However, Shell had over twice as large of a market share in both South Africa and Rhodesia as the US firms.

The payoff structure for some of the sender governments also changed over the course of the sanctions. For the United States government, policy towards South Africa had been one of "quiet diplomacy" from the 1960's to the mid-1980's, but it took a drastic turn in 1986, when Congress seized control of South Africa policy from the State Department (de Villiers, 1995, 201). The increasing violence in the country, combined with the introduction of a new constitution in 1983 which contained a provision for segregated parliaments, led the government to declare a state of emergency in 1985. As a result of this, the public movement to disinvest from South Africa gained tremendous momentum in the US in the mid-1980's. US stockholders began to voluntarily sell their holdings, and local sanctions were adopted by 25 states, 19 counties, and 83 cities by the end of the decade (Knight, 1990, 69).

Each of these factors, combined with the fact that 1986 was a Congressional election year, led to the passage of the Comprehensive Anti-Apartheid Act (CAAA), which led to a significant tightening of US sanctions on all fronts. The passage of the CAAA signified that the issue of human rights in South Africa had become a salient issue to the
voters. Although the adoption of anti-apartheid principles had satisfied US voters in the 1970's, it was no longer enough by the mid-1980's. Voters were angry that nothing had been accomplished and that sanctions appeared to be easily evaded. Voluntary consumer boycotts tipped off Congressmen that positive action on this front could be beneficial to their reelection bids. It became desirable, in this case, for Congress to take action in enforcing the laws.

In addition to the increasing political value of successful sanctions, enforcement was also relatively costless, as it didn't involve extensive monitoring or blockade. A simple change of the taxation laws was enough to get one of the biggest violators of the oil embargo, Mobil Corp., to totally withdraw from South Africa. Despite this seemingly drastic action, the US was also the first to drop the oil embargo and begin trading again in the 1990's (Hengeveld et al., 1995). This is due to the fact that public outcry had abated, and the US government turned towards satisfying its business interests once again.
V. CONCLUSIONS

These findings, although somewhat intuitive, may prove interesting in several respects. First, the threshold points, especially those associated with the effects of monitoring changes on the firm's compliance, provide an area for further investigation. Secondly, if the game were transformed into a signaling game, the effects of these variables on a corporation's posterior beliefs about the type of government with which it was dealing could be more fully determined. In addition, it would be worthwhile to continue this research in terms of empirical verification by reflecting on the connections that these conceptual variables have to real-world factors.

How would the policy value of sanctions to a government be made apparent? One possibility is that the type and extent of the sanctions are an indicator of policy importance. If a government institutes import, export, and financial sanctions on a target, it is far more probable that the sanctions are more than symbolic than if the government institutes a ban on one particular import or export, for example. Another indicator may be the type of issue involved. Sanctions over trade policy or nuclear proliferation tend to have more tangible policy effects to a sender government than, say, human rights or environmental issues. One way to categorize issues is by who they affect—"domestic"
issues or "foreign policy" issues. Target state policies which have potential direct consequences for the sender state are far more likely to have high policy values, whereas sanctions over offensive domestic policies of the target state (i.e. human rights) are more likely to have more symbolic value than policy value. Since symbolic benefits of sanctions can be gained merely by adopting the policy, regardless of whether the firm complies, we should observe lower levels of monitoring associated with these types of policies. This hypothesis is empirically testable with existing data.

Another question that can be derived from the model concerns factors that would make a firm more or less likely to comply with economic sanctions. As monitoring costs go up, the government will be less inclined to monitor at high levels and the company will be more likely to cheat. As monitoring effectiveness decreases (causing the probability of being caught to decrease), the same effect should be observed. One factor that could have a significant impact on monitoring effectiveness is the number of firms doing business in the target state. A small number of firms with large market shares are far more obvious and easy to detect when they try to evade export controls than a large number of businesses, each with a small share of the market. However, businesses with small market shares should also be easier to intimidate with the threat of punishment, as they usually rely less on the business they do with the target state than would a more involved firm.
These are but a few of the implications that can be drawn from the model as it exists now. However, altering the model to one of incomplete information could provide still more testable hypotheses and many avenues for future research. In looking at the poor record that sanctions have for achieving the desired policy goals, this model forces us to ask the question of whether or not policy change in the target state was the most important motive of the sender government. It is quite possible that, where policy change is important, sender governments devote resources towards monitoring and enforcing compliance of their private firms. Also, the model predicts that a sender government will attempt to determine the level of compliance it can expect from private companies before it makes the decision of whether or not to adopt economic measures, which may create a selection bias. As with any foreign policy, the motives behind a sender government's adoption of sanctions against a target state are a clear indicator of the resources it is willing to devote to achieving the success of that policy. Only by dissecting these motives and determining these resources can we begin to explain foreign policy success.
NOTES

' For more information, see the US Department of Commerce Bureau of Export Administration website at www.bxa.doc.gov/press/98/wellco.htm

" http://usaengage.org/studies/nam2.html

"' For more information on penalties for violations of the Export Administration Regulations, visit the Department of Commerce Bureau of Export Enforcement website at www.bxa.doc.gov/eeprogram.htm#index3.


Case Studies:


APPENDIX A:

Mixed Strategy Equilibrium:

\[ s = \text{government's probability of monitoring high} \]
\[ 1-s = \text{government's probability of monitoring low} \]
\[ r = \text{firm's probability of compliance} \]
\[ 1-r = \text{firm's probability of evasion} \]

Firm's utility of compliance:
\[ \pi_r + \sigma_r - \beta_r \]

Firm's utility of evasion:
\[ s \left[ p \left( \pi_r + \delta_r - \beta_r - \phi_r \right) + (1-p) \sigma_r \right] + (1-s) \left[ q \left( \pi_r + \delta_r - \beta_r - \phi_r \right) + (1-q) \sigma_r \right] \]

Government's utility of monitoring high:
\[ r \pi_g + (1-r) \left[ p(\pi_g - \varepsilon_g + \phi_g) \right] + \sigma_g - \mu^2_g \]

Government's utility of monitoring low:
\[ r \pi_g + (1-r) \left[ p(\pi_g - \varepsilon_g + \phi_g) \right] + \sigma_g - \mu^1_g \]

When is the firm indifferent between compliance and evasion?

\[ s = \frac{\pi_f - \beta_f - q(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)} \]

This means that, if the government monitors at a high level with probability "s", and at a low level with probability "1-s", the firm will be indifferent between complying with the sanctions and evading the sanctions.

When is the government indifferent between monitoring at a high level and monitoring at a low level?

\[ r = \frac{(p-q)(\pi_g - \varepsilon_g + \phi_g) - \mu^2_g + \mu^1_g}{(p-q)(\pi_g - \varepsilon_g + \phi_g)} \]

This means that, if the firm complies with probability "r" and does not comply with probability "1-r", the government will be indifferent between monitoring at a high level and monitoring at a low level.
APPENDIX B:

Comparative Statics: Firm's mixed strategy of compliance/evasion (r)

\[
\frac{\partial r}{\partial \pi_g} = \frac{\mu_g^2 - \mu_g^1}{(p-q)(\pi_g - \epsilon_g + \phi_g)^2}
\]

This is always positive. Thus, as policy value of the sanctions to the government increases, the firm's compliance with the sanctions will increase, all else being equal.

\[
\frac{\partial r}{\partial \epsilon_g} = \frac{\mu_g^2 - \mu_g^1}{(p-q)(\pi_g - \epsilon_g + \phi_g)^2}
\]

This is always positive. Thus, as the harm to the government (in terms of policy) of the firm's evasion increases, the firm's compliance with the sanctions will increase, all else being equal.

\[
\frac{\partial r}{\partial \phi_g} = \frac{\mu_g^2 - \mu_g^1}{(p-q)(\pi_g - \epsilon_g + \phi_g)^2}
\]

This is always positive. Thus, as the penalty imposed on the firm if caught increases, the firm's compliance with the sanctions will increase, all else being equal.

\[
\frac{\partial r}{\partial \mu_g^2} = \frac{-1}{(p-q)(\pi_g - \epsilon_g + \phi_g)}
\]

This is negative when \(\pi_g - \epsilon_g + \phi_g\) is positive—that is, when the policy value of the sanctions to the government plus the penalty imposed by the government is greater than the harm to the government of the firm's evasion. An increase in high monitoring will correspond to a decrease in compliance by the firm. However, when this condition is not met (the harm to the government caused by a firm's evasion is too great), an increase in high monitoring will correspond to an increase in compliance.
\[
\frac{\partial r}{\partial \mu^1_k} = \frac{1}{(p-q)(\pi_k - \epsilon_k + \phi_k)}
\]

This is positive when \( \pi_q - \epsilon_q + \phi_q \) is positive—that is, when the policy value of the sanctions to the government plus the penalty imposed by the government is greater than the harm to the government of the firm's evasion. An increase in low monitoring will correspond to an increase in compliance by the firm.

\[
\frac{\partial r}{\partial \phi} = \frac{\mu^2_k - \mu^1_k}{(p-q)^2(\pi_k - \epsilon_k + \phi_k)}
\]

This is positive when \( \pi_q - \epsilon_q + \phi_q \) is positive (same condition as above). Thus, an increase in the probability of being caught under high monitoring will correspond to an increase in compliance.

\[
\frac{\partial r}{\partial q} = \frac{\mu^1_k - \mu^2_k}{(p-q)^2(\pi_k - \epsilon_k + \phi_k)}
\]

This is negative when \( \pi_q - \epsilon_q + \phi_q \) is positive (same condition as above). Thus, an increase in the probability of being caught under low monitoring will correspond to a decrease in compliance. (The last four of these equations are somewhat counterintuitive. This may be due to the fact that an assumption of the model is that, as monitoring costs increase, the probability of being caught will increase.)

**Government's mixed strategy of high/low monitoring (s)**

\[
\frac{\partial s}{\partial \pi_f} = \frac{\delta_f - \phi_f - \sigma_f}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)^2}
\]

Since we made the assumption when preference orderings were first determined, that \( \delta_f < \phi_f \), this is always negative. Thus, an increase in the policy value of sanctions to a firm will always correspond to a decrease in monitoring on the part of the government.
\[
\frac{\partial s}{\partial \sigma_f} = \frac{\pi_f - \beta_f}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)^2}
\]

Given the assumption that \(\beta_f > \pi_f\), we can conclude that the above value is always negative. This means that an increase in the symbolic value of sanctions to a firm will correspond to a decrease in monitoring by the government.

\[
\frac{\partial s}{\partial \beta_f} = \frac{-\delta_f + \phi_f + \sigma_f}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)^2}
\]

Given the assumption that \(\delta_f < \phi_f\), an increase in the firm's benefit of doing business with the target will correspond to an increase in government monitoring.

\[
\frac{\partial s}{\partial \delta_f} = \frac{\beta_f - \pi_f}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)^2}
\]

Once again, given the assumption that \(\beta_f > \pi_f\), an increase in a firm's value for delaying compliance with sanctions will correspond to an increase in government monitoring.

\[
\frac{\partial s}{\partial \phi_f} = \frac{\pi_f - \beta_f}{(p-q)(\pi_f + \delta_f - \beta_f - \phi_f - \sigma_f)^2}
\]

In view of the earlier assumptions, this value is always negative, which means that an increase in a firm's penalty, if caught, will correspond to a decrease in government monitoring.
Figure 1: Model of Economic Sanctions:

\[ \pi_s + \sigma_s - \mu^2_s; \pi_r + \sigma_r - \beta_r \]
\[ \pi_s + \sigma_s - \mu^1_s; \pi_r + \sigma_r - \beta_r \]
\[ \pi_s + \sigma_s - \mu^2_s + \phi_s; \pi_r + \sigma_r + \delta_r - \beta_r - \phi_r \]
\[ \sigma_s - \mu^2_s; \sigma_f \]
\[ \pi_s + \sigma_s - \mu^1_s + \phi_s; \pi_r + \alpha_r + \delta_r - \beta_r - \phi_r \]
\[ \sigma_s - \mu^1_s; \sigma_f \]

\[ \pi = \text{policy benefit of sanctions} \]
\[ \sigma = \text{symbolic benefit of sanctions} \]
\[ \mu = \text{cost of monitoring} \]
\[ \phi = \text{monetary penalty on firm if caught} \]
\[ \delta = \text{cost/benefit of delay by evading} \]
\[ \epsilon = \text{harm to gov't (in terms of policy) of evasion} \]
\[ \beta = \text{benefit of doing business (firm)} \]

\[ f = \text{firm within a sanctioning country} \]
\[ g = \text{government of sanctioning country} \]

\( p > q \)
Figure 2: Model of Economic Sanctions