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Measuring the Effects of Supranational Governing Structures on Corruption through an Economic Experiment

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MEASURING THE EFFECTS OF SUPRANATIONAL GOVERNING STRUCTURES ON CORRUPTION THROUGH AN ECONOMIC EXPERIMENT

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MEASURING THE EFFECTS OF SUPRANATIONAL GOVERNING

STRUCTURES ON CORRUPTION THROUGH

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Corruption has been attracting a great deal of attention recently and various organizations together with free and active media have made great efforts to bring this issue to the forefront of the governance debate. This research uses experimental methods to investigate the effect of supranational governing structures on corruption. A second objective of this research is to investigate the effectiveness of the model for the United Nations missions given that transparency and accountability in the presence of these kinds of supranational governing structures are generally weak. Results of this research show that the presence of supranational governing structures leads to an increased level of corruption. These findings can be generalized for other situations in the public sector or private sector that involve a type of supranational governing structure. For the case of the UN missions, increased transparency and accountability can help reduce the level of corruption under these governing structures.

Key words: corruption, experimental methods, supranational governing structures, UN missions

DEDICATION

I would like to dedicate this research to my parents, Guiping Zhang and Hongxue Wang, for you always trusting and supporting me.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Corruption has been attracting a great deal of attention in recent years although it is not at all new and is one of the most pressing problems of today's governments (Schulze and Frank, 2003). In countries developed or developing, large or small, market-oriented or otherwise, governments have fallen because of accusations of corruption, prominent politicians have lost their official positions, and in some cases, whole political classes have been replaced (Tanzi, 1998). Globalization has brought individuals from countries with little corruption into frequent contact with those from countries where corruption is endemic (Tanzi, 1998). Various organizations together with free and active media have made great efforts to bring this issue to the forefront of the governance debate.

The definition of corruption used in this research is "the misuse of office for private gain" where the office is a position of trust, and one receives authority in order to act on behalf of an institution, be it private, public, or non-profit (Klitgaard and MacLean, 2000).

Corruption's impact is invariably negative (Transparency International, 2004). Corruption can lead to inefficient bureaucracies (Rose-Ackerman, 1997a), inefficient economic outcomes (Gray and Kaufman, 1998) and increased income inequality (Tanzi, 1998).

Corruption takes a variety of forms, including bribery, nepotism, patronage, theft of state assets, evasion of taxes, diversion of revenues and electoral fraud (Klitgaard and Robert, 1998). Bribery refers to payments used by private agents, or sought by officials, in return for the supplying of favors such as government contracts, benefits, lower taxes, licenses or legal outcomes. The theft of state assets by officials charged with their stewardship is also corruption, as is the manipulation or violation of electoral laws regarding campaign finances and voting.

Corruption can be classified in many different ways. One kind of classification is business and political corruption. Business corruption is often regarded as a means to accelerate business processes. Essentially, bureaucracy is bypassed. Business corruption includes bribery, money laundering, embezzlement, tax evasion and accounting irregularities, while political corruption occurs predominantly in developing and less developed countries usually associated with the electoral process, such as nepotism and cronyism, false political promises, and paying journalists for favorable coverage of candidates and parties (Nambia Institute for Democracy, 2008).

Corruption can also be classified as either chaotic or organized. A well-organized system of corruption has clear ideas of whom to bribe, how much should be offered and whether the one offering the bribe can be confident that they will receive the favor in return. Such corruption is often perpetrated by crime gangs and syndicates and includes white-collar crime (a series of premeditated crimes perpetrated in sophisticated financial environments by an individual or group of individuals with the intention of making a misrepresentation which may prejudice another person or company) and identity theft.

Chaotic corruption is disorganized and there is no guarantee that further bribes will not have to be paid to other officials (Nambia Institute for Democracy, 2008).

Corruption is an outcome—a reflection of a country's legal, economic, cultural and political institutions (Svensson, 2007). Causative factors directly linked to the possibility of involvement in corrupt practices include: low salaries, culture, absence of rules and legislation, and absence of transparency and watchdog institution (Namibia Institute for Democracy, 2008). Governments buy and sell goods and services and distribute subsidies. Therefore, a corrupt firm will pay a bribe to obtain government benefits (Sandholtz and Koetale, 2000). Besides, corruption thrives when a single person or an authority is used to make decisions (Namibia Institute for Democracy, 2008). So corruption takes place where public officials have great authority and can exercise discretion with respect to interpretation and application of regulation. Corruption is likely to occur in a society where there seems to be very little or almost no punishment for it and where the rewards for being corrupt seem much greater than the risks of being caught (Namibia Institute for Democracy, 2008).

On the other hand, democracy gives citizens a role in choosing public officers and corrupt elected officials can be voted out of office (Rose-Ackerman, 1997a). In a democracy, public officers must be accountable to people they serve. Accountability means that public officers must provide logical and acceptable explanations for their actions and decisions to the citizens. Public officers in responsible positions must at all times adhere to the principles of transparency and be accountable to citizens. Accountability is also dependent on the enforcement of rules, regulations and policies. However, some institutional mechanisms, like the UN Mission in Kosovo (UNMIK) and

the UN Mission in Bosnia-Herzegovina (UNMIBH) are considered to be a poor model when it comes to transparency and accountability (Spector, et al., 2003). Spector et al. (2003) also state that "This can be remedied, but it will take a major conscious effort by the SRSG to direct greater openness and responsiveness by the international administration." Further, Spector et al. (2003) report that 31 percent of their survey respondents perceive UNMIK officials as highly corrupted. Under these conditions, the lack of openness and responsibility together with the perceived corruption of UNMIK officials, it becomes more difficult for public officers to be held accountable and corrupt practices can flourish (Namibia Institue for Democracy, 2008).

The UN has authorized several missions for peace rebuilding. Examples of such missions are the UNMIK and the UNMIBH. These missions have veto power over the local governments and citizens (UNMIK, 2001) and therefore can be viewed as supra-national governing structures.

The UNMIK is the interim civilian administration in Kosovo, under the authority of the United Nations. On 10 June 1999, the United Nations Security Council passed Resolution 1244 authorizing the United Nations Interim Administration Mission in Kosovo (UNMIK) to begin the long process of building peace, democracy, stability and self-government in the shattered province. In May 2001, UNMIK promulgated a Constitutional Framework which established the Provisional Institutions of Self-Government (PISG), which is the local administrative body in Kosovo. The powers and responsibilities of the Provisional Institutions of Self-Government do not include certain reserved powers and responsibilities, which will remain exclusively in the hands of the Special Representative of the Secretary-General (SRSG) (Chapter 8 of UNMIK

Constitutional Framework, 2001). For example, dissolving the assembly[1] and calling for new elections in circumstances where the Provisional Institutions of Self-Government are deemed to act in a manner which is not in conformity with UNSCR 1244 of June, 10th, 1999, or in the exercise of the SRSG's responsibilities under that Resolution, exercising final authority regarding the appointment, removal from office and disciplining of judges and prosecutors.

The UNMIBH is the interim civilian administration in Bosnia and Herzegovina. On December 14, 1995, the Republic of Bosnia and Herzegovina, the Republic of Croatia, the Federal Republic of Yugoslavia as well as the other parties thereto signed the Peace Agreement in Paris to contribute to the establishment of the rule of law in Bosnia and Herzegovina. UNMIBH is headed by SRSG and the Coordinator of United Nations Operations in Bosnia and Herzegovina. By resolution 1184 of 16 July 1998, the Security Council approved the establishment by UNMIBH of a program to monitor and assess the court system in Bosnia and Herzegovina, as part of an overall program of legal reform under the overall coordination of the High Representative.

Under these supranational governing structures and their broad veto powers, the direct responsibility of local authorities to local citizens may be undermined and so the democratic underpinnings for rulemaking are particularly weak. The officials may pursue policy outcomes that advance their own interests rather than those of the public. This might entail an expanded bureaucracy, outright corruption, or accepting inducements to steer decisions in certain directions (Esty, 2006). The absence of public-mindedness or

[1] The Assembly is the highest representative and legislative Provisional Institution of Self-Government of Kosovo.

neutrality might also lead to public choice failures and special interest capture of the policy process.

This research intends to investigate the effect of supranational governing structures on corruption. The first objective is to measure the effect of these supranational governing structures on the level of corruption. However, first, a decision needs to be made as to what is the base scenario to compare the case with the supranational governing structures present. Two possible cases are considered for the base scenario. For the purpose of this study, I define these two base scenarios based on the treatment of corruption. The first one is what I call a "strong" democracy. In a "strong" democratic society, corrupted public official can be voted out of office more frequently, so the frequency of punishment on corruption is higher while, as a consequence, the corrupt behavior is lower. In the other case, I define a "weak" democracy a democratic society where the likelihood for corrupted public officials to be voted out of office and the frequency of punishment on corruption are much lower. Therefore, the level of corrupt behavior is relatively higher to the case of a "strong" democracy. I hypothesize that the presence of the supranational governing structures will lead to an increased level of corruption compared to that in either the "strong" or the "weak" democratic society. The second objective is to specifically focus on the model of UN missions. The second objective is to investigate the effectiveness of the model for the UN missions in terms of transparency and accountability. To address this objective I will investigate the corruption level when transparency and accountability in the presence of the supranational authority are weak.

CHAPTER II

LITERATURE REVIEW

Corruption in General

A widely accepted definition of corruption is the abuse of public office for private gain (World Bank, 1998). It clearly includes all kinds of bribery of national or local officials or politicians, but excludes bribery which occurs solely within the private sector (Moody-Stuart, 1996). Tanzi (1998) gave a more neutral definition: the intentional non-compliance with arm's length relationship aimed at deriving some advantage from this behavior for oneself or for related individuals. Klitgaard and MacLean (2000) defined corruption as "the misuse of office for private gain" where the office is a position of trust, and one receives authority in order to act on behalf of an institution, be it private, public, or non-profit. The last definition points out that corruption can occur not just in the public sector, but in any of the three major governance pillars- government, the private sector or civil society and is the definition used in this research.

With respect to size, corruption is often described as ranging from "petty corruption", which entails immigration officials, customs clerks, policemen, and the like, to "grand corruption", which involves senior officials, ministers, and heads of state. Petty corruption occurs where citizens and companies seek to evade duties and taxes and when officials abuse their regulatory discretion by attempting to extort money from citizens and

companies, and sometimes just makes thing easy to do or not to do (Moody-Stuart, 1996). Grand corruption is believed to be the most dangerous and covert type of corruption (Nambia Institute for Democracy, 2008) and generally refers to the acts of the political elite by which they exploit their power to decide on economic policies. It mostly occurs in relation to large procurement projects and is most prevalent in public and private construction projects, in roads, dams, hospitals, airports, and in arms and defense contracts, in new weapons technology, aircraft purchase, warships, and artillery pieces. It can occur at financial, political and administrative centers of power. But to focus on grand corruption is not in any way to condone petty corruption because petty corruption can seriously damage the quality of life of the ordinary citizen (Moody-Stuart, 1996). The most critical difference between grand corruption and petty corruption is that the former involves the distortion or corruption of the central functions of government, while the latter develops and exists within the context of established governance and social frameworks (UNDP, 2004).

Causes of Corruption

Since corruption is widely recognized as a major economic problem around the world, there is also a growing interest in the empirical analysis of its causes and consequences. Ackerman (1997a) discusses corruption from the political economy perspective. Ackerman examines the opportunities for illicit gain that exist in all countries. Ackerman asks what factors determine the size and incidence of bribe payments, and assesses the political, economic, and distributive consequences of corruption. As for economic opportunities for corruption, Ackerman notes that bribes can

be viewed as being paid in exchange for obtaining government benefits. Governments buy and sell goods and services and distribute subsidies. Many governments provide infrastructure service concessions to private operators. Therefore, a corrupt firm may pay to be included in the list of qualified bidders to have officials structure the bidding specifications so that it is the only qualified supplier, or to be selected as the winning contractor.

Tanzi (1998) lists factors contributing to corruption both directly and indirectly. Direct causes include nontransparent regulations and noncompetitive authorizations, poorly administrated taxes and other discretionary decisions; indirect causes include quality of bureaucracy, low level of public sector wages, ineffective penalty systems and nontransparent rules, laws and processes.

Treisman (2000) studies the causes of corruption cross-nationally. Looking into several indexes of perceived corruption compiled from business risk surveys for the 1980s and 1990s, the author brings out seven hypotheses. First, Treisman hypothesizes that countries with British and its former colonies tend to have a more effective legal system, and hence lower corruption. Second, Treisman hypothesizes that corruption will be lower in democratic countries and those with a freer press. Treisman's third hypothesis states that corruption rates will be lower in countries with a Protestant tradition. Treisman's fourth hypothesis is that corruption will be lower in more economically developed countries, where populations are more educated and literate. Fifth, Treisman hypothesizes that corruption will be lower in countries with higher relative salaries in public offices. Finally, Treisman hypothesizes that corruption will be higher where political instability is greater. Treisman finds support for five of his hypotheses while he

finds that the degree of democracy does not significantly contribute to the level of corruption.

Sandholtz and Koetzle (2000) report their results of testing a set of hypotheses about the factors affecting corruption. This report is also based on a cross-national study. With multivariate regression analysis, the data broadly confirms their predictions. In countries where the average income level is lower, the extent of state control of the economy is greater, democratic norms and institutions are weaker, the degree of integration in the world economy is lower, and the share of the population with Protestant religious affiliation is lower, levels of corruption are higher.

How to Measure Corruption

Due to its secretive nature, the extent and pervasiveness of corruption has been difficult to assess (Dusek, et al., 2004). Transparency International (TI) (www.transparency.org) publishes an annual Corruption Perceptions Index (CPI) ordering the countries of the world according to "the degree to which corruption is perceived to exist among public officials and politicians". A higher score means less (perceived) corruption. The results for 2007 show seven out of every ten countries (and nine out of every ten developing countries) with an index of less than five points out of ten (Transparency International, 2007). TI also seeks to develop other corruption measurement tools to complement the CPI. The Bribe Payers' Index (BPI) assesses the supply side of corruption and ranks corruption by source country and industry sector. The Global Corruption Barometer (GCB) is a public opinion survey that assesses the general public's perception and experience of corruption in more than sixty countries around the

world. In addition, TI has engaged in a number of innovative efforts to measure corruption, transparency and governance in sub-national measures. Examples include the Mexican state-level indicators (Mexicana, 2003) and the index developed for a subset of the Russian Federation's regions (Transparency International-Russia, 2002).

Kaufmann, Kraay, and Mastruzzi (2006) use a different strategy than TI to aggregate the corruption indicators. In the 1998 corruption index, they rank countries on a scale from -2.5 (high corruption) to 2.5 (low corruption). This index is also rescaled by subtracting country scores from 2.5 so that higher values correspond with higher corruption levels.

Consequences of Corruption

Tanzi (1998) discusses macroeconomic effects of corruption. Corruption reduces public revenue and increases public spending. It thus contributes to larger fiscal deficits, making it more difficult for the government to run a sound fiscal policy. Corruption is also likely to increase income inequality because it allows well-positioned individuals to take advantage of government activities at the cost of the rest of the population. Corruption distorts markets and the allocation of resources and is therefore likely to reduce economic efficiency and growth.

Klitgaard and Robert (1998) discusses the effects of corruption from the political and social perspectives. From the political perspective, corruption is insidious, attacking the quality of governance and national stability by undermining the legitimacy of the political process. Corruption is essentially a form of extortion that marginalizes ordinary citizens. It fosters contempt for the public service and leads to cynicism about politics.

From the social perspective, the "culture of corruption" results in the demoralization of a country's population, leading to a lack of confidence in the state and its institutions, and, in extreme situations, the collapse of the state itself. Corruption violates the public trust and erodes social capital. It undermines laws and regulations meant to serve productive social objectives such as protection of the environment.

Although empirical studies[2] noted by Tanzi (1998) have inquired into the macroeconomic consequences of corruption, the microeconomic determinants of individual corruptibility cannot be determined as easily because of lack of data. The data used in empirical studies of macroeconomic effects is either survey data or indices such as the Transparency International Corruption Perception Index or the Graft Index. On the other hand, clandestine by its very nature, corruption at individual level is hard to measure and unlike tax evasion there is no institution that systematically monitors individual corruption activity on a regular basis.

Measures to Fight Corruption

Tanzi (1998) argues that corruption is closely linked to the way governments conduct their affairs in modern societies, and therefore also to the growth of the government's activities in the economy. It is unlikely that corruption can be substantially reduced without modifying the way governments operate. The fight against corruption is, thus, intimately linked with the reform of the state. However, it is poorly understood what exactly, on the micro-level, the determinants of corruptibility are and what institutional arrangements could be used to fight (the causes of) corruption (Dusek, et al., 2004).

[2] See Mauro (1997,1999), Tanzi and Davoodi (1997), Kaufman (1997) and Graziano (1980)

The United Nations Global Program against Corruption in 2004 produced an anti-corruption toolkit. Based on the UN Convention against Corruption, the toolkit provided an inventory of measures for assessing the nature and extent of corruption and the potential damaging effect on the welfare of entire nations, and suggested measures used successfully by other countries in their efforts to uncover and deter corruption and build integrity.

The United Nations Development Program (UNDP) is involved in accountability, transparency and integrity (ATI) programs as part of its interventions to strengthen democratic governance. UNDP in its Anti-corruption practical notes (UNDP, 2004) pointed out that UNDP is in a unique position to engage a broad range of national stakeholders in a holistic approach to fight corruption and provide high quality support and advice for its mandate to create enabling environment and fight against poverty. The notes give eight entry points to fight against corruption: (1) launching the development and implementation of national and local anti-corruption strategies; (2) improving internal accountability; (3) capacity building of ATI bodies and national integrity institutions; (4) providing special focus to strengthening ATI in post-conflict situations; (5) engaging civil society organizations in ATI programming and policies; (6) coordinating anti-corruption initiatives at the country level; (7) implementing and monitoring the UN Convention against Corruption; and (8) knowledge about corruption and measuring performance. In addition, requirements for successful anti-corruption reforms are discussed in these notes. Strong committed leadership supported by political institutions is needed. Also solid data and analyses are crucial to evaluating problems, devising solutions and assessing progress.

Svensson (2005) poses some questions about corruption. Svensson looks into some aspects of corruption and points out that corruption is not a kind of tax or fee, neither is it rent-seeking. Then, Svensson statistically proves that there is a significant relationship between corruption and real Gross Domestic Product (GDP), human capital stock (years of schooling), openness to external competition from imports, extent of regulation of entry of start-up firms as well as the freedom of the press. Svensson's results shows that corrupt countries have lower income level, less human capital, are less open to external competition and regulate more both entry to the market and the press. Svensson also points out that it is not feasible for most anticorruption programs to only rely on legal and financial institutions. Improving citizen access to information and giving citizens a greater right to action can reduce corruption.

Tanzi(1998) mentions that based on the current legal framework, it is a crime to bribe officials within most countries; however, it is not a crime-except in the US to bribe a foreign official outside the bribe payer's own country. This therefore, opens the possibility for corruption to occur internationally. The growth of international trade and business has created many situations in which the payment of bribes may be highly beneficial to the companies that pay them by giving them access to profitable contracts over competitors. When the economic operators of some countries begin to pay bribes, they put pressure on those from other countries to do the same (Tanzi, 1998).

Spector et al. (2003) report about corruption in Kosovo. They conduct a survey of 505 respondents to assess corruption level at both the local and central levels of government. They analyze the state of public corruption in Kosovo, state the anti-corruption techniques and indicate the opportunities that lie for future initiatives.

They also report that under the governing structures of UN missions, “It is difficult to determine the extent to which Kosovo institutions are capable of functioning on their own.”

Studies on Corruption Using Experimental Methods

As mentioned above, microeconomic determinants of individual corruptibility cannot be determined as easily because of lack of data. Also, empirical evidence on the determinants of corruption will be highly desirable as it would allow assessment of the different proposals for fighting corruption (Schulze and Frank, 2003). Given the nature of corruption as an illegal activity and as such extremely difficult to measure, experimental methods are used to overcome the lack of real-world data.

Abbink, Irlenbusch, and Renner (AIR) (2000) introduce the moonlight game where player A can take money from or pass money to player B, who can either return money or punish player A. In such games, efficiency gains of that kind require a (non-binding) agreement to generate an economic surplus, and hence trust (on the part of player A) and reciprocity (on the part of player B). The novel feature in the game that AIR tested is an appended stage in which the moonlighter faced (non-rational) retribution if he did not reciprocate the trust. The appended retribution stage is constructed so as to not make a difference. Specifically, since retribution would be costly and bring about no direct benefit - telling the authorities that one had engaged in illegal activities would come at a net cost - a rational “player A” would not engage in it. The results of the game show that the prediction is falsified. Retribution is much more compelling than reciprocity.

Based on AIR (2000), AIR (2002) conduct the first laboratory experiment using an interactive corruption game. This game is a two-player, one-shot, sequential game between a firm (the potential briber) and a public official and it consists of several stages. The firm is first requested to decide whether to bribe the public official or not, in order to get the permission to run a factory. Then the public official chooses to accept or reject the bribe and decides whether to grant the permission to the firm or not. Three treatments are conducted in this experiment. In the baseline or "pure reciprocity" treatment, the firm proposes to the public official a deal. The public official could decide whether to accept or reject the deal. If the public official rejects the proposed deal, it does not materialize (and the firm gets stuck with a small initiation fee). If the public official accepts the proposed deal, it brings about (through the experimenter) a tripling of the firm's initial investment. Next the public official has to choose one of two decisions, with the first decision benefiting the firm significantly more than the public official, and the second decision benefiting the public official somewhat more than the firm.

To feature welfare-reducing externalities, the factor of retribution is not taken into account. Still, more trust and reciprocity emerge, and hence more corruption and corruptibility.

AIR (2002) also introduce new features to the experiment, the "negative externality" treatment, as well as the effects of a small probability of detection if they accept the bribe, the "sudden death" treatment[3]. Thirty rounds are conducted for each of the three treatments with pairs of matched subjects being unchanged throughout the

[3] AIR (2002) introduced a new feature named the *sudden death* treatment. In this treatment, the danger of being caught at corrupt activities is modeled. To keep things simple, they model discovery as an exogenous lottery. When a transfer has been offered and accepted, a lottery is played out, and with very low probability the activity is "discovered."

experiment. The results show that introduction of damage inflicted on a third party affects the behavior of both bribers and bribees. The threat of a "sudden death" (although extremely small in the experimental parameterization), decreased attempted bribes.

Several other studies, as discussed below, using experimental methods have looked into causes of corruption, determinants of corruption, characteristics of corruption, and how to fight against corruption. Studies on the causes of corruption suggest that democracy, culture, and wealth all influence the amount of corruption.

Azfar and Nelson (2003) analyze the causes of corruption from the perspectives of hiding corrupt gains, officials' wages and the method to choose the law enforcement officer. They find that voters rarely re-elect chief executives who are corrupt and tend to choose presidents who are not. They also find that increasing government wages and increasing the difficulty of hiding corrupt gains both reduce corruption. Finally, they conclude that directly elected law enforcement officers work more vigilantly at exposing corruption than those who are appointed.

Frank and Schulze (2000) carry out the first controlled experiment on corruption. Unlike AIR, there is no reciprocal relationship between a bribee (the public official) and a briber who might choose to offer a bribe in order to induce the bribee to make a more favorable decision. Instead, a public official decides unilaterally how much money to "divert" from public funds, subject to the risk of being discovered and punished. The experiment is conducted with members of a university student film club in Germany. Before watching a movie, each subject is placed in a (fictitious) position of the manager of the club and present with the following situation: The club needs to obtain some service from a private firm, and the manager has to choose a firm that would perform that

service. Each subject is presented with offers from several firms, which differ in the price that the film club would have to pay and the side payment (bribe) from the firm to the manager that the manager would keep for himself. The higher the offer price is, the higher the bribe.

Participants indicate their secret choice on a form, the forms are collected, one of the forms is drawn, and the payoffs are made according to the subject's choice on the form that is drawn. The club would receive DM[4]200 minus the price chosen by the subject whose form is drawn, and that subject would receive the bribe for which he/she opted. Subjects are paid in private so that others could not observe the identity of the subject who may have harmed the club by his/her corrupt choice.

In the experiment, the authors apply a random lottery payment technique. Ordered logit and probit models are used to analyze the data. They find that economics students are significantly more corrupt than others due to self-selection rather than indoctrination and male students of economics tend to be more corrupt, while male non-economists the least.

Schulze and Frank (2003) in a follow-up study analyze the effect of measures to combat bribery. In particular, they ask whether the possibility of detection is a suitable tool to deter individuals from bribe taking. In this experiment, the decision problem is a calculation of risks and rewards. To test whether the risk of being detected increases or decreases bribery, the authors run a version of their original set-up in which subjects roll a die to determine whether they will be caught. If the decision maker is caught, he or she receives nothing. The higher the bribe taken, the more likely detection becomes. In the

[4] DM stands for Deutsche Marks.

other treatment, the probability of detection is quite high, up to two-thirds for the two highest offers. They conclude that monitoring reduces corruption through deterrence but at the same time destroys the intrinsic motivation for honesty. The net effect on corruption could not thus be determined a priori. Their experimental results also show that the salary level influences corruption through the increased opportunity cost of corruption. They also make policy suggestions that, depending on the degree of prevailing corruption, it would be optimal to either monitor with a high frequency or not to monitor at all.

Laboratory experimental methods can also be used in cross-national studies. Alatas et al. (2006) conduct an experiment to investigate if there are gender differences in the acceptability of corruption, and to see if they differ between countries. They conduct the experiment in Australia, India, Indonesia, and Singapore. The experiment is a one-shot game and subjects play in groups of three, one firm that can offer a bribe, one public official that can accept or reject the bribe, and one citizen that can punish the other two players if a bribe is offered and accepted. They find gender differences in Australia and conclude that gender differences are culture specific, given that they vary between countries. Moreover, they find that males' behavior does not differ much between countries while women's behavior does vary. Later, Rivas (2006) conducted another experiment on gender differences, focusing on corrupt behavior itself, for the reason that the public official does not have more discretionary power than accepting or rejecting the bribe. This experiment is conducted with two kinds of participants, firm and pubic official, as a 20-round repeated game for the purpose of researching into corrupt behavior in a long-run relation between the briber and the official. The results show that women

were indeed less corrupt than men. This suggests that increasing women's participation in the labor force and politics would help to reduce corruption.

Laboratory experiments can also be used to study anti-corruption methods. Abbink (2004) built on the sudden-death treatment of AIR (2002) to study experimentally the corruption-reducing effects of staff rotation. Staff rotation is implemented by re-matching the participants in the experiment in each round ("strangers" treatment) rather than letting fixed pairs play all thirty interactions ("partners" treatment). The results are in line with intuition (but arguably contradicts earlier findings on partners/strangers treatments) in that the number of offered transfers, i.e. bribery attempts, and their volume is cut by about half in the strangers treatment.

As experimental methods are used increasingly more, concern is also increasing about methodological procedures. Dusek (2004) and Abbink (2005) discuss the subject in laboratory experiments. Most experimental economists work with a convenient sample of subjects - traditional college students. This is also true of all corruption studies reviewed above (Dusek, et al., 2004). Since college students can make decisions according to rigid rules that are given by the experimenter as well as they are readily available, it is common practice to use college students as representative samples. Depending on the decisions they make, they receive payoffs that are an integral part of the rules of the game. In economic experiments it is common practice to reward subjects in proportion to the payoffs they have achieved in the experiment. This feature ensures that subjects have proper incentives to maximize their payoffs and to make careful decisions. Thus, unlike in most survey studies, subjects play for real money. Dusek (2004) also quotes findings of several researchers to support the stimuli for college students from four aspects: the

nature of the commodity, the nature of the task or trading rules applied, the nature of the stakes, and the nature of the environment that the subject operates in. All these aspects address ultimately the issue of how the laboratory setting is framed.

Abbink and Hennig-Schmidt (2006) study how suggesting words influence experimental results on corruption. The hypothesis is that strong positive or negative suggesting word should make a significant difference in experimenter's behavior. The experiment is a two-player, two-treatment game, and the experimental paradigm is the same as in AIR (2002). One treatment is context-free while the other one is an in-context presentation of the experiments. Context-free means that terms like "corruption," "bribe," "briber," "public official" are not used in the explanation of the experiments to the participants. Instead neutral terms are used such as "transfer amount," "player A," "player B." In-context means that the experiment is explained to the participants using terms that describe the real situation such as "corruption," "bribe," briber," and "public official." They find that there are no significant differences between the two treatments, and conjecture that the experimental design transmits the essential features of a bribery situation already with neutral framing, such that the presentation does not add substantially to subjects' interpretation of the task.

This research will provide three main contributions to the study of corruption. First, is the addition of a third player, the citizen, in an experimental setup that allows for a long-run relationship between the firm and the public official. Abbink (2002) began to take into account the welfare of a third party by introducing a small probability of sudden death. Alatas et al. (2006) first introduced a three-player game, but the players only play for one round, no long-run relationship has been established. Second, in two of the three

treatments, a fourth player, the supranational governing official, will be added to the game. Third, I allow for interaction between the public official and the supranational governing official, and investigate the reciprocity relationship between them.

Risk Attitude Assessment

Given that involvement in a corruptive behavior encompasses risk, it is important to understand how individuals' willingness to be involved in corruptive behavior is related to their risk preference. There have been several experimental approaches used to assess the nature of risk aversion. Holt and Laury (2002) conduct an economic experiment to present the decision makers with different levels of money rewards. In the experiment, the probabilities of different level of money rewards were specified. In their analysis, they formulate "safe" choices versus "risky" choices, where the number of safe choices in each payoff condition to obtain risk aversion estimates for other functional forms. They find out that most subjects are risk averse, even for relatively small payments of less than $5 and risk aversion increases sharply with large increases in the scale of cash payoffs, but there is no significant effect from increasing the scale of hypothetical payment.

Hey and Orme (1994) report the outcome of an experimental investigation designed to discover whether the generalized preference functions of expected utility theory explain observed data significantly better and whether the implied behavior is significantly different. They found out that the superiority of the generalizations is not fitted to all the subjects.

Binswanger (1980) study the risk attitudes of 240 households in rural India with two methods: an interview method eliciting certainty equivalents and an experimental gambling approach with real payoffs. The results show that all individuals are moderately risk-averse with little variation according to personal characteristics at high payoff levels while risk aversion is fairly widely distributed from intermediate levels to risk neutrality or preference at very low payoff levels, and wealth tends to reduced risk aversion slightly. However, its effect is not statistically significant.

There are also noted studies on risk attitudes with non-experimental data. Lence (2000) estimates farm operator's time preference and risk attitudes. The generalized expected utility model is fitted to available aggregate data on U.S consumption and asset returns. The estimated farmer's utility parameters exhibit much greater precision than the ones obtained in related studies using more aggregate data sets. The model is found to fit the data better than the myopic model typically used to study agricultural production under risk.

CHAPTER III

CONCEPTUAL FRAMEWORK

Experimental economics has been the protagonist of one of the most stunning methodological revolutions in the history of science (Guala, 2008). Experimental economics is the application of experimental method to study economic questions. Using cash-motivated subjects, economic experiments create real-world incentives to help better understand why markets and other exchange systems work the way they do.

In contrast to traditional economic empiricism, which relies on observing decisions in natural environments, experimental economics has certain advantages. In addition to discussing the advantages of experimental economics in general, this thesis will also discuss how experimental economics applies to the study of corruption. First, laboratory experiments allow the researcher to control the behavior of subjects in ways that are typically not possible in the field (Dusek, et al., 2004). When modeling a strategic real-life environment, a theorist relies on behavioral assumptions, typically the assumption of fully rational profit maximization. If these assumptions are not met, the theoretical results may be distorted. Experimental methods are used to test theoretical models. In a laboratory, a rigorous test of the behavioral underpinnings of the model can be carried out. For example, regarding the study of corruption, Abbink (2005) notes that laboratory experiments can substitute for field data that often are unavailable. Second,

laboratory experiments allow researchers to address the issue of causality in ways not possible in field contexts. Thus in studying corruption, the laboratory is an easily controlled environment where it is possible to isolate the specific features that can be at play when subjects send and accept bribes. Therefore, we can design experiments that mimic specific aspects of corruption scenarios, although in a simplified version, to address the issue of causality. Third, it is often less expensive to test alternative institutional arrangements in the experimental laboratory rather than in real life (Dusek, et al., 2004).

In an experiment, the researcher can isolate the relative performance of individual and group behavior, controlling for differences in the abilities, incentives and preferences of the decision-makers, and of the environments in which they work. The main drawback is that it is artificial, and it is not possible to replicate exactly the complexities of real-world policy-making in the context of a simple experiment. The results may still be informative (Lombardelli and Talbot, 2002).

Game Theory

The need for empirical knowledge about principles of strategic behavior creates a role for experiments in game theory (Crawford, 2002).

A game is a mathematical model of a strategic situation in which players' payoffs depend on their own and others' decisions (Holt, 2007). A game consists of a set of *players*, their *actions*, the *information* available at each decision point, and their *payoffs*. A game usually involves *strategic behavior*. A strategy is essentially a complete plan of action that covers all contingencies (Holt, 2007).

Individuals are assumed to behave rationally (maximize their payoffs) in a game theory context. The *rational choice theory* is based on two components: a strategy set consisting of all the actions that, under some circumstances, are available to the decision-maker, and a specification of the decision-maker's *preferences*. There are two assumptions related to decision-maker's preferences. First, the decision-maker knows which action is more desirable or equally desirable. Second, preferences are consistent in the sense that if the decision-maker prefers the action *a* to the action *b*, and the action *b* to the action *c*, then he or she prefers the action *a* to the action *c*. A *payoff function*, which associates a number with each action in such a way that actions with higher numbers are preferred, is used to describe decision-maker's preferences.

The rational choice theory states that the action chosen by a decision-maker is at least as good, according to his or her preferences, as every other available action. Therefore, for any action, we can design preferences with the property that no other action is preferred.

As mentioned above, in a game, there is a set of players and it is normally assumed, as in the theory of a rational decision-maker, that each player chooses the best available action. However, in a game with several players, the best action for any given player also depends, on other players' actions. *Nash equilibrium* is used to provide predictions after behavior settles down (Holt, 2007).

A *Nash equilibrium* is a set of strategies, one for each of the *n* players of a game, that has the property that each player's choice is his or her best response to the choices of the *n*-1other players (Holt and Roth, 2004).

Laboratory experiments have been used as tools that practically apply game theory in testing economic assumptions/hypotheses on people's economic decisions. Smith (1994) defines laboratory experiment as an environment, which is controlled using monetary rewards to induce the desired specific value/cost configuration. Smith also uses the concept of *institution* to define the language of market communication (bids, offers, acceptances), the rules that govern the exchange of information, and the rules under which messages are binding contracts.

To evaluate the experimental data in a careful and skeptical way, treatment structure is involved in the laboratory design. A *treatment* is a set of procedures, completely specified with instructions, incentives and rules of play. The common design is to use a treatment structure that changes only one factor at a time to address the cause of observed change in behavior.

In addition, if individuals are requested to make decisions in more than one treatment, the design of the experiment is called a *within-subject* design. Otherwise, when different individuals participate in different treatments, it is called a *between-subject*s design.

Many games involve simultaneous plays, or at least plays in which a player does not know what strategy the others would follow until after the other player has made the move. However, many games are *sequential* game, and if a player knows the strategies used previously by the other players the game is one of perfect information. *Backward induction* can be used to solve such games and obtain Nash equilibrium. (See Appendix A for an example of backward induction).

A tool named *Game Tree* is introduced in order to describe such a sequential game, as shown in figure 3.1. The tree diagram of the game indicates the dynamic structure of the game – that some choices are made before others. Once a choice has been made, the players are in a *subgame* consisting of the strategies and payoffs available to them from then on. A subgame is any part of a game that remains to be played after a given set of moves. For example, all moves to the right of node A are considered a subgame. For each of the subgames, there is a Nash equilibrium, which is called subgame perfect equilibrium.

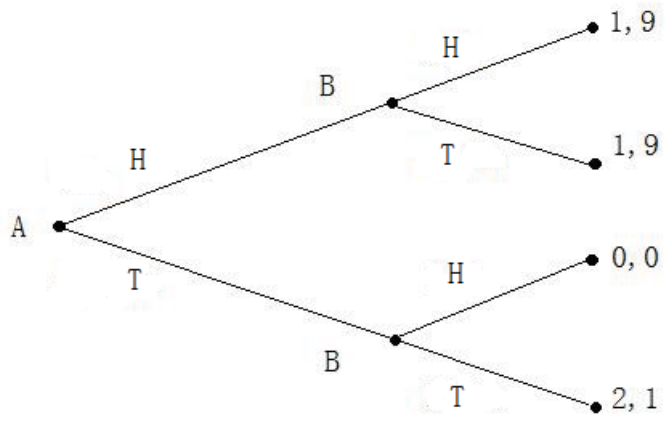

Figure 3.1 An Example of a Game Tree

Risk Attitude

This section provides a brief discussion of people's preferences under *uncertainty.* It is widely accepted that people's preferences toward risk affect decision making. Under uncertainty, which means people are facing many possible outcomes with unknown likelihood, most people find risk undesirable, but some people find it more

undesirable than others. *Risk preference* is a fundamental psychological element in standard theories of decision science, asset valuation, contracts and insurance (Yang, 2006).

Probabilities can be used to describe the likelihoods that possible outcomes will occur. There are two types of probabilities: objective and subjective. Objective probabilities can be deducted through observation; subjective probability is derived from an individual's personal judgment about whether a specific outcome is likely to occur. Subjective probabilities contain no formal calculations and only reflect the subject's opinions and past experience.

An *Expected utility function* states how people maximize their expected utility when faced with a decision involving outcomes with known probabilities. An expected utility function with some uncertain prospect (a_i) takes the form:

$$EU(a_i) = p_1u(a_1) + p_2u(a_2) + ... + p_nu(a_n) \quad (3\text{-}1)$$

There are several utility functions to access risk preferences. Von Neumann and Morgenstern (1994) first advocated the expected utility approach to modeling behavior under uncertainty. The Von Neumann Morgenstern utility function with constant relative risk aversion can be expressed as:

$$U(w) = \frac{w^{1-r}}{1-r} \quad (3\text{-}2)$$

where w represents wealth and r represents the coefficient of absolute risk aversion.

Arrow (1971) and Pratt (1964) defined the quantitative measures of absolute risk aversion as follows:

$$R_a(w) = -u''(w)/u'(w) \quad (3\text{-}3)$$

$$R_r(w) \quad = \quad -wu''(w)/u'(w) \tag{3-4}$$

$R_a(w)$ can be interpreted as the change in marginal utility per unit of outcome. It is positive if the individual is averse to risk, zero if the individual is indifferent to risk, and negative if the individual prefers risk.

$R_r(w)$ can be interpreted as the change in marginal utility as the level of income or wealth increase and it is called the relative risk aversion coefficient. The utility function above exhibits constant relative aversion (CRRA) because $R_r = r$. Since the initial wealth W does not influence the risk preference, CRRA is practically convenient.

Experimental Model on Corruption

In game theory terminology, an experiment on corruption can be conducted as a three player game involving a briber (the firm), a bribee (the public official), and a third party (society), that is damaged by the bribe.

In my experiment, corruption is defined as a situation where two people (the firm and the public official) can act to increase their own payoff at the expense of a third person (the citizen). The transaction that takes place between the two people is assumed to be illegal. Hence, the third person, the victim, is allowed to punish them at a cost.

Specifically, the experiment is based on a three-player, sequential-move game. The first player in the game is called the firm and requests the permit to build an industrial plant which causes negative externalities (pollution) to the society. The second player, the public official, must decide whether to grant the permit to the firm or not. The firm can make a private payment to the public official hoping to influence public official's decision and as a result to increase its own payoff at the expense of society. In

the experiment, the firm first decides whether or not to offer a bribe to the public official. If the firm initiates a corrupt act by offering a bribe to the public official, the public official can either reject or accept the bribe. In any case, the official must decide whether to grant the permit to the firm or not. The third player, the citizen represents the society. The citizen can respond to the act of corruption by choosing to punish both the firm and the public official. The punishment is costly to the citizen, and imposes a monetary sanction on the firm and the public official. I also introduce a fourth player – the supranational governing authority, in the second and third treatments. This kind of player has veto-type power, and it can veto the punishment whenever the citizen chooses to punish the firm and the public official.

The experiment will be conducted as a one-shot game. As corruption is done secretly, no feedback is provided about decisions made by participants playing in other groups. Thus, no one possesses any information about the corruption level in the session, and consequently no subject is informed about the extent to which he or she is damaged by others. The reason for the one-shot game is to make the decisions by the citizen and the supranational governing official unaffected by the anticipation of possible future economic benefits. The game will be played for 30 rounds in an experimental session, where the number of rounds to be played is known by all subjects. Thus, a long-term relationship between a briber and the public official is modeled.

Three treatments of the experiment are conducted, the first one has only three players; the second one adds a fourth player representing the supra-national authority but there is no interaction between public official and the supra-national authority, and the third one allows for interaction between the public official and the supranational

governing official. A detailed description of the experiment design for each treatment is provided below.

Treatment One

Following the design of Abbink and Hennig-Schmidt (2006) and Alatas et al. (2006), the firm, as a potential briber, first decides whether to make a private payoff to a public official in order to increase its payoff at the expense of society. If the firm decides to do so, it specifies the amount to be transferred, an integer between 1 and 9 experimental dollars. The public official first decides whether to accept or reject the bribe. If the official rejects the bribe, then no money is transferred, but the firm still pays a small transfer fee of 2 experimental dollars (each player starts the game with 40 experimental dollars). The fee represents the initiation costs to the briber for attempting to establish a reciprocal relationship with the public official. These costs considered as being independent from the later course, must be paid even if the public official rejects the bribe. If the public official accepts the bribe, then the account of the public official is credited by an amount equal to three times the bribe while the amount of the bribe is subtracted from the firm's account. The multiplier for the public official reflects a difference in marginal utility. Given that earning in the public sector are likely to be lower than earning in the private sector, the same amount of money can be expected to mean much less to the firm than to the public official[5]. Next, the public official must decide whether or not to grant the permit for the plant. If the public official grants the permission, then an amount of 4 experimental dollars, representing the damage to the

[5] Further, the factor ensures that negative total earnings cannot result from the firm transferring too much.

society from pollution, is subtracted from the account of every player in that group (the firm, the public official, and the citizen) as well as the rest of the players in the other groups in the session. Meanwhile an amount equal to 20 experimental dollars is credited to the firm's account. Whenever a bribe is offered and accepted the citizen must decide whether to punish the firm and the public official. I have two different scenarios for treatment one to match the two base scenarios described earlier. In the first scenario (Treatment one), if the citizen decides to punish, all three players in this group will be disqualified from the following rounds of the game. The game ends here for this group of three. The payoffs for this group of three will be set to zero experimental dollars for this round and the remaining rounds. In this case, the possibility of punishment is minimized by reducing citizen's payoff to zero. Therefore, treatment one represents the case of "weak" democracy. In the second scenario (Treatment one A) I have changed the incentives for the citizen compared to Treatment one. In this case, if the citizen decides to punish, the firm and the public official will be disqualified from the following rounds the game and their accounts will be cleared. The citizen will stay in the game and play with players familiar with the game. The data obtained after this point will not be included in the analysis. The citizen's payoff would be reduced by 6 experimental dollars for that round and the remaining rounds. Based on these different incentives for the citizen, compared to treatment one, I expect higher frequency of punishment and lower level of corruption. Therefore, treatment one A represents the case of the "strong" democracy.

Figure 3.2 and Figure 3.3 depicts the game trees of the treatment one and treatment one A, and the players' payoff. Player "F" is the firm, player "P" the public official and player "C" is the citizen. The lines "-4...-4" represents the negative effect of

the plant on society. If a permit in this group is granted to the firm, the negative effect will be applied not only to the players, in this group, but also all the players in other groups, including “F”, “P” and “C”.

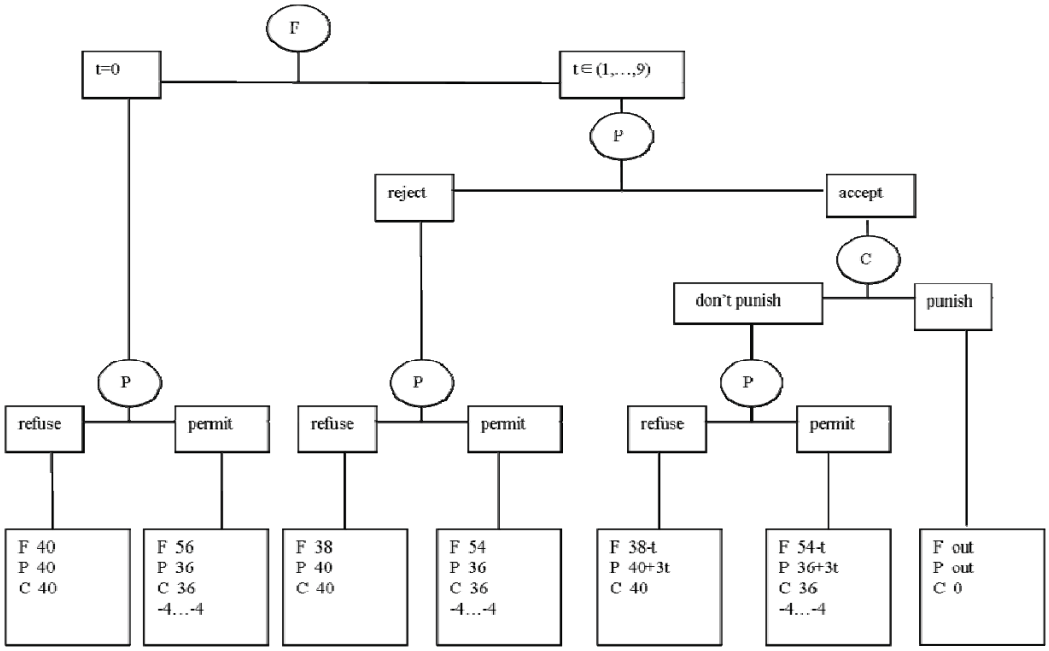

Figure 3.2 Game Tree for Treatment 1

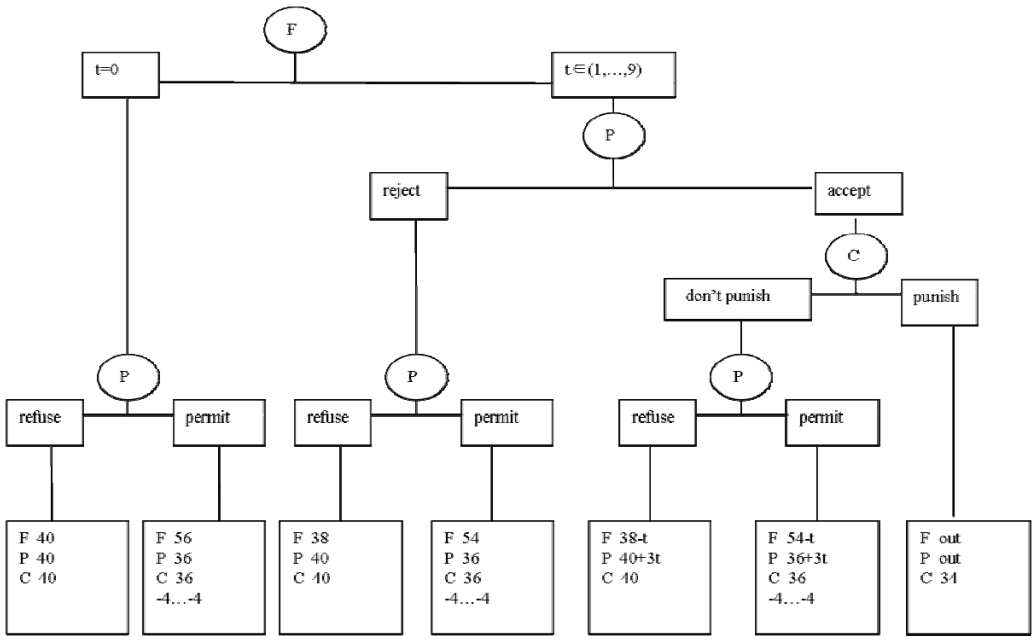

Figure 3.3 Game Tree for Treatment 1A

Based on the proof by Abbink (2004), the subgame perfect equilibrium can be easily searched by applying backward induction and assuming players are only maximizing their own payoff.

On an equilibrium path, the citizen does not punish as its payoff is always larger when it does not punish. Foreseeing this, the public official accepts the bribe and refuses the permission at the terminal decision nodes. Given that, the payoff the firm receives by making a private payment (38, or 38 - t) is always worse than the 40 experimental dollars the firm receives when it transfers nothing. Thus, in equilibrium, the firm does not pay bribes. A thorough game theoretic analysis confirms this intuition. Since the decision of others are not made known, the supergame does not have proper subgames, hence subgame perfection does not select among all possible Nash equilibria. A similar result can be obtained by looking at equilibrium paths. Even in the last round, it is still true that

the citizen will never punish the firm and the public official, and the public official will never grant the permission to the firm with positive probability, since these actions would reduce their payoff without any possible gain. In response, the firm would not offer a bribe as this could not be an equilibrium strategy, given it will not be rewarded on an equilibrium path. This decision is also independent from the behavior of the other groups of players in the game. Based on the above, I formulate the following proposition.

Proposition 1. *In equilibrium of the finitely repeated game, the citizen does not punish the firm and the public official. The firm never transfers a positive amount, and the public official never chooses to give the permission to the firm*. (See Appendix A for proof).

Treatment Two

In this treatment, a fourth player, the supranational authority will be added. This player has the ability to veto the citizen's punishment.

The first stages of the experiment are the same as in treatment one until the citizen makes its decision. If the citizen decides to punish the firm and the public official, the supranational authority is given a chance to veto the punishment. The citizen's punishment of the firm and the public official is also costly for the supranational authority.

In this treatment, the permission to build the plant is costly to the supranational authority as well, but less costly than the local society members – it will only cost the supranational authority a deduction of 2 experimental dollars.

In equilibrium the supranational authority will always veto the citizen's punishment of the firm and the public official. The equilibrium decisions for other players are the same as in treatment one. I formulate the second proposition as below:

Proposition 2. *In equilibrium of the finitely repeated game, the supranational authority will veto the punishment if it gets a chance. The citizen will not punish the firm and the public official. The firm never transfers a positive amount, and the public official never chooses to give the permission to the firm*. (See Appendix A for proof).

Figure 3.4 depicts the game tree for treatment two. Player "S" represents the supranational authority. The lines "–4...–4,-2" mean that if the firm gets the permission, each player's payoff in this session will be reduced by 4 experimental dollars, with the exception of the "S" player, whose payoff will be reduced by 2 experimental dollars.

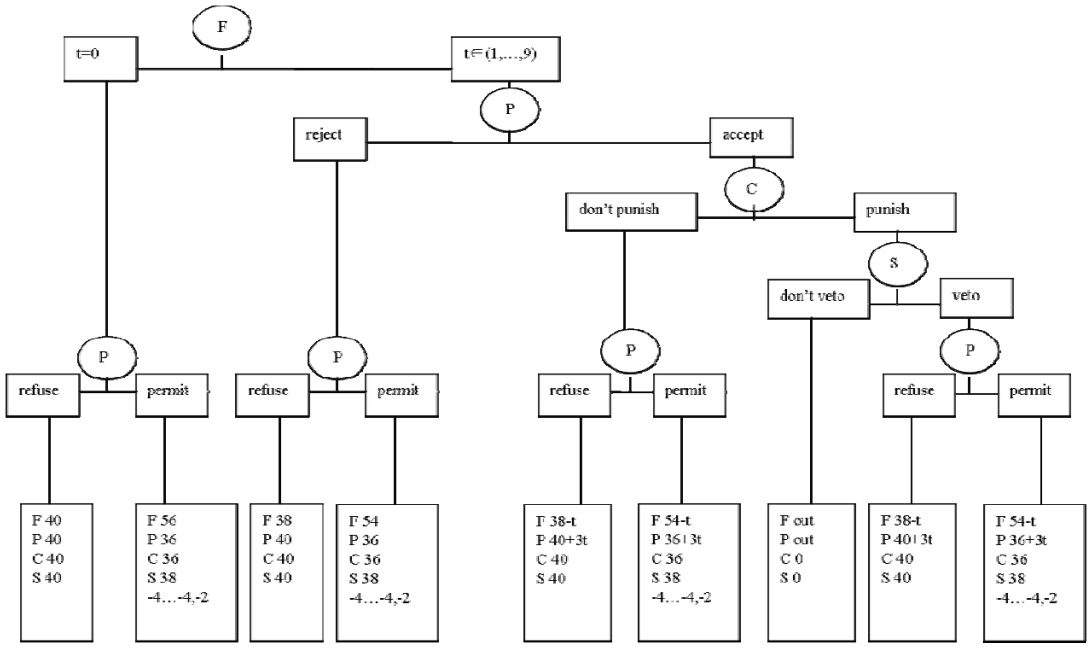

Figure 3.4 Game Tree for Treatment 2

Treatment Three

Different from treatment two in this treatment I will allow for interaction between the public official and the supra-national authority, which means that bribery can occur between "P" and "S." This kind of situation can be viewed as a society with less transparency where public officials have less accountability on the citizens they serve.

The stages of the experiment are the same as in treatment two until the citizen makes its decision. If the citizen decides to punish the firm and public official, the public official is given a chance to make a money transfer t_2 to the supranational authority[6]. t_2 is specified as an integer between 2 and 3*t*. If the public official offers a positive payoff, the supranational authority must first make a decision to accept or refuse the payoff, and then decide whether to veto or not the citizen's decision to punish the firm and the public official.

The game theoretic prediction is the same as that of treatment two. In equilibrium of the finitely repeated bribery game, the supranational authority will veto the punishment, the citizen will not punish the firm and the public official, the public official never chooses to grant the permission to the firm and the firm never transfers a positive amount. I formulate a third proposition as follows:

Proposition 3. *In equilibrium of the finitely repeated game, the supranational authority will veto the punishment and the public official will not transfer a positive amount to the supranational authority, if they get a chance. The citizen will not punish the firm and the public official. The firm never transfers a positive amount, and the public official never chooses to give the permission to the firm*. (See Appendix A for proof).

[6] The initial cost of bribe is made by 2 experimental dollars. And it will be deducted from the public official's account.

Figure 3.5 depicts the additional stages of the game for treatment three after the citizen makes its decision. The previous stages are the same as in treatment two.

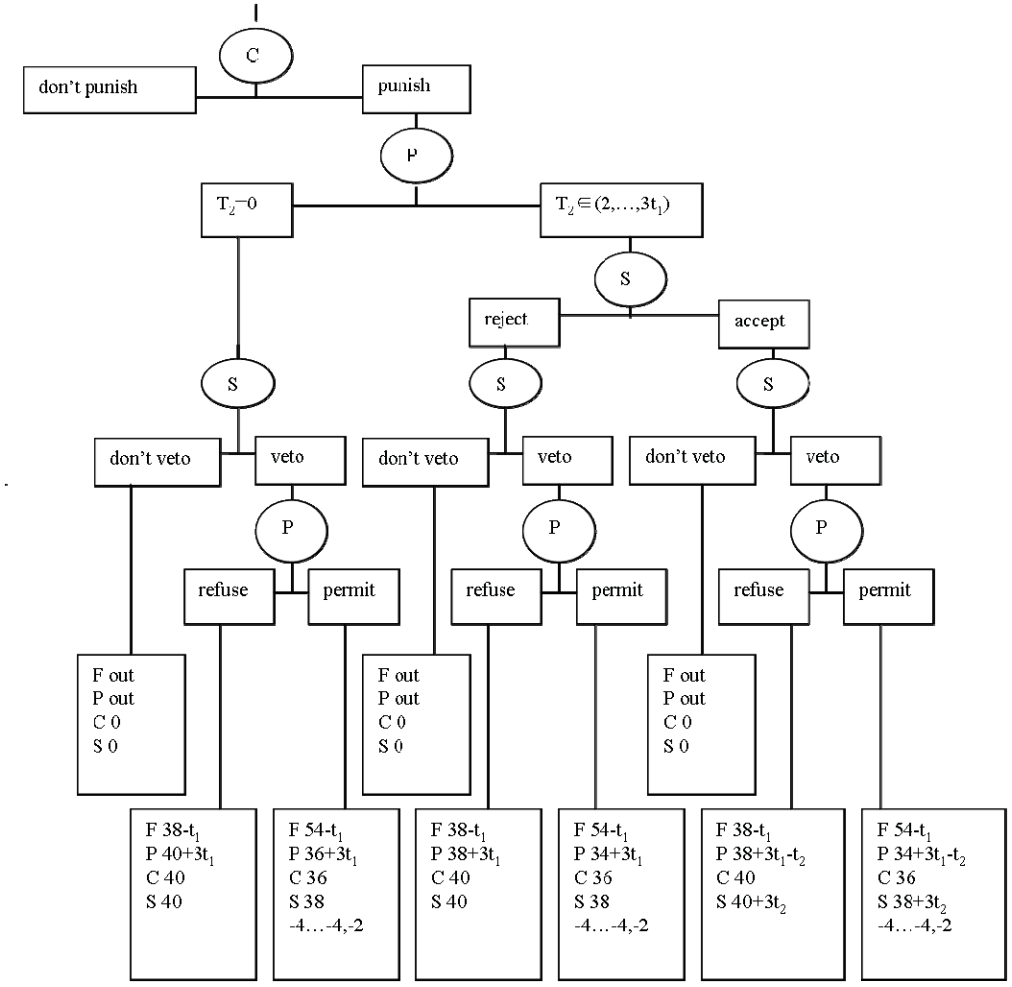

Figure 3.5 Game Tree for Treatment 3

Hypotheses

The three treatments of the experiment allow for testing several hypotheses by comparison of the treatments.

The main difference between treatment one and treatment one A is the frequency of punishment of corruption. Since this is a strategic game, the firm and the public official tend to engage in less corrupted behavior when the frequency of punishment is high and in more corrupted behavior when the frequency of punishment is low. Therefore, I can expect a higher level of corruption in treatment one than that in treatment one A. I formulate the first hypothesis accordingly.

Hypothesis One: In treatment one, with a minimized possibility of punishment, the public official tends to grant the permission more frequently, and the firm tends to transfer more than in treatment one A.

With the addition of the supranational authority I expect the corrupt behavior to increase compared to the treatment without the supranational authority. From this point on, I compare treatment two and three with treatment one, for two reasons. First, treatment one represents the case that is more likely to occur in reality. Second, based on the first hypothesis, if an increased levels of corruption when comparing treatments two and three with treatment one can be observed, then I can expect to observe even higher increases in the levels of corruption when comparing treatments two and three with treatment one A. I formulate the second hypothesis accordingly.

Hypothesis two: In the second treatment, the public official tends to grant the permission more frequently, and the firm tends to transfer more than in treatment one.

Allowing for the possibility of interaction (money transfer) between the public official and the supranational authority should result in an increased level of corruption. I therefore formulate the third hypothesis as follows.

Hypothesis Three: In the third treatment, the firm tends to transfer more and the public official tends to grant the permission more frequently than in the treatment one and treatment two.

In my experiment, the penalty consequences are so severe that they can hardly be compensated by the additional income realized by bribe taking, when the possibility of punishment is taken into account. Therefore, if the subjects tend to offer or accept the bribe, they are expected to be risk-seekers.

Hypothesis Four: The individual bribe amount tends to be negatively correlated to the subject's risk adverse attitude.

In this research, I use a widely accepted approach, which is developed by Holt and Laury in 2002, to estimate the risk aversion coefficient. The detailed procedure is stated in the next section.

CHAPTER IV

CONDUCTING OF THE EXPERIMENT

This research was approved by the Institutional Review Board (IRB 08-334) for research of human subjects at Mississippi State University (Appendix B). All the subjects were junior/senior undergraduate or graduate students from Mississippi State University and were recruited from economics or mathematics classes. Subjects could participate in only one treatment of the experiment.

The experiment was conducted on computers. The design of the experimental software was analogous in the three treatments. All possible moves were visible on the same screen. After all decisions of a round have been made, the subjects were informed about their payoffs resulting from their own group's decisions, and they were reminded that their payoffs would also be influenced by the decisions of all other groups in the experiment.

Each treatment began with an introductory talk (see Appendix C for the written instructions). Payoff tables, also available in Appendix C, were handed out to increase the transparency of the game.

The instructions were read aloud and explained in detail. After the introduction, each subject was assigned an ID number by random draw. The last digit of the ID determined the role of a subject as being firm or public official or citizen. Then the subjects were separated in different rooms according to their IDs. After the subject had

been seated, the play started immediately. The role of a participant remained unchanged throughout the experiment. The thirty rounds of the experiment were played in less than one and a half hours.

To ensure that disqualified subjects would not leave the screen, on-screen questionnaires are provided, which they had to fill in while the other subjects completed the session. These questionnaires were meant to keep disqualified subjects busy rather than to collect meaningful data.

Each participant in the experiment was paid a fixed show-up fee and a payoff amount at the end of the game that depended on several factors. Each player's payoff was reduced if the public official permitted the firm to build the plant thus reflecting the negative effects of the plant to society. However, the public official's payoff may still be larger compared to the case when it refuses the firm's request depending on the bribe. The firm's payoff, of course, will be larger when the public official permits the plant to run.

There were 18 subjects in each scenario of the first treatments, where there were only three roles and 24 subjects in the second and the third treatment, where there were four roles. After the experiment the subjects were paid anonymously in cash, at an exchange rate of $1 per experimental dollar. The total earnings ranged from $30.00 to $60.00.

Based on Holt and Laury (2002), I developed a risk preference decision sheet (Yang, 2006), as shown in Table 4.1. In this experiment, participants can choose between an option that offers payments of $10 or $8 with specified probabilities and another option that offers $19 or $1 with specified probabilities. Notice that the payoffs for "safe"

Option A, $10.00 or $8.00, are less variable than the potential payoffs of $19.00 or $1.00 in the "risky" Option B. In the first decision, the probability of the high payoff for both options is 10%, so only an extreme risk seeker would choose Option B. As can be seen in the right column of Table 4.2, the expected payoff incentive to choose Option A is $5.40[7]. When the probability of the high payoff outcome increases enough (moving down the table), a risk-neutral person should choose Option A four times before switching to Option B, a risk loving person will choose less than four times before switching to Option B while a risk averse person will choose more than four times before switching to Option B. But even the most risk-averse person should switch by decision 10 in the bottom row, since Option B yields a sure payoff of $19.00 in that case. Therefore, the total number of "safe" Option A for each of the ten questions would be used as an indicator of risk aversion.

[7] Expected payoffs were not provided in the instructions to subjects.

Table 4.1 Risk Preference Decision Sheet

Question	Option A	Option B	Which Option is preferred?
1	10% chance of $10.00, 90% chance of $8.00	10% chance of 19.00 90% chance of 1.00	
2	20% chance of $10.00, 80% chance of $8.00	20% chance of 19.00 80% chance of 1.00	
3	30% chance of $10.00, 70% chance of $8.00	30% chance of 19.00 70% chance of 1.00	
4	40% chance of $10.00, 60% chance of $8.00	40% chance of 19.00 60% chance of 1.00	
5	50% chance of $10.00, 50% chance of $8.00	50% chance of 19.00 50% chance of 1.00	
6	60% chance of $10.00, 40% chance of $8.00	60% chance of 19.00 40% chance of 1.00	
7	70% chance of $10.00, 30% chance of $8.00	70% chance of 19.00 30% chance of 1.00	
8	80% chance of $10.00, 20% chance of $8.00	80% chance of 19.00 20% chance of 1.00	
9	90% chance of $10.00, 10% chance of $8.00	90% chance of 19.00 10% chance of 1.00	
10	100% chance of $10.00, 0% chance of $8.00	100% chance of 19.00 0% chance of 1.00	

Table 4.2 Expected Payoff

Question	Option A	Option B	Expected payoff difference
1	$8.20	$2.80	$5.40
2	$8.40	$4.60	$3.80
3	$8.60	$6.40	$2.20
4	$8.80	$8.20	$0.60
5	$9.00	$10.00	-$1.00
6	$9.20	$11.80	-$2.60
7	$9.40	$13.60	-$4.20
8	$9.60	$15.40	-$5.80
9	$9.80	$17.20	-$7.40
10	$10.00	$19.00	-$9.00

When participant completed his/her decisions, the number of "safe" Option A choices would be calculated. The corresponding middle point of relative risk aversion would be used as indicator of his/her risk preference. The relative risk aversion coefficient is listed in table 4.3.

Table 4.3 Risk Aversion Coefficient

Number of safe choices	Range of relative risk aversion for $U(W) = \frac{W^{1-r}}{1-r}$	Middle point of relative risk aversion	Risk preference classification
0-1	-1.76[a] < rr < -0.93	-1.365	Highly risk loving
2	-0.97 < rr < -0.49	-0.73	Very risk loving
3	-0.49 < rr <-0.13	-0.31	Risk loving
4	-0.13 < rr < 0.19	0.03	Risk neutral
5	0.19 < rr < 0.48	0.335	Slightly risk averse
6	0.48< rr < 0.78	0.63	Risk averse
7	0.78< rr < 1.13	0.955	Very risk averse
8	1.13< rr < 1.60	1.365	Highly risk averse
9-10	1.60< rr < 2.2 [a]	1.9	Stay in bed

[a] these two lower and upper bound are subjectively determined

CHAPTER V

RESULTS

In this section I will analyze the data and present results of the experiment. I first provide a comparison of the levels of corruption and the effects of corruption for the three treatments. Second, I investigate the relationship between individuals' tendency for corruptive behavior and their risk preferences.

I first compare the levels of corruption between the two base scenarios, respectively, treatment one and treatment one A. I measure the level of corruption from two aspects. First, the average offered amount measures the firm's propensity to pay bribes. Second, the frequency that equilibrium predictions occur measures the lack of corruption level for each treatment.

Figure 5.1 shows the average amount that is offered for treatment one and reatment one A, over the thirty rounds of the experiment. It can be observed that in treatment one A the game ends for all groups at round twenty-three. That is because in this round, all the six firm-public official pairs are punished by the respective citizens. This observation complies with my hypothesis that there would be more punishment of corruption in treatment one A, which represents the "strong" democracy, compared to treatment one. It can be also observed that the average offered amount in treatment one is higher than that in treatment one A.

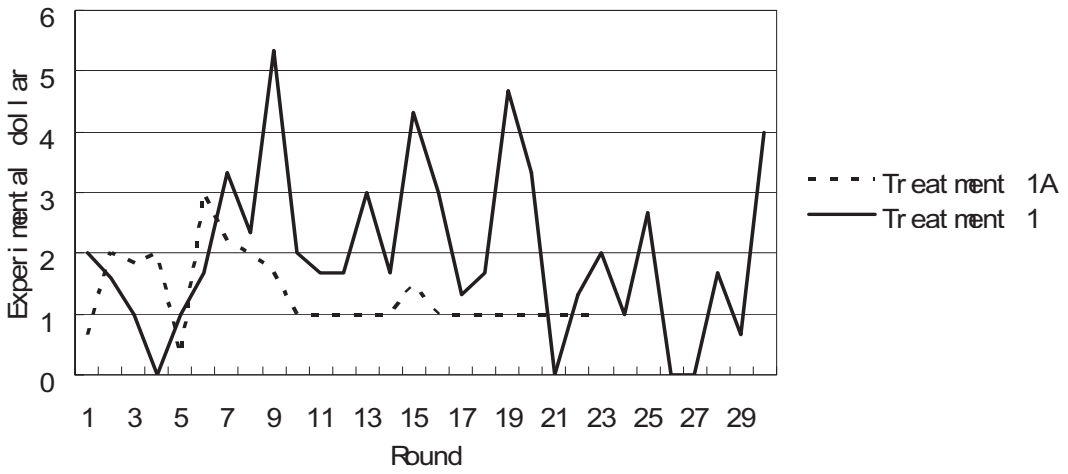

Figure 5.1 Evolution of Offered Amounts

I apply the nonparametric Wilcoxon-Mann-Whitney two-sample test and the parametric *t*-test to test the statistical significance of the direction. In the tests, a one-sided test is employed. The results of these tests are presented in table 5.1. Table 5.1 shows that the test reject the null hypothesis of equal offered amounts between these two scenarios at a significance level of less than $\alpha = 0.05$. On average, \$1.998 is offered in treatment one and \$1.312 in treatment one A.

Table 5.1 Wilcoxon-Mann-Whitney Test and *t*-test Results for The Average Offered Amount in Treatment One

				Z-value for Wilcoxon-Mann-Whitney test (one-sided)		P value for *t*-test (one sided)	
Treatment	Mean	Mode	Median	1	1A	1	1A
1	1.998	1.67	1.67	-	0.0205	-	0.0231
1A	1.312	1.00	1.00	0.0205	-	0.0231	-

Observation I

The average offered amount is higher in treatment one than in treatment one A.

Although the level of the offered amount is an indication of the level of corruption, the variable actually worrisome for policy makers is the frequency of inefficient choices induced by the offer (Abbink, 2004). Figure 5.2 depicts the evolution of the "permit" choices over the thirty rounds (twenty-three for treatment one A) of the experiment, using aggregate data of all choices without differentiating with respect to offered amounts. Figure 5.2 shows that the frequency of "permit" choices is much lower in treatment one A than in treatment one. In treatment one A the choice "permit" was chosen 11.7 percent of the time, compared to 14.6 percent in treatment one.

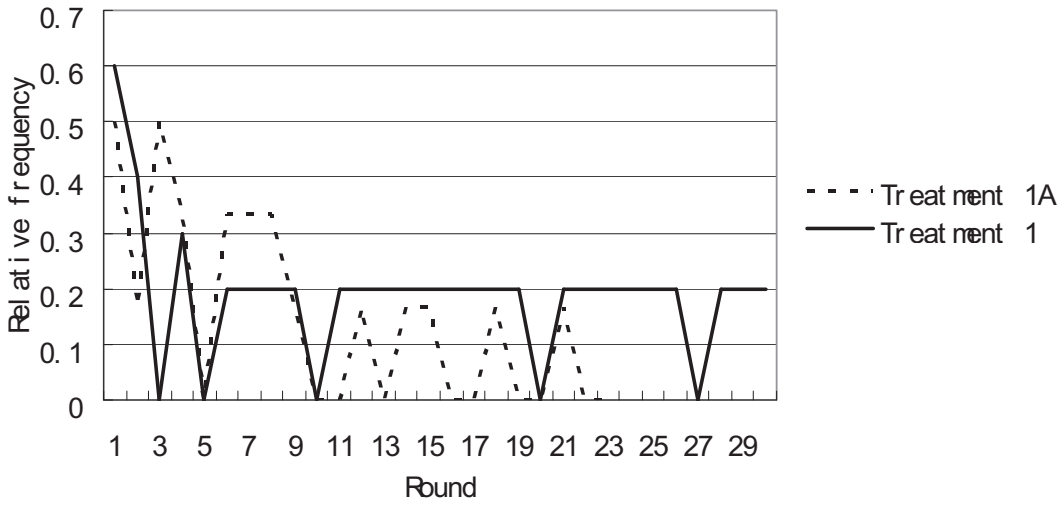

Figure 5.2 Evolution of "Permit" Choice Frequencies

The nonparametric Wilcoxon-Mann-Whitney two-sample test and the parametric *t*-test, applied to the "permit" choice rate in these two scenarios, rejects the null hypothesis of equal rates at a significance level of $\alpha = 0.05$. Both the tests were one-sided tests. The results of these tests are presented in table 5.2.

Table 5.2 Wilcoxon-Mann-Whitney Test and t-test Results for The Frequency of "Permit" Choices in Treatment One

		Z value for Wilcoxon-Mann-Whitney test (one-sided)		P value for *t* test(one sided)	
Treatment	Mean	1	1A	1	1A
1	0.190	-	0.0153	-	0.0176
1A	0.152	0.0153	-	0.0176	-

Observation II

The average frequency of "permit" choice is higher in treatment one than in treatment one A.

From the first two observations, we can see that in treatment one, which represent the "weak" democracy, there is less punishment but higher level of corruption. This finding provides sufficient support to the experimental design of treatment one and treatment one A.

In the following, I will compare the levels of corruption and the effects of the corruption for treatment one, two and three. As mentioned earlier, increased levels of corruption in treatments two and three compared to treatment one would imply even more increased levels of corruption in treatments two and three compared to treatment one A.

Figure 5.3 shows the distribution of the amounts offered by the firm to the public official for all groups and each treatment. The relative frequency represents the rate at which a certain offered amount occurs in all thirty rounds for each treatment. In

treatment one and treatment two, the modal transfer is zero dollars, which is consistent with the predicted equilibrium under the payoff maximization behavior. According to the predicted equilibrium no corruptive behavior would occur. In addition, the frequency of "$0" offered amounts is the highest in treatment one, the treatment with only three players. Treatment one is also the treatment with the lowest frequency of corrupted behavior, with an occurrence of only about 41 percent. The occurrence of corruptive behavior increases to 50 percent in treatment two, and to 77.3 percent in treatment three, which has the highest frequency of corrupted behavior.

In addition to having the highest frequency of corruptive behavior, it can be noticed that in treatment three when a positive amount is offered, players tend to offer the maximum amount of $9 with the highest frequency. On the other hand, in treatment two the different levels of amount offered appear to have a similar frequency of occurrence.

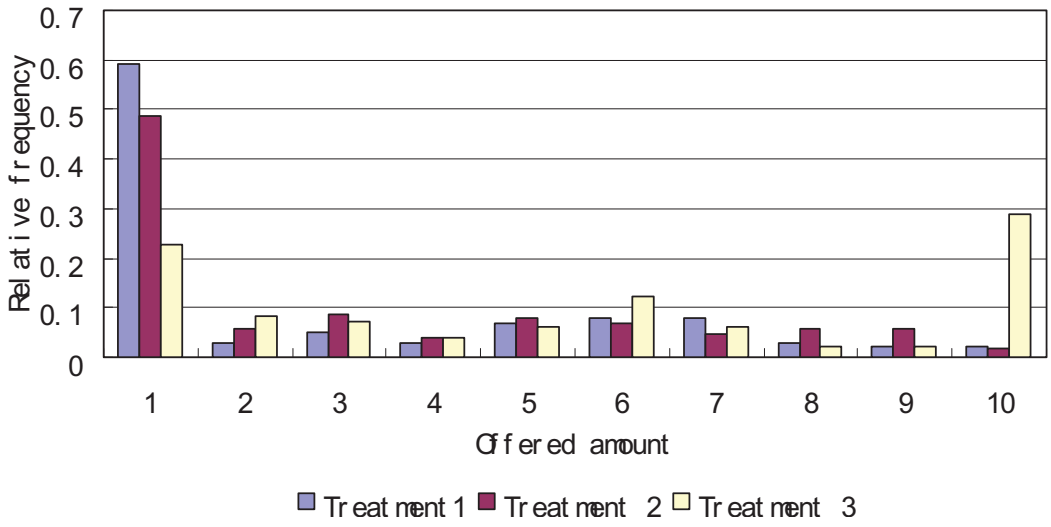

Figure 5.3 Distribution of Offered Amounts

Observation III

The lowest occurrence of corruptive behavior is observed in treatment one and the highest in treatment three. In addition, the maximum offered amount of $9 occurs more frequently in treatment three.

Figure 5.4 shows the average amount that is offered for each treatment, over the thirty rounds of the experiment. I can be observed that the average offered amount in treatment three is higher than both treatment one and treatment two and that the average offered amount in treatment two is higher than that in treatment one.

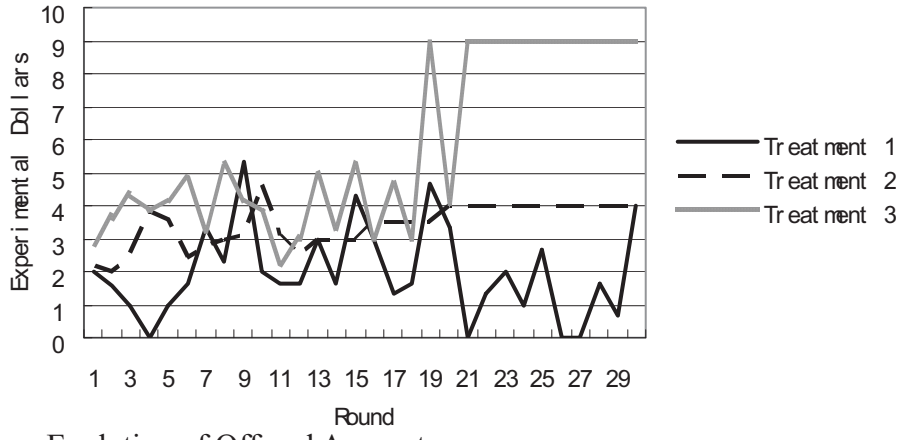

Figure 5.4 Evolution of Offered Amounts

When testing whether the differences between the average offered amounts for the three treatments are statistically significant, first I apply the Kruskal-Wallis test to test the three treatments simultaneously. The test rejects the null hypothesis of equal offered amount in the three treatments at a significance level of $\alpha = 0.0001$. Next, I apply the nonparametric Wilcoxon-Mann-Whitney two-sample test and the parametric *t*-test to each of the three different two-treatment combinations. Specifically, I test the average offered amounts between treatments one and two, one and three, and two and three. In

all these tests I employ a one-sided test. The results of these tests are presented in table 5.3. Table 5.3 shows that the test reject the null hypothesis of equal offered amounts between any two treatments at a significance level of less than $\alpha = 0.01$. On average, $1.998 is offered in treatment one, compared to $2.709 in treatment two and $5.750 in treatment three.

Table 5.3 Wilcoxon-Mann-Whitney Test and *t*-test Results for The Average Offered Amount

				Z-value for Wilcoxon-Mann-Whitney test (one-sided)			P value for *t*-test (one sided)		
Treatment	Mean	Mode	Median	1	2	3	1	2	3
1	1.998	1.67	1.67	-	0.0085	<0.0001	-	<0.0001	<0.0001
2	2.709	3.25	3.00	0.0085	-	<0.0001	<0.0001	-	<0.0001
3	5.75	9.00	4.80	<0.0001	<0.0001	-	<0.0001	<0.0001	-

Observation IV

The average offered amount is highest in treatment three and lowest in treatment one.

Figure 5.5 depicts the evolution of the "permit" choices over the thirty rounds of the experiment, using aggregate data of all choices without differentiating with respect to offered amounts. Figure 5.5 shows that the frequency of "permit" choices is much lower in treatment one than in the other two treatments. For all rounds and the three treatments combined, the choice "permit" was chosen 36.4 percent of the time. In treatment one the choice "permit" was chosen 19 percent of the time, in treatment two 44.3 percent and in treatment three 46.1 percent of the time.

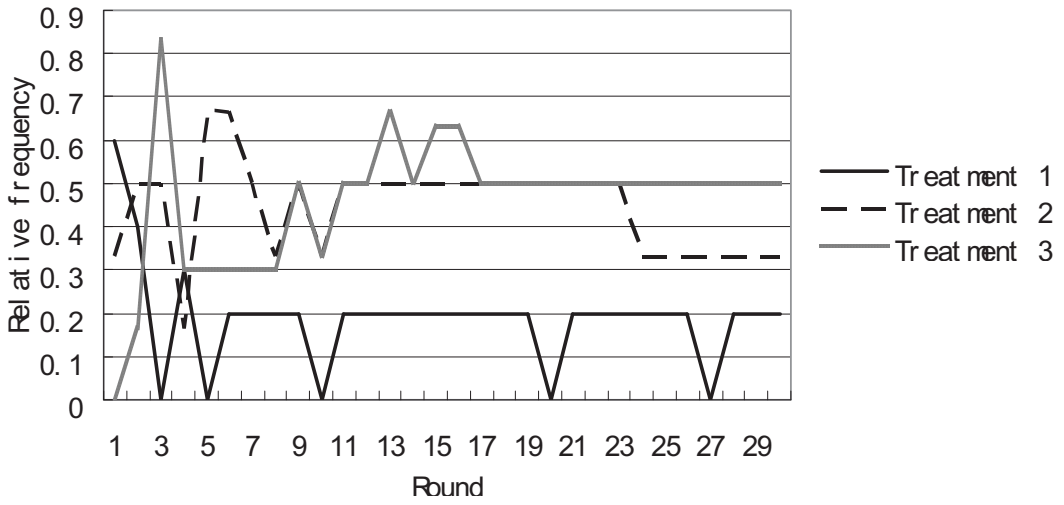

Figure 5.5 Evolution of "Permit" Choice Frequencies

The nonparametric Wilcoxon-Mann-Whitney two-sample test and the parametric *t*-test, applied to the "permit" choice rate in the independent subject groups of each of the three different two-treatment combinations, rejects the null hypothesis of equal rates at a significance level of $\alpha = 0.0001$. In all these tests I employ a one-sided test. The results of these tests are presented in table 5.4. Table 5.4 shows that the test rejects the null hypothesis of equal "permit" choice rates between any two treatments at a significance level of less than $\alpha = 0.1$.

Table 5.4 Wilcoxon-Mann-Whitney Test and *t*-test Results for The Frequency of "Permit" Choices

		Z value for Wilcoxon-Mann-Whitney test (one-sided)			P value for *t* test(one sided)		
Treatment	Mean	1	2	3	1	2	3
1	0.190	-	<0.0001	<0.0001	-	<0.0001	<0.0001
2	0.443	<0.0001	-	0.0003	<0.0001	-	0.0006
3	0.461	<0.0001	0.0003	-	<0.0001	0.0006	-

Observation V

The frequency of the choice "permit" is highest in treatment three and lowest in treatment one.

To investigate the impacts of corruption, I compare the average round payoffs for the three treatments. The average round payoff is the average of each player's payoff for that round. In calculating the average round payoff I also take into account the payoff reducing effect the permission being granted by the public official in all groups. To make the comparison reasonable, although there are four players in treatment two and treatment three, I only use the firm, the public official and the citizen to calculate the average round payoff. Then, I take the average of the round payoff for thirty rounds. Difference among the three average round payoffs will indicate the change of the average individual's income in a society. The average round payoff in treatment one is $23.75, which is higher than that in treatment two, $19.45 and that in treatment three, $18.34.

Both the nonparametric Wilcoxon-Mann-Whitney two-sample test and the parametric *t*-test rejects the null hypothesis of equal average round payoff between treatment one and treatment two at a significance level of $\alpha = 0.0001$. The *t*-test rejects the null hypothesis of equal average round payoff between treatment one and treatment three, while the Wilcoxon-Mann-Whitney test cannot. In all these tests I employ a one-sided test. The results of these tests are presented in table 5.5.

Table 5.5 Wilcoxon-Mann-Whitney Test and *t*-test Results for The Average Round Payoff

		Z-value for Wilcoxon-Mann-Whitney test (one-sided)			P-value for *t* test(one sided)		
Treatment	Mean	1	2	3	1	2	3
1	23.75	-	<0.0001	0.1023	-	<0.0001	0.0068
2	19.45	<0.0001	-	0.2394	<0.0001	-	0.3163
3	18.34	0.1023	0.2394	-	0.0068	0.3163	-

Observation VI

The average round payoff $\bar{\pi}_i$ (i=1, 2, 3) for all the three treatments can be expressed as $\bar{\pi}_1 > \bar{\pi}_2$ $\bar{\pi}_1 > \bar{\pi}_3$.

I further look into the cooperative relationships that can be established through trust and reciprocity. Table 5.6 shows the average offered amount per group made by the player "firm" and the average frequency of "permit" choices by the player "public

official". Values in table 5.6 are ordered from lowest to highest within each treatment. The strong impact of reciprocity can be identified through the strong correlation between the average offered amount and average "permit" choice frequency across the groups. The higher the average offered amount in a group, the higher the frequency of the "permit" choices tends to be.

Table 5.6 Average Offered Amount by First Players and Frequency of "Permit" Choices by Second Players over All Rounds

Treatment 1			Treatment 2			Treatment 3	
Group	Average Offered Amount	Frequency of "Permit"	Group	Average Offered Amount	Frequency of "Permit".	Group	Average Offered Amount	Frequency of "Permit"
5	0.00	0.00	5	0.00	0.9	3	1.06	0.17
1	1.93	0.00	3	1.33	0.25	1	2.61	0.22
6	2.00	0.50	1	3.11	0.33	2	3.60	0.40
3	2.33	0.67	2	4.29	0.42	6	4.00	0.50
2	3.97	0.80	4	4.50	0.67	5	6.00	0.60
4	5.00	1.00	6	5.21	1.00	4	8.10	0.80
Avg.	2.54	0.39	Avg.	3.07	0.60	Avg.	4.23	0.45
St.dev.	1.75	0.49	St.dev	2.02	0.66	St.dev	2.49	0.50

The Spearman rank correlation coefficients between the average offered amount and the frequency of the "permit" choice are r_1=0.97 in treatment one, r_2=1.00 in

treatment two, and r_3=1.00 in treatment three. All coefficients are significantly positive at less than $\alpha = 0.005$.

Figure 5.6 depicts the relative frequency of "permit" choices after a certain amount has been offered. It shows that the frequency of "permit" choices increases as the amount offered increases. This supports the view that the second players tend to reciprocate by choosing "permit" after they receive relatively high amounts, while they typically choose not to grant the permission after they receive no or small offered amounts.

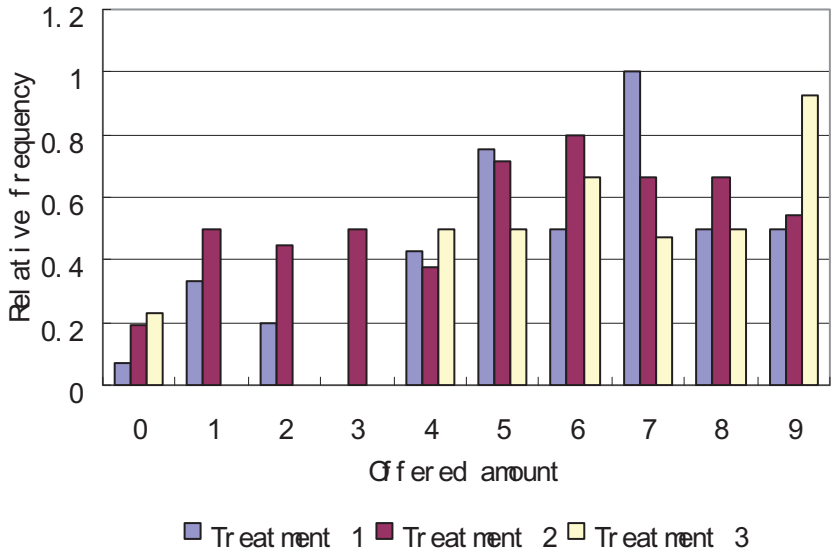

Figure 5.6 Frequency of "Permit" Choices for Different Offered Amounts

Observation VII

The frequency that public official tends to grant the permission to the firm is higher as the offered amount increases.

On the other hand, in the 30-round supergame, not only can the public official (the second player) reciprocate on the firm (the first mover)'s offered amounts, but also the firm can condition its offered amount on the already observed choice made by the public official in previous rounds. If such first-player reciprocation was present in the data, It should be observed that higher offered amounts as a reward for previous "permit" choices, and low offered amounts as a punishment for previous "don't permit" choices. So, for every first player, I measure the impact of his/her reciprocation as the difference between the average offered amount after a "permit" choice and the average offered amount after a "don't permit" choice by the second player in the preceding round. Formally, I measure of first-player reciprocation is computed as

$$R = \frac{\sum t_Y}{N_Y} - \frac{\sum t_X}{N_X}, \tag{5-1}$$

where t_Y denotes the offered amount after a preceding "permit" choice, t_X is the offered amount after a "don't permit" choice, and N_Y, N_X denote the number of "permit" and "don't permit" choices in rounds one through twenty nine. A measure for R can only be computed if a first player experiences at least one "permit" and one "don't permit" choice during rounds one through twenty nine . According to Abbink (2004), a high impact of first player reciprocation would show up in positive values of the *R* measure.

The averages of the first player R measures are +2.192 for treatment one, +9.57 for treatment two, and +2.149 for treatment three. For all treatments, the average R value is positive.

Observation VIII

Reciprocity establishes stable cooperative relationships. In all treatments, public officials reciprocate on higher offered amounts by choosing "permit." Firms reciprocate on favorable choices by transferring higher offered amounts in the next round.

In my fourth hypothesis, I expect that individual's bribe amount tends to be negatively correlated to the subject's risk attitude. I first use the players' response to the ten questions to determine when they switch between the "safe choice" and the "risky choice." Then, using table 3.3, I obtain the middle point of relative risk aversion coefficient for each player. Figure 5.7 depicts the distribution of the number of players on the "safe" choices. It can be detected that the median and mode choices are "5," which represents the risk preference attitude of "slightly risk averse." In addition, it can be observed from the graph that there are more players who choose five or more times the "safe" choices than those who choose three or fewer times the "safe" choices. Therefore, there are more risk averse players than risk loving players in this experiment.

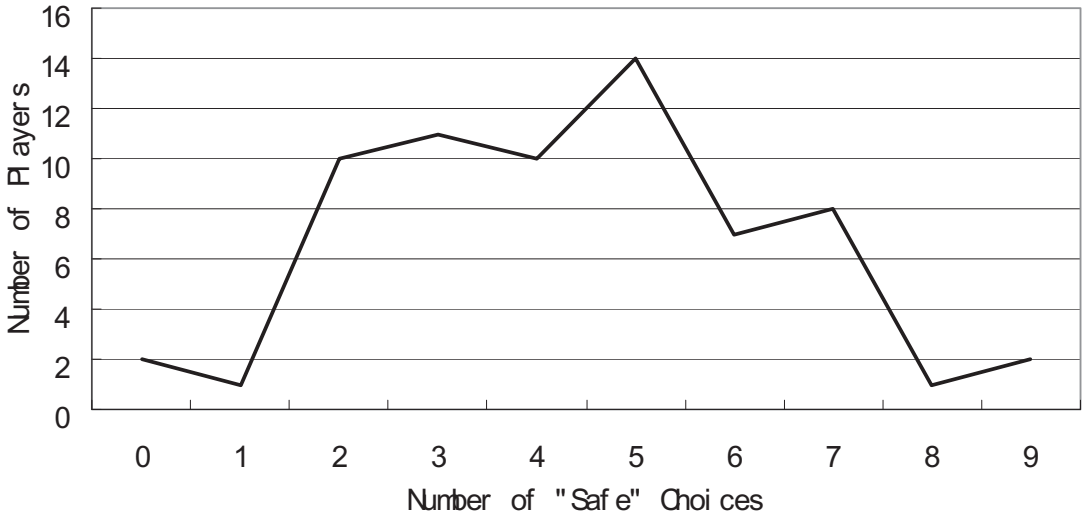

Figure 5.7 Distribution of the Number of Players on the "Safe" Choices

To test the fourth hypothesis, I define the dependent variable *Y* to be the offered amount in the case of the player "firm." I calculate the firm's average offered amount for all the rounds it plays. For example, the player "firm" of group one in treatment one offered the total amount of 58 experimental dollars to the player "public official" and played 30 rounds, so its average offered amount is 58 divided by 30, which is 1.93. As for the player "public official," I calculate the average amount of the bribe that it accepts from the player "firm." For example, in group one, treatment three, the player "public official" is offered totally 47 experimental dollars but only accepts 39 and it played 19 rounds, so its average offered amount is 39 divided by 19, which is 2.05. I use each player's relative risk aversion coefficient as the independent variable *X*. I also introduced a dummy variable, *SA,* to differentiate treatment one with treatment two and three, where there is the fourth player-the supranational authority.

I estimate the relationship presented by the following regression model:

$$Y_i = \alpha_0 + \alpha_1 X_i + SA_i + \varepsilon_i \quad (5\text{-}2)$$

where Y_i is the individual's offered/accepted amount; X_i is individual's relative risk aversion coefficient; SA_i= 1 represents treatment two and treatment three, 0 represents treatment one. $i = 1,2,...,36$.

The results of the regression analysis are represented in table 5.7.

Table 5.7 The Regression Analysis Result for the Risk Averse Attitude Impact Model

Variable	Parameter Estimate	Standard Error	*t*-value
Intercept	1.854*	0.6926	2.68 (0.0115)
Relative risk aversion coefficient	-0.996*	0.4806	-2.07 (0.0461)
SA	2.556**	0.8449	3.02 (0.0048)

**,* denotes significance at the 1%, 5% level; *p*-values are presented in the parentheses

The parameter estimates are significant on at least 5 percent level and the negative sign of the relative risk aversion coefficient represents that there is a negative relationship between individual's offered/accepted amount and individual's relative risk aversion coefficient. This means that if the coefficient of relative risk aversion increases by 1 unit (for example risk preferences change from "risk neutral" to "slightly risk averse"), the offered/accepted amount will decrease by $0.996. The positive sign of the dummy variable complies with the previous statement about an increased level of corruption with the presence of supranational authority. The coefficient can be interpreted as people tend to offer/accept $2.556 more with the existence of the supranational authority.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

Corruption is one of the most pressing problems of today's government. Various organizations together with free and active media have made great efforts to bring this issue to the forefront of the governance debate. In democratic societies citizens play an important role in choosing public officers and corrupt elected officials can be voted out of office. In a democracy, public officers must be accountable to people they serve. Accountability means that public officers must provide logical and acceptable explanations for their actions and decisions to the citizens. Public officers in responsible positions must at all times adhere to the principles of transparency and be accountable to citizens. Accountability is also dependent on the enforcement of rules, regulations and policies. However, some institutional mechanisms, like the UN Mission in Kosovo (UNMIK) and the UN Mission in Bosnia-Herzegovina (UNMIBH) have veto power over the local governments and citizens and therefore can be viewed as supra-national governing structures. These governing structures are considered to be a poor model when it comes to transparency and accountability. Therefore, public officers cannot be held accountable and corrupt practices can flourish.

This research uses experimental methods to investigate the effect of supranational governing structures on corruption. Measuring the effect of these supranational governing

structures on the level of corruption is one of the objectives of this research. The other objective is to investigate the effectiveness of the model for the United Nations missions given that transparency and accountability in the presence of these kinds of supranational governing structures are generally weak. To accomplish these objectives, I design an experiment with several treatments that represent situations where the supranational governing authorities are present or not and different levels of accountability and transparency. To determine the base scenario, I first design two treatments representing the situations of a "strong" and "weak" democracy. In a "strong" democracy the frequency of punishment on corruption is higher than in a "weak" democracy. The experiment is defined in the framework of the public sector, with three or four players representing the firm, the public official, the citizen and the supranational authority. The firm is seeking a permit to build a plant that also produces pollution, a negative externality for the society. The public official needs to determine whether to grant the permission to the firm or not. The firm can make a private transfer to the public official to influence its decision. The citizen, who represents the society, can respond to the act of corruption by choosing to punish both the firm and the public official. The supranational governing authority, having the veto power, decides whether to veto the punishment of the firm and the public official by the citizen. The experiment was conducted with students at Mississippi State University.

Conclusions

I find out that the level of corruption in situations where supranational governing authorities are present is higher than that in situations where there are no supranational governing authorities. In the presence of supranational governing authorities I observe increased level of corruption from private actors (firms) who tend to offer higher bribes to influence the local government official's decision in order to increase their benefits. I also observe increased level of corruption from government officials who tend to accept more offered bribes made by the private actors. In addition, in response to the offers from the private actors, government officials tend to grant permits more frequently, which, in turn, results in less efficient outcomes for the society.

I studied the effects of supranational governing structures on the framework of public sector. These findings can also apply to other sectors with the presence of similar structures as the supranational governing structures. An example might be the case of the private sector, where the government's taking over of some of the management decisions in private companies can be considered a governing structure similar to the supranational authority discussed here.

In regard to the specific case of the UN missions in Kosovo and Bosnia-Herzegovina, I find that a reduction in transparency and accountability results in increased levels of corruption. I observe further increased level of corruption from private actors (firms) in terms of higher bribes and from government officials in terms of higher acceptance of offered bribes. In addition, there is increased frequency of government officials granting permits to the private actors and less efficient outcomes for the society. Finally, I observe that people's risk preferences are important in understanding corrupt

behavior. I find that increased levels of risk aversion result in higher levels of corrupt behavior.

Based on the conclusions of this research, I provide the following recommendations to the policy makers. These recommendations are first based on the finding that the presence of supranational authorities results in increased level of corruption. One way to reduce corruption level under the supranational governing structures might be by a different separation of powers between the supranational and local governing structures. For, example, less veto-power might be authorized for the supranational officials. A second way may be by attempting to shorten the transitory period and the life of the missions and by quickly transferring the responsibilities to the local officials. Finally, based on the finding that reduced levels of transparency and accountability under the supranational governing authority it is recommended that an increased level of transparency and accountability for the UN mission is needed and it can be achieved by improving the responsibility of the UN mission authorities.

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APPENDIX A

PROOF OF PROPOSITION

Proof of proposition 1

Following Abbink (2004), we prove proposition 1 as below. To keep the proof general for various payoff parameter values, define the following variables (values in brackets are the parameters used in the experiment). Following the sequence of moves in the game, we call the firm player 1, the public official player 2, and the citizen player 3.

For convenience, we use X to denote that public official refuse to give the permission to the firm, Y to denote that public official gives the permission to the firm, W to denote that citizen chooses not to punish the firm and the public official, and Z to denote that the citizen chooses to punish the firm and the public official.

π^{1X}	Player 1's payoff if X is chosen	[40]
π^{1Y}	Player 1's payoff if Y is chosen	[56]
π^{1W}	Player 1's payoff if W is chosen	Either [40] or [56]
π^{1Z}	Player 1's payoff if Z is chosen	[0]
π^{2X}	Player 2's payoff if X is chosen	[40]
π^{2Y}	Player 2's payoff if Y is chosen	[36]
π^{2W}	Player 2's payoff if W is chosen	Either [40] or [36]
π^{2Z}	Player 2's payoff if Z is chosen	[0]
π^{3X}	Player 3's payoff if X is chosen	[40]
π^{3Y}	Player 3's payoff if Y is chosen	[36]
π^{3W}	Player 3's payoff if W is chosen	Either [40] or [36]
π^{3Z}	Player 3's payoff if Z is chosen	[0]
f	Transfer fee	[2]
t^{max}	Maximum transfer	[9]

where the inequalities $\pi^{1X} < \pi^{1Y}$, $\pi^{2X} > \pi^{2Y}$, $\pi^{3X} > \pi^{3Y} > \pi^{3Z}$, $f > 0$ and $t^{max} > 0$ hold. Further, denote by $t(I^1)$ player 1's transfer at an information set I^1, by $d(I^2)$ player 2's choice of X or Y at information set I^2, by $d(I^3)$ player 3's choice of Z or W at information set I^3, and by $a(I^2)$ player 2's decision at an information set I^2 at which she has to decide on accepting or rejecting the bribe. For convenience, we use a subscript to denote the round at which this information set is reached, such that I^1_j is an information set of player 1 for round j, by I^2_j an information set at which player 2 decides on X or Y in round j, and by I^3_j an information set at which player 3 decides on Z or not in round j. An information set contains the history of play of the players matched to one another during the play.

Since the payoffs the player gain in the game are additively composed of payoffs resulting from their own moves and the damages done to them by others, we may define $\Pi^i(I^i j)$ as player I's cumulative payoff earned through the moves of the players of the own group, up to the point of time when I^i_j is reached, and by $\delta(s^{-1\text{-}2\text{-}3})$ the expected damages done to each player of a group by the other players' mixed strategies $s^{-1\text{-}2\text{-}3}$. For convenience, we drop the argument $s^{-1\text{-}2\text{-}3}$ if it is not required.

Denote by $p(I^i_j)$ the probability with which information set I^i_j is reached. Denote by q the probability with which a player makes a certain decision at a certain information set. Let us first show that in equilibrium, player 3 will never choose to punish the firm and the

public official. Consider some information set I^3_n and suppose there is an equilibrium $E = (s^1,\ldots, s^n)$ [8] with $q(d(I^3_n)=W)=0$, and $p(I^3_n)>0$. Let us consider player 3's alternative strategy, which differs from his strategy in E only in that $q(d(I^3_n)=W)>0$. $p(I^3_n)$ remains unchanged. Player 3's payoff with the alternative strategy is $\Pi^3(I^3_n)+\pi^{3W}q(d(I^3_n)=W) + \pi^{3Z}(1-q(d(I^3_n)=W))+ \delta$. This is higher than player 3's payoff in E which is $\Pi^3(I^3_n)+\pi^{3Z}(1-q(d(I^3_n)=W)) + \delta$. Note that $\pi^{3Z}=0$. Therefore, E cannot be an equilibrium.

Next let us show that in equilibrium Y is never chosen in the last round. Consider some information set I^i_n, where n is the last round. Suppose there is an equilibrium $E=(s^1,\ldots, s^n)$ with $q(d(I^2_n)=Y)>0$, and $p(I^2_n)>0$. Now consider player 2's alternative strategy, which differs from his strategy in E only in $d(I^2_n)=X$. $p(I^2_n)$ remains unchanged. Player 2's payoff with the alternative strategy is $\Pi^2(I^2_n)+ \pi^{2X}+ \delta$, which is higher than player 2's payoff in E, that is $\Pi^2(I^2_n)+ \pi^{2Y}q(d(I^2_n)=Y) + \pi^{2X}(1-q(d(I^2_n)=Y))+ \delta$. Thus, E cannot be equilibrium.

Now let us show that in equilibrium, player 1 will never transfer a positive amount in the last round. Suppose there is an equilibrium E with $q(t(I^1_n)=0)<1$, and $p(I^1_n)>0$. Since E is equilibrium, player 2 will not choose Y in the following stage of the last round. Thus, the best possible payoff player 1 can get in an equilibrium characterized by $q(t(I^1_n)=0)<1$, and $p(I^1_n)>0$ is $\Pi^1(I^1_n)+ \pi^{1X}q(t(I^1_n)=0) + (\pi^{1X}-f)(1-q(t(I^1_n)=0))+ \delta$. This is the case if in E, player 2's strategy involves rejecting the transfer offer by player 1. If player 2's strategy in E is to accept transfer offers made by player 1, player1's payoff can only be lower, since it is further reduced by transfers and the possibility of being punished.

Whatever equilibrium strategy player 2 would choose, it can easily be seen that player 1's payoff by choosing the alternative strategy, which differs from his strategy in E only in that $q(t(I^1_n)=0)=1$, is always higher than his payoff in E. All other things equal, $p(I^1n)$ remains unchanged. Player 1's payoff in case that this information set is reached, however, is in the range from $\Pi^1(I^1n)+ \pi^{1X}+ \delta$ (player 2 chooses X with probability 1 on all paths reached through player 1's alternative strategy and player 2's strategy in E) to $\Pi^1(I^1n)+ \pi^{1Y}+ \delta$ (player 2 chooses Y for sure). Since all possible payoffs are higher than the maximum payoff in equilibrium E, given in E $q(t(I^1_n)=0)<1$ holds, E cannot be an equilibrium.

Proposition one can now be proved by mathematical induction. Denote by S= [j,…, n] a set of consecutive rounds for which in equilibrium $d(I^3_j),\ldots, d(1^3_n)=W, \forall I^3i$ with $p(I^3_i)>0$, $i=j,\ldots,n$, $d(I^2_j)=\ldots= d(I^2_n)=X \quad \forall I^2i$ with $p(I^2_i)>0$, $i=j,\ldots,n$, and $t(I^1_j)=\ldots= t(I^1_n)=0 \quad \forall \ I^1i$ with $p(I^1_i)>0$, $i=j,\ldots,n$. We have shown that $n\in S$. Now consider round j-1. Suppose there is an equilibrium E in which for some information set $p(I^3_{j-1})>0$ and $q(d(1^3_{j-1})=Z)>0$. Since E is an equilibrium, player 3's payoff in case that I^3_{j-1} is reached is $\Pi^3(I^3_{j-1})+\pi^{3Z}q(d(I^3_{j-1})=Z) + \pi^{3W}(1-q(d(I^3_{j-1})=Z))+ \pi^{3W}\ |S|+ \delta$ where $\pi^{3W}\ |S|$ is player 3's expected payoff from all rounds in S. Note that since E is equilibrium, player 3's strategy

[8] E stands for the subgame perfect equilibrium (i=1,2,3)

must be a best reply to all other players' strategies. It is now sufficient to show that player 3 has an alternative strategy, which is a better reply to all other player's strategies in *E*. Consider player 3's alternative strategy that differs from the equilibrium strategy in that $d(1^3_{j-1})$=W. Player 3's payoff, given I^3_{j-1} is reached, and all other things equal, $p(I^3_{j-1})$ remains unchanged, is then $\Pi^3(I^3_{j-1}) + \pi^{3W}(|S|+1) + \delta$, which is higher than in *E*. Thus, *E* cannot be equilibrium.

Next suppose there is an equilibrium *E* in which for some information set $p(I^2_{j-1})>0$ and $q(d(I^2_{j-1})=Y)>0$. Since *E* is an equilibrium, player 2's payoff in case that I^2_{j-1} is reached is $\Pi^2(I^2_{j-1}) + \pi^{2Y} q(d(I^2_{j-1})=Y) + \pi^{2X}(1-q(d(I^2_{j-1})=Y)) + \pi^{2X}|S| + \delta$ where $\pi^{2X}|S|$ is player 2's expected payoff from all rounds in *S*.. Note that since *E* is an equilibrium, there will be no transfers in later rounds. Further, since *E* is equilibrium, player 2's strategy must be a best reply to all other players' strategies. It is now sufficient to show that player 2 has at least one alternative strategy, which is a better reply to all other players' strategies in *E*. Consider, for example, player 2's alternative strategy that differs from his or her strategy in *E* in that $d(I^2_{j-1})$=X and $a(I^2_{j-1})$=reject . All other things equal, $p(I^2_{j-1})$ remains unchanged, but player 2's payoff given I^2_{j-1} is reached is $\Pi^2(I^2_{j-1}) + \pi^{2X}(|S|+1) + \delta$, which is higher than in *E*. Thus, *E* cannot be equilibrium.

Finally, suppose there is an equilibrium *E* in which $q(t(I^1_{j-1})=0)<1$, and $p(I^1_{j-1})>0$ for some information set I^1_{j-1}. Since *E* is an equilibrium by assumption, $d(I^2_k)=X \ \forall k \geq j-1$ and $p(I^2_k)>0$, and $t(I^1_k)=0 \ \forall k \geq j$ and $p(I^1_k)>0$. Thus, player 1's expected payoff, given I^1_{j-1} is reached, and given $q(t(I^1_{j-1})=0)$, is in the range from $\Pi^1(I^1_{j-1}) + \pi^{1X}(|S|+1)q(0) + (1-q(0))(\pi^{1X} - f - t^{max} + \pi^{1X}(|S|+1)) + \delta$, if player 1 transfers the maximum with probability 1, and player 2 accepts for sure, to $\Pi^1(I^1_{j-1}) + \pi^{1X}(|S|+1)q(0) + (1-q(0))(\pi^{1X} - f + \pi^{1X}|S|) + \delta$, if player 2 rejects all positive amounts transferred. However, since *E* is an equilibrium, player 1's strategy must be a best reply to all other players' strategies. It is now sufficient to show that player 1 has at least one alternative strategy, which is a better reply to all other players' strategies in *E*. Consider, for example, player 1's alternative strategy that differs from the equilibrium strategy in that $q(t(I^1_{j-1})=0)=1$. Player 1's payoff, given I^1_j is reached, is then in the range from $\Pi^1(I^1_{j-1}) + \pi^{1X}(|S|+1) + \delta$, if player 2 chooses X in all later rounds with probability 1, to $\Pi^1(I^1_{j-1}) + \pi^{1Y}(|S|+1) + \delta$, if player 2 always chooses Y for certain. No matter what player 2's strategy is off the equilibrium path of *E*, the alternative strategy is a better response to all other players' strategies in *E* than player 1's strategy in *E*. Thus, *E* cannot be equilibrium.

Proof of proposition 2

Since we add a fourth player- the supranational authority in treatment 2, we define some additional variables to prove proposition 2. We call the supranational authority player 4.

We use V to denote that the supranational authority chooses to veto the punishment, U to denote that the supranational authority chooses not to veto the punishment.

π^{1V}	Player 1's payoff if V is chosen	Either [40] or [56]
π^{1U}	Player 1's payoff if U is chosen	[0]
π^{2V}	Player 2's payoff if V is chosen	Either [40] or [36]
π^{2U}	Player 2's payoff if U is chosen	[0]
π^{3V}	Player 3's payoff if V is chosen	Either [40] or [36]
π^{3U}	Player 3's payoff if U is chosen	[0]
π^{4X}	Player 4's payoff if X is chosen	[40]
π^{4Y}	Player 4's payoff if Y is chosen	[38]
π^{4W}	Player 4's payoff if W is chosen	Either [40] or [56]
π^{4Z}	Player 4's payoff if Z is chosen	[0]
π^{4V}	Player 4's payoff if V is chosen	Either [40] or [38]
π^{4U}	Player 4's payoff if U is chosen	[0]
f	Transfer fee	[2]
t^{max}	Maximum transfer	[9]

where the inequalities $\pi^{4X} > \pi^{4Y} > \pi^{4U}$ holds. Further, denote by $d(I^4)$ player 4's choice of V or U at information set I^4.

Let us show that in equilibrium, player 4 will always choose to veto the punishment. Consider some information set I^4_j and suppose there is an equilibrium $E=(s^1,\ldots, s^n)$ with $q(d(I^4_n)=U)>0$, and $p(I^4_n)>0$. Thus, the best possible payoff player 4 can get in an equilibrium characterized by $q(d(I^4_n)=U)>0$, and $p(I^4n)>0$ is $\Pi^4(I^4_n)+\pi^{4U}q(d(I^4_n)=U) + \pi^{4V}(1-q(d(I^4_n)=U))+ \delta$. Let us now consider player 4's payoff by choosing the alternative strategy, which differs from his strategy in E only in that $q(d(I^4_n)=U)=0$. All other things are equal, $p(I^4_n)$ remains unchanged. Player 4's payoff in case that the information set is reached is $\Pi^4(I^4_n) + \pi^{4V}+ \delta$ (where $\pi^{4V} = \pi^{4X}$ if player 2 chooses X with probability 1 on all paths reached through player 4's alternative strategy and $\pi^{4V}= \pi^{4Y}$ if player 2 chooses Y for sure). Since all the possible payoffs are higher than the maximum payoff in an equilibrium E, given in E $q(d(I^3_n)=U)>0$ holds, E cannot be an equilibrium.

The rest of the proof is the same as that for proposition 1.

The proposition can be proved by mathematical induction. Denote by $S= (j,\ldots, n)$a set of consecutive rounds for which in equilibrium $d(I^4_j),\ldots, d(I^4_n)=U, \forall I^4_i$ with $p(I^4_i)>0$, $i=j,\ldots,n, \quad i=j,\ldots,n, d(I^3_j),\ldots, d(I^3_n)=W, \forall I^3 i$ with $p(I^3_i)>0$, $i=j,\ldots,n, \quad d(I^2_j)=\ldots= d(I^2_n)=X \quad \forall I^2 i$ with $p(I^2_i)>0$, $i=j,\ldots,n,$ and $t(I^1_j)=\ldots= t(I^1_n)=0 \quad \forall \quad I^1 i$ with $p(I^1_i)>0$, $i=j,\ldots,n.$ We have shown that $n \in S$. Now consider round j-1. Suppose there is an equilibrium E in which for some information set $p(I^4_{j-1})>0$ and $q(d(I^4_{j-1})=U)>0$. Since E is an equilibrium, player 4's payoff in case that I^4_{j-1} is reached is $\Pi^4(I^4_{j-1})+\pi^{4U}q(d(I^4_{j-1})=U) + \pi$

$^{4V}(1-q(d(I^4_{j-1})=U))+ \pi^{4V}|S|+\delta$ where $\pi^{4V}|S|$ is player 4's expected payoff from all rounds in S. Note that since E is equilibrium, player 4's strategy must be a best reply to all other players' strategies. It is now sufficient to show that player 4 has an alternative strategy, which is better reply to all other player's strategies in E. Consider player 4's alternative strategy that differs from the equilibrium strategy in that $q(d(I^4_{j-1})=U)=0$. Player 4's payoff, given I^4_{j-1} is reached, is then $\Pi^4(I^4_{j-1})+\pi^{4V}(|S|+1)+\delta$, which is higher than the payoff in E. Thus, the alternative strategy is a better response to all other player's strategies in E than player 4's strategy in E. Thus, E cannot be equilibrium.

The rest of the proof is just the same as that for proposition 1.

Proof of proposition 3

The difference between treatment 2 and treatment 3 is that we allow the interaction between the public official (player 2) and the supranational authority (player 4). Further, denote by $t(I^2)$ player 2's transfer at an information set I^2, The other variables and notations are the same as in the proof for proposition 2.

As shown in proof of proposition 2, in equilibrium player 4 will always choose to veto the punishment. Then let us show that in equilibrium player 2 will never transfer a positive amount in the last round. Suppose there is an equilibrium E with $q(t(I^2_n)=0)<1$, and $p(I^2_n)>0$. Since E is equilibrium, player 4 will not choose U in the following stage of the last round. Thus, the best possible payoff player 2 can get in an equilibrium characterized by $q(t(I^2_n)=0)<1$, and $p(I^2_n)>0$ is $\Pi^2(I^2_n)+\pi^{2X}q(t(I^2_n)=0)+(\pi^{2X}-f)(1-q(t(I^2_n)=0))+\delta$. This is the case if in E, player 4's strategy involves rejecting the transfer offered by player 2. If player 4's strategy in E is to accept transfer offers made by player 2, player 2's payoff can only be lower, since it is further reduced by transfers and the possibility of being punished. Whatever equilibrium strategy player 4 would choose, it can easily be seen that player 2's payoff by choosing the alternative strategy which differs from his strategy in E only in that $q(t(I^2_n)=0)=1$, is always higher than his payoff in E. Player 2's payoff in that case would be $\Pi^2(I^2_n)+\pi^{2X}+\delta$. Therefore, E cannot be an equilibrium.

The rest of the proof is the same as that for proposition 2.

The proposition can be proved by mathematical induction.

Denote by $S=(j,\ldots,n)$a set of consecutive rounds for which in equilibrium $d(I^4_j),\ldots, d(I^4_n)=U, \forall I^4_i$ with $p(I^4_i)>0$, $i=j,\ldots,n$, $d(I^4_j),\ldots, d(I^4_n)=U, \forall I^4_i$ with $p(I^4_i)>0$, $i=j,\ldots,n$, $i=j,\ldots,n$, $d(I^3_j),\ldots, d(I^3_n)=W, \forall I^3 i$ with $p(I^3_i)>0$, $i=j,\ldots,n$, $d(I^2_j)=\ldots=d(I^2_n)=X$ and $q(t(I^2_i)=0)=1 \forall I^2 i$ with $p(I^2_i)>0$, $i=j,\ldots,n$, and $t(I^1_j)=\ldots=t(I^1_n)=0 \forall I^1 i$ with $p(I^1_i)>0$, $i=j,\ldots,n$. We have shown that $n\in S$. Now consider round j-1. Now suppose there is an equilibrium E, in which $q(t(I^2_{j-1})=0)<1$, and $p(I^2_{j-1})>0$ for some information set I^2_{j-1}. Since E is an equilibrium by assumption, $d(I^4_k)=V \forall k\geq j$-1 and $p(I^4_k)>0$, and $t(I^4_k)=0 \forall \forall k\geq j$ and $p(I^4_k)>0$. Thus, player 2's expected payoff, given I^2_{j-1} is reached, and given

$q(t(I^2_{j-1})=0)<1$, is in the range from $\Pi^2(I^2_{j-1})+\pi^{2X}(|S|+1)q(t(I^2_{j-1})=0) + (1- q(t(I^2_{j-1})=0))(\pi^{2X} - f - t^{max} + \pi^{2X}(|S|+1)) + \delta$, if player 2 transfers the maximum with probability 1, and player 4 accepts for sure, to $\Pi^2(I^2_{j-1})+\pi^{2X}(|S|+1)q(t(I^2_{j-1})=0) + (1- q(t(I^2_{j-1})=0))(\pi^{2X} - f + \pi^{2X}|S|) + \delta$, if player 4 rejects all positive amounts transferred. However, since E is an equilibrium, player 2's strategy must be a best reply to all other players' strategies. It is now sufficient to show that player 2 has at least one alternative strategy, which is a better reply to all other players' strategies in E. Consider, for example, player 2's alternative strategy that differs from the equilibrium strategy in that $q(t(I^2_{j-1})=0)=1$. Player 2's payoff, given I^2_j is reached, is then $\Pi^2(I^2_{j-1}) +\pi^{2X}(|S|+1) + \delta$. The alternative strategy is a better response to all other players' strategies in E than player 2's strategy in E. Thus, E cannot be equilibrium.

APPENDIX B

IRB APPROVAL

Mississippi State UNIVERSITY

January 22, 2009

Ardian Harri
Agricultural Economics
Mail Stop 5187

RE: IRB Study #08-334: Measuring the Effects of Supra-National Governing Structures on Corruption Through an Economic Experiment

Dear Dr. Harri:

The above referenced project was reviewed and approved via expedited review for a period of 1/22/2009 through 1/15/2010 in accordance with 45 CFR 46.110 #7. Please note the expiration date for approval of this project is 1/15/2010. If additional time is needed to complete the project, you will need to submit a Continuing Review Request form 30 days prior to the date of expiration. Any modifications made to this project must be submitted for approval prior to implementation. Forms for both Continuing Review and Modifications are located on our website at http://www.orc.msstate.edu.

Any failure to adhere to the approved protocol could result in suspension or termination of your project. Please note that the IRB reserves the right, at anytime, to observe you and any associated researchers as they conduct the project and audit research records associated with this project.

Please note that the MSU IRB is in the process of seeking accreditation for our human subjects protection program. As a result of these efforts, you will likely notice many changes in the IRB's policies and procedures in the coming months. These changes will be posted online at http://www.orc.msstate.edu/human/aahrpp.php. The first of these changes is the implementation of an approval stamp for consent forms. The approval stamp will assist in ensuring the IRB approved version of the consent form is used in the actual conduct of research. You must use copies of the stamped consent form for obtaining consent from participants.

Please refer to your docket number (#08-334) when contacting our office regarding this project.

We wish you the very best of luck in your research and look forward to working with you again. If you have questions or concerns, please contact Jonathan Miller at jmiller@research.msstate.edu or call 662-325-2238.

Sincerely,

Jonathan Miller, CIP
IRB Officer and Assistant Director

Office for Regulatory Compliance
P. O. Box 6223 • 70 Morgan Avenue • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776

Informed Consent Form

Title of Study: *Measuring the effects of supra-national governing structures on corruption through an economic experiment*

Study Site: *Computer lab in Howell Building*

Name of Researcher(s) & University affiliation: *Ardian Harri, Assistant Professor in the Department of Agricultural Economics, Mississippi State University and Wenshuang Wang, Masters student in the Department of Agricultural Economics, Mississippi State University.*

What is the purpose of this research project? *This research intends to investigate the effect of supra-national governing authorities on corruption. An example of a supra-national governing authority is the United Nations (UN).*

How will the research be conducted? *The experiment will be conducted in the computer lab in the Howell building. Participants will answer simple questions presented to them on the computer screen. The experiment will last approximately one hour.*

Are there any risks or discomforts to me because of my participation? *There are no perceived risks to the subject. Experimental instructions are straightforward and represent the course of the experiment accurately. To avoid the potential risk of participant embarrassment all decisions and associated earnings are the participant's private information—earnings will be paid in a sealed envelope confidentially after the experiment.*

Does participation in this research provide any benefits to others or myself? *The results will provide insight and recommendations for governments and lawmakers. Experimental economics will allow us to obtain results that will help guide reformers where empirical studies have not been able to demonstrate clear causal patterns.*

Payment for participation: *Participants will be paid based on decisions made during the experiment. Minimum payment for participants completing the experiment will be approximately $30 and the maximum payment will be approximately $60. Payment will be made at the end of the experiment in a sealed envelope. If making payment immediately after the experiment is not possible, participants will be told when they may come to the office of Dr. Harri to pick up their payment within one week of participation. Participants who begin the experiment but then withdraw from participation will be compensated $10 for their time.*

Will this information be kept confidential? *To ensure confidentiality participants will be assigned a participant number, and all decisions and payoffs will be recorded to that number. Therefore it is impossible for anyone outside the research team to associate experimental results with a name. All collected data is confidential and will be maintained in the Department of Agricultural Economics in the Howell building. Ardian Harri will also maintain the signed consent forms. Also, please note that these records will be held by a state entity and therefore are subject to disclosure if required by law.*

Who do I contact with research questions? *If you should have any questions about this research project, please feel free to contact Ardian Harri at 662-325-5179. For additional information regarding your rights as a research subject, please feel free to contact the MSU Regulatory Compliance Office at 662-325-5220.*

What if I do not want to participate? *Please understand that your **participation is voluntary**, your **refusal to participate will involve no penalty or loss** of benefits to which you are otherwise entitled, and you **may discontinue your participation** at any time without penalty or loss of benefits.*

You will be given a copy of this form for your records.

_____ _____

Participant Signature Date

MSU IRB
Approved: 01/22/09
Expires: 01/15/10

_____ _____

Investigator Signature Date

Version 1/22/09

APPENDIX C

GENERAL INSTRUCTIONS AND THE GAME FLOW FOR EACH TREATMENT

C.1 Written instructions for the bribery game

- *Beginning Instructions - common to all three treatments*

Thank you for agreeing to participate in today's session. Before beginning today's exercise, I have two requests. First, you should sit some distance from any of the other participants. Second, other than questions directed toward me, there is to be NO talking. Failure to comply with the no talking policy will result in immediate disqualification from this exercise. Before we begin, I want to emphasize that your participation in this session is completely voluntary. If you do not wish to participate in the experiment, please say so at any time. Non-participants will not be penalized in any way. I want to assure you that the information you provide will be kept strictly confidential and used only for the purposes of this research. At this time, you should have been given a consent form. We'll now go over the information in the consent form, and if you agree to participate, please sign this form and return it to me.

You will be paid based on decisions made during the experiment. Minimum payment for participants completing the experiment will be approximately $30 and the maximum payment will be approximately $60. Payment will be made at the end of the experiment in a sealed envelope. If making payment immediately after the experiment is not possible, you will be told when you may come to the office of Dr. Harri to pick up your payment within one week of participation. Participants who begin the experiment but then withdraw from participation will be compensated $10 for their time.

C.1.1 Instruction for Treatment 1

Are there any questions before we begin?

Briefly introduce the background information to the participants:

All in all, 18 persons participate in the decision making experiment. There are 3 types of participants: **Firms**, **Public officials**, and **Citizens.** Each type of the participants will be given 40 experimental dollars before the experiment. At the beginning of the experiment, the type of each participant is randomly drawn. Groups of three types of participants are matched randomly. Thus, participants do not know with whom they play. The experiment is a one-shot game. There will be 30 rounds of the one-shot game. At the end of the experiment you will receive a payoff that depends on your success.

In our experiment a firm is requesting a permit to run a plant which causes pollution – a negative externality to the society. The public official must decide whether or not to grant the permission. The firm can offer, in advance, a private payment to the public official, who can accept or reject the payment. The citizen then has to decide whether to punish the firm and the public official.

All possible moves are visible on the screen (described as in *C.1.2*). After all decisions of a round have been made, you will be informed about your payoffs resulting from your own group's decisions, and your payoffs would also be influenced by the decisions of all other groups in the experiment.

The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the four stages of the round. Your final payoff at the end of the experiment will be the average of your payoffs for the 30 rounds of the game. An exchange rate of 1 experimental dollar equal to 1 U.S. dollars will be used to determine your final payoff in U.S. dollars.

C.1.2 Decision situation in a round

Stage 1: Offer a private payment

The firm decides whether or not to offer a private payment to the public official.

- If it does, then the firm decides on the amount ***t*** to be offered to the public official as a private payment. The firm can choose between 1, 2, 3, 4, 5, 6, 7, 8 or 9 experimental dollars. The firm is charged a 2 experimental dollars transfer fee when a private payment is offered to the public official. The game then continues with stage 2.
- If the firm does not offer a private payment, the game continues with Stage 4.

Stage 2: Acceptance or rejection of the private payment

The public official decides on whether to **accept** or **reject** the offered private payment.

- If the public official accepts the private payment, the firm's account is decreased by ***t*** experimental dollars while the public official's account is credited by 3***t*** experimental dollars. In addition, the money transfer is visible to the citizen.
- If the public official rejects the transfer, the game continues with Stage 4.

Stage 3: Punish or don't punish the firm and the public official

The citizen decides whether to **punish** or **not punish** the firm and the public official.

- If the citizen decides to punish them, the firm and the public official will be disqualified from the following rounds of the game and their accounts will be cleared. The game ends here for this group of three. The payoffs for the firm and public official in this group of three will be set to zero experimental dollars for this round and the remaining rounds.
- If the citizen decides not to punish them, the game continues with Stage 4.

Stage 4: Decision on granting the permission

- If the public official does not grant the permission, then the accounts of the three players remain as in the previous stage.
- If the public official grants the permission, then the firm's account is credited by 20 experimental dollars. Due to the negative externality (pollution), the granting of the permission will result in the account of every player in the group and all other groups be reduced by 4 experimental dollars.

After stage 4, the round ends. The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the four stages of the round.

Table C.1 Payoff table for treatment

Round payoff if public official **accepts** (a transfer) [a private payment]; **no** punishment																		
(transferred amount) private payment	1		2		3		4		5		6		7		8		9	
(public official's decision)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)
[permission granted?]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]
Payoff																		
Firm	37	53	36	52	35	51	34	50	33	49	32	48	31	47	30	46	29	45
public official	43	39	46	42	49	45	52	48	55	51	58	54	61	57	64	60	67	63
Citizen	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36
each of the other 16 participants	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4

(transferred amount) private payment	1,...,9		0		1,...,9
(public official's decision)	(X)	(Y)	(X)	(Y)	NA
[permission granted?]	[no]	[yes]	[no]	[yes]	
	Round payoff if public official **rejects** (a transfer) [a private payment]		Round payoff if the firm does **not** (transfer an amount) [offer a private payment]		Round payoff if public official **accepts** (a transfer) [a private payment]; **punishment**
Payoff					
Firm	38	54	40	56	0
public official	40	36	40	36	0
Citizen	40	36	40	36	34
each of the other 16 participants	0	-4	0	-4	

C.2.1 Instruction for Treatment 2

Are there any questions before we begin?

Briefly introduce the background information to the participants:

All in all 24 participate in the decision making experiment. There are 4 types of participants: **Firms**, **Public officials**, **Citizens** and **Supra-national authority.** Each type of the participants will be given 40 experimental dollars before the experiment. At the beginning of the experiment, the type of each participant is randomly drawn. Groups of four types of participants are matched randomly. Thus, participants do not know with whom they play. The experiment is a one-shot game. There will be 30 rounds of the one-shot game. At the end of the experiment you will receive a payoff that depends on your success.

In our experiment a firm is requesting a permit to run a plant which causes pollution – a negative externality to the society. The public official must decide whether or not to grant the permission. The firm can offer, in advance, a private payment to the public official, who can accept or reject the payment. The citizen then has to decide whether to punish the firm and the public official. If the citizen decides to punish the firm and public official, the supra-national authority then decides whether to veto the punishment or not.

All possible moves are visible on the screen (described as in C.*2.2*). After all decisions of a round have been made, you will be informed about your payoffs resulting from your own group's decisions, and your payoffs would also be influenced by the decisions of all other groups in the experiment.

The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the five stages of the round. Your final payoff at the end of the experiment will be the average of your payoffs for the 30 rounds of the game. An exchange rate of 1 experimental dollar equal to 1 U.S. dollars will be used to determine your final payoff in U.S. dollars.

C.2.2 Decision situation in a round

Stage 1: Offer a private payment
The firm decides whether or not to offer a private payment to the public official.

- If it does, then the firm decides on the amount ***t*** to be offered to the public official as a private payment. The firm can choose between 1, 2, 3, 4, 5, 6, 7, 8 or 9 experimental dollars. The firm is charged a 2 experimental dollars transfer fee when a private payment is offered to the public official. The game then continues with stage 2.
- If the firm does not offer a private payment, the game continues with Stage 5.

Stage 2: Acceptance or rejection of the private payment
The public official decides on whether to **accept** or **reject** the offered private payment.

- If the public official accepts the private payment, the firm's account is decreased by ***t*** experimental dollars while the public official's account is credited by 3***t*** experimental dollars. In addition, the money transfer is visible to the citizen.
- If the public official rejects the transfer, the game continues with Stage 5.

Stage 3: Punish or don't punish the firm and the public official
The citizen decides whether to **punish** or **not punish** the firm and the public official.

- If the citizen decides to punish them, the game continues with Stage 4.
- If the citizen decides not to punish them, the game continues with Stage 5.

Stage 4: *Veto or don't veto the punishment*

The supra-national authority decides whether to **veto** the punishment or **not veto**.

- If the supra-national authority decides not to veto the punishment, the firm and the public official will be disqualified from the following rounds of the game and their accounts will be cleared. The game ends here for this group of four. The payoffs for the firm and public official in this group of four will be set to zero experimental dollars for this round and the remaining rounds.
- If the supra-national authority decides to veto the punishment, the play continues with stage 5.

Stage 5: Decision on granting the permission

- If the public official does not grant the permission, then the accounts of the four players remain as in the previous stage.
- If the public official grants the permission, then the firm's account is credited by an amount of 20 experimental dollars. Due to the negative externality (pollution), the granting of the permission will result in the accounts of the firm, the public official and the citizen in this and all other groups be reduced by 4 experimental dollars while 2 experimental dollars will be deducted from the supra-national authorities' accounts.

After stage 5, the round ends. The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the five stages of the round.

Table C.2 Payoff table for treatment 2

Round payoff if public official **accepts** (a transfer) [a private payment], **without** punishment or with punishment but S **vetos** it																		
(transferred amount)																		
private payment																		
	1		2		3		4		5		6		7		8		9	
(public official's decision)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)	(X)	(Y)
[permission granted?]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]
Payoff																		
firm	37	53	36	52	35	51	34	50	33	49	32	48	31	47	30	46	29	45
public official	43	39	46	42	49	45	52	48	55	51	58	54	61	57	64	60	67	63
citizen	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36
supranational	40	38	40	38	40	38	40	38	40	38	40	38	40	38	40	38	40	38
each of the other 20	0	-4*	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4
participants		-2		-2		-2		-2		-2		-2		-2		-2		-2

*: '-4' is for firm, public official and citizen; '-2' is for supranational authority

(transferred amount)					
private payment					
	1,...,9		0		1,...,9
(public official's decision)	(X)	(Y)	(X)	(Y)	NA
[permission granted?]	[no]	[yes]	[no]	[yes]	
	Round payoff if public official **rejects** (a transfer) [a private payment]		Round payoff if the firm does **not** (transfer an amount) [offer a private payment]		Round payoff if public official **accepts** (a transfer) [a private payment], with **punishment**
Payoff					
Firm	38	54	40	56	0
public official	40	36	40	36	0
citizen	40	36	40	36	0
supernational	40	38	40	38	0
each of the other 20	0	-4	0	-4	
participants		-2		-2	

C.3.1 Instruction for Treatment 3

Are there any questions before we begin?

Briefly introduce the background information to the participants:

All in all 24 participate in the decision making experiment. There are 4 types of participants: **Firms**, **Public officials**, **Citizens** and **Supra-national authority.** Each type of the participants will be given 40 experimental dollars before the experiment. At the beginning of the experiment, the type of each participant is randomly drawn. Groups of four types of participants are matched randomly. Thus, participants do not know with whom they play. The experiment is a one-shot game. There will be 30 rounds of the one-shot game. At the end of the experiment you will receive a payoff that depends on your success.

In our experiment a firm is requesting a permit to run a plant which causes pollution – a negative externality to the society. The public official must decide whether or not to grant the permission. The firm can offer, in advance, a private payment to the public official, who can accept or reject the payment. The citizen then has to decide whether to punish the firm and the public official. If the citizen decides to punish the firm and public official, the public official can offer a private payment to the supra-national authority, which can veto or not veto the punishment. The supra-national authority should decide veto the punishment or not.

All possible moves are visible on the screen (described as in C.*3.2*). After all decisions of a round have been made, you will be informed about your payoffs resulting from your own group's decisions, and your payoffs would also be influenced by the decisions of all other groups in the experiment.

The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the seven stages of the round. Your final payoff at the end of the experiment will be the average of your payoffs for the 30 rounds of the game. An exchange rate of 1 experimental dollar equal to 1 U.S. dollars will be used to determine your final payoff in U.S. dollars.

C.3.2 Decision situation in a round

Stage 1: Offer a private payment
The firm decides whether or not to offer a private payment to the public official.

- If it does, then the firm decides on the amount ***t*** to be offered to the public official as a private payment. The firm can choose between 1, 2, 3, 4, 5, 6, 7, 8 or 9 experimental dollars. The firm is charged a 2 experimental dollars transfer fee when a private payment is offered to the public official. The game then continues with stage 2.
- If the firm does not offer a private payment, the game continues with Stage 7.

Stage 2: Acceptance or rejection of the private payment
The public official decides on whether to **accept** or **reject** the offered private payment.

- If the public official accepts the private payment, the firm's account is decreased by ***t*** experimental dollars while the public official's account is credited by 3***t*** experimental dollars. In addition, the money transfer is visible to the citizen.
- If the public official rejects the transfer, the game continues with Stage 7.

Stage 3: Punish or don't punish the firm and the public official
The citizen decides whether to **punish** or **not punish** the firm and the public official.

- If the citizen decides to punish them, the game continues with Stage 4.
- If the citizen decides not to punish them, the game continues with Stage 7.

Stage 4: *Offer a private payment to the supra-national authority*
The public official decides whether or not to **offer** a private payment to the supra-national authority.

- If it does, then the public official decides on the amount t_2 to be offered. The public official can choose between **2** and **3*t* experimental dollars**. The public official is charged a 2 experimental dollars transfer fee when a private payment is offered to the supra-national authority. The game then continues with stage 5.
- If the public official does not offer a private payment, the play continues with Stage 6.

Stage 5: Acceptance or rejection of the private payment
The supra-national authority decides on whether to **accept** or **reject** the offered private payment.

- If the supra-national authority accepts the private payment, the public official's account is decreased by t_2 experimental dollars while the supra-national authority's account is credited by t_2 experimental dollars.
- If the supra-national authority rejects the transfer, the game continues with Stage 6.

Stage 6: *Veto or don't veto the punishment*
The supra-national authority decides whether to **veto** the punishment or **not veto**.

- If the supra-national authority decides not to veto the punishment, the firm and the public official will be disqualified from the following rounds of the game and their accounts will be cleared. The game ends here for this group of four. The payoffs for the firm and public official in this group of three will be set to zero experimental dollars for this round and the remaining rounds.
- If the supra-national authority decides to veto the punishment, the play continues with stage 7.

Stage 7: Decision on granting the permission
The public official decides whether to **grant** or **not grant** the permission.

- If the public official does not grant the permission, then the accounts of the four players remain as in the previous stage.
- If the public official grants the permission, then the firm's account is credited by 20 experimental dollars. Due to the negative externality (pollution), the granting of the permission will result in the accounts of the firm, the public official and the citizen in this and all other groups be reduced by 4 experimental dollars while 2 experimental dollars will be deducted from the supra-national authorities' accounts.

After stage 7, the round ends. The round payoffs are the sum of the initial balance plus any credits and/or minus any debits to your account during the seven stages of the round.

Table C.3 Payoff table for treatment 3

Round payoff if public official **accepts** (a transfer) [a private payment], **without** punishment or with punishment but S **vetos** it																		
private payment	1		2		3		4		5		6		7		8		9	
[permission granted?]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]	[no]	[yes]
Payoff																		
firm	37	53	36	52	35	51	34	50	33	49	32	48	31	47	30	46	29	45
public official	43	39	46	42	49	45	52	48	55	51	58	54	61	57	64	60	67	63
citizen	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36	40	36
supranational	40	38	40	38	40	38	40	38	40	38	40	38	40	38	40	38	40	38
each of the other 20	0	-4*	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4
participants		-2		-2		-2		-2		-2		-2		-2		-2		-2

*: '-4' is for firm, public official and citizen; '-2' is for supranational authority

private payment	0		1,...,9		1,...,9
(public official's decision)	(X)	(Y)	(X)	(Y)	NA
[permission granted?]	[no]	[yes]	[no]	[yes]	

	Round payoff if the firm does **not** (transfer an amount) [offer a private payment]		Round payoff if public official **rejects** (a transfer) [a private payment]		Round payoff if public official **accepts** (a transfer) [a private payment],with **punishment**
Payoff					
Firm	40	56	38	54	0
public official	40	36	40	36	0
citizen	40	36	40	36	0
supranational	40	38	40	38	0
each of the other 20	0	-4	0	-4	
participants		-2		-2	

C.4 Written instructions for Holt and Laury Risk Treatment

Now, you will participate in an exercise where you will have a second opportunity to earn money. You will be asked to make several choices, which will determine how much money you will earn.

You will make ten decisions in this session. Each decision is a paired choice between "Option A" and "Option B." You will make ten choices (either A or B) and record these in the final column, but only one of them will be used in the end to determine your earnings. Before you start making your ten choices, please let me explain how these choices will affect your earnings for the experiment.

Here is a ten-sided die that will be used to determine payoffs; the faces are numbered from 1 to 10 (the "0" face of the die will serve as 10). After you have made all of your choices, we will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what your payoff is for the option you chose, either A or B. Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used. Obviously, each decision has an equal chance of being used in the end.

Now, please look at Decision 1 at the top. Option A pays $10.00 if the throw of the ten sided die is 1, and it pays $8.00 if the throw is 2-10. Option B yields $19.00 if the throw of the die is 1, and it pays $1.00 if the throw is 2-10. Similarly, for Decision 2, Option A will pay $10.00 if the throw of the die is 1 or 2 and will pay $8.00 if the throw of the die is 3-10. The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between $10.00 or $19.00.

To summarize, you will make ten choices: for each decision row you will have to choose between Option A and Option B. You may choose A for some decision rows and B for other rows, and you may change your decisions and make them in any order. When you are finished, we will come to your desk and throw the ten-sided die to select which of the ten Decisions will be used. Then we will throw the die again to determine your money earnings for the Option you chose for that Decision. Earnings for this choice will be paid in cash when we finish.

So now please look at the empty boxes on the right side of the record sheet. You will have to write a decision, A or B in each of the ten boxes, and then the die throw will determine which one is going to count. We will look at the decision that you made for the choice that counts, and circle it, before throwing the die again to determine your earnings.

Are there any questions? Now you may begin making your choices. Please do not talk with anyone while we are doing this; raise your hand if you have a question.