Corruption and intermediaries
-A game theoretical approach

Güzin Bayar[*]

Middle East Technical University, Department of Economics, Turkey
e-mail:guzinbayar@hotmail.com

Abstract

The aim of the article is to examine a bribee-initiated corrupt transaction and the role of intermediaries in such a transaction, using a game theoretical model. Corrupt officers, who want to obtain a bribe from the public services they offer, use their power to increase red tape to enforce clients to pay a bribe. However, if the officer demands a bribe directly from the clients, they face the risk of demanding a bribe from a "whistleblower" client, who has high ethical values and complains to the law enforcement authority about every bribe demand from her. Thus, public officers may prefer using intermediaries to decrease the risk of being complained about and suffering penalties.

I examine cases with and without intermediaries in such a scenario and then compare the results of the two. In the case where there is no intermediary, in some situations the risks involved may be so large that the officer may prefer not to demand a bribe. On the other hand, in the cases with intermediaries, the detection risk is reduced, so taking a bribe is nearly always more profitable for the officer. Based on the model's results, policy suggestions for corruption prevention are made.

Keywords: Corruption, bribe, clients, red tape, intermediaries.

JEL classification: K42, C72.

1. Introduction

Corruption has been a big problem in many societies since ancient times. In all eras, studies on how to prevent corruption were performed; however, the problem has attracted more attention especially in the last two decades. International awareness on the issue is increasing.

There are many definitions of corruption in the literature: Among them, the most commonly used is that of the World Bank: "the abuse of public office for private gain." Shleifer and Vishny (1993, p.599) define

corruption as "the sale by government officials of government property for personal gain."

Corruption is a type of illegal transaction and, like all transactions, there is demand from the briber (the client, to get a public service or other benefit) and supply by the bribee (the public officer, having the power to sell the benefit); a price (the bribe) is created in proportion to the benefit obtained by the briber and compensates the officer for the risks and the effort involved.

Corruption has important harmful effects on economies. Some of the most cited harmful effects are that it discourages entrepreneurs, which in turn harms investment, growth and the development of the country; leads governments to spend less on education and health; tax collection becomes inefficient and public spending wastefully high; harms democracy and ethics in the country, damages the legitimacy of the government and distorts income distribution. Many emprical studies, such as Mauro (1995), Gould and Amaro Reyes (1983), United Nations (1989), Klitgaard (1991), Mauro, (1998) show harmful effects of corruption.

To be able to cure a problem, first, its fundamental causes should be determined. The causes of corruption are numerous and differs from country to country. Wage level of public officers, weight of government in the economy, culture and social structure, existence or non-existence of democracy, free media, independent judicary sistem and rule of law, education and income level of the society are among the factors affecting the degree of corruption in a society most (for a more detailed review of the literature on causes of corruption see Bayar (2003)).

The aim of this article is to take a closer look at one of the factors that facilitates corrupt transactions: namely, the intermediaries. Using game theoretical reasoning, a bribee-initiated corrupt transaction is modeled. In the model, the cases with and without intermediaries are examined and compared. Lastly, based on the model results, policy suggesstions on corruption prevention are made.

Intermediaries exist in many markets, legal or illegal. Efforts of intermediaries in product or service markets usually increase succesful trade possibilities by helping buyer and seller to come together, decreasing search costs, ensuring quality of the goods or services supplied or ensuring enforcement of contracts. A supermarket buys various types of goods households may need from a number of producers and supply them in one convenient place. Thus consumers instead of searching for producers of each good, reach many products they need in one convenient place, they save money and effort. Financial intermediaries bring together those people who save money and who want to make investment; without financial intermediaries savers' and investors' finding each other and building a trust between them to reach a loan agreement is much more difficult. However,

not all intermediaries serve good purposes. Some may cheat on the buyers or sellers or some may help illegal transactions.

The existence of heavy red tape, opaque, difficult to understand rules and regulations encourage the establishment of intermediaries sectors around bureaucracies. People may prefer working with intermediaries to get the services they are legally entitled to since otherwise they would have to struggle with heavy red tape.

Corruption is a risky transaction. It is not legally enforcable, so the fulfillment of the contract largely depends on the relative powers of the parties. The briber may not get the good or service in question even if s\he has paid the price, the bribe. The bribee may face blackmail from the briber after delivering the service.

The open announcement by an officer about his willingness to engage in a corrupt transaction may attract the best buyer, but it also attracts the attention of invetigating authorities and rivals or superiors wishing to share corrupt proceeds. Thus, the process must be secret. All three stages of corrupt transactions, searching for and negotiating the contract, contract enforcement and post enforcement lock-in, involve risk (Jain, 2001).

Building a long-term, reputation-based relationship between the briber and the bribee decreases the risks involved, and so reduce the transaction costs of the corrupt transaction. However, building connections is also costly for the briber, so s\he must weight the costs of building connections against the gains from the reduced uncertainty involved in corrupt transactions with connected officers (Baç, 2001).

The intermediaries sector that assits the public in obtaining government services, serves to decrease the risks of offering a bribe to an honest officer (from the perspective of the client of the public service) or it decreases risk of demanding bribe from a "whistle-blower" client (from the side of the public officer). Intermediaries are specialized connection builders who decrease the costs involved in building connections. They do this job more efficiently by making the connection building 'investment' just once.

"To root out corruption, it may be necessary to risk destroying some of the confidence that goes along with the trust that corrupt favors are reciprocated (...) for example, (...) regulating middlemen can impede them in creating networks of trusted relationships; encouraging whistleblowing can help to destroy the confidence among corrupt partners" (Lambsdorf, 2002:845)"

Bayar (2005) examines how intermediaries make corrupt transactions easier and more profitable for the parties, using a game theoretical model. The author examines role of intermediaries in a *briber-initiated* corrupt transaction and shows how intermediaries decrease the risk of a client who want to offer a bribe to the public officer and fears from being caught up if the officer is honest. In this article, I look at the other side of the coin and examine the role of intermediaries in *bribee-initiated* corrupt transactions.

My results show that intermediaries also decrease risks involved when the officer is the one who demands a bribe.

Ökten and Hasker (2008) also model the role of intermediaries in corrupt transactions, but do not explicitly take into consideration who initiates the corrupt transaction. Thus, they rule out the risks originating from the types of the client from whom the officer demands a bribe. The authors emphasise the role of middlemen in decreasing enforcement costs of the corrupt transactions. That is, middlemen decrease the risk of revenge by the parties of corrupt transaction.

Besides these articles that are directly comparable, in the literature, there are two classes of studies that are related to the current study. In the first class of studies there are models examining corruption as a type of illegal transaction. These studies show similarities to the first part of my model, the case without intermediaries. In the second class, there are models examining the role of intermediaries in the markets with asymmetric information and these models show similarities to the second part (the case with intermediaries) of my model.

Andvig and Moene (1990) examine corruption in public bureaucracies by taking a supply and demand approach. In contrast to my model, here the one who offers the bribe and starts the corrupt transaction is the client. The authors examine how differing costs of bureaucrats (moral and other), proportion of corrupt bureaucrats, salaries, discount rates of the players affect equilibrium corruption level.

In his model Cadot (1987) examines a bribee-initiated corruption case. The corrupt transaction is started by corrupt officials asking for a bribe, as in my model. Thus, the official faces with the risk of denunciation by the client. Similarly to the results of my model, higher wage levels raise the opportunity cost of corruption, thus inducing the officials to take fewer bribes. The author also reaches a similar conclusion to myself that; the effect of harsh penalties may fall short of the expectations of the policy maker. Another similar conclusion is that increasing the regularatory power of the administration creates a basic incentive for corruption.

Lui (1986), in his model, examines the intertemporal decision problem of corrupt officers in an overlapping generations framework. The model is a briber-initiated one. The author shows that the model generates several stationary equilibriums, some with low levels of corruption and others with high levels of corruption.

Manion (1996) establishes a briber initiated corruption model and examines how the existence of corrupt and honest officers in a public office affects occurrences of corrupt transactions. She mentions that intermediaries may facilitate corruption in such a setting but she does not explicitly introduce the role of intermediaries into the model.

Shi and Temzelides (2004) model bureaucracy and corruption in a market with decentralized exchange and with high or low quality goods.

Agents have private information about the quality of goods they produce, thus informational asymmetries exist. The authors examine cases with and without bureaucracy and compare the results. The model results show that no bribes are exchanged in any equilibrium without bureaucracy. The authors conclude that corruption may occur only in the case with bureaucracy, in which case corruption reduces welfare - a finding also in line with the results of my model.

Shevchenka (2004) analyses an economy where agents can either produce goods to be traded for consumption or become middlemen by opening a store. Intermediation has a welfare-improving role in the model, since it helps to reduce the severity of the problem of achieving the double coincidence of the customers' desires, thus increasing the probability of consumption and decreasing market frictions.

Biglaiser (1993) shows in his model that a middleman can reduce inefficiencies in a market where there are both low quality goods and high quality goods and where there is an adverse selection problem.

Albano and Lizzeri (2001) show that intermediaries may increase welfare by providing information to the buyers about the quality of the products sellers sell.

In Gehrig's model (1993), the intermediary has no superior information about the quality of the product, but has the ability to communicate prices to everybody and the ability to commit to her quoted prices. The intermediary in such a situation serves the market by reducing trading frictions in the market. Intermediaries speed up the process of exchange and prevent bargaining breakdowns, thereby increase amount of profitable trade (in my model also intermediaries increase the number of (corrupt) transactions). The author also examines two different cases - the monopoly intermediary case and the case with more than one intermediary.

Lizzeri (1999) examines the role of intermediaries in a market where there is a seller whose product's quality is positive and a random draw from a given distribution and there are two potential buyers who do not know the quality of the product. The informational asymmetry between buyers and seller leads sellers to signal their quality by using intermediaries. The author shows how the welfare effects of the intermediaries change depending on whether the intermediary has monopoly power or intermediary market has an oligopoly structure.

In his model Masters (2008) shows that, under some conditions, intermediaries may occur in a market endogenously, may serve no useful purpose and existence of them may be welfare reducing for the society.

2. The model

This part of the study models a bribee - initiated corrupt transaction, that is, a corrupt transaction occurring between the client and the public officer where the public officer is the one who plays the active role in the

transaction, i.e. (s)he is the one who demands a bribe. Clients want to get a valuable service from the public officer. The demand is legal and the public officer is obliged to provide the service. However, she also has the power to increase red tape. In the model there are whistleblower type clients who are people with high ethical values and report and complain when a bribe is demanded from them. The other type of clients are standard type clients who when required, pay a bribe, as long as doing so is profitable. Two different cases will be examined. The first one is the case in which there is no intermediary; the second one is the case in which there is an intermediary. In the case without an intermediary, the public officer faces the risk of demanding a bribe from whistleblower clients and thus getting a penalty. When an intermediary enters the picture, the risk of demanding the bribe is reduced. Thus, demanding a bribe through intermediaries is more profitable. The public officer and the intermediary share the benefit increased according to their bargaining powers, and especially according to whether the intermediary has a monopoly power or not. In the case with an intermediary, corruption is more widespread and the social costs are greater. In the final section, the results of running the two models will be compared and policy suggestions will be given.

2.1. The case without an intermediary

This part of the article models a corrupt transaction where intermediaries do not exist. There are two players: a public officer and a client. Clients want to get a service valuable for them from the public officer. They are of different types, namely standard and whistleblower types, which are determined by the nature in the first period. The public officer, using his advantageous position as the unique provider of the service, tries to obtain an illegal private benefit from clients. In the second period, he decides on how much red tape to apply to enforce clients to pay a bribe and the amount of bribe to demand from the clients. In the third period, clients observe the red tape and bribe choice of the officer and standard type clients decide on whether to pay bribe, go through red tape or withdraw; whistleblower type clients reject the bribe demand and complain about the public officer to the law enforcement agency. Game tree of the game is given at the appendix-2.

First, nature moves and selects the types of clients. On the first type dimension, clients have types within the interval [0,Z] according to their willingness to pay for the service. The valuation parameter is represented by σ. A client of type σ attaches σZ amount of value to the service, where Z is the maximum amount of value attached by clients to the service. The valuation parameter of each client, σ, is a random draw from the uniform distribution UN [0,1].

On the second type dimension, attitude towards whistleblowing, there are two types of clients: a) standard type clients (represented by S), who

never report or complain about bribery; b) whistleblower type clients (represented by W), who are people with high ethical values, report or place a complaint if they are asked to pay a bribe. The probability of a client being whistleblower type is equal to λ, where $\lambda \in [0,1]$ and it is a constant common knowledge to all players.

The type set of each client can be represented by the pairs (σ, S) or (σ, W).Types on both dimensions are private knowledge and independent of each other. The officer does not know which type of client he is encountering; he only knows the probability distribution of the types.

Since we examine the corrupt transactions which are initiated by the officer, the public officer is assumed to be corruptible and takes a bribe whenever it is profitable for him to do so. After nature chose types of the clients, without observing the choices of the nature, the public officer plays. The public officer chooses the amount of red tape (δ) he will apply while giving the service and a bribe level (β). These are assumed to be continuous variables. His strategy space can be defined as $S_{PO} \in [0,\infty)x[0,\infty)$.

Clients play in the third period, after the nature draw their types and the public officer has decided on the amount of red tape he will apply and the amount of bribe to demand. Clients, observe the red tape and the bribe demand of the officer. Standard type clients have three alternative actions available to them. They can pay the bribe demanded by the officer and get the service (represented by PB); they can go through red tape and again get the service but incur red tape costs (represented by GRT); or they can withdraw, thereby abandoning their demand for the service (represented by W). The strategy space of the standard type client can be defined as S_S=[f: $[0,\infty)x[0,\infty)\rightarrow\{PB, GRT, W\}$].

Whistleblower type clients, if a bribe is not demanded from them go through red tape as long as the amount of red tape does not exceed their valuation, otherwise withdraw and if a bribe is demanded from them reject and report the public officer to law enforcement authority. The strategy space of a whistleblower clients is S_W=[f: $[0,\infty)x[0,\infty)\rightarrow\{GRT, Report, W\}$], GRT and W choices can only be used by whistleblower clients if bribe choice of the public officer is β=0, that is, if the officer does not demand a bribe.

The law enforcement authority is the institution responsible for investigating and punishing corrupt officers. It is assumed that, through its own research, law enforcement authority can detect "k" proportion of corruption cases. Detection and punishment of a corrupt officer occurs also through a whistleblower client's report/complaint. There are two costs for the corrupt officer if punished: loss of wage ω, since he is fired, and some fine/imprisonment (which costs F to the official). Loss of wage can be thought of as the present value (over the expected employment period) of the difference between the wage from current job of the officer and her best

alternative. F is assumed to be a linear function of β, $F=\alpha\beta$, for simplicity, so, amount of the fine increases with the amount of the bribe.

Given that β is the amount of bribe public officer demands and δ is the amount of red tape applied to the client when he wanted to get the service without paying bribe, and s_s is an element of the strategy space of the standard type client, the payoff function of a standard type client for each of the strategies available to her is defined as:

$$U_s{}^\sigma(\delta, \beta, s_s) = \begin{bmatrix} \sigma z - \beta & \text{if} & s_s = PB \\ \sigma z - \delta & \text{if} & s_s = GRT \\ 0 & \text{if} & s_s = W \end{bmatrix} \tag{1}$$

The officer determines the level of the red tape and amount of the bribe. Clients take both β and δ as given. Red tape is taken as money equivalent, that is, a monetary value corresponding to the disturbance caused by red tape.

The payoff function of a whistleblower type client for each of her available strategies is defined as below, where θ is the cost of whistleblowing and η is the utility of honesty :

$$U_w{}^\sigma(\delta, s_w) = \begin{bmatrix} \sigma z - \delta & \text{if} & s_w = GRT & \beta = 0 \\ 0 & \text{if} & s_w = W & \beta = 0 \\ \sigma z - \theta + \eta & \text{if} & & \beta \neq 0 \end{bmatrix} \tag{2}$$

The whistleblower client, due to her type, does not have the option of getting the service by paying a bribe. Her actions are pre-determined, behaves on the basis of her ideal thinking and if a bribe is demanded from her, she rejects and reports the officer, no matter how much it costs to her; that is, we assume that η is always greater than Θ. On the other hand, if a bribe is not demanded, she simply follows the procedures if the procedures does not exceed her valuation, otherwise withdraws.

The officer gets utility from the amount of bribe he takes and gets disutility if caught by the law enforcement authority and punished. The officer also gets disutility from applying red tape (may be in the form of getting a warning from superiors etc.). The amount of disutility an officer gets from applying high red tape is represented by $G(\delta)$. For simplicity, G is assumed to be a linear function of δ, $G(\delta)=\varphi\delta$.

Thus, the expected payoff of the officer (if he decides to demand a bribe) for each of the strategies of the standard clients is (if she is faced with a whistleblower client, she is reported and gets $(-\omega-F)$)

$$V_{PO}(\delta,\beta,s_s,s_w,)= \begin{bmatrix} -G(\delta)+\beta & \text{if} & s_s = PB \\ -G(\delta) & \text{if} & s_s = GRT \\ -G(\delta) & \text{if} & s_s = W \end{bmatrix} \qquad (3)$$

If the officer decides not to demand a bribe, he does not apply red tape and apparently he will receive only his wage. If the officer decides to demand a bribe, he chooses the bribe level (β) and level of red tape (δ). The assumption here is that the service in question is a legal one. If the client does not give the bribe to the officer, the officer must deliver the service anyway. However, he has the power to increase red tape (by incurring the cost G(δ)). Next, I try to find Perfect Bayesian Equilibrium of the game. I begin from the last period (last continuation game), the decision-making problem of the clients.

In the third stage, a standard type client prefers accepting the bribe demand of the officer as long as σz-β≥ σz-δ (i.e δ≥β, the amount of red tape is greater than or equal to the amount of bribe demanded) and does not withdraw as long as at least one of the actions gives positive utility. When β= δ, σz-β=σz-δ, so a standard type client gets the same utility from accepting or rejecting the bribe demand of the officer. However, it is assumed that the client prefers paying the bribe in such an equality situation (for simplicity).

The whistleblower type client goes through red tape as long as a bribe is not demanded from him and σz-δ>0 that is, if the amount of red tape does not exceed her valuation of the service. If officer demands bribe she reports him and gets the service by incurring the cost of whistleblowing and getting the utility of honesty.

In the second stage, the officer plays. The officer knows that if standard type clients prefer going through red tape or withdrawing, he would not get any bribe. If β>δ, standard type clients prefer going through red tape (or withdrawing if red tape exceeds their valuation), but does not pay the bribe. On the other hand, the officer continues to be faced with the risk of facing with a whistleblower client. In this case if the officer demands a bribe, his utility function becomes:

$$V_{PO} = (\lambda + k)(-\omega - \alpha\beta) - G(\delta) \qquad (4)$$

As seen from the equation (4), V_{PO}<0, thus the officer even prefers not to demand a bribe instead of setting β>δ, i.e. β>δ is a dominated strategy.

On the other hand, if the officer chooses the amount of red tape to be greater than or equal to the bribe demanded (δ≥β), then standard type clients who value the service more than the bribe demanded, will prefer paying the bribe. Thus, the officer sets β≤δ and tries to maximize his expected utility as such:

$$V_{PO} = (\lambda + k)(-\omega - \alpha\beta) + (1 - \lambda - k)(1 - \frac{\beta}{Z})\beta - G(\delta)$$

$$\text{s.t. } \beta \leq \delta \tag{5}$$

The first term of the payoff function shows the risk of officer to come across a whistleblower client or to be caught by the law enforcement authority. With $(\lambda+k)$ probability, an officer encounters with a whistleblower client or caught by law enforcement agency. If these risks are realized, the officer gets penalized by a fine, which is assumed to be a linear function of the bribe he demanded, $\alpha\beta$, and he is fired (and so loses his wage). The second term of the payoff function says that the officer faces a standard type client and is not caught by the law enforcement authority with probability $(1-\lambda-k)$, and with probability $(1-\beta/Z)$ this client values the service more than the amount of the bribe demanded (Since $\sigma Z \sim UN[0,Z]$) and thus pays the bribe. The third term is the cost of applying red tape.

Increasing red tape is costly for the officer thus, the officer sets the level of red tape no higher than the level necessary to induce the standard clients to pay the bribe, which is $\beta=\delta$. Thus, the inequality constraint of the maximization problem is satisfied with equality. Meaning that, while maximizing, we may write $\varphi\beta$ instead of $G(\delta)$. The officer maximizes V_{PO} using β :

$$\frac{\partial V_{PO}}{\partial \beta} = -\lambda\alpha - k\alpha + (1 - \lambda - k)(1 - \frac{\beta}{Z} - \frac{\beta}{Z}) - \varphi = 0 \tag{6}$$

$$-\lambda\alpha - k\alpha + 1 - \lambda - k - \frac{2\beta}{Z} - \frac{2\beta\lambda}{Z} - \frac{2\beta k}{Z} - \varphi = 0 \tag{7}$$

$$\beta^* = \frac{Z(1 - \lambda - k - \alpha\lambda - k\alpha - \varphi)}{2(1 - \lambda - k)} \tag{8}$$

The second order derivative is negative, thus, β^* is indeed the maximum point. As argued before, $\delta^* = \beta^*$, thus, $\beta^* = \delta^* = \dfrac{Z(1 - \lambda - k - \alpha\lambda - k\alpha - \varphi)}{2(1 - \lambda - k)}$.

The optimum level of bribe demanded increases as the clients' maximum valuation of the service increases and decreases as fines and the cost of rising red tape increase. The effect of the change in the proportion of whistleblower clients and the probability of being caught up by the law enforcement agencies are determined by looking at comparative statics:

$$\frac{\partial \beta}{\partial \lambda} = \frac{Z(-1-\alpha)2(1-\lambda-k) + 2(1-\lambda-k-\alpha\lambda-k\alpha-\varphi)Z}{4(1-\lambda-k)^2} = \frac{-2Z(\alpha+\varphi)}{4(1-\lambda-k)^2} < 0 \tag{9}$$

$$\frac{\partial \beta}{\partial k} = \frac{Z(-1-\alpha)2(1-\lambda-k)+2(1-\lambda-k-\alpha\lambda-k\alpha-\varphi)Z}{4(1-\lambda-k)^2} = \frac{-2Z(\alpha+\varphi)}{4(1-\lambda-k)^2} < 0 \quad (10)$$

Thus, increasing proportion of whistleblower clients and increasing probabilities of being caught up decreases the amount of bribe demanded by the public officer. Although increasing risks may lead officers to demand more money to compensate, the fear of increasing penalties (as size of the bribe increase) dominates. Note that, wage level does not directly effect the size of the bribe demanded; as will be seen in the next analysis, it is an effective factor in the participation constraint (whether to demand or not to demand a bribe) of the officer.

Participation constraint of the officer can be checked by examining whether at the optimal red tape and bribe level, the utility from demanding a bribe is grater than zero, which is the base case if does not demand bribe (so, does not apply red tape either), thus only continues to get his wage. The officer's expected utility function at the optimal points of bribe β* and δ* takes the value

$$V^* = (\lambda+k)(-\omega-\alpha\beta^*) + (1-\lambda-k)(1-\frac{\beta^*}{Z})\beta^* - \varphi\beta^* \geq 0 \quad (11)$$

is the participation constraint which determines the officer's decision to demand a bribe or not. If this condition holds, the officer decides to take a bribe, demands his optimum bribe $\beta^* = \frac{Z(1-\lambda-k-\alpha\lambda-k\alpha-\varphi)}{2(1-\lambda-k)}$, and sets the optimum amount of red tape, δ*, equal to β*.

If this condition does not hold, he does not demand a bribe and does not apply red tape either, since the officer expects no gains (on the contrary it incurs costs) from increasing red tape. A higher probability of encountering with whistleblower type clients, a higher probability of being caught by the law enforcement authorities, a higher cost of applying red tape, a higher level of wage, decrease the probability that the participation constraint holds (that is, corrupt transactions get less likely to occur).

In response to this strategy of the officer, standard type clients whose valuation exceeds the amount of bribe prefer paying the bribe. Others withdraw. Whistleblower clients prefer going through red tape as long as a bribe is not demanded from them and their valuation of the service does not exceed the amount of red tape. If a bribe is demanded from them, they complain to the law enforcement authority.

The payoff levels of the players from playing their equilibrium strategies are (if participation constraint of the officer holds) as follows:

$$U_S = Max\{\sigma Z - \frac{Z(1-\lambda-k-\alpha\lambda-k\alpha-\varphi)}{2(1-\lambda-k)}, 0\} \quad (12)$$

$$U_W = \sigma Z - \theta + \eta \qquad\qquad (13)$$

$$V^* = (\lambda + k)(-\omega - \alpha\beta^*) + (1 - \lambda - k)(1 - \frac{\beta^*}{Z})\beta^* - \varphi\beta^* \qquad (14)$$

If the participation constraint does not hold, then the officer does not demand a bribe. $\beta = 0$, so $\delta = 0$ also. In such a case, the utility levels the players achieve are: $U_w^\sigma = U_s^\sigma = \sigma Z$ and $V_{PO} = 0$. Thus, the existence of corruption decreases the utilities of the standard type clients by β^*. A public officer's utility increases in response, but since it increases by less than β^*, there are also deadweight welfare losses.

2.2. The case with an intermediary

When there is the possibility of using an intermediary, the structure of the game changes a lot. If the officer cooperates with an intermediary, his risk of demanding a bribe from the whistleblower client decreases. Clients have the alternatives of whether to go through red tape, withdraw or go to an intermediary and pay a bribe plus the commission of the intermediary. Standard type clients also decide on whether to give a bribe directly to the officer if the officer demands bribe directly from them.

In the first stage, intermediary announces the amount of fee (f) to demand from the clients. Formally, intermediary seems just helping the clients to tackle with the red tape, to prepare documents, to trace the bureaucratic procedures etc. But, in reality the intermediary has a long run relationship with the officer and pays a bribe to the officer to remove red tape. Thus, the fee is constituted from the share of the intermediary plus share of the officer, which is the bribe officer collects by the means of intermediary (that is f=b+x, where b is the officer's share and x is the intermediary's share). The strategy space of the intermediary is defined as $S_I = [0, \infty)$. Clients cannot observe these secret relationships, cannot know whether a bribe is given, but can just observe the fact that intermediary removes the red tape.

After intermediary announces the fee, nature plays and determines the valuation and attitude types of clients and standard/whistleblower types, as in the case without intermediary. In the third stage, the public officer, without observing the types of the clients, determine the amount red tape to apply (δ). Clients, after observing the amount of red tape, decides on whether to go directly to the public office (GD), to go to the intermediary (GI) or to withdraw (W). If a client goes to the intermediary, she pays the fee and gets the service. If a client withdraws, he does not get the service, thus gets zero utility. On the other hand, if the client decides to go directly, in the fourth stage, the officer decides whether to demand a bribe (β) directly or not and the amount of bribe. If a bribe is demanded from her, in the fourth stage the whistleblower clients reject it and report the officer. The officer can be caught by the complaint of the whistleblower clients, or with k

probability, by the investigations of the law enforcement agency and gets αβ amount of punishment, as before, if demands a bribe directly. Standard type clients, after observing a bribe demand of the officer, decide on whether to pay the bribe (PB), to reject paying the bribe and to go through the red tape or to go to the intermediary. Game tree of the game is given at the appendix-2.

Strategy space of the officer becomes $S_{PO}=[\{(f:[0,\infty)\to[0,\infty)),(f:[0,\infty)x[0,\infty)\to[0,\infty)\}$. The strategy space of the whistleblower type clients becomes $S_W=[f:[0,\infty)x[0,\infty)\to\{GD, GI, W\}]$ and the strategy space of the standard type clients becomes $S_S=[(f:[0,\infty)x[0,\infty)\to\{GD, GI, W\}),(f:[0,\infty)x[0,\infty)x[0,\infty)\to\{GRT, GI, PB, W\})]$. The utility function of the whistleblower type client becomes (where θ is perceived cost of whistleblowing and η is the utility of honesty).

$$U_w^{\sigma}(\delta,s_w,f)=\begin{bmatrix} \sigma Z-\theta+\eta & if & s_w=GD & and & \beta>0 \\ \sigma Z-\delta & if & s_w=GD & and & \beta=0 \\ \sigma Z-f & if & s_w=GI & \\ 0 & if & s_w=W & \end{bmatrix} \quad (15)$$

The whistleblower type client, by her nature, does not have the option of paying a bribe. She goes to intermediary if the level of red tape exceeds the fee of the intermediary. If both alternatives exceed her valuation of the service, she withdraws from her demand. Again her behavior when she faces with a bribe demand is predetermined, she rejects and reports.

The utility function of the standard type is (where t ∈ {PB, GRT, GI, W} is the any one of the strategies of the standard type client at the last stage).

$$U_S^{\sigma}(\beta,\delta,s_s,f)=\begin{bmatrix} \sigma z-\beta & if & s_s\in\{(GD,PB)\} \\ \sigma z-\delta & if & s_s\in\{(GRT,t),(GD,GRT)\} \\ \sigma z-f & if & s_s\in\{(GI,t),(GD,GI)\} \\ 0 & if & s_s\in\{(t,W),(W,t)\} \end{bmatrix} \quad (16)$$

Depending on the changing actions of the players, the utility function of the officer (if he decides to obtain a bribe through the intermediary) becomes

$$U_{PO}^{with}(\delta,b,\beta,s_s) = \begin{bmatrix} -G(\delta) & \text{if} & s_s \in \{(GRT,t),(GD,GRT)\} & \text{and} & s_W=W \\ -G(\delta)+b & \text{if} & s_s \in \{(GI,t),(GD,GI)\} & \text{and} & s_W=GI \\ -G(\delta)+\lambda b+(1-\lambda)\beta & \text{if} & s_s \in \{(GD,PB)\} & \text{and} & s_W=GI \\ -G(\delta)+\lambda(-\omega-\alpha\beta)+(1-\lambda)\beta & \text{if} & s_s \in \{(GD,PB)\} & \text{and} & s_W=GD \\ -G(\delta)+\lambda(-\omega-\alpha\beta)+(1-\lambda)b & \text{if} & s_s \in \{(GD,GI)\} & \text{and} & s_W=GD \\ -G(\delta) & \text{if} & s_s \in \{(W,t),(GD,W)\} & \text{and} & s_W=W \end{bmatrix} \quad (17)$$

If the officer decided not to try to obtain a bribe, obviously he gets $U_{PO}=0$ and does not apply any red tape.

The intermediary plays in cooperation with the public officer and his share from the total amount demanded from the client is determined according to his bargaining power.

Now I try to find the Perfect Bayesian Equilibrium of the game. Thus, I begin to solve from the last continuation game.

A standard type client, after observing the bribe demand of the officer,

If pays a bribe, gets $\sigma Z - \beta$

If goes through red tape, gets $\sigma Z - \delta$

If goes to intermediary, gets $\sigma Z - f$

If withdraws, gets 0

A whistleblower type client, after observing the bribe demand of the officer, rejects the bribe demand and reports the officer to law enforcement agencies, which gives $\sigma z - \theta + \eta$ utility (because a whistleblower client has high ethical values, η is assumed to be very high and the client rejects bribe demand of the officer no matter how high θ is. Thus, the decision of whistleblower type client is taken as predetermined).

The case where $\delta < f$ is the same as the case without intermediary, since if the level of red tape is smaller than the fee of the intermediary, nobody goes to intermediary, every client goes directly to the public office, and the officer may demand a bribe from the clients.

Thus, the interesting case that we will examine is where $\delta \geq f$, thus the clients have incentive to go to the intermediary, as long as f does not exceed their valuation. In the last stage, standard type client pays a bribe if $\beta < f \leq \delta$, otherwise rejects the bribe demand and goes to intermediary (even though at the beginning she has chosen to go direct).

Thus, the officer, in the fifth stage, if sets a bribe $\beta \geq f$, nobody pays a bribe, everybody goes to intermediary and the officer gets a share of b from the clients whose valuation exceeds f. I will evaluate this option while examining the participation constraints.

If the officer decides to demand bribe not only through intermediary, but also directly, in the fifth stage, she must set $\beta < f$. Expected utility of the officer in that case can be represented as:

$$Max \quad U_{PO} = (P(W|GD) + k)(-\omega - \alpha\beta) + P(S|GD)(1 - \frac{\beta}{Z})\beta - G(\delta) \tag{18}$$

$$s.t. \qquad \delta \geq f \quad and \quad \delta \geq \beta \quad and \quad \beta < f$$

To be able to evaluate this function, first, the officer calculates posterior probabilities of the types of clients she faces, whether she is a standard type or whistleblower type client; given that the client has decided to go directly to the officer.

The officer can calculate the optimization problem of the clients as well as they can. A whistleblower type client goes directly to the officer if red tape is smaller than the fee of the intermediary. Otherwise, as long as δ≥f (which is the case we examine in this section) she goes to the intermediary (For simplicity, it is assumed that, when the level of red tape and the fee are equal, clients prefer using the intermediary).

A whistleblower type client prefers not to withdraw as long as at least one of the other options gives positive utility.

A standard type client, as long as δ≥f, prefers to go to the intermediary and pay the fee (as long as σz – f >0 also holds). However, some of the standard type clients may also want to try their chance by going direct with the hope that the officer may demand a bribe lower than the fee of the intermediary. Since we model the case where the corrupt transaction initiated by the bribee, we assume that the clients are so risk aversive that, they cannot offer a bribe directly to the officer (due to the risk that if she offers a bribe to an honest officer, the officer may complaint the client to the law enforcement agencies). We suppose, as long as δ≥f , "m" proportion of the standard type clients go direct, (1-m) proportion of them go to the intermediary. (e.g. some value time more, or do not expect to be faced with a corrupt bureaucrat vs. which may be modeled as another game).[1]

Thus, the officer can assume that all the clients who apply directly are standard type if she sets the red tape level higher than the fee of the intermediary. This means the risks associated with demanding a bribe from a whistleblower client is eliminated if there is an intermediary and red tape is set to a high enough level to induce clients to use the intermediary.

Thus the officer maximizes this function using β, where the first term represents the risk of detection by the law enforcement authorities, the second term represents the fact that officer can get bribe only from the clients whose valuations are higher than the bribe demanded and the third term represents the cost of applying red tape:

---

[1]   In fact, since we assume no time discounting, it is to the interest of all standard type clients first to go directly and see whether they get a small enough bribe demand. But, by setting the proportion m, we examine the more general case, we can see the case where all standard type clients try their chances just by setting m=1.

$$Max \quad U_{PO} = mk(1-\lambda)(-\omega - \alpha\beta) + m(1-\lambda)(1-\frac{\beta}{Z})\beta - G(\delta) \tag{19}$$

$$s.t. \quad \delta \geq f \quad and \quad \delta \geq \beta \quad and \quad \beta < f$$

$$\frac{\partial U_{PO}}{\partial \beta} = m(1-\lambda)(-k\alpha + 1 - \frac{2\beta}{Z}) = 0 \quad \Rightarrow \quad \beta^* = \frac{(1-k\alpha)Z}{2} \tag{20}$$

Since increasing red tape is costly, the constraint $\delta \geq f$ should hold with equality, that is $\delta = f$. Since $\delta = f$ and $\beta < f$ holds, the other inequality constraint, $\delta > \beta$ also automatically holds.

Remember that optimum bribe level in the case without intermediary was: $\beta^* = \frac{Z(1-\lambda-k-\alpha\lambda-k\alpha)}{2(1-\lambda-k)}$. It can be observed that, the amount of bribe taken directly (even from the ones who do not use intermediary) is greater in the case with intermediary. Amount of bribe demanded increases as the valuations of the clients increase. On the otherhand, as the probability of detection and proportion of the punishment increases, amount of bribe demanded decreases. Effect of proportion of the whistleblower clients is not a relevant factor in the determination of bribe, mere existence of an intermediary eliminates this risk.

In the first stage, the intermediary set the fee, bargaining with public officer, by taking into consideration how will be the strategies of the clients, probability distribution of the types and the strategies of the public officer in the proceeding stages of the game.

Intermediary and the public officer, while determining the fee, try to maximize their joint payoff. (represented by f=(b+x)). For simplicity, we assume that taking a bribe through intermediaries has no risk of being caught up, since the clients even do not know the secret relationship between the intermediary and the officer and since there is a relationship between intermediary and officer depending on mutual trust, the corruption can more easily be hidden from the law enforcement agencies.[2]

Max $\Pi = (\lambda + (1-m)(1-\lambda))f(1-f/Z)$ (21)

So, the optimum amount to be demanded from the clients becomes

f*=Z/2 (22)

After determining the amount to be demanded from the clients as such, the officer sets the optimum level of red tape as $\delta^* = f^* = Z/2$.

This amount is shared between officer and the intermediary according to their bargaining powers. In that process, participation constraints, and reservation values/disagreement points of the parties become important. Then, intermediary gets his share from f*=Z/2 and participates as long as his

---

[2] This assumption can be revealed easily by adding a penalty term (negative utility) with an independent probability of detection to the utility functions of the intermediary and the officer.

participation constraint holds. We can assume that if the intermediary does not make intermediation, he can find a job in the economy with a salary level s (or can establish a business and gain profit of s). Thus, the intermediary participates as long as his expected revenue is greater than that alternative salary, which means:

$$\Pi = (\lambda + (1-m)(1-\lambda))x(1-f/Z) > s \tag{23}$$

The participation constraints of the officer (about whether demanding a bribe through intermediaries or not) can be represented with the condition that the officer prefers using intermediary both to the case without intermediary and the case of not demanding a bribe. This can be represented as:

$$(\lambda + (1-m)(1-\lambda))b^*(1-\frac{f}{Z}) + mk(1-\lambda)(-\omega - \alpha\beta^*_{with}) + (1-\lambda)m(1-\frac{\beta^*_{with}}{Z})\beta^*_{with} - \varphi(\frac{Z}{2}) >$$

$$(\lambda + k)(-\omega - \alpha\beta^*_{without}) + (1-\lambda-k)(1-\frac{\beta^*_{without}}{Z})\beta^*_{without} - \varphi\beta^*_{without} \quad > 0 \tag{24}$$

The other participation constraint of the officer is whether to demand a bribe from the clients who come directly to the office or letting them also go to the intermediary:

$$mk(1-\lambda)(-\omega - \alpha\beta^*_{with}) + m(1-\lambda)(1-\frac{\beta^*_{with}}{Z})\beta^*_{with} - G(f^*) > m(1-\lambda)(1-\frac{f^*}{Z})b^* - G(f^*) > 0 \tag{25}$$

if k is large, demanding a bribe directly from the clients can be prohibitively high and all corruption occurs through intermediaries.

Apparently, in equation (24), the first part of the inequality is greater as long as b* and m are not very small or φ is not very big, which means that, there is an increase in corruption cases if intermediaries exist. As the proportion of whistleblower clients and/or detection probabilities of law enforcement agencies increases or the wages of the officers' rises, use of intermediaries increases. This means, the policies that can be effective in preventing corruption in the case without intermediaries can only increase the use of intermediaries in the case with intermediaries. Only increase in φ, cost to the public officials of increasing red tape, discourages corruption both with and without intermediaries. This constraint can also be interpreted as, if the officer incurs high costs from increasing red tape, his bargaining power for getting share b from the total amount obtained from the client, f, increases.

Thus, in the Perfect Bayesian Nash Equilibrium, a proportion of standard type clients prefer to apply to the intermediary and the remaining ones go directly to the public office. The officer sets red tape high enough to induce standard clients pay a bribe or go to intermediary rather than satisfying the requirements of the red tape, thus, $\delta^* = f = Z/2$. Standard type

clients who has chosen to go to the intermediary pay (b+x)=Z/2 to the intermediary and the ones who has chosen to go the public office directly pay a bribe equal to $\beta^* = \dfrac{(1\text{-}k\alpha)Z}{2}$,as long as one of these options give positive utility, otherwise they withdraw. One should notice that the amount paid directly to the officer is smaller than the fee paid to the intermediary, f. If we assume that all standard type clients are identical then all should prefer bribing the officer directly and thus m=1, this constitutes a special case of the more general representation of the model.

In the Perfect Bayesian Nash Equilibrium, whistleblower clients go to intermediary if σZ-f*>0; they withdraw otherwise. They never face a bribe demand.

The officer and intermediary share the total amount obtained, f, with shares b and x respectively, the amounts of which are determined according to the bargaining power of each person and thus represent the best alternatives available for each.[3]

Utility level of the intermediary turns out to be:

$$U_I = \left(\lambda + (1-\lambda)(1-m)\right)(1 - f^*/Z)\, x^*$$

In the case with intermediaries, demanding bribe becomes less risky for the public officer. Thus, her utility increases. Remember that equilibrium utility levels of the players in the first case (the case without intermediaries) was

$$U_S = \sigma Z - \frac{Z(1 - \lambda - k - \alpha\lambda - k\alpha}{2(1 - \lambda - k)} \qquad (26)$$

$$U_W = \sigma Z - \theta + \eta \qquad (27)$$

$$V^* = (\lambda + k)(-\omega - \alpha\beta^*{}_{without}) + (1 - \lambda - k)$$
$$(1 - \frac{\beta^*{}_{without}}{Z})\beta^*{}_{without} - \varphi\beta^*{}_{without} \qquad (28)$$

These values should be compared with the ones in the case with intermediaries:

$$U_S{}^{direct} = \sigma Z - \frac{(1 - k\alpha)Z}{2} \qquad (29)$$

$$U_S{}^{usinginterm} = \sigma Z - Z/2 \qquad (30)$$

$$U_W = \sigma Z - Z/2 \qquad (31)$$

---

[3] Bargaining problem between the officer and the intermediary is given at the appendix-1.

$$U*_{PO}{}^{with} = mk(1-\lambda)(-\omega-\alpha\beta*_{with}) + m(1-\lambda)(1-\frac{\beta*_{with}}{Z})\beta*_{with} +$$
$$b*\left(\lambda+(1-\lambda)(1-m)\right)(1-f*/Z) - \varphi Z/2 \tag{32}$$

clients' utilities are the highest in the case without corruption, second highest in the case without intermediary and lowest in the case with intermediary. In the case with intermediary utility of the public officer is higher as long as the officer's share from the total amount gathered from the clients is not too low. This also enters into the bargaining process of the officer with the intermediary. The officer does not accept a share of f* such that he will get lower utility in comparison to the case where an intermediary is not used. The bargaining on the f* depends on the bargaining powers of the players.

For the intermediaries sector to be established, the share of both public officers and intermediary must be at least equal to their payoffs from their best alternatives. Thus the condition

$$(\lambda+k)(-\omega-\alpha\beta*_{without}) + (1-\lambda-k)(1-\frac{\beta*_{without}}{Z})\beta*_{without}$$
$$-\varphi\beta*_{without} + s \leq \frac{Z}{2} \tag{33}$$

must hold.

Consequently, increasing costs of red tape to the officers, decreasing alternative wages of intermediaries makes the establishment of an intermediaries sector more likely. Increasing the wages of public officers, increasing penalties and increasing the proportion of whistleblower clients, increasing probability of detection of law enforcement agencies, since increase the risk of demanding a bribe directly, decrease the share public officer demands and make the establishment of an intermediaries sector more likely.

Thus, policies that can work to reduce corruption in the case without intermediaries cannot decrease corruption in the case with intermediaries; they can just increase intermediary usage. Another important point is that, if intermediary candidates have alternatives of better-paying jobs (i.e. s is high), establishment of an intermediaries sector gets less likely. Thus, increasing economic growth and investments, and the existence of a booming private sector in the economy make a damping effect on the establishment of an intermediaries sector; thus it has an indirect effect on decreasing corruption.

3. Discussions and conclusions

Bureaucratic rules, permits, licenses etc., in many countries lead to the appearance of intermediaries sectors. These sectors are usually established

around the bureaucratic services involving heavy red tape. Formally, they are established to save clients' valuable time- to follow up the bureaucratic procedures, fill in forms, or give required documents. However, behind the scenes, these industries may be a way of serving corrupt transactions. The sector may decrease the risks involved in the corrupt transactions by separating the briber and the bribee, playing a mediator role.

The model aims to examine the factors leading to the establishment of intermediaries sector and to figure out how they facilitate corrupt transactions. The most significant result of the model is that the existence of intermediaries can decrease the corrupt officers' probability of being caught down to zero. The existence of such a 'big service' makes demanding a bribe nearly 'always profitable' from the viewpoint of the officers.

In the case where there is no intermediary, in some situations, risks involved may be so large that the officer may prefer not to demand a bribe. High wages, severe penalties, a large probability of being caught up by the law enforcement agencies or a high ratio of whistleblower type clients in comparison to standard type clients may cause the participation constraint not to hold. Thus, a benefit-maximizing officer, may prefer processing the applications without demanding a bribe not necessarily due to his honesty, but since bribe taking is not profitable.

On the other hand, in the cases with intermediary, detection risk is reduced, so taking a bribe becomes nearly always more profitable for the officer (as long as the cost of increasing red tape is not very high). In such a situation, high wages, high penalties, a high proportion of whistleblower clients etc. cannot stop officers from demanding a bribe. Such changes in these parameters can only increase the share of the intermediary from the payments made by the client, thus encouraging the establihment of an intermediaries sector.

Another important point is that the model shows that intermediaries give the biggest 'service' to the officers. Clients do not get a benefit from the existence of intermediaries on the contrary, their utilities decrease in comparison to the case without intermediary. The officer and the intermediary get the whole benefit. Clients are always worse off than in the case where there is no corruption, and so they get the service without paying any bribe and without incurring red tape costs.

The public officer demands a bribe using the threat of increasing red tape, and clients give the bribe directly or through an intermediary to avoid the cost of dealing with red tape. Therefore, the discretion of officers to increase red tape, vague rules, procedures, and regulations lead to a fertile environment for corrupt transactions to occur and an intermediaries sector to be established. The model results show that increasing the costs of red tape reduces the amount of corruption both with and without intermediaries. Public officer demands bribe using the threat of increasing red tape and clients give bribe directly or through intermediary to avoid the cost of

dealing with red tape. So, when the threat power of public officers is taken out of their hands, they cannot collect a bribe. If rules were widely known and clear, procedures were simple and fast, if there were well-established mechanisms controlling officers, then clients (both whistleblower and standard types), would prefer getting the service by going through the procedures. They would neither go to intermediaries, nor give bribes directly to the officers.

The case should also be evaluated from the point of view of the social costs it caused. The opportunity cost of the 'service' given by the intermediaries sector should also be taken into consideration. If such a sector did not exist, people and capital employed in this sector could be used in productive sectors, and could produce goods and services that are valuable. The model also shows us that, as the opportunity cost of intermediaries increases, that is, as the salary an intermediary can get from another job increases, the use of intermediaries gets less likely. Thus, an economy's job creation capacity is another important factor in the establishment of intermediaries sector. If in the economy (especially in the private sector) investment level is high, then new jobs are created at a fast pace, thus, intermediaries' opportunity cost is higher and they will be used less. Since without intermediaries corruption is risky, the level of corruption will also decrease. Since corruption decreases the total welfare of the society, when corruption level declines, welfare of the society rises. Resources wasted by rent-seeking activities can be used to produce goods and services that are valuable instead.

Assuming that all public officers are corruptible is not very realistic of course. There are many people in bureaucracies holding to moral principles and not taking bribes, no matter how profitable it is to do so.

However, I would claim that, systems should be designed by taking into consideration the people who can abuse it. Combating corruption should of course involve moral education. However, there will always be immoral people who will engage in corruption whenever s\he finds it profitable. Best is to design systems such that, even for the most opportunist people, bribe taking seems unprofitable. To be able to examine the characteristics of such a system design, it is assumed that officers are corruptible and the model tries to offer policy solutions to design the system so as to prevent these immoral people reducing society's welfare.

An aspect of the problem that can be examined in future work may be corrupt transactions involving illegal services. In cases where the client applies for a service that she is not legally entitled to, the problem changes a lot. The public officer this time has more power than just increasing red tape- he can refuse to provide the service. The risks involved are also higher. In such a transaction the intermediaries sector provides more important services for the corrupt parties.

Appendix-1

Bargaining Between the Officer and the Intermediary

If the intermediary is monopoly, he captures all surpluses after compensating the officer for losses; so as to give the same utility to the officer with directly demanding a bribe or not demanding any bribe at all. Thus b* is just the amount to make the officer participate:

$$mk(1-\lambda)(-\omega-\alpha\beta*_{with}) + m(1-\lambda)(1-\frac{\beta*_{with}}{Z})\beta*_{with} +$$

$$b*(\lambda+(1-\lambda)(1-m))(1-f*/Z) - \varphi Z/2$$

$$= (\lambda+k)(-\omega-\alpha\beta^*_{without}) + (1-\lambda-k)(1-\frac{\beta^*_{without}}{Z})\beta^*_{without} - \varphi\beta^*_{without}$$

and x*=Z/2-b* (as long as $(\lambda+(1-\lambda)(1-m))(1-f*/Z)$ x*>s).

If there are more than one intermediary, Bertrand Competition among them reduces economic profits to zero and thus all intermediaries can just get s; the remaining surplus is captured by the officers. So, $(\lambda+(1-\lambda)(1-m))(1-f*/Z)$ x*=s

and b*=Z/2-(s/$(\lambda+(1-\lambda)(1-m))(1-f*/Z)$)).

Of course, as long as this gives the officer a higher utility than the case without intermediary, $V*^{without}_{PO}(\beta*) < U*^{with}_{PO}(\beta*,b*))$
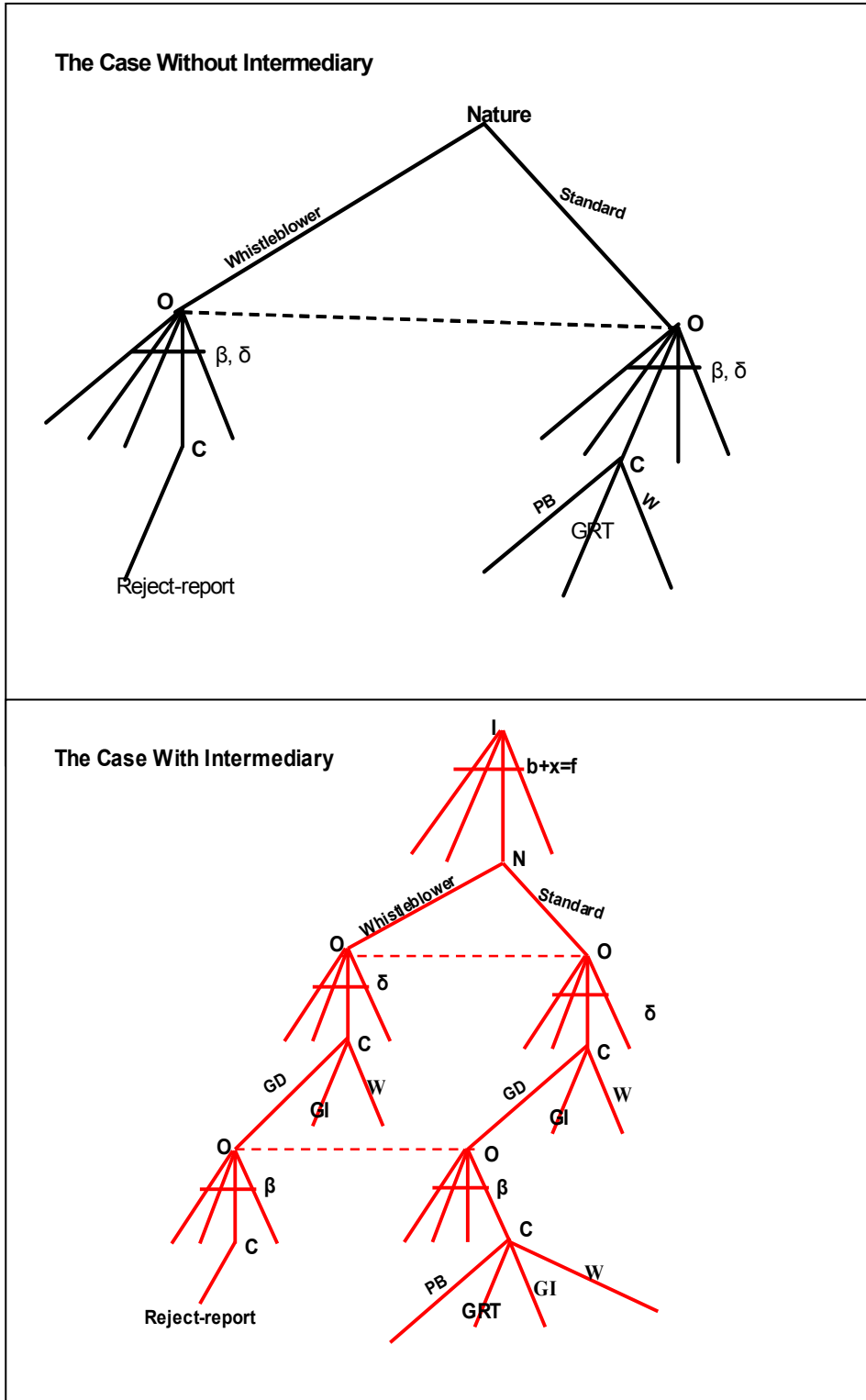
If the bargaining powers of the parties are equal, Nash Bargaining Solution can be reached by maximizing the following function using U_{PO}, where d_I and d_{PO} are the disagreement points of the intermediary and the officer respectively.

$$Max \quad (U_I-d_I)(U_{PO}-d_{PO}) =$$

$$((\lambda+(1-m)(1-\lambda))Z/2-U_{PO}-s)(U_{PO}-(\lambda+k)(-\omega-\alpha\beta*)+(1-\lambda-k)(1-\frac{\beta*}{Z})\beta*-\varphi\beta*)$$

Appendix-2

Game Trees of the Models

The Case Without Intermediary

The Case With Intermediary

References

ALBANO, G.L. and LIZZERI, A. (2001). "Strategic certification and provision of quality", *International Economic Review*, 42: 267–283.

ANDVIG, J. C. and MOENE, K. O. (1990), "How Corruption May Corrupt", *Journal of Economic Behavior and Organization*", 13, 63-76.

BAÇ, M. (2001), "Corruption, Connections and Transparency: Does a Better Screen Imply a Better Scene?, *Public Choice*, Vol. 107 (1-2), pp. 87-96.

BAYAR, G. (2003), "Corruption-A Game Theoretical Analysis", *Ph D Thesis, Middle East Technical University*, June 2003.

————(2005), The Role of Intermediaries in Corrupt Transactions, *Public Choice*, 122(3), 277-298.

BENNETT, R.J. (1997), "Trading Cards, Heroes and Whistleblowers", *Humanist*, 57(2).

BIGLAISER, G. (1993), "Middlemen as Experts", *RAND Journal of Economics*, 24(2), 212-223.

BOZEMAN, B. (2000), "Bureaucracy and Red Tape", Prentice Hall, New Jersey.

BUSCAGLIA, E. (2001), "An Analysis of Judical Corruption and Its Causes: An Objective Governing – Based Approach", *International Review of Law and Economics*, 21, 233-249.

CADOT, O. (1987), "Corruption as a Gamble", *Journal of Public Economics*, 33, 223-244.

GEHRIG, T. (1993), "Intermediation in Search Markets", *Journal of Economics and Management Strategy*, 2(1), 97-120.

GOULD, D. J., Reyes, J.A.A. (1983), "The Effect of Corruption on Administrative Performance", *World Bank Staff Working Paper* No. 580, The World Bank, Washington D.C.

HASKER, K, & Ökten, Ç. (2008), Intermediaries and Corruption, *Journal of Economic Behavior and Organization*, 67, 103-115.

JAIN, K. A. (2001), "Corruption: A Review", *Journal of Economic Surveys*", 15(1), 71-121.

JOHNSON, S., KAUFMANN, D and ZOIDO-LOBATAN, P. (1998), "Regulatory discretion and the unofficial economy, *American Economic Review*, 88, 387-392.

KAUFMANN, D. (1997), "Corruption: The Facts." Foreign Policy 107 (Summer): pp. 114-131.

KLITGAARD, R. (1991), "Gifts and Bribes", *Strategy and Choice*, ed. R., Zeckhauser, MIT Press, Cambridge, MA.

LAMBSDORF, J. G. (2002), "How Confidence Facilitates Illegal Transactions: An Empirical Approach", *American Journal of Economics and Sociology*, Vol. 61(4), pp. 829-853.

LEFF, N. H. (1964), "Economic Development Through Bureaucratic Corruption*", Political Corruption: Readings in Comparative Analysis*, ed. A. J., Heidenheimer, H., Reinhart, New York, pp. 8-14

LEYS, C. (1970), "What Is The Problem About Corruption", *Political Corruption: Readings in Comparative Analysis*, ed. A. J., Heidenheimer, H., Reinhart, New York, pp. 31-37.

LIZZERI, A. (1999), "Information revelation and Certification Intermediaries", *Rand Journal of Economic*s, 30(2), 214-231.

LUI, F. (1985), "An Equilibrium Queueing Model of Corruption", *Journal of Political Economy*, 93, pp. 760-781.

LUI, T.F. (1986), "A Dynamic Model of Corruption Deterrence", *Journal of Public Economics*, 31, 215-236.

MASTERS, A. (2008), Unpleasant Middlemen, *Journal of Economic Behavior and Organization*, 68, 73-86.

MAURO, P. (1995), "Corruption and Growth", *Quarterly Journal of Economics*, 110(3), pp. 681-712.

————(1998), "Corruption: Causes, Consequences and Agenda for Further Research"" *Finance & Development*, 11-14.

SCHEVCHENKO, A. (2004), "Middlemen", *International Economic Review*, Vol. 45(1), pp. 1-24.

SHI, B., TEMZELIDES, T. (2004), "A Model of Bureaucracy and Corruption", *International Economic Review*, Vol. 45(3), pp. 873-908.

SHLEIFER, A., VISHNY, R.W. (1993), "Corruption", *The Quarterly Journal of Economics*, 108, 519-617.

UNITED NATIONS (1989), "Corruption in Government", United Nations, New York.

Özet

Yolsuzluk ve aracılar- bir oyun kuramı yaklaşımı

Bu makelenin amacı oyun kuramı kullanılarak "rüşveti alanın" başlattığı bir yolsuzluk eylemini ve bu eylemde aracıların rolünü incelemektir. Verdiği kamu hizmetinden rüşvet almak isteyen ahlak seviyesi düşük bürokrat, hizmeti alan vatandaşları (müşterileri) rüşvet vermeye zorlamak için kırtasiyeciliği artırma gücünü kullanmaktadır. Ancak, rüşvetçi bürokrat kamu hizmetinin müşterilerinden rüşvet istediği zaman, yüksek ahlak seviyesine sahip, kendisininden istenen rüşvet hakkında her zaman hukuki işlem yaptırmayı seçen "idealist" tip bir müşteriden de rüşvet isteme ve deşifre edilip cezalandırılma riski ile karşı karşıyadır. Bu sebeple bürokrat, şikayet edilmek ve ceza almak riskini azaltmak için aracılar vasıtasıyla rüşvet almayı tercih edebilir.

Bu makalede aracılı ve aracısız olmak üzere iki yolsuzluk eylemi tipi incelenmiş ve sonuçları karşılaştırılmıştır. Aracıların olmadığı durumda, bazı şartlar altında riskler o kadar fazla olabilir ki, rüşvetçi bürokratlar bile yolsuzluğa bulaşmamayı tercih edebilir. Ancak, aracıların bulunduğu durumda yakalanma riski çok düşmekte ve rüşvet almak ahlak seviyesi düşük bir bürokrat için neredeyse her zaman karlı olmaktadır. Model sonuçlarına dayanılarak, yolsuzluğu önlemek için alınabilecek tedbirler önerilmektedir.

Anahtar kelimeler : Yolsuzluk, rüşvet, müşteriler, kırtasiyecilik, aracılar.

JEL kodları: K42, C72.