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Spurious Middlemen in Corrupt Transactions

Güzin Bayar

Abstract
The first step in solving the problem of corruption lies in diagnosing its root causes and determining the underlying factors. One of the most important facilitators of corrupt transactions is intermediaries who make corrupt dealings less risky, thereby increasing corruption. Even worse, there are spurious intermediaries who obtain bribes in connection with public services by pretending to have power over the issue. This deception may be carried out even if the officer providing the public service in question is honest. The simple game theoretical model formulated in this article tries to capture the mechanisms behind such deception. From the solutions of the model, certain policy recommendations to prevent such a process from occurring shall be provided.

JEL K42 C72
Keywords Corruption; spurious middlemen; game theory

Authors
Güzin Bayar, ✉ Middle East Technical University—part time instructor and Turkish Ministry of Economy—Foreign Trade Expert, Ankara, Turkey, guzinbayar@yahoo.com

The ideas presented in the article is that of the author and does not bind her institutions.

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1 Introduction

Although corruption is not specific to our time and society, its social and economic costs have been the center of increased attention in the last decade. Efforts at solving this problem have been intensified in a number of countries. It is now almost universally accepted that corruption causes a great deal of harm. The corruption of public officers discourages entrepreneurs, causes inefficiency, wastes resources, distorts income distribution, and harms democracy as well as ethical values.

To cure a problem of this magnitude, its root causes should be analyzed meticulously. One of the most frequently cited causes of corruption is excessive red tape coupled with the discretion given to public officers over the public service provided. Studies by Jain and Tırtıroğlu (2000) (cited in Jain, 2001), Buscaglia (2001), Kaufmann (1997) and Rijckeghem and Weder (2001) have demonstrated a positive relationship between corruption and excessive bureaucratic procedures or excessive regulatory discretion given to public officers.

Information problems also encourage corruption. Manion (1996) examined how a fertile environment of bribe exchange for the licensing requirements of businesses in China was created by numerous detailed and complex rules, a gap between formal and informal operating standards, as well as inaccessibility of information about the rules. She also modeled how both the expectations of clients about the honesty or corruptness of officers and the clients' imperfect knowledge about whether their application was acceptable or not affected the frequency of corrupt transactions.

Corruption is a risky transaction since it is illegal. Consequently, long-term reputation-based relationship between the briber and the bribee become important in terms of lowering the risk. Intermediaries are specialized connection builders who decrease the costs involved in building connections by making an initial connection-building investment, thereby benefiting individual clients in return for some 'commission'. The ways that these intermediaries can increase corruption have been examined in Manion (1996), Bayar (2005), Bayar (2009), Bayar (2013), Hasker and Ökten (2008), Bose and Gangopadhyay (2009), Mogiliansky et al. (2009), and Mishra and Samuel (2013).

There are few empirical studies on the effects of intermediaries on corruption. Drugov et al. (2014) designed a laboratory experiment on bribery that simulated

petty corruption transactions between private citizens and public officials. Their results show that the existence of intermediaries significantly increases cases of corruption by decreasing the moral costs to both parties, even after uncertainty effects about the reservation price of the public officer (intermediaries also increase corruption by removing that uncertainty) are accounted for.

Bjorvatn et al. (2005) discussed the anti-corruption reform in tax bureaucracy in the mid-1990s in Tanzania, where former bureaucrats who had been fired during an anti-corruption operation became intermediaries later on, using their contacts in the bureaucracy to facilitate corrupt transactions.

Bertrand et al. (2007) conducted a field study on obtaining a driver's licence in India. They found no evidence of direct bribes to bureaucrats in any of the experimental groups; instead, all extralegal payments were made through private intermediaries (agents). The agents provided services to circumvent official rules; they were even able to procure licenses for people who lacked the required driving skills.

Mishra and Samuel (2013) considered data from the US Department of Justice concerning cases within the scope of the Foreign Corruption Practices Act, which imposes civil and criminal penalties on the corrupt activities of US individuals and corporations with any foreign government, including corruption conducted through the use of intermediaries. The data indicate that intermediaries are employed in slightly over 40% of all corrupt transactions, and on average, the bribes paid to foreign officials by US firms and persons in the presence of intermediaries are higher than those paid in their absence.

Lambsdorff (2013) discussed several real-life events of intermediary usage. The examples show how intermediaries facilitate corrupt transactions using their long-term relationships with officials, and how they shield their clients from detection and prosecution, (e.g. by allowing their clients to claim ignorance in court). It is rather complicated for prosecutors to prove that money transferred from a firm's account to an intermediary's account was in fact used to bribe a public official.

Even worse, intermediaries try to create perceptions of corruption on certain occasions to obtain private benefit, even in the absence of any corrupt demands by officers. That is, these intermediaries are able to earn money by telling clients that bureaucrats must be bribed, even in cases where there is no corruption. The intermediary then pockets the bribe he obtains from the client.

Lambsdorff (2013) gives the example of an event that occurred in Duisburg, Germany. A city official, posing as an intermediary regarding the business of building school pavilions, obtained DM141,000 from a private construction firm. He demanded more and more money, claiming that he was passing money to the officials in charge, although in reality all he did was naming the firm once to those in charge of awarding the contracts.

Oldenburg (1987) observed in an investigation of the Indian Land Consolidation Department in the northern Indian state of Uttar Pradesh a "contradiction between a low incidence and a high reputation of wide-spread corruption". It was noted that middlemen, who were trying to maximize their benefits, were trying to spread the rumor that procedures were mysterious, that real decisions were made behind the scenes, and that nothing could be achieved "without bribing the officials." Such middlemen try to give the impression that only they can reach the officials, get the job done, and know the subtle hints and techniques for passing bribes. Thus, the administration is perceived as rather corrupt, even though the actual level of corruption is much lower. Farmers, believing the rumours, enlist the "services" of these "intermediaries" to be able to get fair treatment from the department; and when fair treatment is provided without any bribe, the middlemen pocket the money.

Similarly, Simhan (2004) warned against spurious agents in India's business process outsourcing sector, who promise business from the US or Europe before vanishing without trace after obtaining money for their supposed services.[1]

In Ghana, the Driver and Vehicle Licensing Authority (DVLA) arrested 41 suspected middlemen or "Goro Boys" who had allegedly issued fake vehicle documents to clients of the Authority. The "Goro Boys" took documents from clients and supposedly sent them to DVLA officials, while extorting money from their clients to help them acquire driving documents. However, the driver's licenses, roadworthiness stickers and registration papers that they gave their customers were actually fake.[2]

The simple game theoretical model formulated in this article tries to capture the mechanisms behind a deception process like those outlined above. The model examines the case of spurious middlemen obtaining bribes through a public

[1] http://www.thehindubusinessline.in/2004/02/26/stories/2004022602800100.htm

[2] http://news.peacefmonline.com/pages/news/201405/198505.php?storyid=100&#commentsread

service by pretending that they can obtain the desired results although they have no such influence over the issue. This deception process may be carried out even if the officer providing the public service in question is honest. A client's lack of information about the honesty of the officials and her uncertainty about whether her application is acceptable or not may cause her to believe these spurious middlemen.

The interesting thing in these procedures is that whereas 'normal' middlemen provide a 'service' to clients in dealing with corrupt officers by decreasing the risks involved, spurious middlemen engage in pure deception, which harms all parties other than the middlemen themselves.

Using game theoretical modeling we can derive certain policy recommendations to prevent such corruption from taking place. To our knowledge, there are as yet no game theoretical models studying the case of spurious middlemen in the literature. The next part of the article establishes the model and gives the solution. In the third part, extensions to the current model are suggested, while the fourth part comments on the results, makes policy recommendations and concludes the study.

2 The Model

The aim of the model is to describe a peculiar type of corruption: a case of spurious middlemen, who take bribes concerning particular official services by pretending that they have influence over the delivery of the service in question. These spurious middlemen allege that they can mediate in the bribing of officials to ensure that the public service is delivered, when in fact they have no such role.

The model is a Bayesian game with two players: the spurious middleman (SM) and the client (C). The client wants to get a public service that is valuable to her. Clients have different valuations of this service; their type is a random draw from a uniform distribution UN[0,1], represented by σ. Clients of type σ have a valuation σZ for the service, where Z is the valuation parameter of the most eager client.

The person in charge of the service is the bureaucrat. The bureaucrat can be an honest person who does her job without demanding a bribe and rejects applications only if they fail to meet certain criteria. However, there is also the probability that the bureaucrat may be a corrupt one who expects a bribe from the client. If the

application is acceptable but the client does not bribe, the corrupt bureaucrat will eventually accept the application but will slow down the process, increasing red tape. On the other hand, if the application is unacceptable and the client does not bribe, the corrupt bureaucrat will simply reject the application. We assume for simplicity that the client is afraid of being prosecuted. Therefore, she does not directly offer a bribe to the officers.

We also assume that rules and regulations are not transparent. The client thinks that her application will be acceptable with probability t, and that, if an honest bureaucrat processes it, she will get the service with probability t.·The assumption that $t<1$ may be realistic even under more transparent regulations if the service given by the bureaucrat is contestable. For example, consider a case where everybody can apply for a licence but only a limited number of licences will be awarded to the best applicants, consistent with certain criteria. In such a case, even if the client is fully aware of the criteria, since she does not know the quality of the other applications, she cannot be certain whether her demand will be accepted or not; and, therefore, she can only make a guess about her prospect of winning.

If the incumbent officer is corrupt, the client thinks her application will be rejected if it is unacceptable. However, the client also believes that, even if her application is acceptable, it will be processed slowly with heavy application of red tape. We represent the expected costs of this with Φ; the costs the client expects to incur if the bureaucrat is corrupt and her application is acceptable (Φ may be generalized to include the probability that the client's application may be rejected by the corrupt bureaucrat even if the application is acceptable just by setting $\Phi \geq \sigma Z$). The client makes her application to the public office without knowing which bureaucrat is responsible for processing her application. Therefore, she expects *ex ante* that the bureaucrat in charge is honest with probability (p) or corrupt with probability $(1-p)$. These types are selected by nature at the beginning of the game, with the probabilities depending on the general image of the public office in the eyes of the citizens.

The spurious middleman (SM) works inside the public office, for instance, as a civil servant in charge of document receipt and dispatch, in a suitable position to observe the application and evaluation process. He, therefore, knows who is in charge of the client's application and also has private insider information about whether this bureaucrat is corrupt or honest. We assume that the SM is a low-level civil servant with no connections to influence either type of bureaucrat (corrupt or

honest) in processing applications in any way. While corrupt bureaucrats may be using some genuine intermediaries, the SM is not one of them. The corrupt bureaucrat can pass a positive verdict even when the application in question does not meet elgibility criteria. However, accepting an unacceptable application is a strictly dominated strategy for her when the client applies through the SM rather than through bureaucrat's geniune intermediary. In fact, the bureaucrat does not even know that the SM is mediating in the process. In reality, the SM cannot make any type of bureaucrat accept an unacceptable application. If the client applies through a geniune intermediary, the corrupt bureaucrat may receive a bribe from the client in order to pass a positive verdict on an unacceptable application, but this is a different process outside the main model of this present study. We do not model the behavior of geniune intermediaries in this article for the sake of simplicity; detailed models of genuine intermediaries are discussed by Bayar (2005), Bayar (2009), Bayar (2013), Hasker and Ökten (2008), Bose and Gangopadhyay (2009), Mogiliansky et al. (2009), and Mishra and Samuel (2013).

In order to obtain a bribe from the clients, the SM tries to guess and change the prior probability *p* attached by the client to the chance of facing an honest bureaucrat, and the probability *t*, as perceived by the client about the probability that her demand is acceptable. The SM plays after observing which bureaucrat is given the job by the superiors. As already mentioned, he has insider information concerning the acceptability of the application, and whether the bureaucrat to whom the job is given is corrupt or honest. The SM, therefore, has to determine how much bribe to demand in four possible cases: honest bureaucrat/acceptable application, corrupt bureaucrat/acceptable application, honest bureaucrat/-unacceptable application, and corrupt bureaucrat/unacceptable application. The strategy space of the SM is, therefore, defined as $S_{SM}=T_1xT_2\rightarrow R_{+,}$ where T_1 is the type space of the bureaucrats and T_2 is the type space of the application.

The client, without observing the type of her application and the type of the bureaucrat, but after observing the SM's claims and bribe demand, decides whether to accept or reject the offer. Accordingly, the strategy space of the client (C) is defined as $S_C= R_+\rightarrow\{\text{Accept, Reject}\}$.

The game is a dynamic game of incomplete information composed of four stages. In the first stage, nature plays and draws the type of the incumbent

bureaucrat.[3] In the second stage, nature determines the type of the application. In the third stage, the SM observes the types of both bureaucrat and application and determines how much bribe to demand, β. The SM then lies to the client about the type of bureaucrat and/or the type of her application, trying to make her change her initial expectations in a way that is most profitable to the SM. In the fourth stage, the client, after hearing the SM's lie, updates her prior probabilities of facing an honest officer and her prior probability of whether her application is acceptable or not. This updating also includes client's suspicions about whether the SM is a genuine intermediary or not. If the client does not believe that the SM is a genuine intermediary, she rejects his bribe demand and does not update her initial probabilities concerning the honesty of the bureaucrat and the acceptability of her application. The client also observes the amount of the bribe demanded by the SM, and decides whether to pay the bribe or not. We assume that the client only pays the SM the bribe after she gets the service in order to exclude the possibility of the SM reneging.[4] The utility function of the client can thus be defined as follows:

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[3] In fact, in the first stage, nature determines the type of each bureaucrat, and then the chief of the office gives the job randomly to one of the bureaucrats without observing the decision of nature. Thus, if the client thinks that the probability of facing an honest bureaucrat is p, she also expects that the bureaucrat processing her application is honest with probability p, since the chief distributes jobs randomly. Thus we can represent the process with a single move of nature.

[4] If there is a genuine intermediary, *ex-post* payment increases thelikelihood of the client reneging, while*ex-ante* payment increasesthe likelihood of intermediary reneging. In our case, the SM has no possibility to renege because, since he has no influence over the job, the client will get the service anyway. However, since client does not know this, we can include the possibility that the SM might renege in the utility function of the client.If the client accepts the SM's demand then his expected utility in equation (1) becomes $V_{CL}=(1-\gamma)(\sigma Z)-\beta$; thus, γ=renege probability of the SM becomes a factor decreasing the utility of the client;this in turn decreases the bribe she can pay. In such a situation, the SM may have the incentive to take the bribe *ex post*.Thus, the SM can removethe renege probability from the client's utility function, whichcan increase the bribe he can obtain.Moreover, he can give a more credible impression to the client. However, still there is the possibility of the client reneging so the SM should include this in his utility function. Thus, in equation (2), the utility the SM gets when the client accepts his bribe demand is discounted by the renege probability of the client to become $V_{SM}=(1-\xi-\gamma)\beta-\xi F$. Notice that, because this will not change the amount of bribe demanded by the SM and most of the other results, for simplicity, we remove this renege possibility. For a more detailed analysis of renege, please refer to articles mentioned in the introduction.

$$V_{CL}^{\sigma} = \begin{cases} P(\text{honest \& acceptable} \mid SM\text{'s claim}) (\sigma Z) & \\ + P(\text{corrupt \& acceptable} \mid SM\text{'s claim}) (\sigma Z - \Phi) & \\ + P(\text{unacceptable} \mid SM\text{'s claim}) 0 & \text{if } s_{cL} = R \\ \sigma Z - \beta & \text{if } s_{cL} = A \end{cases} \quad (1)$$

The client thinks that, if she accepts the SM's offer, he will get the job done for sure since she will only pay the bribe after getting the service. On the other hand, if she rejects the SM's bribe demand, she forms an expectation about the probabilities of the four cases, given the SM's claims. That is, if the client rejects the SM's bribe demand, she can get σZ if the bureaucrat is honest, or can get $\sigma Z - \Phi$ if the bureaucrat is corrupt and the demand is acceptable. If her demand is unacceptable, however, she assumes that both the honest and corrupt bureaucrats will reject the application. The utility function of the SM can thus be defined as follows:

$$V_{SM}(\beta, \sigma, Z, T_1, T_2) = \begin{cases} (1-\xi)\beta - \xi F & \text{if } s_{cL} = A \\ 0 & \text{if } s_{cL} = R \end{cases} \quad (2)$$

where ξ is the probability of the SM being caught while demanding the bribe or while disseminating the image that he gets the job done, while F is the penalty that the SM will receive if he gets caught.

Lemma 1: SM can only demand a bribe from the clients in two cases: honest bureaucrat/acceptable application; corrupt bureaucrat/acceptable application.

Proof: If the application is unacceptable, the SM cannot demand a bribe from the client because he has no ability to ensure that any bureaucrat accept any type of application since he has no real connection with the bureaucrats. However, he knows that, if the incumbent bureaucrat is honest and the application is acceptable according to the regulations, then the application will be accepted and the client will receive the service without facing any problems. Similarly, if the application is acceptable but the bureaucrat is corrupt, he knows that this application will also be accepted, but with red tape costs Φ. The SM can also guess Φ since he has private information on the bureaucrats. In such cases, the SM has the possibility of taking advantage of the informational deficiency of the client by telling the client

that the incumbent bureaucrat is corrupt and/or the application is unacceptable in order to pretend that he can get the job done in return for a certain sum of payment. □□

Lemma 2: The SM determines different bribes for the two possible cases: when the incumbent bureaucrat (IB) is honest, and when the IB is corrupt (that is, $\beta_C \neq \beta_H$). In both cases, the SM tells the client that the incumbent bureaucrat is corrupt and that he can obtain the desired outcome provided she gives a bribe of β. In the case of an honest bureaucrat/acceptable application, the SM tells the client the truth about the acceptability of the application, whereas in the case of the corrupt bureaucrat/acceptable application, he lies to the client by saying that her application is unacceptable.

Proof: If the SM says that the IB is honest, the dominant strategy of the client is to reject, s_{cL}=R. In that case, the SM cannot get any bribe. Thus, saying that the IB is honest is a weakly dominated strategy for SM. Therefore, he tells the client that the incumbent bureaucrat is corrupt in both of the cases.

As explained in Lemma 1, the SM only demands a bribe from clients with acceptable applications. Since the client with an acceptable application will have to wait longer if the application is processed by a corrupt bureaucrat, the SM tells the client that her application is unacceptable (to explain the delay), and that, if the client gives a bribe, he can make the IB accept her application although she might still wait for some time. If the IB is honest and the application is acceptable, the SM tells the client that her application is acceptable but the IB is corrupt.

If the SM tells clients with acceptable applications that their application is acceptable in both the honest bureaucrat and corrupt bureaucrat cases, he cannot explain the difference in waiting time between the corrupt and honest bureaucrat cases and may lose credibility. If, on the other hand, the SM tells clients that their application is unacceptable in both the corrupt and honest bureaucrat cases, he can miss out on the extra profit opportunities he can derive from the rapidly processed case of an acceptable application/honest bureaucrat.□

Lemma 3: In the acceptable application/corrupt bureaucrat case, the SM chooses a waiting time equal to the red tape applied by the corrupt bureaucrat to all acceptable applications, Φ.

Proof: Since, the SM lacks the power to affect the decisions of the bureaucrats in any way, he cannot choose any waiting time smaller than the waiting time set by the corrupt bureaucrat; that is, $\Phi^* < \Phi$ is impossible. Usually, as a lower level civil servant, the SM also lacks the power to delay delivery of the finished decision to the clients. Even if he had sufficient power to make clients wait longer than Φ, he would not want to do this anyway, since it would decrease clients' willingness to pay a bribe to the SM, which would decrease his profit opportunities.□□

Assumption: The client, after hearing the SM's claims, decides whether to change her prior beliefs, p, about the honesty of the bureaucrat and the acceptability of her application, t.

After listening to the SM's claim that the incumbent bureaucrat is corrupt, the client adjusts her belief of facing an honest officer to some probability different from her initial belief; i.e. she calculates P (IB is honest|SM says IB is corrupt) = $\delta < p$, where δ decreases with the increasing persuasiveness of SM. The client also updates her initial belief (t) about whether her application is acceptable or not after hearing the SM's claims to calculate P (application is acceptable|SM says unacceptable) = $m < t$ and P (application is acceptable|SM says acceptable) = $k > t$. If the client does not believe that SM is a true intermediary, she rejects the SM's demands and does not change her initial probabilities.

We assume that the SM can guess all the posterior probabilities of the clients. This may seem to be a major assumption because it implies that the SM has significant informational advantage over all the other parties under all conditions. However, we can assume that the SM may be able to develop a pretty accurate idea about the behavior of the average client since he is always in touch with clients. The SM can read from the reactions of clients how much they believe his words. Therefore, the posterior probabilities depend on the SM's persuasive abilities to a very large extent; in fact, the model and its results depend on posterior beliefs.

If the SM is quite sure of his persuasive abilities, the SM can then take the probabilities close to $\delta=0$, $m=0$ and $k=1$ whatever the client's initial expectations may be. The possibility that the SM may not be correctly guessing the expectations of the client can easily be included in the model by taking the expectations of the SM about δ, m and k as δ', m' and k' for example. However, the main results of

our model do not change in this case. The SM's revenues increase as he guesses the expected probabilities of the clients more accurately. However, this option is not included in the model since it complicates the analysis unnecessarily.

Persuasion process of the SM is not modelled separately, for the sake of simplicity. Persuation abilities of the SM is taken as given and changes on it influence the model by changing updated probabilies of the client. The SM can have persuasion methods of his own. He can also show evidence regarding the previous clients he 'successfully' (!) served because it seems to those clients that the SM intervened and they received the service they wanted! Even if the client makes a search among the previous clients that SM has given as reference, what he would find out is their client satisfaction! Some SMs may also be so skillfully persuasive that, even without showing hard evidence, they can impress naive people. In addition, the search cost for the client may be greater than the bribe demanded so whether or not she actually believes the SM, she does not bother to seek more information in order to form more sophisticated updated probabilities. Alternatively, the new client can investigate whether the SM's claims are true, and then reflect the results of her search in updated probabilities.

To be able to find the Perfect Bayesian Equilibrium of the game, we begin solving the game from the final information sets.

2.1 Solution of the Last Stage

2.1.1 Case #1: Acceptable Application/Honest Bureaucrat

In case #1, the actual situation is that the application is acceptable and the bureaucrat is honest but the SM tells the client that although her application is acceptable, the bureaucrat is corrupt, therefore if she pays a bribe, the SM can make the IB accept the application without any red tape. The client thinks that she will certainly obtain the service if she accepts the SM's bribe demand because she will only pay the bribe after getting the service. Whereas if she rejects the SM's offer, she thinks that with δ probability she will face an honest bureaucrat and with k probability that her application is acceptable, which will result in receiving the desired outcome. Conversely, she thinks that with $(1-\delta)$ probability the incumbent bureaucrat will be corrupt; so, even if her application is acceptable, the corrupt bureaucrat will increase red tape making her incur red tape cost (Φ), or with $(1-k)$

probability that her application is unacceptable, so she will not get the service regardless of the IB's integrity. The expected payoff function (V_{CL}^{σ}) of the client is defined below.

$$V_{CL}^{\sigma}(\beta,\sigma,Z,T_1,T_2)=\begin{cases}\delta k(\sigma Z)+(1-\delta)k(\sigma Z-\Phi)+(1-\delta)(1-k)0+\delta(1-k)0 & \text{if} \quad s_{cL}=R\\ \sigma z-\beta & \text{if} \quad s_{cL}=A\end{cases} \quad (3)$$

The SM can only take a bribe if the client decides to accept his bribe demand in the third stage. Thus, the expected payoff function of the SM (V_{SM}) is given in equation (4):

$$V_{SM}(\beta,\sigma,Z,T_1,T_2)=\begin{cases}(1-\xi)\beta-\xi F & \text{if} \quad s_{cL}=A\\ 0 & \text{if} \quad s_{cL}=R\end{cases} \quad (4)$$

The Perfect Bayesian Equilibrium of the game can be calculated by beginning to solve from the last information sets.

Proposition 1: In the case with acceptable application/honest bureaucrat, at the last stage of the game, the clients whose valuations exceed the critical number, $\sigma > \frac{\beta+(\delta-1)\Phi k}{(1-k)Z}$, accept the SM's bribe demand and get the service by paying the bribe while the others reject it and apply directly to the bureaucrat.

Proof: It is apparent that the client prefers to accept the SM's bribe demand so long as her expected utility from doing so is greater than the expected utility from rejecting the offer. Thus, in the fourth stage, the client accepts the SM's bribe demand so long as

$$\delta k(\sigma Z)+(1-\delta)k(\sigma Z-\Phi)+(1-\delta)(1-k)0+\delta(1-k)0 \; < (\sigma Z-\beta) \quad (5)$$

This can be simplified as:

$$\sigma > \frac{\beta+(\delta-1)\Phi k}{(1-k)Z} \quad (6)$$

which means that clients whose valuations exceed a critical value of σ accept the SM's bribe demand

$$\text{since} \quad \sigma \sim \text{UN}[0,1], \quad P(\sigma > \frac{\beta + (\delta - 1)\Phi k}{(1-k)Z}) = 1 - \frac{\beta + (\delta - 1)\Phi k}{(1-k)Z} \tag{7}$$

is the proportion of the clients who prefer to accept the SM's bribe demand given the amount of bribe demanded by the SM, β.□□

2.1.2 Case #2: Acceptable Application/Corrupt Bureaucrat

The reality in the second case is that the application is acceptable but the bureaucrat is corrupt, so the SM tells the client that her application is unacceptable and the bureaucrat is corrupt, and claims that he can make the IB accept it but with some delay. The client thinks that if she accepts the SM's bribe demand, she will surely get the service by paying the bribe cost and waiting for some time. However, if she does not accept it, she thinks that with δ probability she will be faced with an honest incumbent bureaucrat and that with m probability her application is acceptable, in which case she will get the service anyway. Conversely, she thinks that with $(1–\delta)m$ probability the incumbent bureaucrat will be corrupt so even if her application is acceptable, she will only get the service by incurring red tape costs. She also thinks that with $(1–m)$ probability her application is unacceptable so she will not get the service whether the IB is honest or corrupt. The expected payoff function of the client (V_{CL}^{σ}) in this case is defined below.

$$V_{CL}^{\sigma}(\beta,\sigma,Z,T_1,T_2) = \begin{cases} \delta m(\sigma Z) + (1-\delta)m(\sigma Z - \Phi) + (1-\delta)(1-m)0 + \delta(1-m)0 & \text{if} \quad s_{cL} = R \\ \sigma Z - \beta - \Phi & \text{if} \quad s_{cL} = A \end{cases} \tag{8}$$

As before, the SM can only take a bribe if the client decides to accept his bribe demand in the third stage. So the expected payoff function of the SM can be defined as:

$$V_{SM}(\beta,\sigma,Z,T_1,T_2) = \begin{cases} (1-\xi)\beta - \xi F & \text{if} \quad s_{cL} = A \\ 0 & \text{if} \quad s_{cL} = R \end{cases} \tag{9}$$

Again, the "Perfect Bayesian Equilibrium" of the game can be calculated beginning from the last information sets.

Proposition 2: In the case with acceptable application/corrupt bureaucrat, at the last stage of the game, the clients whose valuations exceed the critical number, $\sigma > \frac{\beta + \Phi + (\delta - 1)\Phi m}{(1-m)Z}$ accept the SM's bribe demand and get the service by paying the bribe, while the others reject it and apply directly to the bureaucrat.

Proof: The client prefers to accept the bribe demand of the SM so long as her expected utility from doing so is greater than the expected utility from rejecting the offer. Thus, in the fourth stage, the client accepts the SM's bribe demand so long as

$$\delta m(\sigma Z) + (1-\delta)m(\sigma Z - \Phi) + (1-\delta)(1-m)0 + \delta(1-m)0 \; < (\sigma Z - \beta - \Phi) \tag{10}$$

This can be simplified as:

$$\sigma > \frac{\beta + \Phi + (\delta - 1)\Phi m}{(1-m)Z} \tag{11}$$

Thus, clients whose valuations exceed critical σ accept the SM's bribe demand

since $\sigma \sim UN[0,1]$, $P(\sigma > \frac{\beta + \Phi + (\delta - 1)\Phi m}{(1-m)Z}) = 1 - \frac{\beta + \Phi + (\delta - 1)\Phi m}{(1-m)Z}$ (12)

is the proportion of the clients who prefer to accept the SM's bribe demand, given the amount demanded by SM, β.□

2.2 Solution of the Third Stage

Predicting what will happen in the last stage, the SM calculates his expected payoff in the third stage. The SM can win a bribe as long as the expected utility of the client from rejecting the bribe and waiting for the IB to process the job is

smaller than that of paying the SM. Moreover, the SM demands a bribe as long as $V_{SM}>0$ (which is the participation constraint of the SM). The probability of being caught while demanding the bribe (or while disseminating the image that he can get the job done) is represented by ξ. The SM takes the probability of being caught as given. If caught, it is assumed that he suffers a penalty of amount F. For simplicity, the probability of being caught, ξ, is assumed to be independent of β; this is not too unrealistic an assumption considering current money transfer technologies through which bank accounts can be used for payments and even large amounts of money be secretly transferred. In addition, even when β is excessively high, usually the clients do not think of whistle-blowing since, at this stage, they do not know who is processing the application and how high in the hierarchy the bribe links reach. Thus, they perceive whistle-blowing as risky.[5]

As explained in Lemma 1 and Lemma 2, the SM demands a bribe in two different situations: acceptable application/honest IB and acceptable application/corrupt IB. In each case, the SM says different things to the clients and charges different prices. In the acceptable application/honest IB case, the SM tells the client that her application is acceptable but that the IB is corrupt. In the acceptable application/corrupt IB case, the SM tells the client that her application is unacceptable and that the IB is corrupt.[6] The SM determines two different bribe levels for each case, as shown below.

2.2.1 Strategy of the SM in the Acceptable Application/Honest Bureaucrat Case

Proposition 3: In the acceptable application/honest IB case, the SM demands a bribe of amount $\beta^* = \frac{(1-k)Z + (1-\delta)\Phi k}{2}$ from the clients. Clients whose

[5] Concerning the risks of whistle-blowing, see Bennett (1997).

[6] In the case with acceptable application/corrupt bureaucrat, if the corrupt bureaucrat applies red tape of amount $\Phi \geq \sigma Z$ (which is equivalent to rejecting the application), the SM cannot demand a bribe; under that condition, he can exploit clients only if the case is acceptable application/honest bureaucrat.

valuations exceed $\sigma > \frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ accept the bribe demand while others reject it and go through the normal procedure.

Proof: In the acceptable application/honest IB case, the expected utility of the SM can be defined as:

$$V_{SM}(\sigma,\beta,Z,T_1,T_2) = (1-\xi)\,P(\sigma > \frac{\beta+(\delta-1)\Phi k}{(1-k)Z})\beta - F =$$

$$= (1-\xi)(1-\frac{\beta+(\delta-1)\Phi k}{(1-k)Z})\beta - \xi F \quad (13)$$

The SM tries to maximize his utility function by using β:

$$\frac{\partial V_{SM}}{\partial \beta} = (1-\xi)\left[1-(\frac{\beta+(\delta-1)\Phi k}{(1-k)Z})-(\frac{\beta}{(1-k)Z})\right] = 0 \quad (14)$$

$$\beta^* = \frac{(1-k)Z+(1-\delta)\Phi k}{2} \quad (15)$$

The optimum amount of bribe the SM demands increases with the client's increasing valuation of the service. The amount of bribe also increases as clients attach higher posterior probability to encountering a corrupt IB and a lower probability to their demand being acceptable according to existing regulations. The SM can increase the bribe collected if he can better persuade clients that the bureaucrats are corrupt. Thus, he has the incentive to spread rumors that the office is corrupt and that nothing can be done if a bribe is not given to officers. As k increases, β^* decreases; thus, increasing the transparency of the public office decreases the bribe demands of spurious middlemen. The more a client is certain that her application is acceptable according to the regulations, the less she is willing to pay in a bribe. As the red tape applied by the corrupt IB increases, the SM's bribe demand increases as well.

The SM demands the optimum β^* amount of bribe so long as his participation constraint holds:

$$V_{SM}(1-\xi)(1-\frac{\beta+(\delta-1)\Phi k}{(1-k)Z})\beta-\xi F=(1-\xi)\frac{((1-k)Z+(1-\delta)\Phi k)^2}{4(1-k)Z}-\xi F>0 \quad (16)$$

Increasing valuations of clients, increasing red tape applied by the corrupt IB, decreasing expectations about the application being acceptable and/or the IB being honest, all make the participation constraint of the SM more likely to hold. The SM's participation constraint is also more likely to hold as fines get smaller. Thus, increasing fines, or increasing detection probabilities can make the participation constraint of the SM fail, thereby preventing this type of corruption.

Inserting the optimum bribe demand of the SM into the condition for the client to accept the bribe demand, we get

$$\delta k(\sigma Z)+(1-\delta)k(\sigma Z-\Phi) \; <\sigma Z-\frac{(1-k)Z+(1-\delta)\Phi k}{2} \quad (17)$$

This gives $\sigma>\frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ (18)

Thus, in the Perfect Bayesian Nash Equilibrium, the SM demands a bribe of $\beta^*=\frac{(1-k)Z+(1-\delta)\Phi k}{2}$ and clients whose valuations exceed $\sigma>\frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ accept the SM's bribe demand while others reject it and go through the normal procedure.□

2.2.2 Strategy of the SM in the Acceptable Application/Corrupt IB Case

Proposition 4: In the acceptable application/corrupt IB case, the SM demands a bribe of amount $\beta^*=\frac{(1-m)Z+(1-\delta)\Phi m-\Phi}{2}$ from the clients. Clients whose valuations exceed $\sigma>\frac{(1-m)Z-(1-\delta)\Phi m+\Phi}{2Z(1-m)}$ accept the demand while others reject it and go through the normal procedure.

Proof: In the acceptable application/corrupt IB case, again, the SM can get a bribe if he is not caught and if the clients accept his bribe demand. So, the SM's expected utility can be defined as:

$$V_{SM}(\sigma,\beta,Z,T_1,T_2) = (1-\xi)\,P(\sigma > \frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z})\beta - \xi F$$

$$= (1-\xi)(1-\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z})\beta - \xi F \quad (19)$$

The SM tries to maximize his utility function by using β:

$$\frac{\partial V_{SM}}{\partial \beta} = (1-\xi)\left[1-(\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z})-(\frac{\beta}{(1-m)Z})\right] = 0 \quad (20)$$

$$\beta^* = \frac{(1-m)Z+(1-\delta)\Phi m-\Phi}{2} \quad (21)$$

As in the acceptable application/honest bureaucrat case, the optimum amount of bribe the SM demands increases with the clients' increasing valuation of the service. The amount of bribe also increases as clients attach higher posterior probability to encountering a corrupt IB and a lower probability to their demand being acceptable according to the regulations. Again, the SM can increase the bribe collected if he can better persuade clients that the bureaucrats are corrupt. The main difference from the first case is that, this time, the size of the bribe demanded by the SM decreases as the red tape the corrupt IB applies increases. In addition, notice that, given the SM's persuasiveness, β^*, the amount of bribe demanded is higher in the cases with honest bureaucrats.

The SM demands optimum β^* amount of bribe as long as his participation constraint holds:

$$V_{SM} = (1-\xi)(1-\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z})\beta - \xi F = (1-\xi)\frac{((1-m)Z+(1-\delta)\Phi m-\Phi))^2}{4(1-m)Z} - \xi F > 0 \quad (22)$$

Increasing valuation of clients, decreasing expectations about the application being acceptable and/or the IB being honest, all make the participation constraint of the SM more likely to hold. Conversely, increasing red tape makes the participation constraint of the SM less likely to hold. This is an interesting result

since increasing red tape makes the use of genuine intermediaries more likely (Bayar, 2005). Again, increasing fines or increasing detection probabilities can make the participation constraint of the SM fail.

Inserting the optimum bribe demand of the SM into the condition for the client to accept the bribe demand of the SM, we get

$$\delta m(\sigma Z) + (1-\delta)m(\sigma Z - \Phi) \; < \sigma Z - \frac{(1-m)Z + (1-\delta)\Phi m - \Phi}{2} - \Phi \tag{23}$$

which gives $\sigma > \dfrac{(1-m)Z - (1-\delta)\Phi m + \Phi}{2Z(1-m)}$ (24)

Thus, in the Perfect Bayesian Nash Equilibrium, the SM demands a bribe $\beta^* = \dfrac{(1-m)Z + (1-\delta)\Phi m - \Phi}{2}$ and clients whose valuations exceed $\sigma > \dfrac{(1-m)Z - (1-\delta)\Phi m + \Phi}{2Z(1-m)}$ accept the demand while others reject it and go through the normal procedure. □

3 Extensions

An important question is regarding what happens over time to this deception process. How long can the SM abuse the information deficiencies of people without being caught or before losing all of his clients?

The same client may interact with the same public office many times or clients may talk to each other. Over time, therefore, the players' perceptions of the game, the other players and the perceived probabilities may all change. In particular, clients who reject the SM's bribe demand will experience the real situation through dealing directly with the bureaucrats themselves.

Assuming that, with probability μ, clients applying to the public office this term also apply in the next term and that the total number of clients applying does not change between the periods, we can examine how the base game changes.

Apparently, any client who rejected the SM's bribe demand and applied directly to the public officer in the previous period will have learned about the

SM's deception so they will not apply through the SM in the current period. On the other hand, for a client who previously accepted the SM's bribe demand, it is even more optimal to accept the demand in the current period since the client's previous experience will have given her the misleading impression that when the SM promises, he really gets the job done! Thus, we can safely assume that a player who accepted the SM's bribe demand in the first period will believe whatever the SM says if they play again in the second period.

As calculated in the sections above, in the case with acceptable application/honest bureaucrat, in the Perfect Bayesian Nash Equilibrium, clients whose valuations exceed $\sigma > \frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ accept the bribe demand while others reject it and go through the normal procedure. This means that $P(\sigma < \frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}) = \frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ proportion of clients go directly to the public office and learn that their job can be done without any red tape or bribe.

Similarly, in the case with acceptable application/corrupt bureaucrat, in the Perfect Bayesian Nash Equilibrium, clients whose valuations exceed $\sigma > \frac{(1-m)Z-(1-\delta)\Phi m+\Phi}{2Z(1-m)}$ accept the SM's bribe demand while others reject it and go through the normal procedure. Thus, a proportion of those clients, $P(\sigma < \frac{(1-m)Z-(1-\delta)\Phi m+\Phi}{2Z(1-m)}) = \frac{(1-m)Z-(1-\delta)\Phi m+\Phi}{2Z(1-m)}$, will see that their application is acceptable and done with Φ amount of red tape, but without any bribe. Thus, both types learn about the SM's deceit.

Let's call the proportion of clients that went to the bureaucrat directly in the previous period in the case of acceptable application/honest bureaucrat $\eta_{AH} = \frac{(1-k)Z-(1-\delta)\Phi k}{2(1-k)Z}$ and in the case of acceptable application/corrupt bureaucrat $\eta_{AC} = \frac{(1-m)Z-(1-\delta)\Phi m+\Phi}{2Z(1-m)}$. Thus, we can define R as the proportion of clients who, having refused to use the SM's 'service' in the previous period, thereby learning about the SM's deceit, applied to the public office once again in the current period.

$$R = \mu pt\eta_{AH} + \mu(1-p)t\eta_{AC}$$

3.1 Strategy of the SM in the Acceptable Application/Honest Bureaucrat Case for the Newcomers

Proposition 5: In the case of acceptable application/honest bureaucrat, the SM cannot continue to deceive newcomers in the long run if

$$\mu > \frac{((1-k)Z + (1-\delta)\Phi k)^2(1-\xi) - 4\xi F(1-k)Z}{2((1-k)Z + (1-\delta)\Phi k)^2(1-\xi) - 4\xi F(1-k)Z} \tag{25}$$

Proof: The game is the same as before except that now the proportion of new clients has decreased to *(1–μ)*. Since the SM will apply a different price to the repeat users of his 'services', we can deduce the proportion of clients who acccepted the bribe demand in the previous period and applied again to the public office. (We will examine the case of repeat users in the sub-sections below.) Thus, the SM's strategy in the acceptable application/honest bureaucrat case turns out to be his decision for the newcomers. In that case, all the results remain the same, except the utility of the SM decreases by a proportion of *(1–μ)*:

$$V_{SM} = (1-\xi)(1-\mu)(1-\frac{\beta + (\delta-1)\Phi k}{(1-k)Z}))\beta - \xi F \tag{26}$$

$$\frac{\partial V_{SM}}{\partial \beta} = (1-\xi)(1-\mu)\left[(1-(\frac{\beta + (\delta-1)\Phi k}{(1-k)Z}) - (\frac{\beta}{(1-k)Z})\right] = 0 \tag{27}$$

$$\beta^* = \frac{(1-k)Z + (1-\delta)\Phi k}{2} \tag{28}$$

The SM's utility is decreased by *(1–μ)*:

$$V_{SM} = (1-\xi)(1-\mu)(1-\frac{\beta + (\delta-1)\Phi k}{(1-k)Z})\beta - \xi F = (1-\xi)(1-\mu)\frac{((1-k)Z + (1-\delta)\Phi k)^2}{4(1-k)Z} - \xi F > 0 \tag{29}$$

What happens to the SM's participation constraint over time?

$$V_{SM} = (1-\xi)(1-\mu-\mu^2...)\frac{((1-k)Z+(1-\delta)\Phi k)^2}{4(1-k)Z} - \xi F > 0 \quad (30)$$

$$\lim_{t\to\infty} V_{SM} = (1-\xi)(1-\mu-\mu^2...)\frac{((1-k)Z+(1-\delta)\Phi k)^2}{4(1-k)Z} - \xi F = \quad (31)$$

$$V_{SM} = (1-\xi)(1-\frac{\mu}{1-\mu})\frac{((1-k)Z+(1-\delta)\Phi k)^2}{4(1-k)Z} - \xi F > 0 \quad (32)$$

Thus, the SM's participation constraint holds so long as

$$\mu < \frac{((1-k)Z+(1-\delta)\Phi k)^2(1-\xi) - 4\xi F(1-k)Z}{2((1-k)Z+(1-\delta)\Phi k)^2(1-\xi) - 4\xi F(1-k)Z} \quad (33)$$

□

3.2 Strategy of the SM in the Acceptable Application/Corrupt IB Case for the Newcomers

Proposition 6: In the case of acceptable application/corrupt bureaucrat, the SM cannot continue to deceive newcomers in the long run if

$$\mu > \frac{((1-m)Z+(1-\delta)\Phi m-\Phi)^2(1-\xi) - 4\xi F(1-m)Z}{2((1-m)Z+(1-\delta)\Phi m-\Phi)^2(1-\xi) - 4\xi F(1-m)Z} \quad (34)$$

Proof: The game is again the same as before except that now the clients decrease to a proportion *(1–μ)*.

$$V_{SM} = (1-\xi)(1-\mu)(1-\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z}))\beta - \xi F \quad (35)$$

$$\frac{\partial V_{SM}}{\partial \beta} = (1-\xi)(1-\mu)\left[(1-(\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z}) - (\frac{\beta}{(1-m)Z})\right] = 0 \quad (36)$$

$$\beta^* = \frac{(1-m)Z+(1-\delta)\Phi m-\Phi}{2} \quad (37)$$

Again, the SM's utility is decreased by *(1–μ)*:

$$V_{SM} = (1-\xi)(1-\mu)(1-\frac{\beta+\Phi+(\delta-1)\Phi m}{(1-m)Z})\beta - \xi F = (1-\xi)(1-\mu)\frac{((1-m)Z+(1-\delta)\Phi m-\Phi)^2}{4(1-m)Z} - \xi F > 0 \quad (38)$$

What happens to the SM's participation constraint over time?

$$V_{SM} = (1-\xi)(1-\mu-\mu^2...)\frac{((1-m)Z+(1-\delta)\Phi m-\Phi)^2}{4(1-m)Z} - \xi F > 0 \quad (39)$$

as t→∞

$$V_{SM} = (1-\xi)(1-\frac{\mu}{1-\mu})\frac{((1-m)Z+(1-\delta)\Phi m-\Phi)^2}{4(1-m)Z} - \xi F > 0 \quad (40)$$

The SM's participation constraint holds so long as

$$\mu < \frac{((1-m)Z+(1-\delta)\Phi m-\Phi)^2(1-\xi)-4\xi F(1-m)Z}{2((1-m)Z+(1-\delta)\Phi m-\Phi)^2(1-\xi)-4\xi F(1-m)Z} \quad (41)$$

□

3.3 Strategy of the SM in the Acceptable Application/Honest IB Case with repeat dealings—SM says the case is Acceptable Application/Corrupt IB, the client believes

Proposition 7: In the case with acceptable application/honest bureaucrat, for the SM to be able to continue the deception in the long run when faced with repeat users of his 'services', μ must exceed a threshold:

$$\mu > \frac{4\xi F}{Z(1-pt\eta_{AH}-(1-p)t\eta_{AC}(1-\xi)+4\xi F} \quad (42)$$

Proof: $V_{CL}{}^{\sigma}(\beta,\sigma,Z,\Phi,T_1,T_2) = \begin{cases} \sigma Z-\Phi & \text{if } s_{cL}=R \\ \sigma Z-\beta & \text{if } s_{cL}=A \end{cases}$

Thus, in the fourth stage, the client accepts the SM's bribe demand so long as $(\sigma Z-\Phi)\leq(\sigma Z-\beta) \rightarrow \beta \leq \Phi$ and as long as accepting the bribe demand gives a positive utility, $(\sigma Z-\beta)\geq 0,\ \sigma \geq \beta/Z$. Thus, it is optimal for the SM to set β as[7]

$$\begin{aligned} V_{SM} &= (1-\xi)(\mu - R)(1-\left(\frac{\beta}{Z}\right))\beta - \xi F \\ \frac{\partial V_{SM}}{\partial \beta} &= (1-\xi)(\mu - R)(1-\frac{2\beta}{Z}) = 0 \quad \Rightarrow \quad \beta = \frac{Z}{2} \\ V_{SM} &= (1-\xi)(\mu - R)\frac{Z}{4} - \xi F \end{aligned} \tag{43}$$

where R is the proportion of clients who in the previous period rejected the SM's bribe demand and thus learned about the real case: $R = \mu pt\eta_{AH} + \mu(1-p)t\eta_{AC}$

What happens to the SM's participation constraint over time? In repeated dealings, increasing μ improves the SM's utility, thereby making the participation constraint more likely to hold.

$$V_{SM} = (1-\xi)G(\mu + \mu^2 + ...)\frac{Z}{4} - \xi F > 0 \qquad where \quad G = (1 - pt\eta_{AH} - (1-p)t\eta_{AC}) \tag{44}$$

$$\begin{aligned} V_{SM} &= (1-\xi)(\frac{\mu}{1-\mu})\frac{Z}{4} - \xi F > 0 \\ \Rightarrow \mu &> \frac{4\xi F}{ZG(1-\xi) + 4\xi F} = \frac{4\xi F}{Z(1 - pt\eta_{AH} - (1-p)t\eta_{AC})(1-\xi) + 4\xi F} \end{aligned} \tag{45}$$

□

[7] If $Z/2 \leq \Phi$, SM sets $\beta = Z/2$, otherwise he sets $\beta = \Phi$. We assumed $\Phi \geq Z/2$, extension to the case of $Z/2 \leq \Phi$ is straightforward.

3.4 Strategy of the SM in the Acceptable Application/Corrupt IB Case with repeat dealings—SM says the case is Unacceptable Application/Corrupt IB, the client believes

Proposition 8: In the case of acceptable application/corrupt bureaucrat, for the SM to be able to continue the deception in the long run when faced with repeat users, μ must exceed the following threshold:

$$\mu > \frac{4\xi FZ}{(1-pt\eta_{AH}-(1-p)t\eta_{AC})(1-\xi)(Z-\Phi)^2+4\xi FZ} \tag{46}$$

Proof: $V_{CL}{}^{\sigma}(\beta,\sigma,Z,\Phi,T_1,T_2) = \begin{cases} 0 & \text{if} \quad s_{cL}=R \\ \sigma Z - \beta - \Phi & \text{if} \quad s_{cL}=A \end{cases}$

Thus, in the fourth stage, the client accepts the SM's bribe demand so long as $(\sigma Z-\beta-\Phi)\geq 0 \quad \rightarrow \sigma \geq (\beta+\Phi)/Z$. Thus, it is optimal for the SM to set β as

$$\begin{aligned} V_{SM} &= (1-\xi)(\mu-R)\left(1-\left(\frac{\beta+\Phi}{Z}\right)\right)\beta-\xi F \\ \frac{\partial V_{SM}}{\partial \beta} &= (1-\xi)(\mu-R)\left(1-\frac{2\beta+\Phi}{Z}\right)=0 \quad \Rightarrow \quad \beta=\frac{Z-\Phi}{2} \\ V_{SM} &= (1-\xi)(\mu-R)\frac{(Z-\Phi)^2}{4Z}-\xi F \end{aligned} \tag{47}$$

What happens to the SM's participation constraint over time? With repeated dealings, increasing μ improves the SM's utility, thereby making the participation constraint more likely to hold.

$$\begin{aligned} &V_{SM} = (1-\xi)G(\mu+\mu^2+\ldots)\frac{(Z-\Phi)^2}{4Z}-\xi F>0 \quad \text{where} \quad G=(1-pt\eta_{AH}-(1-p)t\eta_{AC}) \\ &\Rightarrow \mu > \frac{4\xi FZ}{G(1-\xi)(Z-\Phi)^2+4\xi FZ}=\frac{4\xi FZ}{(1-pt\eta_{AH}-(1-p)t\eta_{AC})(1-\xi)(Z-\Phi)^2+4\xi FZ} \end{aligned} \tag{48}$$

The results of the analysis show that, as the proportion of clients, μ, applying to the public office more than once increases, it becomes more diffficult to obtain a bribe from newcomers. However, it becomes easier to obtain a bribe from clients

who apply more than once, provided that they used the SM in the previous period. It seems that the SM can abuse at least one group of clients in either case. Increasing the size of penalties and the probability of being caught by the authorities seems to be an important policy tool in all cases to reduce this type of corruption.□

Corollary: If, some proportion of clients who apply directly to the bureaucracy in the first period, η_{AH} and η_{AC}, are whistle-blowers who complain about the SM to the law enforcement agencies, the probability of the SM being caught increases. This makes it more likely for the SM's participation constraints to fail in all cases.

Another factor is that the IBs may learn gradually about what the SM does as well. Since both corrupt and honest bureaucrats as well as the public office itself are harmed by the SM's activities, it can be expected that the bureaucrats will try to stop the SM by complaining about him to their superiors or to law enforcement agencies, if they become aware of the situation. This may as well be included in the model as an addition to the SM's probability of being caught (ξ). However, there may be other factors making this discovery and complaint process slower. SM's corruption does not impose direct monetary costs on honest bureaucrats but merely disturbs them by harming the office's reputation. Some people may not take preventive action either because they are apathetic to what happens around them or they do not want to have problems with those they have dealings with.

Unlike an honest bureaucrat, a corrupt bureaucrat incurs direct monetary costs as a result of the SM's behavior since his activities decreases the bureaucrat's own bribe-taking opportunities. At the same time, however, the corrupt officer may be afraid to complain about the SM to his superiors or law enforcement agencies because he is also corrupt and may fear that his complaints might increase the likelihood of his being investigated.

Another possibility is that, even if a complaint is made about the SM to higher level superiors or law enforcement agencies by whistle-blowing clients or bureaucrats, some of the superiors or law enforcers may have some form of interest relation with the SM, monetary or otherwise, and thus may protect him. For example, the SM may share some of his profits to persuade the superiors or law enforcers to turn a blind eye to his deceptive and corrupt activities. All these factors make the prevention of SMs more difficult.

4 Results and Conclusions

The model presented here examines a peculiar type of intermediation process: a person inside a public office who has no role in the jobs performed but can observe the process is able to obtain a bribe from a client by taking advantage of her informational deficiencies about the integrity of the public office and whether her application is acceptable or not.

An interesting conclusion of the model is that this spurious middleman gains a bribe even from jobs performed by honest bureaucrats for acceptable applications. Thus, the SM can obtain bribes from clients whose jobs would have been done anyway. This is a completely deceitful process that harms all parties other than the SM: clients make extra payments for a service they would have received with no additional costs anyway, the image of the office is damaged, and citizens begin to perceive the office as more corrupt than it actually is.

Although a clean image of the public office is important, the office's endeavors to present such an honest image may be rendered ineffective if the SM can effectively persuade people to the contrary. Thus, even if the proportion of honest bureaucrats increases in the office but this increase somehow cannot be made known to the public, clients' expectations will not change. Therefore, the increase in the proportion of honest officers will just result in more gains for the SM.

Which is worse in terms of damaging impacton public sector service delivery: geniune intermediaries or spurious ones? SMs appear to be more harmful since they give the impression of corruption when there is none. Oldenburg (1987) summarizes his observations of the Indian Land Consolidation Program as: "[a] contradiction between a low incidence and a high reputation of wide-spread corruption"; the SM can present even a low level of corruption as high, and has a strong incentive to do so. On the other hand, genuine intermediaries are usually a reflection of existing corruption since they really are mediating existing corrupt transactions.

The model shows us that the SM's participation constraint may cease to hold for newcomersin cases where some proportion of clients apply to the public office more than once, for some critical proportion of re-applying clients; however, he may still continue to benefit from those clients who used his 'services' in the previous period. If the SM is not caught, or the clients who learned about the truth

do not whistle-blow, the process can feed itself. The SM becomes more persuasive, the public office is perceived to be more corrupt, more people accept the SM's bribe demands, and the SM begins to build an image that he can achieve the desired outcome provided you accept his bribe demand. Thus, in a vicious circle, the SM obtains more bribes and the public office is perceived as even more corrupt.

The results of the model also demonstrate that the SM's activities in the public office cause a paradox. Namely, the SM can get more bribes from clients if the application is processed by an honest bureaucrat. Ironically, honest and idealistic bureaucrats who try to serve clients with integrity through fast and efficient services can help the SM exploit clients more easilywithout realizing it.

What policy proposals can prevent such a vicious circle from developing? The results of the model show that the increasing posterior probability of a corrupt public office or clients' increasing uncertainty about whether their application is acceptable according to the regulations are two of the most important factors that feed the process. Therefore, rules and regulations must be clear and understandable for clients in order to prevent such a process. All steps of the processing of the applications should be transparent. Each client should be able to learn easily whether and why her application is acceptable. Drawing on a field experiment, Peisakhin and Pinto (2014) show that India's recently adopted freedom of information law has been effective in helping the poor to secure access to basic public services nearly as fast as before, but now without paying bribes.

However, as Baç (2001) shows although a higher level of transparency in decision making increases the probability of corruption or wrongdoing to be detected, it may also improve outsiders' information about the identities of key decision makers, thus enhancing incentives to establish connections for engaging in corruption. This implies that there may be an optimal level of transparency: for local improvements in transparency, the 'connections effect' may dominate the 'detection effect', thereby causing an increase in corruption.

The results of the model also indicate that increasing penalties and increasing the probabilities of being caught are among the most important factors that discourage the SM under all conditions. A transparent public office with a well-established, dependable complaint-processing system that protects whistleblowers is an important factor in decreasing the clients' willingness to bribe the SM due to fear that they cannot otherwise get the service they need.

Lambsdorff (2013) suggests auditing of intermediaries and certification of "good" intermediaries, who actually help firms and individuals to deal with the bureaucracy without supporting corrupt transactions. According to Lambsdorff, outright prohibition of intermediaries would not work because in that case firms may find ways of illegally arranging the corruption intermediation in-house or alternatively, the intermediation activities can go underground. Moreover, the real services given by honest intermediaries are prevented. As Lambsdorff (2013) states: "A more formal approach will be needed to certify honest intermediaries today. Transparent Agents and Contracting Entities (TRACE) is a recently established non-profit initiative that certifies intermediaries' commitment to abstain from bribery" (Lambsdorff, 2013, p. 361).

If intermediaries are audited and certified to ensure their honesty, it would become more difficult for spurious middlemen to convince their clients that they can mediate in the process because potential clients could demand to see the certificate of anyone claiming to be an intermediary.

The development of e-government, increasing today in many countries, can also offer good results. Automation of procedures ensures simplicity and clarity of rules, as well as predictability of results. When clients make their applications over the internet, they follow standardized procedures without the need to engage with public officers or intermediaries (either internal or external).

This indicates that a useful subject for further study would be to analyze the effects of e-government efforts, transparency of evaluation processes and protection of whistle-blowers against corruption with or without spurious or genuine intermediaries.

The case of spurious middlemen has only recently begun to be investigated in the corruption literature, with this study being the first theoretical analysis of the issue, although there have been some empirical observations of this type of intermediary in literature, as mentioned in the introduction. It would be valuable to conduct further survey studies among the users of public services to establish whether clients have detected such events and the mechanisms through which they noticed the deception. In addition, laboratory experiments can be designed where one of the players acts as an SM to a group of clients so that the behavior of the parties can be observed. Such studies have the potential to greatly increase our insights into this important aspect of corruption and would suggest ways to combat it.

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