Lobbying and Bribery

Vivekananda Mukherjee*

Amrita Kamalini Bhattacharyya

Department of Economics, Jadavpur University, Kolkata 700032, India

June, 2016

*Corresponding author. E-mail: mukherjeevivek@hotmail.com

Abstract

The paper explores the relation between lobbying and bribery by construction of a theoretical model. In particular it asks whether ease of lobbying reduces bribery. The answer as it appears is ambiguous. It derives the condition for which lobbying and bribery are substitutes and complements of each other. It also shows that under certain conditions ease of lobbying may reduce social welfare.

Keywords: Lobbying, Corruption, Social Welfare
JEL Classification: D72, D73, H23, I31, P18

1. Introduction

Bribery is a well-known façade of corruption in government departments through which favor is exchanged between a government official and a perpetrator of an illegal activity. In lobbying, on the other hand, favor is bestowed on policy makers for a desired change in policy. Lobbying may not necessarily be an act of corruption. In fact in many developed countries lobbying is legal and they have a legal framework through which certain industrial or non- governmental organization can lobby for certain policies[1]. But in case of developing countries like India, China lobbying is still illegal[2]. According to the most of the widely used indices of corruption like the Corruption Perception Index these are also the countries known as the more corrupt countries in the world[3]. The natural question that comes to mind that is there any relation between illegality of lobbying and prevalence of corruption in the economies? If illegality of lobbying induces the prevalence of bribery, easing up of lobbying in these countries would reduce the incidence of corruption. This paper tries to explore the relation between lobbying and bribery by construction of a theoretical model. In particular it asks whether ease of lobbying reduces

[1] For example in Australia the government maintains a register of the lobbyists both at federal and state level, who are the only people allowed to contact the government legislatures for lobbying activities. The same registration system exists in the USA. It has brought a Lobbying Disclosure Act in 1995 which made it mandatory to publicly disclose all the expenses met for the lobbying activity by each firm. European Union has also allowed legal lobbying to the point that they have put a ceiling on the amount of contributions a member of European parliament can accept (Jacobs, 2010).

[2] In India allegation of lobbying dates back to almost 60 years ago when a Member of Parliament, H.G Mudgal, was accused of taking cash from Mumbai Bullions Association and was expelled from the parliament. But only recently the issue of lobbying, has entered the public domain as the allegations of taking money for bestowing favors to industries, coming into light more frequently. First of the many such cases is the Nira Radia Tape controversy that rose in 2010. Nira Radia, an influence peddler used her acquaintance with the then Telecom Minister of India, A. Raza to gain private access for the big telecom companies of India, and is currently undergoing trial for the same. The absence of proper channel through which legal lobbying can be done, has led to many corporate espionage cases. The most recent is the one where the finance minister of India's budget speeches was leaked through the employees working at the ministry. Information from the defense ministry were also leaked as a housekeeper stole important documents from the minister's office. Many high level corporate executives from the top firms were involved in the espionage case and were charged for the same (Kalra & Sanyal, 2013).

[3] India ranks at the 85th position out of the 136 countries that are covered under this index for the year 2014. China ranks at the 100th position (Transparency International, 2015).

bribery.

The model presented in the paper takes up the case of lobbying done by an industry association for reduction in fine rate related to environmental pollution. As it is non-excludable and non-rival in its consumption the outcome of the successful lobbying comes as a public good for all the firms in the industry. The lobbying cost is shared by the members of the association[4]. We explore the way the reduction in lobbying cost influences the corrupt behavior of the individual members of the association who bribes the pollution inspector if detected of polluting the environment. A firm in our model therefore engages in lobbying at collective level as a member of the association and in corruption at personal level by offering a bribe to the representative of the lower level bureaucrats. The model attempts to capture the influence of the collective action on personal behavior. We show that with the ease of lobbying waste level generated definitely increases but the effect on bribe is ambiguous. But most interestingly, the frequency of bribe incidence may either rise or fall depending on some initial set of conditions. We also derive the conditions under which the social welfare falls with the ease of lobbying. Therefore this model elicit that legalizing lobbying may not bring down corruption in the economies with prevalent corruption; in some of the situations it may even result in loss of welfare.

Becker (1983) was one of the pioneering papers to discuss lobbying games. However the present paper concerns itself not with lobbying games as such, it discusses the effect of factors that eases lobbying on incidence of bribery. For this it extends the framework of Mookherjee and Png (1995) by introducing possibility of lobbying. It is not that the relationship between lobbying and bribery has not intrigued academics in the past. The paper by Giovannoni & Campos (2006) elicits that lobbying and corruption has a substitutable relation. They show with data from twenty-five countries that the firms who take membership of any lobbying group consider themselves more able to influence policy makers through lobbying in comparison to more direct means of influence that is through bribery. However the problem with their argument is the following: it is neither that lobbying and bribery are practiced at the same level of a government nor they affect a

[4] Lobbying by an individual firm is rare unless it is a monopoly (or trying to create a monopoly) as it is not possible for an individual firm in an industry to appropriate all the benefits generated through lobbying, but the cost is concentrated to the firm only.

firm's profit in similar way. First, while lobbying is usually targeted to the legislators for change of laws, bribery is targeted towards the bureaucrats for escaping violation of a law; second, while the benefits of lobbying are like a public good to a firm, the benefits of bribery is private. So there is no reason why lobbying and bribery cannot be complements of each other. In another paper Damania, Friedriksson, and Mani (2004) on the other hand have shown that bribery and lobbying have a complementary relation with each other. In their paper, similar to the present one, lobbying and bribery are targeted to different levels of government. Lobbying targeted to weaken judiciary/to create political instability facilitates bribery at the lower level of the bureaucracy for private benefit. In cross-country data they show that there exists a positive association between weak judiciary/weak democracy and bribery. But the problem with their framework is that they do not endogenize the behavior of the bribe-takers and the complete theoretical link between lobbying and bribery remains unexplored. We address this in the present paper. In other related papers Harstad and Svensson (2011) have shown that while bribery is more prevalent at the low income countries, lobbying is more prevalent in the high income countries. They argue that this happens due to the existence of hold-up problem in corrupt economies: the hold-up problem affects investment in lobbying. The effect of lobbying has been studied extensively by Richter, Sampatharak and Timmons (2008) on effective taxes. They showed that the extensive practice of lobbying activities leads to decrease in the amount of effective taxes and disruptive development activities through corruption.

In the theoretical model presented in the paper we endogenize behavior of both bribe takers and bribe givers through a bribery game and links it up to ease of lobbying. Unlike the literature surveyed above we show that in economies with prevalent corruption under different set of conditions one might expect the substitute and complementary relations between lobbying and corruption. Though none of the previous papers looked at the welfare issue, here, we derive the sufficient conditions under which the ease of lobbying reduces the welfare of a corrupt economy.

In the next section we present the theoretical model and derive the results. The section following concludes.

Olson have argued that lobbying groups with fewer but larger members are more effective in comparison to large groups. The problem of 'free ride' affects the effectivity of the group (Olson, 1965). The lobbying results of this paper will depend upon the size of each lobbying group and will vary amongst industries.

2. The Model

Consider the case of a representative firm in an industry that while producing a good, releases untreated waste w into the environment. The cost of legally disposing the waste through proper treatment is $c(w)$. Therefore being a profit maximizer the benefit of the firm is the unrealized cost of treating the waste i.e. $c(w)$. We assume $c(0) = 0,\ c'(w) > 0$ and $c''(w) < 0$. The released waste causes harm to the environment $h(w)$ where $h'(w) > 0$ and $h''(w) > 0$. For checking the harm the legislative body fixes a penalty at the rate of f per unit of waste released and delegates its implementation on the Pollution Control Authority (PCA). The PCA cannot have information about w unless an inspector it employs actually goes to the firm, investigates and reports the amount of waste. Finding out the firm's true level of waste is not costless for the inspector; she needs to put an effort of intensity $e(\mu)$, where $\mu \in (0,1)$ represents the probability of discovering the firm's true level of waste. We assume $e'(\mu) > 0, e''(\mu) > 0$ and $e(0) = 0$. The effort level, put in by inspector is unobservable by its employer the PCA. We assume while the inspector can under-report i.e. can report $\widehat{w} < w$ if she wishes but over-reporting i.e. reporting $\widehat{w} > w$ is infinitely costly for her. Reporting $\widehat{w} = 0$ in fact eliminates the effort cost of the inspector. To counter such a possibility the PCA offers a reward scheme to the inspector. The inspector receives a portion $r \in (0,1)$ of the fine collected out of the reporting i.e. if $\widehat{w}$ is reported, she receives $rf\widehat{w}$ as reward. The firm always wants to reduce its burden of penalty for releasing waste.

In this paper we consider two alternative strategies for the firm in managing this: (1) by reducing the penalty rate f which requires industry level lobbying with the legislatures; (2) by bribing the inspector to report $\widehat{w} < w$. While the reduced f will be like

a public good for all the firms in the industry, bribing the inspector will create only individual benefit to the bribing firm. In this paper we would look for the possible tradeoffs between these two strategies for a typical firm in the industry. Below we discuss the lobbying case and the bribing case in sequence, starting with lobbying first.

Because of the public good nature of the benefit from reduction of f, the lobbying for this best done at the industry level through the industry association. We assume that the industry association lobbies to the legislatures to keep the fine rate f to a minimum such that its members benefit from the reduced burden of penalty. The share of lobbying cost for the representative firm is $e_F(f,\theta)$ where θ represents all the factors other than magnitude of f in influencing the lobbying cost like legal status for lobbying, better coordination among the association members etc. Since lobbying for a lower fine rate requires higher resources per firm, we assume $\frac{\partial e_F}{\partial f} < 0$. We also assume $\frac{\partial^2 e_F}{df^2} > 0$ i.e. the marginal resources cost increases with lower fine rate. We interpret θ in such a way that $\frac{\partial e_F}{\partial \theta} < 0$ and $\frac{\partial}{\partial \theta}\left(\frac{\partial e_F}{\partial f}\right) > 0$. Given f, as θ rises, which is possible, for example if lobbying receives legal status or better co-ordination among the association members is achieved, the lobbying cost falls.

The firm offers a bribe to the inspector only if she discovers the true pollution level of the firm. As mentioned above that this event occurs with probability μ. In such a situation a corruptible inspector after successful negotiation may accept a bribe b to report an amount $\hat{w} < w$ to the authority such that a surplus of $f(w-\hat{w})$ created for the firm. The lower is the report, the higher is the surplus, and the higher is the demand for bribe made by the inspector in the negotiation. However the incidence of bribery may leak out with the probability λ to a vigilant government agency or to the media. The PCA then penalizes the corrupt inspector at the rate of P_t such that she has to pay $P_t(w-\hat{w})$ as penalty. The firm as a bribe giver is penalized at the rate of P_g such that it has to pay $(1+P_g)f(w-\hat{w})$ as penalty.

We model both the firm and the inspector as risk neutral agents. Therefore the expected pay-off of the firm is given by the concave function,

$$\pi^F(w,\mu,f) = c(w) - b - f\widehat{w} - \lambda\{(1 + P_g)f(w - \widehat{w})\} - e_F(f,\theta)$$

(1)

Similarly the expected pay-off of the inspector is given by the concave function,

$$\pi^I(w,\mu,f) = -e(\mu) + b + rf\widehat{w} - \lambda P_t(w - \widehat{w}) \quad (2)$$

Equations (1) and (2) show interdependence between the strategies of the firm and the inspector. The sequence of decisions is specified as follows:

Stage 1: The firm chooses e_F and by lobbying f gets determined;

Stage 2: Given f the firm chooses w and the inspector chooses μ simultaneously;

Stage 3: Given (w,μ) the bribe negotiation determines $(b,\widehat{w})$.

In this paper we propose to study the effect of changes in θ on the equilibrium outcome. For this purpose we solve the model in back-ward induction first.

Stage 3: bribery

Proposition 1: [(Mookherjee & Png, 1995)] $\widehat{w} = 0, b^* = \frac{1}{2}[\{1 - \lambda(1 + P_g) + r\}f + \lambda P_t]w(f(\theta))$.

While the firm expects to gain $[\{1 - \lambda(1 + P_g)\}f(w - \widehat{w}) - b]$ from bribing the inspector to underreport, the inspector's expected gain is $\{b - (rf + \lambda P_t)(w - \widehat{w})\}$ from taking a bribe. The bribery takes place if and only if both the firm and the inspector gain at the same time. The condition that ensures the occurrence of bribery is given by:

$$\{1 - \lambda(1 + P_g)\}f > rf + \lambda P_t \quad (3)$$

If inequality (3) holds, they first agree about $\widehat{w} = 0$ because it maximizes the joint surplus. Then the amount of bribe is determined through Nash-bargaining as:

$$b^* = \frac{1}{2}[\{1 - \lambda(1 + P_g) + r\}f + \lambda P_t]w \quad (4)$$

Stage 2: Determination of w and μ

Substituting the values of $\widehat{w}$ and b^* in equations (1) and (2) we rewrite them as:

$$\pi^F(w,\mu,f) = c(w) - \frac{1}{2}\mu\left[\{1-\lambda(1+P_g)+r\}f + \lambda P_t\right]w - e_F(f,\theta),$$

(5)

$$\pi^I(w,\mu,f) = \mu\left(\frac{1}{2}\left[\{1-\lambda(1+P_g)+r\}f + \lambda P_t\right]w - \lambda P_t\right)w - e(\mu).$$

(6)

The firm and the inspector simultaneously choose $w = w^* > 0$ and $\mu = \mu^* > 0$ to maximize their respective payoffs given in (5) and (6) above. At the Nash equilibrium the following equations must hold:

$$c'(w^*) = \frac{1}{2}\mu^*\left[\{1+\lambda(1+P_g)+r\}f + \lambda P_t\right] \quad (7)$$

$$e'(\mu^*) = \frac{1}{2}w^*\left[\{1-\lambda(1+P_g)+r\}f - \lambda P_t\right].$$

(8)

Lemma 1: $\frac{\partial w^*}{\partial f} < 0$.

Proof:

$$\frac{\partial w^*}{\partial f} = \frac{\frac{1}{2}\mu^*\{1+\lambda(1+P_g)+r\}e''(\mu^*)+1/4\ \omega^*\{1-\lambda(1+P_g)+r\}[\{1+\lambda(1+P_g)+r\}f+\lambda P_t]}{c''(w^*)\ e''(\mu^*)-1/4\ [\{1+\lambda(1+P_g)+r\}f+\lambda P_t][\{1-\lambda(1+P_g)+r\}f-\lambda P_t]}$$

(9)

We can see from the above equation that the denominator

$c''(w^*)\ e''(\mu^*) - \frac{1}{4}\left[\{1+\lambda(1+P_g)+r\}f + \lambda P_t\right]\left[\{1-\lambda(1+P_g)+r\}f - \lambda P_t\right]$ have $c''(w) < 0$, $e''(\mu) > 0$ and $\left\{\left[1-\lambda(1+P_g)+r\right]f - \lambda P_t\right\}$ is positive from inequality (3). Therefore both the terms of the denominator are negative making it negative overall. The numerator is positive from the inequality (3) that is if the bribery condition holds then along with positive values of both w^* and μ^* and $e''(\mu^*) > 0$ ensures that the numerator of the equation (9) is positive. Hence $\frac{\partial w^*}{\partial f} < 0$, meaning fall in fine rate leads to increase in waste produced. □

It follows from lemma 1 that when the fine rate falls, the firm chooses to produce more waste. This happens as the expected cost of producing waste falls as f falls.

The introduction of lobbying affects the fine rate and the optimum level of waste produced by the firms. This indirectly affects the intensity with which the inspector is expected to put in effort to discover the actual level of waste. Since bribery occurs if and only if the inspector finds out the actual level of waste produced by the firm, the effect of lobbying on the intensity of effort of the inspector determines the frequency of bribery when lobbying takes place.

Lemma 2: $\frac{\partial \mu^*}{\partial f} \gtreqless 0$ if and only if $-\frac{1}{2}c''(w^*)w^*\{1-\lambda(1+P_g)+r\} \gtreqless \frac{1}{2}\mu^*\{1+\lambda(1+P_g)+r\}[\{\{1-\lambda(1+P_g)+r\}f-\lambda P_t\}]$.

Proof: From (7) and (8) we obtain:

$$\frac{\partial \mu^*}{\partial f} = \frac{\frac{1}{2}c''(w^*)w^*\{1-\lambda(1+P_g)+r\}+\frac{1}{2}\mu^*\{1+\lambda(1+P_g)+r\}[\{1-\lambda(1+P_g)+r\}f-\lambda P_t]}{c''(w^*)e''(\mu^*)-\frac{1}{2}[\{1+\lambda(1+P_g)+r\}f+\lambda P_t][\{1-\lambda(1+P_g)+r\}f-\lambda P_t]}$$

(10)

The denominator of R.H.S. of (10) is identical with the denominator of $\frac{\partial w^*}{\partial f}$ in the R.H.S of (9) and has been proved to be negative. The first term of the numerator is negative from $c''(w^*) < 0$ and the inequality (3). But second term is positive from inequality (3). The sign of the numerator depends on strength of these two terms. If $\left(\frac{1}{2}\mu^*[1+\lambda(1+P_g)+r]\{[1-\lambda(1+P_g)+r]f-\lambda P_t\}\right) > \frac{1}{2}c''(w^*)w^*[1-\lambda(1+P_g)+r]$ then the numerator is positive, in that case $\frac{\partial \mu^*}{\partial f} > 0$ and vice versa. Therefore the statement of lemma follows. □

Intuitively, when the fine rate falls, it affects the effort supplied by inspector in two ways. First, the amount of optimal bribe $b^* = \frac{1}{2}[\{1-\lambda(1+P_g)+r\}f+\lambda P_t]w$ falls. This adversely impacts the incentive of the inspector to put higher effort. But on the other hand, as optimum amount of waste produced by the firm increases it becomes easier to discover the actual waste level which positively affects incentive to put higher effort. The bribe rate also depends on the actual waste level, therefore it might lead to higher effort by the inspector.

Lemma 3: $\frac{\partial b^*}{\partial f} \lesseqgtr 0 \; iff \left(-\left[\{1-\lambda(1+P_g)+r\}f+\lambda P_t\right]\frac{\partial w^*}{\partial f}\right) \gtreqless \{1-\lambda(1+P_g)+r\}w^*$

Proof: Substituting the values of (w^*, μ^*) in the equation (4), the optimum value of bribe is calculated as

$$b^* = \frac{1}{2}\left[\{1-\lambda(1+P_g)+r\}f+\lambda P_t\right]w^*$$

Differentiating b^* with respect to f:

$$\frac{\partial b^*}{\partial f} = \frac{1}{2}\{1-\lambda(1+P_g)+r\}w^* + \frac{1}{2}\left[\{1-\lambda(1+P_g)+r\}f+\lambda P_t\right]\frac{\partial w^*}{\partial f}$$

The first term in the R.H.S is positive from (3) but as $\frac{\partial w^*}{\partial f} < 0$ from lemma 1, the second term is negative. Hence the statement follows. □

The amount of bribe an inspector receives from a firm depends on both the fine rate and the amount of waste that the firm produces. As decrease in fine rate directly lowers the amount of prospective bribe but as the fine rate falls, the amount of waste produced by the firm rises, which raises the amount of bribe. Therefore the effect of changes in fine rate on equilibrium bribe becomes ambiguous.

Next we check the effect of decline in fine rate on social welfare. Let us define the welfare of the economy as

$$S = c(w^*) - h(w^*) - e(\mu^*) - e_F(f,\theta) \tag{11}$$

where $h(w)$, the social harm function that we assume to be a strictly increasing convex and differentiable function of waste w^*. Notice, bribe rate being pure transfer does not feature in calculation of the welfare.

Lemma 4: $\frac{\partial S}{\partial f} > 0$ if $c'(w^*) \leq h'(w^*)$ and $\frac{\partial \mu^*}{\partial f} \leq 0$

Proof: From (11) differentiating S with respect to f, we obtain:

$$\frac{\partial S}{\partial f} = \{c'(w^*) - h'(w^*)\}\frac{\partial w^*}{\partial f} - e'(\mu^*)\frac{\partial \mu^*}{\partial f} - \frac{\partial e_F}{\partial f} \tag{12}$$

As $c'(w) > 0, h'(w) > 0, \mathrm{e}'(\mu) > 0, \frac{\partial e_F}{\partial f} < 0$ by assumption, $\frac{\partial w^*}{\partial f} < 0$ from lemma 1 and $\frac{\partial \mu^*}{\partial f}$ is ambiguous in sign from lemma 2, the sign of $\frac{\partial S}{\partial f}$ can be either positive or negative and the statement of the lemma follows.

□

Lemma 4 intuitively states that for the case where the benefit from untreated waste is lower than the harm caused to the society and the intensity of bribery rises or remains unchanged due to fall in in the fine rate (which raises the cost to the society as the inspector chooses to supply higher effort) the social welfare decreases as the fine rate falls.

But notice lemma 4 defines only insufficient condition for having $\frac{\partial S}{\partial f} > 0$. Clearly if these conditions are violated as in the case of $\frac{\partial \mu^*}{\partial \mathrm{f}} > 0$ or $c'(w) > h'(w)$ then a decrease in fine rate leads to ambiguous effect on the social welfare.

Stage 1: Lobbying

Substituting the values of w^* and μ^* in equations (5) and (6) we rewrite them as:

$$\pi^F(f) = c(w^*) - {}^1\!/_2\,\mu^*\left[\{1 - \lambda(1 + P_g) + r\}f + \lambda P_t\right]w^* - e_F(f, \theta) \quad (13)$$

$$\pi^I(f) = \mu^*\left({}^1\!/_2\left[\{1 - \lambda(1 + P_g) + r\}f + \lambda P_t\right]w^* - \lambda P_t\right)w^* - e(\mu^*) \quad (14)$$

At this stage of the game the firm decides its lobbying effort for reduction in f. How does reduction of f affect $\pi^F(f)$ as given in (13). Using equation (7), from (9) we obtain:

$$\frac{\partial \pi^F(f)}{\partial f} = -\frac{\partial \mu^*}{\partial f}\left[{}^1\!/_2\,\{1 - \lambda(1 + P_t) + r\}f + \lambda P_t\right]w^* - {}^1\!/_2\,w^*\mu^*\left[\{1 - \lambda(1 + P_g) + r\}\right] - \frac{\partial e_F}{\partial f}(f, \theta), \quad (15)$$

Notice the reduction in f affects the firm's expected profit at the margin in three different ways; first, as it now affords to produce more of untreated waste; second, as the lower value of f is realized only with a higher lobbying cost; third, as the probability of a bribe incidence changes with the change in probability of waste-detection. Let us identify

the marginal benefit of the firm from the reduction of f as $\left(\frac{1}{2}w^*\mu^*\left[\{1-\lambda\left(1+P_g\right)+r\}\right]+\frac{\partial\mu^*}{\partial f}\left[\frac{1}{2}\{1-\lambda(1+P_t)+r\}f+\lambda P_t\right]w^*\right)$ and the marginal cost of the same as $\left\{-\frac{\partial e_F}{\partial f}(f,\theta)\right\}$. Notice if no lobbying costs were there since $\left[\frac{1}{2}\{1-\lambda(1+P_t)+r\}f+\lambda P_t\right]w^*>0$ had it been the case that $\frac{\partial\mu^*}{\partial f}>0$, the marginal profit from reduction of f would always be positive. In such a situation the firm would lobby for $f=0$. However in presence of lobbying cost we assume $\left\{-\frac{\partial e_F}{\partial f}(f,\theta)\right\}$ is high enough to ensure existence of an interior solution $0<f^*<f$ for the firm's choice of fine rate. At f^*, $\frac{\partial\pi^F(f^*)}{\partial f}=0$ holds which in turn implies:

$$\frac{1}{2}w^*\mu^*\left[\{1-\lambda\left(1+P_g\right)+r\}\right]+\frac{\partial\mu^*}{\partial f}\left[\frac{1}{2}\{1-\lambda(1+P_t)+r\}f^*+\lambda P_t\right]w^*=-\frac{\partial e_F}{\partial f}(f^*,\theta)$$

(16)

is satisfied. We assume $\frac{\partial^2\pi^F}{\partial f^2}>0$ for reduction of fine at f^* towards the satisfaction of the second order condition for maximization. Note that if $\frac{\partial\mu^*}{\partial f}=0$ the marginal benefit from lobbying falls compared to the situation where $\frac{\partial\mu^*}{\partial f}>0$ but the marginal cost remains unchanged. Therefore the firm would choose a higher value of fine rate (would lobby for a lower reduction in fine rate) compared to the equilibrium described in equation (16) above. By similar logic, the case where $\frac{\partial\mu^*}{\partial f}<0$ the lobbying would fall further. In the extreme case if the lobbying cost for reduction of fine rate exceeds the marginal benefit for the reduction of it for all values fine rates in $[0,f]$ the firm would decide not to lobby at all.

Ease of Lobbying

The variable θ stands for ease of lobbying. The higher is θ, easier is lobbying in an economy in terms of advocacy forums, regulations and organized framework. Therefore $\frac{\partial}{\partial\theta}\left(-{}^{\partial e_F}/_{\partial f}\right)<0$ which means the marginal cost of lobbying decreases when θ increases.

Lemma 5: $\frac{\partial f^*}{\partial\theta}<0$

Proof: Since $\frac{\partial}{\partial\theta}\left(\frac{\partial e_F}{\partial f}\right) > 0$, at an interior solution of the firm's problem at stage 1 (where $\frac{\partial^2 \pi^F}{\partial f^2} > 0$) it must be the case that $\frac{\partial f^*}{\partial\theta} < 0$.

□

This follows intuitively as well. When lobbying by the firms are facilitated in the economy, it is expected that the fine rate will go down. The decreasing marginal cost affects the frequency of bribery level μ^*as well as the optimum waste level w^* indirectly through changes in the optimum level of fine rate f^*.

Proposition 2: $\frac{\partial\mu^*}{\partial\theta} \lesseqgtr 0$ *if and only if* $-\frac{1}{2}C"(w^*)w^*\{1-\lambda(1+P_g)+r\} \gtreqless \frac{1}{2}\mu^*\{1+\lambda(1+P_g)+r\}[\{1-\lambda(1+P_g)+r\}f-\lambda P_t]$

Since $\frac{\partial\mu^*}{\partial\theta} = \frac{\partial\mu^*}{\partial f}\frac{\partial f^*}{\partial\theta}$ the statement of the proposition follows from lemma 2 lemma 5

□

If lobbying is introduced in a country or facilitated through a proper framework, the fine rate of an environmental harm will fall as it becomes easier for the industry associations to lobby and influence the policy makers. The fall in the fine rate f^* might or might not affect the incidence of bribery μ^*. Even if it affects, the direction in which it works is ambiguous. If fall in the fine rate affects the incidence of bribery positively, bribery goes down with increased lobbying. Lobbying then have a substitutable relation with bribery. But if decrease in fine rate affects the intensity of bribery negatively, bribery goes up with increase in lobbying. Lobbying then have a complementary relation with bribery.

Proposition 3: $\frac{\partial w^*}{\partial\theta} > 0$.

Proof: From Lemma 1, $\frac{\partial w^*}{\partial f} < 0$, and as $\frac{\partial f^*}{\partial\theta} < 0$ from lemma 5.

Therefore, $\frac{\partial w^*}{\partial\theta} = \frac{\partial w^*}{\partial f}\frac{\partial f^*}{\partial\theta} > 0$. □

If lobbying is made legal and easier in a country, it leads to fall in the fine rate for environmental harm caused by the waste. The decrease in the fine rate leads to an increase amount of waste produced by every firm. This intuitively explains proposition 3.

Proposition 4: $\frac{\partial b^*}{\partial \theta} \gtreqless 0$ when $-\{[1-\lambda(1+P_g)+r]f+\lambda P_t\}\frac{\partial w^*}{\partial f} \gtreqless \frac{1}{2}[1-\lambda(1+P_g)+r]w^*$.

Proof: Since we know $\frac{\partial b^*}{\partial \theta} = \frac{\partial b^*}{\partial f}.\frac{\partial f^*}{\partial \theta}$

The statement of the proposition follows from lemma 3 and lemma 5. □

Note that the effect of ease of lobbying on the rate of bribe remains ambiguous as well. The effect of decrease in fine rate on the bribe is ambiguous. Decrease in fine rate increases optimal waste but decreases the amount of expected bribe. Ease of lobbying indirectly affects the bribe through the changes in fine rate. Therefore the effect remains ambiguous also in this case.

Proposition 5: $\frac{\partial S}{\partial \theta} < 0$ if both $c'(w^*) \leq h'(w^*)$ and $\frac{\partial \mu^*}{\partial f} \leq 0$ holds.

Proof: Since $\frac{\partial S}{\partial \theta} = \frac{\partial S}{\partial f}\frac{\partial f^*}{\partial \theta}$ the statement of the proposition follows from Lemma 4 and the lemma 5. □

We can see from propositions 2 and 3 above that ease of lobbying increases the optimal waste level of an industry but the effect of it on bribery is ambiguous. The incidence of bribery (and therefore the corruption level) might go up when lobbying is eased up depending upon the reactions of the inspectors who are agents of corruption. On one hand, the decrease in the fine rate reduces the amount of bribe they expect from the firm which leads to reduction in their effort towards discovery of the actual waste level of the firm. On the other hand, decrease in the fine rate leads to increase in the amount of waste. Therefore it becomes easier for an inspector to investigate and discover the possible waste production and possibility of getting a bribe. This leads to an increase in the incidence of bribery. If the later dominates the former and the social harm created by the waste is sufficiently high the social welfare falls following easier lobbying opportunities in the economy.

3. Conclusions

This paper tries to derive the relationship between lobbying and bribery in a game theoretic framework. In the proposed model a firm produces a good along with an environmentally harmful by-product. There exists a fine rate for producing harmful goods. The firm at the same time may lobby the legislature through industry association for reduction of the fine rate and may bribe an inspector to persuade her to report less amount of waste so that it can escape the payment of existing fine. The effect of ease of lobbying is ambiguous on the incidence of bribery. It can rise or fall depending upon the reaction of the inspector who engages herself in bribery. It also shows that the waste level definitely increase if lobbying is eased in an economy with prevalent corruption. It also derives the condition for which ease of lobbying definitely reduces welfare of such economies.

The existing literature on the issue of lobbying and bribery predicts either a relation of substitution or of complement between the two, but they do not study how the incentives of the bribe-givers and bribe-takers change due to lobbying. Once this is endogenized this paper shows that the substitutability or complementarity between lobbying and bribery essentially depends on the reaction of the inspectors in a corrupt economy. This paper also checks the impact of ease of lobbying on welfare of such economies and derives the conditions under which it falls. So at the policy level the paper sounds a caution before easing lobbying process in a corrupt economy: it may neither reduce corruption nor improve welfare of the economy.

The predictions of the model possibly can be checked empirically as well depending on availability of data. The strength of lobbying of an industry association varies from one industry to another. It depends on some parameters of the association as suggested by Olson (1965) like the number and size of firms involved in the association on which data can be collected. On the other hand the data on the amount of bribe each firm pays for persuading the inspectors to underreport can be collected through primary surveys and it can be checked how the amount of bribe its member pays depends on the strength of the industry association. The effect of inclusion of civil society or non- governmental organizations in the lobbying game also can be checked in an extended framework.

References

Becker, G. S., 1983. A theory of competition among pressure groups for Political Influence. *Quarterly Journal of Economics*, August, pp. 371-400.

Damania, R., Friedriksson, P. G. & Rani, M., 2004. The persistence of corruption and regulatory comliance failures: Theory and evidence. *Public Choice 121,* Volume 121, pp. 363-390.

Giovannoni, F. & Campos, N. F., 2006. *Lobbying, Corruption and Political Influence.* Bronn, Institute for the study of labor.

Harstad, B. & Svensson, J., 2011. Bribes, Lobbying and Development. *American Political Science Review,* 105(1), pp. 46-63.

Jacobs, M., 2010. Lobbying. *The Washington Post*, 9 May.

Kalra, H. & Sanyal, K., 2013. *A case for lobbying in India.* [Online]
Available at: http://www.livemint.com/Opinion/DWZTZTfYOScT8inQuPCHAO/A-case-for-lobbying-in-India.html
[Accessed 15 July 2015].

Mookherjee, D. & Png, I., 1995. Corruptible Law Enforcers: How should they be compensated. *The Economic Journal,* Volume 105, pp. 145-159.

Olson, M., 1965. *The Logic of Collective Action.* 1st ed. Cambridge: Harvard University Press.

Richter, B. K., Samphantharak, K. & Timmons, J. F., 2008. Lobbying and Taxes. *American Journal of Political Science,* 53(4), pp. 893-909.

Transparency International, 2015. *Corruption Perception Index 2014,* Germany: Transparency International.