ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 10, Issue, 05, pp. 35768-35772, May, 2020
https://doi.org/10.37118/ijdr.18800.05.2020

RESEARCH ARTICLE OPEN ACCESS

HOW HONEST LEADERS GIVE UP CONTROLLING THE CORRUPT BEHAVIORS OF DECEPTIVE JUNIORS? – A GAME THEORETICAL APPROACH TO STUDY THE CORRUPT BEHAVIORS OF INSIDER MIDDLEMEN

***Kannan Perumal**

Author is a Post Graduate in Anti-Corruption Studies

ARTICLE INFO

Article History:
Received 09th February, 2020
Received in revised form
29th March, 2020
Accepted 06th April, 2020
Published online 25th May, 2020

Key Words:

Bayesian game, corrupt arrangements, Anti-corruption interventions, Middleman, Personal gain.

****Corresponding author:*** **Kannan Perumal,**

ABSTRACT

This Bayesian game examines the situation where honest leadership gives-up controlling the corrupt behaviors of their juniors who create imperfect information for personal gain. By applying theoretical inputs from the game theory, this work has developed a mathematical model that can be subjected to further empirical testing. The model suggests that anti-corruption interventions must factor the constraints that restrict the efforts of leadership in controlling corruption. Further, this work argues that increasing the probabilities of detection; and of service by the leadership can bring in a shift in the belief of the clients in favour of reporting against the middlemen.

Citation: ***Kannan Perumal.*** "How honest leaders give up controlling the corrupt behaviors of deceptive juniors? – a game theoretical approach to study the corrupt behaviors of insider middlemen*", International Journal of Development Research*, 10, (05), 35768-35772.

INTRODUCTION

Role of intermediaries in corrupt transactions is a well researched area. The infamous Petrobras scandal that spread across sixteen countries in four continents had well structured intermediary arrangements both for bribing and laundering the illicit wealth. More than ninety percent of the cases investigated under the Foreign Corrupt Practices Act between 1977 and 2017 had involvement of middlemen (Stanford Law School, 2017). Due to obvious advantages that the intermediaries provide, parties to corrupt deals prefer intermediaries. Studies show that with increasing risk and complexity of corrupt transactions (Della P & Vannucci, 2012) actors to corrupt deals prefer engaging intermediaries. Moretti (2018) argues that intermediaries reduce the costs by managing the risk of getting detected by enforcement agencies; solving the problems involved in initiating & setting-up the corrupt transactions; and by operating complex money laundering schemes. Addressing the issues of intermediaries is a challenge to anti-corruption enforcement as the intermediaries sustain corruption by reducing the uncertainties associated with corrupt deals. According to Bussel (2017) paying inadequate attention for detecting the middlemen is one of the reasons of failure of anti-corruption interventions. Lambsdorff (2007) argues that by specializing in the nuances of illegal markets middlemen can facilitate transactions and reduce costs, thereby meriting their inclusion in an illegal exchange. Ideally, middlemen build connections between bribe giver and the public servant/service provider for commissions by guaranteeing the delivery of service. But, there could be instances of middlemenship where intermediaries benefit themselves by pretending to be controlling the service the client expects which they actually do not. In such cases, middleman signal the potential client that he can get things done and that without his intermediary client may not be able to get the desired service. Constraints of the decision maker and procedural complexities in availing the service favour the intermediary to make the client believe that approaching the middleman is a rational choice. Such instances have been studied in various countries. Retired bureaucrats (Bertrand et al., 2007); members of outsourcing agencies (Simhan, 2004); professional intermediaries (Lambsdorff, 2013); public servants who were removed from service (Tirtirglu, 2000) have been found to be acting as intermediaries in many countries without having any control over the service the client desires to have from the service provider. In such arrangements, the intermediary creates the impression that his intervention is critical for getting the service. With incomplete information about actual service provider, the client believes that approaching the middlemen will maximize his benefits. In successful deals, the intermediary benefits himself by harming both service provider and the client by deception. This work expands the dimensions of anti-corruption literature by studying a situation that constraints the honest leadership to ignore the corrupt behaviors of their junior colleagues. Central question to be answered in this work is why the honest senior gives up controlling the corrupt behaviors of the junior who deceives him and the client for personal gain? For answering the research question this work applies Bayesian model in which the players have incomplete information about each other.

This game theory based work examines in detail as to how the middlemen use incomplete information for affecting the uncertainties for personal gain at the cost of service provider and the client. In this work, the intermediary who is a junior public servant by pretending to be impacting the decisions of the service provider demands bribe from the client. Though the intermediary is not the actual service provider and his senior provides services on merit, corrupt behaviors of the intermediary could not be controlled by the senior leader who is honest. Client, driven by utility maximization behavior approaches the intermediary by paying the bribe he demands. In effect, the middleman benefits himself by causing harm both to the honest service provider and the client. Taking insights from the demand theory, Becker (1968) argues that incidence of crime depends upon the probability of detection and quantum of punishment. Thus, the correct combination of probability of detection and the quantum of punishment can lead to optimal deterrence to corruption (Dominic. S, 2014). There are many types of corruption like, individual corruption; petty corruption; grand corruption; centralized corruption etc. Ackerman (1999) talks about decentralized corruption where there are many public authorities each determining and collecting their own bribes. Depending upon the uncertainties involved in corrupt transactions parties to corrupt deals engage intermediaries. Middlemen assure services for commission. Oldenburg (1987) studied about intermediaries who take bribe by pretending to be impacting the decisions of service providers. But, middlemen need not always be from outside the organization. It is quite possible that someone in the hierarchy of decision making can demand bribe by creating incomplete information about the service that the client wants. Depending upon the accessibility of client to information the middlemen can construct his corrupt behaviors.

Study of Amegashie (2013) shows situations in which consumers with incomplete information require services from public authorities who may be corrupt. In incomplete information, player's type is known to themselves and the probability distribution over types is common knowledge (Dominic. S, 2014). Incomplete information can become imperfect information if a party to the game does not know the history of movements of the game while entering the game; and driven by incomplete information, the opposite party can be misled to pay bribe. In other words, at least one party to the game is unaware of the pay off functions of the other party. The existence of private information with one party leads the informed party to signal and the uninformed party to learn and respond (Gibbons, 1997). The Bayesian games try to model situations in which some players have private information before the game begins (Dominic. S, 2014). The private information can be anything which is relevant to the player's decision making, such as pay off function; beliefs etc. (Kockesen, n.d). In such scenarios, perfect Bayesian equilibrium becomes a solution concept. The perfect Bayesian equilibrium concept was developed in order to refine the Bayesian Nash equilibrium concept. Besides, in extensive form games with incomplete information the requirement of sub-game perfection does not work well (Levin, 2002). Essentially, the perfect Bayesian equilibrium strengthens the sub-game perfection by requiring two elements: 1. A complete strategy for each player and 2. Beliefs for each player (Johari, n.d). It combines the strategy profile and conditional beliefs that players have about other player's types at every information set. Perfect Bayesian equilibrium is a well suited solution in signaling games where the first player observes some information and takes action; and the second player without observing the type of the first player forms beliefs about his type and acts (Jimmy, 2013). Since belief and behaviors are internally consistent in the perfect Bayesian equilibrium, the Bayes theorem places no restriction on the opposition's belief following any offer (Powell, 2008) and thus, the perfect Bayesian equilibrium is necessarily rational (Gailmard, 2014). Signaling games and Bayesian games have widely been applied in many fields of social sciences like, economics (Benabou, 1992); law, marketing (Tracy, 1992) and finance (Rogoff, 1989).

The Game: In this Bayesian game there are three players 1.The senior public official who heads the organizational unit and is competent to provide services (CPO); 2. The junior public official (JPO) who demands bribe from client pretending to be impacting the decisions of CPO and 3. The client (CL) who wants service desirable to him. The CPO, being competent authority, runs the organizational unit commanding the JPO and other officials in his unit. At the same time, CPO has relatively less stable tenure *(α)* and any of his decisions can be reversed *(π)* by his superiors in the hierarchy. The model assumes that CPO is honest and provides services on merit. But, being at the top of the hierarchy in his unit and due to cumbersome official procedures CPO is not directly accessible to the CL. Besides, between the CPO and JPO there are layers of officers junior to the CPO in decision making. By virtue of being part of the decision making process, JPO has opportunity to present his views before the CPO though decisions taken by the CPO are independent of the views of JPO. Also JPO is accessible to CL as he forms part of the cutting edge level administration. JPO is a scarce resource *(χ)* as the CPO has shortage of junior officers for running the administration. But, JPO is corrupt and demands bribe *(β)* from CL by pretending to be impacting the decisions of CPO; and sends the signal *(γ)* that he can guarantee the service desired by the CL.

This Bayesian model further assumes that CL has incomplete information about CPO; but has beliefs about the pay off functions. With incomplete information, CL has to decide whether to approach the CPO or JPO by incurring β. CL prefers to approach JPO because the incomplete information that he has drives him to think that approaching the CPO will give him lesser utility. Strategy in a Bayesian game is defined as a mapping from the set of type of player to set of pure strategies of the player (Kesen & Efe, 2007). Further, strategy of a player specifies a pure action for each type of player (Al-raweshidy, 2010). In this model, β is the increasing function of value Z attached by CL to the service. Here, JPO has two issues to make choices in deciding his strategy. 1. deciding whether to demand β or not; if he decides to take β, he needs to decide the quantum also and 2. deciding the cost γ that he would incur in sending signal to the CL. In this model $P(\lambda)$, $P(\eta)$ represent probabilities of getting detected while taking bribe and consequent prison term that the JPO shall undergo respectively. Also the JPO takes the constraints of CPO α, π and χ as given while deciding γ. Accordingly, strategy space of the JPO can be expressed as: $S_{JPO}= J_1 X\ J_2$. Here J_1 represents space of service provider; and J_2 represents space of the service. CPO is the one who is competent to decide the nature of service to be provided to the CL. JPO has to comply with the instructions of JPO as he works under him.

As assumed by the model, CPO provides services on merit without taking bribe. Further, CPO is aware that JPO being part of the decision making process can misinform the CL for his personal benefit; and also the CPO is concerned about maintaining his image of being clean. But, CPO has the $P(1-\alpha)$ stability and the scarcity constant χ. Besides, there is $P(1-\pi)$ of his decisions getting reversed by his superiors. In addition, CPO gets disutility $(-\Omega)$ when CL approaches JPO with the mistaken belief that he can ensure the desired service. $-\Omega$ includes damage on the reputation of CPO and possible misleads that the JPO can give in official briefs upon his successful deal with the CL. JPO and CL can make their corrupt deal in such a way that CPO can neither observe nor detect their agreement in normal course as $\lambda=f(R)$.Here, R represents reporting by the CL against JPO. Still, CPO tries to prevent the possible corrupt deal between JPO and CL by incurring μ. μ includes efforts made by the CPO to inform CL about his honesty in providing services and about possible administrative and legal consequences on the JPO in the event of detection. It is assumed that γ and μ happen simultaneously as required by the Bayesian model. As far as the CPO is concerned, without considering the type of client or the middleman, he needs to decide whether to incur μ or not. Thus, the strategy space of CPO becomes $S_{CPO}= P_+$ (incur μ or not).

The game has three stages. At stage one, nature randomly chooses the valuation type of CL. At stage two, JPO decides β & γ; and simultaneously the CPO decides μ to bring down β & γ. But, CPO cannot observe β & γ as the JPO factors λ and η while structuring the corrupt deal and γ. As assumed by the model neither JPO nor CPO knows the type of CL as it is a random distribution. At stage three, CL forms his belief about the probability of not getting his desired service $P(\omega)$ from CPO observing the outcomes of moves at the previous stage. If CL decides to approach CPO he will incur δ for locating the CPO and to find out if he will provide service without the influence of JPO. Then, he decides whether to approach CPO or the JPO for service incurring β. CL can be categorized as per the value Z he attaches to the service. Accordingly, the type of CL (φ) is a random draw from the continuum of clients over the interval [0, 1]. $\varphi Z =1$ is value attached by the most eager CL to the service. CL has disutility from both β and δ. Here, he has two choices: 1. locate and approach the CPO by incurring δ or 2. approach the JPO and pay β. Thus, strategy space of the CL becomes: $S_c= (C_1)\ (C_2)$ with choices of approaching or ignoring CPO and JPO for service. Having defined the strategy spaces of all the three players, I proceed to define their pay off functions. Pay off is a mathematical function describing the award given to a single player at the outcome of a game. It is function of the strategies adopted by all the players. In this model, $V^i(V_{CL},V_{JPO},V_{CPO})$ represents pay off functions. Considering strategies of all the three palyers, expected pay off function of CL can be defined as,

$V_{CL}(\gamma, \mu, \beta, S_c) = \{[1- \omega (\gamma, \mu)]\ \varphi\ Z + \omega (\gamma, \mu)-\delta\}$, if CL approaches the CPO incurring δ; and,

$V_{CL}(\gamma, \mu, \beta, S_c) = [\varphi\ Z- \beta]$, if CL approaches the JPO paying β.

Here, $(1-\omega)$ represents the probability of CL getting the desired service from CPO considering $(1-\alpha)$, $(1-\pi)$ and χ; $(1-\alpha)$, $(1-\pi)$ represent the probability of CPO getting stable tenure and the probability of his decisions getting not reversed by his superiors. χ represents scarcity constant. Though the CPO is honest and provides services on merit, with increasing function of γ, CL believes that incurring δ with $P(1-\omega)$ getting the desired service from CPO will give him lesser utility. As a result, he prefers approaching the JPO by incurring β. Here, I define the functional relationship between ω and γ & μ as $\omega(\gamma)>0$; $\omega(\mu)<0$.

JPO's pay off β is the function of CL approaching him instead of going to CPO at stage three. Thus, expected pay off function of JPO can be defiend as,

$V_{JPO}(\beta, \eta, \gamma, S_c) = (1-\lambda)\ \beta + \lambda\ (-\eta) - \gamma$, if CL approaches JPO; and

$V_{JPO}(\beta, \eta, \gamma, S_c) = - \gamma$, if CL approaches CPO.

Here, λ with sample space {0, 1} is the probability of getting detected while taking bribe; and $-\eta$ represents the disutility of prison term that the JPO shall undergo in the event of detection. Thus, when CL approaches the JPO expects β as long as $P(\lambda)=0$; but, he incurs γ in both the cases.

CPO gets disutility $-\Omega$ at stage three when the CL approaches JPO incurring β and he incurs μ in both the cases. Thus, the expected pay off function of CPO becomes,

$V_{CPO}(\mu, S_c) = (1-\lambda)\ (-\Omega) - \mu$, if CL approaches JPO

$V_{CPO}(\mu, S_c) = -\mu$, if CL approaches CPO.

I solve the problem by beginning from stage three using backward induction technique. CL decides to approach JPO and incurs β as he believes that incurring δ with $(1-\omega)$ probability of getting the desired service from CPO will give him lesser utility. This behavior of CL favors JPO as long as $\{(1-\omega)\ (\gamma, \mu)\ (\varphi Z- \delta)\} < (\varphi Z- \beta)$.

Knowing the possible utility functions of CL, JPO expects his pay off function at stage two as follow: $V_{JPO}(\omega, \varphi, \beta, \gamma, \mu) = (1-\delta)\ \{(1-\omega)\ (\gamma, \mu)\ (\varphi Z- \delta) < (\varphi\ Z- \beta)\}\ \beta+ \lambda\ (-\eta) - \gamma$. JPO can expect β as long as $[(1-\omega)\ (\gamma, \mu))\ \varphi\ Z- \delta)] < (\varphi\ Z- \beta)$ where CL has lesser utility.

Similarly, JPO will continue to engage in corruption as long as $V_{JPO}> 0$. Participation constraint of JPO is the function of λ and η. But, λ is independent of μ and β because by increasing μ, the CPO cannot make $P(\lambda)=1$. Similarly β has no functional relationship with λ as the corrupt deal is independent of β. Even in the event of increase in μ, CL prefers against reporting because he is not sure about corrupt networks in the bureaucratic hierarchy and the CPO is not readily accessible. Besides, JPO being part of the decision making process may jeopardize his chances of getting the desired service.

As far as the CPO is concerned, I define his pay off function as follow,

$$V_{CPO} = (1-\lambda)\ \{(1-\omega)\ (\gamma, \mu)\ (\varphi Z-\delta) < (\varphi Z-\beta)\}\ (-\eta) - \mu$$

Now I proceed to explain the utility maximization behavior of the actors assuming that *(β- δ)>0* and *(β- δ) < φZ*. Here, JPO tries to maximize his utility in terms of both *β* and *γ*. *β* increases with increase in *Z*. *β* also increases when *P(1- ω) = 0*. Bribe demanded is again positively related to *δ*. Thus, JPO's profit maximization function with respect to *β* becomes,

$$V_{JPO} = (1-\lambda) \left\{ \frac{\beta-\delta}{\omega z} < (\varphi\beta + \delta) \quad (-\eta) - \gamma \right\}$$

Also JPO tries to maximize his benefit according to *γ*. He incurs *γ* up to the point where the perception of CL about *P (ω) =1*. At this stage, since *δ* and *ω* have strong positive correlation and the JPO chooses to reduce *γ*. With reduced *γ* level P(λ) becomes less. On the other hand, as long as the belief of CL about P $(\omega) > 0$, JPO increases *γ*. Again, *γ* is the decreasing function of P (λ). Thus, profit maximization function of the JPO with respect to *γ* becomes,

$$V_{JPO} = (1-\lambda)\ \{(1-\omega\ (\gamma, \mu)\ (\varphi Z-\delta) < (\varphi Z-\beta)\}\ \beta + \delta\ (-\eta) - C > 0$$

If the participation constraint of JPO fails, utility from *β* becomes zero; then, the JPO will refrain from engaging in corruption. By increasing *η & μ* and the probabilities of *(1-ω) & λ;* and by lowering *δ* the participation constraint of JPO can be driven to failure. Optimization problem of the CPO is to maximize the utility by using *μ*,

$$V_{CPO} = (1-\lambda)\ \{(1-\omega\ (\gamma, \mu)\ (\varphi Z-\delta) < (\varphi Z-\beta)\}\ (-\Omega) - \mu.$$

CPO increases *μ* aiming at decreasing *β* as *Ω* is the increasing function of *P (ω)*. As *δ* and *Ω* increase, the CPO increases *μ*. But, the CPOs participation constraint that makes him to decide whether to incur *μ* or not fails whenever,

$$\{(1-\lambda)\ [(1-\omega)\ (\gamma, \mu)\ (\varphi Z-\delta) < (\varphi Z-\beta)]\ (-\Omega) - \mu\} < \{(1-\lambda)\ [(1-\omega)\ (\gamma, 0))\ (\varphi Z-\delta) < (\varphi Z-\beta)]\ (-\Omega)\}$$

If the cost of *μ* is very high, the effect of *μ* on ω becomes low. Now, the CPO becomes helpless and considers that corruption is uncontrollable and takes β & γ given. At the third stage CL plays. Given *γ* and *μ,* the CL determines his expectation about *ω*. CL also observes *β* and decides his choice comparing the expected utilities. When he prefers to approach JPO, he gets service by incurring *β* and if he decides to approach CPO he gets service without paying bribe.

FINDINGS

This game theory based model shows the utility maximization behavior of JPO by harming both CPO and CL by deception. With given constraints, the only way available to the CPO is to increase the cost of *μ* to bring down *β* and *γ*. But, *β* and *γ* are, by nature, independent of *μ*. Similarly, when *P[(1- α), (1-π), χ] >0*, the cost of *μ* tends to increase and when it becomes very high its effects on *γ* becomes low. As a result *P (ω)>0*. This makes the CPO to give up his efforts to control the deceptive JPO and he takes *β* and *γ* as given. The model suggests two fold solutions: Firstly, increasing the probability of CL preferring to approach the CPO by bringing down *δ*. This requires, providing free access of CL to the CPO and ensuring decision making at the level of CPO & his superior authorities transparent and time bound. This can work well in the context where *P[(1- α), (1-π), χ] =1*. This will help the CL to form opinion about $P\ (1-\omega)$. The point at which $P\ (1-\omega) = 1$, can alter the belief of CL by lowering *δ,* and by reducing the impact of γ on the CL. Similarly, increasing the probabilities of *λ* by creating mechanism to process and dispose off the complaints against JPO can lower *γ*. With *P (λ) =1* and $P\ (1-\omega) = 1$, the CL will come forward to report against the JPO.

REFERENCES

Ackerman. (1999). *Corruption and government: causes, consequences and reform.* Cambridge: Cambridge University Press.

Al-raweshidy, H. (2010). *Theory of games: an introduction.* London: Brunel University.

Amegashie. (2013). *Consumers' complaints, the nature of corruption, and social welfare.* Ontario: Department of Economics, University of Guelph.

Becker. (1968). Crime and punishment: an economic approach. *Journal of Political Economy* , 156-169.

Benabou. (1992). Privileged information to manipulate markets: insiders, gurus and credibility. *Quarterly Journal of Economics* , 921-958.

Bussell, J. (2017). When do middlemen matter? evidence from variation in corruption in India. *Governance* , 1-16.

Dekel, E., & Fudenberg, D. (2110). *Learning to Play Bayesian games.* Cambridge: Departments of Economics, Harvard University.

Diogo, M. (2018). *The use of intermediaries in corrupt deals: lessons from the Petrobras case for compliance officers.* Laxenberg, Vienna: International Anti-Corruption Academy.

Dominic, S. (2014). *Detection and deterrence in the economics of corruption: a Game theoretic analysis and some ecperimental evidence.* New York: University of New York.

Gailmard. (2014). *Preventing prevention.* Berkeley: Department of Political Science, California University.

Gibbons, R. (1997). An introduction to applicable game theory. *The Journal of Economic Perspectives* , 127-149.

Jeon, Y., & Miller, S. (2005). *An ideal decomposition of industry dynamics:an application to the nationwide and state level US banking industry.* New York: Department of Economics,University of Connecticut.

Kesen, L. K., & Efe, O. (2007). *An introduction to game theory.* New York: New York University.

Lambsdorff. (2007). *The institutional economics of corruption and reform: Theory, evidence, and policy.* Cambridge: Cambridge University Press.

Levin. (2002). *Dynamic games with incomplete information.*

Nichols, P. (2004). Corruption as an assurance Problem. *American University International Law Review* , 1308-1348.

Perumal, K. 2019. *In-built safeguards for anti-corruption enforcement- to protect the innocence or to protect the* *corrupt- a case study on the effectiveness of the Prevention of Corruption Act, India,* Vienna: International Anti-Corruption Academy.

Perumal, K. (2020). *Rents, sanction for prosecutions and corruption control: evidence from the Prevention of Corruption Act, 1988.* Sardar Vallabhbhai Patal National Police Academy , p. 86-103.

Powell, R. (2008). *A model of spoils politics.* Stanford: Graduate School of Business, Stanford University.

Princeton University, 2014. *Anti-corruption agencies and their relevance,* New Jersey: Princeton University.

Rogoff. (1989). Reputation, coordination and monetary policy. In Barro, *Modern Business Cycle Theory* (pp. 236-264). Cambridge: Harvard University Press.

Song, Y., & Zhu, M. (2016). Game-theoretic approach for anti-corruption policy between investigating committee and inspected departments in China. *International Conference on Applied Mathematics* (pp. 452-455). Shanghai : Shanghai philosophy and social science.

Sousa, L. d., 2010. Anti-corruption agencies: between empowerment and irrelevance. *Crime Law Social Change,* I(53), p. 5–22.

Stanford Law School. (2017). *Third party intermeduaries: Foreign Corrupt Practices Act.* Stanford: Stanford Law School.

Teng, J. (2013). *Is perfect Bayesian Equilibrium a subset of Nash equilibrium?* Ras al Khaimah: American University of Ras Al Khaimah.

Tracy. (1992). Strikes and holdouts in wage bargaining: theory and data. *American Economic Review* , 100-121.

Trantidis, A. & Tsagkroni, V., 2017. Clientelism and corruption:Institutional adaptation of state capture strategies in view of resource scarcity in Greece. *The British Journal of Politics and International Relations,* XIX(2), p. 263–281.

Wong, Y.-Y., & Wrigh, R. (2011). *Buyers, Sellers and Middlemen.* Madison: Wisconsin University.

****