Models of Corruption

by

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Abstract

In this thesis we formulate two theoretical models of corruption making two contributions to Economic literature. First, we formulate a model where economic agents (who would want to work in the bureaucracy), heterogeneous in their public sector motivation i.e. some of them would like to work in the bureaucracy who are the motivated agents while others would not like to work in the bureaucracy. Second we formulate a model with two competing governments where honesty is modeled as a function of bureaucratic wage rate which affects the firm's investment decision to invest in a given bureaucracy of a government. The firm has a choice of investing in either of the two bureaucracies dependent on its proximity to the bureaucracy. Both the above models are based on aspects that are not previously covered in literature. In Chapter 1 we review relevant literature on corruption and the various popular and well-cited models of corruption. We then turn to psychological and organization literature to study motivation and then to studies of competition between governments and its efforts to attract FDI. In Chapter 2 we set up the economic model with motivation and in Chapter 3 we set up the model with competing governments and the efforts to attract FDI.

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Contents

Chapter 1

Bureaucratic Corruption: A Review of Issues

1.1 Introduction

There are various studies which attest that there is a close link between bureaucracy and corruption (see Ackerman 1975; Acemoglu and Verdier, 1998 2000). Though we focus in this chapter on bureaucratic corruption we would also like to give the reader an overall view on corruption.

We pose here eight questions that help the reader to get a picture on corruption: 1) What are the causes of corruption? 2) Is corruption the outcome of government intervention? 3) Can corruption be dependent on market structure? 4) How does corruption affect the investment climate of the economy? 5) How does corruption affect growth? 6) Does corruption vary in the regions of the same country? 7) Can centralization of government affect corruption? 8) Is corruption related to the legal system of the country? 9) Do wealth inequalities determine investment?

In Section 1.2 we introduce corruption in bureaucracy and in Section 1.3 we answer the above questions and establish a link between bureaucracy and corruption. In Section 1.4 we study how bureaucracy is a social structure and the characteristics of the individuals working in it. In Section 1.5 we study the impact of bureaucracy as an organization on

investments.

1.2 Bureaucracy and Corruption

Bureaucracy has been defined by Weber (1947) as an organization with "clearly defined hierarchy of offices" and entire separation of bureaucratic officials "from ownership of the means of administration" and is attributed to the "mission-oriented sector" (Besley and Ghatak, 2005). The organizations that provide collective goods cohere around a mission like the researchers who advance knowledge, doctors who are committed to saving lives, judges to promote justice and soldiers to defend their country in battle. The benefits and costs generated by mission-oriented production organizations are typically not priced as seen in bureaucracies. Niskanen (2007) argues that bureaucracy has been a key characteristic of "public sector administrations for all governments with extensive territorial sovereignty" from "ancient kingdoms of Sumer and Egypt to the modern nation states" (Niskanen, 2007, pp. 4). The modern day bureaucracy has been defined by Hegel (1976) as an organization where it is expected that public sector officials will be independent from external influences since they live off the fixed salary that is given by the state. Besley and Ghatak (2005) argue that officials who work in the mission orientated sector will get satisfaction or utility from working from attributes that do not necessarily have a market value. However, experience demonstrates that bureaucrats do not always exercise their authority according to Hegel (1976) and do not necessarily drive satisfaction from non-market valued attributes as suggested by Besley and Ghatak (2005). One of the possible reasons for the non-functioning according to ideological principles of a mission-orientated sector is corruption. Normally, "mission oriented sector" becomes more vulnerable to corruption since the people who are a part of the organization may decide to act dishonestly. "Bureaucratic corruption" refers to acts by public sector officials who may engage in what are termed as "corrupt dealings" with the with the public or with the political elite (Rose-Ackermann, 1998). Bureaucrats demand bribes from the public either to offer a service or to speed up a bureaucratic procedure in the most common form called

as "petty corruption"(Kaufmann,1997). A service that is not supposed to be available may also be provided with a bribe. While carrying out tasks for the political elite the bureaucrats may also extract payments.

1.2.1 Causes of Bureaucratic Corruption

In a more regulated economy bureaucrats have more power to abuse it. Collier(2000) states four factors that caused the African countries (which are considered to be regulated economies) to slide into corruption "over regulation of private activity, expanded public sector employment, expanded public procurement, and weakened scrutiny" (Collier, 2000, p.194). These corrupt activities were further encouraged due to complex economic control regimes where corruption was seen as discretion plus monopoly minus the accountability (Klitgaard, 1988).

Collier (2000) explains corruption to be both morally and economically wrong. Economics based solutions to reduce corruption have resulted in offering incentives which attempt to change the behavior of public sector officials. Dixit (2002) looks at the effects of different incentive based structures have on the performance of public sector workers. However incentives can differ from a society to the other, a corrupt society will always have incentives that will make people corrupt leaving the society in high corruption equilibrium. Aidt (2003) discusses the concept of self reinforcing corruption. When a lot of officials in the society are corrupt the probability of giving and accepting bribes increases. In such societies the choice of occupation is also dependent on which job provides them with the most bribes or opportunity for bribes (Murphy 1991; Acemoglu 1995).

The concepts of "fair wages" [1](Akerlof and Yellen, 1988) which affects the behavior of the civil servants has been examined by Van Rijckeghem and Weder (1997). The Corruption index from Political Risk Services (International Country Risk Guide) has been used to test the relationship between corruption and the number of variables which are related to the ability and the desire of the civil servants to earn income from corrupt sources. Their

[1]if the wages that the workers receive is less than their conception of fair wage then they supply an effort less than their normal effort

pay variable is measured as the ratio of government wages relative to the manufacturing wages.

The main empirical findings of the paper are that law and quality of the bureaucracy are highly correlated with the civil service wages and so may have indirect effects on corruption. Secondly, corruption index improves on the order of 1 point when there in as an increase in the ratio of civil service to manufacturing pay from 1 to 2 in the cross-country regressions for a sample of 25 developing countries. Thirdly, the relative pay has no significant effects on "within country" regressions, which indicates that relative pay has no contemporaneous effect on corruption. Fourthly the quasi-eradication of corruption would require a relative wage which would be 3-7 times the manufacturing wage. When the bribe level is low or the probability of detection is high then these findings are consistent with "Fair wage-corruption hypothesis" (Van Rijckeghem and Weder, 1997, pp 4).

1.3 Models of Corruption

The above causes of bureaucratic corruption outlined in above section discusses the incentives and disincentives existing in a bureaucracy. The models of corruption that we now explain attempt to explain the level of corruption existing within a society.

Model A: Corruption and the Government

Centralization would mean that there is just one monopolist who sells the government good, therefore if a customer wants two complementary permits he will have to bribe the joint monopolist however in a decentralized system he will have to bribe two separate monopolists. The corrupt official in a joint monopolist agency would ask for a bribe inclusive of the price in such a way that the marginal revenue is equal to the marginal cost. In an independent monopolistic agency system the bribes that are to be paid increase due to the complementary nature of the government goods. An example in this context has been given by Shleifer and Vishny (1993) who have compared inefficiency arising from the corrupt system existing in communist Russia with that of post communist Russia. In the communist Russia the central party used to collect bribes however in the post communist

Russia there were different ministries, local level government who were collecting bribes.

Model B: Government Intervention is not characterized by market structure

Government intervenes to correct the market failures, hence to facilitate the intervention it requires agents who would implement policies, make decisions and collect information (Acemoglu and Verdier, 2000b). This paper derives that the government intervention is non monotonic with the per capita income of the country. When the output in a country increases we see that the opportunity cost of intervention increases since the government will have to withdraw agents from the productive sector.

This would imply that one way we could reduce corruption by having minimal government intervention in the form of over - regulation of the economic activities which often benefits politicians and bureaucrats (Shleifer et al., 2001). Opportunities of corruption are associated with discretionary powers involving transfer of large volume of assets from the public to private hands. Kaufmann and Siegelbaum (1997) establish that though privatization can lead to corrupt free economy we do simultaneously also need more competitive and transparent methods of privatization.

Acemoglu and Verdier (1998) model explains that with many bureaucrats we see that even by paying a small wage to the bureaucrat, corruption can be prevented. With many bureaucrats corruption is sure to be prevented since all entrepreneurs can be inspected. The wage above which the investor will invest is analyzed, hence even having a large bureaucracy which is being paid low may retard investment. Instead of having a large bureaucracy it may be more feasible to have some relatively dishonest bureaucrats and a high number of honest bureaucrats. Hence, having government intervention with partial corruption is more desirable. The model also suggests a U-shaped relation between per capita income and the government intervention. The opportunity cost for diverting agents from the productive sector to bureaucracy rises for richer countries with high per capita income. Hence government intervention is less desirable.

When all entrepreneurs choose good technology, the government would find it difficult to raise taxes to pay for subsidies to the entrepreneurs using the good technology and the wages for the bureaucrats. Hence when all entrepreneurs choose good technology, the revenues from taxes will fall short again. It is required that some entrepreneurs choose bad technology to act as the "tax - base". Since output is being produced by the entrepreneur hence a poor economy will produce less. Although it would appear that corruption would affect entrepreneurs in the same manner as the investors, however its effect on entrepreneurs is more pronounce since it changes the risks that are associated with entrepreneurial activities. Rent-seeking activities tend to lead to reallocation of talent if the rent seeking activities would yield higher returns than other activities. This would affect growth when the most able entrepreneurs become rent-seekers (Murphy et al., 1991, pp. 507-515). Entrepreneurs will not want to undertake projects which have a longer gestation period as the public officials may have an option to collect rents from the future earnings that are associated with risky investments.

Model C: Government intervention is characterized by market structure

Rose-Ackerman (1975) studies the relationship between incidence of corrupt dealings in government contracting process and market structures. The paper hence concentrates on the relationship between the official and the briber who is trying to corrupt the official. The author assumes that the high level policy maker defines the state preferences and the handling of the contract is delegated to a lower level bureaucrat. Hence the bureaucrat is in charge of the procurement. The bribe is dependent on the market structure which can either be competitive markets, market with product differentiation and market with bilateral monopoly. In a competitive market due to existence of a private market for the good there is no cost advantage for the seller to sell to the bureaucrat. In a market with product differentiation if the seller and the buyer of the good can bargain amongst themselves, if the seller feels that he can extract the surplus fairly enough then he won't

engage in bribery. Hence the model is based on the relative bargaining strength of the two participants.

Ackerman's paper suggests that the amount of resources that are devoted to law enforcement do not completely support the amount of corruption. The more fundamental factor is dependent on the market structure; we can either have a market structure with product differentiation or a market structure without product differentiation. In a market with no product differentiation and many sellers, corruption can be easily avoided. Corruption can be avoided if the government exactly knows what it wants and finds a large number of sellers those are willing to supply it.

If the government purchases a good that is also sold on the private market then the state will simply purchase the good at the price prevailing in the markets. Hence the sellers in a perfect competition market regime will have no incentive to bribe the government to obtain the contract since they would all sell privately in the market.

Model D: Does corruption have effects on growth?

Efficient government institutions foster economic growth. The institutions and the economic variables evolve simultaneously, as the institutions affect economic variable, so do the economic variables effect institutions. Milgrom et al. (1990) emphasized that an efficient judicial system was required to enforce contracts in the economy. In the absence of an efficient judicial system there would exist insecure property rights over patents, profits and physical capital that may reduce the incentives to invest. Dishonest bureaucracies may make the procurement of licenses very hard. It is also seen in such bureaucracies that the public resources that are meant for building infrastructure that eventually increase the productivity (total as well as marginal) of investment are diverted towards politicians and bureaucrats private consumption .

Empirical work done by Mauro (1995) analyzes data based on Business International indices on red tape, corruption and bureaucratic efficiency. The corruption data was based on the degree of corruption involved in the business transactions. Mauro (1995) finds

that corruption lowers investment and hence growth, summarizing some of his results he finds that the judiciary system, corruption and red tape indices are closely related (their simple average can be taken as a proxy). The author has labeled it as bureaucratic efficiency. The degree of corruption is dependent on the judiciary system or the probability with which the corrupt official taking a bribe is caught as explored in many theoretical models. Mauro (1995) using his data set and his model shows that there exist very strong association between political stability and bureaucratic efficiency. The author then rates the countries according to this index. The author finds that 1) If Bangladesh had been to improve its efficiency and integrity of its bureaucracy (by one -standard deviation increase in bureaucratic efficiency index) we would see it will lead to increase in investment rates by 5 percentage points. 2) Investment rate and corruption have a significant and negative association between them. 3) On analyzing the relationship between economic growth and institutional efficiency, it was found that bureaucratic efficiency and corruption are significantly associated with the average per capita GDP growth. 4) Expenditure on education is less by the corrupt unstable governments. Tanzi and Davoodi (1997) propose that public investment as a ratio of GDP is strongly related to a corruption index even when corrections were made for the levels of development and of economies and for the availability of funds to finance large-scale projects. This observation is strongly supported by empirical results since the decision makers would want to collect more bribes which would motivate them to direct the public expenditure through those channels that would make it easier to collect bribes. This would causes a bias towards high-value and large-scale projects instead of projects which add value, like maintenance expenditures or decentralized small-scale projects.

Triesman (2000) in his paper analyzes that why are some countries considered to be more corrupt than the others. As we discussed above that institutions can foster economic growth and institutions and economic variables evolve simultaneously. The institutions that we study here are: a) Religion, b) Code of Law, c) Whether the country was a former British Colony, d) Political Stability, e) Democracy, f) Federal Structure, and,

g) openness to trade. The author finds that: 1) Countries that have higher growth rates and more efficient institutions will be less corrupt. 2) The corrupt official weighs his financial cost which is the risk of getting caught and punished against the expected benefits. The probability of getting caught is dependent on how effective the legal system of the country is. 3) He also includes the role that religion and freedom of press play in the cost of corruption.

Model E: Corruption reinforces Corruption

Esteban and Ray (2006) discuss that uneven investments in the economies may not be due to "corrupt economies" but because unequal and poor economies would display greater public misallocation. Public support is required by agents in the form of licenses, permissions or public infrastructure to translate potential productivity in to economic reality. To do so they lobby, agents who have a higher productivity would lobby harder but to do so they also must have higher wealth. The aggregate level of wealth determines the extent of inefficiency in the public decision (for a given degree of inequality). Higher degrees of inefficiency is displayed by poor countries which makes it tempting to say that corruption is more widespread in poorer economies. In several cases public efficiency is improved by reduction in inequalities since the degree of efficiency in the public allocation of resources is also dependent on existing inequalities in the distribution of wealth.

Model F: Corruption and Property Right Enforcement

The prevention of corruption and enforcement of property rights is very expensive procedure. Hence socially optimal allocation may be less enforcement of property rights and more corruption. Acemoglu and Verdier (1998) have assessed the enforcement of property rights using a general equilibrium approach. They show that increasing the public sector wages may also improve entrepreneurial investment by inducing better enforcement of property rights. Kaufmann and Siegelbaum (1996) while they examine the link between corruption and privatization, separate property rights into "cash flow rights" and "control rights". They hypothesize that corruption is correlated with control rights and also and

the lack of professionalism in the civil service, lack of pay incentives as well certain lack in the penalty , monitoring and enforcement process.
The conclusions that Acemoglu and Verdier (1998) derive are:

1. Property rights are more secure when there is a honest bureaucracy.

2. Returns to investment are lower, when the degree of corruption is high.

3. There is a trade off between allocation of talent and enforcement of property rights.

4. It is shown that this misallocation of resources does not make the government. counter- productive however it is a feature of an economy where there are incomplete contracts and incentive problems.

1.3.1 Corruption and behavior

The above section explains existing work done in corruption literature. We over here slightly change our discussion and focus on a more qualitative aspect which is the characteristic of an agent or something that is more innate that distinguishes an agent from the other. We begin to look at how efficiency can be increased in the bureaucracy by introducing competition in a bureaucracy on a organizational level. We then look at behavior of the individuals working in the bureaucratic organization.

Model G: Corruption affected by competition between bureaucrats

Shleifer and Vishny (1993) developed a model of petty bureaucratic corruption which took account of supply, demand and cost functions. The costs of bureaucrats include the costs attached to providing services and considering whether the revenues from the bribes have to be shared with others. The demand would refer to the competition amongst the bribers. The bureaucrats from the supply side have a monopoly over the service or they may compete with bureaus. The amount of bribes to be taken cannot be negotiated openly by the officials given the nature of the deal. A bureaucrat may accept a bribe but

may refuse without a further payment provision of contracted service, hence it becomes difficult for the parties to ensure that the contract is enforced.

In Drugov (2010) competition is introduced amongst the bureaucrats. The firms would invest in eliminating the negative externalities of production, and the bureaucrats administer the process of issuing license. The bureaucrats that are corrupt would give license to the firms in exchange of a bribe. It is found that the competition regime will create incentives ex-ante in nature and the ex-post allocation of incentives will be better with the monopoly regime. Indian case has been referred to as the monopoly regime. The license must be obtained from a pre-specified bureaucrat in this regime; hence, this bureaucrat has a monopoly power over the applicants in his district. The Russian case is described by the competition regime. Bureaucrats compete for applicants since any applicant can request a license from any bureaucrat. Competition in public administration is often seen as a solution to bureaucrat's corruption; however there is no detailed design of it. Among the techniques of fighting corruption Rose-Ackerman (1978, 1999, p.49) proposes "creative use of competitive pressures within government". Gioacchino and Franzini (2008) explain that corruption can take 2 shapes: bribery and extortion, under asymmetric information about the honesty of the bureaucrats, competition is effective in fighting extortion however it worsens bribery. Hence there can be faced a problem of trade-off where in trying to make one better can worsen the other. By increasing competition (i.e. when each of the agent is provided with more higher number of licenses) a bureaucrat can get more bribes. Competition can work well when there is extortion in the model by endowing every bureaucrat with as large as number of licenses as possible. Competition in bureaucracy should however be properly designed. A crucial aspect of it is considering how many licenses can be allocated to each of the bureaucrat and how many licenses can each of the bureaucrats manage.

Model H: The choice of the agent to work in the Political or the Private sector

Mattozzi and Merlo (2007) have used a dynamic model to describe the occupational choice of a politician to work in the political sector or leave the public office and work in the private sector. The agents can be heterogeneous in political skills or their market ability. The authors have explained career politicians as those who get non-pecuniary rewards from being in office while those with political careers leave their public office before retirement and work just to increase their market wage. The model describes when there is an increase in salary of politician the average quality of individual in the office would decrease. In equilibrium the model proves the simultaneous existence of political careers and career politicians[2]

Model I: Corruption based on individual's perception of the environment

Sah (2006) construct a dynamic model, at each stage of which we have perceptions of the players being influenced from a variety of factors such as experiences of oneself and the others. It aims to predict the behavior of the individual and the group. The setting is that of overlapping generation's model. A principal theme of the paper is that an individual's perceptions of his environment are based mostly on his experiences. These perceptions are based on "level of corruption" he encounters.

The perception would define whether the bureaucrat and the citizen choose to be corrupt. These perceptions in turn influence the future choices of people. Hence in this dynamic framework the author examines some of the properties: 1) how the levels of cheating and corruption are affected by some of the economy's parameters, 2) choices of the individual, and, 3) the dynamic evolution in the economy of corruption and cheating. This dynamic framework model explains that how in a country level of corruption can differ according

[2]What would attract career politicians are the non-pecuniary rewards that they derive from being in office

to the perception.

Model J: Corruption studied as a game of "gamble"

Multiple equilibria results have been derived in other theoretical models, one by Cadot (1987) where he has constructed a model with corruption as a gamble, where the official would face the risk of being reported and sacked by a superior officer. The Nash equilibrium will be obtained under different information structure. He gives 3 conditions for the officials to be corrupt lower degree of risk aversion, higher time discount rate and lower wage rate. When corruption interacts at different levels of hierarchy it will lead to multiple equilibria. When the general level of corruption in the bureaucracy is high we have that probability of being caught also diminishes and vice versa.

Model K: Corruption dependent on belief formation

Sah (1988) in the paper modeled with overlapping generation's corruption with intertemporal behavior, and in the belief formation have a Bayesian learning process. The agents and the bureaucrats would start off with a subjective probability distribution and in the process they meet agents who are corrupt or not. The corrupt ones would prefer to meet the corrupt and the non corrupt would prefer meeting non - corrupt.

This is because of the strategic complementaries arising in the model, where it would be more profitable for one agent to do something that the other agent is doing. Strategic complementaries would give rise to multiple equilibria. Hence their beliefs will be formed on the basis of whether they are meeting the corrupt or the non corrupt agents. The formation of these beliefs based on past experiences can lead to a culture of corruption giving rise to multiple equilibria. Bardhan (1997) also suggest that the multiple equilibria of corruption would depend on the number of officials who are corrupt. The marginal benefits for a honest official will decrease as the number of corrupt officials will increase giving rise to three equilibria: in the first stable equilibrium all the agents are honest, the second when all are dishonest and third equilibrium will be unstable lying in between these two equilibria. Whether we move towards the dishonest or the honest equilibrium

will depend upon the behavior of the marginal office. An interesting comparison can be derived with two economies having same parameters may end up with different levels of corruption (dependent on the belief formation in that economy), hence the steady state to which each of the economies will settle to is dependent on its history.

Model L: Corruption and Reputation Model

Every organization: firm, country builds on a reputation, if it happens to build on a bad reputation the future generation may have to bear the bad consequences. Tirole (1996) constructed a model with an overlapping generation's framework where we have where an organization's collective reputation is dependent on the individual reputation. Such collective reputations have persistence effect that is to say that reputation is passed on to generations. Tirole (1996) further developed the model by taking persistence of corruption in a overlapping generation model, by introducing one time shock on the equilibrium; hence exposure to the corrupt activities would be independent of the corrupt acts in the past.

1.4 Bureaucracy: A Social Structure

The earliest design of an organization came up in the form of "bureaucracy" associated with the German Sociologist and philosopher Max Weber. The characteristics of a Weberian bureaucracy were 1) Job Specialization: the jobs were broken down into simple, routine and well-defined tasks. 2) Authority Hierarchy: positions were in a hierarchy of authority, where each of the position was under the authority of the other. 3) Employment and Career: selection and promotion took place on the basis of technical qualifications. 4) Recording: Decisions and administrative acts were recorded in writing. 5) Rules and Procedures: Reliable, predictable behavior was ensured from the side of employees since it was subject to rules and procedures. 6) Impersonality: rules and procedures were impersonal and applied to non-managerial and managerial employees alike (Huczynski and Buchanan, 2007, pp. 489).

Even though Weber gave an ideal organization design in the form of a 'bureaucracy'

which is associated with legitimate authority we see that the usage of the term has acquired derogatory implications among the public and the media: especially when it comes against red tape and obstructiveness in any aspect of organizational life. We now understand the reasons for inefficiencies in the bureaucracy. Three elements will have to co-exist for the existence of corruption. Someone must have discretionary powers, to be so one must have power which includes authority to design the regulations. There must be economic rents associated with these powers, such that the specific groups can capture those rents. The judicial or legal system would offer a low probability of being caught. The first two reasons create incentives to act dishonestly. As the government of states grew larger during the modern period modern bureaucracies also arose and especially following the Industrial Revolution. The arbitrary exercise of power by authoritarian regimes was taken over by bureaucracy. The logic assembly line brought to the factory, the same logic was brought to the government. The efficient undertaking of large complex tasks was made possible under the hierarchical authority.

Do the perceptions of an individual matches the organizational reality given the needs of such a social structure? We answer the question posed, by discussing the personality, perception, and motivation of an individual working in this social structure. These characteristics are built by learning, communication, punishment, values attitudes and interest. We first look at the attributes of learning, communication, punishment and values attitudes and interest and see on how they build the personality, perception, need for power, status, leadership and motivation of an individual.

1.4.1 Learning

Learning would mean change, but change that is relatively permanent in nature (Robbins, 2003). This change is brought about since the individual has experienced something. Learning results in different actions and behavior, since it is continuous and automatic process. It therefore links the individual to the social world. In organizations learning increases the capacity of everybody to contribute to the process. Goals are met more

effectively by the organizations. The organization is emancipated through "behavior, purpose, vision and values" (Mullins, 2007). Management practices are thus affected by learning theories including induction of new recruits, delivery, design of job training and the system of payments, how performance is evaluated by supervisors and feedback is provided and the creation of learning organizations.

1.4.2 Punishment

American psychologist Burrhus Frederic Skinner (1904-90) developed the idea of Skinnerian conditioning involves the association of the behavior with the consequence. The most controversial method of behavior modification is dependent on the occurrence of an undesirable behavior which involves the deliverance of an unpleasant consequence dependent upon such behavior (Huczynski and Buchanan, 2007).
We explain 4 systems of management Likert (1967) which have been sophistically put by (Singh, 2010). Here punishment is used as a reform mechanism in the following ways:

1. Exploitative Authoritative: managers have no trust in their subordinates, and they motivate the managers using punishment and fear and decision-making is limited to the top.

2. Benevolent Authoritative: Managers using this system have trust and confidence in their subordinates. They get sometimes opinions and ideas for problem solving from their subordinates. Motivate their subordinates using sometime punishment or rewards.

3. Consultative Authoritative: Managers do not have complete trust and confidence on this system. Usually get ideas and opinions from their subordinates, motivate sometime with punishment and sometime with reward.

4. Participative Decision Making: Managers allows or encourage employees to participate and share in organizational decision making. Punishment is not seen as a way to motivate subordinates.

1.4.3 Values, Attitudes and Interest

Values lay the foundation for the understanding of motivations, attitudes, personality and perceptions hence essential for understanding organizational behavior. Individuals enter an organization with preconceived notions of what is true and what is not true (Robbins, 2009). Direct consequence of it is that they imply certain behaviors or outcomes that are preferred over others.

1.4.3.1 Source of Attitudes

Attitudes determine behavior since they are linked with personality, perception and motivation. Specific influence is exerted on the person's response to objects, situations and people. Culture, language and mores influence attitudes. An understanding of the functions of attitudes is important for the study of organizational behavior. They also help predict work behavior (Jain, 2005).

1.4.3.2 Type of Attitudes

The variety of the job, the challenge attached to it and the gratifications that accrue to the workers are all attached (Morse, 1953). Following on what Morse (1953) says we limit our attention to three main types of job-related attitudes. The positive or negative evaluations that employees hold about aspects of their work environment are tapped by the job-related attitudes. The Likert theory (1967) is based upon 1) how efficiency in group would maximize motivation, and, 2) how for achieving group goals motivation can be channeled. Based on the hierarchical structure the individual is tied to its organization. Typically, there are three primary attitudes that are of concerned to us i.e. job satisfaction, job involvement, and organizational commitment.

1. **Job satisfaction**: It is regarded both as the general attitude of the individual towards the job as well as the satisfaction that the individual gets from specific dimensions of the job like supervision, co-workers, promotion opportunities, the pay and the work in it. The degree of satisfaction is derived from how well the outcomes are fulfilled (Kalleberg, 1977). A person with a positive attitude will be the one who

has greater job satisfaction while a person with negative attitude will be dissatisfied with the job. (Saari and Judge, 2004).

2. **Job Involvement**: has often been seen as a predictor of work-related outcomes ethical behavior and professional commitment (Leong, Huang, & Hsu, 2003); psychological ownership for performance in organization (Van Dyne & Pierce, 2004).

3. **Organizational commitment**: expresses an individual's orientation toward the organization by tapping his or her loyalty to, identification with, and the degree of involvement in the organization. Individuals who express high commitment see their identity as closely attached to that of the organizations. Hence organizational identification is antecedent to organizational commitment (Gemmiti, 2007).

According to Rosenburg and Hovland (1960) there are three different kinds of responses from which we can infer attitudes: 1) Cognitive Response: these responses reflect the information or the perception about the attitude object. 2) Affective Response: from these responses we can infer feelings or attitudes toward the attitude object. 3) Conative Responses: these are behavioral inclinations, actions, commitments, intentions with respect to the attitude objects.

1.4.4 Personality

Personality can be defined as the stable set of characteristics and the tendencies that determine the differences and the commonalities in the psychological behavior (Maddi, 1980).

All personality psychologist agree that psychologies related to personality are usually coherent and consistent (Cervone and Shoda, 1999).

Often people's experiences and actions are interconnected which makes personality coherent leading to coherence in social behavior and experiences. Due to the coherence in social behavior, personality is often linked with organizational behavior.

Bureaucratic Personality forms a part of personality dimensions

A bureaucratic person would value orderly processes in the organization and impersonal and formal relationships, conformity, rules and subordination. The respect for authority is based upon respect for organizational rules and regulations and is not total and blind (Merton, 1957).

1.4.5 Perception

In individual decision-making in organizations a crucial role is played by perceptions, by affecting the decision as well as the quality of it. Our actions are influenced by how we perceive the physical and social environment. Our behavior is explained by terms like 'motive', 'intentions', 'reasons', 'purpose' and 'desires'. Hence human behavior becomes a function of how we perceive events and other people (Huczynski and Buchanan, 2007). Rogers' Self Theory approach (1951) is described as phenomenological to personality and perception. For him behavior is the result of immediate events and how they are perceived and interpreted by the individual. This approach emphasizes the characteristics of the self. Hence also referred to as the "Self theory" of personality because behavior of the individual is best understood from the internal frame of reference of the individual himself.

1.4.6 Communication

To the understanding of organizational behavior communication is central since it affects performance in the organization and career prospects. Everything significant that happens in an organization involves communication. Hierarchical networks, variation in power and status, job structures and nature of employment contracts in organizations prevent communication. Communication is regarded as a major problem by many managers (Buchanan, Claydon and Doyle, 1999).

1.4.7 Power, Authority and Leadership

Organizations though they are rational entities they do not often strictly follow their own well defined system which leaves scope for politics and power play. For organizations to be

managed in a proper way it is necessary to understand the dynamics between authority, politics and power. We see in bureaucracies that these concepts are inter-dependent. Authority is related to the position in an organization, hence confined and dependent on the organizational structure (Ashraf, undated). Power is linked with the individual based on its individual understanding. It is also a critical dimension of leadership (Astley and Sachdeva, 1984; Pettigrew and McNulty, 1995). Bureaucratic organization sometimes raise incompetent individuals to the position of leadership, it is often seen that such leaders would often build alliances and coalitions (Ashraf, undated).

1.4.8 Motivation

Lay people and scholars have their own definition of motivation. Technically, the term motivation can be traced to the Latin word movere, which means, "to move". This meaning is evident in the following comprehensive definition: A motive is an inner state that energizes, activates, or moves (Berelson and Steiner, 1964). It directs or channels behavior toward goals. The key to understand motivation, it appears, lies in the meaning of, and relationship between, 'needs', 'drives', and 'goals' (Maslow, 1943). The needs, drives and goals can be defined as pressures and influences that would sustain, channel and trigger human behavior.

Motivation can be explored from the three related perspectives:

1. **Goals:** Wealth, status and power trigger behavior that is directed towards this pursuit. Motivation is viewed in terms of the desired goal or outcome.

2. **Decisions:** The individual's choice of goals is influenced by the cognitive-decision making process.

3. **Influence:** this factor looks at motivation as a social influence process like when the managers want to motivate their employees on time.

Motivation can be distinguished as extrinsic and intrinsic motivation. Extrinsic motivation links the employee's monetary motives to the goals of the firm. Pay for per-

formance is an ideal incentive system (Osterloh and Frey, 2000). Extrinsic motivation is strongly influenced by opportunism where individuals are independent of any rules. However intrinsic motivation works through immediate need satisfaction. Intrinsic motivation would be indispensable when the external incentive lead to undesired consequences.

If identification with the work or intrinsic job satisfaction has to be aroused then the job must in itself provide sufficient skill, variety, complexity and challenge to engage the abilities of the worker.

Intrinsic motivation would involve people doing an activity because they derive spontaneous satisfaction from it. However extrinsic motivation would require that the satisfaction comes from not the activity in itself but rather the extrinsic consequences.

Motivation can also be characterized as distal and proximal. The distal factors are linked with the utility of the person of doing the task and the person's perception of how much effort to be applied for effective performance (Gagne and Deci, 2005). When there are complex activities that require sustained and complex efforts then the proximal factors of self regulation and self monitoring are critical for performance.

1.4.8.1 Motives

A motive be aimed at stimulation having a social basis that is activated by the environment (Huczynski and Buchanan, 2007). Some of the more important motives associated with organizational behavior are power, achievement, and affiliation. In addition, security and status are also important secondary motives. The two motives that are easily attached to bureaucrats are a) Power Motives that are derived from the need to manipulate other or the drive for superiority over others (Adler, 1927b). Status Motive can be defined as the motivation derived from how the person is relatively ranked in a group, organization, or society.

1.4.9 Job Characteristics Theory

We now explain how in work-motivation theories motivation is treated.

1.4.9.1 Hackman & Oldham (1980)

According to Hackman and Oldhman (1980) the most effective way of motivating individual is through the optimal design of jobs. High internal work motivation is focussed on in their theory of job characteristics which bears considerable relation to autonomous motivation. Jobs should be designed such that internal work motivation can be increased such that they (1) provide variety (2) afford discretion and considerable freedom to the employee (3) meaningful performance feedback is provide. The following equation gives us easy way to understand the variables affecting the total motivating score.

1.4.9.2 Goal Setting theory

This theory is related to the decision making process of an individual also regarded as the process theory of motivation. Locke (1968, 1975) argued that one of the main motivational technique is goal-setting. The goal theory has established four main propositions that have been well supported by research. 1) Challenging goals: high levels of performance are achieved by them. 2) Specific Goals that lead to higher levels of performance than having vague goals. 3) Participation in goal setting improves performance by increasing commitment to the goals. 4) For effective goal achievement knowledge of results from past performance is also necessary.

1.4.9.3 Hierarchy of Needs or Deficient Theory of Motivation

Maslow (1943) gave the hierarchy of Needs or Deficient Theory of Motivation. In this theory needs are arranged in a definite sequence of domination i.e., the higher order needs do not dominate unless the needs of lower order are reasonably satisfied. Lower/primary order needs includes basic physiological needs and to feel safe and secure. The social needs and needs attached to esteem and self-actualization are higher or secondary needs.

1.4.9.4 Achievement Theory of Motivation

According to the McClelland (1961) achievement theory of motivation we have three basic social needs: affiliation, power and achievement.

- **Need for achievement:** The need for a person to advance , achieve and attain realistic, challenging goals would be "achievement motivated".
- **Need for power:** A person who has the need to be influential is "authority motivated".
- **Need for affiliation:** A person motivated toward interaction with other people is "affiliation motivated".

McClelland observed that as we advance in the hierarchical structures the need for power increased as compared to the need for power and achievement. People at the top ceased to be motivated by this drive.

1.4.9.5 Elton Mayo (1945)

Mayo (1945) is known for his "Hawthorne Experiments" which provided for the basis for the studies in organizational design, organizational development, participation, leadership and motivation. The workers were motivated by psychological and social factors rather than just the work, pay conditions and physical working conditions.

1.4.9.6 Equity theory of J. Stacey Adams (1963, 1975)

This theory is based on our perceptions of fair treatment. The theory argues that perception attached to unfairness creates tension which which makes people more motivated to act. People compare their outputs and inputs and use subjective judgment to compare the outcomes (the rewards in the form of pay and recognition) and contributions (in the form of time, effort and ideas). Wider organizational and social context is ignored by the theory in two ways. The first would concern the basis at which we make social comparisons which can be extremely varied, the second concerns systematic inequities in

the capitalist economies. The perception of equity holds when same treatment is received from the employing organization while being exploited by those in power.

1.4.9.7 Other Motivational Theories

For people to be intrinsically motivated the feeling of competency and autonomy are important as suggested by the Cognitive Evalution Theory. Intrinsically motivating activities are optimally challenging (Danner and Lonky, 1981).

Self Determination theory (Gagne and Deci, 2005) talks about two types of motivation: autonomous and controlled motivation. Autonomy would involve having an experience of choice. According to Dworkin (1988) autonomy would mean to endorse ones actions at the highest level. Intrinsic motivation would be an example of autonomous motivation. Controlled motivation requires using extrinsic awards to induce controlled motivation. However both autonomous and controlled motivation is intentional.

Intrinsically motivated which is propelled by the people's interest in the activity is autonomous. Extrinsic motivation however can vary in the degree to which it can be controlled versus autonomous. Those activities that are not found to be intrinsically motivating will be extrinsically motivating so that their enactment would depend upon the perception of an immediate response between the motivated behavior and the consequence that is desired like any tangible reward or implicit approval. This type of behavior would be typically extrinsically motivated.

Self determination theory also distinguishes between amotivation (i.e. the lack of motivation) and motivation. Motivation requires intentionality and amotivation involves not having an intention to act (Gagne and Deci, 2005).

The concepts that have been described above of those of autonomous motivation, amotivation and controlled motivation are connected to the person's relation to the activity. These motivational variables are predicted from both aspects of the job and work environment and how they affect the social environment.

The Self determination theory focuses on the relative strength of controlled versus autonomous motivation however most work motivation theories focus on the total amount

of motivation needed.

Action Regulation Theory: Hacker(2003) and a number of other scholars have used this theory to examine motivation in work organizations and other settings. The theory uses the concept of goals and also emphasizes the mechanisms that keep people effectively focused on goal directed action. The theory has become crucial in work design since it explains the various stages of preparing for action. This includes orientation on the task, redefining the task in to a goal and then evaluating and implementing it.

1.4.10 Treatment of Motivation in Organizations

Our discussion has pertained with understanding "motivation" and how work motivation theories discuss it. We now look at how motivation is treated in organizations. Our discussion follows from the management literature.

Klehe and Anderson (2007) compare maximum performance of what people can do and typical performance of what they will do. They find that motivation rose significantly under the maximum performance condition, with the persistence of effort and the level and direction of it increasing significantly. The average motivation of participants in an experiment on 138 participants that were assigned to perform an internet search task was higher in maximum rather than typical performance conditions.

Milne (2007) discusses that performance, interest and self-motivation is positively affected by means like rewards and recognition programmes within the organization. Team based incentives can also encourage and support positive outcomes.

Moynihan and Pandey (2007) focus on the formative role of socio-historical context. They examine the role that is played by organizational factors in shaping public sector motivation. Education and professional membership in organization would greatly determine public sector motivation. The length of organizational membership and red tape also determines public sector motivation. Reform efforts and hierarchical authority will have a positive relationship on public sector motivation.

Siemsen et al. (2008) build on motivation-opportunity-ability framework as a driver to

knowledge-sharing behavior. With it is also studied a constraining-factor model (CFM) which determines the knowledge sharing that occurs. Macro level insights are provided by the CFM with respect to how bottleneck in MOA (motivation-opportunity-ability) variable can be removed, which helps in setting related policies.

Manolopoulos (2008) advance the understanding of the relationship between organizational performance and motivation. In the public sector of Greece extrinsic and intrinsic motives that could be given to public sector employees was identified. It was identified that in Greece extrinsic rewards were more likely to be provided.

Ritz (2009) studies the links between institutional factors, attitudes of the employee, the measures taken by the management and the performance in the organization. They empirically test the effects of job satisfaction, public sector motivation and organizational commitment on perceived performance in the federal administration of Switzerland. Performance-oriented management tools and higher individual and organizational performance have been focussed on in the management reforms in the public administration In the Swiss federal administration it was found that the efficiency related to reduction in cost and decision making is positively related to the relationship between commitment, motivation and job satisfaction.

The variables that we discuss above that affect the public sector employee's performance have however not been formally incorporated in the wage contracts. The two incentive problems that we have in contract formation is that of hidden-information and hidden actions. The first problem would refer to a situation where we have that the employee has private information about the unwillingness or inability to take on certain tasks. This information would be about some relevant characteristic of the employee. In our model the employee (the bureaucrat) is differentiated by the level of motivation hence the employer or the government is not informed about the motivation of the agent. The second problem that arises in contract formation is that whether the employer can see what the employee does that how much effort is put by the employee. Mostly in public sector, the employer (the government) does not know whether the employee is honest

dishonest. Hence in the contract formation between the bureaucrat and the government we have adverse selection and moral hazard both as incentive problems. The literature on contract theory and corruption does not talk about this aspect of hidden-information in contract design by the government for the bureaucrat. In Macchiavello (2008) a public good is produced by a worker and there is heterogeneity amongst the workers in terms of their public sector motivation. The quality of the public good produced in the public sector determines the utility of the agent in the private sector. The quality of the public good is in turn dependent upon agents who do not behave opportunistically in the public sector and the incentives given in the public sector. The wages given in the public sector which the author has quoted as public sector wage premia, if high enough would motivate the workers to be honest. The model also emphasizes that the provision of "on the job incentives" would vary systematically with private sector wages.

1.5 Impact of Bureaucracy as an organization on Investments

The incentives in organization like the bureaucracy also are linked to the magnitude of investments in the bureaucracy. An entrepreneur would favor to invest in an economy where his investments give him the expected returns. To understand reasons for investing and not investing in an economy we first look at tax competition literature and how governments compete for investments.

1.5.1 Tax Competition

The literature on competition amongst governments has dealt with mainly tax competition. However recent tax literature also deals with developing two sided markets where we have sellers and buyers. We first in the following section develop on tax competition literature then talk about foreign direct investment and competition amongst governments. A lot of empirical research investigates the link between fiscal decentralization and growth. The evidence linking the both is mixed. There are two mechanisms linking the two. Hat-

field (2006) shows that tax competition will increase the returns to savings by raising the post tax return on growth leading to growth in an endogenous growth model. Koenthenbuerger and Lockwood (2008) assess how diversifying portfolio and rate of return arbitrage as two relevant motives for investing outside in a multi jurisdiction endogenous growth model. A demand for portfolio diversification is created by assuming that there are independent shocks to production in each of the states. However in the standard tax competition model the diversification motive is absent. A rate-of-return differential is the only driving force taken into account in a standard tax competition model. Capital flows to other jurisdictions when there is a higher capital tax rate in the other jurisdiction and expands the tax base therein. Kotsogiannis and Serfes (2011) look at the tax competition model when the equilibrium outcome is dependent on the firms and shoppers (two sided market). The jurisdictions compete by providing public goods and they levy taxes to attract the firms and the shoppers in a model of horizontal and vertical differentiation. The intensity of tax competition is affected by the interaction of two markets and when the strength of the interaction is weak and ineffective then then the minimum tax policy is effective. They compare in their paper two US towns A and B, A has a better selection of restaurants and shopping areas than B. This high shopper's traffic in town A attracts even more business. This is because town B has a higher fee tax to start up a business and a poorer relative public infrastructure.

This example helps us understand the investments in different jurisdictions. Even though there may be a change in tax policies it does not result in an exodus of business since the firms also benefit from market access and government spending. In most of the tax competition literature firms and consumers are immobile; two sided markets have only recently been studied. In a two sided market the two set of agents interact through a platform or an intermediary and the outcome of the other set of the agent is dependent on the decision of each set of the agent (Rysman, 2009).

In the theoretical literature on tax evasion collusive corruption has been extensively studied (Besley and McLaren, 1993). The incentives differ when we have collusive corruption

as to when there is extortion. If for example the customs inspector has information about the value of the firms' imports, then the inspector could ask for a bribe from the firms' management giving an offer to reduce the overall tariff liability. The firm has no incentive to report. Klitgaard (1988) also describes this form of 'collusive corruption' in the Philippine tax system; where this form of corruption is also called arreglo (arrangement). For example if the tax-payer pays half of the correct taxes then the rest of the amount is paid as a bribe to the tax collector.

1.5.2 Foreign Direct Investment

Alguacil et al. (2010) discuss how a set of policies should be developed by the host government that not only focuses on the inward FDI promotion but also on the economic and political framework. FDI through technology transfers and managerial expertise has a positive impact on productivity growth (De Mello, 1997).

The question then that arises is the FDI exploited more efficiently by countries with better macroeconomic environments and institutional environments or whether the presence of the local conditions is mainly responsible for growth. The literature provided by endogenous growth theories has stressed the growth enhancing effect also come from mechanisms like quality of human capital, level of infrastructures, macroeconomic and institutional background and the degree of financial and trade openness.

Literature by Demekas et al. (2007) sees the effect on foreign inflows and economic performance of the macroeconomic environment. Policies along with 'institutions', play a key role in development and also attracting FDI. Easterly (2005) talks on how 'deep-seated social arrangements like property rights, rule of law, legal traditions, trust between individuals, democratic accountability of governments and human rights", are reflected by institutions (Easterly, 2005, pp. 19). They set the general macro-environment for the economy. Reduced investment related costs such as corruption related costs is also responsible because of good institutions.

Corruption non-uniformly affects horizontal investments which are aimed at sales to the

local market and vertical investments which are made to access low factor costs for export sales. Using Swedish firm level data it is seen that corruption reduces the probability that the firm invests. Horizontal investments get deterred by corruption to a larger extent (Hakkala et al., 2008). They show that impact of corruption may be asymmetric in two aspects : 1) The probability with which a firm chooses to invest is affected, and, 2) it also has differential effect which depends on the size of the type of investment.

Corruption deters foreign direct investment by acting like a tax on investments, increasing the insecurity about costs (Sheliefer and Vishny, 1993). Corruption is viewed as tax on profits since the activities involved with corruption like payment of extra costs by the foreign investor to get license or government permits decreases the expected profitability of investment (Bardhan, 1997). Wei (1997) showed that corruption would slow Foreign Direct Investment, since due to the general uncertainty induced by the arbitrariness in corruption investors in general dislike to invest. He found that 'the effect of uncertainty on FDI is negative, statistically significant and quantitatively large"' (Wei, 1997, pp. 14). If the uncertainty had to increase from the level of Singapore to that of Mexico, then it would be equivalent to raising the tax rate by 32 percentage points on multinational firms.

Smarzynska and Wei (2000) by using firm level data in Eastern Europe and former Soviet Union show the probability of inward foreign investment in host country is reduced by corruption in host country. Business meet the most common form of financial corruption where for each of the following: tax assessments, import and export license, exchange controls, police protection and other public services bribes are expected.

Mlambo (2005) identifies the various factors that constrains foreign direct investments in Southern African development community (SADC). Growing perception of corruption makes the region unattractive for foreign investments. The cost of business transaction is added on by corruption which leads to inefficient economic outcomes. Wei (1997) found that major disincentive to foreign investment was caused by corruption in host countries. The most promising policies would be attract FDI inflows by protecting and enforcing

property rights, reducing excessive regulation, reducing corruption and improving the quality of bureaucracy (Mlambo, 2005).

1.5.3 Competition amongst Governments

To attract investments in their jurisdictions there is competition amongst the governments at both national and sub national levels (Charlton, 2003).

In case of incentive competition the governments bid against each other to attract mobile capital. Positive sum game hypothesis believes that the efficient mechanisms for competitive markets are the incentives that the government intervention is designed to achieve through industry policy objectives. Even if there is no competition amongst jurisdictions governments do offer incentive to keep investors mobile. In foreign investment literature it is seen that there is an evidence of "following the leader" or clustering (Charlton, 2003). The reason behind this being that the firms do not wish to take "first mover risk" in an uncertain new location (Ziet and Valdes, 1989).

"Leviathan models" also propose that due to tax competition welfare also improves since government officials are forced to reduce wasteful expenditure. In the absence of tax competition the size of the government will be excessive and hence tax competition improves welfare (Brennan and Buchanan, 1980).

Oates (2003) sums up the paradigm of incentive competition by saying that less than efficient levels of local services may result due to tax competition. Officials may hold spending below (optimal) level to attract business investment. Governments may pay too much for their investment projects leading to competition for incentives.

The competition for incentives can also lead governments to pay too much for their investment projects which would lead to inefficiently high subsidization of international firms at the expense of domestic country.

Firms will be more wanting to reduce the "depth" of investment in any location when there is incentive competition enabling them to capitalize on incentive offers more frequently and enabling the firms to move easily (Fierro-Duran and Reisen, 1990). Competition

plays a major role in driving incentive deals resulting in intensive bidding wars between countries that are similar or have similar regional governments (Oman, 2000).

Regional governments or countries having decentralized forms of governments at the sub-national levels that contribute to international and intra-national competition and deliver incentive packages (Akuoko-Frimpong, 1990). Looking at a case study from the Brazilian industry there exist competition at several levels of government- regional, state and federal. From the case studies of Brazilian automobile sector which is the most important sector of Brazilian economy it is seen that its growth has tripled from 1990 to 2000. Competition amongst ASEAN countries for FDI has been the key factor for the growing investment incentives. There is a potential to increase effectiveness of incentives and also reduce wasteful expenditure when transparent and comprehensive accounting practices are introduced. For nations it is "individually optimal" to offer incentives exceeding the efficient levels hence creating a "prisoners dilemma" situation in this form of strategic competition The anticipation of a potential effect of the "prisoner's dilemma" makes coordination amongst the jurisdictions justified (Charlton, 2003).

The coordination amongst the jurisdictions is difficult since governments do not reveal the true nature of incentive deal. Some of the incentives distort economic decisions (contributing to outright corruption) or also escalating bidding wars amongst the governments competing against each other. "Opaque" subsidies are generally criticized since it is difficult to value it correctly and lead to unpredictable revenue losses and can be very costly at large. Due to cooperation amongst governments transparency is increased and positive welfare outcomes are yielded. Improved reporting standards must be achieved by creating and enforcing collective policies and informational disadvantage is also reduced that the governments have in negotiating with the investor firm.

The OECD countries to reduce "harmful tax competition" also adopted the "import prohibition" approach. "Import prohibition" is a term that has been defined by WTO agreement on Subsidies and Countervailing Measures (SCM) which is mainly applied to the area of export. Prohibited subsidies are those that are most damaging to trade.

Oman (2000) notes that investment competition has the potential to generate corruption, graft and other rent seeking behavior. The opportunity for corrupt behavior is reduced when there is less discretion and greater accountability on the part of the government officials.

The above discussion leads to a need of economic reforms. It is also seen that the economic reforms like market liberalization and privatization lead to a rise in corruption. These reforms often respond to the vested interest of the corrupt elites; however the absence of well-implemented economic reforms will lead to greater amount of corruption[3]

Robert Leiken wrote that market and administrative reforms may even become counterproductive when corruption is systemic. Economic activity can lead to loosening of government controls. By exacting new 'fees' in other areas bureaucrats have known to compensate for lost revenues (Kaufmann,1997).

Some of the anticorruption efforts have been described below: The tax inspectorate institution of Philippines called the Bureau of Internal Revenue (BIR) was revamped and tax reforms were implemented. Argentina's social security reforms (ANSES) are examples of institutional reforms that have been very effective. Corrupt personnel were immediately fired, new control systems were put in place, and there were modern incentive and performance assessment systems that were assigned. Exemptions were significantly reduced and tax rates were simplified reducing the discretion and incentive to reduce bribes.

Macroeconomic stabilization which essentially include policy reforms like broad market liberalization, constituency build up that favors' competition, removing the discretion to provide soft credits and subsidies (Kaufmann, 1997).

However with macroeconomic liberalization we should also have microeconomic liberalization like creating moderate, uniform and simple tax rates, regimes with determined enforcements and without exemptions; reforms in the budget and the government which includes establishing financially sound and transparent expenditure and revenue mechanisms; institutional reforms like eliminating redundant agencies and ministries; reforms

[3]given the reforms are competitive and transparent.

in civil service and legal reforms.

"Setting up an improved civil service pay system, with adequate salary incentives and enforceable penalties for malfeasance, is also critical. Countries that have established a system of rewards for civil servants that is competitive with the private sector have also reduced corruption" (Kaufmann, 1997,pp 128).

Hence we end at this note where we see that for effective foreign direct investment in a region we need an efficient bureaucracy.

Chapter 2

Motivation, Private Sector Wages and Corruption: An Equilibrium Approach

2.1 Introduction

Bureaucratic Corruption has been modeled and discussed widely in the corruption literature. This paper relates bureaucratic corruption and public sector motivation.

The model and the analysis is based on the questions below:

1) Is the occupational choice of working in a bureaucracy dependent more on non-pecuniary payoffs received working in the bureaucracy or the wages received in private sector?

2) Do higher wages given to agents in the public-sector attract non-motivated agents; if the wages in private sector are sufficiently low then what leads them to behave honestly?

Bureaucratic corruption has been studied as an intervention by the government to correct market failures (Verdier and Acemoglu, 1998); the incidence of corrupt dealings in government contracting process and the market structures (Ackerman, 1975); corruption based on perception of the agent which is influenced by his experiences (Sah, 1996); bureaucrat acts as a monopolist of the good say a license or provides permit (Shleifer and Vishny,

1993); corruption is taken as a gamble when the official faces the risk of being reported and sacked (Cadot, 1987); reputation that a firm, organization, country inherits from the past (Tirole, 1996); is corruption result of weak property right enforcement (Acemoglu and Verdier, 1998).

Our approach is different as it analyzes what makes an agent to pick up a private sector job as compared to bureaucratic job or vice versa. Agents have different degrees of motivation for public service, the more motivated ones would want to work in the bureaucracy while the less motivated/non-motivated ones would work for a wage. If they get a private sector job, then they work for a private sector wage rate or work dishonestly in the bureaucracy. Besley and Ghatak (2005) in a different setup cast light on how changes in the productivity of the private sector would affect the optimal incentive schemes in any mission oriented sector. We discuss how the extrinsic benefits of working in the bureaucracy affect the private sector productivity. There have been ongoing discussion on how the pay-setting in public sector bureaucracies would respond to the private sector,our model discusses this aspect of wage setting in bureaucracies.

Our model is so designed to shed light on the contract formation between the employee and the employer. The two incentive problems that we have in contract formation is that of hidden-information and hidden actions. In our model the employee (the bureaucrat) is differentiated by the level of motivation hence the employer or the government is not informed about the motivation of the agent. The second problem that arises in contract formation is that whether the employer can see what the employee does that how much effort is put by the employee. In our cast the employer does not know whether the employee is honest dishonest. Hence in our contract formation between the bureaucrat and the government we have adverse selection and moral hazard both as incentive problems. The literature on contract theory and corruption does not talk about this aspect of hidden -information in contract design by the government for the bureaucrat. In Section 2.2 we lay out the basic model. In Section 2.3 we discuss the equilibrium and in Section 2.4 we discuss the policy choices.

2.2 The Basic Model

We have a static economy which consist of continuum 1 of risk -neutral agents. Each agent can work in private sector or work as a bureaucrat. Agents are differentiated by their level of motivation (added payoff received when working in the bureaucracy), with the convention that $\theta = 0$ represents non-motivated agent. The level of motivation is uniformly distributed over $[0, 1]$ and is private information. We let n be the mass (fraction) of bureaucrats in the public sector, and let $(1-n)$ be the mass of private sector agents. x is a set of bureaucrats relative to total population that are acting honestly and are the ones that are most motivated. w^b is the wage rate that is paid to the bureaucrat. Each bureaucrat is given control over an exogenous amount of resources g. These resources could be diverted by the bureaucrat increasing the utility by g. In this case it would not contribute towards the output from bureaucracy. We assume that λg is benefit of a good bureaucrat for the private sector. w^p is the private sector wage rate determined endogenously. q $(0, 1)$ is the exogenous probability with which the opportunistic behavior of the bureaucrat is detected. y is the private sector output. When detected the bureaucrat would lose the wage and be dismissed. G is government expenditure by the government such that $G{=}n(g + w^b)$, g of these resources are allocated to each bureaucrat ng are total resources allocated to the bureaucracy and nw^b is the total wage bill.

Preferences

All agents are assumed to be risk neutral with a utility function that is additively separable in wages (from the private sector and the bureaucracy) and motivation.

Since motivation is uniformly distributed amongst the agents the utility of the bureaucrat is given by equation (1) and the utility of the agent working in the private sector is given by (2)

$utility(b) = max\left[(w^b + \theta), (w^b + g + \theta)(1 - q)\right].....(1)$

$utility(p) = w^p$ ....(2)

The first equation explains that the bureaucrat can either be honest or dishonest. If the agent is honest and motivated he gets a payoff of $(w^b + \theta)$. If the agent is dishonest and works in the bureaucracy he would get an expected payoff of $(w^b+g+\theta)(1-q)$. The payoff of the dishonest agents is $(w^b + g + \theta)$ if not caught; hence the utility of the dishonest agent is $(w^b + g + \theta) - q(w^b + g + \theta)$. If the agent works in private sector he would get a payoff of w^p.

Order of play

Stage 1: The government sets a public sector wage rate w^b, n the size of the bureaucracy, and g are the resources allocated to each bureaucrat. This then determines $G = n(g + w^b)$ the size of government expenditure. The limit on G is given by G* such that it satisfies $G^* = n(g^* + w^{b^*})$ where g^* are the maximum resources allocated to each bureaucrat and w^{b^*} are the wage rates at which all bureaucrats are honest.

Stage 2: Two professions are offered to each agent. One can become government employee (bureaucrat) or can become a private sector agent.

If the agent decides to work as a bureaucrat he can either be honest or dishonest. If the agent is honest the payoff of the agent is:

$\pi_{honestagent} = (w^b + \theta)$.

If the agent is dishonest the payoff of the agent is :

$\pi_{dishonestagent} = (w^b + g + \theta)(1 - q)$.

If the agent works in private sector the payoff of the agent is:

$\pi_{privatesector} = w^p$.

Stage 3: The agent applies for work. The government chooses a number n, and hence gets a proportion who will be honest to a proportion who are not honest, in line with the pool of applicants. The rest of applicants who are not selected to bureaucracy go to the private sector.

Private Sector Output

If we have in the bureaucracy honest agents who are also motivated such that $x = x(w^b, w^p, g, q, n)$; where x is total number of honest bureaucrats that the bureaucracy employs. Hence the private sector output comes from the private sector employment to the power α, multiplied by the value of the government spending by honest agents $g\lambda$ times x.

Private sector output $= \left[x(w^b, w^p, g, q, n))g\lambda\right][1-n]^{\alpha}$

Private sector wage rate is determined endogenously.

$w^p = \alpha\left[x(w^b, w^p, g, q, n)g\lambda\right][1-n]^{\alpha-1}$

We see from the equation that w^p is a function of x (honest agents who are more highly motivated) and x is dependent on w^p i.e to say the number of motivated agents in the bureaucracy is dependent on private sector wage rates.

2.2.1 Switching Point/Cut Off Level

θ_h is the cut off the point for a honest motivated agent to work in the bureaucracy. For the market to be in equilibrium an agent with lower than θ_h should prefer working for wages and agents with higher motivation should prefer bureaucracy. Fig (2.1) describes the switching point. Point A is a switching point/cut off level where the wage function for private sector and wages for honest motivated agents intersect

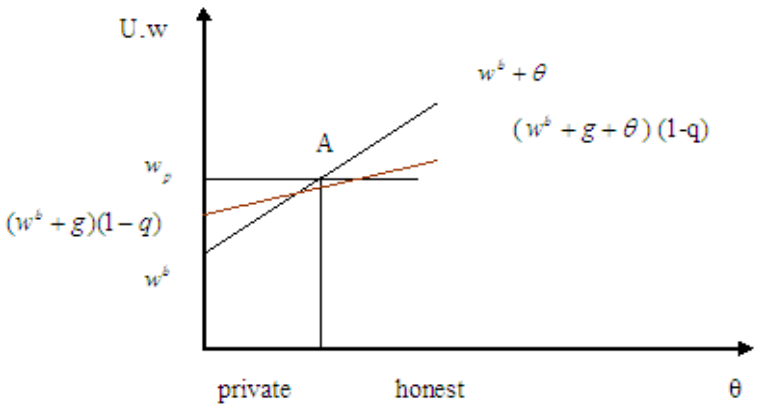

Figure 2.1:

Multiple Switching Points/Cut Off Levels

When the bureaucratic wage rate paid to the agent is less than the bureaucratic wage rates where all agents are honest we observe multiple switching points. Point B gives us the cut-off point θ_h which is the intersection for wages for honest motivated agent and the wage function for dishonest agent. Point A gives us the cut-off point θ_l which is the intersection for wages for dishonest agent and the wage function for private sector. The interval θ_l, θ_h is given by intersections A and B in the (Fig(2.2)). In this case we see that at point B (Fig(2.2)) the honest motivated bureaucrats with motivation in the interval $[\theta_h, 1]$ would reduce and we would have dishonest low motivated agents in the interval $[\theta_l, \theta_h]$. At point B we have the intersection for wage function for dishonest agent and for the honest agent. Beyond pt. B the agent gets a higher utility from being honest and motivated.

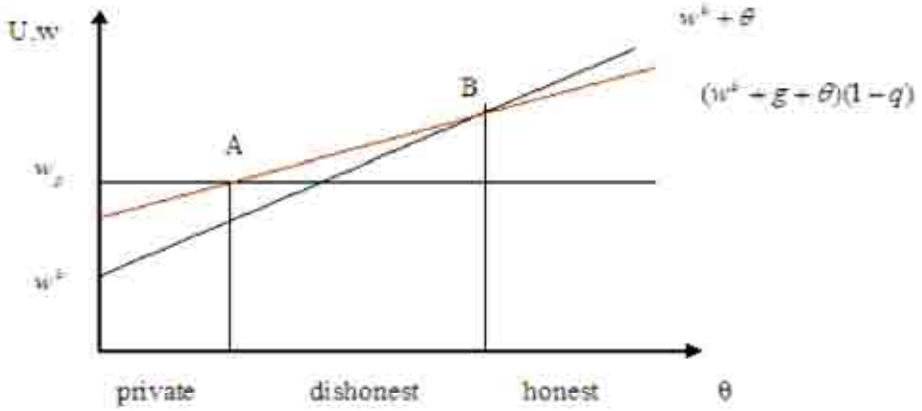

Figure 2.2:

2.2.2 Agent's behavior

In the above diagrams in Fig(2.1) and Fig(2.2), for a given w^p, w^b, g and q and motivation(θ) we have agents preferring to work in private sector or as dishonest honest agents in the bureaucracy. In this section we analyze how the choices of the agents change when one parameter changes with respect to other keeping other parameters constant.

In Fig(2.2) as we increase w^b the wage lines for dishonest and the honest bureaucrats become steeper. We will see that the size of the dishonest agents working in the bureaucracy remains constant however the size of private sector reduces and the size of honest bureaucracy increases.

As we increase w^p the private sector wage line shifts parallel up the size of dishonest agents working in the bureaucracy would fall and private sector agents would increase and the size of honest bureaucracy remains constant.

In Fig(2.3) we see that as we increase bureaucratic wages the agents who are honest and decide to work in bureaucracy increase ($w^p = 1.35, q = 0.3, g = 0.7$)

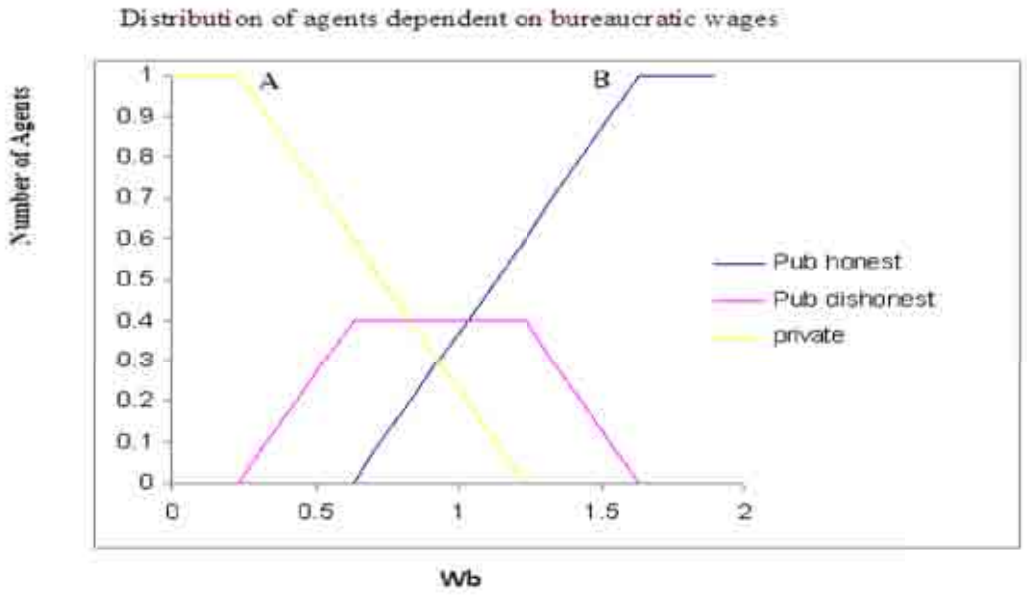

Figure 2.3:

As we increase bureaucratic wages those wanting to work in the private sector would fall. The agents in bureaucracy working dishonestly would rise and then remain constant and the agents working honestly in the bureaucracy would rise.

The kink at A is given by the intersection of private sector wage line and the wage line for public-dishonest agents at minimum motivation. The kink at B is given when the wage line for the dishonest agent and the wage line for public-honest agents would converge to a point where they intersect each other.

However the utility of agents working in the private sector before the kink at A is higher than working dishonestly in bureaucracy, the utility of the agents working in the private sector after the kink at A starts falling. The utility of the honest agents working in the bureaucracy after the kink at B is much higher than working in the private sector.

In Fig 2.4 we see that as we increase private sector wages the agents who are honest and

decide to work in bureaucracy remain constant and then with further increase in private sector wages the agents working in the bureaucracy would fall. The public dishonest agents would also remain constant and then start falling. The agents working dishonestly in bureaucracy however start falling before the agents who work honestly in the bureaucracy would fall ($q = 0.2, g = 0.2, w^b = 0.5$)

We explain how we get the kink points:

The kink at B corresponds to the kink at C. It is when in Fig(2.2) we parallely shift the private sector wage line, those who would want to work dishonestly in bureaucracy would start falling and the private sector workers would start increasing.

The kink at A corresponds to the kink at D hence those who would want to work honestly in the bureaucracy would start falling and there would be no more dishonest agents working in the bureaucracy. After the kink at E everybody wants to work in the private sector. Hence for an increasing wage rate in the private sector the utility of the dishonest

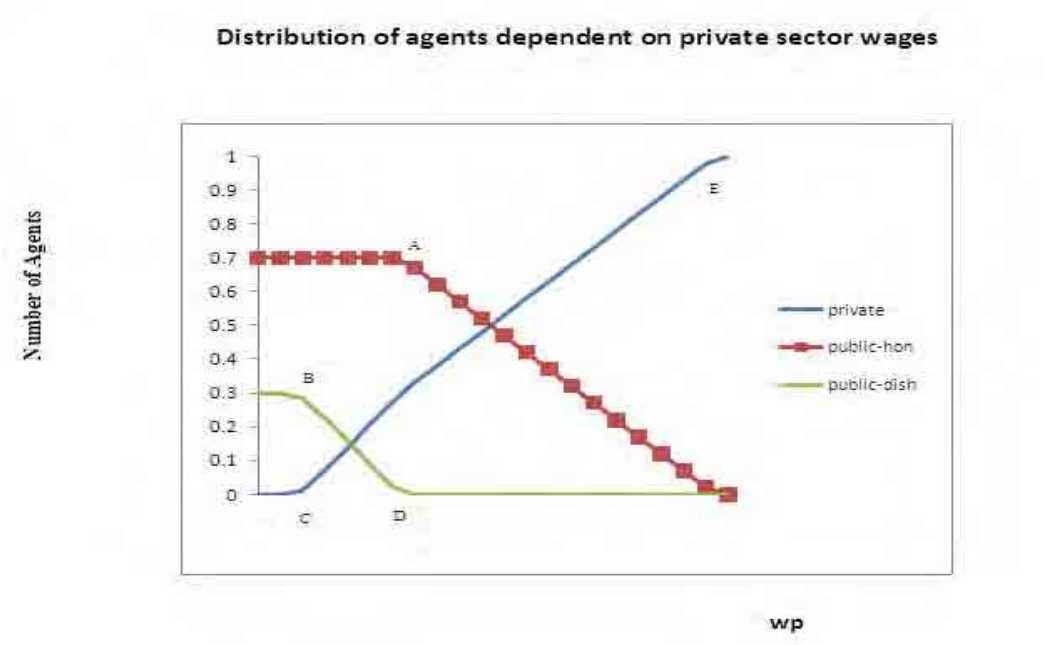

Figure 2.4:

agent to work in the bureaucracy starts falling before the utility of the honest agent to work in bureaucracy. Hence for given private sector wages we will have only honest (and

those who are also highly motivated) agents working in the bureaucracy.

2.3 Equilibrium

An equilibrium consists of a set of values of x, w^p and y given the government's choice of n, g and w^b. We formally define equilibrium in our model as values of $\widehat{x}$ and $\widehat{w}^p$ such that $(\widehat{x}\ ,\ \widehat{w}^p)$ solve for the equations $x = f(w^p)$ and $w^p = f(x)$. In Fig(2.5) we see 4 segments of x as a function of w^p.

Segment A: For low levels of w^p, working in the private sector is unattractive and all workers prefer to be in the public sector. Those with low motivation would act dishonestly if recruited, but those with higher motivation would act honestly. With everyone preferring to work in the public sector however only a fixed proportion of those will act honestly, giving a vertical relationship between the number of honest bureaucrats and the private sector wages.

The number of honest applicants (and those who are also highly motivated) in bureaucracy remain constant till a given wage rate in the private sector.

Segment B: When private sector wages increase, working in the private sector becomes attractive for workers with no motivation, because these would have the least utility from public sector. On further increasing the private sector wage rate we have fewer dishonest applicants in the bureaucracy.

Segment C: no more applicants who would be dishonest as bureaucrat find public sector more attractive than the private sector i.e. all applicants would be honest. Even as w^p rises (in this range)there are more applicants than the jobs, so x can be vertical.

When we have all agents that apply to the bureaucracy are honest we see that as we increase private sector wages the number of honest bureaucrats remain constant.

Segment D: Private sector is attractive even to relatively high motivation . Can't hire n workers; as w^p rises, x falls. As the private sector wages further increase honest bureaucrats would leave the bureaucratic job to work in the private sector.

We thus see 4 segments of x as a function of w^p:

$$\begin{aligned}
\widehat{x} &= n\left(1 + w^b + g - \frac{w^p}{1-q}\right) && \text{for} \quad 0 \leq w^p < (w^b + g)(1-q) \\
&= n\frac{1 + w^b - g(\frac{1-q}{q})}{1 + w^b + g - \frac{w^p}{1-q}} && \text{for} \quad (w^b + g)(1-q) \leq w^p < g\frac{1-q}{q} \\
&= n && \text{for} \quad g\frac{1-q}{q} \leq w^p < (w^b + 1 - n) \\
&= (w^b + 1 - w^p) && \text{for} \quad (w^b + 1 - n) \leq w^p \leq (w^b + 1)
\end{aligned} \tag{2.1}$$

Eq(2.2) gives us marginal product or real wage equation.

$$\widehat{w^p} = \alpha x(w^b, \widehat{w^p}, g, q, n) g\lambda(1-n)^{\alpha-1} \tag{2.2}$$

Eq(2.3) gives us total output.

$$\widehat{y} = x(w^b, \widehat{w^p}, g, q, n) g\lambda(1-n)^{\alpha} \tag{2.3}$$

Equilibrium number of honest bureaucrats and private sector wages is given by the intersection of the set of equations given by Eq(2.1) and we plot them in Fig(2.5) and in Fig(2.6) below.

Since x is a linear function in w^p, w^b, g, q, n; $\widehat{w^p}$ is an increasing function of x.

$\widehat{x}$ is concave function of w^p.

Hence at a low private sector wages we have some bureaucrats to be dishonest, at a medium wage rate we have more applicants in the bureaucracy to be honest. At a higher private sector wage rate we have all applicants in the bureaucracy to be honest (those who are also highly motivated).

As the private sector wages further increase honest bureaucrats would leave the bureaucratic job to work in the private sector.

In Fig(2.5) if the w^p line pivots (eg because w^p has risen) there will be single intersection

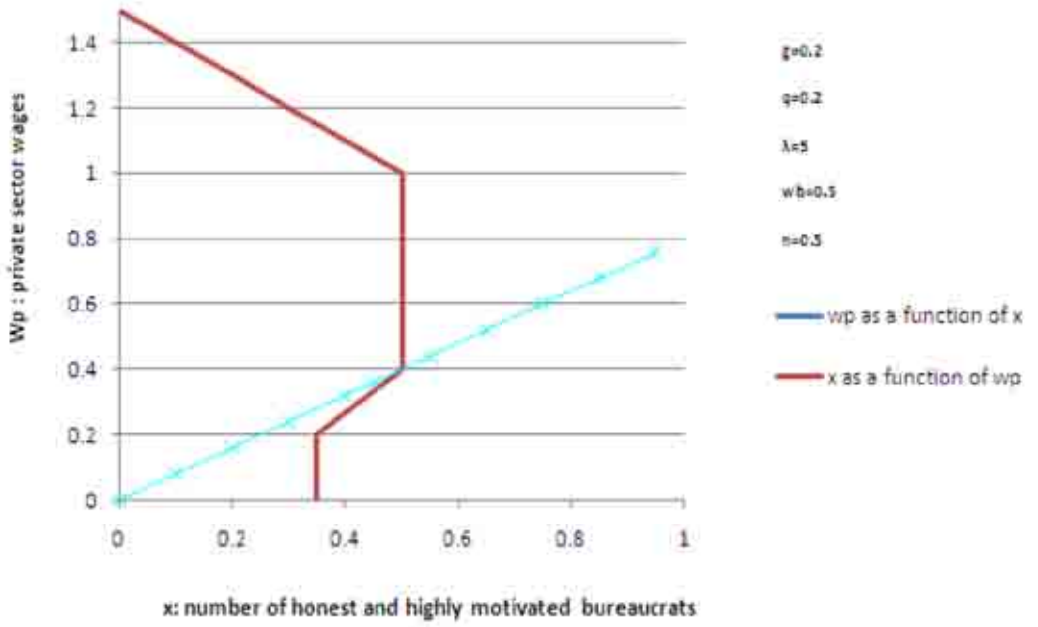

Figure 2.5:

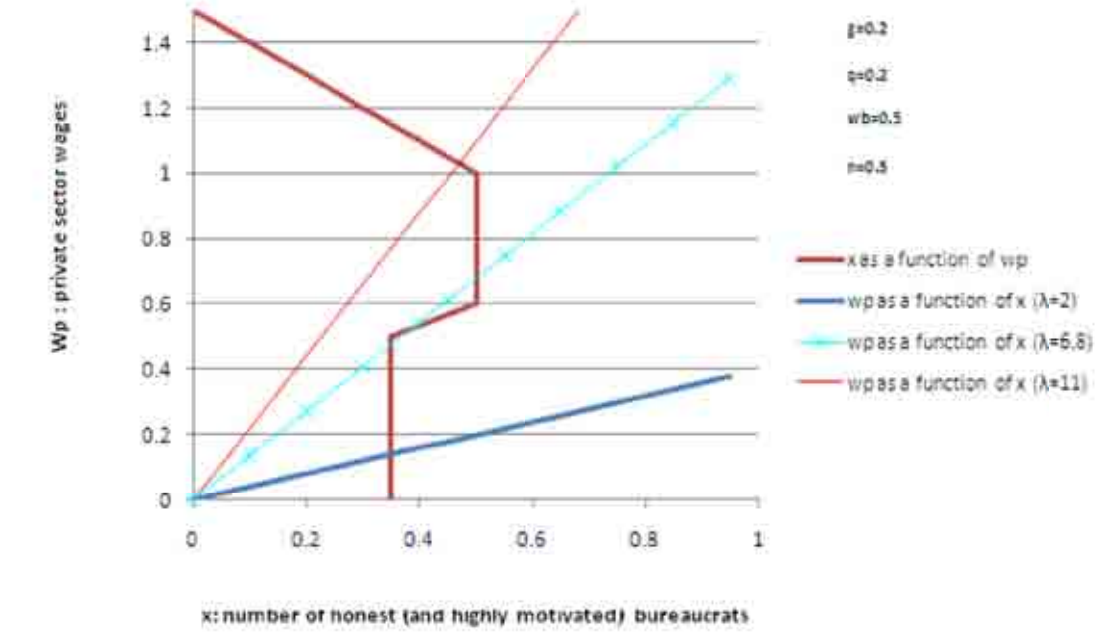

Figure 2.6:

with the line and a unique equilibrium. However if Segment B is flatter as in Fig(2.6) we have multiple equilibrium.

In the best equilibrium we have more number of honest agents and higher private sector wages which in turn keep the less motivated, dishonest workers away from the bureaucracy.

Single Equilibrium will hold when:

$\frac{1}{\frac{\partial x}{\partial w^p}} > \frac{w^p}{x}$(Slope of wage function)

$\frac{\partial x}{\partial w^p} < \frac{x}{w^p}$

$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$

$\frac{\partial x}{\partial w^p} = \frac{n(1+w^b-g\frac{1-q}{q})(1-q)^{-1}}{(1+w^b+g-\frac{w^p}{1-q})^2} < \frac{1}{\alpha\lambda g(1-n)^{\alpha-1}}$

Substituting and solving we have $2w^p < (1 + w^b + g)(1 - q)$ at the corner point. The utility of being dishonest and working in the bureaucracy is greater than twice of the utility obtained working in the private sector.

We now study the impact of each of the parameters on the wage lines and the equilibrium. In Fig(2.7) for a very low q we have that no agent would want to work in the bureaucracy. (The x as function of $w^p(q = 0.1)$ coincides with the y-axis). As we increase q further on we have an equilibrium with a higher private sector wage rate and honest agents (and those who are also highly motivated). Increasing q further on we have an equilibrium where all applicants are honest for a bigger range of private sector wages, on increasing the private sector wages further bureaucrats would leave the bureaucratic job to work in the private sector. If utility from working honestly in the bureaucracy is higher than the utility from working dishonestly in the bureaucracy, and the utility from working in private sector is greater than working dishonestly in bureaucracy then nobody would want to work dishonestly in public sector.

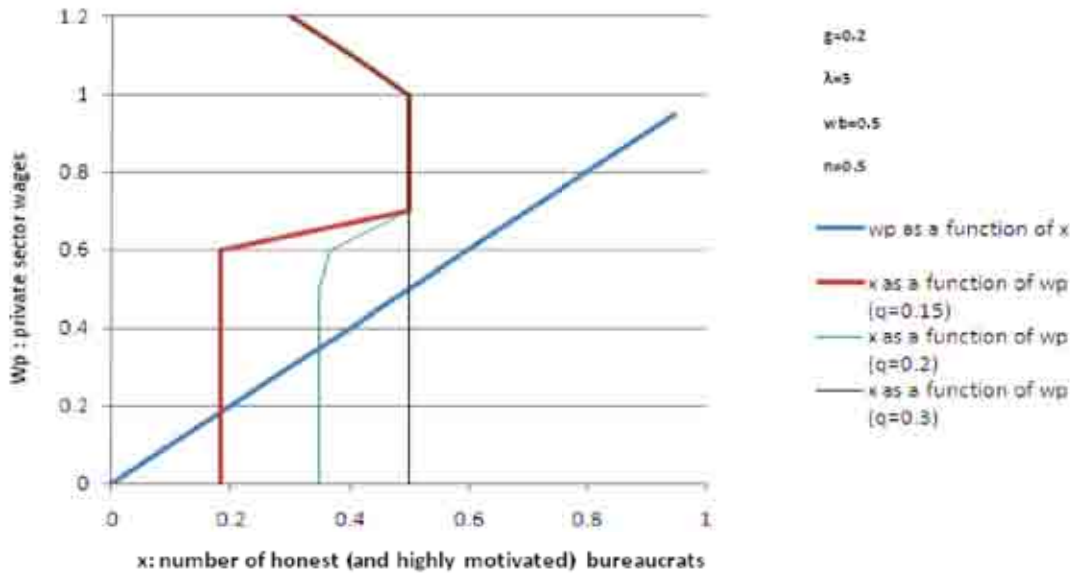

Figure 2.7:

Proposition 1: When the opportunistic behavior of the dishonest bureaucrat goes undetected (i.e.probability of being caught is zero) no-one working in the bureaucracy will be honest. For $q < \frac{g}{w^p+g}$ as there is increase in q the number of honest agents in the bureaucracy will increase, for $q > \frac{g}{w^p+g}$ (where q 1) as there is increase in q the number of honest agents in the bureaucracy will remain constant, since once we get to the point $x = n$ any further increases in q will not change the number of honest bureaucrats

Proof:

We first establish results on the number of agents.

Bureaucrats would work honestly in the bureaucracy when the utility from being honest and motivated is greater than what the agent gets if he is dishonest and works in the bureaucracy i.e. $(w^b + \theta) > (w^b + \theta + g)(1 - q)$.

If $q = 0$ (the probability with which the opportunistic behavior of the bureaucrat is detected) then this would fail to hold $(w^b + \theta) < (w^b + \theta + g)$(for any $g > 0$).

Hence, $(w^b + \theta) > (w^b + \theta + g)(1 - q)$ (Substituting for $\theta = 1$).

$q(w^b + 1 + g) > g$

For $q < \frac{g}{w^b+1+g}$ no-one is honest.

Hence for $0 < q < \frac{g}{w^b+1+g}$ no honest agent would work in the bureaucracy.

Segment A :

$$\widehat{x} = \left(1 + w^b + g - \frac{g}{q}\right) n$$

So $\frac{\partial \widehat{x}}{\partial q} = ng\frac{1}{q^2} > 0$

Segment B:

$$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$$

Using implicit form of equation we have: $Z = \widehat{x}$(defined from L^s) - $\widehat{x}$ (defined from inverse wage line)$\equiv 0$)

$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial q}\partial q = 0$

$\frac{\partial w^p}{\partial q} = -\frac{\frac{\partial Z}{\partial q}}{\frac{\partial Z}{\partial w^p}}$

$$\frac{\partial Z}{\partial w^p} = (1 + w^b - g(\frac{1-q}{q}))(1 + w^b + g - \frac{w^p}{1-q})^{-2}(1-q)^{-1} - (\alpha\lambda g(1-n)^{\alpha-1})^{-1}$$

$$\frac{\partial Z}{\partial q} = \frac{\frac{g}{q^2}(1+w^b+g) - \frac{w^p g}{q(1-q)}(\frac{1}{q}+1) + \frac{w^p}{(1-q)^2}(1+w^b)}{(1+w^b+g-\frac{w^p}{1-q})^2}$$

which gives us

$\frac{\partial w^p}{\partial q} = -\frac{\frac{g}{q^2}(1+w^b+g)-\frac{w^p g}{q(1-q)}(\frac{1}{q}+1)+\frac{w^p}{(1-q)^2}(1+w^b)}{(1+w^b+g-\frac{w^p}{1-q})^2}\frac{1}{(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}-(\alpha\lambda g(1-n)^{\alpha-1})^{-1})} >$
0

$\frac{\partial w^p}{\partial q} = -\frac{\partial x}{\partial q}\frac{\partial w^p}{\partial x}$

Now we know; $\frac{\partial w^p}{\partial x} = \frac{1}{(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}-(\alpha\lambda g(1-n)^{\alpha-1})^{-1}}$

Therefore, $\frac{\partial x}{\partial q} = \frac{\frac{g}{q^2}(1+w^b+g)-\frac{w^p g}{q(1-q)}(\frac{1}{q}+1)+\frac{w^p}{(1-q)^2}(1+w^b)}{(1+w^b+g-\frac{w^p}{1-q})^2}$

$\frac{\partial w^p}{\partial q} < 0$ for $\frac{\partial x}{\partial q} > 0$; $\frac{\partial w^p}{\partial x} < 0$ when $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} < n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$

which is the condition for a multiple equilibrium and here we have an inferior equilibrium.

$\frac{\partial w^p}{\partial q} > 0$ for $\frac{\partial x}{\partial q} > 0$; $\frac{\partial w^p}{\partial x} > 0$ when

$(\alpha\lambda g(1-n)^{\alpha-1})^{-1} > n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$

which is the condition for a single equilibrium.

Segment C and Segment D

For $q \geq \frac{g}{w^p+g}$,the curve changes shape and we have a curve defined by Segment C and Segment D.

Therefore, $\frac{\partial x}{\partial q} = 0$, once $w^p > g\frac{1-q}{q}$; because

$x = n$ for $g\frac{1-q}{q} \leq w^p < (w^b+1-n)$

$x = (w^b+1-w^p)$ for $(w^b+1-n) \leq w^p < (w^b+1)$

$Q \quad D$

Lemma 1: We now prove the results on the private sector wages that for $q < \frac{g}{w^p+g}$ as there is increase in q the private sector wages will increase for $q > \frac{g}{w^p+g}$ as there is increase in q private sector wages will be constant.

Proof in the appendix

Implication 1: On the inferior segment(i.e. Segment B), as we increase q the probability of being caught the private sector wages will fall.

Implication 2 : The change in x the number of honest agents(and those who are also highly motivated) w.r.t to q the probability of being caught is dependent on change in private sector wages w.r.t change in x .

$\frac{\partial x}{\partial q} = \frac{\frac{\partial w^p}{\partial q}}{\frac{\partial w^p}{\partial x}}$

The change in private sector wages w.r.t to changes in q is proportional to change in x the number of honest agents(and those who are also highly motivated) w.r.t q and change in private sector wages to x

$\frac{\partial w^p}{\partial q} = \frac{\partial x}{\partial q}\frac{\partial w^p}{\partial x}$

Hong Kong and Singapore both have been very successful examples of credible reforms in civil service by setting up an independent anticorruption agency to control corruption by law enforcement. In 1974 the Independent Commission against Corruption (ICAC) was set-up. The ICAC was given the right to recommend administrative and legal changes to reduce corrupt incentives (Klitgaard 1988). Surveys of the public that were carried out between 1977 and 1994 indicated that the perception of corruption by the public had reduced (Ackermann 1999). Singapore government party, People's Action Party which assumed power in 1959 made control of corruption a priority. It strengthened the powers of an existing Corrupt Practices Investigations Bureau (CPIB). In the case of Philippines

penalties and the rewards were altered. Rewards in the form of transfers, promotions, cash prize and praise was given for good performance the perpetrators of corrupt acts were punished and also led to dismissal of officers. Singapore is now considered to be clean government complying with Western standards. Public policies have controlled most corruption in the government. The above case studies describe how with an increase in the legal standards there is an increase in the number of honest agents and then the number of honest agents remain constant.

Proposition 2: If for a given slope of x as a function of w^p as λ the unit benefit of a honest bureaucrat on the private sector increases the private sector wages will increase ($\frac{\partial w^p}{\partial \lambda} > 0$, in this case we shall have a single equilibria)

If for a given slope of x as a function of w^p, we have that as we increase λ the unit benefit of a honest bureaucrat on the private sector the private sector wages will fall(s.t. we have an inferior equilibrium where ($\frac{\partial w^p}{\partial \lambda} < 0$)).

Proof in the appendix

In Fig(2.8) for a low g we have more honest bureaucrats (keeping the q constant) and higher private sector wages. On increasing g the number of honest agents would fall and the private sector wages also fall. At a very high g we have no honest applicants in the bureaucracy.

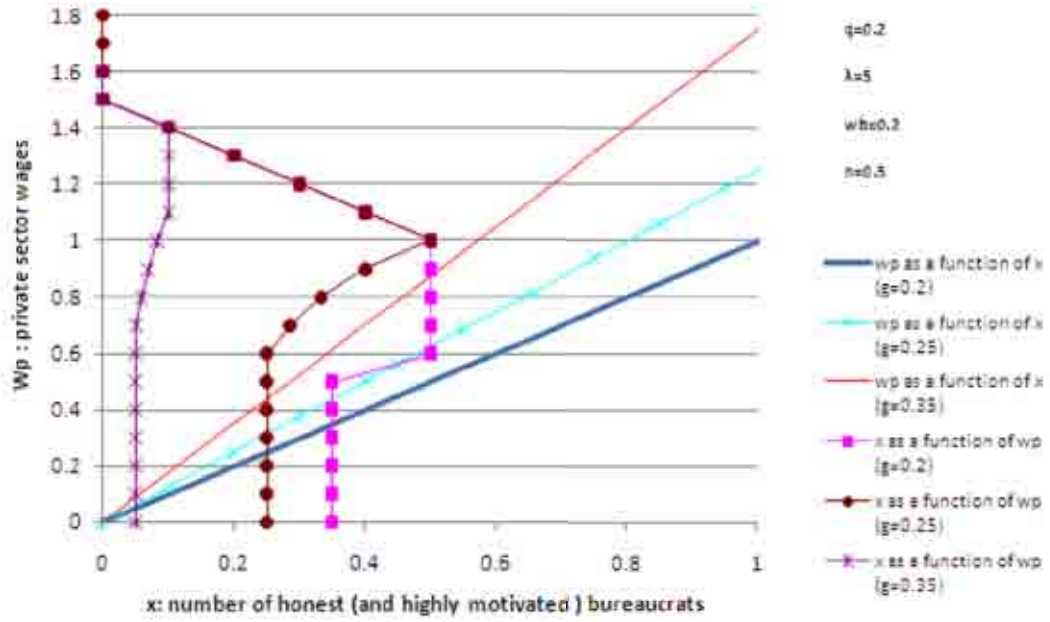

Figure 2.8:

Proposition 3 : As g increases, the allocation of resources to the bureaucracy the private sector wages will increase if and only if $(1+w^b) > 2g\frac{1-q}{q}$. As we further increase g private sector wages will decrease for $(1+w^b) > w^p$.

Proof in the appendix

Carnis (2010) writes about developing ways to understand the functioning of bureaus and determining the consequences of allocation of resources. Due to the impossibility of economic calculation and ill-defined ownership rights, leads to absence of market prices with

the bureau which makes it impossible to evaluate production (Mises, 1983(1969,1944),p. 52). This makes it impossible to correctly allocate resources leading to overuse or inefficient use of resources. Since the bureaucrat has no ownership rights over the resources agents may sometimes may loose the incentive for inefficiency. According to Carnis (2010) due to absence of an economic calculation the bureaucratic organizations are characterized by errors, furthermore these bureaucratic organizations lack the means to correct them easily. Due to an increase in these organizations it leads to 'error clusters' (Hulsmann, 1998, p. 11). It leads to spread of distortions in all interconnected markets in the economy. The author concludes by expressing a need for work on the internal dynamics of bureaucracies and private sector. We in the above proposition prove how much resources should be allocated to the private sector such that they are used efficiently and lead to an increase in private sector wages. On further increasing the allocation can lead to it being used inefficiently.

In Fig(2.9) for a low w^b we have an equilibrium with less number of honest(those who are also highly motivated) bureaucrats and low private sector wages. As we increase w^b there are greater number of honest applicants and an equilibrium with higher number of honest agents and private sector wages. On increasing the wage rate further we have an equilibrium with higher honest applicants and higher private sector wages. However when this high bureaucratic wage rate is paid we see that honest (and those who are also highly motivated) do not leave the bureaucratic jobs to work in the private sector.

For a high bureaucratic wage rate ($w^b = 0.9$), applications by agents with motivation $\theta \quad (0, 1)$ would work honestly in the bureaucracy.

We see when $\theta = 0$, $w^b > w^p > (w^b + g)(1 - q)$; hence agents with no motivation as well would like to work in bureaucracy.

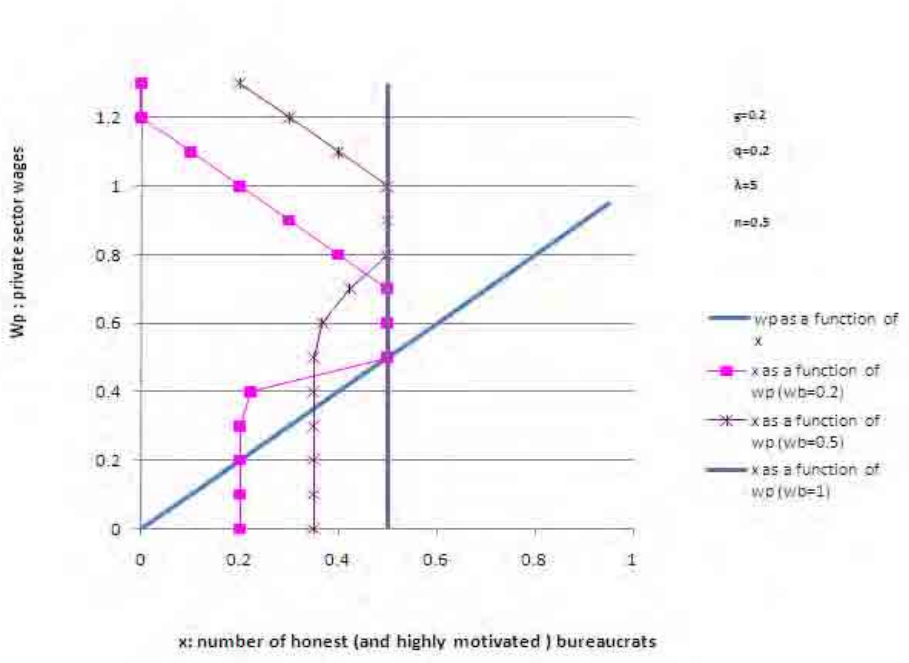

Figure 2.9:

Proposition 4: When private sector wages are low, and hence working in the private sector is unattractive, all workers prefer to be in public sector.

As we increase w^b, s.t. $0 \leq w^p < g\frac{1-q}{q}$

the number of honest agents in the bureaucracy will increase till $w^p = g\frac{1-q}{q}$ (for $\theta^B = w^p - w^b$).

For $w^p < (w^b + 1 - n)$, increasing bureaucratic wages the number of honest agents will remain constant.

For $w^p > (w^b + 1 - n)$ the number of honest agents will increase.

As the bureaucratic wage rates increase the private sector wages will increase.

Proof in the appendix :

The above proposition is related to the work done by Besley and Mclaren (1993) where they evaluate in their model alternative payment schemes in the presence of corruption. The problems of moral hazard is considered where taking of the bribes cannot be observed and adverse selection since all the agents cannot be observed as being dishonest or honest. Three wage regimes have been identified by them, the reservation wage is the wage that the tax inspector can earn elsewhere. The efficiency wage, which is the wage that deters bribery and solves the moral hazard problem. The government could also pay a wage that is below the reservation wage and called capitulation wage at which only the dishonest would become the tax inspectors. The developing world when undergoing a structural adjustment programme faces a dilemma on how much to pay its civil servants. Tanzi (1990) hence argues that the policy of wage cutting "is likely to increase the inefficiency of public sector employees, especially at a time when the public sector is expected to play a larger role in restructuring the economy" (p. 16). The authors compare the three wage regimes, they base their argument on tax paying capability tax payers. There are θ such tax payers that have income above the threshold at which a tax must be paid. For θ=0.1, capitulation wages are always preferred to efficiency wages as there is a choice only between

reservation and capitulation wages. The decisive factor is the size of y (the probability of meeting dishonest agent) for the given q. For a low y, hence low dishonesty the best wage regime is to have reservation wages. However when y increases capitulation wages are the best response to the existence of corruption problems whenever the government wants to raise revenues. The authors evaluate the wage regimes when the value of θ increases to 0.5. Efficiency wages are preferred when q is low and y is high, since it makes sense to deter corruption as monitoring is effective on dishonest inspectors. Highest revenues are yielded with capitulation wages when y is high however it is accompanied by poor monitoring. Capitulation wage regime is best chosen by countries where the tax revenue relative to total GNP is low. They then evaluate the case when θ=0.9, in this case efficiency wages play a greater role as compared to both capitulation and reservation wages. With a increase in proportion of tax payers who are willing to pay taxes efficiency wage regime is optimal since the increase in efficiency wages winds up in the hands of the government. In our model the government chooses n and w^b. The government can choose to pay a reservation wage in Segment A and B leading to a mix of honest and dishonest agents. Besley and Mclaren(1993) examine that if only capitulation wages are paid we would have only dishonest agents working in the bureaucracy. However we predict using our model that there would be some honest agents since they obtain utility from being motivated. In segment C the government could pay an efficiency wage however we examine further that paying higher bureaucratic wage like the "efficiency wage" may not be optimal.

US policy from 1960's has been to achieve similarity in pay of the federal employees and the private sector workers. President Kennedy agreed that a wage differential between the federal government and the private sector should not exist and action should be taken in order that "federal pay rates be comparable with private enterprise pay rates for the same level of work."(Smith, 1976, pg. 181). The Postal Service and Federal Employees Salary Act of 1962, was enacted to achieve a comparable pay for the federal workers and the private sector workers. More recently Chile has been a leader in introducing competitive pressures in the public sector. Reid (1992) explains in his paper on Chile

made systematic efforts to improve incentives for its central government employees. 80 per cent of the employees stayed in the public sector while the rest 20 per cent left the public sector to get jobs in private sector.

We also examine that in the inferior segment i.e. Segment B we see that as q and λ increases private sector wages will fall. We understand this using the centralization form of corruption in countries. Centralization would mean that there is just one monopolist who sells the government good, therefore if a customer wants two complementary permits he will have to bribe the joint monopolist however in a decentralized system he will have to bribe two separate monopolists. The corrupt official in a joint monopolist agency would ask for a bribe inclusive of the price in such a way that the marginal revenue is equal to the marginal cost. An example in this context can be given for Russia (see Shleifer and Vishny (1993)) where the Communist Russia had a centralized system of Corruption. In this case if we increase q it would disrupt the centralization as the honest bureaucrats would sell the good at the price assigned by the government resulting in a higher tax revenue to the government however it will lead to the firm (or the entrepreneur) paying a higher price for the government good which may result in it paying lower wages to its employees.

2.4 Policy Choice

Fig (2.10) shows the wage needed to ensure that n bureaucrats are willing to work in the bureaucracy and to act honestly. This is given by the kinked frontier ABC.

We find the minimum motivation for the least motivated agent such that the agent is just indifferent between working dishonestly in the bureaucracy and the private sector.

$(w^b + \widehat{\theta} + g)(1 - q) = w^p$

$\widehat{\theta} = \frac{w^p}{1-q} - w^b - g$

At this minimum level of motivation the utility the agent gets from being honest is just

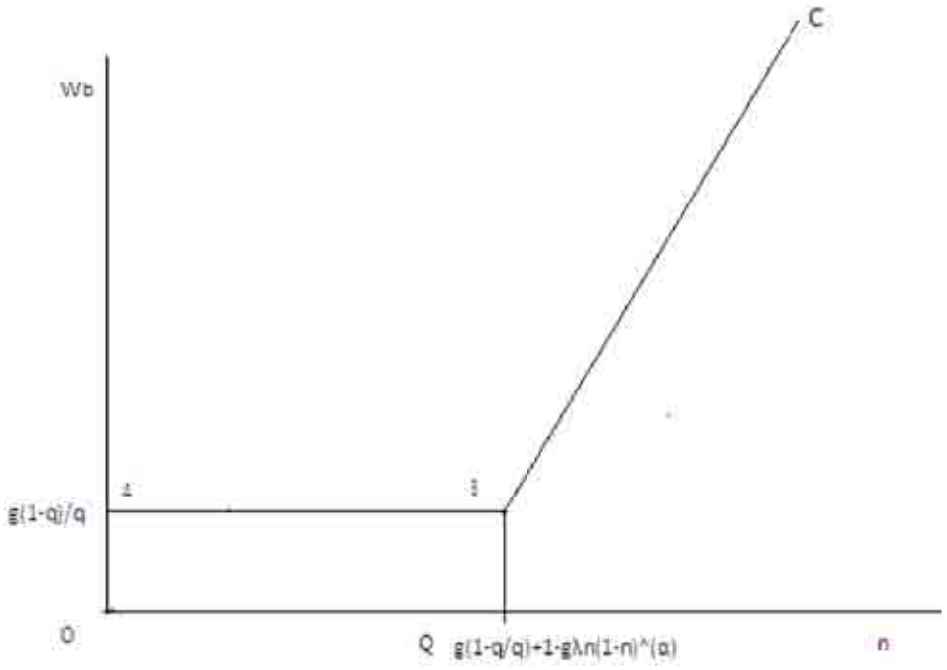

Figure 2.10:

bigger than utility obtained from being dishonest.

Hence we need $w^b + \frac{w^p}{1-q} - w^b - g > (w^b + \frac{w^p}{1-q} - w^b)(1-q)$

$\frac{w^p}{1-q} - g > w^p$

$w^p > g\frac{1-q}{q}$

$w^b = min(g\frac{1-q}{q}, w^p + n - 1)$

Hence at a wage rate $w^b = g\frac{1-q}{q}$ all post will be filled by honest agents(in the segment AB).

For an increasing bureaucratic and private sector wage rate given by the relation $w^b = w^p + n - 1$ all post are filled (in the segment BC).

We solve for the value of n at the kink point B given by the intersection of segment AB and BC in Fig(2.10).

$g\frac{1-q}{q} = w^p + n - 1$

$n = w^b + 1 - w^p$

$n = g\frac{1-q}{q} + 1 - g\lambda n(1-n)^{\alpha}$

We want to maximize the net private sector output (y) given by private sector output less $(w^b + g)n$.

In Fig(2.10) the net private sector output is given by: Gross private sector output - cost of public sector , hence we have curve with a lower peak as given by the net private sector output.

Case 1:

When $w^b = g\frac{1-q}{q}$

$y = (x(w^b, w^p, q, n)g\lambda)(1-n)^\alpha - nw^b - ng$

$y = xg\lambda(1-n)^\alpha - ng\frac{1-q}{q} - ng$

$\frac{dy}{dn} = g\lambda(1-n)^\alpha - \alpha xg\lambda(1-n)^{\alpha-1} - g\frac{1-q}{q} - g$

$\frac{dy}{dn} = g\lambda\left[(1-n)^\alpha - \frac{\alpha n(1-n)^\alpha}{1-n}\right] - \frac{g}{q}$

$\frac{d^2y}{dn^2} = -2\alpha g\lambda(1-n)^{\alpha-1} + \alpha(\alpha-1)ng\lambda(1-n)^{\alpha-2} < 0$

Case 2:

When $w^b = w^p + n - 1$

$y = (x(w^b, w^p, q, n)g\lambda)(1-n)^\alpha - nw^b - ng$

$y = (x(w^b, w^p, q, n)g\lambda)(1-n)^\alpha - n(w^p + n - 1) - ng$

$\frac{dy}{dn} = -\alpha g\lambda n(1-n)^{\alpha-1} + g\lambda(1-n)^\alpha - (w^p + 2n - 1) - g$

$\frac{dy}{dn} = -2n + 1 - g + g\lambda(1-n)^\alpha\left(1 - \frac{n}{1-n}\right) + \frac{n}{1-n}\alpha ng\lambda(1-n)^{\alpha-1}(\alpha-1)$

$\frac{d^2y}{dn^2} = -2 - g\lambda(1-n)^{\alpha-1}(1+2\alpha) + ng\lambda(1-n)^{\alpha-2}(\alpha-1)(1+\alpha) - 2\alpha g\lambda(1-n)^{\alpha-2}\frac{n}{1-n} < 0$

$\frac{d^2y}{dn^2}$ in both above mentioned cases is a concave function hence as n 1, $\frac{dy}{dn}$ 0.

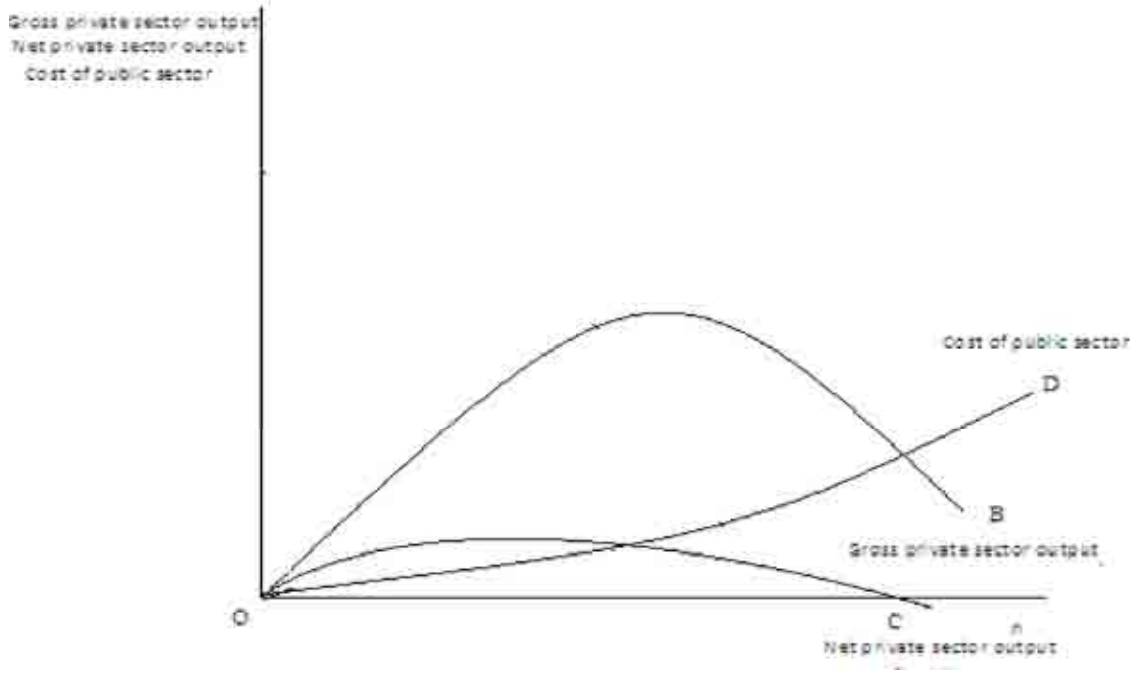

Figure 2.11:

In the above Fig(2.11) OB is the gross private sector output, OC is the net private sector output and OD is the increasing cost of public sector.

As we increase x the productivity per private worker increase since the number of private workers fall, which gives an inverted-U relationship. The cost of public sector in increasing and a quadratic function given by $(w^{b*}(x) + g)n$ where $x = n$.

2.4.1 Optimal Bureaucratic Wage Rates

Proposition 5: If we have $x = n$, the derivative of net private sector output wrt wage is negative, and so the net private sector output is higher with some corruption than with none.

Proof:

We have $y = xg\lambda(1-n)^{\alpha} - nw^{b} - ng$

$\frac{\partial y}{\partial w^{b}} = \frac{\partial x}{\partial w^{b}} g\lambda(1-n)^{\alpha} - n = 0$

Is given by the bureaucratic wage rate that the government would like to pay its bureau-

crats.

The equation for number of honest agents in Segment B is:
$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$

$\frac{\partial x}{\partial w^b} = n\left[\frac{\frac{g}{q}-\frac{w^p}{1-q}}{(1+w^b+g-\frac{w^p}{1-q})^2}\right] < 0$

$$\frac{\partial y}{\partial w^b} = n\left[\frac{\frac{g}{q}-\frac{w^p}{1-q}}{(1+w^b+g-\frac{w^p}{1-q})^2}\right] g\lambda(1-n)^\alpha - n < 0 \tag{2.4}$$

Hence for $w^b < g\frac{1-q}{q}$ the derivative of net private sector output with respect to the bureaucratic wage rates is negative. Hence net output is higher with a wage that's not high enough to achieve a fully honest bureaucracy.
Hence it could be excessively costly to prevent all corruption and some corruption could infact maximize net private sector output.
$Q \quad D$

The above proposition in our model explains that a small change in the wage (such that we do not have all bureaucrats to be honest) will lead to a bigger saving in the cost of employing bureaucrats than a bigger loss from some bureaucrats being corrupt. In Eq(2.4) we see that if we wish to pay our bureaucrats just enough wage to make them honest then our net private sector output will fall. Hence the savings by having the net private sector output positive is much larger than the losses from paying a wage that makes all agents working in the bureaucracy honest.
Flatters and Macleod (1995) study a model where a wage is chosen for the tax official by the government while consideration that the agent may moonlight is given. The incentives are set at a level to ensure that the government's revenue target is met by the tax officials. The authors find that corruption is a necessary part of the efficient solution. They give two reasons for it. Firstly is the existence of constraints on the civil service wages. This

could be in the form of some wage parity between the tax office and other government offices or a wage ceiling for tax officials. Such wage constraints lead to the bribe taking behavior of the civil servants. The second consideration they give is that the bribes act like an unofficial commission to the tax collectors as they need to meet the revenue targets of the government or face the consequences of being dismissed by the government. Since a certain amount of effort is required from the tax officials to determine the tax liabilities of the individual tax payer and to collect taxes from them. However the authors also add that having 'accepted' a level of corruption it is also important to be ensured that it does not lead to deprivation of revenues for the government. They suggest that heavier penalties must be imposed rather than simple dismissal

2.4.2 Concluding Comments

The paper explores a general equilibrium model to establish dynamics between private sector wages and bureaucratic wage rates.

We identify; (1) The behavior of agents as we increase bureaucratic wages and private sector wage rates, (2) We diagrammatically show the behavior of applicants to the bureaucracy by changing private sector wages (by fixing each of the variables), (a) We then change each of the variables and see its impact on the behavior of the applicants to the bureaucracy, (3) The lowest possible bureaucratic wage rates that needs to be paid to bureaucrats such that all are honest, (4) Even if the government is paying the lowest possible wage rate, at this wage rate it is not possible to maximize net private sector output. Hence the idea of maximization of net private sector output is not compatible with maintaining an honest bureaucracy.

2.5 Appendix

Proposition 1: When the opportunistic behavior of the dishonest bureaucrat goes undetected (i.e.probability of being caught is zero) no-one working in the bureaucracy will be honest. For $q < \frac{g}{w^p+g}$ as there is increase in q the number of honest agents in the bureaucracy will increase, for $q > \frac{g}{w^p+g}$ (where $q \quad 1$ [1]) as there is increase in q the number of honest agents in the bureaucracy will remain constant.

Proof:

We first establish results on the number of agents.

Bureaucrats would work honestly in the bureaucracy when the utility from being honest and motivated is greater than what the agent gets if he is dishonest and works in the bureaucracy i.e. $(w^b + \theta) > (w^b + \theta + g)(1 - q)$.

Lemma 1: We now prove the results on the private sector wages that for $q < \frac{g}{w^p+g}$ as there is increase in q the private sector wages will increase for $q > \frac{g}{w^p+g}$ as there is increase in q private sector wages will be constant.

Proof :

Segment A :

$$\widehat{x} = \left(1 + w^b + g - \tfrac{g}{q}\right) n$$
$$w^p = \left(1 + w^b + g - \tfrac{g}{q}\right) n\alpha\lambda g(1-n)^{\alpha-1}$$
$$\tfrac{\partial w^p}{\partial q} = \tfrac{g}{q^2} n\alpha\lambda g(1-n)^{\alpha-1} > 0$$

As we increase q private sector wages will increase.

[1] We also explain in our proofs that $w_p > g\frac{1-q}{q}$ for $\frac{dx}{dq} = 0$, the inequality for private sector wages will not hold true for $q = 1$

Segment B:

$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$

$\frac{\partial w^p}{\partial q} = -\frac{\frac{g}{q^2}(1+w^b+g)-\frac{w^p g}{q(1-q)}(\frac{1}{q}+1)+\frac{w^p}{(1-q)^2}(1+w^b)}{(1+w^b+g-\frac{w^p}{1-q})^2}\frac{1}{(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}-(\alpha\lambda g(1-n)^{\alpha-1})^{-1})} >$
0

$\frac{\partial w^p}{\partial q} < 0$ for $\frac{\partial x}{\partial q} > 0$; $\frac{\partial w^p}{\partial x} < 0$ when $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} < n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$
which is the condition for a multiple equilibrium.

$\frac{\partial w^p}{\partial q} > 0$ for $\frac{\partial x}{\partial q} > 0$; $\frac{\partial w^p}{\partial x} > 0$ when $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} > n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$
which is the condition for a single equilibrium.

Segment C and Segment D

When $q > \frac{g}{w^p+g}$, $\frac{\partial x}{\partial q} = 0$ and $\frac{\partial w^p}{\partial q} = \frac{\partial x}{\partial q}\frac{\partial w^p}{\partial x} = 0$

$Q \quad D$

Proposition 2: If for a given slope of x as a function of w^p as λ the unit benefit of a honest bureaucrat on the private sector increases the private sector wages will increase ($\frac{\partial w^p}{\partial \lambda} > 0$, in this case we shall have a single equilibria)
If for a given slope of x as a function of w^p, we have that as we increase λ the unit benefit of a honest bureaucrat on the private sector the private sector wages will fall(s.t. we have an inferior equilibrium where ($\frac{\partial w^p}{\partial \lambda} < 0$)).
Proof:

$Z = \widehat{x}$(defined from L^s)-$\widehat{x}$ (defined from inverse wage line) $\equiv 0$)

$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial \lambda}\partial \lambda = 0$

$\frac{\partial w^p}{\partial \lambda} = -\frac{\frac{\partial Z}{\partial w^p}}{\frac{\partial Z}{\partial \lambda}}$

$\frac{\partial w^p}{\partial \lambda}$= f^n(slope of private sector wage line - slope of L^s function)$\frac{\partial Z}{\partial w^p}$

In segment A, C and D we see that slope of private sector wage line > slope of L^s function hence we have a single equilibria.

In segment B when slope of private sector wage line > slope of L^s function we have a single equilibria and when slope of private sector wage line < slope of L^s function we have an inferior equilibrium.

Segment A

$\widehat{x} = \left(1 + w^b + g - \frac{g}{q}\right) n$

$Z = \widehat{x}$(defined from L^s) - $\widehat{x}$ (defined from inverse wage line)$\equiv$ 0)

$w^p = \left(1 + w^b + g - \frac{g}{q}\right) n\alpha\lambda g(1-n)^{\alpha-1}$

$\frac{\partial w^p}{\partial \lambda} = \left(1 + w^b + g - \frac{g}{q}\right) n\alpha g(1-n)^{\alpha-1} > 0$

Segment B :

$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$

$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial \lambda}\partial \lambda = 0$

Using implicit form of equation we have: $Z = \widehat{x}$(defined from L^s) - $\widehat{x}$ (defined from inverse

wage line)$\equiv 0$)

$\frac{\partial w^p}{\partial \lambda} = -\frac{\frac{\partial Z}{\partial w^p}}{\frac{\partial Z}{\partial \lambda}}$

$\frac{\partial Z}{\partial w^p} = \frac{w^p}{\alpha\lambda^2 g(1-n)^{\alpha-1}}$

$\frac{\partial Z}{\partial \lambda} = (\alpha\lambda\ g(1-n)^{\alpha-1})^{-1} - n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$

$\frac{\partial w^p}{\partial \lambda} = \frac{w^p}{\alpha\lambda^2 g(1-n)^{\alpha-1}} \frac{1}{(\alpha\lambda g(1-n)^{\alpha-1})^{-1}-n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}}$

The above derivative is positive given that:

$(\alpha\lambda g(1-n)^{\alpha-1})^{-1} > n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$

The above condition will give us a single equilibria.

If $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} < n(1+w^b-g(\frac{1-q}{q}))(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}$

holds the above derivative will be negative and it will give us an inferior equilibrium in case we have a multiple equilibria.

Segment C

$x = n$

$w^p = n\alpha\lambda g(1-n)^{\alpha-1}$

$\frac{dw^p}{d\lambda} = \alpha n g(1-n)^{\alpha-1} > 0$

Since it is an increasing function as unit benefit λ increases the equilibrium private sector wages will also increase.

Segment D

$\widehat{x} = w^b + 1 - w^p$

$w^p = (w^b + 1 - w^p)\alpha\lambda g(1-n)^{\alpha-1}$

$\frac{\partial w^p}{\partial \lambda} = \frac{(w^b+1)\alpha g(1-n)^{\alpha-1}}{(1+\lambda\alpha g(1-n)^{\alpha-1})^2} > 0$

$Q \quad D$

Proposition 3 : As g increases, the allocation of resources to the bureaucracy the private sector wages will increase if and only if $(1+w^b) > 2g\frac{1-q}{q}$. As we further increase g private sector wages will decrease for $(1 + w^b) > w^p$.

Proof:

Segment A:

$\widehat{x} = \left(1 + w^b + g - \frac{g}{q}\right) n$
$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial g}\partial g = 0$

Using implicit form of equation we have: $Z = \widehat{x}$ (defined from L^s) - $\widehat{x}$ (defined from inverse wage line)$\equiv 0$)

$\frac{\partial w^p}{\partial g} = -\frac{\frac{\partial Z}{\partial g}}{\frac{\partial Z}{\partial w^p}}$

$\frac{\partial Z}{\partial w^p} = -\frac{1}{\alpha\lambda g(1-n)^{\alpha-1}}$

$\frac{\partial Z}{\partial g} = n - \frac{n}{q} + \frac{w^p g^{-2}}{\alpha\lambda(1-n)^{\alpha-1}}$

$\frac{\partial w^p}{\partial g} = n - \frac{n}{q} + \frac{w^p g^{-2}}{\alpha\lambda(1-n)^{\alpha-1}}$

$\frac{dw^p}{dg} > 0$, given $(1 + w^b) > 2g\frac{1-q}{q}$
$\frac{dw^p}{dg} < 0$, given $(1 + w^b) < 2g\frac{1-q}{q}$, in this case the shift in vertical Segment A is too close to Y axis and hence there is a fall in private sector wages.

Segment B :

$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$, then

$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial g}\partial g = 0$
Using implicit form of equation we have: $Z = \widehat{x}$(defined from L^s) - $\widehat{x}$ (defined from inverse wage line)$\equiv$ 0)

$\frac{dw^p}{dg} = \frac{\frac{n(1+w^b-w^p)}{q}\alpha g\lambda(1-n)^{\alpha-1} + \frac{w^p(1+w^b+g-\frac{w^p}{1-q})^2}{g}}{\frac{n}{1-q}(1+w^b-g\frac{1-q}{q})\alpha g\lambda(1-n)^{\alpha-1} - (1+w^b+g-\frac{w^p}{1-q})^2}$

$\frac{dw^p}{dg} < 0$ when we have multiple equilibria, which holds when we have;

$w^p < (1 + w^b)$ and $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} < n(1 + w^b - g(\frac{1-q}{q}))(1 + w^b + g - \frac{w^p}{1-q})^{-2}(1-q)^{-1}$

$\frac{dw^p}{dg} > 0$ when we have single equilibria, which holds when we have ;

$w^p > (1 + w^b)$ and $(\alpha\lambda g(1-n)^{\alpha-1})^{-1} > n(1 + w^b - g(\frac{1-q}{q}))(1 + w^b + g - \frac{w^p}{1-q})^{-2}(1-q)^{-1}$

Segment C :

$\widehat{x} = n$

$\frac{\partial x}{\partial g} = 0$(x is independent of g)
$\frac{dw^p}{dg} = \alpha x(w^b, w^p, q, n)\lambda(1-n)^{\alpha-1} > 0$

Since $\frac{dw^p}{dg}$ is positive as g increases w^p will increase in the segment

Segment D :

$\widehat{x} = w^b + 1 - w^p(g)$ (x is not independent of g)
$\frac{\partial x}{\partial g} = -\frac{\partial w^p}{\partial g}$

$\frac{dw^p}{dg} = -\alpha\frac{\partial w^p}{\partial g}g\lambda(1-n)^{\alpha-1} + \alpha x(w^b, w^p, g, q, n)\lambda(1-n)^{\alpha-1} > 0$
$\frac{dw^p}{dg}$ is positive, hence as we increase g allocation of resources , private sector wages will increase.
$Q \quad D$

2.5.1 Size of bureaucracy

In Fig(2.12) as we increase n, the number of honest agents in the bureaucracy would increase and the private sector wages will also increase.

Proposition 4: When private sector wages are low , and hence working in the private sector is unattractive, all workers prefer to be in public sector.
As we increase w^b, s.t. $0 \leq w^p < g\frac{1-q}{q}$
the number of honest agents in the bureaucracy will increase till $w^p = g\frac{1-q}{q}$ (for $\theta^B = w^p - w^b$).

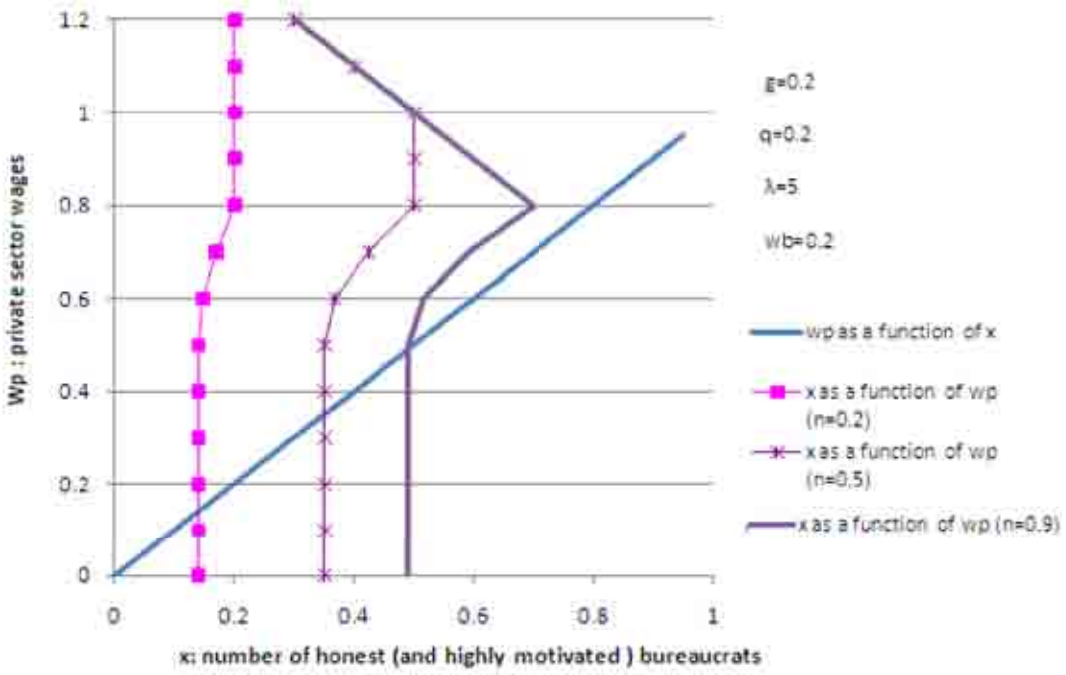

Figure 2.12:

For $w^p < (w^b + 1 - n)$, increasing bureaucratic wages the number of honest agents will remain constant.

For $w^p > (w^b + 1 - n)$ the number of honest agents will increase.

As the bureaucratic wage rates increase the private sector wages will increase.

Proof :

First we demonstrate how honesty in the bureaucracy is affected by private sector wages and bureaucratic wages.

Segment A :

$$\widehat{x} = \left(1 + w^b + g - \tfrac{g}{q}\right) n$$

$$\tfrac{\partial \widehat{x}}{\partial w^b} = n$$

Here as we increase w^b the number of honest agents in the bureaucracy will increase.

Segment B:

$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$

$\frac{\partial \widehat{x}}{\partial w^b} = n\left(\frac{g}{q} - \frac{w^p}{1-q}\right) > 0$

As we increase bureaucratic wages the number of honest agents will increase.

Segment C:

$\widehat{x} = n$

Then, $\widehat{x}$ is independent of bureaucratic wage rates.

Segment D :

$\widehat{x} = w^b + 1 - w^p(w^b)$

Then , $\frac{\partial \widehat{x}}{\partial w^b} = 1 - \alpha g\lambda(1-n)^{\alpha-1} > 0$

In this case we see that private sector wages are so high that it is attractive even to agents with high motivation. The number of agents who would like to work in the bureaucracy is less than those who would like to work in full size bureaucracy. But with an increase in bureaucratic wages the number of honest agents will increase.

We now show that as we increase bureaucratic wage rates private sector wages will increase.

Segment A:

$$\widehat{x} = \left(1 + w^b + g - \tfrac{g}{q}\right) n$$

$$w^p = \left(1 + w^b + g - \tfrac{g}{q}\right) n\alpha\lambda g(1-n)^{\alpha-1}$$
$$\tfrac{\partial w^p}{\partial w^b} = n\alpha g(1-n)^{\alpha-1} > 0$$

Segment B:

$$\widehat{x} = n\frac{1+w^b-g(\frac{1-q}{q})}{1+w^b+g-\frac{w^p}{1-q}}$$

Using implicit form of equation we have

$$\tfrac{\partial Z}{\partial w^p}\partial w^p + \tfrac{\partial Z}{\partial w^b}\partial w^b = 0$$

$$\tfrac{\partial w^p}{\partial w^b} = \frac{\alpha\lambda g(1-n)^{\alpha-1-1} - n(1+w^b-g\frac{1-q}{q})(1+w^b+g-\frac{w^p}{1-q})^{-2}(1-q)^{-1}}{n(\frac{g}{q}-\frac{w^p}{1-q})} > 0$$

Hence as we increase bureaucratic wage rates private sector wages will increase.

Segment C:

$x = n$

In Segment C when there are all honest agents working in the bureaucracy private sector wages are independent of bureaucratic wage rates.

Segment D:

$\widehat{x} = w^b + 1 - w^p$

Using implicit form of equation we have

$\frac{\partial Z}{\partial w^p}\partial w^p + \frac{\partial Z}{\partial w^b}\partial w^b = 0$

(where $Z = \widehat{x}$(defined from L^s) - $\widehat{x}$ (defined from inverse wage line)$\equiv 0$)

$\frac{\partial w^p}{\partial w^b} = -\frac{\frac{\partial Z}{\partial w^b}}{\frac{\partial Z}{\partial w^p}}$

$\frac{\partial w^p}{\partial w^b} = -\frac{\frac{\partial Z}{\partial w^b}}{\frac{\partial Z}{\partial w^p}}$

$\frac{\partial w^p}{\partial w^b} = \frac{1}{1+\frac{1}{\alpha\lambda g(1-n)^{\alpha-1}}}$

As we increase bureaucratic wage rates private sector wages will increase.

$Q \quad D$

Chapter 3

Two State Story: Wage Contracts and Profits under Competing Government facing Competition

3.1 The Basic Model

Corruption models have been studied in a setup where there is a single government. Verdier and Acemoglu (2000) in a single government setup discuss how investment is affected by a large corrupt bureaucracy that is paid low as compared to a small honest bureaucracy with some dishonest bureaucrats. Ackerman (1975) studies the relationship between the officials and the market structures. Shleifer and Vishny (1993) study a model where they have the bureaucrat as the monopolist of the good say the license, providing permits. We however study corruption in a duopolistic regime where there are two governments and a market for firms.

The economy consist of 2 regions (each of which has its own government) and continuum of firms which have to take a decision to where to invest. The government of the 2 regions set p which is the royalty[1] on producing a resource (the resource has a value net of production cost of 1). The price charged on the royalty is inclusive of the sale of

[1]Government is selling a concession or a permit.

government good and part of after investment profits that the government would keep. The firm would locate and invest in one of the regions. Firms are located along a line of unit length with one government on each end. Firms are indexed by i, measured from the end of the line at which government A is located. The government is the seller of homogeneous product, with zero production cost.

Since the product is homogeneous, a customer will buy from the seller who quotes the least price after transport cost. The transport cost is τ per unit distance.

We assume that the good is sold for the government by an official. The official can restrict the quantity of the good that is sold (say he can deny the investor the investment license). This denial might mean a long delay or an imposition of many requirements. It can be assumed that the official will simply refuse to provide the good. The power to deny the permits and regulations would give the officials the power to collect bribes in return for providing the permits (De Soto, 1989).

The cost involved in issuing license is cost of having a bureaucracy or paying the bureaucrats a wage rate w_g (g=A,B).

We assume that the probability of meeting honest/dishonest bureaucrats is h_a, $1 - h_a$ respectively in the government serving Region A and h_b, $1 - h_b$ respectively in the government serving the Region B.

The Model setup has resemblance to Hotelling (1929), with reference to each seller and groups of buyers who will deal with him. The seller acts like a monopolist within his region.

We distinguish our work from others on the basis of these following points 1) We have a continuum of firms and two governments which decide to invest in either of the governments. The decision to invest in our model is dependent on transport cost, the number of honest agents in the government and the bribe that the bureaucrat needs to pay. 2) We do not distinguish our countries on the basis of natural endowments and natural resources and we conclude that when both the governments serve then both the governments earn

higher revenues. 3) In our model the Nash prices are dependent on transport cost, hence the firm will have to pay a higher price if the transport cost are higher. 4) When governments collude then they choose higher corruption as when they are acting independently. 5) The governments decision to serve all firms or some firms is dependent on relation between transport cost and honesty. We now discuss the literature to describe ways in which our work differs from already existing work.

Emerson (2006) present a model where there is interaction between the corrupt government officials and the industrial firms where they show that corruption is negatively related to competition. The government agent has a self interest, and it demands a bribe which limit the number of firms and the number of firms that pay the bribe. The agents rent collection ability is dependent on the number of "formal" firms. We can have multiple equilibrium where there is high corruption and low competition and other with low corruption and high competition. The model describes that the firms invest in the governments, where the agent is in a position to demand a bribe. In equilibrium the firms pay the bribe. The probability that the agent is detected and dismissed is a function of both the level of bribe payment and the number of firms that are going to enter the market. Hence the agent maximizes the expected revenues by taking bribes from the firms and by choosing the level of bribe. Given we have a graph for the detection function, there are multiple equilibria where one equilibrium has the characteristics of low competition and high corruption and the other with high competition and low corruption. The empirical evidence is in support that corruption and competition are negatively related. The lower competitiveness in the economy arises due to the higher level of corruption existing in the economy. In our model we have two governments competing against each other and there is a market for firms. The firm has to locate and invest in one of these regions.The decision to invest in our model is dependent on relation between transport cost and honesty.

Cai and Triesman (2005) study a model based on whether there is competition to attract mobile capital. Competition for capital sometimes shifts the priorities away from non-productive government activities towards business inducing investments. Rogoswki (2003)

also finds that policies will diverge for two countries when there is mobility for capital. Besley and Smart (2001) derive in their model that voter welfare will increase when there is competition for capital however they do not take infrastructure into account. Cai and Triesman (2005) study how capital competition affects tradeoff between public goods and rents taken together and infrastructure. The authors conclude by saying that better endowed countries in terms of natural resources, human capital or infrastructure tend to drain out capital from poorly endowed economies. Centrally funded infrastructure investments help in decentralized states poorly endowed regions to compete. Freeing capital flows in unions like the European Union may help the disadvantaged countries to grow. Our model does not take into account size of the country or differential in natural endowments. We find that higher revenues are earned by both the governments when they serve all firms.

Kanbur and Keen (1993) analyze a model where tax competition is unrestricted and the borders are open. Each government (of the home country and the foreign country) behaves in a Nash manner where it chooses its tax rate to maximize the tax revenue. In Nash equilibrium the amount of cross-border trading is independent of transport cost. However in our model the Nash prices at which the government sells the royalty is dependent on the transport cost. The increase in transport cost in their model has little effect on cross-border shopping. The authors show a unique non-cooperative equilibrium where the smaller country is charging a lower tax than the larger country.

In Section(3.2) we find that how wage contracts differ when we have independent or collusive governments setting the same. In Section(3.3) we see the firms profits. and in Section(3.4) we discuss the firms profits and then suggest policy choice.

Order of play

STAGE 1: Government sets a price p(royalty on producing a resource) and bureaucratic wage rate w^b. The bureaucratic wage rate w^b is the fixed cost of the government incurred

in maintaining a bureaucracy.

STAGE 2: Firm goes to the bureaucrat; h_a are honest ($1-h_a$ are dishonest) in government serving the region A and h_b are honest (and $1-h_b$ are dishonest) in government serving the region B. The firm can't change its mind when it finds that the bureaucrat is dishonest.

STAGE 3: If the firm meets the honest bureaucrat its payoff is $1-\tau i-p_A$, from region A $1-\tau(1-i)-p_B$ from region B. If it meets a dishonest bureaucrat it will also have to pay an arbitrary bribe b.

In our model the size of the public sector doesn't depend on output, which would imply that the size of bureaucracy doesn't need to be proportional to size of private sector in an economy. The profit function of the government and hence the wage it pays to its bureaucrats is independent of the size of the private sector output. The surplus of the firm would depend upon the probability with which the firm meets the dishonest bureaucrat. The firm pays the bureaucrat a bribe b on top of prices it pays for buying the service.
We define i^* such that the firm is indifferent between buying a license from government A or government B.
The government at A effectively offers firm i: $1-\tau i-p_a-(1-h_a)b$
The government at B effectively offers firm i: $1-\tau(1-i)-p_b-(1-h_b)b$

$1-\tau i^*-p_a-(1-h_a)b=1-\tau(1-i^*)-p_b-(1-h_b)b$
$i^*=\frac{bh_a-bh_b-p_a+p_b+\tau}{2\tau}$

The profit function for government A when the firm approaches it:
$\pi_a=p_ai^*-w_a$
We differentiate with respect to p_a and rearrange for the first order condition: $p_a=\frac{bh_a-bh_b+p_b+\tau}{2}$

The profit function for government B when the firm approaches it:

$\pi_b = p_b(1 - i^*) - w_b$

$p_b = \frac{-bh_a + bh_b + p_a + \tau}{2}$

The Nash equilibrium is given by :$(p_a^*, p_b^*) = \frac{bh_a - bh_b + 3\tau}{3}, \frac{-bh_a + bh_b + 3\tau}{3}$

We denote the net revenue of the government (or the government surplus as Π)

$\Pi_A = p_a(\frac{1}{2} + \frac{b}{6\tau}(h_a - h_b)) - w_a$

$\Pi_B = p_b(\frac{1}{2} + \frac{b}{6\tau}(h_b - h_a)) - w_b$

The calculated Nash equilibrium which are the prices at which the government would sell the royalty to firm in our model and the net revenue of the firm both depend on honesty of the agents in Government A and Government B. We model honesty as a function of the bureaucratic wage rates.

We look at the wage setting for the bureaucrats in the bureaucracies. The wage contracts for the employee is often incomplete since they take the form of a fixed wage contract, without any explicit performance incentives and a considerable degree of workers discretion over work effort (Fehr and Falk, 1999). We take the case of efficiency wages under incomplete wage contract. Here the employer and in our case government rewards the employee (the bureaucrat) for good performance (by putting in more effort) in the form of efficiency wages. However we do not model efficiency wages explicitly but assume that there is a relationship between wages and honesty.

3.1.1 Government surplus dependent on Transport Cost

When we have symmetry in the model such that $h_a = h_b$ then $\frac{\delta\pi}{\delta\tau}$ is positive for $h_a = h_b$ (We prove in next section that we have symmetry in the model)

$\Pi_A = (b\frac{h_a - h_b}{3} + \tau)(\frac{1}{2} + \frac{b}{6\tau}(h_a - h_b)) - w_a$
$\frac{d\Pi_A}{d\tau} = -\frac{b^2}{18(\tau)^2}(h_a - h_b)^2 + \frac{1}{2}$

$\Pi_B = (b\frac{h_b - h_a}{3} + \tau)(\frac{1}{2} + \frac{b}{6\tau}(h_b - h_a) - w_b$
$\frac{d\Pi_B}{d\tau} = -\frac{b^2}{18(\tau)^2}(h_b - h_a)^2 + \frac{1}{2}$

As τ increases by a unit then each government's surplus increases by one-half, however the Nash prices increase by a unit and each government sells to half of the firms.
As τ increases the government surplus will increase as the firm will have to have to pay higher price for the royalty.
We look at the wage setting for the bureaucrats in the bureaucracies. The wage contracts for the employee is often incomplete since they take the form of a fixed wage contract, without any explicit performance incentives and a considerable degree of workers discretion over work effort (Fehr and Falk, 1999). We take the case of efficiency wages under incomplete wage contract. Here the employer and in our case government rewards the employee (the bureaucrat) for good performance (by putting in more effort) in the form of efficiency wages. However we do not model efficiency wages explicitly but assume that there is a relationship between wages and honesty. In the following section we assume a wage corruption relationship, however we do not explicitly derive this relationship using the general equilibrium approach since we do so in the previous chapter.

3.1.2 Efficiency Wages

We use an efficiency wage argument to make honesty an increasing concave function of bureaucratic wage rates s.t. $h_a = \sqrt{\frac{w_a}{W}}$ (Where W is a constant and are the wages that the bureaucrat can earn elsewhere) and $h_b = \sqrt{\frac{w_b}{W}}$

Proposition 1: The probability of meeting an honest agent is the same in both the bureaucracies

Proof:

$$\Pi_A = (b\frac{h_a - h_b}{3} + \tau)(\frac{1}{2} + \frac{b}{6\tau}(h_a - h_b)) - w_a \tag{3.1}$$

$\Pi_A = (b\frac{h_a - h_b}{3} + \tau)(\frac{1}{2} + \frac{b}{6\tau}(h_a - h_b)) - h_a^2 W$

$$\Pi_B = (\frac{bh_b - bh_a + 3\tau}{3})(\frac{1}{2} + \frac{b}{6\tau}(h_b - h_a)) - w_b \tag{3.2}$$

$\Pi_B = (\frac{bh_b - bh_a + 3\tau}{3})(\frac{1}{2} + \frac{b}{6\tau}(h_b - h_a)) - h_b^2 W$

We differentiate the government surplus of government A with respect to h_a and solving for h_a we get:

$$h_a = \frac{b(bh_b - 3\tau)}{b^2 - 18\tau W} \tag{3.3}$$

We have h_a honest agents as the best response to h_b honest agents in the other bureaucracy.

By the same procedure we get:

$$h_b = \frac{b(bh_a - 3\tau)}{b^2 - 18\tau W} \tag{3.4}$$

For h_a honest agents in a bureaucracy we have h_b honest agents in the other bureaucracy. Solving the above symmetric equations for the Nash equilibrium we get :

$$h_a*, h_b* = \frac{b}{6W}, \frac{b}{6W} \tag{3.5}$$

Substitute for h_a and h_b in $h_a = \sqrt{\frac{w_a}{W}}$ and $h_b = \sqrt{\frac{w_b}{W}}$

We get Nash Equilibrium as:

$(w_a*, w_b*) = \frac{b^2}{36W}, \frac{b^2}{36W}$

$Q \quad D$

In the above proposition and proof we establish symmetric honesty in both the bureaucracies, we now in the proposition below derive a relationship between surplus maximizing wage rate and the efficiency bureaucratic wage rate.

Proposition 2: The surplus maximizing wage rate for the other government will fall as the efficiency wage rates for the bureaucrats in the other bureaucracy increase s.t. the following condition must hold: $b^2 < 18\tau W^2$

Proof: Differentiating Equation(3.1) and Equation(3.2) w.r.t. w_a and w_b respectively we get:

$$w_a = \frac{b^2 W(b\sqrt{\frac{w_b}{W}} - 3\tau)^2}{(b^2 - 18\tau W)^2} \tag{3.6}$$

$^2 b^2 < 18\tau W$

$\frac{b^2}{18W} < \tau$

$\frac{w_a*}{2} < \tau$

$w_{a*} = 2\tau$

There is a symmetric relationship between bureaucratic wage rates and transport cost when we have symmetry.

$$w_b = \frac{b^2 W(b\sqrt{\frac{w_a}{W}} - 3\tau)^2}{(b^2 - 18\tau W)^2} \tag{3.7}$$

We plot the above two equations in the figure below (3.1) and we get point A which gives an interior Nash Equilibrium and hence a solution for (w_{a*}, w_{b*}):

As we see in figure 3.1 we must also have $\frac{dw_a}{dw_b} < 0$

$\frac{dw_a}{dw_b} = 2\frac{b^2 W(b\sqrt{\frac{w_b}{W}} - 3\tau)}{(b^2 - 18\tau W)^2}\frac{1}{2}(\sqrt{\frac{W}{w_b}})\frac{1}{W}$

$b\sqrt{\frac{w_b}{W}} < 3\tau$

$b\sqrt{\frac{w^b}{W}} < 3\tau$

$b^2\frac{w_b}{W} < 9\tau^2$

$\frac{w_b}{W} < 9\frac{\tau^2}{b^2}$

$(\frac{b}{6W})^2 < 9\frac{\tau^2}{b^2}$ The following condition that must be satisfied is: $b^2 < 18\tau W$

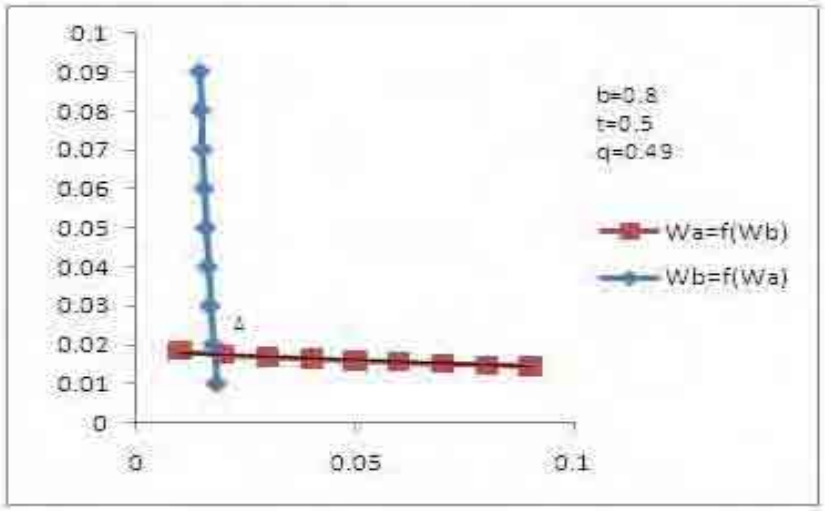

Figure 3.1:

3.2 Government collusion over wage rates

We have derived Nash equilibrium with incomplete labor contracts.

We prove in this section that under government collusion the Collusive wage rates are less than the wage rates that are set by governments acting independently.

'Honesty' has a surplus increasing effect on bureaucratic wage rates (since $\frac{d\Pi_a}{dh_a} > 0$ and $\frac{d\Pi_b}{dh_b} > 0$). If honest agents of only one government increases the government surplus of the other government will fall.

$\Pi_a = (b\frac{1-(1-q)b+qw_a-h_b}{3} + \tau)(\frac{1}{2} + \frac{b}{6\tau}(1-(1-q)b+qw_a-h_b)) - w_a$

$\frac{\Pi_a}{dh_b} = -\frac{b}{3} - \frac{2b^2}{18\tau}(1-(1-q)b+qw_a-h_b)$

$\frac{\Pi_a}{dh_b} < 0$

Similarly $\frac{\Pi_b}{dh_a} < 0$

Proposition 3: If the governments were to collude they would set a bureaucratic wage rate much below than set by the government acting independently.

Proof:

$$\pi_A + \pi_B = Max[(b\frac{h_a - h_b}{3} + \tau)^2\frac{1}{2\tau} - h_a^2W + (b\frac{h_b - h_a}{3} + \tau)^2\frac{1}{2\tau} - h_b^2W] \tag{3.8}$$

$$\frac{\partial\pi}{\partial h_a} = \frac{1}{\tau}(b\frac{h_a - h_b}{3} + \tau)(\frac{3}{b} - \frac{3}{b}) - 2h_aW \tag{3.9}$$

Therefore, $\frac{\partial\pi}{\partial h_a} < 0$

So when governments collude their government surplus is decreasing in honesty and therefore in wages. The governments agree to tolerate low h to save on the cost of reducing corruption. The governments don't henceforth want a honest bureaucracy. Implying that they'll pay their bureaucrats a low wage rate as well. As we see below the government does not pay its bureaucrat any reservation wages.

In Equation(3.8) we substitute for $h_a = \sqrt{\frac{w_a}{W}}$ differentiate and solve for w_a.
Similarly we substitute for $h_b = \sqrt{\frac{w_b}{W}}$ differentiate and solve for w_b.

We get:

$$(w_a*, w_b*) = \frac{b^4 w_a*}{(b^2 - 9\tau W)^2}, \frac{b^4 w_b*}{(b^2 - 9\tau W)^2} \tag{3.10}$$

Since $w_a* = \frac{b^4 w_a*}{(b^2-9\tau W)^2}$ and $w_b* = \frac{b^4 w_b*}{(b^2-9\tau W)^2}$.

Since $b^2 = b^2 - 9\tau W$, the only solution to this is that $w_a* = w_b* = 0$(we normalize the wage rates here) in other words the government pays the lowest wage possible and have no honest agents.
This however does not take account of the possibility that firms might prefer not to invest when the level of dishonesty is too great, an issue we consider in the next section.

3.3 Firms' profits

The firms are subject to a participation constraint such that their $\Pi^e \geq 0$
$\Pi^e = 1 - \tau i* - p_a - (1 - h_a)b$
The above Π^e gives us profits of marginal firms where we assume $i* = \frac{1}{2}$ and hence all firms are participating. We also substitute for prices in the above equation π^e and we get:

$\pi^e = 1 - \tau\frac{1}{2} - b\frac{h_a - h_b}{3} - \tau - (1 - h_a)b$

$\pi^e = 1 - \frac{3}{2}\tau - (1 - h_a)b$

From the above participation constraint we see that the firms decision to invest in a given government is dependent on τ the unit cost of transportation that needs to be paid, b bribe that firm pays if it meets a dishonest agent and h_a are the number of honest agents.

Firms are subject to the participation constraint such that $\pi^e \geq 0$ which implies (if we are to have full participation with governments following the policies set out above):

$1 - \frac{3}{2}\tau - (1 - h_a)b > 0$

For a given bribe we must have the following condition to hold on honesty:

$h_a > \frac{3}{2}\frac{\tau}{b} + 1 - \frac{1}{b}$

Discussion

Fig(3.2) gives us the combinations for full participation ($i* = \frac{1}{2}$) or in other words the choice for participating firms when their decision to invest is dependent on h i.e. honesty of the bureaucrats and τ the transport cost.

Each point on the two curves gives us full participation. For a given level of honesty the flatter left hand line is for the case where the firm would have to pay a higher bribe and therefore there is a lower willingness to pay high transport cost. Similarly for a given level of honesty the steeper line is for the case when the firm is paying a lower bribe and therefore has a higher willingness to pay a high transport cost. Full participation for high transport cost is possible with high honesty. There is only one value of $\tau = (\frac{2}{3})$ where we have a completely honest bureaucracy or ($h_a = 1$) given by Point A in Fig(3.2). At point A all agents are honest and the size of the bribe is irrelevant to any investment decision. All firms invest only if $\tau \leq \frac{2}{3}$, shown as point A.

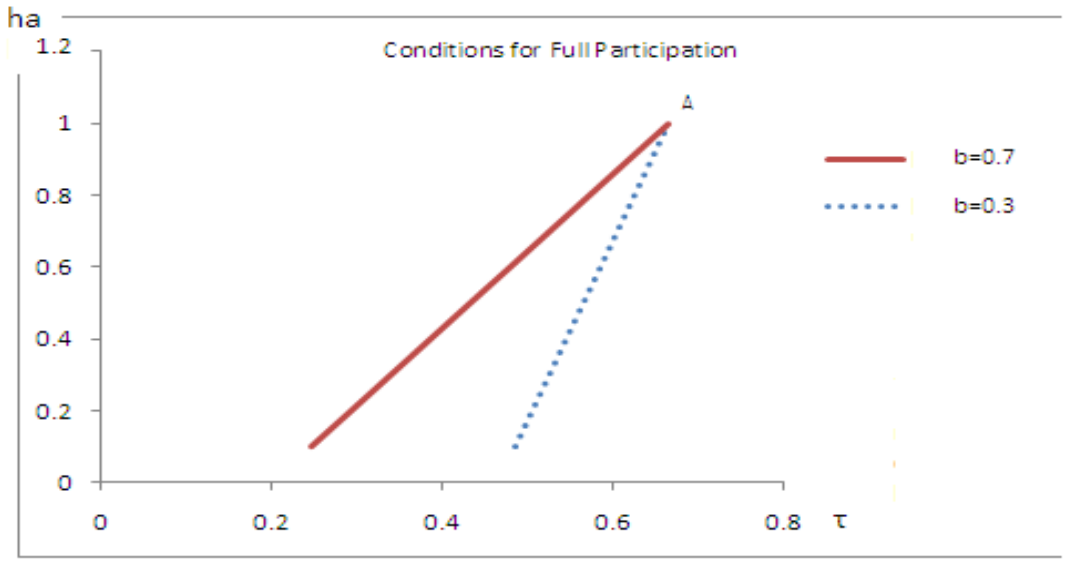

Figure 3.2:

Fig(3.3) describes the investment decision for each marginal participating firm. LM and OR gives us the profit curves for the firms. The profits for the firms are: $(1 - \tau i * -p_a)$ at the intersection of the two curves at point A. If the firm has to pay for a dishonest bureaucracy as well then we have an inward parallel shift of the curves s.t. they intersect at point B s.t. we have $1 - \tau - p_a - (1 - h_a)b$. If the bribes increase then TP and DC shifts inward. As the transport cost increases then the lines pivot inwards around their vertical intercept(not shown in the diagram).

A decrease in h_a and an increase in p_a will shift the left line inward and a decrease in h_b and an increase in p_b will shift the other line inward. The curves can shift inward and hence the participation by 'marginal participating firm' will fall. The firms along the segment FK will not participate.

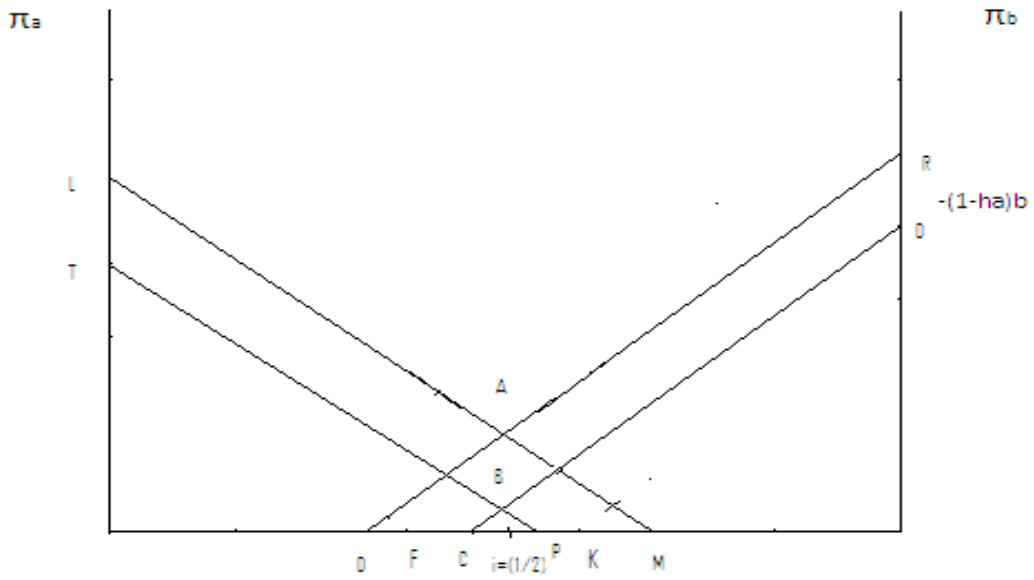

Figure 3.3:

3.4 Optimal Profit Path

Proposition 4: If both the government were to serve all firms the profit maximization price would be higher than the profit maximization price where only a few firms would be served.

Proof:

We discuss 2 cases:

Case 1) Some of the firms are served in this case $i* = \frac{1-(1-h_a)b-p_a}{\tau}$

Case 2) All of the firms are served, in this case $i* = \frac{bh_a-bh_b-p_a+p_b+\tau}{2\tau}$

Hence the sales function $i*$ when a single government serves wherein not all firms are participating and when both the governments serve wherein all firms are participating is:

$i* = min(\frac{1-(1-h_a)b-p_a}{\tau}, \frac{bh_a-bh_b-p_a+p_b+\tau}{2\tau})$

The above sales function calculates the effect of sales for a single government and both the governments' w.r.t prices.

Case 1) $\frac{di*}{dp_a}$(prices are such that only one government is serving)
$= -\frac{1}{\tau}$

Case 2) $\frac{di*}{dp_a}$ (prices are such that both the governments are serving)$= -\frac{1}{2\tau}$

In figure (3.4) at the kink point K the government at A is competing at the margin with government B. So the marginal firm has zero profits with either of the governments.
The firms sales are shown in figure (3.4). For high prices, the marginal firm served by the government A has zero profits and is choosing whether or not to participate. At the kink point K the marginal firm would also have zero profits if it went to government B. For lower prices, all firms will participate and government A's marginal firm is choosing which government to patronize. This part of the graph has a slope twice as steep as the upper part.

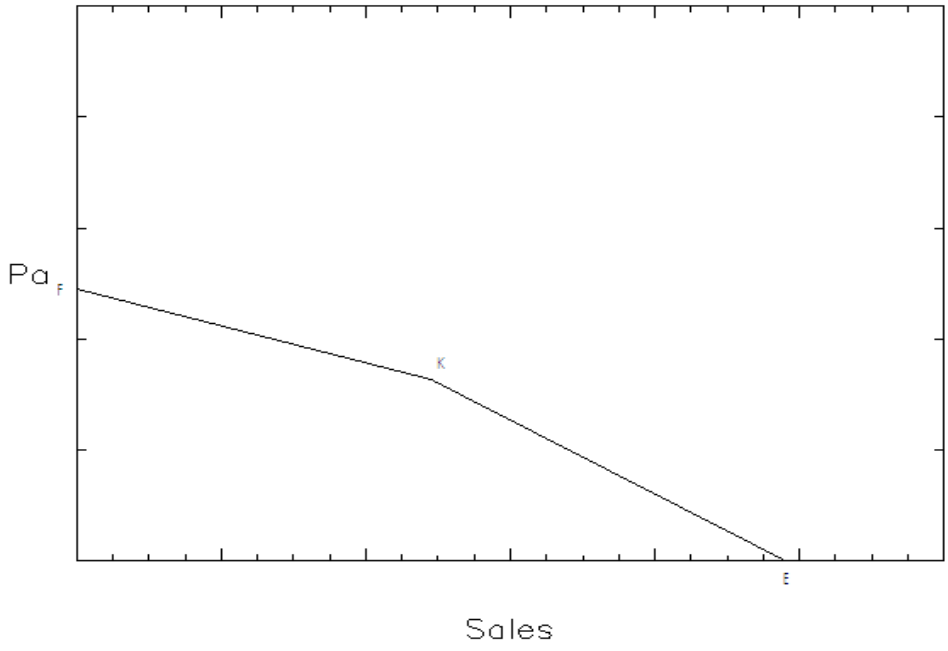

Figure 3.4:

In fig (3.5) we see that at the kink point the two curves intersect at the point k , the kink point k is given by equating

$\frac{1-(1-h_a)b-p_a}{\tau} = \frac{bh_a-bh_b-p_a+p_b+\tau}{2\tau}$

From the above equation we get: $1 - b - bh_a - p_a = \frac{bh_a}{2} - \frac{bh_b}{2} - \frac{p_a}{2} + \frac{p_b}{2} + \frac{\tau}{2}$

$p_a = 2 - 2b + bh_a + bh_b - p_b - \tau$

Hence at the kink point we have the above price p_k

$$p_a + p_b = 2 - 2b + bh_a + bh_b - \tau \tag{3.11}$$

We now want to find the profit-maximizing prices in each of the two cases:

Case 1: When not all firms are served:

$\pi^a = p_a(\frac{1-(1-\sqrt{\frac{w_a}{W}})b-p_a}{\tau}) - w_a$

Differentiate the above profit function w.r.t p_a and solve for p_a to get:

$$p_a = \frac{b\sqrt{\frac{w_a}{W}} - b + 1}{2} \tag{3.12}$$

Case 2: When all firms are served:

$\pi^A = p_a(\frac{b\sqrt{\frac{w_a}{W}} - bh_b - p_a + p_b + \tau}{2\tau}) - w_a$

Differentiate the above profit function w.r.t p_a and solve for p_a to get:

$$p_a = \frac{b\sqrt{\frac{w_a}{W}} - bh_b + p_b + \tau}{2} \tag{3.13}$$

Discussion:

In fig (3.5) we have two profit curves OKE and OKC. The two curves intersect at point K. At the kink point K there is a change in behavior of the firms. Before the kink point K on the profit curve OKE for low prices there is participation by all firms (on the solid line OK) and after the kink point K for higher prices not all firms participate.

Point K also gives us the equilibrium point which is also the kink point. At point K we also have maximization of profits for the government when it does not serve all firms, which would lie on the optimal profit path OKE.

When there is an increase in prices in our model (we could also think about it like taxes in tax competition literature) then there is an increase in exodus of firms from the market, we find that it is more optimal for only a single government to serve or sell royalties.

At K we have profit maximization for the firms such that;

We have for a single government:

$$\pi^A = p_a(\frac{1-(1-h_a)b-p_a}{\tau}) - w_a \tag{3.14}$$

Now $\frac{d\pi_a}{dp_a} = \frac{1-(1-h_a)b-2p_a}{\tau} = 0$

$2p_a = 1-(1-h_a)b$

$$p_a = \frac{1-b(1-h_a)}{2} \tag{3.15}$$

At K we must have profits of both the governments increasing when they sell royalties to all participating firms s.t on OK part of the curve we have:

$$\pi^A = p_a(\frac{b\sqrt{\frac{w_a}{W}} - bh_b - p_a + p_b + \tau}{2\tau}) - w_a \tag{3.16}$$

$\frac{\partial\pi}{\partial p_a} = \frac{b(h_a-h_b)-2p_a+p_b+\tau}{2\tau}$

Now $\frac{\partial\pi}{\partial p_a} > 0$ if $2p_a < b(h_a-h_b) + p_{b^k} + \tau$

Substituting in the above equation for p_b at the kink point we have:

$$p_a < \frac{2}{3}(1-b(1-h_a)) \tag{3.17}$$

At KE part of the curve we have:

$$\pi^A = p_a(\frac{1-(1-h_a)b-p_a}{\tau}) - w_a \tag{3.18}$$

Now $\frac{d\pi_a}{dp_a} = \frac{1-(1-h_a)b-2p_a}{\tau} < 0$

$2p_a > 1-(1-h_a)b$

$$p_a > \frac{1 - b(1 - h_a)}{2} \tag{3.19}$$

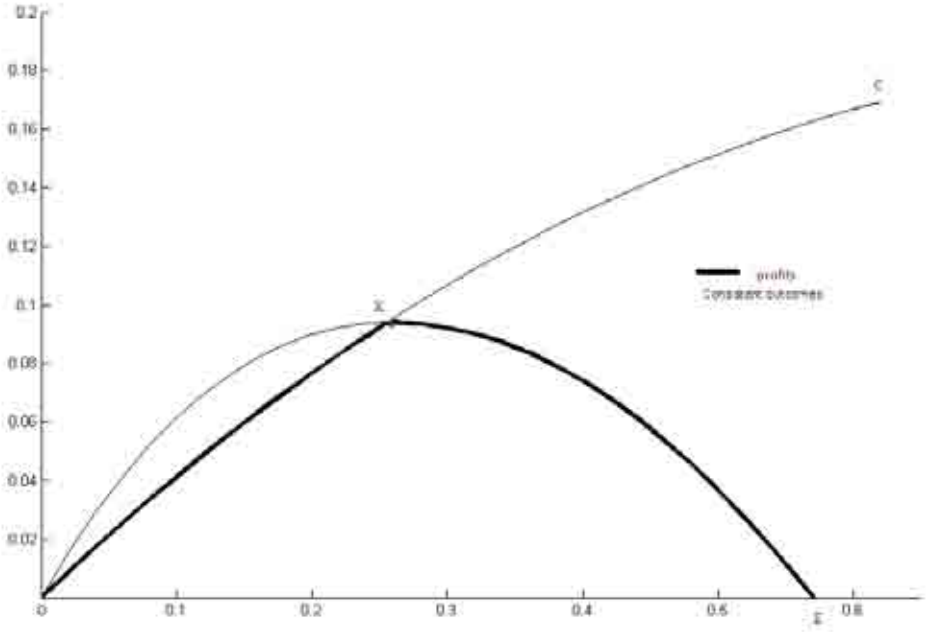

Figure 3.5:

We construct in the above section profit curves when all firms are participating and when all firms are not participating. We see that the profit maximization price on the curve where not all firms participate is also the kink price , where the kink price stands for a change in behavior for the firms. As beyond the kink price all firms do not want to participate. However it may not be the best outcome for the government to change its behavior at the profit maximization prices, we see in the section below what the best outcome for the governments are. $Q \quad D$

3.4.1 Best Outcomes for Governments

We see in this section that the government can decide when to serve all firms and when not to which is dependent on the transport cost.

The Governments do not serve all firms in this case the profit function is:

$$\pi^A = p_a(\frac{1-(1-h_a)b-p_a}{\tau}) - w_a \tag{3.20}$$

Now $\frac{d\pi_a}{dp_a} = \frac{1-(1-h_a)b-2p_a}{\tau}$

Substituting $\frac{d\pi_a}{dp_a} = 0$ we have:

$2p_a = 1-(1-h_a)b$

At profit maximization prices we have:

$$^3p_a^N = \frac{1-b(1-h_a)}{2} \tag{3.21}$$

From Eq (3.11) we have

$p_a + p_b = 2 - 2b + bh_a + bh_b - p_b - \tau$

$p_a^k + p_b^k = 2 - 2(1-h)b - \tau$

Now we assume that $h_a = h_b = h$ and $p_a = p_b$

[3] we denote these prices when not all firms are served

$$p_a^k = 1 - (1-h)b - \frac{\tau}{2} \tag{3.22}$$

From Eq (3.21) and Eq (3.22) we see that if: $\tau < \frac{1-(1-h)b}{2}$

Then $p_a^k > p_a^N$ i.e. the kink prices are greater than the profit maximization prices.

In fig (3.6) point A gives us the kinked price beyond which not all firms participate, point Q is the profit maximization price.

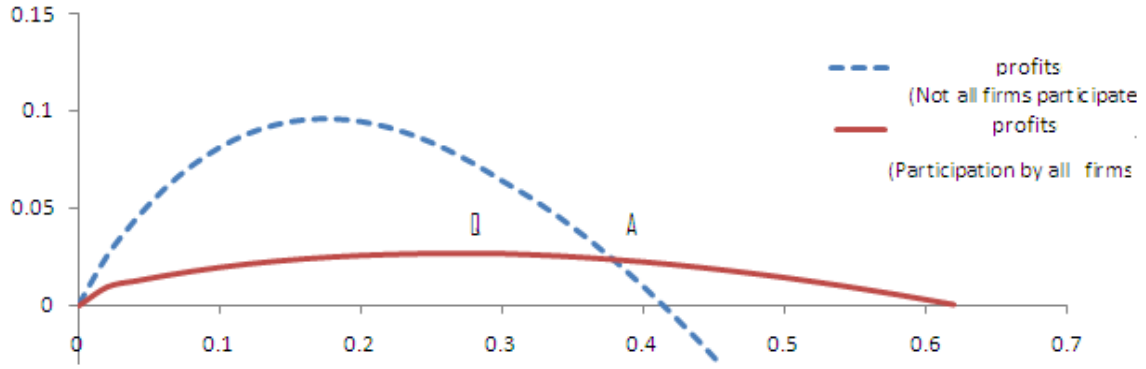

Figure 3.6:

From Eq (3.21) and Eq (3.22) we see that if: $\tau > \frac{1-(1-h)b}{2}$

Then $p_a^k < p_a^N$ i.e. the kink prices are less than the profit maximization prices.

In fig (3.7) point A gives us the kinked price beyond which not all firms participate, point Q is the profit maximization price.

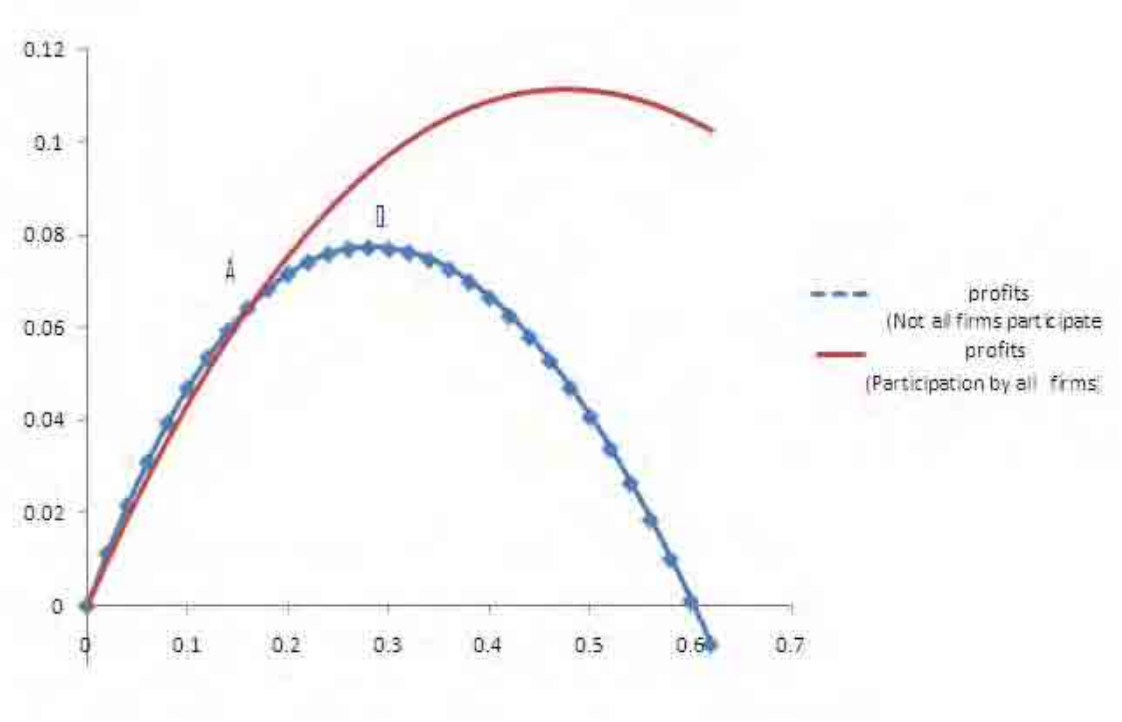

Figure 3.7:

The Governments want to serve all firms in this case the profit function is:

$$\pi^A = p_a(\frac{b\ \ \overline{\frac{w_a}{W}} - bh_b - p_a + p_b + \tau}{2\tau}) - w_a$$

Differentiate the above profit function w.r.t p_a and solve for p_a to get:

$$p_a = \frac{b\sqrt{\frac{w_a}{W}} - bh_b + p_b + \tau}{2} \tag{3.23}$$

Assume $p_a = p_b$ and $h_a = h_b = h$

From Eq(3.23) we get: $2p_a - p_b = \tau$

$$^4p_a^A = \tau \tag{3.24}$$

from Eq (3.22) we have:

[4]we denote these prices when all firms are served

$p^k = 1 - (1 - h_a)b - \frac{\tau}{2}$

If $\tau < \frac{1-(1-h)b}{2}$

$$p_a^A < \frac{1-(1-h)b}{2} < p_k \tag{3.25}$$

If $\tau > \frac{1-(1-h)b}{2}$

$$p_k < \frac{1-(1-h)b}{2} < p_a^A \tag{3.26}$$

3.4.2 Policy Choice

When $\tau < \frac{1-(1-h)b}{2}$;

Both the governments are directly competing against each other[5] the price at which the profits are maximized for a single government is equal to the prices at which the profits are maximized for both the governments.

When transport cost are low the governments set low prices for selling royalties. It is not optimal for any of the governments to increase the price since with a higher price the marginal firm that is served by the government A will have zero profits and will choose whether to participate or not to participate. In Fig (3.8) we see that at point Q which is the profit maximization price where all firms are participating $p_A^A = p_A^N$. At KE part of the optimal curve OQE not all firms participate.

[5]Proof in the appendix

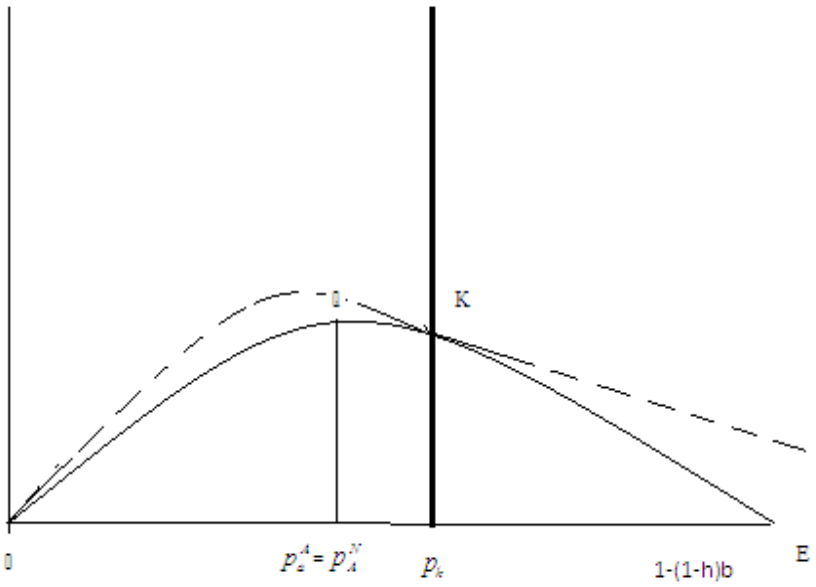

Figure 3.8:

When $\tau > \frac{1-(1-h)b}{2}$;

With high transport cost the governments would set a high price if all firms are served and that would mean that some firms don't enter. A higher transport cost, and higher honesty would mean higher price and higher profits. Both the governments are not directly competing as some firms are unserved. In Fig(3.9)on the curve OKE, at KE part of the curve not all firms participate.

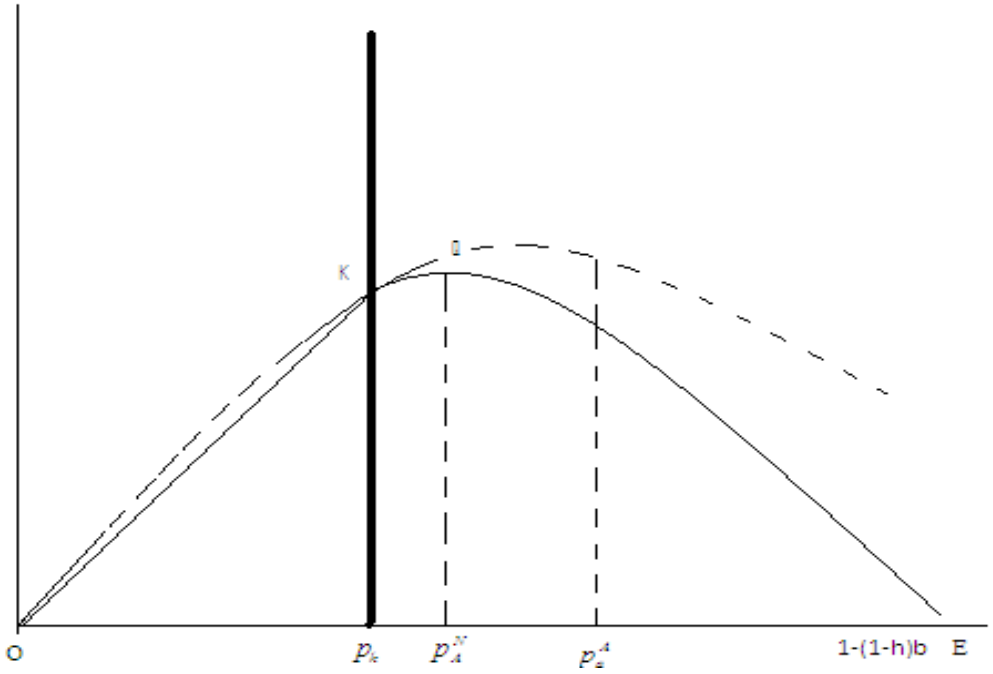

Figure 3.9:

3.4.3 Concluding Comments

The paper explores wage contracts in corruption model when we have competing governments facing corruption. Government sets a price for the royalty and maximizes its profits on selling the royalty, that is still consistent with all firms participating. When the transport cost are low, government sets a low level of honesty leading to high corruption. When the transport cost are high, then buying royalties from the governments such that governments profits are maximized will drive away firms from the market. This is a consequence of the governments objective function concentrating solely on profits. Corruption in this case will be low. We could possibly extend our model in two ways 1) The argument can be that in a non-linear utility model where the agent who receives a higher wage may substitute high effort for low effort in the allocation of licenses (which our model does not accommodate for). The agent who receives a higher wage may devote less effort, however the honest agent who receives a higher wage will always sell a lower number of licenses as compared to the dishonest agent since the dishonest agent earns a bribe on each permit

(see Gioacchino and Maurizio (2008), pp. 296). The pure income effect generated by our linear utility model will however not change the results of the model. 2) We introduce the possibility of extortion in our model by firms on corrupted bureaucrats (such that firm has to pay a certain amount of money to get the licenses). In this case we see that decision to invest by the firm will no longer just depend on honesty of the agent and hence the bureaucratic wage rate that is given to the agent. Introducing the possibility of extortion can determine the decision to invest for the firms right from the beginning of the game as the firm will now invest in the government where it doesn't need to pay a higher extortion fee.

3.5 Final Concluding Comments

We explore a general equilibrium model to establish the dynamics between the private sector wages and the bureaucratic wages. We have identified the behavior of the agents as we increase bureaucratic wage rates and private sector wages. We also diagrammatically show the behavior of the applicants to the bureaucracy by changing the private sector wages. We show that at the lowest possible bureaucratic wage rates that are paid to the bureaucrats it is not possible to maximize net private sector output and maintain an honest bureaucracy. In Chapter 2 we explore wage contracts in corruption model when we having competing governments facing corruption. Government sets a price for the royalty and maximizes its profits on selling the royalty, that is still consistent with all firms participating. When the transport cost are low, government sets a low level of honesty leading to high corruption. When the transport cost are high, then buying royalties from the governments such that governments profits are maximized will drive away firms from the market. This is a consequence of the governments objective function concentrating solely on profits. Corruption in this case will be low. We would like to take forward our research on the models proposed above.

3.6 Appendix

We prove in the appendix that when $\tau < \frac{1-(1-h)b}{2}$ then the governments serve all firms where the firms are directly competing against each other.

When all the firms are being served we have the profit function to be:
$\pi^A = p_a(\frac{b \quad \frac{\overline{w_a}}{W} - bh_b - p_a + p_b + \tau}{2\tau}) - w_a$

Differentiating and solving for w_a we get :

$w_a = \frac{b^2 p_a^2}{16W\tau^2}$, $h_a = \frac{bp_a}{4W\tau}$
Hence we get the transport cost as: $\tau = \frac{bp_a}{4Wh_a}$

Therefore: $\tau < \frac{b}{4Wh_a}(\frac{1-(1-h_a)b}{2})$
(Since $\frac{b}{4Wh_a} < 1$)

Hence we prove that when the governments' do not collude then $\tau < \frac{1-(1-h_a)b}{2}$

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