

On Corruption and Red Tape

Thesis submitted to Jadavpur University

For the Degree of

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On Corruption and Red Tape submitted by me for the award of the Degree of Doctor of Philosophy in Arts at Jadavpur University is based upon my work carried out under the supervision of Dr. Vivekananda Mukherjee, Professor, Department of Economics, Jadavpur University. And that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere/elsewhere.

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“Statement of Originality”

I, **Poulomi Bhattacharya**, registered on 26th July 2016 do hereby declare that this thesis entitled “**On Corruption and Red Tape**” contains literature survey and original research work done by the undersigned candidate as part of Doctoral studies.

All information in this thesis have been obtained and presented in accordance with existing academic rules and ethical conduct. I declare that, as required by these rules and conduct, I have fully cited and referred all materials and results that are not original to this work.

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Dedicated to,

My mother, Sipra Bhattacharya and brother, Pallab Bhattacharya who has motivated me throughout, without whom pursuing this course was never possible.

The loving memory of my late father, Pradip Bhattacharya.

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Chapter 1

INTRODUCTION

1.1 Backdrop

In the economics literature, corruption is characterized as exploiting public power for personal benefit. It acts as a negative externality to an economy. Krueger (1974) shows that rent-seeking activities lead to divergence in private and social benefits and costs and cause welfare losses. It occurs during different government activities including the provision of publicly provided private goods and services like driving licenses, construction permits, birth or death certificates, BPL certificates, free hospital beds, subsidized food, education, etc., and therefore, is an issue of concern. Since a government wants the goods to be allocated to its targeted beneficiaries, and the type of applicant is private information, a screening is conducted. The officials are assigned to check the credentials to identify the beneficiaries. The process creates two alternative kinds of power for the officials. First, since screening is time-consuming, and with elapsed time the good loses its value to the beneficiary, the official applies his discretion to speed up the process. Second, the official can suppress the information about the true type of applicant and allocate the good to an undeserving applicant. Both being illegal and punishable, in presence of a positive probability of detection, an official applies discretion only in return for bribes. A corrupt official accepts a bribe from both the deserving and undeserving applicants to shorten the delay due to the screening process, popularly known as 'red tape'. While bribery, being pure transfer, does not affect the welfare of an economy, the misallocation of the good creates a negative externality. On the other hand, speeding up the delivery of the good reduces welfare loss. Therefore, the net welfare impact of red tape-related bribery is an important area of study.

Red tape and bribery in the provision of public goods and services are prevalent both in the developing and developed countries of the World. The Global Corruption Barometer (GCB, 2017) report shows that developed countries like US also reported police and elected representatives to be corrupt and that bribery is a problem. Transparency International's GCB

report collecting data from 162,136 adults worldwide shows that 25 percent (1 in 4) people report paying a bribe in the provision of public services. Global Corruption Barometer (2020) dataset shows that in India 39 percent of people report paying a bribe in the provision of public services. Does payment of speed money hurt the bribe-payers? Do they dislike it? The answer to this question is not clear. Some individuals who would not have access to the good in an honest bureaucracy could access the good through bribery. Also, the speed-money allows the consumption of the good before it loses much of its value. The attempts in different countries to reduce the length of red tape and the officials' discretion through measures like time-bound delivery of the good and introduction of ICTs, therefore, attracted a mixed reaction. While it definitely would benefit the deserving applicants by reducing their need for paying speed money, it would harm the beneficiaries of misallocation. The introduction of such a scheme in the form of e-choupals found different success rates in different states of India. Bussell (2012) in her study of the scheme found support for the red tape and bribery in her survey respondents. In the economics literature also there is a debate about the same in the form of the 'greasing the wheel' role of speed-money vs. its 'sanding the wheel' role in a country's growth and development. While the papers like Lui (1985), Beck and Maher (1986) support the 'greasing the wheel' role, Djankov, La Porta, Lopez-De-Silanes and Shleifer (2002), Mauro (1995) support the 'sanding the wheel' role.

The present thesis derives its interest from the prevalence of the incidence of red tape and speed money in a country like India and the possible ambiguous impact of them on the welfare of the economy. It attempts to theoretically find out the supporters of red-tape-related corruption and supporters of an honest bureaucracy in different possible situations. It tries to derive the conditions under which the shortening of red tape and the grievance-redress mechanisms, generate support for an honest regime. It finds the conditions under which 'greasing the wheel' improves the welfare of an economy. In economies with persistent

corruption, it is often seen that even the individuals who do not support corruption, would often pay bribes. The thesis also attempts to find the factors influencing such behavior.

1.2 Survey of Literature

The thesis relates broadly to three strands of literature. First is the literature on screening and red tape; second, the literature on ground-level monitoring vs. top-down monitoring of corruption; third, the literature on types of corruption that is, collusion and extortion.

The literature on screening and efficient red tape in service delivery is scant. Papers like Wilson (1989), Bardhan (1997), Guriev (2004) show that a certain level of screening and red tape is efficient and necessary for identifying the deserving ones from a pool of applicants given the resources are limited. The thesis following this strand of literature considers a non-zero span of service delivery as opposed to Banerjee (1997) which considers the optimal span of red tape to be zero. This is because Banerjee (1997) deals with red tape as an unnecessary and wasteful procedure marred with corrupt practices. Papers like Banerjee (1997), Saha (2001) consider red tape as an instrument of rent-seeking and corruption. Moreover, while papers like Banerjee (1997), Saha (2001), Guriev (2004), Fredriksson (2014) try to explain the length of red tape in equilibrium, in this thesis the length of red tape is considered to be institutionally given and we check the stakeholder's preferences in equilibrium. Few of these papers also analyze the effect of red tape and corruption from the perspective of social welfare. We intend to gauge how the exogenous institutional reforms like ICT that cuts down the length of red tape by accelerating the service delivery affect the attitudes and behaviors toward corruption.

Wilson (1989) argues that the rules are made complicated and the bureaucracy is marred with several formalities only to ensure that the good/service is provided to those who deserve it. He discusses that red tape as a screening procedure is a superior instrument over auctions or bribery in providing the good/service to the deserving applicant. The paper describes red tape

as a procedure to reduce misallocation in service delivery while ensuring social optimality. Bardhan (1997) also considered red tape to have social objectives and is a response to market failures that occurs due to adverse selection. However, excessive red tape generates corruption. Guriev (2004) constructs a model with the insights drawn by both the aforementioned papers that red tape can produce information and screen applicants. However, corruption can turn into an excessive and wasteful procedure. He shows in absence of proper incentives provided to the government officials, excessive red tape can be generated. Hence, it determines the optimum length of red tape in equilibrium. In Guriev both with ex-ante (before the information is revealed) and ex-post (after the information is revealed) corruption is above the socially optimum level even if the corruption reduces the length of red tape. The present thesis falls in the group of efficient red tape literature.

Banerjee (1997) is one of the first papers to model and analyze the link between red tape and corruption. In his paper, red tape is considered a wasteful procedure. He shows that when both the government and its bureaucrats are corrupt, there will be no red tape. There would not be any red tape either when both are social welfare maximizers. So red tape exists only when there is a difference in objective between the government and the bureaucrats. In particular, it occurs when the government is a social welfare maximizer and the bureaucrats are bribe maximizers. He shows that corruption and extreme divergence between bureaucrats' objectives and society's objectives exist when there is a high level of red tape. The threshold level of red tape is more likely to be higher in less developed economies where there is a resource constraint. Nonetheless, red tape and corruption can move in the opposite direction depending on the government's choice of controls on bureaucrats. Fredriksson (2014) with bureaucratic intermediaries and endogenous red tape studies the effect of competition among intermediaries on corruption and social welfare. He elucidates that competition among intermediaries results in a fall in social welfare and induces a higher level of corruption. Along

the same line, Saha (2001), Ahlin and Bose (2007) also study the length of red tape as an inefficient system. Ahlin and Bose (2007) show that with a higher number of honest officials the probability of misallocation and delay may increase. Therefore, social welfare depends on the proportion of honest officials in the economy.

Rose-Ackerman (2010) argues that bribery is never the first-best outcome. However, Becker (1968) pointed out that corruption can both reduce and increase the welfare of the economy under different conditions. If it overturns an efficient and just system, the welfare falls. This is the case where corruption ‘sands the wheel’ of the growth and development of an economy. But if it allows the economy to escape from an inefficient and unjust system, it ‘greases the wheel’. Earlier, papers like Lui (1985) and Beck and Maher (1986) with an assumption of exogenously given ‘red tape’ like the present thesis, argued that bribes ‘grease the wheel’ by ensuring efficient allocation of a good/service. The efficiency is achieved as the allocation takes place in favor of the parties that value the good/service the most. However, these papers faced criticisms both from theoretical and empirical grounds. Empirically Mauro (1995) in a cross-country study observed negative relation between corruption and economic growth. Aidt (2009) also elucidates that the theory of efficient corruption does not hold. Theoretically, Andvig (1991) pointed out that a corrupt official’s objective may not match the social objective. Also, since the officials and the applicants would not know each other’s type the search cost may stand in the way of achieving efficiency (Nitzan, 1994; Tollison, 1997). Banerjee (1997) also shows corruption and extreme divergence between bureaucrats’ objectives and society’s objectives exist when there is a high level of red tape. The present thesis adds to the literature by showing how the society’s preference toward corruption when aggregated from the individual beneficiaries’ preferences differs from the society’s preferences toward corruption based on the welfare calculation. It also derives conditions on how an exogenous implementation of ICT driven system of provision of goods and services could

assist in matching these two objectives towards an honest regime and ensure maximum welfare. Ahlin and Bose (2007) show the non-monotonicity of the social welfare function. It decreases with the presence of honest officials. They argue that corruption is never the first best outcome as it involves misallocation and delay. On a similar note, the present thesis focuses on the trade-off between the welfare gain from bribery in speeding up the delivery of the good/service vis-vis the welfare loss due to misallocation of the good/service to the undeserving recipients. It gauges whether there are situations where the payment of ‘speed-money’ may also ‘sand the wheel’ unlike conventionally perceived in the literature.

The literature on methods of controlling corruption is vast. Papers like Becker and Stigler (1974), Shleifer and Vishny (1993), Mookherjee and Png (1995), Buccirosi and Spagnolo (2006), Basu (2011), Mishra and Mookherjee (2013), Basu, Basu and Cordella (2014), Banerjee, Banerjee and Mukherjee (2021) focusses on the ‘top down’ approach of controlling corruption that relies on prize, leniency and punishment mechanisms. The thesis differs in its approach from these papers in the sense that it does not aim at finding the optimum solution or combinations of policies like penalties and rewards or leniencies to understand the dynamics of corruption. It takes the grievance redressal process in particular, and finds the effect of the delay in the redressal process, which is common in the developing part of the world, influences bribery in presence of red tape. The effect of both bribery and the attitude towards corruption are explored.

In contrast to the ‘top down’ approach mentioned above the World Bank (2004), Olken (2007), Serra (2012), Yanez-Pagans and Machicado (2012) focus on the ‘bottom up’ approach that stresses the use of beneficiaries’ ‘voice’ in controlling corruption. While research on the top-down approach is enormous, research on the bottom-up approach is rare. The thesis relates relatively more to this strand of literature because it tries to understand the preferences of the beneficiaries between a corrupt regime and an honest regime and gauges what induces them to

raise their voice against corruption. The problem of corruption is easier to solve if people vote against it. The thesis combines the top-down and bottom-up approaches and theoretically derives the conditions to understand how a change in administrative policy influences beneficiaries' voices against corruption. It also derives the beneficiaries' attitudes towards corruption through firm-level data from World Bank Enterprise Survey and the institutional parameters from the World Bank Doing Business data and finds support in favor of the hypotheses derived in the theoretical section of the thesis.

For the enhancement of delivery of publicly provided private goods and services, the World Bank (2004) strongly advocates that the beneficiaries should be allowed to monitor service provision and should have a strong voice in policy-making. With a field experiment in 608 Indonesian villages, Olken (2007) tests the effectiveness of two different kinds of monitoring mechanisms in reducing corruption: 1) audits or formal prosecution and punishments (top-down monitoring); 2) grassroots approach of community participation. The grassroots approach follows two steps: first, invitation of beneficiaries to accountability meetings for a project; and second, giving them a voice against corruption, by providing them comment forms, where they could anonymously describe the loopholes in service provision and allocation of funds. It shows that while invitations increased community participation, the comment forms were effective in undertaking serious actions to improve services and reduce corruption. It turned out that a 'top down' monitoring approach (higher punishments or audits) was more successful in eradicating corruption than a 'bottom up' monitoring approach when the service provided was a public good like roads project in his work. Olken (2007) anticipated that in the case of publicly provided private goods like hospital beds, subsidized food, etc. the 'bottom up' approach would be more effective than the 'top down' approach. Yanez-Pagans and Machicado (2012) through a field experiment in Bolivia, show that providing voice and accountability to grassroots organizations has a huge impact on improving service delivery.

Serra (2012), based on a lab experiment on the bribery model, concludes that providing the citizens' voice even in a weak institutional structure i.e. where the probability of detection from the formal top-down monitoring is low, is an effective method of reducing corruption. However, Bardhan (2002), Banerjee, Banerji, Duflo, Glennerster, and Khemani (2010), Gurgur (2016) sound caution against the vulnerability of the grassroots approach to local elite capture.

The thesis also relates to the theoretical models of extortion and collusion like Hindriks, Muthoo, and Keen, (1999), Marjit, Mukherjee, and Mukherjee (2000), Polinsky and Shavell (2001), Guriev (2004), Drugov (2010), Banerjee and Mukherjee (2020). However, the present thesis derives the conditions for the occurrence of extortion and collusion in the context of red tape, which is different from most of the above-mentioned papers except Guriev (2004). In Guriev (2004) extortion does not occur as an equilibrium outcome. It shows a corrupt official extends the length of red tape above the socially optimum level to force an applicant to participate in the 'speed money' equilibrium. Since the applicant complies with the threat, extortion does not occur at the equilibrium. Although collusion achieved through speed money is commonly discussed in the literature on red tape, extortion is rarely discussed. The present thesis shows that the presence of delay in the redressal process may lead to the existence of extortion in presence of red tape. The predictions of the model have been also tested by the use of the data available from World Bank Enterprise Survey in a cross-country setting. Although the existence of corruption and burdensome regulations are studied in many papers with anecdotal evidence, empirical papers are few due to a lack of reliable data. De Soto (1989) recounts an investigation by the Institute for Liberty and Democracy into the costs of setting up a small, fictitious firm in Peru, a venture that took 289 days of full-time work, with bribe payments being asked for on 10 occasions (and being unavoidable in 2 instances). Kaufmann (1997) reveals that 64 (44) percent of firms surveyed in Ukraine (Russia) agreed to pay bribes to overcome red tape and that 96 (43) percent of firms confessed to making illegal payments

to obtain official licenses and permits. Brunetti, Kisunko, and Weder (1997) report that, in a survey of firms around the world, red tape and corruption were ranked among the highest major obstacles to doing business (especially in the less developed regions). Raj, Sen, and Kar (2018) comparing the State-level *de jure* data for construction permits and operating licenses with the Enterprise Survey data on the *de facto* number of days required for starting a business in Indian states finds that the *de facto* numbers are much smaller than the *de jure* numbers. This gap between the two numbers displays the existence of widespread ‘deal-making’ corruption in the state administration circumventing the ‘red tape’. Mukherjee, Mukherjee, and Bose (2022) in the context of India derive extortion data from National Crime Records Bureau to check the spatial influence of extortion in the Indian States on private investment. Since no individual agent will self-report bribing, papers like Brunetti et al. (1997) collect data on corruption indirectly as “does similar firms pay bribe” or “does firms in your line pay bribe for this good/service”. Fan, Lin, and Treisman (2009), Duvanova (2014), Raj et al. (2018) and Amin and Soh (2020) employed the World Bank Enterprise Survey where again the same methodology has been adopted to interpret the bribing patterns or the number of informal payments made for accessing a service/good. The present thesis also does the same for identifying the bribe incidences from the Survey. The thesis uses the World Bank Enterprise Survey data in a novel way to analyze the responses in the Survey regarding bribe payments, the length of time spent on administrative purposes, whether the interviewed-firms think corruption is an obstacle or not, and divide these responses into four distinct groups and identified from them the likely group that has been extorted and the group that has colluded. It also identifies the ‘honest’ firms which think of corruption as an ‘obstacle’ in doing business, yet pays a bribe. It finds the institutional factors that incentivize these firms to pay the bribe.

The next section provides an outline of the core chapters of the thesis.

1.3 Outline of the Chapters

The thesis contains three core chapters. This section provides a brief description of the chapters in the thesis.

In the thesis, we develop a theoretical model where a benevolent government allocates a good/service to the applicants who deserve it. The allocation of the good to a deserving applicant generates a positive externality and its allocation to an undeserving applicant generates a negative externality to society. It appoints officials for this purpose for screening the deserving candidates out of all the applicants. The bureaucracy has a mix of corrupt and honest officials and the applicants' group is a mix of deserving and undeserving ones. The information of either group's type is private until both parties meet. The official's type is revealed depending on whether he charges a bribe for the good/service. If he charges a bribe, he is corrupt. The applicant's type is revealed through red tape (screening). In the honest regime, to identify the type of applicant, the applicants are required to go through a screening process that takes a fixed time. After the applicants apply and their credentials are received in Period 1, their types get revealed in Period 2 and only the deserving applicants receive the good from the honest officials at the end of the period. In a corrupt regime, an applicant can meet a corrupt official with some probability. The bureaucracy is a monopoly in the sense that the applicants meet the same official for the submission of credentials and screening in Period 1 as well as for the delivery of the good/ service in Period 2.

Chapter 2 focuses on the introduction of Information and Communication Technology (ICT) for shortening the red tape i.e., the time required for screening and delivery of the good in an honest regime. It checks the desirability of the ICT from the stakeholders' perspective. The chapter shows that the support for such a policy reform depends on the stakeholders' profile, the nature of the public good/service, and the initial length of red tape. The

implementation of ICT in the delivery of public goods/services may create demand for an honest regime at the individual level. The chapter also compares social welfare under an honest regime and a corrupt regime. The welfare calculation takes account of the loss due to the misallocation of the service in the corrupt regime vis-à-vis the gain from speeding up the delivery of the good compared to an honest regime. The private preference takes care of the loss due to the delay only. It derives the conditions under which the ICT could help in the convergence of the two social preferences based on the aggregation of private preferences and the social welfare calculation.

Chapter 3 studies corruption in the same bureaucracy that delivers a publicly provided private good to deserving applicants through a time-consuming screening process. The corruption may take alternative forms of collusion involving ‘speed money’ and extortion. However, this chapter introduces a grievance redressal mechanism in the model, which is also assumed to be time-consuming. The deserving applicants who do not collude in Period 1 can seek redress against Period 2’s extortion. There is an application cost of a complaint. Also, it is not that that the redressal process is successful with certainty. If the complaint is successfully redressed the corrupt official is penalized an amount that also includes the application cost of the applicant, and the applicant is provided the goods along with the compensation amount equivalent to the official’s penalized amount. The chapter tries to show under what condition collusion and extortion occur as an equilibrium outcome in such a bureaucracy. It also compares the equilibrium payoffs of the applicants under an honest regime and a corrupt regime to derive their preference over the two regimes. The chapter then empirically validates the prediction of the theoretical model on the responsiveness of the bribe amount concerning the length of service delivery and the length of the grievance redress mechanism with the help of the cross-country data taken from the World Bank Enterprise Survey and the World Bank Doing Business Report (2006-2020).

Chapter 4 presents an empirical study where we explore the factors that induce an ‘honest firm’ that thinks of corruption as an obstacle to doing business to pay a bribe. It is not that everyone violates the law, participates in bribery, and loves a corrupt regime. Some firms think corruption is bad yet pays a bribe for avoiding the cost of delay in receiving public goods/services. Some firms do not compromise. This is evident from the survey itself when we divide the types into four groups. The chapter thus divides the firms into four types: Type I: the firms who report not paying a bribe and think that corruption is not an obstacle to doing business; Type II: the firms who report not paying a bribe and think that corruption is an obstacle in doing business; Type III: the firms who report paying a bribe and think that corruption is not an obstacle in doing business; Type IV: the firms who report paying a bribe and think that corruption is an obstacle in doing business. The chapter studies the impact of the two *de jure* institutional factors that are studied in Chapter 2 and Chapter 3 i.e. the length of service delivery and the length of the grievance redress mechanism on the ‘honest’ firm’s probability of paying a bribe. Since the data on time spent in administrative procedures by the World Bank Enterprise Survey is a *de facto* measure and the World Bank Doing Business data do not provide data for the sufficient number of procedures, we derive the *de jure* time of service delivery from the World Bank Enterprise Survey in a novel way. Since the Enterprise Survey data do not provide the time taken for grievance redressal the *de jure* time for grievance redressal is derived from the World Bank Doing Business data, which is a comprehensive one. It prescribes policies for controlling corruption based on the results obtained in the chapter.

1.4 Results and Contribution to the Literature

The thesis explores individuals’ responses to various institutional reforms in a bureaucracy that screens the applicants for the deserving type and delivers the good to the designated recipient. There can be corruption in the bureaucracy, where the corrupt officials

would deliver the good to any applicant in exchange for a bribe. The bribe is also used to speed up the delivery of the good.

Chapter 2 focuses on the desirability of ICT in shortening red tape in the delivery of a public good both from the stakeholders' and the welfare perspectives. It shows that although all types of applicants pay speed money in presence of red tape, it is not that everyone prefers a corrupt regime to an honest regime. The undeserving applicants never dislike a corrupt regime. But the deserving applicants dislike a corrupt regime in two types of situations: the first if the proportion of deserving applicants is high enough and the second if the proportion of deserving applicants is low but the length of the red tape is not long enough. In presence of too long a red tape, no one dislikes corruption. The introduction of ICT may increase support for an honest regime if the red tape is not long enough and if the gap between the two types of applicants' payoff is not very large. Extortion never occurs at the equilibrium since the applicants prefer paying speed money in Period 1. In terms of society's welfare calculation, the chapter shows that there exists a trade-off in a corrupt regime between speeding up the delivery of the good, as it reduces the fall in welfare due to delay in an honest regime and the misallocation that happens as the good is delivered to the undeserving applicants. Whether the welfare gain exceeds the loss crucially depends on the number of deserving applicants in the economy and the extent of externality associated with the good/service. A lower number of deserving applicants reduces the gain from payment of speed money and increases the loss due to misallocation. Therefore, corruption leads to a net loss in welfare 'sanding' the wheel of growth and development. However, the opposite happens in presence of a sufficiently high number of deserving applicants in the economy. If the length of the 'red tape' is shortened through instruments like ICT, the welfare calculation must show social preference tilted towards an honest regime since a shorter red tape reduces the welfare gain from payment of speed money in a corrupt regime. It identifies from the model the conditions under which

corruption related to payment of speed money may sand or grease the wheel of development. It also points out that there is a divergence in the preference for an honest regime viewed from the individualistic perspective and the welfare perspective. The individual perspective does not take care of the negative externality generated through the misallocation of the good under a corrupt regime. It also finds out the conditions under which ICT could make the social preferences based on the two approaches converge and increases welfare in an economy. The results are new to the literature.

Chapter 3 adds a grievance redress mechanism to the model of red tape presented in chapter 2. It shows that unlike the models without the presence of a grievance redress mechanism, where speed money was the only form of bribery, under certain conditions extortion also becomes an equilibrium outcome of the model. It also compares the equilibrium payoffs of the applicants under an honest regime and a corrupt regime to derive their preference over the two regimes and finds, that faster delivery of the goods is a better instrument to generate support for an honest regime than a faster redressal of grievances. In terms of policies, the paper suggests, that (1) the success of the ‘bottom up’ approach to controlling corruption depends on the choice of the ‘top down’ approach for the same; (2) implementation of a faster redressal process has limited appeal in controlling the occurrence of corruption compared to faster delivery of public services.

Chapter 4 presents an empirical study on the comparative effect of two different institutional factors viz. speeding of delivery of a public good vis-à-vis speeding of the grievance redress process on the corruptibility of the ‘honest firms’, who think corruption is an obstacle in doing business yet pays a bribe, using cross-country data. It finds that a slower delivery process and a faster grievance redressal process are conducive to the participation of the ‘honest’ firms in bribery. The results suggest, that for controlling corruption among these firms, the government should speed up the delivery of public goods/services.

Counterintuitively, it also suggests that a faster grievance redress/legal process would increase corruption. The novelty of the chapter lies in the derivation of the data on *de jure* red tape and the identification of the different types of applicants from the World Bank Enterprise Survey.

1.5 Plan of the thesis

The rest of the thesis is organized as follows.

Chapter 2 presents the basic model and derives the conditions under which corruption persists in presence of red tape where ICT exogenously reduces the length of red tape. It also compares the social preferences based on the welfare calculations for the economy with that the preferences based on the aggregation of individual preferences.

Chapter 3 compares the impact of faster service delivery and faster grievance redress on attitudes of economic agents towards corruption.

Chapter 4 first identifies the ‘honest firms’ from the World Bank Enterprise Survey data and then uses it to derive the factors that induce the honest firms to pay a bribe.

Chapter 2*

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RED TAPE, CORRUPTION AND ICT

*This chapter is based on Bhattacharya, P., and Mukherjee, V. (2020). Red tape, corruption and ICT. In: D. Maiti, C. Fulvio, & M. Arne (Eds.), *Digitization and development: Issues for India and beyond* (pp 345-360). Springer, Singapore. https://doi.org/10.1007/978-981-13-9996-1_13

2.1 Introduction

Information and Communication Technologies (ICTs) are usually considered as an antidote to the problems related to 'red tape' and corruption in public administration. It not only reduces the length of red tape by speeding up the administrative procedures, also minimizes the scope of interaction between the prospective recipient of public goods/services and the corrupt officials. This chapter focuses on that aspect of ICT which reduces the length of red tape and analyzes the desirability of introduction of ICT both from the stakeholders' perspective and from the welfare perspective. In a theoretical model we show that the support for such a reform depends on the stakeholders' profile, the nature of the public good/service and the initial length of red tape. The implementation of ICT in delivery of public goods/services may create demand for an honest regime.

Since public goods are delivered with specific social objective and are funded by public money its provision involves a careful screening process at the governmental level. The complexity of the screening process like the number of stages involved, the time taken between application and delivery of the good sometimes is referred as 'red tape' in the administration. The length of 'red tape' for delivery of a public good/service depends on the efficiency of the administration. The more efficient administration is likely to have a shorter length of 'red tape'. The existence of 'red tape' on the other hand opens for the possibility of corruption in the administration as bribes are paid to speed up the process. Sometimes the corrupt officials deliberately lengthen the 'red tape' to make the bribe option more attractive to the applicants. This is a phenomenon particularly observed in countries with persistent corruption such as the developing countries of the world. The ICTs can interfere with this phenomenon by increasing the speed with which screening is done and assuring time bound delivery of the services. It may also minimize the interaction between the corrupt officials and the applicants, but the later remains out of scope of this chapter.

In developing countries like India, the introduction of ICT in recent times has been reported to reduce the time to process applications and get services done from few days or months to few minutes, reduced information secrecy and reduced the intensity of giving speed money (Bussell, 2012; Bhatnagar, 2010). Yet the studies on the implementation of ICTs reveal that it has not been successful in all the states and across all the schemes in India. It has not always been successful in other countries as well. Moreover, in the countries like India where the introduction of ICT is widely held as successful, corruption has shown an increasing trend over the last decade. Therefore, the question arises, what are the conditions for success of ICT in reduction of corruption in countries given the length of service delivery? The chapter explores an answer to this question.

On this line, the chapter further explores the conditions for the existence of conflict between society's preferences over a corrupt regime vis-à-vis an honest regime based on aggregation of the private preferences, and the one, based on the welfare calculation. While the welfare calculation takes account of the loss both due to the misallocation of the service and the delay in the service delivery, the private preference takes care of the loss due to the delay only. It finds the condition under which reducing red tape by means of ICT could align two kinds of preferences.

In a recent paper Raj et al. (2018) compare the State-level *de jure* data with the Enterprise Survey data on the *de jure* number of days and the *de facto* number of days required for starting a business in Indian states and find that the *de facto* numbers are much smaller than the *de jure* numbers. The gap between the two numbers shows the existence of wide-spread 'deal making' corruption in the state administration circumventing the 'red tape'. The existing literature in economics deals with different aspects of 'red tape'. A class of papers like Banerjee (1997), Saha (2001), Guriev (2004), Fredriksson (2014) tries to explain the length of red tape. Banerjee (1997) shows why the red tape is likely to be longer in developing countries vis-à-vis

developed countries. Saha (2001) shows the way the length of red tape depends on the waiting costs of the recipients of the transfer of the targeted benefit program. Guriev (2004) derives the socially optimum level of red tape and explains why in absence of proper incentive the officials may create excessive red tape. Fredriksson (2014) investigates the role of intermediaries in red tape and corruption. He shows that inclusion of intermediaries in bureaucracy leads to a longer red tape than in exclusion of it and a consequent fall in social welfare. Ahlin and Bose (2007) explore the effect of bureaucratic competition in a model of red tape. In this chapter unlike Banerjee (1997), Saha (2001), Guriev (2004), Fredriksson (2014) the length of red tape is exogenously fixed by technological factors. It also does not deal either with bureaucratic competition or with intermediaries. Instead it looks at the demand side of corruption in presence of 'red tape'. It first tries to explain under what kind of situation the applicants for the delivery of public good would like to pay bribe and would prefer persistence of a corrupt system to an honest system. Then tries to derive implications for introduction of ICT in such a set up.

In order to deter corruption and deal making in red tape, e-governance (ICT enabled red tape) was introduced. E-governance is aimed at reducing misallocations and time cost while screening individuals through red tape. Maumbe, Owei, and Alexander (2008) explains that for the developing countries the implementation of ICT becomes second priority as that requires first the elimination of illiteracy, poverty and unemployment thus having undesired impact of ICT on prevention of corruption. Koutrakou (2006) particularly mentioned that the success of e-government initiatives would be in terms of improved citizen-government interaction. Twinomurinzi and Ghartey-Tagoe (2011) with case studies on e-government initiatives from Asia, Africa and South America identified three underlying factors for the successful implementation of ICT in red tape, as: strong political leadership against corruption, active community participation and available funding for the creation of dedicated ICT systems that target corruption. Bussell (2012) in her book about implementation of ICT in India supports

the fact that political elites have a huge influence on the implementation of ICT. The book analysing a relation between political corruption and e-governance reports that the e-Choupal program in India succeeded in the below average corruption states like Himachal Pradesh, Chhattisgarh and Andhra Pradesh but failed in relatively above average corruption states like Orissa and Haryana. Mimbi and Bankole (2016) finds that the extent to which ICT can efficiently increase voice and accountability, rule of law and government effectiveness in BRICS countries is low and varies greatly among these countries.

Bussell (2012) in her survey of e-choupal program (establishment of information kiosk and application centres for receiving public services) implemented by various state governments in India around 2006 for time-bound, corruption-free delivery of public services report that a section of beneficiaries preferred status-quo. While it is apparent that the corrupt officials would oppose e-choupal program as it puts a bound on the length of red-tape and eliminates the interface between the applicants and the officials, it was puzzling why the applicants wanted persistence of corruption. Reddick, Abdelsalam, and Elkadi (2012) found a similar result from a study in Egypt that people preferred availing the offline provision of services over the online provision. Banerjee, Duflo, Imbert, Mathew, and Pande (2016) and Muralidharan, Niehaus, and Sukhtankar (2016) through their surveys in Indian states of Bihar and Andhra Pradesh respectively claim that fund transfers through e-channels in National Rural Employment Guarantee Program (NREGA) was successful in reducing leakages and hence corruption¹. Ali and Gasmi (2017) shows that e-governance is generally negatively related to corruption but there may exist a threshold level of ICT above which it can curb corruption.

Becker (1968) pointed out that depending on the situation corruption can both reduce and increase welfare of the economy. If it overturns an efficient and just system, the welfare

¹ See Dreze (2022) for a critical assessment of this study and the results.

falls. This is the case where corruption ‘sands the wheel’ of growth and development of an economy. But if it allows the economy to escape from an inefficient and unjust system, it ‘greases the wheel’. Earlier, papers like Lui (1985) and Beck and Maher (1986) with an assumption of exogenously given ‘red tape’ like the present chapter, argued that bribes ‘grease the wheel’ by ensuring efficient allocation of a good/service. The efficiency is achieved as the allocation takes place in favour of the parties that value the good/service the most. However, these papers faced criticisms both from theoretical and empirical ground². Empirically Mauro (1995) in a cross-country study observed a negative relation between corruption and economic growth³. Theoretically, Andvig (1991) pointed out that there is no reason to assume the corrupt official’s objective matches the social objective. Also, since the officials and the applicants would not know each other’s type the search cost may also stand in the way of achieving the efficiency (Nitzan, 1994; Tollison, 1997). Unlike these papers, the present chapter, focuses on the trade-off between the welfare-gain from bribery in speeding up the delivery of the good/service vis-vis the welfare-loss due to misallocation of the good/service to the undeserving recipients. It finds that there are situations where the payment of ‘speed-money’ may also ‘sand the wheel’ unlike conventionally perceived in the literature.

The structure of the chapter is as follows: the next section (Section 2.2) presents the theoretical model. The theoretical model presented in the next section attempts to find a logical regularity behind the empirical findings mentioned above. It presents society’s preferences based on aggregation of private preferences. Section 2.3 presents the social preference based on welfare calculations and identifies conditions under which the social preferences computed with the two methods converge or diverge. The section following concludes.

² See Aidt (2003) for detailed survey of the literature.

³ See also Aidt (2009), Gupta, Davoodi, and Tiongson (2000) for similar findings.

2.2 The Model

Let us consider a government that provides a public good/service among the applicants for free⁴ in a way that the social welfare is maximized. There are two types of applicants in the economy: ‘deserving’ and ‘undeserving’. The ‘deserving’ applicants derive higher benefit $\beta > 0$ from the possession of the good than the ‘undeserving’ applicants who derive a benefit of $g > 0$; $\beta > g$. The social welfare is higher too if a deserving applicant gets the good in lieu of an undeserving applicant. We assume that the social benefit from providing the good to a deserving applicant is $\gamma\beta$ where $\gamma > 1$; and to an undeserving applicant is g . The unit cost of provision of the good is $c > 0$. In particular, we assume, $\gamma\beta > c > g$. Therefore, the government with its objective of social welfare maximization wants the good to be allocated to the deserving applicants alone. However, the identity of an applicant is private information to her which is revealed only through a screening process organized by the government. The screening process starts with submission of credentials to an official in period 1 and the eligibility of the applicant is revealed in period 2. If the applicant turns out to be ‘deserving’ the good is delivered free. An applicant who turns out to be ‘undeserving’ is denied. We assume the bureaucracy is ‘monopoly’ in the sense that the delivery of the good is done by the same official in period 2 who has checked the credential of the applicant in period 1⁵. The length of ‘red tape’ is defined as the time taken between the checking of the credentials and the delivery of the good. The better is the screening technology, less time is taken for delivery of the good, the lower is the length of the red tape. The existence of the red tape turns out to be costly for an applicant. The higher is the time elapsed before the delivery of the good, the lower is the effective benefit derived from the good. If $\beta > 0$ represents the benefit that was supposed to

⁴ Examples would be delivery of free food, hospital beds for people below the poverty line, licences and permits etc.

⁵ In a competitive bureaucracy these two tasks are done by two different officials. An analysis of a competitive bureaucracy remains as our future research agenda.

be received by a ‘deserving’ applicant from the delivery of the public good without delay, with delay she receives only $\delta\beta < \beta$. The parameter $\delta \in (0,1)$ stands for the length of the red tape in the sense that the longer is the red tape, the lower is the value of δ . With no red tape $\delta = 1$. A more efficient bureaucracy has a higher value of δ . The application of ICT reduces the length of red tape by reducing the screening time and thus increasing the value of δ .

In an honest bureaucracy with length of red tape of δ a deserving applicant receives a payoff of $\delta\beta$. An undeserving applicant does not receive the good; therefore, receives a payoff of zero. Thus, the expected payoff of a deserving applicant in an honest regime is:

$$U_d^h = \delta\beta. \quad \dots\dots\dots (1)$$

The expected payoff of an undeserving applicant is:

$$U_u^h = 0. \quad \dots\dots\dots (2)$$

In a corrupt bureaucracy, we assume, it is common knowledge that ρ proportion of the officials are honest, but the rest are corrupt. But an applicant does not know which official is corrupt before she meets one. A corrupt official, independent of the type of the applicant, transfers the good to an applicant only in exchange of a bribe. This can happen either in period 1 or period 2 of the application process. If a bribe is charged, we assume, the amount of bribe is determined as the entire amount of bribe surplus lying with an applicant⁶. For simplification, we also assume that the applicants have sufficient ability to meet the bribe demand and their outside option is zero⁷. Now let us discuss the determination of bribes and other payoffs in a corrupt equilibrium.

⁶ Alternatively, the amount of bribe could also be determined through Nash bargaining where the corrupt official would share the bribe surplus with the applicant. But with alternative bribe conventions the results would remain unchanged.

⁷ In the next chapter we relax this assumption of the model.

First consider the corrupt official's behavior in period 2 of the application process. We discuss his behavior in period 1 later as his behavior in period 1 depends on his expectation about the period 2 outcome. In period 2, it may be recalled that the type of applicant is revealed through the 'red tape'. So, the corrupt official knows whether the applicant who has come to receive the good is a 'deserving' one or not. In presence of red tape, the corrupt official knows that by receiving the good the deserving applicant would have a payoff of $\delta\beta$ and the undeserving applicant would have a payoff of δg . Since the outside option of each type of applicants is zero, their payoffs also define their bribable surplus. Therefore, the corrupt official charges as bribe amount $\delta\beta$ to a deserving applicant and δg to an undeserving applicant for delivery of the good. While for a deserving applicant the bribe incidence would be a situation of extortion, for an undeserving applicant it would be a situation of collusion. Notice that because of the corruption in period 2 both types of applicants leave with the good but with zero net payoff.

Let us now discuss the possibility of bribery in period 1 of the application process. Now the corrupt official offers the good to the applicants who have come for submitting the credentials at period 1 in the period 1 itself without any delay, in exchange of a bribe⁸. The bribe rate depends on the bribe surplus lying with the applicants at this period. What is the amount of bribe surplus lying with the two types of applicants at period 1? First, let us look at the case of a deserving applicant. By receiving the good immediately at period 1, she knows that she can skirt the red tape and enjoy a payoff of β . But if she rejects the bribe-offer and waits for the good to be delivered in period 2, since the bureaucracy is monopoly, she knows that the good will be delivered by the same corrupt official at period 2 and in that case she will

⁸ Ideally an official detected of such a practice will be liable to punishment. However, to keep things simple here we assume that the expected punishment is zero, which can be relaxed in an extended version of the model. But it is also true that the expected punishment for the corrupt officials is close to zero in many countries especially in the developing part of the world.

surely be extorted to receive a net payoff of zero in period 2. So, her bribable surplus in period 1 is calculated as $(\beta - 0) = \beta$. Now let us look at the case of the undeserving applicant. By similar logic as applied for the deserving applicants, her bribable surplus at period 1 is calculated as $(g - 0) = g$. If the corrupt official could identify the types of the applicants in period 1, he would charge β as bribe to a deserving applicant and g to an undeserving applicant. But since the type of applicant gets revealed only at the end of period 2, the corrupt official does not have the information to differentiate a deserving applicant from an undeserving one. However, we assume, it is common knowledge that α proportion of the applicants are deserving and $(1 - \alpha)$ proportion are undeserving. So, the corrupt official knows that the applicant whom he meets in period 1 for checking credentials, is a deserving applicant with probability α and is an undeserving applicant with probability $(1 - \alpha)$. Therefore, he also knows that since $\beta > g$ if he offers a bribe rate of β to the applicants for avoiding the red tape, with probability α the offer will be accepted; and with probability $(1 - \alpha)$ the offer will be rejected. Only the deserving applicants will agree to pay the bribe. An undeserving applicant will reject the offer and wait for the period 2 interaction when she receives the good by paying δg . So, this bribe offer is exclusionary in nature. If the corrupt official is risk-neutral, he calculates his expected payoff from offer of the exclusionary bribe rate of β as $[\alpha\beta + (1 - \alpha) \cdot \delta g]$. Similarly, he knows that on offering a bribe rate of g his expected payoff is g since both types of applicants is expected to accept the bribe offer in period 1 itself. So, this bribe offer is pooling in nature. The corrupt official will offer an exclusionary bribe if and only if $\alpha\beta + (1 - \alpha) \cdot \delta g > g$ which implies $\alpha > \frac{g - \delta g}{\beta - \delta g} = \alpha^*$ i.e. if and only if the proportion of deserving applicants in the economy exceeds a critical threshold value of α^* . Otherwise, a pooling bribe will be offered.

Observation 1: If $\alpha > \frac{g - \delta g}{\beta - \delta g}$, a corrupt official offers an exclusionary contract in period 1; if $\alpha \leq \frac{g - \delta g}{\beta - \delta g}$, he offers a pooling contract.

Proof: Follows from the discussion above. □

Let us summarize the equilibrium in a corrupt regime as discussed above. In an economy where $\alpha > \alpha^*$, if a corrupt official is met an exclusionary bribe is offered at the stage of checking credentials (in period 1) for skirting the red tape of length δ ; only the deserving applicants accept such an offer, the undeserving applicants wait through the length of red tape for getting the good in period 2 only; both receives a payoff of zero as the entire bribe surplus gets extracted in the process. If an honest official is met in period 1 a deserving applicant receives the good at the end of period 2 with a discounted payoff of $\delta\beta$. However, if an honest official is met in period 1 an underserving applicant does not receive the good. Therefore, the expected payoff of a deserving applicant in a corrupt regime is:

$$U_d^E = \rho\delta\beta + (1 - \rho)(\beta - \beta). \quad \dots\dots\dots(3)$$

Similarly, the expected payoff of an undeserving applicant in this regime is:

$$U_u^E = \rho \cdot 0 + (1 - \rho)0 = 0. \quad \dots\dots\dots (4)$$

In an economy where $\alpha \leq \alpha^*$, if a corrupt official is met, a pooling bribe is offered at the stage of checking credentials which is readily accepted by both types of applicants for skirting the red tape; a deserving applicant receives a payoff of $(\beta - g) > 0$ and an undeserving applicant receives a payoff of zero. Therefore, the expected payoff of a deserving applicant in such a case is:

$$U_d^P = \rho\delta\beta + (1 - \rho)(\beta - g) \quad \dots\dots\dots (5)$$

Similarly, the expected payoff of an undeserving applicant in this case is calculated as:

$$U_u^P = \rho \cdot 0 + (1 - \rho) \cdot (g - g) = 0. \quad \dots\dots\dots (6)$$

Observe that though the possibility of an extortion is there, in neither of the economies extortion is an equilibrium outcome. The deserving applicants are the ones who readily collude at the stage of submission of credentials itself and avoid the red tape. The undeserving applicants also collude but suffer the red tape in an economy where the proportion of deserving applicants is above the threshold. It is imperative that the corrupt official would always like the corrupt regime to persist which is apparent in the preceding analysis as well. The corrupt officials enjoy a positive payoff in a corrupt regime compared to zero in an honest regime. What about the applicants? Do they prefer a corrupt regime to persist, or long for honesty to prevail? The model provides an interesting answer to this question.

Proposition 1: (i) *If $\alpha > \alpha^*$ and the contract is exclusionary, while a deserving applicant prefers an honest regime to a corrupt regime, an undeserving applicant remains indifferent between the two.*

(ii) *If $\alpha \leq \alpha^*$ and the contract is pooling, a deserving applicant prefers a corrupt regime to an honest regime if and only if $\delta < \delta^*$ (prefers an honest regime to a corrupt regime if and only if $\delta \geq \delta^*$) while an undeserving applicant remains indifferent between the two, where $\delta^* = 1 - \frac{g}{\beta}$.*

Proof: (i) Follows from comparing equation (1) with (3) and (2) with (4).

(ii) Follows from comparing equation (1) with (5) and (2) with (6). □

First, consider the case of the undeserving applicants. In an honest regime they do not receive the good and their payoff is zero. In a corrupt regime, if $\alpha > \alpha^*$ and if a corrupt official is met, they endure the red tape to receive the good in period 2. But their entire bribe surplus gets extracted in period 2 bribery and they receive a payoff of zero. On the other hand, if $\alpha \leq \alpha^*$ and a corrupt official is met, they pay the collusive bribe at period 1 itself and receives the good without a wait; but receives a net payoff of zero. If an honest official is met, even in a corrupt regime, their payoff is zero. So, the undeserving applicants must be indifferent between

a corrupt regime and an honest regime. Next let us consider the case of the deserving applicants. In an honest regime they receive the good for free at the end of period 2 and enjoy a payoff of $\delta\beta$. In a corrupt regime if $\alpha > \alpha^*$ and a corrupt official is met, they pay collusive bribe for avoiding red tape, but the exclusionary bribe rate extracts their entire surplus so that they end up with a net payoff of zero. If an honest official is met, their payoff is zero. So, in an economy where $\alpha > \alpha^*$ the deserving applicants would always vote for an honest system over a corrupt system. If $\alpha \leq \alpha^*$ and a corrupt official is met, they again enter a collusive bribery and avoid the red tape; but the pooling bribe rate being low enjoy a positive payoff of $(\beta - g)$. Therefore, now they prefer a corrupt regime to an honest regime if and only if $\beta - g > \delta\beta$ or $\delta < 1 - \frac{g}{\beta} = \delta^*$ i.e. the length of the red tape is long enough. If the length of the red tape is below the threshold value of δ^* that is, $\delta \geq \delta^*$ they would not mind waiting in an honest regime.

The implications of the above analysis in terms of preference towards corruption in red tape can be illustrated in Figure 2.1 below, where the horizontal and vertical axis represent the values of $\delta \in (0, 1)$ and $\alpha \in (0, 1)$ respectively. In presence of red tape, at all the (δ, α) combinations in the unit square, ‘speed money’ is paid in a corrupt bureaucracy. But it is not that at all the combinations of (δ, α) ‘speed-money’ and corruption is a preferred option for the applicants. Some of the applicants, if asked about their preference over a corrupt regime vis-à-vis an honest regime will vote for an honest regime and if their preference prevails, corruption would not exist in an economy even in presence of red tape.

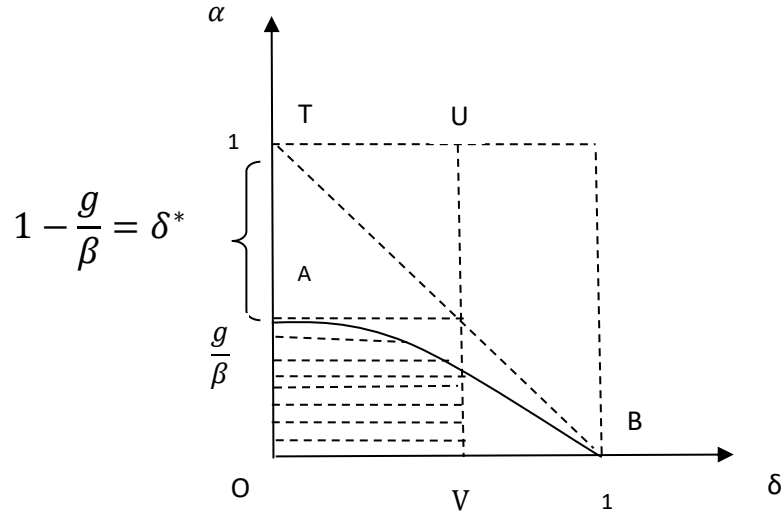


Figure 2. 1: Preference towards Corruption and its Existence under Red Tape

The curve AB in Figure 2.1 represents $\alpha^* = \frac{g-\delta g}{\beta-\delta g}$. Since for all $\alpha > \alpha^*$ the exclusionary contract is offered by the corrupt official at the time of checking credentials, in Figure 2.1 at all the points above AB curve in the unit square the deserving applicants prefer an honest regime to a corrupt regime and if they are supported by the undeserving applicants who are indifferent between the two regimes, corruption would not exist in red tape. From the above analysis it implies if the preference of the deserving applicants prevails, corruption is preferred and exists in red tape at the combinations of α and δ such that $\alpha \leq \alpha^*$ and $\delta < \delta^*$. In the figure above, the length $AT = 1 - \frac{g}{\beta} = \delta^* = \text{length } TU = \text{length } OV$. Therefore, the vertical line UV represents δ^* which is independent of α and the shaded area AOV represents the combinations of α and δ for which corruption in red tape would exist. For the (δ, α) combinations in AOV no one complains about the existing corruption in the economy.

Notice that the shape of the area AOV depends on $\frac{g}{\beta}$ i.e. the ratio of benefits accrued to an undeserving applicant vis-à-vis a deserving applicant from the public good/service which is being distributed. As $\frac{g}{\beta} \rightarrow 1$ i.e. there is not much difference in benefits accrued to the two

types of applicants, the AB curve becomes steeper as A moves to T, δ^* falls and the UV line shifts in the inward direction to the vertical axis as V moves to O. The opposite happens if $\frac{g}{\beta} \rightarrow 0$ i.e. there is sharp difference between the benefit accrued to a deserving applicant vis-à-vis an undeserving applicant. These two extreme cases are represented in Figure 2.2 below.

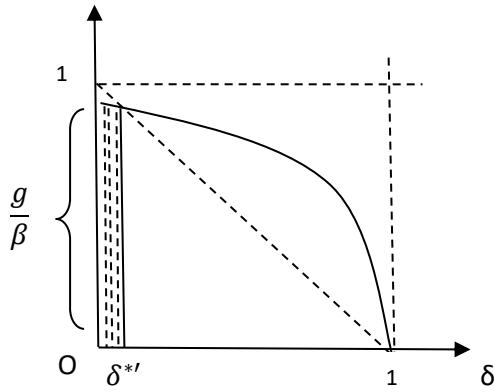


Figure 2.2(a): Extreme Case 1: $\frac{g}{\beta} \rightarrow 1$

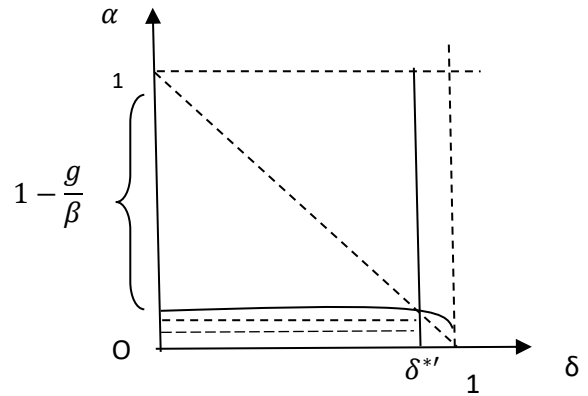


Figure 2.2(b): Extreme Case 2: $\frac{g}{\beta} \rightarrow 0$

The above analysis shows that in presence of red tape and corruption, both types of applicants would participate in collusive bribery for avoiding the red tape, which is empirically supported by Raj et al. (2018). However, the undeserving applicants would never complain about existence of a corrupt regime. It is the deserving applicants who would complain about existence of corruption under two different situations: (i) if the number of deserving applicants is above the threshold i.e. $\alpha > \alpha^*$; and (ii) if the number of deserving applicants is below the threshold i.e. $\alpha \leq \alpha^*$ but the length of the red tape is short enough i.e. $\delta \geq \delta^*$. The result is interesting because it helps us to understand the responses from the individuals in the survey conducted by Bussell (2012) and the responses from the firms as part of surveys like World Economic Forum Executive Opinion survey 2017-18 (Schwab, 2017) and Enterprise Survey Report about red-tape related corruption in economies. For example, consider the case of the Enterprise Survey Report. The 2014 survey reports that 35.8% firms in India consider corruption as a major obstacle in doing business. If $\alpha > \alpha^*$ the result of the theoretical model

suggests that the firms complaining about corruption are essentially the deserving applicants for delivery of the firm-specific public good/service. But if we accept it is most likely to be the case that $\alpha \leq \alpha^*$, the theoretical prediction of the model suggests it must be the case that $\delta \geq \delta^*$ i.e. the length of the red tape is not long enough in the country. If the second possibility is true, in the case of distributing firm-specific public goods/services by shortening of the length of red tape further through introduction of ICTs is not expected to reduce corruption. What is really needed for solving the problem of corruption is creation of a political system where the preference of the deserving applicants complaining about corruption prevails. However, if the length of red tape is too long to start with such that $\delta < \delta^*$, shortening of red tape through ICT and time bound delivery of services can create a possibility that the threshold is crossed, and the deserving applicants start complaining about corruption. Similarly, for delivery of individual/household specific public goods the finding of Bussell (2012) that in some of the Indian states the individuals preferred the corrupt system of public good delivery to ICTs, can also be explained through our model. Our model suggests that it must be the case in such situations it was $\alpha \leq \alpha^*$ and the length of the red tape was long enough i.e. it was $\delta < \delta^*$ so that the deserving applicants preferred the corrupt system to the ICTs. Clearly, the introduction of ICTs was not sufficient in shortening the length of the prevailing red tape such that the direction of inequality reverses to $\delta \geq \delta^*$. This explains why for individual/household public goods delivery the introduction of ICTs was not successful in some states of India, but it was successful in some other states. The extreme situation presented in Figure 2.2(a) suggests that if the difference in payoff of the deserving and undeserving applicants is not much i.e. $\frac{g}{\beta} \rightarrow 1$, δ^* is so low that the success of ICT and time bound delivery of public services in creation of demand for an honest regime is imminent. However, the other extreme situation presented in Figure 2.2(b) suggests that if the difference in payoff of the deserving and undeserving applicants is high i.e. $\frac{g}{\beta} \rightarrow 0$, δ^* is so high that the ICT and the time bound delivery of public

services is less likely to be successful in solving the problem of corruption in presence of red tape.

The above analysis shows that the marginal effect of introduction of ICT in a corrupt country on desirability of an honest regime is uncertain. It depends on the difference between β and g , the proportion of deserving applicants and the length of red tape. If $\frac{g}{\beta} \rightarrow 1$, it is likely to have a positive effect in presence of a long red-tape. If $\frac{g}{\beta} \rightarrow 0$ and $\alpha \leq \alpha^*$, in most of the cases it is likely to have no effect. But the presence of a short red tape is likely to generate a positive effect.

From the discussion above three important observations follow:

Observation 2: Of all the possible combinations of α (the proportion of deserving applicants) and δ (the length of red tape), the corruption exists in less than 50% combinations.

Observation 3: The possibility of existence of corruption in red tape sharply falls both in the cases where there is not much difference between the benefits accrued to a deserving and to an undeserving applicant and there is extreme difference between the two. In the former case, corruption takes place almost independent of proportion of deserving applicants in the society but for extremely large length of red tape. In the later, it takes place almost independent of the length of red tape but only if the proportion of deserving applicants is low enough.

If the gap between the return from the good/service to the distinct types of applicants is small, it is likely that the shortening of red tape induces deserving applicants to prefer an honest regime. If the gap is large and the proportion of deserving applicants is lesser than the threshold, in most of the cases shortening of the red tape does not induce deserving applicants to prefer an honest regime.

Observation 4: Corruption in presence of red tape can generally be controlled in two steps: (i) by calculating $\delta^* = 1 - \frac{g}{\beta}$; (ii) by setting the length of red tape in such a way that $\delta \geq \delta^*$.

However, corruption is almost impossible to control by shortening of red tape if $\frac{g}{\beta} \rightarrow 0$.

In the next section we compare the welfare of the economy under an honest regime and a corrupt regime.

2.3 Welfare

In an honest regime since only the α proportion of the deserving applicants present in the economy receive the good with a delay of δ , the society evaluates their benefit as $\alpha\delta\gamma\beta$. Since the cost of providing the good to each of the applicants is c , the welfare of the economy under an honest regime is:

$$w_H = \alpha[\delta\gamma\beta - c]. \quad \dots\dots\dots (7)$$

We assume, $\delta\gamma\beta > c$ such that $w_H > 0$. The assumption justifies the existence of the institution of ‘screening’ at the first place.

In a corrupt regime, the welfare calculation depends on the type of equilibrium that occurs in the interaction between the applicants and the officials. However, in all such equilibrium situations w_H is realized with probability ρ when the applicants meet an honest official. A corrupt equilibrium occurs with probability $(1 - \rho)$ when the welfare calculation differs from one case to another as explained below.

Case 1: $\alpha > \alpha^*$.

It follows from Observation 1 that in this case the corrupt official offers exclusionary contract in period 1 such that only the deserving applicants accept it and they receive the good without any delay through payment of the speed money. Therefore, on account of the α proportion of

the deserving applicants present in the economy the welfare gain of the society is given by $\alpha(\gamma\beta - c)$. However, since $(1 - \alpha)$ proportion of undeserving applicants also receive the good in period 2 after waiting, the society loses $(1 - \alpha)(c - \delta g)$ on their account. The bribe amount, being a transfer, does not enter the welfare calculation. Therefore, the expected welfare of the economy is:

$$w_C^1 = \rho w_H + (1 - \rho)[\alpha(\gamma\beta - c) - (1 - \alpha)(c - \delta g)].$$

Case 2: $\alpha \leq \alpha^*$.

It follows from Observation 1 that in this case the corrupt official offers pooling contract in period 1 such that both types of applicants accept it. They receive the good without any delay through payment of the speed money. Therefore, on account of the α proportion of the deserving applicants present in the economy the welfare gain of the society is given by $\alpha(\gamma\beta - c)$. Similarly, on account of the $(1 - \alpha)$ proportion of the undeserving applicants present in the economy the welfare loss of the society is given by $(1 - \alpha)(c - g)$. The bribe amount, being a transfer, does not enter the welfare calculation. Therefore, the expected welfare of the economy is:

$$w_C^2 = \rho w_H + (1 - \rho)[\alpha(\gamma\beta - c) - (1 - \alpha)(c - g)].$$

Proposition 2: (i) If $\alpha > \alpha^*$, and

- a. if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] \leq 0$, $w_H < w_C^1$;
- b. if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$ there exists a value of $\alpha = \hat{\alpha} > \alpha^*$ such that for all values of $\alpha \in (\alpha^*, \hat{\alpha}]$, $w_H \geq w_C^1$ and for all values of $\alpha \in (\hat{\alpha}, 1]$, $w_H < w_C^1$.

(ii) If $\alpha \leq \alpha^*$, and

- a. if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] \geq 0$, $w_H \geq w_C^2$;

b. If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] < 0$, there exists a value of $\alpha = \tilde{\alpha} < \alpha^*$ such that for all values of $\alpha \in (0, \tilde{\alpha}]$, $w_H \geq w_C^2$ and for all values of $\alpha \in (\tilde{\alpha}, \alpha^*]$, $w_H < w_C^2$.

Proof: See the Appendix. □

The intuition behind Proposition 2 is as follows. The society gains $(\gamma\beta - c)$ from the allocation of the good to each of the deserving applicants and loses $(c - \delta g)$ from its allocation to each of the undeserving applicants. If $\alpha > \alpha^*$, in the corrupt regime the exclusionary contract is offered, and all the deserving applicants pay the speed-money to receive the good in period 1 itself. Therefore, compared to the honest regime, the loss due to the delay is avoided. The higher is the number of the deserving applicants (α), the higher is the gain in welfare. However, on account of the undeserving applicants, the loss occurs since the allocation to the undeserving applicants is costly for the society. If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] \leq 0$ i.e. the welfare under the corrupt regime is higher than the welfare under the honest regime at $\alpha = \alpha^*$, it must also be higher for all values of $\alpha > \alpha^*$ on account of higher number of deserving applicants. The gain from speeding outweighs the loss from the misallocation. However, if $\alpha \leq \alpha^*$, a pooling contract is offered in period 1 itself, which is accepted by both types of applicants. Here due to lower number of deserving applicants the welfare gains to the economy due to speeding may fail to outweigh the loss due to misallocation to the undeserving applicants. Proposition 2 shows that there exists a value of $\alpha = \tilde{\alpha}$ such that for all values of $\alpha \in (\tilde{\alpha}, \alpha^*]$ the welfare under the corrupt regime is higher. The opposite is the case for all values of $\alpha \in (0, \tilde{\alpha}]$ when the welfare is higher in an honest regime. If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$ i.e. the welfare under the honest regime is higher than the welfare under the corrupt regime at $\alpha = \alpha^*$. Since the cost due to misallocation outweighs the gain due to speeding at $\alpha = \alpha^*$, it is also higher for all values of $\alpha \leq \alpha^*$ where the number of deserving

applicants is lower than α^* . However, if $\alpha \geq \alpha^*$, the gain from the speed money paid by the deserving applicants rises and Proposition 2 shows that for all values of $(\hat{\alpha}, 1]$ it outweighs the loss due to misallocation. The welfare under the honest regime continues to be higher for all values of $\alpha \in (\alpha^*, \hat{\alpha}]$. Proposition 2 can be summarized in the following figure:

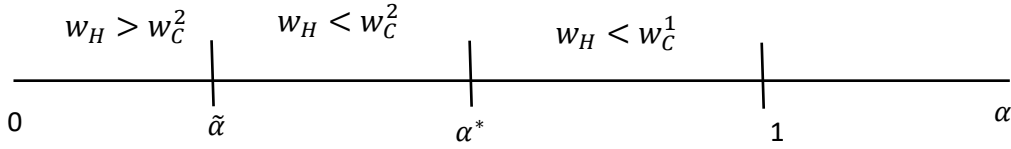


Figure 2.3(a): The welfare comparison when $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$.

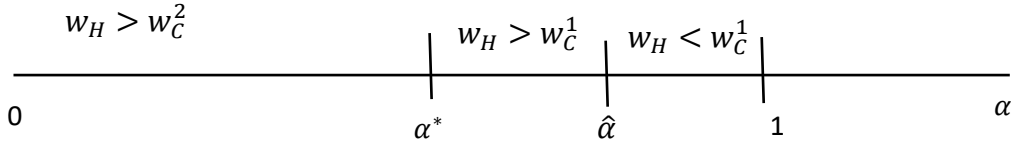


Figure 2.3(b): The welfare comparison when $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$.

Notice that Proposition 1 and 2 highlights the difference between the social preference about a corrupt regime over an honest regime based on aggregation of private preference and based on welfare calculation. If $\alpha > \alpha^*$, while by the private preference, the society weakly prefers an honest regime (Proposition 1), the social welfare could have been higher under a corrupt regime if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$ and $\alpha > \hat{\alpha} > \alpha^*$ (Proposition 2). Similarly, if $\alpha \leq \alpha^*$ and $\delta \geq \delta^*$, while by the private preference, the society weakly prefers an honest regime (Proposition 1), the social welfare could have been higher under a corrupt regime if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$ and $\alpha \in (\tilde{\alpha}, \alpha^*]$ (Proposition 2).

Would a shorter red tape tilt the social preference based on welfare calculation in favour of an honest regime? From Proposition 2 it follows that this would happen only if both $\hat{\alpha}$ and $\tilde{\alpha}$ rise with a rise in the value of δ .

Observation 5: (i) If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$, based on social welfare comparison with a shorter red tape the social preference towards an honest regime will always increase.

(ii) If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$, based on social welfare comparison with a shorter red tape the social preference towards an honest regime will increase if $\frac{g}{\beta} > \frac{\hat{\alpha}\gamma}{1-\hat{\alpha}}$.

Proof: See the Appendix.

If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$, at all values of $\alpha \in (\tilde{\alpha}, 1]$ the social welfare under corrupt regime is higher than the social welfare under the honest regime as the gain from the speedy delivery of the good exceeds the loss from its misallocation. At $\tilde{\alpha}$ the social welfare under the two regimes balance with each other. With a shorter red tape, at $\tilde{\alpha}$ the gain from the speedy recovery falls below the loss from misallocation. Therefore, at the margin, the society's preference for an honest regime rises. On the other hand, if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$, the similar argument holds at $\hat{\alpha}$. But since $\hat{\alpha} > \alpha^*$, the proportion of applicants gaining from the shorter red tape in this situation is high. Therefore, unless the loss from misallocation is sufficiently high to exceed the gain from the speedy delivery of the good, the society's preference for an honest regime does not rise. This happens if the condition $\frac{g}{\beta} > \frac{\hat{\alpha}\gamma}{1-\hat{\alpha}}$ is satisfied.

2.4 Conclusions

The chapter studies the interaction between red tape, corruption and introduction of ICTs in delivery of public goods and services. The chapter develops a theoretical model for the study. The model first defines two types of individuals in an economy: the individuals who are targeted by the government for the delivery of the public good and the individuals who are not. Since the type of an individual whether she is deserving or not is her private information, the

government screens the applicants by checking their credentials. The screening process takes certain time to establish the type of the individual which is defined as 'red tape' in the model. However, the good loses some of its value because of the red tape. The longer is the length of the red tape, the higher is the loss. A corrupt official independent of the type of the applicant takes bribe for delivery of the good. The ICT promises to shorten the length of the red tape.

The results of the model show that although all types of applicant pay speed-money in presence of red tape, it is not that everyone prefers a corrupt regime to an honest regime. The undeserving applicants never complain about a corrupt regime. But the deserving applicants complain about corrupt regime in two types of situations: the first, if the proportion of deserving applicants is high enough and the second, if the proportion of deserving applicants is low but the length of the red tape is not long enough. In presence of too long a red tape no one complains about corruption. The introduction of ICT by shortening the length of red tape may increase support for an honest regime if the red tape is not long enough and if the gap between the two types of applicants' payoff is not very large.

In terms of society's welfare calculation, the chapter shows that there exists a trade-off between speeding-up of the service, as it reduces the fall in welfare due to delay in delivery of the good/service and its misallocation that happens in the process of corruption since undeserving applicants also receive the good/service. It turns out that whether the welfare gain exceeds the loss crucially depends on the number of deserving applicants in the economy and the extent of externality associated with the good/service. Given the amount of externality generated by the good/service, a lower number of deserving applicants reduces the gain from payment of speed-money and increases the loss due to misallocation. Therefore, the corruption leads to net loss in welfare 'sanding' the wheel of growth and development. However, the opposite happens in presence of sufficiently high number of deserving applicants in the economy. The corruption 'greases' the wheel of the economy. The chapter also shows the

preference towards an honest regime derived through aggregation of private preference and that derived through welfare calculation may differ. If the length of the 'red tape' is shortened through instruments like ICT, the welfare calculation must show social preference tilted towards an honest regime since a shorter red tape reduces the welfare-gain from payment of speed-money in a corrupt regime.

The results explain why introduction of ICT has not been successful in many corrupt economies and in some of them, preference for a corrupt regime has been found. The future extension of this work involves finding out the effect of ability to pay of the stakeholders and the strength of the legal system on the scope of ICT.

Appendix

Proof of Proposition 2:

(i) Comparing w_H and w_C^1 we obtain:

$$w_H - w_C^1 = (1 - \rho)[w_H - \alpha(\gamma\beta - c) + (1 - \alpha)(c - \delta g)]. \quad (\text{A.1})$$

After substituting w_H from (7) in the RHS of (A.1):

$$w_H - w_C^1 = (1 - \rho)[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)]. \quad (\text{A.2})$$

From (A.2) it follows that $w_H - w_C^1 > = < 0$ if and only if $[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > = < 0$.

Notice that since $\{-\gamma\beta(1 - \delta) - (c - \delta g)\} < 0$, $\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\}$ is monotonically declining in $\alpha > \alpha^*$. Also, at $\alpha = 1$, $[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] = -\gamma\beta(1 - \delta) < 0$. On the other hand, as $\alpha \rightarrow \alpha^*$, the sign of $[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)]$ is uncertain.

If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] \leq 0$, for all values of $\alpha > \alpha^*$, $[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$. Therefore, $w_H < w_C^1$. If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$, there exists a value of $\alpha = \hat{\alpha} > \alpha^*$ such that for all values of $\alpha \in (\alpha^*, \hat{\alpha})$, $w_H > w_C^1$.

However, for all values of $\alpha \in (\hat{\alpha}, 1]$, $w_H < w_C^1$. The statement follows. \square

(ii) Comparing w_H and w_C^2 we obtain:

$$w_H - w_C^2 = (1 - \rho)[w_H - \alpha(\gamma\beta - c) + (1 - \alpha)(c - g)]. \quad (\text{A.3})$$

After substituting w_H from (6) in the RHS of (A.3):

$$w_H - w_C^2 = (1 - \rho)[\alpha\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)]. \quad (\text{A.4})$$

From (A.4) it follows that $w_H - w_C^2 \geq 0$ if and only if $[\alpha\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] \geq 0$.

Notice that since $\{-\gamma\beta(1 - \delta) - (c - g)\} < 0$, $\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\}$ is monotonically declining in $\alpha \leq \alpha^*$. Also, at $\alpha = 0$, $[\alpha\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] = (c - g) > 0$.

On the other hand, at $\alpha = \alpha^*$, the sign of $[\alpha\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)]$ is uncertain.

If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] \geq 0$, for all values of $\alpha \leq \alpha^*$, $[\alpha\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] \geq 0$. Therefore, $w_H \geq w_C^2$. If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] < 0$, there exists a value of $\alpha = \tilde{\alpha} < \alpha^*$ such that for all values of $\alpha \in (0, \tilde{\alpha}]$, $w_H \geq w_C^2$.

However, for all values of $\alpha \in (\tilde{\alpha}, \alpha^*]$, $w_H < w_C^2$. The statement follows. \square

Proof of Observation 5: If $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] < 0$, $\tilde{\alpha}$ satisfies:

$$[\tilde{\alpha}\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] = 0. \quad (\text{A.5})$$

From (A.5) it follows:

$$\frac{\partial \tilde{\alpha}}{\partial \delta} = - \frac{\tilde{\alpha}\gamma\beta}{\{-\gamma\beta(1 - \delta) - (c - \delta g)\}} > 0.$$

On the other hand, if $[\alpha^*\{-\gamma\beta(1 - \delta) - (c - \delta g)\} + (c - \delta g)] > 0$, $\hat{\alpha}$ satisfies:

$$[\hat{\alpha}\{-\gamma\beta(1 - \delta) - (c - g)\} + (c - g)] = 0. \quad (\text{A.6})$$

From (A.6) it follows:

$$\frac{\partial \hat{\alpha}}{\partial \delta} = - \frac{g - \hat{\alpha}(\gamma\beta + g)}{\{-\gamma\beta(1 - \delta) - (c - \delta g)\}},$$

which is positive if and only if $\frac{g}{\beta} > \frac{\hat{\alpha}\gamma}{1 - \hat{\alpha}}$.

The statement of the observation follows. \square

Chapter 3

INSTRUMENTS FOR CHANGING ATTITUDE TOWARDS CORRUPTION: ACCELERATING DELIVERY VS. ACCELERATING REDRESSAL

3.1 Introduction

Corruption is thought as one of the major impediments to economic development, especially in developing countries, where it widely exists⁹. For solving the problem of corruption, it is imperative that the honest regime is supported by the stakeholders. The present chapter by using a theoretical model of a bureaucracy that involves delay in public service delivery discusses how such support is generated through institutional design.

In developing countries delay in delivery of public services and payment of ‘speed money’ for avoiding such delay are rampant¹⁰. Typically, the government screens the deserving applicants as recipients of freely available/subsidized public goods/services by help of its officials. The screening takes time and the officials, who are corrupt, offers to be bribed for faster delivery of the good/service circumventing the screening process. The collusive bribery is particularly attractive for the undeserving applicants, who would not receive the good in an honest regime. But, would not a deserving applicant, who receive the good for free in an honest regime at the end of the screening process, prefer an honest regime to corrupt regime? The answer is not obvious because of two reasons. First, the delay associated with the screening process reduces the value of the good to her, which incentivizes her to prefer the corrupt regime. Second, in a corrupt regime, the deserving applicant may expect that even if she does not pay the ‘speed money’ and waits for the screening process to complete, she would be extorted by a corrupt official, who without payment would block the legitimate delivery of the good to her. The first chapter of the thesis showed, facing such a choice, a deserving applicant in certain situations would prefer a corrupt regime to an honest regime. In all other situations, she would prefer an honest regime. However, she pays ‘speed money’ in all situations. Clearly, there are

⁹ See Bardhan (1997); Aidt (2010); Mukherjee et al. (2022).

¹⁰ Myrdal (1968); Rosenn (1971); De Soto (1989); Tanzi (1998); La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999). The delay is more popularly referred as ‘red tape’.

situations, where her choice of action diverges from her regime-preference. The present chapter extends this research, by asking, if a deserving applicant is allowed to approach a redressing authority like a court of justice seeking redressal of the extortionary bribe-demand, which she faces at the end of screening process, would it strengthen her preference for an honest regime? In answering the question, it takes account of the fact that redressal process also involves delays, which is common in developing part of the world¹¹. Therefore, the present chapter compares the effect of two alternative instruments for influencing the deserving applicants' regime preference: (1) accelerating the delivery of the good/service; (2) accelerating the redressal process. The chapter shows, first, that the introduction of the redressal mechanism, under certain situations, would sustain extortion as an equilibrium outcome. This explains how extortion may occur in a system of red tape, apart from the widely discussed the 'speed money' equilibrium. Second, it shows that the equilibrium amount of bribe, be it collusive or extortionary or speed-money in nature, unambiguously falls with faster grievance redress process, but the effect of faster service-delivery process on it is not unambiguous. The present chapter also empirically validates this result by using cross-country data from the World Bank Enterprise Survey and the World Bank Doing Business Report. Third, it shows that a faster service-delivery process serves as a more effective instrument than a faster redressal process for garnering support for an honest regime from the stakeholders in a corrupt system where both bureaucratic delay and judicial delay coexist.

¹¹ Government of India (2016): Tenth Meeting of Advisory Council of the National Mission for Justice Delivery and Legal Reforms elaborately talks about the stages of administrative processes in justice delivery, its qualities and inefficiencies. It discusses that the court cases remain pending due to the 'delay and complexities in service of process' citing examples and discusses ways in which it could be improved like having e-courts and new management system etc. It also discusses the effects of these reforms on pendency of court cases. Economic Survey (2020, Ch. 6, Volume 1) highlights the fact that India takes in average 1445 days as compared to 216 days in New Zealand to resolve disputes. It highlights what The Economic Survey 2018-19 had stressed that the biggest constraint in doing business in India is the malfunctioned legal system that enforces contracts and resolves disputes. Yahagi (2018) shows that corrupt policy makers set less stringent enforcement policies as compared to the socially acceptable level.

The present chapter relates to two different strands of existing literature. The first is on the screening and red tape in provision of publicly provided private goods and the other is on the ‘top down approach’ vs. the ‘bottom up’ approach towards control of corruption. In the screening and red tape literature, this chapter is aligned to ideas of papers like Wilson (1989), Bardhan (1997), Guriev (2004), Bhattacharya and Mukherjee (2020) that red tape of certain length is necessary as screening device and socially optimum¹². Among these papers, Guriev (2004) and Bhattacharya and Mukherjee (2020) present theoretical models, where the beneficiaries pay ‘speed money’ at the equilibrium for avoiding red tape. In Guriev (2004), a corrupt official extends the length of red tape above the social optimum level in order to force an applicant to participate in the ‘speed money’ equilibrium. Since the applicant complies to the threat, extortion does not occur at the equilibrium. Bhattacharya and Mukherjee (2020) finds a qualitatively similar result, but unlike Guriev (2004), it also studies the regime preference of the applicants and finds that even if an applicant, who is deserving, accepts the ‘speed money’ offer, in certain situations she prefers an honest regime over a corrupt regime. Particularly, this happens when the proportion of the deserving applicants is sufficiently high and the length of red tape is sufficiently short. In such a situation, a corrupt official without complete information about the applicants’ types, demands a high bribe from all the applicants as ‘speed money’. Since the length of red tape is short, the deserving applicant, finds her gaining in an honest regime compared to the corrupt regime, when she waits to receive the good for free. However, none of the papers shows the possibility of extortion occurring as an equilibrium outcome in presence of red tape. The present chapter shows that existence of a grievance redressal process against corruption, ironically creates such a possibility, which clearly deceives its original purpose. The redressal process itself takes time. A faster redressal

¹²In papers like Banerjee (1997) and Saha (2001) red tape is an instrument of corruption and its socially optimum length is zero.

reduces extortion bribe and weakens the threat point of an official in the bargaining for determination of the magnitude of ‘speed money’. In this situation a deserving applicant would accept the speed-money offer at such a low bribe-rate, which a corrupt official would refuse to offer. Therefore, a deserving applicant would choose to wait and get extorted. The chapter shows that the low proportion of deserving applicants acts as a sufficient condition for occurrence of an extortion equilibrium. The present chapter also extends the analysis of the first chapter of the thesis (Bhattacharya and Mukherjee, 2020), by studying the relative effect of two alternative instruments of corruption control under red tape, reduction of delivery time vs. reduction of grievance redress time, on the regime preference of the applicants between a corrupt regime and an honest regime. It finds that a faster delivery of the good is more effective in garnering support for an honest regime than a faster disposal of grievances of the applicants about the delivery of the good. A faster redressal process, by reducing the bargaining power of the corrupt official, lowers both the extortion bribe and ‘speed money’ demand and makes a corrupt regime more attractive to a deserving applicant.

The present chapter is also related to the literature on the ‘top down’ approach vs. the ‘bottom up’ approach in control of corruption. While the ‘top down’ approach relies on prize/punishment mechanisms (Becker and Stigler, 1974; Shleifer and Vishny, 1993; Mookherjee and Png, 1995; Basu, 2011; Mishra and Mookherjee, 2013; Basu et al., 2014; Banerjee et al., 2021 etc.), the ‘bottom up’ approach stresses on the use of beneficiaries’ ‘voice’ (World Bank, 2004; Olken, 2007; Serra, 2012; Yanez-Pagans and Machicado, 2012 etc.). World Bank (2004) advocates that for improvement of delivery of public services the beneficiaries should be allotted to monitor service provision and should have a strong voice in policy making. Olken (2007) with a field experiment in 608 Indonesian villages tests the effectiveness of two different kinds of monitoring mechanism in reducing corruption: 1) audits or formal prosecution and punishments (top-down monitoring); 2) grassroots approach of

community participation. The grassroots approach follows two steps: first, invitation of beneficiaries to accountability meetings for a project; and second, giving them voice against corruption, by providing them comment forms, where they could anonymously describe the loopholes in service provision and allocation of funds. It shows that while invitations increased community participation, the comment forms were effective in undertaking serious actions to improve services and reduce corruption. It turned out that a ‘top down’ monitoring approach (higher punishments or audits) was more successful in eradicating corruption than ‘bottom up’ monitoring approach, when the service provided was a public good like roads project in his work. However, Olken (2007) expected that in the case of publicly provided private goods like hospital beds, subsidized food etc. the ‘bottom up’ approach would be more effective than the ‘top down’ approach. Yanez-Pagans and Machicado (2012) through field experiment in Bolivia, shows that providing voice and accountability to the grassroots organizations has a huge impact towards improving service delivery. Serra (2012), based on a lab experiment on bribery model, concludes that providing the citizens voice even in a weak institutional structure i.e. where the probability of detection from formal top down monitoring is low, is an effective method of reducing corruption¹³. The present chapter contributes to this literature by showing that in the case of public provision of private goods the design of the ‘top down’ approach may have an influence on the effectiveness of the ‘bottom up’ approach. It shows that in presence of red tape the voice against corruption is expected to be stronger in presence of a faster delivery of the good rather than in presence of faster redressal of grievances in the delivery of the good.

Let us summarize the contributions of the chapter. First, the chapter shows that in a bureaucracy involving screening and red tape, which delivers a publicly provided private good,

¹³ However, Bardhan (2002) and Gurgur (2016) sounds caution against the vulnerability of the grassroots approach to local elite capture. See also Banerjee et al. (2010) on this.

extortion can occur as an equilibrium in presence of a grievance redressal mechanism against corruption. Particularly it is likely to occur with a low proportion of deserving applicants and a faster redressal process. The result is new in the literature. Second, the chapter shows that a faster delivery of the good is a better mechanism for generating support for an honest regime among the recipients of the good than a faster redressal of grievances. The result is new for both the literatures on screening and red tape and the ‘top down’ vs. ‘bottom up’ approach of controlling corruption, to which the present chapter is related. From the policy perspective, the result is important, as it shows the design of ‘top down’ approach can determine the success of a ‘bottom up’ approach, which asks the recipients to voice their views over corruption. It also highlights the limitation of the faster redressal policy in solving the problem of corruption in presence of screening and red tape.

Section 3.2 below presents the model. Section 3.3 analyzes the bribe offers under incomplete information. Section 3.4 validates the model by testing its bribe-prediction using cross-country data from the World Bank Enterprise Survey and the World Bank Doing Business Report. Section 3.5 uses the model to derive the attitudes of the two types of applicants towards corruption in order to derive the main result. The section following concludes.

3.2 The Model

We consider a government that distributes a license for free. There are two types of applicants: deserving and undeserving. The government wish to distribute the good only to the deserving applicants. However, the type of the applicant applying for the good is private information to her. It is common knowledge that α proportion of the applicants is deserving and $(1 - \alpha)$ proportion is undeserving. So, the government appoints bureaucrats for verification of credentials and delivery of the good in a two-period administrative process. In

period 1 the submission of credentials takes place, which we assume as done immediately. After submission screening starts for identification of types and the delivery takes place in period 2 after the identification is complete. The delay in delivery process discounts the payoff at $\delta \in (0,1)$. We assume, $\delta = 1 - \mu$.

The bureaucracy consists of both honest and corrupt officials. It is common knowledge that among the officials ρ proportion is honest and $(1 - \rho)$ proportion is corrupt. The bureaucracy is monopoly in the sense that an applicant is randomly matched with a single official in both the stages: for verification and for delivery¹⁴. An honest official distributes the license only to a deserving applicant. A corrupt official, unlike the honest official, delivers the license even to an undeserving applicant in exchange of bribe. A corrupt official may also accept speed-money for delivery of the good in period 1 itself by bypassing the two-period screening process. The speeding up costs $\sigma > 0$ to the corrupt official. We assume, σ is small¹⁵.

There is an authority that addresses the applicants' grievance related to bribery. The cost of appealing to the authority is $a > 0$, which is small. The appeal can be submitted only after period 2. While an undeserving applicant, as she receives the good only through collusion, never goes to the authority; a deserving applicant, who is extorted on demand of bribe, may or may not go. On appeal, a deserving applicant is expected to receive justice with probability $q \in (0, 1)$. The compensation she receives is $(z + a) > 0$. However, in period 3, it is common knowledge that the redressal process takes a time of $\mu_1 \in (0, 1)$. The delay in redressal discounts the payoffs at $\delta_1 \in (0,1)$. We assume, $\delta_1 = 1 - \mu_1$.

¹⁴ Having the option to reapply to another official is the same as introducing competition in bureaucracy. Moreover, re-applying in the second period would further delay the screening process and delivery of the good. It is the same as applying in the next period as in Ahlin and Bose (2007).

¹⁵ The σ accounts for the cost of punishment, if detection takes place, as well as the effort cost of the official. However, 'speed-money' being a Pareto-improving side contract between the parties is likely to be reported and punished with a very low probability.

Let us describe the bribery game below. The nature (N) first decides an official to be honest (H) with probability ρ and an official to be corrupt (C) with probability $(1 - \rho)$. With either of the officials it assigns a deserving applicant (D) at probability α and an undeserving applicant (UD) at probability $(1 - \alpha)$. If a deserving applicant faces an honest official, which happens with probability $\rho\alpha$, she receives the license for free at the end of period 2 and enjoys a payoff of $\delta\beta$. If an undeserving applicant faces an honest official, which happens with probability $\rho(1 - \alpha)$, she does not receive the license and therefore, has a payoff of 0. Unlike the honest official, the corrupt official looks for bribe for delivery of the license. However, since the type of the applicant is private information only to the applicant in period 1, he does not have information about which specific type of applicant he has met. The applicant may be deserving with probability α or undeserving with probability $(1 - \alpha)$. Therefore, he offers bribe $b_1 > 0$ to the applicant he meets at period 1 independent of her type. An applicant may either accept or reject the bribe offer. If the deserving applicant accepts the bribe offer, she receives a payoff of $(\beta - b_1)$ while the official receives $(b_1 - \sigma)$ and the game ends. Similarly, if the undeserving applicant accepts the bribe offer, she receives a payoff of $(g - b_1)$ while the official receives $(b_1 - \sigma)$ and the game ends. The period 1 bribe is paid as ‘speed-money’ and collusive in nature, since both the parties benefit from it. The game progresses to period 2 if either type of applicants, rejects the period 1 bribe offer. At period 2, the screening technology reveals the type of the applicant. Now the corrupt official, if decides to charge bribe to the applicants for delivery of the license, charges $b_2^D > 0$ from the deserving applicant and $b_2^{UD} > 0$ from the underserving applicant. Here also, either type of applicant may accept or reject the period 2 bribe offer. Independent of whether she accepts or rejects the bribe offer the deserving applicant can go to the redressal authority seeking justice against extortion by the corrupt official. Since with the undeserving applicants the period 2 bribe, like the period 1 bribe, is also collusive in nature, she never goes to the redressal authority.

Assumption 1: The officials and the applicants, independent of their type, discount their future payoffs at the same rate.

Notice that *the higher is the length of time which is required in an honest system between submission of credentials in period 1 and delivery of the license in period 2, the lower is the value of δ . Similarly, the higher is the time taken in the redressal process, lower is the value of δ_1 .*

Assumption 2: The outside option is zero both for the applicants and the officials.

The bribe amounts are endogenously determined in the model. Assumption 2 fixes the disagreement payoffs for both the applicants and the officials in the bribe negotiation process.

Figure 3.1 below describes the extensive form of the bribery game with the associated payoffs of the players.

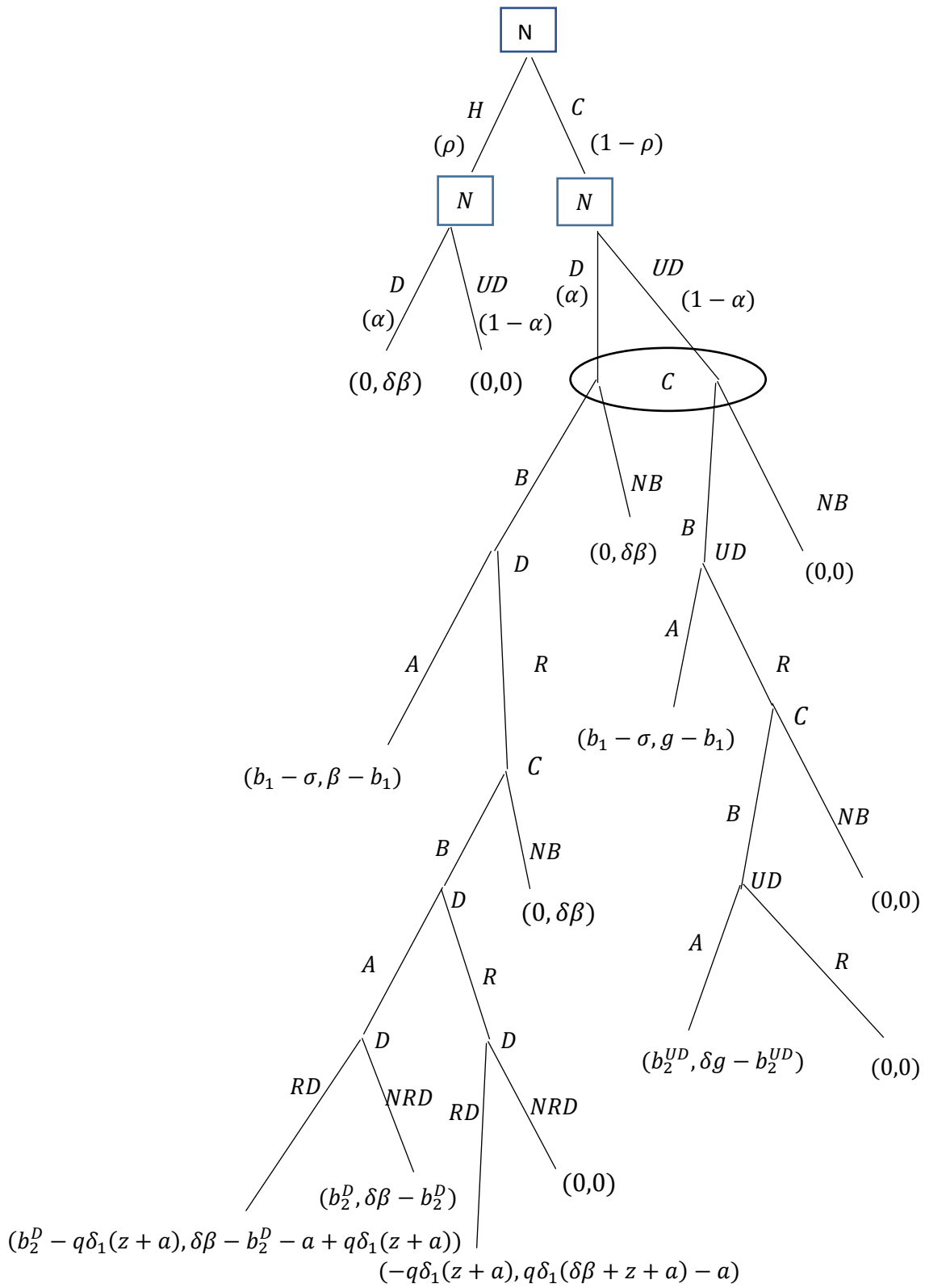


Figure 3. 1: The Representation of Bribery Game

Now we solve the game in backward induction. There are two types of subgames involving the corrupt officials: one involving the deserving applicants; the other involving the undeserving applicants. We start with the subgames involving the deserving applicants.

The subgames involving deserving applicants

Let us start with the subgame that starts after following the path $\{C, D, B, R, B, A\}$, when the deserving applicant accepts the period 2 bribe offer by the corrupt official and decides whether to go to the redressing authority (RD) or not to go the redressing authority (NRD).

Since at this path the deserving applicant has already accepted the bribe offer of b_2^D and received the good at the end of period 2 enjoying a value of $\delta\beta$, if she chooses RD , her payoff is: $\delta\beta - b_2^D - a + q\delta_1(z + a)$.

On the other hand, if she chooses NRD her payoff is: $\delta\beta - b_2^D$.

Comparing the payoffs, she decides to choose RD if and only if:

$$\delta_1 \geq \frac{a}{q(z+a)} = \bar{\delta}_1. \dots\dots\dots (1)$$

If $\delta_1 < \bar{\delta}_1$, the deserving applicant decides not to go the redressing authority (NRD) after accepting the period 2 bribe offer.

Now consider the decision of the deserving applicant at the subgame that starts after following the path $\{C, D, B, R, B, R\}$, when the deserving applicant rejects the period 2 bribe offer by the corrupt official and decides whether to go to the redressing authority (RD) or not to go to the redressing authority (NRD).

Since at this path the deserving applicant has rejected the bribe offer of b_2^D and has not received the license, if she chooses RD , her payoff is: $q\delta_1(\delta\beta + z + a) - a$.

On the other hand, if she chooses NRD her payoff is: 0.

Comparing the payoffs, she decides to choose *RD* if and only if:

$$\delta_1 \geq \frac{a}{q(\delta\beta+z+a)} = \tilde{\delta}_1. \dots\dots\dots (2)$$

If $\delta_1 < \tilde{\delta}_1$, the deserving applicant decides not to go the redressing authority (*NRD*) after rejecting the period 2 bribe offer.

Notice from comparison of RHS of the inequalities in (1) and (2), $\tilde{\delta}_1 < \bar{\delta}_1$, which in turn implies $\bar{\mu}_1 < \tilde{\mu}_1$.

Now, we go one step backward and analyze the decision of the deserving applicant at the subgame that starts following $\{C, D, B, R, B\}$ when she decides whether to accept (A) or reject (R) the period 2 bribe offer.

Case 1: $\delta_1 \geq \bar{\delta}_1$ or $\mu_1 \leq \bar{\mu}_1$.

In this case, independent of whether she accepts or rejects the period 2 bribe offer, the deserving applicant always goes to the redressing authority against the extortion she faces.

Her payoff, if she accepts the period 2 bribe offer is: $\delta\beta - b_2^D - a + q\delta_1(z + a)$.

Her payoff, if she rejects the period 2 bribe offer is: $q\delta_1(\delta\beta + z + a) - a$.

Therefore, she accepts the period 2 bribe offer if

$$b_2^D \leq \delta\beta(1 - q\delta_1). \dots\dots\dots (3)$$

Then, the corrupt official receives a payoff of: $b_2^D - q\delta_1(z + a)$.

If condition (3) is violated, the deserving applicant rejects the period 2 bribe offer, then the corrupt official receives: $-q\delta_1(z + a)$.

Since $b_2^D - q\delta_1(z + a) > -q\delta_1(z + a)$ for all $b_2^D > 0$, in this case, the corrupt official would like the deserving applicant to accept the period 2 bribe offer.

Case 2: $\tilde{\delta}_1 \leq \delta_1 < \bar{\delta}_1$ or $\bar{\mu}_1 < \mu_1 \leq \tilde{\mu}_1$.

In this case, if the deserving applicant accepts the period 2 bribe offer, she decides not to go the redressing authority. If she rejects it, she goes to the redressing authority.

Her payoff, if she accepts the period 2 bribe offer is: $\delta\beta - b_2^D$.

Her expected payoff, if she rejects the period 2 bribe offer is: $q\delta_1(\delta\beta + z + a) - a$.

Therefore, she accepts the period 2 bribe offer if

$$b_2^D \leq \delta\beta - q\delta_1(\delta\beta + z + a) + a. \quad \dots\dots\dots (4)$$

Then, the corrupt official receives a payoff of: b_2^D .

If condition (4) is violated, the deserving applicant rejects the period 2 bribe offer, then the corrupt official receives: $-q\delta_1(z + a)$.

Since $b_2^D > -q\delta_1(z + a)$ for all $b_2^D > 0$, in this case also, the corrupt official would like the deserving applicant to accept the period 2 bribe offer.

Case 3: $\delta_1 < \tilde{\delta}_1$ or $\mu_1 > \tilde{\mu}_1$.

In this case, independent of whether she accepts or rejects the period 2 bribe offer, the deserving applicant never goes to the redressing authority against the extortion-demand she faces at the end of period 2.

Her payoff, if she accepts the period 2 bribe offer is: $\delta\beta - b_2^D$.

Her payoff, if she rejects the period 2 bribe offer is: 0.

Therefore, she accepts the period 2 bribe offer if

$$b_2^D \leq \delta\beta. \quad \dots\dots\dots (5)$$

Then, the corrupt official receives a payoff of: b_2^D .

If condition (5) is violated, the deserving applicant rejects the period 2 bribe offer, then the corrupt official receives: 0.

So, in this case also, the corrupt official would like the deserving applicant to accept the period 2 bribe offer.

Now we move one step backward to the decision of the corrupt official at the subgame that starts after following the path $\{C, D, B, R\}$ where he decides whether to ask for period 2 bribe. He also decides about the amount of bribe to charge.

The analysis so far suggests that in all the cases discussed above, independent of the time taken in the redressal process, if the corrupt official decides to offer bribe, he would choose the period 2 extortion-bribe in such a way that the deserving applicant accepts the bribe offer.

If the corrupt official does not ask for bribe in period 2, he gets 0 for sure. But, if he asks for bribe, he is likely to receive a positive payoff. Therefore, he always asks for a bribe.

If $\mu_1 \leq \bar{\mu}_1$, case 1 occurs. The corrupt official maximizes his payoff by demanding b_2^D that satisfies condition (3) with equality. Therefore,

$$b_2^D = \delta\beta(1 - q\delta_1). \dots\dots\dots (6)$$

By similar logic, if $\bar{\mu}_1 < \mu_1 \leq \tilde{\mu}_1$, from condition (4),

$$b_2^D = \delta\beta - q\delta_1(\delta\beta + z + a) + a; \dots\dots\dots (7)$$

and if $\mu_1 > \tilde{\mu}_1$, from condition (5),

$$b_2^D = \delta\beta. \dots\dots\dots (8)$$

Observation 1: Given the length of the delivery procedure (μ),

(i) if $\mu_1 \leq \bar{\mu}_1$, the extortion bribe $b_2^D = \delta\beta(1 - q\delta_1)$ rises with the length of the redressal procedure at the rate of $\delta\beta q$; the maximum bribe is $\frac{\delta\beta z}{z+a}$.

(ii) if $\bar{\mu}_1 < \mu_1 \leq \tilde{\mu}_1$, the extortion bribe $b_2^D = \delta\beta - q\delta_1(\delta\beta + z + a) + a$ rises with the length of the redressal procedure at the rate of $q(\delta\beta + z + a)$; the maximum bribe is $\delta\beta$.

(iii) if $\mu_1 > \tilde{\mu}_1$, the extortion bribe remains constant at $\delta\beta$.

Proof: Since $\delta = 1 - \mu$ and $\delta_1 = 1 - \mu_1$, follows from equation (6), (7), (8) by use of definitions of $\bar{\delta}_1$ and $\tilde{\delta}_1$ from equations (1) and (2) respectively. \square

The observation 1 is summarized in Figure 3.2 below:

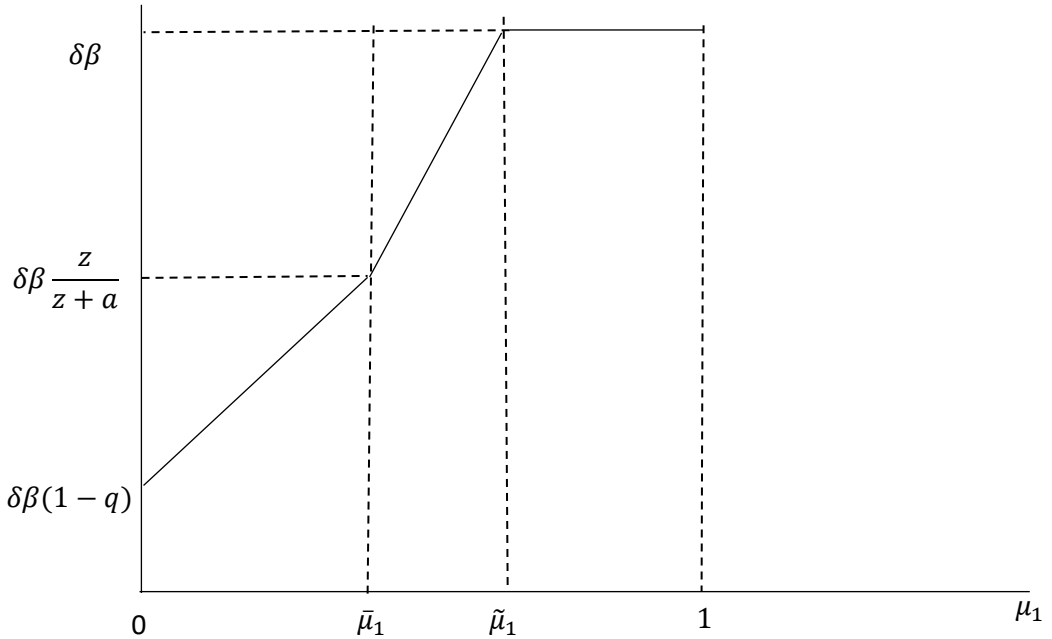


Figure 3. 2: Extortion bribe at different lengths of the redressal procedure

The extortion bribe rate rises with the rising delay in redressal procedure. It is the maximum when the time required for redressal procedure is close to 1. It is the minimum when length of the redressal procedure is close to zero.

If the deserving applicant accepts the period 1 bribe offer at the subgame that starts after following the path $\{C, D, B\}$, she receives the payoff $(\beta - b_1)$. But if she rejects it, her payoff depends on the length of the redressal procedure that determines the period 2 bribe offer.

If $\mu_1 \leq \bar{\mu}_1$, substituting for b_2^D from equation (6) her payoff on rejection of period 1 bribe-offer is calculated as:

$$u_2^D = q\delta_1(\delta\beta + z + a) - a. \quad \dots\dots\dots (9)$$

If $\bar{\mu}_1 < \mu_1 \leq \tilde{\mu}_1$, substituting for b_2^D from equation (7) her payoff on rejection is calculated as:

$$u_2^D = q\delta_1(\delta\beta + z + a) - a,$$

which is exactly the same as her payoff on rejection of period 1 bribe-offer in the previous case given in equation (9).

If $\mu_1 > \tilde{\mu}_1$, substituting for b_2^D from equation (8) her payoff on rejection is calculated as:

$$u_2^D = 0. \quad \dots\dots\dots (10)$$

The deserving applicant accepts the period 1 bribe offer if and only if:

$$\beta - b_1 \geq u_2^D.$$

If $\mu_1 \leq \tilde{\mu}_1$, substituting the value of u_2^D from equation (9), the condition above can equivalently be written as:

$$\beta - q\delta_1(\delta\beta + z + a) + a \geq b_1. \quad \dots\dots\dots (11)$$

If $\mu_1 > \tilde{\mu}_1$, similarly substituting the value of u_2^D from equation (10), the condition under which the deserving applicant accepts period 1 bribe offer can be written as:

$$\beta \geq b_1. \quad \dots\dots\dots (12)$$

The corrupt official offers the bribe in period 1 if and only if $b_1 \geq \sigma$.

Had the corrupt official been able to identify the type of the applicant, if $\mu_1 \leq \tilde{\mu}_1$, it follows from (11) that he would charge $b_1^D = \beta - q\delta_1(\delta\beta + z + a) + a$ from the deserving applicant; if $\mu_1 > \tilde{\mu}_1$, it follows from (12) that he would charge, $b_1^D = \beta$.

Therefore, if $\mu_1 \leq \tilde{\mu}_1$, the period 1 bribery involving speed-money takes place if $\beta - \sigma \geq q\delta_1(\delta\beta + z + a) - a$. Similarly, if $\mu_1 > \tilde{\mu}_1$, the period 1 bribery takes place if $\beta - \sigma \geq 0$.

Notice that a longer redressal process allows the corrupt official to charge a larger ‘speed-money’ in period 1 delivery process under a weaker condition.

In such a situation, the deserving applicant’s payoff as she accepts the period 1 bribe offer is:

$$\begin{aligned}
 u_1^D &= q\delta_1(\delta\beta + z + a) - a > 0 && \text{if } \mu_1 \leq \tilde{\mu}_1; \\
 &= 0, && \text{if } \mu_1 > \tilde{\mu}_1. \quad \dots\dots\dots (13)
 \end{aligned}$$

But, in period 1, the corrupt official does not have complete information about the type of the applicant. The bribe offer in the incomplete information situation will be discussed in a separate section below.

Now let us analyze the subgames involving the undeserving applicants. The analysis would follow the same backward induction technique that we have used to analyze the subgames involving the deserving applicants in this section.

The subgames involving undeserving applicants

As mentioned earlier, an undeserving applicant never goes to the higher authority seeking redressal since she is not entitled to receive the good at the first place and has participated in collusive bribery. Hence seeking redressal from higher authority would not help her. Therefore, we start with the undeserving applicant’s decision at the subgame that starts following

$\{C, UD, B, R, B\}$ when she decides whether to accept (A) or reject (R) the period 2 bribe offer.

Since by rejecting the bribe offer, she can always ensure a zero payoff for her, she accepts the bribe offer if and only if

$$\delta g - b_2^{UD} \geq 0. \quad \dots\dots\dots (14)$$

In that case, the corrupt official receives a payoff of $b_2^{UD} \geq 0$.

If condition (14) is violated, the undeserving applicant rejects the period 2 bribe offer, then the corrupt official receives 0.

Therefore, the corrupt official would like the undeserving applicant to accept the period 2 bribe offer.

Now we move one step backward at the decision of the corrupt official at the subgame that starts after following the path $\{C, UD, B, R\}$ where he decides whether to ask for period 2 bribe or not. Here, he decides about the bribe amount as well.

From the above analysis it is known that if the corrupt official decides to offer bribe, he will choose b_2^{UD} in such a way that the undeserving applicant accepts it i.e. condition (14) is satisfied with equality. Therefore, $b_2^{UD} = \delta g$.

If the corrupt official does not ask for bribe in period 2, he gets 0 for sure. But, if he asks for bribe, he receives $\delta g > 0$. Therefore, he always asks for a bribe that gets immediately accepted by the applicant, who receives $u_2^{UD} = \delta g - \delta g = 0$.

Therefore, at the subgame that starts after following the path $\{C, UD, B\}$, if the underserving applicant rejects the period 1 bribe offer by the corrupt official, she receives zero. If she accepts the period 1 bribe offer as speed-money, she receives $(g - b_1)$. She accepts the offer if and only if $g \geq b_1$. The corrupt official offers the bribe if and only if $b_1 \geq \sigma$.

As mentioned earlier, the corrupt official cannot associate an applicant with her type in period 1. Had the corrupt official been able to identify an applicant as of underserving type, he would charge, $b_1^{UD} = g$ to her. In that case the undeserving applicant would end up with a payoff of $u_1^{UD} = 0$.

3.3 The bribe offers under incomplete information

Since the corrupt official cannot identify the applicant's type in period 1, the official makes the same bribe-offer to both the types. The applicants, according to their type, decide whether to accept or reject the bribe-offer.

The official has the following options:

- (i) if $\mu_1 > \tilde{\mu}_1$, he can either offer $b_1 = \beta$ or $b_1 = g$;
- (ii) if $\mu_1 \leq \tilde{\mu}_1$, he can either offer $b_1 = \beta - q\delta_1(\delta\beta + z + a) + a$ or $b_1 = g$.

In each case, the corrupt official chooses the option that maximizes his expected payoff. We analyze the cases separately below.

Case 1: $\mu_1 > \tilde{\mu}_1$.

In this case the corrupt official either offers $b_1 = \beta$ or $b_1 = g$ to both the types of applicants.

Since $\beta > g$, an offer of $b_1 = \beta = b_1^D$ excludes participation of the undeserving applicants in period 1 bribery. The undeserving applicant would reject the period 1 bribe offer and would pay $b_2^{UD} = \delta g$ at period 2. Given that α proportion of applicants are deserving, the expected payoff of corrupt official from this bribe-offer is:

$$\pi_1^{EUD} = \alpha(\beta - \sigma) + (1 - \alpha)\delta^2 g. \dots\dots\dots (15)$$

On the other hand, an offer of $b_1 = g$, is accepted independent of type of the applicants. A pooling occurs. Therefore, the expected payoff of the corrupt official from this offer is:

$$\pi_1^P = \alpha(g - \sigma) + (1 - \alpha)(g - \sigma) = g - \sigma. \quad \dots\dots\dots (16)$$

From equations (15) and (16),

$$\pi_1^{EUD} - \pi_1^P = \alpha[\beta - \sigma - \delta^2 g] + \delta^2 g - g + \sigma.$$

Clearly, $\pi_1^{EUD} - \pi_1^P \geq 0$ if and only if $\alpha \geq \alpha^*$ where $\alpha^* = \frac{g - (\sigma + \delta^2 g)}{\beta - (\sigma + \delta^2 g)}$. An offer that excludes the participation of the undeserving applicants in payment of speed-money, is given, if the proportion of deserving applicants is above the threshold α^* . Otherwise, the pooling offer is given where applicants pay speed-money independent of their type. If $\alpha < \alpha^*$, the bribe is lower and all the applicants, independent of their own type, pay speed-money.

Case 2: $\mu_1 \leq \tilde{\mu}_1$.

If $\beta - g \geq q(\delta\beta + z + a)$, since $\beta - q\delta_1(\delta\beta + z + a) \geq g$ and $\delta_1 \in (0,1)$, it must always be that an offer of $b_1 = \beta - q\delta_1(\delta\beta + z + a) + a$ exceeds g for all values of $\mu_1 \leq \tilde{\mu}_1$. Therefore, like the previous case, here also the offer of $b_1 = \beta - q\delta_1(\delta\beta + z + a) + a$ excludes participation of the undeserving applicants in period 1 bribery. The undeserving applicant would reject the period 1 bribe offer and would pay the bribe at period 2. Given that α proportion of applicants are deserving, the expected payoff of corrupt official from this offer is:

$$\pi_2^{EUD} = \alpha(\beta - q\delta_1(\delta\beta + z + a) + a - \sigma) + (1 - \alpha)\delta^2 g. \quad \dots\dots\dots (17)$$

On the other hand, an offer of $b_1 = g$ is accepted independent of type of the applicants. A pooling occurs and the expected payoff of the corrupt official from this offer is π_1^P as in (16).

Now, $\pi_2^{EUD} - \pi_1^P \geq 0$ if and only if $\alpha \geq \hat{\alpha}$ where $\hat{\alpha} = \frac{g - (\sigma + \delta^2 g)}{\beta - q\delta_1(\delta\beta + z + a) + a - (\sigma + \delta^2 g)}$. An offer that excludes the undeserving applicants from speed-money is given if the proportion of deserving applicants is above the threshold $\hat{\alpha}$. Otherwise, the pooling offer is given. Notice that $\hat{\alpha} > \alpha^*$.

As the redressal procedure becomes faster compared to case 1, the exclusionary offer is given only under stricter conditions. Not only a higher threshold of α needs to be satisfied, it also requires $\beta - g \geq q(\delta\beta + z + a)$ i.e. a deserving applicant's payoff from the license needs to be substantially higher than that of an undeserving applicant. If $\alpha < \alpha^*$, the bribe is lower and all the applicants, independent of their own type, pay speed-money.

If $\beta - g < q(\delta\beta + z + a)$, since $[\beta - q\delta_1(\delta\beta + z + a) + a]$ is monotonically rising in $\mu_1 (= 1 - \delta_1)$, there exists a value of $\mu_1 = \hat{\mu}_1 = 1 - \frac{\beta - g}{q(\delta\beta + z + a) - a} \in (0, \tilde{\mu}_1)$ such that $\beta - q\delta_1(\beta + z + a) + a = g$; for all values of $\mu_1 < \hat{\mu}_1$, $g > \beta - q\delta_1(\delta\beta + z + a) + a$ and for all values of $\mu_1 > \hat{\mu}_1$, $g < \beta - q\delta_1(\delta\beta + z + a) + a$.

Suppose $\mu_1 < \hat{\mu}_1$. Since $g > \beta - q\delta_1(\delta\beta + z + a) + a$, it must always be that an offer of $b_1 = \beta - q\delta_1(\delta\beta + z + a) + a$ is accepted by the applicants irrespective of their type. A pooling occurs. Therefore, the expected payoff of the corrupt official from this offer is:

$$\pi_2^P = \beta - q\delta_1(\delta\beta + z + a) + a - \sigma. \quad \dots\dots\dots (18)$$

On the other hand, if $b_1 = g$ is offered, it will not be accepted by a deserving applicant as it is above her willingness to pay for period 1 bribe. She waits and pays the period 2 bribe b_2^D . Only the undeserving applicants would accept the offer. So, such an offer would exclude the deserving applicants. The expected payoff of the corrupt official from this offer is:

$$\pi_2^{ED} = \alpha\delta b_2^D + (1 - \alpha)(g - \sigma). \quad \dots\dots\dots (19)$$

It follows from observation 1 that if $\hat{\mu}_1 \leq \bar{\mu}_1$, for all values of $\mu_1 \leq \bar{\mu}_1$, $b_2^D = \delta\beta(1 - q\delta_1)$. However, if $\hat{\mu}_1 > \bar{\mu}_1$, then for all values of $\mu_1 \in (\bar{\mu}_1, \hat{\mu}_1)$, $b_2^D = \delta\beta - q\delta_1(\delta\beta + z + a) + a$. It is clear from Figure 3.2 that, given μ , since b_2^D rises in μ_1 , π_2^{ED} also rises in μ_1 , the length of the redressal procedure.

If $\hat{\mu}_1 \leq \bar{\mu}_1$, since $g > \beta - q\delta_1(\delta\beta + z + a) + a$, $\pi_2^P - \pi_2^{ED} = [(\beta - g) - q\delta_1(\delta\beta + z + a) + a] - \alpha(\delta^2\beta(1 - q\delta_1) - (g - \sigma)) < 0$ for small values of σ . Therefore, the offer $b_1 = \beta - q\delta_1(\delta\beta + z + a) + a$ is never made that would pool both types of applicants in period 1. The period 1 bribe $b_1 = g$ is offered that excludes the deserving applicants from payment of speed-money, independent of their proportion in the applicants.

If $\hat{\mu}_1 > \bar{\mu}_1$, , since for all $\mu_1 \leq \bar{\mu}_1$, $b_2^D = \delta\beta - q\delta_1(\delta\beta + z + a) + a$, by similar argument above, $\pi_2^P - \pi_2^{ED} < 0$ and $b_1 = g$ is offered by the corrupt official that excludes the deserving applicants from payment of speed-money. Only the undeserving applicants pays the speed-money. Also, if $\mu_1 \in (\bar{\mu}_1, \hat{\mu}_1)$, the same result holds.

We summarize the results from the above analysis in Observation 2 below.

Observation 2: (i) If $\mu_1 > \tilde{\mu}_1$, a corrupt official offers β as speed-money if and only if $\alpha \geq \alpha^*$ where $\alpha^* = \frac{g - (\sigma + \delta^2 g)}{\beta - (\sigma + \delta^2 g)}$, which only a deserving applicant accepts; he offers g as speed-money otherwise, which both types of applicant accepts.

(ii) if $\mu_1 \leq \tilde{\mu}_1$ and $\beta - g \geq q(\delta\beta + z + a)$, the corrupt official offers $(\beta - q\delta_1(\delta\beta + z + a) + a)$ as speed-money if and only if $\alpha \geq \hat{\alpha}$ where $\hat{\alpha} = \frac{g - (\sigma + \delta^2 g)}{\beta - q\delta_1(\delta\beta + z + a) + a - (\sigma + \delta^2 g)} > \alpha^*$, which only a deserving applicant accepts; he offers g as speed-money otherwise, which both types of applicant accepts.

(iii) if $\mu_1 \leq \tilde{\mu}_1$ and $\beta - g < q(\delta\beta + z + a)$, he offers g as speed-money independent of a , which only an undeserving applicant accepts; a deserving applicant waits and pays the extortion bribe instead of paying speed-money and goes to authority for redressal.

Proof: Follows from the discussion above. □

If the redressal process is delayed over the threshold value of $\tilde{\mu}_1$, and if the official knows that the proportion of deserving applicants is above certain threshold α^* , he offers β as period 1 bribe, which he would have charged, had he known the applicant as deserving type. Otherwise, he charges g as period 1 bribe, which he would have charged, had he known the applicant as undeserving type. If the delay is below the threshold value of $\tilde{\mu}_1$, and $\beta - g \geq q(\delta\beta + z + a)$, the same principle is followed. Since the extortion bribe falls with faster redressal process, the deserving applicant's bargaining power in speed-money negotiation rises. Therefore, the period 1 bribe rate falls if the proportion of deserving applicants is above certain threshold, when the threshold itself rises above the level of the previous case. However, if the delay is below the threshold value of $\tilde{\mu}_1$, and $\beta - g < q(\delta\beta + z + a)$, the extortion bribe a corrupt official can charge to a deserving applicant falls below g . In such a situation, g is offered as speed-money which the deserving applicant does not accept. She waits and participates in the period 2 bribery.

Before deriving the attitude of the applicants towards an honest regime vis-à-vis a corrupt regime let us empirically validate the model from its prediction about the amount of bribe to be paid under alternative institutional regimes. The predictions are summarized in the table below:

Table 3. 1: Equilibrium bribe paid at different institutional set up

Length of redressal process	Magnitude of $(\beta - g)$	'Speed money' paid by the deserving applicants	Extortion bribe paid by the deserving applicants	'Speed money' paid by the undeserving applicants	Collusion bribe paid by the undeserving applicants
$\mu_1 > \tilde{\mu}_1$	-	β if $\alpha \geq \alpha^*$ g if $\alpha < \alpha^*$	-	g if $\alpha < \alpha^*$	δg if $\alpha \geq \alpha^*$
$\mu_1 \leq \tilde{\mu}_1$	$\beta - g$ $\geq q(\delta\beta + z + a)$	β $- q\delta_1(\delta\beta + z + a) + a$ if $\alpha \geq \hat{\alpha}$ g if $\alpha < \hat{\alpha}$	-	g if $\alpha < \hat{\alpha}$	δg if $\alpha \geq \hat{\alpha}$
$\bar{\mu}_1 < \mu_1 \leq \tilde{\mu}_1$	$\beta - g$ $< q(\delta\beta + z + a)$	-	$\delta\beta$ $- q\delta_1(\delta\beta + z + a) + a$	g	-
$\mu_1 \leq \bar{\mu}_1$	$\beta - g$ $< q(\delta\beta + z + a)$	-	$\delta\beta(1 - q\delta_1)$	g	-

Source: Author's Computation.

From Table 3.1 it must be clear that a definite prediction of the model is: both for the speed-money and the extortion cases the amount of bribe paid by the deserving applicants falls with a faster redressal process. The bribe paid by the undeserving applicants does not respond to the length of the redressal process. The length of the delivery process has ambiguous effect on the equilibrium amount of bribe. A faster delivery process (a lower μ and a higher δ) while increases the amount of collusive bribe paid by the undeserving applicants, keeps the amount of speed-money paid by them unchanged. For deserving applicants, the faster delivery process in presence of moderate delay in redressal and a sufficiently large gap between the payoffs of the deserving and underserving applicants reduces the amount paid in speed-money. But it increases the extortion-bribe paid by them.

3.4 Empirical validation of the model

We use the World Bank Enterprise Survey data (WBES), 2006-2020 to validate the theoretical model presented above. The WBES is a cross-country dataset that asks an enterprise in a country about the approximate amount of informal payments as a percentage of their total annual sales a similar enterprise pays as gifts for ‘getting things done’ in regulations, licenses, taxes, customs, services, etc. It contains data collected from 171,352 firms located in 297 countries around the World. However, it distinguishes neither between speed-money, collusive and extortion bribe, nor between the deserving and undeserving applicants as we do in the model. So, after controlling for other factors like firm, industry and country specific characteristics we expect the data to show that the reported bribe payment has a negative relation with the length of the redressal process in a country as predicted by the model. Since the WBES does not provide data on the average length of redressal process of a country, we use the cross-country score given in World Bank Doing Business data (2020 Corrected Historical Data) in the legal disputes, counted from the moment plaintiff decides to file the lawsuit in court until enforcement. A higher score implies faster redress of a dispute in a country. We considered country-level scores at one year lag to fully capture the effect of the redressal process of a country on firms’ experiences. The regression we run is the following:

$$\begin{aligned} \text{Bribe Amount}_{ijk} & \\ &= \beta_0 + \beta_1(\text{Fast Grievance Redress}) + \text{Controls} \\ &+ \text{Country Fixed Effects} + \text{Industry fixed Effects} + \varepsilon_{ijk} \end{aligned}$$

where, i = i -th firm, j = j -th country and k = k -th industry, ε_{ijk} denotes the error term. In the analysis, we consider a country_year pair as an individual country¹⁶. This takes care of the

¹⁶ Example, Afghanistan_2008 as country 1 and Afghanistan_2014 as country 2. See Appendix A for country details.

changes in factors affecting the country_year pair over time. In the regression we expect β_1 to be negative.

Since the length of delivery process also plays an important role in determination of bribe, in the regression we also include its *de jure* value as a control. The *de jure* values are calculated from the WBES data itself in the following way. Apart from asking the enterprises the question that whether the similar enterprises paid bribe and by how much, the WBES also collects the data on the time in a week spent by the senior manager of the enterprise in ‘getting things done’ and whether the enterprise considers corruption as an obstacle in doing business. Depending on their responses, we divide the enterprises into four types:

Type I: the enterprises that report not paying bribe and do not consider corruption as an obstacle in doing business;

Type II: the enterprises that report not paying bribe and consider corruption is an obstacle in doing business;

Type III: the enterprises that report paying bribe and do not consider corruption as an obstacle in doing business;

Type IV: the enterprises that report paying bribe and consider corruption is an obstacle in doing business.

From the response of these firms, it is not difficult to imagine that Type I enterprises did not face any bribe demand from the officials. Therefore, we can interpret the *de facto* time spent by the senior managers of these enterprises also as the *de jure* time required in service delivery, which is institutionally given and not related to bribery. We have checked that this data has very little variation within a particular industry in a particular country, which confirms our apprehension. Since the regression focuses on determinants of the amount of bribe paid by the firms, we include the data for only type II, III and IV enterprises in our analysis.

We run simple OLS regression. All the regressions consider robust standard errors and clustered at the country times industry cluster. The results are controlled for country, industry and other firm specific factors which could influence the bribe amount offered. The firm specific controls include dummy for the sector of the firm- Manufacturing sector (reference group) or the Service sector; for size of the firm - small firms (reference group), medium firms and large firms; for ownership - domestic (reference group) or foreign; for export status- non-exporter (reference group) or the exporter; and natural logarithm of (manager experience+1)¹⁷. Country dummies for each country_year pair excluding one (257 dummies out of 258 countries) and industry dummies for 27 industries (out of 28 industries) are included. The definitions and source of the control variables and their descriptive statistics are provided in Table A.1 and A.2 respectively in the appendix. The country details and the industry details are available as supplementary data. The regression results are reported in Table 3.2 below.

¹⁷ Since managers could have zero years of experience. See Appendix Table A.2 for more information.

Table 3. 2: Regression Results

	Bribe amount (1)	Bribe amount (2)
Fast grievance redress	-3.63** (1.74)	-3.50** (1.74)
Long service delivery		4.36*** (1.57)
Constant	7.57*** (0.85)	7.36*** (0.85)
Other Controls	Yes	Yes
Industry Dummies	Yes	Yes
Country Dummies	Yes	Yes
R-squared	0.19	0.19
Number of observations	15355	15355

Note: Standard errors are in parentheses. All standard errors are robust and clustered at the country times industry level. All standard errors have adjusted for different country_industry clusters. Significance is indicated by ***, ** and * at 1%, 5% and 10% respectively. Other controls include sector, size, ownership, export status and manager experience. A country_year pair is considered as an individual country. This considers the changes in factors affecting the country_year pair over time. Country and Industry details are provided in Appendix B (Supplementary) Table B.1 and B.2 respectively.

From Table 3.2, the bribe amount falls with faster grievance redress (significant at 5% level). The result is robust as we also include the *de jure* length of service delivery in the regression. This validates the prediction of the theoretical model. In the next section we use the model to derive preference of the applicants to an honest regime vis-à-vis a corrupt regime.

3.5 The preference of the applicants between an honest regime and a corrupt regime

In an honest regime, a deserving applicant receives $u_h^D = \delta\beta$ and an undeserving applicant receives $u_h^{UD} = 0$.

Assumption 3: If a deserving applicant receives identical payoffs under an honest regime and a corrupt regime, prefers honest regime over corrupt regime. An undeserving applicant under similar situation prefers a corrupt regime.

Now consider case 1 first, where $\mu_1 > \tilde{\mu}_1$.

If $\alpha \geq \alpha^*$, since $b_1 = \beta = b_1^D$ is offered to a deserving applicant and she accepts it, her payoff in the corrupt regime is $u_1^D = 0$, which follows from (13). An undeserving applicant at this offer, although, does not agree to pay the speed-money, accepts the collusive bribe offer in period 2. Therefore, her payoff in the corrupt regime is $u_2^{UD} = 0$.

If $\alpha < \alpha^*$, as the pooling contract of $b_1 = g$ is offered, both type of applicants agrees to pay speed-money. The deserving applicant receives $u_1^D = \beta - g > 0$ and the undeserving applicant receives $u_1^{UD} = 0$ in the corrupt regime.

Observation 3: If $\mu_1 > \tilde{\mu}_1$ and

(i) $\alpha \geq \alpha^*$, a deserving applicant pays speed-money and prefers an honest regime to corrupt regime; an undeserving applicant does not pay speed-money but participates in collusive bribery to receive the good and prefers a corrupt regime.

(ii) if $\alpha < \alpha^*$, both type of applicants pays speed-money; while an undeserving applicant prefers a corrupt regime; a deserving applicant prefers an honest regime if and only if $\mu \leq \mu^*$ where $\mu^* = \frac{g}{\beta}$; she prefers a corrupt regime otherwise.

Proof: (i) Follows from comparison of u_1^D and u_2^{UD} with u_h^D and u_h^{UD} respectively and application of assumption 3.

(ii) Follows from comparison of u_1^D and u_1^{UD} with u_h^D and u_h^{UD} respectively and application of assumption 3. In particular, comparison of u_1^D and u_h^D implies, a deserving applicant prefers an honest regime if

$$\beta - g < \delta\beta. \quad \dots\dots\dots (20)$$

Inequality (20) implies $(1 - \delta)\beta < g$. Since $\mu = 1 - \delta$, the statement of the proposition follows.

If the redressal process is long and it is common knowledge that the number of deserving applicants is above the threshold of α^* , a corrupt official, who is unable to recognize the applicant's type in period 1, offers a high bribe $b_1 = \beta$ to all the applicants. A deserving applicant accepts the bribe offer, which extracts her entire bribe surplus and leaves her with zero payoff. She accepts the offer because owing to the length of redressal process, by rejecting the bribe offer, she cannot secure a better payoff for herself. On the other hand, she would have received a positive payoff $\delta\beta > 0$ independent of the length of the delivery process in an honest regime. Therefore, she prefers an honest regime to corrupt regime. If the number of deserving applicants is below the threshold of α^* , a corrupt official offers a smaller bribe $b_1 = g$ to all the applicants and pooling occurs. Now, the deserving applicant receives a positive payoff $(\beta - g)$ by accepting the speed-money offer, which she compares with the honest regime payoff of $\delta\beta$ to decide about her preference over the two regimes. She prefers an honest regime over a corrupt regime, if the delivery process is not too long (below the threshold of μ^*) that keeps the value of δ sufficiently high.

Now consider case 2 where $\mu_1 \leq \tilde{\mu}_1$.

If $\beta - g \geq q(\delta\beta + z + a)$ and $\alpha \geq \hat{\alpha}$, since $b_1 = \beta - q\delta_1(\beta + z + a) + a = b_1^D$ is offered to a deserving applicant and she accepts it, her payoff in the corrupt regime is $u_1^D = q\delta_1(\delta\beta + z + a) - a > 0$, which follows from (13). An undeserving applicant at this offer, although, does not agree to pay the speed-money, accepts the collusive bribe offer in period 2. Therefore, her payoff in the corrupt regime is $u_2^{UD} = 0$.

If $\alpha < \hat{\alpha}$, like case 1, as $b_1 = g$ is offered, both type of applicants agrees to pay speed-money. The deserving applicant receives $u_1^D = \beta - g > 0$ and the undeserving applicant receives $u_1^{UD} = 0$ in the corrupt regime.

If $\beta - g < q(\delta\beta + z + a)$, the corrupt official offers $b_1 = g$ that excludes the deserving applicants from the payment of speed-money. A deserving applicant rejects the period 1 bribe offer and accepts the period 2 bribe offer. She receives a payoff of $u_2^D = q\delta_1(\delta\beta + z + a) - a$ in the corrupt regime. An undeserving applicant, however, accepts the period 1 bribe offer and receives a payoff of $u_1^{UD} = 0$ in the corrupt regime.

Observation 4: If $\mu_1 \leq \tilde{\mu}_1$ and

(A) $\beta - g \geq q(\delta\beta + z + a)$ and

(i) $\geq \hat{\alpha}$, a deserving applicant pays speed-money and prefers an honest regime to corrupt regime if and only if $\mu_1 \geq \bar{\mu}_1$ where $\bar{\mu}_1 = 1 - \frac{\delta\beta + a}{q(\delta\beta + z + a)}$; she prefers a corrupt regime otherwise.

An undeserving applicant does not pay speed-money but participates in collusive bribery to receive the good and prefers a corrupt regime.

(ii) $\alpha < \hat{\alpha}$, both type of applicants pays speed-money. While the undeserving applicant prefers a corrupt regime; a deserving applicant prefers an honest regime if and only if $\delta \geq \delta^*$ or $\mu \leq \mu^*$ where $\mu^* = \frac{g}{\beta}$; she prefers a corrupt regime otherwise.

(B) $\beta - g < q(\delta\beta + z + a)$, the deserving applicant does not pay speed-money and prefers an honest regime to corrupt regime if and only if $\mu_1 \geq \bar{\mu}_1$; she prefers a corrupt regime otherwise.

An undeserving applicant pays speed-money to receive the good and prefers a corrupt regime.

Proof: (A) Follows from comparison of u_1^D , u_1^{UD} and u_2^{UD} with u_h^D and u_h^{UD} respectively and application assumption 3.

(B) Follows from comparison of u_2^D and u_1^{UD} with u_h^D and u_h^{UD} respectively and application of assumption 3. □

If $\mu_1 \leq \tilde{\mu}_1$, $\beta - g \geq q(\delta\beta + z + a)$ and proportion of deserving applicants is above $\hat{\alpha}$, the deserving applicant receives a speed money offer of $\beta - q\delta_1(\delta\beta + z + a) + a$. Due to the shorter redressal process than in observation 3, the extortion bribe is lower in this case. Therefore, the speed-money charged to the deserving applicants is also lower. This leaves a positive surplus of $(q\delta_1(\delta\beta + z + a) - a)$ with a deserving applicant after payment of speed-money. She trades off this amount with $\delta\beta$, the payoff she would have received in an honest regime. Since $(q\delta_1(\delta\beta + z + a) - a)$ monotonically falls with rise in the length of redressal process and for all values of $\mu_1 \geq \bar{\mu}_1$ it falls below $\delta\beta$, the deserving applicants prefer honest regime to corrupt regime if $\bar{\mu}_1 \leq \mu_1 \leq \tilde{\mu}_1$. For $\mu_1 < \bar{\mu}_1$ she prefers corrupt regime. If the proportion of deserving applicants is below $\hat{\alpha}$, the period 1 bribe offer is $b_1 = g$. Here also, a deserving applicant is left with a surplus of $(\beta - g)$ independent of the length of the redressal process. While deciding about her preference towards an honest regime, she compares $(\beta - g)$ and $\delta\beta$, therefore, the length of the redressal process does not matter. However, the length of the delivery process matters. She prefers an honest regime in presence of a sufficiently fast delivery process.

If $\beta - g < q(\delta\beta + z + a)$, both types of applicant receive a speed-money offer of $b_1 = g$. While an undeserving applicant accepts it and receives a zero payoff, a deserving applicant rejects the bribe offer and accepts the period 2 bribe offer, instead. She receives a payoff of $u_2^D = q\delta_1(\delta\beta + z + a) - a$ in a corrupt regime, which she trades off with the honest regime payoff of $\delta\beta$. Since u_2^D is monotonically declining in the length of redressal process and for all values of $\mu_1 \geq \bar{\mu}_1$ it falls below $\delta\beta$, the deserving applicants prefer honest regime to corrupt regime if $\bar{\mu}_1 \leq \mu_1 \leq \tilde{\mu}_1$. For $\mu_1 < \bar{\mu}_1$ she prefers corrupt regime.

The undeserving applicants always support a corrupt regime. Therefore, attitude towards a corrupt regime in a society can change only if the honest regime finds support from the deserving applicants.

We summarize the deserving applicants' preference for the two regimes as stated in observation 3 and 4 in the Figure 3.3 below.

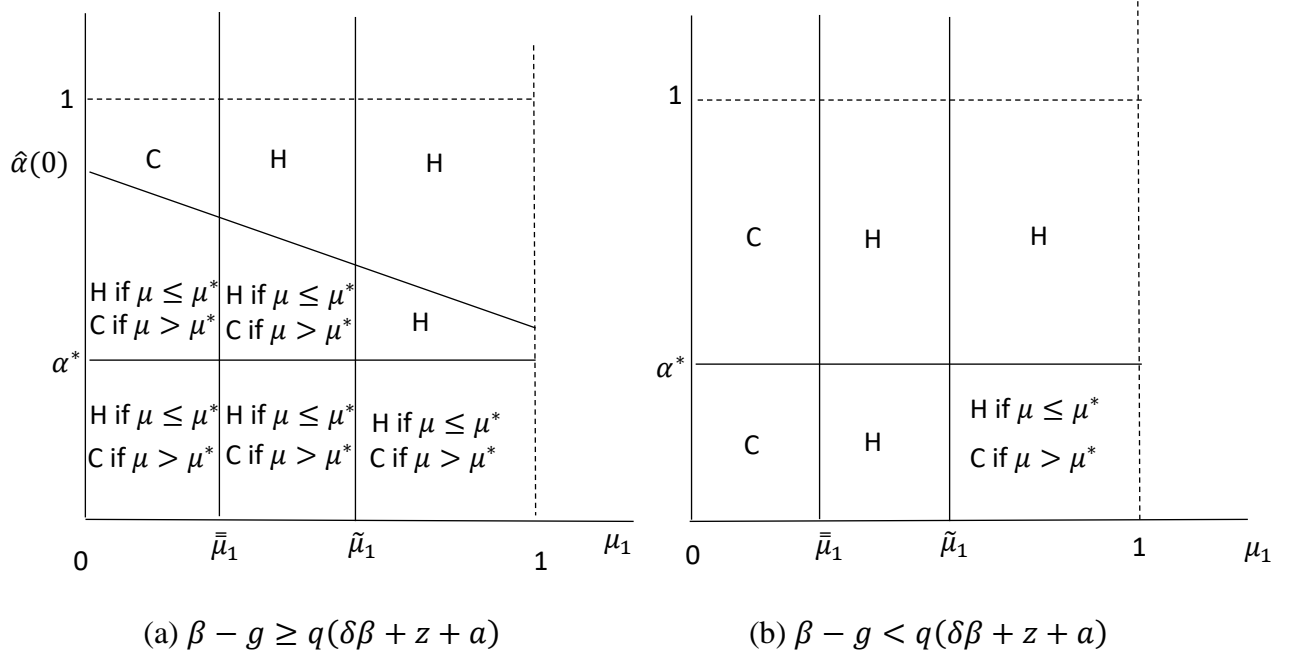


Figure 3. 3: The preference of deserving applicants over honest regime (H) and corrupt regime (C)

Proposition 1: (A) *If the delivery process is long such that $\mu > \mu^*$ and if $\alpha \geq \alpha^*$ the support for an honest regime is non-increasing in faster redressal process; if $\alpha < \alpha^*$, it is non-monotonic when $\beta - g < q(\delta\beta + z + a)$ and does not exist if $\beta - g \geq q(\delta\beta + z + a)$.*

(B) *Lowering the length of the delivery process at μ^* or below it, generates support for an honest regime except for two situations: (i) $\beta - g \geq q(\delta\beta + z + a)$, $\mu_1 < \bar{\mu}_1$ and $\alpha \geq \hat{\alpha}$; (ii) $\beta - g < q(\delta\beta + z + a)$, $\mu_1 < \bar{\mu}_1$.*

Proof: Follows from Figure 3.3 above. □

Proposition 1 shows that as conventionally thought faster redressal of corruption complaints may not change the preference of the society towards an honest regime. A faster delivery of government services is a more effective instrument for achieving the same. However, if the redressal process is very fast ($\mu_1 < \bar{\mu}_1$), the extortion bribe and the speed-money falls to such a low level that it is possible, no one in the society prefers an honest regime.

3.6 Conclusions

The present chapter constructs a theoretical model where a publicly provided private good is delivered through a time-consuming screening process. The good loses its value with time. A corrupt official exploits this opportunity to demand bribe from the applicants, who arranges for faster delivery of the good bypassing the screening. A deserving applicant, if does not accept the collusive ‘speed money’ offer, gets extorted after the screening is over. In absence of a grievance redressal mechanism, the applicants irrespective of their type, accepts the ‘speed money’ offer, as the conventional literature suggests. The present chapter shows, in presence of a grievance redressal mechanism, extortion may occur as an equilibrium outcome even in such a bureaucracy involving screening and red tape. The chapter also studies the preference of the applicants between an honest regime and a corrupt regime on the basis of their expected payoffs under the two regimes, and finds the effect of two alternative governance mechanisms: (1) faster delivery of the good; and (2) faster redressal process, on their preference. The finding suggests, while the undeserving applicants would be indifferent between the regimes, it is more likely that the deserving applicants prefer the honest regime under the faster delivery mechanism than under the faster redressal mechanism. Therefore, the present chapter concludes that in the case of public provision of private goods, the success of a ‘bottom up’ approach of controlling corruption, where the stakeholders are given voice against corruption, may depend on the ‘top down’ approach of administrative reform. The chapter also empirically validates the prediction of the theoretical model with cross-country

data taken from the World Bank Enterprise Survey and the World Bank Doing Business Report to show that the amount of bribe payment falls with faster redressal process.

The contributions of the present chapter are the following. First, it shows that in a bureaucracy involving screening and red tape, which delivers a publicly provided private good, extortion can occur as an equilibrium in presence of a grievance redressal mechanism against corruption. The result is new in the literature. Second, the chapter shows that a faster delivery of the good is a better mechanism for generating support for an honest regime among the recipients of the good than a faster redressal of grievances. The result is new for both the literatures on screening and red tape and the ‘top down’ vs. ‘bottom up’ approach of controlling corruption, to which the present chapter is related. From the policy perspective, the result is important, as it shows the design of ‘top down’ approach can determine the success of a ‘bottom up’ approach, which asks the recipients to voice their views over corruption. It also highlights the limitation of the faster redressal policy in solving the problem of corruption in presence of screening and red tape.

Appendix A

Table A. 1: Description of Explanatory Variables

Variable	Definition and Source	Author's Computation
Length of Service-delivery (Long service delivery)	Average percentage of senior management's time that is spent in a typical week dealing with requirements imposed by government regulations (eg. taxes, customs, labor regulations, licensing and registration), including dealings with officials, completing forms, et cetera. Source: World Bank Enterprise Survey (WBES)	Derived from Type=I group above. Then taking the average of these firm's time spent in a particular country times industry cluster and assigning a single value (the average) for all the firms in the same country times industry cluster. Red Tape=cluster average time spent/100
Length of Grievance-redress (Fast Grievance Redress)	The score for time to enforce contracts benchmarks economies with respect to the regulatory best practice on the indicator. The score is indicated on a scale from 0 to 100, where 0 represents the worst regulatory performance and 100 the best regulatory performance. The time to enforce contracts is counted from the moment plaintiff decides to file the lawsuit in court until payment. The average duration of the following three different stages of dispute resolution is recorded: (i) filing and service, (ii) trial and judgment, and (iii) enforcement. Country-level data. Source: World Bank Doing Business Report	Redress= Score/100
Sector	The survey is stratified by business sector: Manufacturing and Services. Source: WBES	Sector Dummies Reference group is manufacturing sector.
Size of Enterprise	Firm size is a composite measure of permanent and temporary workers. The number of temporary workers is adjusted by the average number of months worked in a year. Small: 5-19 workers Medium: 20-99 workers Large: 100+ Source: WBES	Recoded: Firm Dummies Reference group is Small scale firm.
Ownership of Entrepreneurship	Domestic (less than 10% foreign ownership) Foreign (At least 10% Foreign Ownership) Source: World Bank Enterprise Survey	Ownership Dummies Reference group is Domestic.
Manager Experience	Years of experience of the top manager working in the sector. Source: WBES	Recoded: Manager Experience = natural log of variable (manager experience+1)
Export Status	Non-exporter=0 Exporter=100 (at least 10 percent of its annual sales is derived from direct exports) Source: WBES	Exporter status dummies Reference group is Non-Exporter.

Source: Author's computation

Table A. 2: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Length of Grievance Redress (Fast Grievance Redress)	15368	0.60	0.24	0	0.93
Length of Service Delivery (Long Service Delivery)	15368	0.10	0.09	0	1
Manufacturing Sector (Dummy)	15355	0.52	0.50	0	1
Service Sector (Dummy)	15355	0.48	0.50	0	1
Small Size Firm (Dummy)	15368	0.48	0.50	0	1
Medium Size Firm (Dummy)	15368	0.34	0.47	0	1
Large Size Firm (Dummy)	15368	0.17	0.38	0	1
Domestic Ownership (Dummy)	15368	0.88	0.32	0	1
Foreign Ownership (Dummy)	15368	0.11	0.32	0	1
Non-exporter (Dummy)	15368	0.85	0.36	0	1
Exporter (Dummy)	15368	0.15	0.36	0	1
Manager Experience (natural logarithm)	15368	2.73	0.69	0	4.11

Source: Author's Computation.

Appendix B (Supplement)

Table B. 1: Country Details

Serial No.	Country	Region	Number of Firms
1	Afghanistan2008	South Asia Region	153
2	Afghanistan2014	South Asia Region	89
3	Albania2007	Eastern European and Central Asia region	53
4	Albania2013	Eastern European and Central Asia region	33
5	Albania2019	Eastern European and Central Asia region	75
6	Angola2006	Africa Region	88
7	Angola2010	Africa Region	61
8	Antiguaandbarbuda2010	Latin America and the Caribbean region	8
9	Argentina2006	Latin America and the Caribbean region	58
10	Argentina2010	Latin America and the Caribbean region	99
11	Argentina2017	Latin America and the Caribbean region	43
12	Armenia2009	Eastern European and Central Asia region	31
13	Armenia2013	Eastern European and Central Asia region	66
14	Armenia2020	Eastern European and Central Asia region	50
15	Azerbaijan2009	Eastern European and Central Asia region	12
16	Azerbaijan2013	Eastern European and Central Asia region	97
17	Azerbaijan2019	Eastern European and Central Asia region	27
18	Bahamas2010	Latin America and the Caribbean region	10
19	Belarus2008	Eastern European and Central Asia region	13
20	Belarus2013	Eastern European and Central Asia region	48
21	Belarus2018	Eastern European and Central Asia region	79
22	Belgium2020	Eastern European and Central Asia region	44
23	Belize2010	Latin America and the Caribbean region	9
24	Benin2009	Africa Region	14
25	Benin2016	Africa Region	24
26	Bhutan2009	South Asia Region	11
27	Bhutan2015	South Asia Region	24
28	Bolivia2006	Latin America and the Caribbean region	61
29	Bolivia2010	Latin America and the Caribbean region	49
30	Bolivia2017	Latin America and the Caribbean region	30
31	Bosnia and Herzegovina2009	Eastern European and Central Asia region	18
32	Bosnia and Herzegovina2013	Eastern European and Central Asia region	40
33	Bosnia and Herzegovina2019	Eastern European and Central Asia region	13
34	Botswana2006	Africa Region	22
35	Botswana2010	Africa Region	25
36	Bulgaria2007	Eastern European and Central Asia region	102
37	Bulgaria2009	Eastern European and Central Asia region	9
38	Bulgaria2013	Eastern European and Central Asia region	62
39	Bulgaria2019	Eastern European and Central Asia region	36
40	Burkinafaso2009	Africa Region	15

Serial No.	Country	Region	Number of Firms
41	Burundi2006	Africa Region	39
42	Burundi2014	Africa Region	20
43	Cambodia2016	East Asia and Pacific region	121
44	Cameroon2009	Africa Region	118
45	Cameroon2016	Africa Region	75
46	CentralAfrica Regionicanrepublic2011	Africa Region	41
47	Chad2009	Africa Region	46
48	Chad2018	Africa Region	42
49	Chile2006	Latin America and the Caribbean region	50
50	Chile2010	Latin America and the Caribbean region	23
51	Colombia2006	Latin America and the Caribbean region	69
52	Colombia2010	Latin America and the Caribbean region	47
53	Colombia2017	Latin America and the Caribbean region	84
54	Costarica2010	Latin America and the Caribbean region	6
55	Croatia2007	Eastern European and Central Asia region	76
56	Croatia2013	Eastern European and Central Asia region	70
57	Croatia2019	Eastern European and Central Asia region	9
58	Cyprus2019	Eastern European and Central Asia region	17
59	Czech Republic2009	Eastern European and Central Asia region	10
60	Czech Republic2013	Eastern European and Central Asia region	51
61	Czech Republic2019	Eastern European and Central Asia region	52
62	Côte d'Ivoire2009	Africa Region	79
63	Côte d'Ivoire2016	Africa Region	44
64	Djibouti2013	Middle East and North Africa region	12
65	Dominican Republic2010	Latin America and the Caribbean region	32
66	Dominican Republic2016	Latin America and the Caribbean region	28
67	Drc2006	Africa Region	77
68	Drc2010	Africa Region	131
69	Drc2013	Africa Region	114
70	Ecuador2006	Latin America and the Caribbean region	44
71	Ecuador2010	Latin America and the Caribbean region	21
72	Ecuador2017	Latin America and the Caribbean region	17
73	Egypt2013	Middle East and North Africa region	297
74	Egypt2016	Middle East and North Africa region	209
75	Egypt2020	Middle East and North Africa region	210
76	El Salvador2006	Latin America and the Caribbean region	56
77	El Salvador2010	Latin America and the Caribbean region	26
78	El Salvador2016	Latin America and the Caribbean region	33
79	Eritrea2009	Africa Region	74
80	Estonia2013	Eastern European and Central Asia region	25
81	Estonia2019	Eastern European and Central Asia region	46
82	Eswatini2016	Africa Region	24
83	Ethiopia2011	Africa Region	19
84	Ethiopia2015	Africa Region	54

Serial No.	Country	Region	Number of Firms
85	Fiji2009	East Asia and Pacific region	16
86	Gambia2018	Africa Region	10
87	Georgia2013	Eastern European and Central Asia region	39
88	Georgia2019	Eastern European and Central Asia region	84
89	Ghana2013	Africa Region	76
90	Greece2018	Eastern European and Central Asia region	14
91	Grenada2010	Latin America and the Caribbean region	18
92	Guatemala2006	Latin America and the Caribbean region	35
93	Guatemala2010	Latin America and the Caribbean region	50
94	Guatemala2017	Latin America and the Caribbean region	42
95	Guinea2006	Africa Region	80
96	Guineabissau2006	Africa Region	15
97	Guyana2010	Latin America and the Caribbean region	26
98	Honduras2006	Latin America and the Caribbean region	42
99	Honduras2010	Latin America and the Caribbean region	37
100	Honduras2016	Latin America and the Caribbean region	27
101	Hungary2009	Eastern European and Central Asia region	10
102	Hungary2013	Eastern European and Central Asia region	51
103	Hungary2019	Eastern European and Central Asia region	17
104	Indonesia2015	East Asia and Pacific region	86
105	Iraq2011	Middle East and North Africa region	99
106	Ireland2020	Eastern European and Central Asia region	154
107	Israel2013	Middle East and North Africa region	59
108	Italy2019	Eastern European and Central Asia region	41
109	Jamaica2010	Latin America and the Caribbean region	12
110	Jordan2013	Middle East and North Africa region	28
111	Jordan2019	Middle East and North Africa region	28
112	Kazakhstan2009	Eastern European and Central Asia region	64
113	Kazakhstan2013	Eastern European and Central Asia region	116
114	Kazakhstan2019	Eastern European and Central Asia region	229
115	Kenya2007	Africa Region	249
116	Kenya2013	Africa Region	123
117	Kenya2018	Africa Region	209
118	Kosovo2013	Eastern European and Central Asia region	48
119	Kosovo2019	Eastern European and Central Asia region	12
120	Kyrgyz Republic2009	Eastern European and Central Asia region	53
121	Kyrgyz Republic2013	Eastern European and Central Asia region	101
122	Kyrgyz Republic2019	Eastern European and Central Asia region	50
123	Lao PDR2009	East Asia and Pacific region	98
124	Lao PDR2012	East Asia and Pacific region	42
125	Lao PDR2016	East Asia and Pacific region	87
126	Lao PDR2018	East Asia and Pacific region	53
127	Latvia2009	Eastern European and Central Asia region	9
128	Latvia2013	Eastern European and Central Asia region	30

Serial No.	Country	Region	Number of Firms
129	Latvia2019	Eastern European and Central Asia region	14
130	Lebanon2013	Middle East and North Africa region	117
131	Lebanon2019	Middle East and North Africa region	35
132	Lesotho2016	Africa Region	9
133	Liberia2017	Africa Region	51
134	Lithuania2009	Eastern European and Central Asia region	9
135	Lithuania2013	Eastern European and Central Asia region	39
136	Lithuania2019	Eastern European and Central Asia region	15
137	Luxembourg2020	Eastern European and Central Asia region	15
138	Madagascar2009	Africa Region	49
139	Malawi2009	Africa Region	13
140	Malawi2014	Africa Region	54
141	Malaysia2015	East Asia and Pacific region	203
142	Mali2010	Africa Region	17
143	Mali2016	Africa Region	25
144	Mauritania2006	Africa Region	18
145	Mauritania2014	Africa Region	14
146	Mauritius2009	Africa Region	6
147	Micronesia, Fed. Sts.2009	East Asia and Pacific region	5
148	Moldova2009	Eastern European and Central Asia region	33
149	Moldova2013	Eastern European and Central Asia region	36
150	Moldova2019	Eastern European and Central Asia region	28
151	Mongolia2009	East Asia and Pacific region	31
152	Mongolia2013	East Asia and Pacific region	52
153	Mongolia2019	East Asia and Pacific region	25
154	Montenegro2009	Eastern European and Central Asia region	5
155	Montenegro2013	Eastern European and Central Asia region	27
156	Montenegro2019	Eastern European and Central Asia region	27
157	Morocco2013	Middle East and North Africa region	71
158	Morocco2019	Middle East and North Africa region	239
159	Mozambique2018	Africa Region	70
160	Myanmar2014	East Asia and Pacific region	91
161	Myanmar2016	East Asia and Pacific region	83
162	Namibia2006	Africa Region	20
163	Namibia2014	Africa Region	74
164	Nepal2009	South Asia Region	20
165	Nepal2013	South Asia Region	46
166	Netherlands2020	Eastern European and Central Asia region	172
167	Nicaragua2006	Latin America and the Caribbean region	40
168	Nicaragua2010	Latin America and the Caribbean region	22
169	Nicaragua2016	Latin America and the Caribbean region	51
170	Niger2009	Africa Region	22
171	Niger2017	Africa Region	23
172	North Macedonia2009	Eastern European and Central Asia region	27

Serial No.	Country	Region	Number of Firms
173	North Macedonia2013	Eastern European and Central Asia region	64
174	North Macedonia2019	Eastern European and Central Asia region	29
175	Panama2006	Latin America and the Caribbean region	59
176	Panama2010	Latin America and the Caribbean region	13
177	Papua New Guinea2015	East Asia and Pacific region	9
178	Paraguay2006	Latin America and the Caribbean region	37
179	Paraguay2010	Latin America and the Caribbean region	45
180	Paraguay2017	Latin America and the Caribbean region	28
181	Peru2006	Latin America and the Caribbean region	23
182	Peru2010	Latin America and the Caribbean region	114
183	Peru2017	Latin America and the Caribbean region	119
184	Philippines2009	East Asia and Pacific region	334
185	Philippines2015	East Asia and Pacific region	273
186	Poland2009	Eastern European and Central Asia region	12
187	Poland2013	Eastern European and Central Asia region	85
188	Poland2019	Eastern European and Central Asia region	29
189	Portugal2019	Eastern European and Central Asia region	16
190	Romania2009	Eastern European and Central Asia region	24
191	Romania2013	Eastern European and Central Asia region	67
192	Romania2019	Eastern European and Central Asia region	93
193	Russia2012	Eastern European and Central Asia region	524
194	Russia2019	Eastern European and Central Asia region	172
195	Rwanda2006	Africa Region	7
196	Rwanda2011	Africa Region	20
197	Rwanda2019	Africa Region	55
198	Samoa2009	East Asia and Pacific region	9
199	Senegal2014	Africa Region	16
200	Serbia2009	Eastern European and Central Asia region	47
201	Serbia2013	Eastern European and Central Asia region	38
202	Serbia2019	Eastern European and Central Asia region	28
203	Sierra Leone2017	Africa Region	37
204	Slovakia2009	Eastern European and Central Asia region	8
205	Slovakia2013	Eastern European and Central Asia region	26
206	Slovakia2019	Eastern European and Central Asia region	67
207	Slovenia2009	Eastern European and Central Asia region	5
208	Slovenia2013	Eastern European and Central Asia region	76
209	Slovenia2019	Eastern European and Central Asia region	44
210	Solomon Islands2015	East Asia and Pacific region	29
211	SouthAfrica Regionica2020	Africa Region	55
212	Southsudan2014	Africa Region	158
213	SriLanka2011	South Asia Region	46
214	Stkittsandnevis2010	Latin America and the Caribbean region	6
215	Stvincentandthegrenadines2010	Latin America and the Caribbean region	5
216	Sudan2014	Africa Region	33

Serial No.	Country	Region	Number of Firms
217	Suriname2010	Latin America and the Caribbean region	18
218	Suriname2018	Latin America and the Caribbean region	38
219	Tajikistan2008	Eastern European and Central Asia region	82
220	Tajikistan2013	Eastern European and Central Asia region	65
221	Tajikistan2019	Eastern European and Central Asia region	29
222	Tanzania2006	Africa Region	111
223	Tanzania2013	Africa Region	40
224	Thailand2016	East Asia and Pacific region	35
225	Timor-Leste2009	East Asia and Pacific region	21
226	Timor-Leste2015	East Asia and Pacific region	24
227	Togo2009	Africa Region	14
228	Togo2016	Africa Region	11
229	Tonga2009	East Asia and Pacific region	8
230	Trinidadandtobago2010	Latin America and the Caribbean region	28
231	Tunisia2013	Middle East and North Africa region	25
232	Tunisia2020	Middle East and North Africa region	80
233	Turkey2008	Eastern European and Central Asia region	82
234	Turkey2013	Eastern European and Central Asia region	266
235	Turkey2019	Eastern European and Central Asia region	25
236	Uganda2006	Africa Region	116
237	Uganda2013	Africa Region	57
238	Ukraine2008	Eastern European and Central Asia region	97
239	Ukraine2013	Eastern European and Central Asia region	73
240	Ukraine2019	Eastern European and Central Asia region	101
241	Uruguay2006	Latin America and the Caribbean region	7
242	Uruguay2010	Latin America and the Caribbean region	30
243	Uruguay2017	Latin America and the Caribbean region	6
244	Uzbekistan2008	Eastern European and Central Asia region	139
245	Uzbekistan2013	Eastern European and Central Asia region	167
246	Uzbekistan2019	Eastern European and Central Asia region	434
247	Vanuatu2009	East Asia and Pacific region	9
248	Venezuela2010	Latin America and the Caribbean region	51
249	Vietnam2009	East Asia and Pacific region	140
250	Vietnam2015	East Asia and Pacific region	123
251	West Bank And Gaza2013	Middle East and North Africa region	12
252	West Bank And Gaza2019	Middle East and North Africa region	15
253	Yemen2010	Middle East and North Africa region	189
254	Yemen2013	Middle East and North Africa region	110
255	Zambia2013	Africa Region	44
256	Zambia2019	Africa Region	38
257	Zimbabwe2011	Africa Region	22
258	Zimbabwe2016	Africa Region	51

Source: Author's Computation from WBES. Countries with less than 5 observations are dropped.

Table B. 2: Industry Details

ID	ISIC	Activity
1	15 and 16	Manufacturing of food products and beverages; Manufacture of tobacco products
2	17	Manufacture of textiles
3	18	Manufacture of wearing apparel; dressing and dyeing of fur
4	19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
5	20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
6	21	Manufacture of paper and paper products
7	22	Publishing, printing and reproduction of recorded media
8	23 and 24	Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of chemical and chemical products
9	25	Manufacture of rubber and plastics products
10	26	Manufacture of other non-metallic mineral products
11	27	Manufacture of basic metals
12	28	Manufacture of fabricated metal products, except machinery and equipment
13	29	Manufacture of machinery and equipment n.e.c.
14	30,31,32 and 33	Manufacture of office, accounting and computing machinery; Manufacture of electrical machinery and apparatus n.e.c.; Manufacture of radio, television and communication equipment and apparatus; Manufacture of medical, precision and optical instruments, watches and clocks
15	34 and 35	Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
16	36	Manufacture of furniture; manufacturing n.e.c.
17	45	Construction
18	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
19	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
20	52	Retail trade, except of motor vehicles and motor cycles; repair of personal and household goods
21	55	Hotels and restaurants
22	60	Land transport; transport via pipelines
23	61	Water transport
24	62	Air transport
25	63	Supporting and auxiliary transport activities; activities of travel agencies
26	64	Post and telecommunications
27	70,71,73 and 74	Real estate activities; Renting of machinery and equipment without operator and of personal and household goods; Research and development; Other business activities
28	72	Computer and related activities

Source: Authors Computation from Francis, Karalashvili, Maemir, and Meza (2020) and United Nations 2002 ISIC Revision 3.1. Recycling is dropped.

Chapter 4

WHEN AN HONEST AGENT PAYS BRIBE?

4.1 Introduction

The literature on corruption and bribery points out that there are two types of bribe-situations. One involves collusion, when a corrupt agent pays bribe to an official for obtaining an illegal benefit. The other involves extortion, when an honest agent is forced to pay bribe¹⁸. However, in strict sense an honest agent, who pays the bribe, is ‘corruptible’ since by paying the bribe she plays a compromise strategy that benefits her too. For understanding this, one should remember that she could always refuse to pay the bribe, lodge a complaint with the redressing authority/court against the extorting official and wait for the justice, which a ‘purely’ honest agent would do. Since waiting delays delivery of the desired public good/service, it is costly. While a ‘purely’ honest agent bears the cost; a ‘corruptible’ honest agent by paying the extortion bribe tries to minimize the same. Whether an honest agent pays bribe or not depends on how the cost of paying the bribe squares with the cost of going to court. The bribe cost depends on the bargaining power of the agent against the corrupt official. On the one hand, a longer delivery process of the public good increases the probability of bribe-payment by a ‘corruptible’ honest agent as it increases the waiting cost.¹⁹ On the other hand, a faster legal process with some positive probability of winning, strengthens the bargaining position of the agent and also increases the probability of bribe-payment by lowering the bribe cost²⁰. The present chapter finds evidences in favor of these hypotheses from the World Bank Enterprise Survey (WBES) data for 2006-2020.

The present chapter uses a novel approach in identifying an honest agent and *de jure* time in public good delivery process from the WBES data. The WBES 2006-2020 dataset contains the following information about a firm: (1) the time spent by the senior manager of

¹⁸ See papers like Hindriks et al. (1999), Marjit et al. (2000), Polinsky and Shavell (2001), Drugov (2010), Banerjee and Mukherjee (2020) that discuss both collusion and extortion.

¹⁹ See papers like Banerjee (1997), Saha (2001) and Guriev (2004).

²⁰ See Bhattacharya and Mukherjee (2022).

the firm in the regulatory process (reported as ‘the percent of senior manager’s time in a typical week last year spent in ‘getting things done’’); (2) whether the similar firms pay bribe; and (3) whether the firm thinks corruption as an obstacle in doing business. The present chapter interprets the firms, which mentions that corruption is an obstacle in doing business, as the ‘honest’ firms. Some of these firms point out that the similar firms pay bribe. Following the papers like Fan et al. (2009), Duvanova (2014) and Amin and Soh (2020) we interpret such a response as an expression that the firm itself pays a bribe. But not all firm pays bribe even if they face obstacle in doing business. A switch from a decision of not-paying-bribe to paying-bribe is interpreted as the sign of ‘corruptibility’ of an honest agent. The present chapter checks with the data the way the length of the delivery process and the length of the legal process affect the corruptibility of an honest agent. The data on the *de jure* length of the delivery process is also derived from the WBES data in a novel way. It takes the data reported on *de-facto* delivery time by the firms, which do not report either corruption as an obstacle in doing business or it has paid a bribe, as the *de jure* time required for delivery. The logic of this interpretation is that the waiting time of these firms is not influenced by the bribe incidence. This method of calculating the *de jure* delivery time removes the possible endogeneity bias that is there in previous papers like Duvanova (2014) and Amin and Soh (2020), which averages the *de facto* delivery time of all firms for finding country-specific *de jure* time. Our interpretation of the data also picks up the variation of the *de-jure* data across country-industry pair, which is not there in other studies. Since WBES does not provide the cross-country data on time required in the legal process, the present chapter uses the country-score on the same from the World Bank Doing Business data (2020). The chapter also uses the other firm-specific and country-specific controls in the regression analysis.

Section 4.2 of the chapter describes the data in detail. Section 4.3 discusses the regression analysis and the results. The section following concludes.

4.2 The Data

The WBES 2006-2020 dataset contains the following information about a firm: (1) the time spent by the senior manager of the firm in the regulatory process (reported as ‘the percent of senior manager’s time in a typical week last year spent in ‘getting things done’’); (2) whether the similar firms pay bribe; and (3) whether the firm thinks corruption as an obstacle in doing business. The data is collected from 171,352 firms located in 297 countries around the World. Depending on their responses, we divide the firms into four types:

Type I: the firms who report not paying bribe and think that corruption is not an obstacle in doing business;

Type II: the firms who report not paying bribe and think that corruption is an obstacle in doing business;

Type III: the firms who report paying bribe and think that corruption is not an obstacle in doing business;

Type IV: the firms who report paying bribe and think that corruption is an obstacle in doing business.

We record the *de facto* time spent by the senior manager of the four types of firms defined above in the regulatory process. The data on average time spent by these firms is presented in the table below.

Table 4. 1: Average time spent for ‘getting things done’ in regulatory process by different types of firms (reported as ‘the percent of senior manager’s time in a typical week’)

	Corruption is not an obstacle	Corruption is an obstacle
Not Paying Bribe	8.73 Type I firms (96350) [0.05]	20.11 Type II firms (2089) [0.42]
Paying Bribe	9.33 Type III firms (24817) [0.09]	11.46 Type IV firms (2758) [0.31]

Note: 1) The numbers in the first bracket are the absolute number of a particular type of firm in WBES 2006-2020 dataset

2) The numbers in the third bracket are standard errors.

Table 4.1 shows that while the senior managers of the type I firms spend 8.73% of their time in a week for ‘getting things done’ in regulatory process, which is the minimum among the four types of firms described above, the senior managers of the type II firms spend 20.11% of their time, which is the maximum. We interpret the type III firms, which pay bribe but still thinks that corruption is not an obstacle in doing business, as corrupt firms. They must be involved in violation of some law and paying bribe as a price for the benefit they receive and therefore do not think paying bribe is an obstacle to their business. Since the focus of the present chapter is the study of institutional factors that influence the bribe payment by the ‘corruptible’ honest agents, we do not include the type III firms in our analysis. The type I firms in our analysis, do not pay bribe and also do not think that corruption is an obstacle in doing business. From the response of these firms, it is not difficult to imagine that these firms did not face any bribe demand from the officials in the regulatory process. Therefore, we can interpret the *de facto* time spent by the senior managers of these firms is also the *de jure* time required in the regulatory process i.e., average time required to pass the regulatory process in an honest bureaucracy is 8.73% of the senior manager’s time in a week. The time spent by the senior

managers of type I firms in the regulatory process is institutionally given and is not related to bribery. We have checked that the type I firm's data has very little variation within a particular industry in a particular country, which confirms our apprehension²¹. Notice from Table 4.1 that the senior managers of type II firms, who experience corruption and do not pay bribe, ends up spending 20.11% of their weekly time (the highest among the four types of firms) in getting things done. We can interpret this as a price they pay for not obliging to bribe demand of the corrupt officials. In contrast, the senior managers of type IV firms, who compromises on their honesty and get the things done by paying bribe, spends much lower proportion of their weekly time (11.46%) in the regulatory process and benefits from the faster delivery of the services. Interestingly, the average time spent by type IV firms is still higher than 8.73%, the *de jure* time in the regulatory process, which supports the idea of strategic lengthening of the regulatory process by the corrupt officials, theorized by Guriev (2004). Table 4.1 also shows that as expected the corrupt (type III) firms, which are regular in illegal business practices, on average enjoy faster delivery of services on payment of bribe compared to the honest firms participating in corruption (type IV firms).

4.3 The Regression Specification

The chapter uses the following regression specification.

$$\begin{aligned}
 Bribe_{ijk} = & \beta_0 + \beta_1 Long\ Service\ Delivery_{jk} + \beta_2 Fast\ Grievance\ Redress_j \\
 & + Firm\ Control + Country\ Control + Industry\ Fixed\ Effects \\
 & + Region\ Fixed\ Effects + \varepsilon_{ijk}
 \end{aligned}$$

where, i = i-th firm, j= j-th country and k= k-th industry, ε_{ijk} denotes the error term.

²¹ Ideally if we take industry average of the *de jure* data from the WBES (2006-2020) in a particular country and construct a country wise index of *de jure* time required in the delivery process, it should exhibit a negative correlation with the country level *de jure* score for length of service delivery derived from the data provided in the World Bank Doing Business (2006-2020) report. The negative relation is expected because higher score in Doing Business data implies lesser time involved in the delivery processes. Appendix A of this chapter confirms this intuition.

The hypotheses it tests are:

Hypothesis I: Longer de jure time of service delivery increases the probability that an honest firm pays bribe.

Hypothesis II: Faster legal process for grievance redress increases the probability that an honest firm pays bribe.

The dependent variable, *Bribe*, represents the bribing behavior of the honest firms, which respond in the WBES that they think corruption as an obstacle to business. $Bribe_{ijk}$ is a dummy variable where it takes a value of 1 if the i th firm in the j th country and k th industry pays bribe²². It takes a value of 0, otherwise. As mentioned in the previous section, one of the two main explanatory variables is the *de jure* time required in the service delivery (*Long Service Delivery*) constructed from the WBES data. The longer *de jure* time of service delivery incentivizes an honest firm to participate in bribery by increasing the waiting cost. Therefore, the coefficient of the variable ‘long Service Delivery’ is expected to have positive sign. The other main explanatory variable is the time required in the grievance-redressal/legal process. Since WBES do not provide this data, for our purpose we use the cross-country score given in World Bank Doing Business data (2020) in the legal disputes, counted from the moment plaintiff decides to file the lawsuit in court until enforcement. A higher value of the variable implies less time taken in the process. It is expected that with decrease in time of waiting for the verdict, with some probability of win, would decrease the bribe rate and increase participation in bribery. Therefore, the coefficient of the variable ‘Fast Grievance Redress’ is expected to have positive sign. To deal with the omitted variable bias we control for the firms, country, industry and region characteristics. The firm-level controls include age of firm, manager’s experience, dummy variables for firm size, ownership type, export status, manager’s

²² A firm who spontaneously refused to respond is considered to pay bribe by the WBES. We follow the same convention.

gender and use of internet in running the business, sourced from WBES. Country-level controls include GDP per capita at PPP (constant 2017 international \$), trade openness from World Development Indicators (WDI) and control of corruption from Worldwide Governance Indicators (WGI). In order to avoid spurious correlations we include specific controls like region dummies and industry dummies. In our specification, endogeneity from reverse causality is not possible from firm level responses to country level institutional (*de jure*) factors. The details of all explanatory variables are given in Appendix Table C.2.

Chen, Yaşar, and Rejesus (2008) emphasized that understanding the bargaining position is important in determining the probability of bribe paid by a firm. Svensson (2003) shows that the profit level that determines the bargaining position and ability to pay increases the bribe incidence. The profit level in turn is determined by factors like the foreign ownership, the age and the experience of firms, the firm size and its exports status (Soans and Abe, 2015; Webster and Piesse, 2018). A firm with a female manager are less likely to bribe (Swamy, Knack, Lee, and Azfar, 2001; Breen, Gillanders, McNulty and Suzuki, 2015). At the macro-level, Svensson (2005) and Banerjee (1997) shows that higher income countries experience lesser corruption. Krueger (1974) and Ades and Di Tella (1999) argue that trade openness is negatively related to corruption as that increases firm's outside option. Corruption is likely to be low in countries where the consensus on controlling corruption is high like freedom of press, proper monitoring etc. (Cuervo-Cazurra, 2006; Kosac and Fung, 2014). Since GDP, trade openness and control of corruption could be correlated we include them one by one in the alternative regression specifications.

In the analysis, we consider a (country, year) pair as an individual country²³. This specification is able to take account of the changes in factors affecting the (country, year) pair

²³ Example, Afghanistan_2008 as country 1 and Afghanistan_2014 as country 2.

over time. Since data for more than one rounds is not available for many countries we do check the validity of our results using time fixed effects for these countries. The dataset is cleaned rigorously. All firms with negative sales value and other anomalies in the data are dropped. Also, each country-industry cluster cell with more than 2 firms are only considered for analysis to rule out the monopoly situation where the bribes could influence some of the controls used in the regression and thus, could bias the results.

Table 4.2 provides the descriptive statistics of the variables used in the regression.

Table 4. 2: Descriptive statistics

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Honest firms paying bribes (Dummy=1, if bribe paid, =0 otherwise)	1389	.56	.50	0	1
Long service Delivery (country-industry level/measure)	1386	.096	.06	0	.32
Fast Grievance Redress (country level/measure)	1389	.59	.23	0	.91
Large firm Size (Dummy=1, if 100+ workers =0, otherwise)	1389	.19	.39	0	1
Firm Age (natural log of Age)	1374	2.66	.80	0	5.03
Manager Experience (natural log of experience)	1370	2.70	.74	0	4.09
Ownership (Dummy=1, if at least 10% foreign ownership =0, otherwise)	1383	.11	.32	0	1
Exporter (Dummy=1, if at least 10 percent of its annual sales is derived from direct exports =0, otherwise)	1388	.12	.33	0	1
Female Manager (Dummy=1, if Female Top manager =0, otherwise)	1247	.15	.35	0	1
Web (Dummy=1, if firms use website for business purposes =0, otherwise)	1384	.51	.50	0	1
GDP per capita PPP (natural log)	1330	9.12	.81	6.78	10.65
Trade Openness (natural log)	1283	4.22	.40	3.53	5.25
Control of corruption (Index)	1389	-.64	.45	-1.59	1.33

Source: Author's Computation.

Interestingly, 55.94% of the honest firms reported of paying bribes. It also shows that the domestic ownership firms, non-large firms, non-exporter firms, non-female managers represent around 80 percent of the data in each category. The proportion of web users and non-web users are almost identical. Average firm age and manager experience is almost same around 19 years. Country's corruption index shows that on average these are moderately corrupt countries. The data on the countries' GDP and trade shows that these are mostly developing economies. The grievance redress statistics show on average a moderately fast process. The senior managers on average spent 10% of their time in administrative works with bureaucrats.

The dependent variable in the regression specification being a binary variable with values 0 and 1, we run a probit regression in order to check our hypothesis. For the hypothesis to be true both β_1 and β_2 should be greater than zero. All the regressions consider robust standard errors and clustered at the country level. The results are controlled for firm, industry, country, region and time fixed factors. Since GDP, trade openness and control of corruption could be correlated with each other, we include them in separate specifications of the regression. The results are robust with alternative specification like OLS estimation in Linear Probability Model.

4.3.1 The Results

The regression results are reported in Table 4.3 below.

Table 4. 3: The Regression results

	(1) Bribe	(2) Bribe	(3) Bribe	(4) Bribe	(5) Bribe	(6) Bribe
Long service Delivery (country-industry level/measure)	1.23** (.020) [.53]	3.65** (.016) [1.52]	3.59** (.021) [1.56]	4.45*** (.005) [1.58]	3.52*** (.005) [1.26]	3.52*** (.005) [1.26]
Fast Grievance Redress (country level/measure)	.65*** (.000) [.15]	.80** (.021) [.35]	.88*** (.009) [.34]	.83*** (.014) [.34]	.87*** (.010) [.34]	.87*** (.010) [.34]
Large firm Size			-.08 (.410)	-.04 (.726)	-.08 (.455)	-.08 (.455)

	(1) Bribe	(2) Bribe	(3) Bribe	(4) Bribe	(5) Bribe	(6) Bribe
(Dummy=1, if 100+ workers =0, otherwise)			[.10]	[.11]	[.11]	[.11]
Firm Age (natural log of Age)			-.09 (.200) [.07]	-.08 (.212) [.06]	-.04 (.453) [.06]	-.04 (.453) [.06]
Manager Experience (natural log of experience)			-.19*** (.001) [.06]	-.17*** (.008) [.06]	-.14** (.030) [.07]	-.14** (.030) [.07]
Ownership (Dummy=1, if at least 10% foreign ownership =0, otherwise)			.09 (.580) [.15]	.12 (.399) [.14]	.18 (.231) [.15]	.18 (.231) [.15]
Exporter (Dummy=1, if at least 10 percent of its annual sales is derived from direct exports =0, otherwise)			.22* (.104) [.14]	.24* (.076) [.14]	.27** (.053) [.14]	.27** (.053) [.14]
Female Manager (Dummy=1, if Female Top manager =0, otherwise)			-.33*** (.003) [.11]	-.30*** (.009) [.12]	-.32*** (.005) [.12]	-.32*** (.005) [.12]
Web (Dummy=1, if firms use website for business purposes =0, otherwise)			-.14 (.134) [.09]	-.01 (.887) [.08]	.01 (.931) [.08]	.01 (.931) [.08]
GDP per capita PPP (natural log)				-.58*** (.000) [.14]	-.28* (.065) [.15]	-.28* (.065) [.15]
Trade openness (natural log)					.34 (.111) [.22]	.34 (.111) [.22]
Control of Corruption (Index)					-.80*** (.001) [.24]	-.80*** (.001) [.24]
Time (t)						-.001 (.989) [.08]
Constant	-.35*** (.001) [.10]	-.50* (.094) [.30]	.19 (.589) [.36]	4.69*** (.000) [1.15]	.08 (.965) [1.79]	.08 (.965) [1.79]
Industry Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Observations	1386	1386	1200	1144	1078	1078
Pseudo R ²	.01	.10	.14	.17	.19	.19
Predicted probability (bribe=1)	.56*** (.000) [.01]	.56*** (.000) [.03]	.56*** (.000) [.03]	.55*** (.000) [.03]	0.56*** (.000) [0.03]	0.56*** (0.000) [0.03]

P-values are in first brackets. Standard errors are in third brackets. P-values show the significance levels: P<.01 at 1-percent level; P<.05 at 5-percent level; P<.10 at 10% level. Significance is indicated by ***, ** and * at 1%, 5% and 10% respectively. Standard error in Specification (1) are not robust clustered, else all standard errors are robust and clustered at the country level since we have one main explanatory variable at country-industry level and another at country-level. Errors clustered at country-industry level does not change results. The main results remain unchanged with country controls like inflation (CPI from WDI), political stability (WGI), and mean years of schooling (closest lag year available from Barro and Lee, 2021). Time fixed effects in regression specification (6) do not affect our results.

Source: Author's Computation

Table 4.3 shows that a longer service delivery time significantly increases the probability of honest firms paying bribe. The faster grievance redressal also has significant positive impact on honest firms turning ‘corruptible’. The results find support for the hypotheses. The other controls also have their expected sign.

The results table (Table 4.3) begins with a basic regression specification (1) to which more factors are subsequently controlled for to gauge the contribution of each variable in influencing the variable of interest and whether that changes the interpretation (the signs) of the main explanatory variables. In regression specification 1 of Table 4.3, the results are not controlled for the industry, region and time fixed effects. The standard errors in this specification are also not robust clustered. Therefore, the correlation within the country observations is not controlled for in this specification. This specification helps to understand how the main explanatory variables would behave if left uncontrolled. It shows, long service delivery and fast grievance redress increases the probability of the honest firms to pay bribe at 5% and 1% percent level of significance. From specification (2)- specification (6) the standard errors are clustered at the country level to control for the factor that the observations within a country could be correlated but not across countries. Furthermore, in these specifications (2)-(6), the industry fixed effects and the region fixed effects are incorporated which controls for the industry and region-specific characteristics. The time specific characteristics are not controlled for in any of the specifications except (6). This is because, for this analysis, each (country, year) pair has been considered as an individual country²⁴. Such consideration takes account of the changes in factors affecting the (country, year) pair over time. Since data for more than one rounds is not available for many countries it seems not necessary to control for the time-specific characteristics. Nevertheless, the validity of the results is checked using time fixed effects in specification (6) and the results remain unchanged. In specification (3), the

²⁴ Example, Afghanistan_2008 as country 1 and Afghanistan_2014 as country 2.

firm-specific characteristics are controlled for. With increases in age, manager's experience, size of firm the probability of paying bribe falls. Firms with foreign ownership are as much likely to be corruptible as the domestically owned firms. For an exporter firm, the chances of being corruptible increases because they entail higher waiting costs through the lost opportunity from the delay of services than the bribe cost. Female managers are less likely to be 'corruptible'. Firms using websites are less likely to be corruptible. However, with country controls like control of corruption and trade openness, the sign of using web changes to positive even though it remains insignificant. In specification (4), (5) and (6), in addition to firm-specific characteristics the country-specific characteristics are incorporated gradually given that there could be huge correlations with GDP of a country with other country characteristics. This correlation between GDP and other factors is clearly identifiable from the altered significance level of GDP in specification (5) which is 1% to 10% in specification (6) when control of corruption and trade openness is accounted for. The results for country controls also hold as expected. Higher income countries experience lesser corruption. Trade openness is negatively related to corruption. Corruption is likely to be low in countries where the consensus on controlling corruption is high like freedom of press, proper monitoring etc. We have checked, although not reported in Table 4.3, that the main results remain unchanged with other country level controls like inflation (Paldam, 2002), mean years of schooling (Svensson, 2005), political stability (Lederman, Loayza, and Soares, 2005). The data for inflation was taken from World Development Indicators (WDI), for political stability from Worldwide Governance Indicators (WGI), and for mean years of schooling closest lag year available from Barro and Lee (2021).

The marginal effects of the variables of interest, 'long service delivery' time and 'fast grievance redress' time are derived for the regressions reported in Table 4.3. They are evaluated at the mean level and reported in Table 4.4 below.

Table 4. 4: Marginal effects

	Coefficient (P-values) [Standard error] (1)	Coefficient (P-values) [Standard error] (2)	Coefficient (P-values) [Standard error] (3)	Coefficient (P-values) [Standard error] (4)	Coefficient (P-values) [Standard error] (5)	Coefficient (P-values) [Standard error] (6)
Marginal Effect- Long Service Delivery	.48** (.020) [.21]	1.44** (.016) [.60]	1.42** (.021) [.61]	1.76*** (.005) [.63]	1.38*** (.005) [.50]	1.38*** (.006) [.50]
Marginal Effect- Fast Grievance Redress	.26*** (.000) [.06]	.31** (.021) [.14]	.35*** (.009) [.13]	.33*** (.014) [.13]	.34*** (.011) [.13]	.34*** (.011) [.13]

Note: Reporting the required as per regression specifications in Table 4.3. P-values and standard errors are reported in the first and third brackets respectively. P-values show the significance levels: P<.01 at 1-percent level; P<.05 at 5-percent level; P<.10 at 10% level. Significance is indicated by ***, ** and * at 1%, 5% and 10% respectively

Table 4.4 shows that 1% increase in the length of service delivery time increases the probability of an honest firm paying bribe by 1% and a slightly fast grievance redress time increases the same by 0.3%. The results are significant at 1-percent and 5-percent level as indicated by the p-values.

4.4 Conclusions

There are different types of individuals in a corrupt economy. It is not that everyone violates law, participates in bribery and loves a corrupt regime. There exist individuals who think corruption is awful yet pays bribe for avoiding the cost of delay in receiving public goods/services. There are also individuals who do not compromise. The present chapter searches for institutional factors that are responsible in turning the ‘honest’ firms, who think corruption as an obstacle in doing business, paying bribe. It uses the WBES data for its purpose and interprets it in a novel way. It finds that the slower delivery process and faster grievance redressal process are conducive for participation of the ‘honest’ firms in bribery. The results suggest, for controlling corruption among these firms, the government should speed-up the delivery of the public good/service. Counterintuitively, it also suggests that a faster grievance redress/legal process would increase corruption.

Appendix C

For checking whether the *de jure* data computed by us from the WBES at the firm level is comparable with the World Bank Doing Business (WBDB) country-level data on the *de jure* time required in public goods/service delivery, we adopt the following steps. First, we derive the average *de jure* time required for public goods/service delivery from the WBES data in an industry in a country, which shows very little variation at the industry level; and then, we calculate the weighted industry average of the country by using alternatively the share of permanent workers and the share of fixed assets in an industry as weights. When we use the share of permanent workers as weight, we call it WBESP and when we use the share of fixed asset as weight, we call it WBESF. We rank the countries according to their WBESP and WBESF scores. For the WBDB data, we take sum of the scores of the following five indicators: score of time for starting business, score of time for dealing with construction permits, score of registering property, score of getting electricity and score for paying taxes. In the WBDB data, higher is the score the less time is required for receiving the delivery. Therefore, the country ranks with WBDB is expected to be negative with the ranks derived either with WBESP and WBESF.

Table C. 1: Pearson’s Correlation Coefficient

	WBDB
WBESP	-0.23*** (.000)
WBESF	-0.22*** (.000)

Source: Author’s Computation.

P-values are reported in the first brackets. P<.01 shows significance at 1% level. Significance is indicated by ***, ** and * at 1%, 5% and 10% respectively.

Table C.1 confirms that our interpretation of the *de jure* data from WBES falls in line with the more widely used WBDB data.

Table C. 2: Description of Explanatory Variables

Variable	Definition and Source	Author's Computation
Bribe	Percentage of establishments that consider that firms with characteristics similar to theirs are making informal payments or giving gifts to public officials to "get things done" with regard to customs, taxes, licenses, regulations, services etc. It asks establishments "On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?" If this is positive it is considered to pay. Also, if a firm has refused to answer spontaneously the WBES interpret it as one involved in bribery.	
De jure time for administrative purposes (Long service delivery)	Average percentage of senior management's time that is spent in a typical week dealing with requirements imposed by government regulations (eg. taxes, customs, labor regulations, licensing and registration), including dealings with officials, completing forms, et cetera. Source: Enterprise Survey	Derived from Type I group. Then taking the average of these firm's time spent in a particular country times industry cluster and assigning a single value (the average) for all the firms in the same country times industry cluster. De jure = cluster average time spent/100
De jure Score Court Time (Fast Grievance Redress)	The score for time to enforce contracts benchmarks economies with respect to the regulatory best practice on the indicator. The score is indicated on a scale from 0 to 100, where 0 represents the worst regulatory performance and 100 the best regulatory performance. The time to enforce contracts is counted from the moment plaintiff decides to file the lawsuit in court until payment. The average duration of the following three different stages of dispute resolution is recorded: (i) filing and service, (ii) trial and judgment, and (iii) enforcement. Country-level data.	Redress= Score/100

Variable	Definition and Source	Author's Computation
	Source: World Bank Doing Business	
Industry	ISIC 2 digit Rev 3.1. Source: Enterprise Survey	As in Appendix Table D.2: Industry details. 21 Industry Dummies. Source: Authors Computation, Francis et al. (2020) and United Nations 2002 ISIC Revision 3.1. Recycling is dropped.
Firm Size	Firm size is a composite measure of permanent and temporary workers. The number of temporary workers is adjusted by the average number of months worked in a year. Small: 5-19 workers Medium: 20-99 workers Large: 100+ Source: Enterprise Survey	Firm Dummies=0 if firm size is small and medium Firm Dummies=1 if firm size is Large Reference group is non-large firm.
Firm Age	Age (in years) of the firm based on the year in which the firm began operations. Source: Enterprise Survey	Firm Age=natural log of variable (Age in years)
Firm Ownership	Domestic (less than 10% foreign ownership) Foreign (At least 10% Foreign Ownership) Source: Enterprise Survey	Ownership Dummies Reference group is Domestic.
Female Manager/Gender of Top Manager	Is the Top Manager female? Yes/No. Source: Enterprise Survey	Manager Dummies Reference group is Not Female.
Manager's Experience	Years of experience of the top manager working in the sector. Source: Enterprise Survey	natural log of variable (experience in years)
Export status	Exporter (at least 10 percent of its annual sales is derived from direct exports) or Non-Exporter. Source: Enterprise Survey	Exporter status dummies Reference group is Non-Exporter.
Website	At the present time, does this establishment use its own website? Yes/No. Source: Enterprise Survey	Website Dummies Reference group is not having own website for business activities.

Variable	Definition and Source	Author's Computation
GDP per capita, PPP (constant 2017 international \$)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2017 international dollars. Source: World Development Indicators.	natural log of GDP
Trade Openness [Trade (% of GDP)]	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. Source: World Development Indicators.	natural log of Trade Openness
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance) Source: World Governance Indicators.	
Region	AFR=Africa region; EAP=East Asia and Pacific region; EAC=Eastern European and Central Asia region; LAC=Latin America and the Caribbean region; MNA=Middle East and North Africa region; SAR=South Asia region. Source: Enterprise Survey	Location Dummies Reference is AFR.

Source: Author's Computation.

Appendix D (Supplementary data)

Table D. 1: Country Details

Serial no.	Country	Region	Number of firms
1	Afghanistan2008	South Asia Region	13
2	Afghanistan2014	South Asia Region	8
3	Albania2007	Eastern European and Central Asia region	7
4	Albania2019	Eastern European and Central Asia region	7
5	Angola2006	Africa Region	8
6	Angola2010	Africa Region	18
7	Antiguaandbarbuda2010	Latin America and the Caribbean region	3
8	Argentina2006	Latin America and the Caribbean region	6
9	Argentina2010	Latin America and the Caribbean region	9
10	Armenia2013	Eastern European and Central Asia region	6
11	Benin2016	Africa Region	3
12	Bolivia2006	Latin America and the Caribbean region	5
13	Bosnia and Herzegovina2009	Eastern European and Central Asia region	3
14	Bosnia and Herzegovina2013	Eastern European and Central Asia region	7
15	Botswana2010	Africa Region	3
16	Bulgaria2007	Eastern European and Central Asia region	23
17	Bulgaria2013	Eastern European and Central Asia region	4
18	Burundi2014	Africa Region	3
19	Cambodia2016	East Asia and Pacific region	11
20	Cameroon2016	Africa Region	3
21	Colombia2010	Latin America and the Caribbean region	7
22	Colombia2017	Latin America and the Caribbean region	27
23	Croatia2007	Eastern European and Central Asia region	7
24	Croatia2013	Eastern European and Central Asia region	4
25	Côte d'Ivoire2016	Africa Region	6
26	Dominican Republic2010	Latin America and the Caribbean region	9
27	Dominican Republic2016	Latin America and the Caribbean region	13
28	Drc2013	Africa Region	24
29	Ecuador2006	Latin America and the Caribbean region	9
30	Ecuador2010	Latin America and the Caribbean region	3
31	Ecuador2017	Latin America and the Caribbean region	6
32	Egypt2013	Middle East and North Africa region	20
33	Egypt2016	Middle East and North Africa region	18
34	Egypt2020	Middle East and North Africa region	29
35	El Salvador2010	Latin America and the Caribbean region	3
36	El Salvador2016	Latin America and the Caribbean region	6

Serial no.	Country	Region	Number of firms
37	Eswatini2016	Africa Region	4
38	Ethiopia2015	Africa Region	4
39	Guatemala2006	Latin America and the Caribbean region	6
40	Guatemala2010	Latin America and the Caribbean region	11
41	Guatemala2017	Latin America and the Caribbean region	14
42	Guyana2010	Latin America and the Caribbean region	3
43	Honduras2006	Latin America and the Caribbean region	11
44	Honduras2010	Latin America and the Caribbean region	6
45	Indonesia2015	East Asia and Pacific region	7
46	Iraq2011	Middle East and North Africa region	8
47	Israel2013	Middle East and North Africa region	3
48	Italy2019	Eastern European and Central Asia region	3
49	Kazakhstan2009	Eastern European and Central Asia region	15
50	Kazakhstan2013	Eastern European and Central Asia region	21
51	Kazakhstan2019	Eastern European and Central Asia region	19
52	Kenya2007	Africa Region	16
53	Kenya2013	Africa Region	19
54	Kenya2018	Africa Region	22
55	Kosovo2019	Eastern European and Central Asia region	3
56	Kyrgyz Republic2009	Eastern European and Central Asia region	10
57	Kyrgyz Republic2013	Eastern European and Central Asia region	10
58	Kyrgyz Republic2019	Eastern European and Central Asia region	9
59	Lebanon2013	Middle East and North Africa region	10
60	Lebanon2019	Middle East and North Africa region	9
61	Malaysia2015	East Asia and Pacific region	16
62	Mali2016	Africa Region	4
63	Moldova2009	Eastern European and Central Asia region	8
64	Moldova2013	Eastern European and Central Asia region	9
65	Moldova2019	Eastern European and Central Asia region	3
66	Mongolia2009	East Asia and Pacific region	3
67	Mongolia2013	East Asia and Pacific region	8
68	Morocco2013	Middle East and North Africa region	16
69	Morocco2019	Middle East and North Africa region	17
70	Mozambique2018	Africa Region	24
71	Namibia2014	Africa Region	9
72	Nicaragua2016	Latin America and the Caribbean region	3
73	Niger2009	Africa Region	4
74	Panama2010	Latin America and the Caribbean region	11
75	Paraguay2006	Latin America and the Caribbean region	7

Serial no.	Country	Region	Number of firms
76	Paraguay2010	Latin America and the Caribbean region	7
77	Paraguay2017	Latin America and the Caribbean region	7
78	Peru2006	Latin America and the Caribbean region	4
79	Peru2010	Latin America and the Caribbean region	17
80	Peru2017	Latin America and the Caribbean region	54
81	Philippines2009	East Asia and Pacific region	37
82	Philippines2015	East Asia and Pacific region	37
83	Romania2009	Eastern European and Central Asia region	4
84	Romania2013	Eastern European and Central Asia region	12
85	Romania2019	Eastern European and Central Asia region	18
86	Russia2012	Eastern European and Central Asia region	90
87	Russia2019	Eastern European and Central Asia region	15
88	Serbia2009	Eastern European and Central Asia region	11
89	Sierra Leone2017	Africa Region	6
90	Slovakia2019	Eastern European and Central Asia region	12
91	Solomon Islands2015	East Asia and Pacific region	23
92	Southafrica2007	Africa Region	19
93	Southafrica2020	Africa Region	28
94	Timor-Leste2015	East Asia and Pacific region	3
95	Tonga2009	East Asia and Pacific region	5
96	Tunisia2020	Middle East and North Africa region	45
97	Turkey2008	Eastern European and Central Asia region	5
98	Turkey2013	Eastern European and Central Asia region	3
99	Uganda2013	Africa Region	6
100	Ukraine2008	Eastern European and Central Asia region	16
101	Ukraine2013	Eastern European and Central Asia region	7
102	Ukraine2019	Eastern European and Central Asia region	56
103	Uzbekistan2008	Eastern European and Central Asia region	12
104	Vietnam2009	East Asia and Pacific region	6
105	Vietnam2015	East Asia and Pacific region	16
106	West Bank And Gaza2013	Middle East and North Africa region	3
107	Yemen2010	Middle East and North Africa region	37
108	Yemen2013	Middle East and North Africa region	22
109	Zambia2007	Africa Region	7
110	Zambia2019	Africa Region	3
111	Zimbabwe2016	Africa Region	7

Source: Author's computation.

Table D. 2: Industry Details

ID	ISIC	Activity
1	15 and 16	Manufacturing of food products and beverages; Manufacture of tobacco products
2	17	Manufacture of textiles
3	18	Manufacture of wearing apparel; dressing and dyeing of fur
4	19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
5	22	Publishing, printing and reproduction of recorded media
6	23 and 24	Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of chemical and chemical products
7	25	Manufacture of rubber and plastics products
8	26	Manufacture of other non-metallic mineral products
9	27	Manufacture of basic metals
10	28	Manufacture of fabricated metal products, except machinery and equipment
11	29	Manufacture of machinery and equipment n.e.c.
12	30,31,32 and 33	Manufacture of office, accounting and computing machinery; Manufacture of electrical machinery and apparatus n.e.c.; Manufacture of radio, television and communication equipment and apparatus; Manufacture of medical, precision and optical instruments, watches and clocks
13	36	Manufacture of furniture; manufacturing n.e.c.
14	45	Construction
15	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
16	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
17	52	Retail trade, except of motor vehicles and motor cycles; repair of personal and household goods
18	55	Hotels and restaurants
19	60	Land transport; transport via pipelines
20	63	Supporting and auxiliary transport activities; activities of travel agencies
21	70,71,73 and 74	Real estate activities; Renting of machinery and equipment without operator and of personal and household goods; Research and development; Other business activities
22	72	Computer and related activities

Source: Authors Computation from Francis et al. (2020) and United Nations 2002 ISIC Revision 3.1. Recycling is dropped.

Chapter 5

SUMMARY AND CONCLUSIONS

This chapter presents the summary of the results and concludes the thesis.

The thesis tried to explore the political economy aspect of corruption through the stakeholder's perspective in situations of red tape. Since voice against corruption requires an applicant's dislike/animosity towards corruption, in this thesis with a theoretical model we derive conditions under which the agents will dislike corruption and prefer an honest regime in presence of red tape in an economy. In the thesis, red tape is considered an efficient screening procedure. The length of red tape and service delivery and the length of grievance redress against extortion are institutionally given. While the allocation of the good to a deserving applicant derives a positive externality to society, its allocation to an undeserving applicant derives a negative externality to it. The government wants to implement the social optimum in which only the deserving applicants receive a public good, which is provided free of cost. It uses red tape as a screening device due to a lack of information about the qualification of the applicants. The bureaucracy has both corrupt officials and honest officials and the corrupt officials try to extract bribe rent from both types of applicants. The type of applicant is private information to the applicants and gets revealed only at the end of the screening process. An official meets an applicant throughout the length of the screening process; first, at the point of submission of the credentials and second, at the time of delivery of the good. A corrupt official has no way to learn about the type of applicant on their first meeting when he demands a bribe for speeding up the delivery of the good. However, he knows about her type at the end of the screening process. Therefore, if a deserving applicant does not accept the speed-money offer, gets extorted at the point of delivery of the good. An undeserving applicant in both situations participates in collusion. In the framework presented in the thesis, an applicant may pay the speed money but may also raise her voice against corruption.

Chapter 2 simplifies the model by assuming away the possibility that a deserving applicant may go to the grievance redress authority complaining about extortion. It rather focuses on the length of the screening process, which can be altered through exogenous interventions like the introduction of ICT-enabled services. The introduction of ICT is expected to shorten the time required for the delivery of the good. In the basic model, the results suggest that if the number of deserving applicants is high in society, an exclusionary contract will be offered by the corrupt official which is costly and affordable only to the deserving applicants. If the length of red tape is not long enough, in such a situation, the deserving applicant would reject an offer of speed money payment from a corrupt official and would prefer an honest regime to a corrupt regime. If the number of deserving applicants is lower than a threshold level, a pooling contract is offered that all the applicants can afford. Thus, both types of applicants pay speed money to receive the good earlier than the stipulated time fixed in an honest regime. In this case, a deserving applicant also prefers corruption as she benefits from the faster delivery of the good. The results highlight two important facts. One is important from the policy perspective that shortening of red tape through mechanisms like ICT may generate support for an honest regime. The other is that while supporting the corrupt regime the deserving applicants think only about their benefit from the shortening of the length of the red tape, but ignore the social cost generated through misallocation of the good to the undeserving applicants. If the number of deserving applicants is below a threshold level, a corrupt regime that works through speed money may result in welfare loss to society. Therefore, the result opposes the conventional idea in the economics literature that speed money in a situation of red tape would grease the wheel of development. The introduction of policy reforms like ICT would weaken the argument in favour of ‘greasing the wheel’ by reducing the benefit from the payment of speed money.

Chapter 3 introduces a redressing authority in the model. The redressing process is also time-consuming and has a probable rate of successfully redressing complaints. The chapter compares the relative efficiency of the two administrative policy reforms viz. the fastening of delivery of the good and the fastening of the grievance redress in harnessing support toward an honest regime. It is found that faster delivery of a public good is a relatively more effective instrument compared to a faster grievance redress process for generating support for an honest regime. This is because a faster grievance redress strengthens the bargaining position of the deserving applicant who complains against possible extortion she faces and hence, reduces the amount of speed money in period 1 itself. Therefore, counterintuitively support for a corrupt regime increases. By the same intuition, a longer delivery process would increase the chance of finding an extortion equilibrium in this situation, which is unexpected in a model without the grievance redress mechanism. The effect of the two instruments mentioned above on bribe rates as predicted by the model has also been tested by using the World Bank Enterprise Survey database and the Doing Business database. The chapter concludes that in the case of public provision of private goods, the success of a ‘bottom up’ approach to controlling corruption, where the stakeholders are given a voice against corruption, may depend on the ‘top down’ approach of administrative reform.

Chapter 4 searches for institutional factors that are responsible for turning the ‘honest’ firms, who think corruption as an obstacle to doing business, paying a bribe. In this chapter, first, we divide the firms in the World Bank Enterprise Survey data into four types and derive the *de jure* red tape data for the delivery of public services. The four types of firms are: Type I: the firms who report not paying a bribe and think that corruption is not an obstacle to doing business; Type II: the firms who report not paying a bribe and think that corruption is an obstacle in doing business; Type III: the firms who report paying a bribe and think that corruption is not an obstacle in doing business; Type IV: the firms who report paying a bribe

and think that corruption is an obstacle in doing business. We record the *de facto* time spent by the senior manager of the four types of firms in the regulatory process and see that the type I firms are the ones who did not face corruption and therefore their *de facto* length of time spent in administrative procedures could be taken as the *de jure* time for service delivery. Type III firms are firms engaged in collusive practices. Both Type II and Type IV firms believe that corruption is an obstacle to business. We interpret these firms as honest firms. But Type II firms do not pay a bribe and remain as honest facing unusually long delivery of the public good confirming the theorization of Guriev (2004). Type IV firms pay a bribe and successfully reduce the length of delivery of the public good. We interpret them as ‘corruptible’. We study the impact of longer service delivery time and longer redress process on the bribe-paying probability of the ‘honest’ firms. Since the Enterprise Survey data do not provide the time taken for grievance redressal the *de jure* time is derived from the World Bank Doing Business data, which is a comprehensive one. In the regression analysis, controlling for other variables, we find significant coefficients of both the variables with the sign expected in the theory developed in Chapters 2 and 3. The results suggest, that for controlling corruption among the ‘honest’ firms, the government should speed up the delivery of public goods/services. Counterintuitively, it also suggests that a faster grievance redress/legal process would increase corruption.

The thesis can be adopted for future research in many ways. First, the present model could be extended with varying discount factors for officials and applicants that would make the model more realistic. Second, it could be extended using a competitive bureaucracy. The competitive bureaucracy can be compared in terms of its efficiency with the instruments for controlling corruption discussed in the present thesis viz. the faster delivery of public goods and services and the faster redress of the grievances of the applicants.

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