WHO IS WHO IN PETTY CORRUPTION

THE RATIONALITY BEHIND SMALL BRIBES

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Dedicated with love and gratitude to my wife Paola, my daughters Antonia y Francisca and my parents, Manuel and Urit

In memoriam of Paz Fabrega-Villalobos

CONTENTS

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LIST OF FIGURES

LIST OF TABLES

ABSTRACT

To obtain access to public services, users can follow the formal procedures or they may try informal arrangements with the bureaucrats in charge. In ‘face to face’ societies prevalent in many Latin American, African and Asian countries, where users choose the second option, they impose a dilemma on bureaucrats: breaking the formal rules to help those users implies the risk of a legal or judicial sanction, but rejecting a request for help is also costly within dense networks. On the other hand, while formal procedures are equally available for all users, informal arrangements through social networks are unequally available to them. As a result, better connected users have greater chances of success in corrupted exchanges with bureaucrats. Furthermore, relatively closer users can sustain cooperation with bureaucrats in the long term, even if they do not have direct ties to one another. Hence, the topology of a network affects the characteristics of a corrupted exchange between pairs of users and bureaucrats. Those with overlapped networks can exchange favors on the basis of long-term relationships whereas unconnected or weakly interconnected ones must monetize their interaction. Analysis of survey data from 16 African countries supports the claim that well-connected individuals have a greater chance of being involved in petty corruption.

INTRODUCTION – PETTY CORRUPTION AS A PROBLEM OF COOPERATION

Petty corruption, also known as street level and bureaucratic corruption, is the kind of corruption that citizens face daily when seeking access to medical treatment and medication, school enrollment, licenses, the police and so on. It pettiness refers to the sum of money that is usually involved in a corrupt interaction of this kind. That amount of money is negligible when compared with the big sums of money flowing though corrupted deals among big firms and politicians. This type of corruption at the bottom rung of bureaucracy is a widespread phenomenon in many countries in Sub-Saharan Africa, Latin America and South Asia.

Analytically speaking, there are three main players and two main interactions in petty corruption. The players are: the governing authority who delegates the provision of goods and services, the bureaucrat in charge of that provision, and the private user of those goods and services. The relevant interactions among them are: the one between the governing authority and the bureaucrat, and the one between the bureaucrat and the user. Figure I.1 illustrates the exchanges involved in those relationships. The governing authority G designs a policy and pays a salary to a bureaucrat B who manages the delivery of the goods and services. When the delivery involves corrupted deal, the user U has paid an unofficial fee (a bribe), or give a gift or do a favor to him in order to get access to those goods or services.

The rational choice studies on petty corruption have focused the analysis on the first of these two interactions (see, for example, Shleifer and Vishny, 1993). Thus, corruption is studied as a delegation problem. Under this framing of the problem, the governing authority (or principal) G delegates the provision of public goods and services on the bureaucrat (or agent) B under some set of formal procedures and the key point is that there is an asymmetry of information between

them that may benefit the latter. Specifically, to the extent that monitoring can be costly, B has incentives to use his informational advantage to his own benefit by bending or breaking the formal rules designed by G. Therefore, G´s problem is to find a mechanism which discourages the bureaucrat from behaving in such a way. Since Becker and Stigler (1974), given the framework of the problem, the approach has taken advantage of the principal-agent techniques to study this part of the phenomenon. I call this the *standard rational choice approach*.

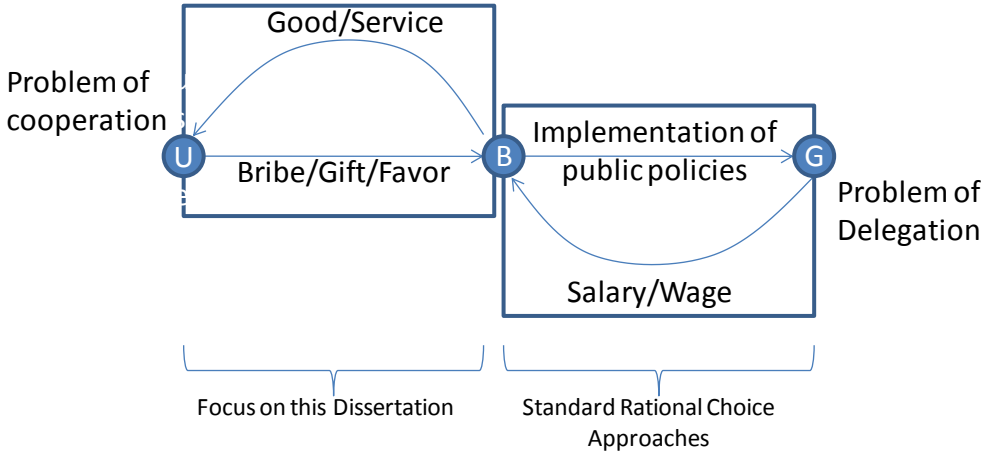
The basic conclusion of the standard approach is that the bureaucrat will cross that line separating honest from corrupt behavior if the expected costs of being caught are lower than the bribes.

For policy implications, authorities cannot control the size of bribes, but they have several tools to influence the expected costs of becoming a corrupt bureaucrat and also the opportunity costs of being a honest one. Thus, the literature has been prolific on implications. For instance, on one hand, more observability of public officers' actions and more severe sanctions can be introduced to increase the expected costs of being caught in corrupted exchanges; and, on the other hand, higher wages and merit-based incentives can decrease the opportunity cost of being an honest bureaucrat.

Now, it is important to notice that, for the explanations and implications obtained from the standard approach, the interaction between the user and the bureaucrat is omitted in the analysis. Specifically, it does not matter who the user is and what kind of payment he gives to the bureaucrat. Firstly, with regard to the user, the standard approach to corruption simply requires that users be rational. This requirement translates into the idea that, for corruption to happen, there must be a user willing to pay a bribe big enough to cover the bureaucrat's expected costs of

being caught. If he is not willing to pay such an amount, petty corruption is not possible and the analysis becomes uninteresting. Secondly, underlying the standard approach it rests the assumption that all users behave in the same way. For instance, it cannot be explained the empirical observation that, in order to get access to the good or services, some users pay bribe but others give gifts or favors. Tacitly, these variations are considered superfluous.

Figure I.1 – Actors involved in petty corruption



I suggest that the lack of a more detailed analysis of the interaction between the user and the bureaucrat has important consequences for the explanatory power of the standard approach, especially within geographical areas (countries, cities, towns, etcetera) where petty corruption is rampant. In those areas, their inhabitants are, at the same time, both victims and practitioners. At the macro level, they are victims because the spread of corruption jeopardizes the development of better formal institutions, modern public services, and economic growth. But, ironically, at the micro level, they practice corruption to deal with poorly working formal institutions.

The fact that users are practitioners and not mere victims of petty corruption suggests that they can also behave in opportunistic ways. But, does it matter? In all likelihood, the magnitude of the bribes, gifts and favors characterizing users' participation in petty corruption is not

substantial enough when we compare them with the sums involved in the grand corruption among politicians and big firms that are exposed in newspapers time to time. That gives the wrong impression that their participation in petty corruption is a phenomenon of negligible importance that does not warrant a separate chapter in the study of corruption. However, it is precisely its pettiness that matters. In any social system, other forms of corruption involving large sums of money are unreachable for the majority. They are mere spectators and, eventually, angry victims of the collusion between bureaucrats, politicians, big firms, etcetera. But petty corruption has the potential to be popular, potentially available to everyone. Thus, when it is practiced by many, it spreads along the social system the belief that formal rules can be overlooked or bended; such that, people have incentives to invest time (and other resources) to find ways of reaping benefits by breaking the formal rules.

The result is that the sum of many petty corrupted exchanges made by many different individuals erodes the coordinating capacity of formal institutions. In the big picture, this dynamic puts policymaking design at risk and becomes an important factor to explain institutional failure.

To put it differently, when they are victims, users of public services can be important players in anti-corruption agendas, acting as fire alarms that let authorities know about the wrongful practices carried out by some bureaucrats. Indeed, when users can only be spectators of the abuses committed by others, it is easier to organize their collective action against the perpetrators. Anticipating that reaction, some political entrepreneurs can successfully build their careers and electoral campaigns by profiling themselves as the anti-corruption crusaders, and, in the long term, what emerges is a virtuous circle against the misuse of public office for private gain.

However, when people know that there is a way to circumvent formal rules for their own benefit, they become part of the problem rather than part of the solution. Moreover, they do not have strong incentives to denounce the corruption perpetrated by others when they expect to be involved in similar practices at some point in the future. As a result, every new rule designed to bring transparency to the behavior of public servants is followed by new, ingenious ways through which colluded users and bureaucrats bend or break the new rule. In that scenario, collective action against corruption is more difficult to foster and public discourse against it can easily become a wish without practice.

For the above reasons, it is worth for rational choice scholars interested on understanding the phenomenon of corruption to also study the interactions among users and bureaucrats. The purpose of this dissertation is to contribute to move forward that researching agenda.

A rational choice approach to this side of the phenomenon must be built on a different framework than the standard one. The reason for this is simple: the players, their constraints and their incentives are different. For instance, users cannot change formal procedures, or increase sanctions, or raise wages, or take advantage of any of those tools available to ruling authorities to influence bureaucrats' behavior. In fact, as said before, they are not necessarily motivated to respect the formal procedures in all circumstances.

As a result, the study of the user-bureaucrat interaction requires to understand not only bureaucrats but also users as strategic players. Indeed, when both the bureaucrat and the user behave in such a way, petty corruption looks more like a problem of cooperation among potential partners rather than a exploitation of innocent users by unscrupulous bureaucrats as it is

implicitly assumed in the standard approach. Therefore, in order to understand when a corrupt exchange can happen, it is relevant to ask who can coordinate with whom.

To the best of my knowledge the rational choice literature has only one previous line of research that have been advanced by Lambert-Mogiliansky and her coauthors in a series of papers (Lambert-Mogiliansky *et al*. 2007, 2008, 2009) in which the behavior of the private agent is explicitly studied. However, the analysis is still one in which the private agent is a victim of the bureaucracy and his only relevant behavior is to either apply for the good (or service) or quit. Briefly, they study a common situation happening in the underdeveloped world where entrepreneurs must go through a long process through several public agencies to get all the permits to start a business. Normally, those permits are provided by a sequence of public agents with monopoly power on a part of the process. The key strategic problem in their framework is that each bureaucrat in the track does not know the value of the project and the bribe requested by previous bureaucrats in the track. Consequently, each bureaucrat is uncertain about the size of the bribe that he can charge without inducing the entrepreneur to abandon the project.

Their analyses show, among other things, that the lack of coordination among bureaucrats to charge a single bribe is inefficient. They results are consistent with Shleifer and Vishny (1993) accounts that a single tax produces a lower dead weight loss than a multiplicity of uncoordinated bribes. They also explore other structures but a common theme in all of them is that petty corruption is about how bureaucrats can maximize the bribes that they get from users.

Thus, in both, the standard approach and Lambert-Mogiliansky and coauthors approaches, users` participation in petty corruption is still an epiphenomenon. In simple, their participation in corrupt exchanges is imposed by the grabbing hands of the bureaucrats.

The understanding of users (of the goods and services delivered by public agencies) as victims impedes us to study their strategic behavior. This is a byproduct of the methodological decision of focusing the attention on the asymmetries of information that, certainly, exist among bureaucrats and their governing authorities and among bureaucrats and private agents. That decision impedes us to study the problem of cooperation that private and public agents must solve in the first place. Thus, those approaches are mute with respect to who are those pairs of users and bureaucrats who collude in petty corrupt exchanges missing an important part of the phenomenon.

Therefore, I choose a different path to analyze users` participation in petty corruption. I expect to convince the reader that there is a gain in explanatory power of rational choice models of corruption specially useful for social contexts in which corruption is rampant if we hold the asymmetries of information and focus the attention on explaining why the bureaucrat crosses the line in his interactions with some users but not in his interaction with others whose willingness to pay is the same.

In order to build that alternative framework capable to explain the problem of cooperation involved in corrupt exchanges I will take advantage of insights taken from the anthropological literature in the topic. The anthropological literature has suggested that corruption is a cultural phenomenon that must be understood in the social context in which it happens (see Oliver de Sardan 1999 and Smith 2007). Anthropologists pay attention to the fact that people mutually reciprocate favors, exchange gifts and pay or receive tips as part of generally accepted private social exchanges; and civil servants also participate in those exchanges as a routine of their private life.

From an anthropological perspective, petty corruption occurs when bureaucrats use goods and services that they control by virtue of their public role as part of their private interactions. Thus, corruption would be a consequence of the vagueness with which the private and public roles of civil servants are separated in practice. At that point, the cultural factor comes into play: people in different social systems can develop different criteria to separate public life from private life. Thus, an exchange that is considered "corruption" in a given social system can be a legitimate and acceptable one in another. Consequently, anthropologists claim that we cannot truly understand the phenomenon of corruption without giving serious consideration to the social context in which it happens. With this in mind, in order to avoid any preconception about the rightness or wrongness of corrupt exchanges, anthropological studies on corruption limit themselves to describing petty corruption in its many forms and with as many details as possible.

In sum, the anthropological understanding of corruption as a form of social exchange offers a promising setup for our inquiry that can be studied within a rational choice perspective. The bureaucrat provides a good or service under his control and the user offers a bribe (or a gift or a favor) in exchange. Both need an enforcement mechanism to guarantee their interaction: the user needs to guarantee that his favors, gifts or bribes will be reciprocated by being given the good or service and, simultaneously, the bureaucrat also needs to guarantee that his breaking of the rules will be compensated by something else.

Consequently, while the authorities-bureaucrat's interaction can be studied as a delegation problem, the bureaucrat-user interaction can be studied as a problem of cooperation in which both must choose the rules or institutions in which their interaction will rest on.

In general, there are three broad kinds of institutions available in which support an exchange: the laws, the markets and the networks (Granovetter, 1985, 2005). Given that corruption implies breaking formal rules, pairs of users and bureaucrats cannot sustain a corrupted exchange on legal contracts. Thus, users and bureaucrats must sustain their corrupted exchange either on price or network mechanisms.

A user can rely on a price mechanism to set up a corrupted deal if there are several bureaucrats available for the exchange. In that scenario, the information about opportunistic behaviors is transmitted through prices. User can credibly threaten bureaucrats to select another counterparts if they fail to provide the good or service; and, simultaneously, the bureaucrat can credibly threaten to reject the request for a good or service if the user does not pay. Therefore, markets can sustain corruption as a *quid pro quo* interaction. However, market solutions face an important limitation: bureaucrats and users want to hide their corrupted exchanges to avoid judicial costs. Hence, they are not interested on making public statements about the prices of their exchanges, and consequently, that information is not publicly known. Consequently, we should not expect that information about the market value of dealing with a particular partner in a corrupted transaction will spread across the social system through a price mechanism.

When legal and price mechanisms are unavailable to sustain corrupted deals, there is a good theoretical reason to explore the role of networks on corruption. For that, we need to analyze the way in which networks modify the incentives of users and bureaucrats. The basic idea is simple: in the standard approach, it is implicitly assumed that there is only one set of rules that matters (those designed by the principal and broken by the bureaucrats). My approach relaxes that assumption by allowing users and bureaucrats to decide what is the best institutional framework to govern their interaction (by "best", I mean that which is cheaper for them). Specifically, I

argue that they have a choice to make between (a) following the principal's rules, namely *formal rules*, and (b) following reciprocity rules that rest on their belonging to the same social networks, namely *informal rules*. The point being that each institutional framework has its own benefits and disciplinary mechanism to prevent defections (judicial and social punishment, respectively). Consequently, the user-bureaucrat's choice is not between following or breaking formal rules but rather deciding what rules to follow (either formal or informal) and, simultaneously, what rules to break (informal or formal, respectively) to coordinate their interaction. Within this framework, the dissertation poses three main questions. If we randomly select pairs of bureaucrats and users:

(a) Which pairs face higher risks of being involved in corrupted exchanges?

(b) What is the bureaucrat's minimum price for each of his potential pairs?

Finally,

(c) In which social system should petty corruption be more frequent?

The organization of the research

Chapter 1 explains the causal link of networks on petty corruption. It starts with two real cases of petty corruption in the access to education in Nigeria. Choosing Nigeria and these examples was not done randomly. Commentators, scholars, policymakers and its own citizens all agree that corruption is pandemic in Nigeria (see, for example, Dike 2005 and Lewis and Etannibi 2005). Moreover, anticorruption speeches in this country are at the forefront in all its electoral campaigns and the development of anticorruption agendas has even involved multilateral organizations such as the World Bank. However, the fact is that, despite the public alarm and

reform efforts to decrease the levels of corruption in the country, the phenomenon is still rampant. As a result, this oil-based economy systematically ranks as one of the most corrupted places around the world. With this record, it should not be surprising that Nigeria has provided a rich ground for ethno-methodological analyses of corruption and a prolific source of examples.

The examples that I use here are taken from the work done by anthropologist Daniel Smith in a book that is suggestively titled "Nigeria: a Culture of Corruption". The examples have two attractive features: first, Smith had the opportunity to be directly involved in them as both a participant and an observer. That allowed him to provide details that are usually hidden to third parties. Second, both cases of corruption were perpetrated by the same user in her attempts to obtain access to higher levels of formal education by breaking the formal admission procedures. Nevertheless, the features of both corrupted deals were different. Later, the analysis of these details will help us to show the underlying mechanism connecting clientelism and bribery, two phenomena that are usually studied as different ones, are conceptually the same phenomenon.

Once the link between networks and corruption is made explicit through the examples provided, I then discuss where the standard approach must be modified to incorporate networks within a rational choice theory of corruption. Such an effort requires the study of networks of reciprocity, the norms that emerged within them, and the impact that they have on the behavior of bureaucrats. The chapter ends with the study of the bureaucrat's dilemma that emerges when corruption is understood as a problem of cooperation between a user and a bureaucrat rather than a delegation problem between a bureaucrat and his principal. Departing from the standard approach, I will show why bureaucrats can accept bribes that are smaller than the expected costs of being caught and still be rational individuals.

I suggest that networks have an impact not only on the existence of petty corruption but also on the price that users pay in each corrupted exchange. This idea is motivated in Chapter 1 and studied in detail in Chapter 2. In short: networks provide access to resources, and the network's members can jeopardize the access that others could have to those resources. That capacity of threaten others' access to network resources is based on their relative position within the network, such that, socially closer individuals have more credible devices to support cooperation. From there, differences in their relative position explain why some individuals exchange favors with bureaucrats but others must bribe them. Thus, the inclusion of networks in the analysis lays down the foundation for a joint explanation of clientelism and bribery.

At that stage of the research, further inquiries are difficult without mathematical tools. For that reason, Chapter 2 is centered on the development of formal expressions to capture the relevance of individuals´ positions in networks. For that purpose, I have used tools from graph theory. These tools show how the relative position of an individual within a network endows him with a certain capacity to threaten others and that those capacities vary in theoretically measurable ways.

Based on the ideas developed in the previous two chapters, Chapter 3 builds a simple strategic game between a bureaucrat and a set of users. In the game, users want a public service controlled by the bureaucrat. To obtain it, they must decide between offering him a dishonest deal (corruption) or following the formal procedures established by his principal. For each dishonest proposition, the bureaucrat must decide whether to accept or reject it. In the model, the only difference between the users is their relative position in the network of reciprocity (i.e. among other things, they are willing to pay the same amount of money to get a privileged access to the service). Variation in their position in networks affects their capacity to threaten the bureaucrat's

access to resources in the network, and, consequently, the costs that he faces when he refuses to break formal rules for them. Thus, when users decide to propose a dishonest deal, they force the bureaucrat into a dilemma whereby he or she must decide what rules to follow and what rules to break. Bureaucrat's optimal solution to that dilemma will depend of who the user is.

The analysis of the model shows the impact that an individual´s relative position has on the existence and price of corrupted exchanges. It is suggested that petty corruption can be an efficient coordination solution in a social context where all individuals in the system are directly connected with each other in a dense network of reciprocity. However, such a social context never happens in real networks because people only directly reciprocate with subsets of their social system. The result of that unplanned process through which people connect to each other is that some users are in a better position than others to reach informal deals with specific bureaucrats. As a result, petty corruption is inefficient because it reproduces the inequalities embedded in networks. The analysis also explains the rationality behind the pettiness of bribes and, from there, the reason why clientelism and bribery are two variants of the same phenomenon. At the end of the chapter, I expand on the policy implications of the model.

In chapter 4, I undertake an exploratory analysis of one of the model´s implications. Using data from African countries, I have analyzed the probability that individuals with networks of different sizes have to participate in petty corruption. Despite the exploratory character of the empirical inquiry, the results are in line with the theory developed in previous chapters: people with bigger networks face greater risks of engaging in corruption for such dissimilar public services as licensing, schooling and the repair of sewage and electrical systems. Finally, Chapter 5 summarizes the main conclusions of my research and suggests issues for further studies.

CHAPTER 1: PETTY CORRUPTION AND SOCIAL NETWORKS

Every day, users of public services rely on their social contacts for a myriad of needs: to expedite the processing of their applications; to obtain public services; to avoid paperwork or taxes; to obtain passports and medicines in short supply within a matter of hours; to obtain licenses or authorizations to start up businesses in record time; to ensure a bed in a public hospital or an appointment for surgery that would otherwise take months; to guarantee faster resolution of their lawsuits; to obtain faster repair of their sewer systems; or, as I will describe below, to get a placement for a child in a much sought-after public school.

In spite of obvious differences, all the above situations are performed by users of public services who take advantage of their social networks to strike special agreements with civil servants. Those are not simple criminal behaviors made by people willing to break rules (specifically, the rules designed by governing authorities for the provision of public goods and services). On the contrary, they are very sophisticated behaviors that are also based in rules, although different ones. To make a clear contrast between them, I will refer to the former as formal rules and to the latter as informal rules.

In this chapter, I explain why the existence of both kind of mutually exclusive rules allow us to study corruption as a coordination problem. Specifically, corruption can be understood as coordination based on informal rules that breaks formal ones. As a result of that analysis it will be shown (in Chapter 3) that those dilemmas are more relevant in social contexts where the use of informal rules is spread across the population through what I will call dense social networks (in Chapter 2).

The chapter is organized in four sections. First, I analyze the impacts of informal rules of reciprocity embedded in social networks over the existence (section 1.1) and the price (section 1.2) of a corrupt exchange. Later, section 1.3 explains the main points in which a model of corruption factoring in those impacts must departure from the standard rational choice model of corruption. Finally, section 1.4 studies corruption as the coordination problem that emerges from the previous sections.

1.1 Informal rules at work, Part I: social networks and the existence of corruption

Petty corruption is a kind of social interaction that is extremely familiar to citizens in African countries. As suggested by anthropologist Oliver de Sardan (1999), "everyone in Africa has routine experience in dealing with corruption (and the like), this being a part of the social landscape. It has even become a part of popular know-how, at the base of good usage of administrative services, and is indispensable for survival in the post-colonial milieu" (p.28). For these reasons, anthropologists have made extensive field work on corruption in Africa that is useful as a source of information for our analysis. Here, I use one of those cases reported in the anthropological literature on the subject to show the role played by informal rules in the existence of corruption. In the next section, I expand on it to also explain the link between social networks and the price of a corrupt exchange.

At the beginning of the 21st century, Adanna was a young Nigerian girl who had pursued undergraduate studies in her homeland (a great achievement if we compare it to the average

education attained by the Nigerian population at the time[1]). However, she did not move forward in the educational system due to her merits but because of her social connections. American anthropologist Daniel Smith (Smith 2007) gives us the details of her case from his triply privileged position of being, first, a scholar doing ethnographic research on corruption in Nigeria; second, her uncle-in-law and, third, an active player in getting admission for her in spite of her low scores. For these reasons, his report is a marvelous ethnographic example of petty corruption in practice.

In 1996, Adanna's scores in the admission test for senior high school were not good enough to obtain a placement in the school to which she applied.[2] Coincidentally, that school was located in a region where Daniel Smith had carried out research that put him in contact with several public agents in the local educational sector. Instead of preparing her for the next admission process, Adanna´s father (who happened to be Smith´s brother-in-law) asked him to talk with the school´s principal to obtain a placement for her. Despite the fact that he did not know the principal in person, Smith approached her to intercede for Adanna. His attempt to break the formal procedures to have Adanna admitted into this school failed. However, he was not the only person from whom Adanna´s parents asked for help on that occasion. Thanks to this, they obtained what they were looking for through another social tie. Smith reports that a girlfriend of Adanna´s aunt, and who worked at the Ministry of Education, contacted an influential person

[1] To illustrate this point, by 2003, only 3.4 percent of the female population in Nigeria had completed secondary education. If we narrow the population range to consider segments of the female population, that percentage does not increase over one tenth in any population range (see Demography and Health Survey, Nigeria 2003, page 13, available on line at http://www.measuredhs.com/pubs/pub_details.cfm?ID=454&ctry_id=30&SrchTp=ctry&flag=sur).

[2] Formal education in Nigeria is essentially offered by the State and has four levels. The first two levels (elementary and junior high school) are mandatory and the admission to the following two (senior high school and undergraduate studies) are regulated by tests known as the Junior Secondary Certificate Examination (JSCE) and the Joint Admission Matriculation Board Examination (JAMBE), respectively.

who, ultimately, was able to obtain admission for Adanna at that school. Smith also tells us that Adanna´s parents had to pay a bribe for this "favor".

Six years later, Adanna faced a new admission test as part of the application procedures for undergraduate education. As before, her score was insufficient and her parents asked Smith for help. They thought that he could lend her a hand to get admission in the university where he taught some years before. But there were three problems with this request. Firstly, Smith was back in United States. Secondly, Adanna had not applied to that particular university. And, thirdly, the application period was over.

Despite these limitations, Smith made a call with excellent results for Adanna. In his words, "In addition to having taught at Abia State University in 1996 as a Fulbright Fellow, I had since maintained a continuous relationship with several faculty members with whom I collaborated on research. My best friend at the university had become a dean, and through him I also knew the vice chancellor, who is the university's chief executive officer. When I phoned my friend to explain Adanna's predicament, he said that I should instruct [her parents] to come to the university with all her documents. I remember his precise words 'you are one of us. Even if I have to perform magic, your niece will get admission'. Not only did my friend secure Adanna's admission but he also arranged it so that she would have university housing, a resource even scarcer than a place in the incoming class. >> (p.72, brackets mine).

What do we learn from these examples of petty corruption? In order to obtain admission to higher levels of formal education for Adanna, her parents needed to motivate specific civil servants to break the formal rules designed precisely to regulate the access to those educational levels. In both cases, they did not simply knock on the bureaucrat´s doors to directly negotiate a

bribe nor did they search for brokers in the open market to accomplish their objective; instead they spoke with family members and friends trying to find a path of personal connections leading to those bureaucrats. Thus, the examples suggest that social networks are important factors in the existence of petty corruption.

Moreover, the example is also useful to observe variations in petty corruption. Adanna's admission to a school is a clear case of bribery; while her admission to a university is a clear case of favoritism. This is an important point: both cases are examples of petty corruption, but the price paid in them varied. In the former she did not have a close enough contact (being forced to pay a bribe); in the latter, she had a very close tie through her uncle (obtaining extra benefits without a bribe). Thus, social networks are factors in both, the existence and the price of a corrupt exchange. In this section, I expand on the former leaving the effect on the later for section 1.2.

Ethnographers are inclined to explain cases like Adanna`s by pointing to cultural explanations; nevertheless, the fact is that these behaviors are not idiosyncratic to African countries. On the contrary, they are observable everywhere. For example, consider the following experience described by the renowned political scientist Adam Przeworski while he lived in Chicago, USA. Przeworski writes: "the tires of my car froze into the ice created by the overnight cold. I called the city government and nothing happened. After a wait of some days - ice never melts in Chicago – my wife who knew better, called the Democratic precinct captain. He was at our door in a few minutes, pointing out that we had not voted in the last municipal election. We assured him that we were registered Democrats, promised that we would vote in the next election and, one hour later, the ice was chipped away by a city crew. Guided by partisan interest, the public bureaucracy was buying our votes by selectively providing public services, while voters in the Republic precincts of the city could only swear at the municipal government, regardless of the

urgency of their, as opposed to my, needs" (Przeworski, 2003, p.135). In other words, in order to be provided with the public service, the user (Mr. Przeworski) needed to put into action an alternative mechanism (as opposed to the formal one) that involved more people than him and the bureaucrat who provides the service; in this case, a mechanism only available to political comrades: an exchange of services by hypothetical votes in the next election. [3]

In both cases, Adanna`s and Przeworski`s, users of public services approached a bureaucrat through a network-member to break a formal procedure required to get access to that service. I will call this behavior a *network-based strategy*. In Adanna's example, twice, that strategy gave her access to scarce public services that, without the breaking of the formal rules of admission, would have been unreachable for her. Network-based strategies are not a cultural trait of any particular country (like Nigeria) but, rather, a pattern found in all social systems where personal ties overlap in a complex of networks that involve relatives, friends, classmates, political comrades, fraternity members, religious groups, ethnic communities, etcetera.

The network-based strategy works because users take advantage of the informal rules of reciprocity governing their social networks. While formal rules are enforced through the legal system, informal ones rest on multilateral mechanisms of enforcement and, for that reason, are decentralized methods of social control. When informal rules actively frame social interaction, cooperative networks are sustainable. Their members provide and receive favors because defectors suffer credible social punishments that damage their ongoing relationships.[4] As commented by anthropologist Akhil Gupta with respect to network-based enforcing mechanisms

[3] For additional anthropological evidence of the use of networks to obtain privileged treatment by civil servants in African countries, see Olivier de Sardan (1999) and Smith (2006); for Latin American countries, see Lomnitz (1988), Barbosa (1992), Fitch (1998) and Duarte (2006); for Asian countries, see Gupta (2005) and Shieh (2007). For an excellent illustration of the tolerance of these practices in Italy, see Stanley (2001).

[4] Grief (1993) and Dixit (2007) are great sources to review rational choice approaches to understand the workings of informal enforcing mechanisms.

in India, someone who fails to help a network member will be "roundly criticized by people for not fulfilling his obligations to his kinsmen and village brothers" (quoted in Smith 2007, p.15).

This inclination to disapprove of non-reciprocators in social exchanges has also commonsense, psychological roots: in any exchange, beyond the material value of the objects interchanged, people tend to expect courtesy and reciprocity, and to sanction impoliteness. This asymmetry has found recent empirical support in experiments on dictator games in which it has been proven that the act of giving encourages more prosocial behaviors than objectively equivalents acts of taking (Keysar, et al, 2008).

Moreover, even when they are not involved in a corrupted exchange, network members face counter-incentives to sanction or denounce corrupted acts perpetrated by other participants on their set of connections. As pointed out by Oliver de Sardan (1999), "in a 'face to face' society, the price of open conflicts is too high. It is unthinkable to denounce to the police a relative, a neighbor, the relative of a friend, that is, someone with whom one has a personal tie, even a weak one: social disapproval would be too heavy" (p.30). Therefore, the informal rules work in both directions; they are used to punish non-reciprocators and to justify the tolerance for illegal deals made by other members of their networks of reciprocity.

Consequently, the existence of informal rules of reciprocity within networks creates incentives to break formal ones, to disprove those who do not break them and to stay quiet when other network`s members do it. For these reasons, their existence facilitates the occurrence of petty corruption because informal rules make it less expensive. In simple, with them, it is easier to ask for help and harder to deny it. On one hand, the user does not refrain from asking for help because, first of all, the expected reactions of the network's members (who are not inclined to

condemn his behavior) provide him with an oasis of social protection should the corrupt transaction be discovered and, secondly, his breaking of the formal rules is usually perceived as justifiable.

Regarding this point, the ethnographic and anthropological evidence on petty corruption is conclusive, as summarized by Smith (2007): "Actions to assist family, friends, clients, and community are often undertaken out of a sense of social obligation that trumps a notion of civic duty tied to the state or the national polity. Obligations to kin and clients are rooted in a moral economy that privileges reciprocity, sharing and interdependence" (p.222-223).

Quantitative research is in line with these findings from ethnographic and anthropological studies about the relevance of social obligation vis-a-vis individual behavior. For instance, the Afrobarometer Dataset analyzed further on in Chapter 4, applied in sixteen African countries using national probabilities samples, asks citizens to choose the statement that they agree with the most: (a) Alternative 1: "Since everyone is equal under the law, leaders should not favor their own family or group" or (b) Alternative 2: "Once in office, leaders are obliged to help their own family or group". Although the question only captures the predisposition to break formal rules at a general level, it explicitly imposes a comparison between two broad sets of rules: the formal ones versus the informal ones. Hence, it is suitable for demonstrating whether public roles are separated from private ones in the mind of citizens.[5]

According to the Afrobarometer Survey (shown in Table 1), a belief in equality under the law is mostly shared by interviewees; however, the percentage of citizens declaring that bureaucrats must use their position to help their networks is far from negligible, representing over a fifth of

[5] In that sense, it only sets up a bottom level to lawbreaking because it is not possible to distinguish whether the answers are conditioned by having or lacking network members in bureaucratic positions.

the population in eight countries and 75% in one of them. Thus, for a significant part of the population in these countries, the public and private roles of bureaucrats are not strictly separated.

Table 1 - Which of the following statements is closest to your view?

Country	Agree or Strongly agree with "Since everyone is equal under the law, leaders should not favor their own family or group"	Agree or Strongly agree with "Once in office, leaders are obliged to help their own family or group"	% with neither
Cape Verde	24%	75%	1%
Mozambique	54%	36%	10%
Uganda	70%	30%	1%
Ghana	69%	28%	3%
Mali	66%	28%	6%
Namibia	73%	23%	4%
Tanzania	75%	23%	2%
Nigeria	78%	20%	2%
Botswana	79%	19%	2%
Senegal	83%	17%	0%
Lesotho	85%	14%	1%
South Africa	80%	13%	7%
Kenya	86%	11%	3%
Malawi	89%	10%	0%
Zambia	88%	9%	3%

Source: Afrobarometer Dataset, wave II

Of course, the question remains as to what percentage of respondents of surveys like the Afrobarometer choosing the second alternative would be needed to trump the spread of a notion of civic duty across a given population; but, it is clear that for each of those who selected the second alternative such a separation does not exist in their minds. The point is that a general agreement among citizens on the separation of public and private spheres is critical to sustain that the understanding of corruption as a crime (breaking the rules) is not a mere construct of the

researcher. Without such an agreement among citizens, it is correct the usual criticism raised from the anthropological literature on the rational choice approach that criticizes what is saw as a Western-oriented bias in the study of corruption (Oliver de Sardan, 1999).

In social systems where a sense of civil duty is contested by a moral of network solidarity, a perverse dynamic can emerge to make petty corruption endemic: for example, information about ongoing petty corruption instead of causing public alarm reinforces the perceived legitimacy of using network-based strategies to break the law ("if everyone does it, why should not I?"). As an illustration, in Italy, there was a court case of influence peddling brought against a judge who had promised to help expedite the legal proceedings of a plaintiff and received a gift in exchange; the judge was acquitted of all charges because he actually knew the persons that he promised to contact(!). As commented by an Italian sociologist: "essentially, the judges are saying what everybody in Italy believes: [the use of contacts to obtain favors] is not a crime as long as you do it well […] It is our version of Protestant Ethic, i.e. when a favor works successfully, it ceases to be a crime and becomes a work of art" (brackets mine, quoted in Stanley, 2001).

Those informal rules governing the coming and going of favors within networks in Italy has crystallized into a social convention that plays the role of a focal point: the *raccomandazione* (the practice of obtaining privileged access to services by approaching those in charge of delivering them with a "recommendation" from someone who that person already knows and who can exercise influence on the bureaucrat). Similar conventions are found in other countries, for example, the *Jeitinho* in Brazil; *vara* or *padrinazgo* in Peru; *pituto* in Chile; *palanca* in Colombia; *conecte* in Mexico; *guaperia* in Cuba; *gauchada* in Argentina; *chtara* in Algeria; *yŏnjul* in South Korea; *enchufe* or *padrino system* in Philippines, *guanxi* in China; and *blat* in Russia.

In sum, network-based strategies impact on the existence of petty corruption because (1) users are not refrained from asking for help, (2) the network's members are not encouraged to denounce corrupt exchanges, (3) bureaucrats are socially pressed into a dilemma in which they have to choose what set of rules they will follow and, simultaneously, which one they will break (those of the policy designers or those of their social networks). Finally, (4) the use of these strategies spreads knowledge about petty corruption throughout the social system, facilitating an attitude of tolerance. Examples are found in places with different cultures and political systems. For instance, the second most tolerated behavior (after buying pirated products) in Peru is a public agent giving special treatment to a friend or relative;[6] and, as commented above, in Italy, the acceptability of the use of contacts has even been written in court rulings.[7]

If everybody (including users and bureaucrats) believe that a civil servant must follow formal procedures, the deliberate transgression or circumvention of such procedures can be studied as a form of a criminal activity *because* individuals in the system do not base the breaking of formal rules on any alternative set of rules. Thus, it makes sense to frame the problem as a one involving delegation as has been done since Becker and Stigler (1974). However, when such a general agreement is missing and the line between the public and private spheres is blurry, we should evaluate which set of rules are actually binding on individuals' interaction. This sets the grounds for a network-based explanation of corruption.

[6] Details about the survey are accessible online in www.proetica.org.pe and the data indicated in the text in www.proetica.org.pe/Descargas/PPT/1.

[7] In the court case of influence peddling described above, the *Suprema Corte di Cassazione* –the highest Court of Appeals in the country– dropped the criminal charges against the judge because he did not incur in the *vendita di fumo* (i.e. to offer influence that he did not have), because he actually knew the magistrate whose help he solicited in order to speed up the case. The verdict is available on line in http://www.litis.it/giunews/news.asp?id=14 (Corte di Cassazione, Sezione Sesta Penale sentenza n.13236/2001 03/04/01).

The discussion in this section has shown that, in practice, petty corruption is at the core of a "competition among rules": coordination following network-based strategies or coordination following formal rules. The substitutability between both alternatives imposes rational participation constraints on petty corrupted exchanges for both the user and the bureaucrat. In the next section, we turn on the effect of network-based strategies on the price of a corrupt exchange.

1.2 Informal rules at work, Part II: Social networks and the price of a corrupt exchange

On two separate occasions, Adanna obtained access to higher educational levels that would have been unreachable for her had she followed the formal rules of admission. Although her parents used the same strategy in both circumstances, they paid a different price in each case: for admission into senior high school, they transferred money; but, for admission into the university, they even got extra benefits without having to monetize the exchange. From the analysis in the previous section, this fact can be understood as follows: they had to pay a bribe when the useful link was a weak one (the girlfriend of an aunt who contacted an influential person who then approached someone else on Adanna´s behalf) but they got additional benefits when the useful link was strong (a family member, Mr. Smith).

This suggests that social network are also causal factors which determines the price of a corrupt exchange. Therefore, it is convenient to refer to the position of individuals within social networks in order to account for that aspect of the phenomenon. I suggest that the *relative social position* separating the user and the bureaucrat explains the price paid by the former. The following two chapters build the theoretical grounds for that proposition and the empirical evidence is subsequently studied in Chapter 4.

The causality of relative social position is explained by the following reasoning: a pair of socially closer individuals can add a corrupted exchange in a complex of long-term relationships within a network; but socially disconnected pairs cannot. In the latter circumstances, users cannot use their networks to sustain informal deals based on future paybacks and credible threats over bureaucrats' ongoing social relationships. Hence, unable to sustain their illegal access to public services on long-term relationships, users can only induce petty corruption through a direct transfer of money or gifts in an amount at least sufficient to compensate the bureaucrat´s expected costs of being sanctioned.

The relative social positions of users explain variations in their capacity to threaten the bureaucrat's access to resources in the network. Standard rational choice approaches omit that effect. Instead, users and bureaucrats are assumed as socially disconnected individuals; and, in particular, users are understood as identical subjects (except, eventually, in their willingness to pay). In contexts where that is a good hypothesis (but only in those contexts),[8] differences between users do not matter and the attention can be centered on the bureaucrat´s side of the phenomenon, regardless of who the briber is. In all other cases in which there is a link between users and bureaucrats, a network-based strategy can improve the bargaining power of the user, reducing the minimum direct transfer that he must allocate to the bureaucrat to induce his cooperation.

However, that resource is not available to all users in the same conditions because they do not occupy identical positions in the networks (in the jargon of social network analysis that we will use in Chapter 2, they are not structural equivalents). In other words, all users can use network-

[8] When individuals´ economic actions are weakly embedded in their social relationships, this effect is negligible and we can safely frame the analysis of corruption according to the traditional principal-agent setup; however, when their embeddedness is substantial, it greatly matters who the user is to explain the bureaucrat´s behavior.

based strategies but the prices that they pay for using that strategy vary with their relative position from the bureaucrat. Hence, the explicit consideration of this effect conditions the bureaucrat´s optimal decision depending on who the user is; such that, the same bureaucrat can be inclined to break the law with someone at a given price, with another person at a different price and to refuse to participate in a petty corrupted exchange with others, typically, strangers.

As an example, recall the first episode of petty corruption in Adanna´s case where her parents finally paid a bribe for her admission into senior high school. As stated before, Smith failed to persuade the school's principal to admit Adanna. After he reported the results of his efforts to her parents, he writes: "… they did not seem all that surprised. [They] said: 'She was afraid because you are a foreigner. She just wanted to hide everything from you´" (Smith, 2007, p71, brackets mine). In other words, Smith´s relative social position was too far from that of the school's principal to induce her to break the formal rules. However, through a bribe, another person in their network was better positioned to change the behavior of the *same* school's principal. Had the principal been even closer to Adanna´s family through another tie, she would have obtained admission plus extra benefits without a bribe (as she did at the university).

As Adanna's example clearly shows, bribery (a simultaneous transfer of money or gifts to the bureaucrat in exchange for a certain service) is a subset of the corruption phenomenon that emerges when the social distance between the user and the bureaucrat is high. In those cases, the user lacks sufficiently strong links to set up informal deals without having to pay in cash or with gifts. For this reason, the size of the bribe increases as the social connection becomes weaker and weaker. Eventually, the minimum bribe that a user would need to pay to induce the bureaucrat to break the law is higher than the price that the same user would pay by following the formal rules. This imposes a user´s rational participation constraint on corrupted exchanges. Similarly,

bureaucrats also face rational participation constraints. However, theirs are conditioned by who the users are.

As I have already pointed out, a user lacking good connections cannot rest on network strategies to set up informal deals; therefore, in his case, the bureaucrat´s rational participation requires a transfer at least enough to cover the expected costs of being caught in the corrupted deal. In this context, the bureaucrat is free to reject the request for help, because the user cannot exert any form of social control on him. Conversely, the bureaucrat can offer a take-it-or-leave-it choice to the user as in Shleifer and Vishny (1993). However, yet another user with several and good connections with the bureaucrat can negatively impact the bureaucrat´s ongoing relationships if he refuses to help him. In that case, denying participation in petty corruption is costly for the bureaucrat. Consequently, his rational participation constraint in a corrupted deal with that user is set at a lower compensation level than his participation constraint with a stranger.

In sum, the relative social distance that separates the user from the bureaucrat defines the bargaining space of their interaction; such that, it can be expected that the stronger the network connection is, the higher the influence that the user can exert on the bureaucrat through a network strategy, improving his bargaining power over him. Consequently, users are willing to participate in petty corruption when the network-based strategy is cheaper than the formal procedures; and, for the same compensation, bureaucrats are willing to participate with some but not with other users.

In the previous and this section, I have used anthropological examples to argue that social networks (specifically, relative positions within networks) are causal factors in the existence and

price of corrupt exchanges. Using that information as inputs, in the following two sections, I set the grounds for the formal analyses developed in subsequent chapters.

1.3 Frameworks to analyze corruption: coordination versus delegation

Besides some controversies about the suitability of different operational definitions, the standard among rational choice scholars is to understand corruption as a breaking of *the* rules of the game, assuming that there is a single set of rules available to govern user-bureaucrat's interactions. Here, it is suggested that social networks are factors in the practice of corruption because they provide alternative sets of rules to those explicitly designed for delivering public services.

Every time that two or more individuals have competing rules to base their interactions, they face a coordination problem. I suggest that petty corruption is an example of that, especially in many underdeveloped countries where well-established social conventions legitimate the use of networks of reciprocity to break formal rules. There, rational users and bureaucrats must decide on which rules to base their interaction: either the formal rules designed to govern the delivery of public services or the informal ones embedded in their social networks. Within this general framework, the analysis is focused on the difficulties that public officers face when they must say "no" to some users; or, seen from the other side of the coin, it delves into the social control that some users (but not others) can exercise over bureaucrats, thereby inducing their corrupt behavior.

To the best of my knowledge, those circumstances in which a bureaucrat is forced into a dilemma between following the rules designed by his principal and following the rules governing his ongoing relationships as a relative, friend, colleague, neighbor, fellow party member, etcetera

have been ignored by rational choice explanations of corruption. I expect, firstly, to convince the reader of the importance of paying attention to this particular part of the phenomenon of corruption and, secondly, build a theoretical framework within the tradition of rational choice capable of sustaining future research on the topic.

In this dissertation, I depart from standard rational choice explanations of corruption in three main assumptions related with users' victimization, bargaining power of users and bureaucrats, and the informational structure involved in a corrupt exchange. First, as I commented in the introduction, rational choice approaches to corruption mostly build on the findings of Becker and Stigler (1974) in which corruption is usually understood as a form of criminal behavior. Such that, corruption takes place each time that the current benefits of accepting a bribe - from the bureaucrats' point of view - are higher than the expected costs of being caught in corrupted deals. Implicit in this approach is a normative argument about the wrongness of corruption that justifies implementing social control on bureaucrats' incentives. Given that the social control is seen as a task for policy designers, the analysis is focused on the interaction between the bureaucrat who can be corrupt and the benevolent policy designer who fight against corruption.[9]

As a result, the standard rational choice models assume that users are always victims of the abuse of misbehaving bureaucrats. However, cases like Adanna's do not fit well in such a theory about users' victimization because the user was who tries to induce the bureaucrat to break the formal rules. Therefore, our first departure from the standard model requires to also understanding the user as a strategic player. This requires changing the focus of the analysis from

[9] To support this vision, there is a considerable amount of empirical evidence regarding the negative effects of corruption on economic growth (Mauro, 1995, Kaufmann, Kraay and Zoido, 2002), investment (Tanzi and Davoodi, 1998), level of human capital (Svensson, 2005), levels of competition (Ades and Di Tella, 1999), the quality of judicial systems (Buscaglia 2001), among many other negative impacts. For recent surveys on the topic, see Tanzi (1998), Jain (2001), Aidt (2003) and Dreher and Herzfeld (2007).

the interaction between the bureaucrat and the policy designer (or governing authority) to the interaction between the bureaucrat and the user. While the former can be studied as a problem of delegation, the latter is better analyzed as a problem of coordination.

Second, when we analyze corruption as a coordination problem it is easier to observe that corrupt exchanges generate a negotiation over the distribution of gains. How those gains are finally allocated among users and bureaucrats depends on their bargaining powers. In the standard rational choice model, this bargaining problem is implicitly solved when the user is not thought as an strategic player. Specifically, bureaucrats are conceived as monopolists who control the delivery of a good or service and users as their powerless victims. Hence, in that framework, each bureaucrat uses all his monopoly power to extract the entire surplus from the users (his victims).

However, as I discussed in section 1.2, when network-based strategies are used as mechanisms to induce lawbreaking, we are in situations in which the users also have bargaining power. In those circumstances, bureaucrats (pushed to use their position to help someone for whom a network's member interceded) face a dilemma because two mutually exclusive rules of coordination, the formal and the informal ones, clash in a single decision. Breaking the formal rules can lead to punishments meted against him; however, following the formal rules (i.e. denying the request for help from a network's member) can also impose costs on them. If a user can credible threaten the bureaucrat with those expected punishments within the network, he is who has all the bargaining power.

Consequently, the second departure from the standard model consists on assuming that all the bargaining power is at the user's side. For reasons that are developed in detail in chapter 2, it will

be shown that the standard rational choice model can be interpreted as the particular case in which the user does not have any bargaining power. In section 1.2, I anticipated the discussion of chapter 2 by arguing that individuals' bargaining powers are functions of their relative position in the social network. This implies that, within any social system, different users have different bargaining powers and therefore users differ on both their participation in petty corruption and the price at which they participate on it. In other words, by factoring in the role of social networks, we can explain both the existence of a corrupt exchange and its operation.

Before we move on that direction, let me explain what the third important departure from the standard rational model is. The third analytical difference with the standard model refers to the information structure of the problem. Following Becker and Stigler (1974), most studies on corruption from a rational choice perspective focus the attention on the bureaucrat's private information that gives him a range of discretionary powers to behave in an opportunistic way. From this approach, the literature evaluates the efficiency costs of corruption (Shleifer and Vishny 1993, Mauro 1995) and it uses principal-agent models to study a formal type of social control: how the principal can induce honest behavior in civil servants (Rose Ackerman 1975, 1999).[10]

The theoretical framework I have chosen allows me to analyze one aspect of corruption´s informational structure which is omitted in the standard approach. Here, the problem of information does not affect the governing authority who finds it costly to monitor his agents. Instead, the participants (users and bureaucrats) are who encounter an information problem because they do not know beforehand if their counterpart is or isn´t a "good" partner with whom to strike an informal deal. Here, I focus the attention in one of those circumstances that affects

[10] For recent surveys, see Tanzi (1998), Jain (2001) and Aidt (2003).

users: they do not know in advance who the best person is to link them with the public agent. Consequently, they spread information about their demand through as many contacts as possible. For example, for Adanna's parents, Daniel Smith was not a good enough link to obtain a school placement for their daughter.[11] In contrast, he was indeed that link when they sought a placement for her in a university. However, Adanna's parents asked him for help in both circumstances. The same happened with others who helped them to find a school placement for their daughter. Consequently, in each case, many individuals knew that an attempt to break a formal procedure was in motion; however, equally important, their participation in those social networks induced their cooperation rather than their disapproval.

The three assumptions discussed above produce a framework that allows us to study one facet of the phenomenon of corruption that has been neglected in the standard approach (a feature that is important to understand the persistency of rampant corruption in many African, Latin American and Asian countries). I expand more on that framework in the next section.

Before we move on an analysis of corruption as a coordination problem, it is important to say that this research does not claim that the standard approach is wrong. Instead, it is said that in some social contexts, it is better to understand petty corruption from another perspective in which the role of users is make explicit. The relevance of this departure from the usual analysis is that some of the implications extrapolated from the standard model must be put into context. Specifically, it is suggested that policies designed to improve the monitoring of bureaucrats´ behavior (also known as "transparency" reforms) can be misleading if network relationships are not taken into account. Through networks, it is relatively easy to hide corrupt transactions from the eyes of a benevolent governing authority. If the latter centers all his anticorruption efforts

[11] Explaining his unsuccessful attempt, Smith speculates that, he "was not, in the eyes of the principal, part of a trusted social network" (Smith 2006, p.71).

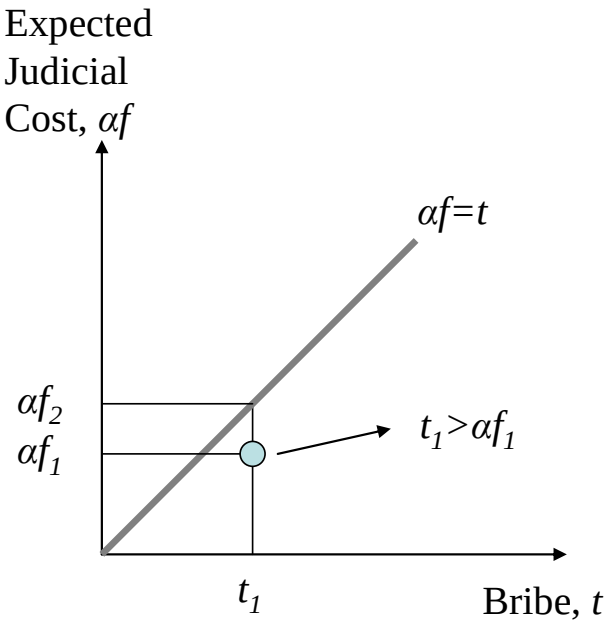
exclusively on bureaucrat's behavior, bureaucrats and users who can cooperate in a corrupt exchange have incentives to find ingenious ways to "stay in business".

1.4 *The bureaucrat's dilemma: Selecting rules of coordination*

Since Nye´s (classical work, 1967), rational choice scholars have understood corruption as essentially the misbehavior of civil servants consisting in their failure to uphold their formal duties with the purpose of obtaining private gain. Consequently, it has been proposed that the *bureaucrat's dilemma* lies in choosing between (a) following the rules that have been designed to govern his interaction with users and (b) playing a lottery in which he accepts a bribe (or some in-kind benefit) knowing there is a potential cost of being caught in a corrupted act. If he decides to play the lottery, the corrupt deal is sealed. In essence, this approach to the phenomenon of petty corruption applies the lessons from principal-agent models. According to these models, the challenge facing policymakers is to design rules that promote honest behavior among bureaucrats. Such incentives have been focused on variations of deterrence models plus merit-based incentives.

Let f be the legal punishment imposed on detected corruption, α the probability of that detection, t the minimum transfer to the bureaucrat to induce him to break the formal rules, and, finally, s his salary or exit option. The standard approach suggests that the bureaucrat's dilemma is solved by choosing the higher prize between $t - \alpha f$ and s. This is summarized in Figure 1.1 where s is set at zero without loss of generality. Whenever $t > \alpha f$ (below the diagonal), the bureaucrat's best decision is to participate in petty corruption. Consequently, corrupt acts will take place whenever the institutional framework creates benefits and costs on the bureaucrat that leave him below the diagonal.

Figure 1.1 - The Standard Rational Choice Model of Corruption



The basic lesson of the standard approach is that anticorruption policies must impose credible punishments on the bureaucrat involved. This has two basic components. On one hand, it suggests that α should be raised (e.g. more transparency/observability regarding the behavior of civil servants as they carry out their duties) and f (higher sanctions). On the other hand, it recommends improvements in the alternative option (e.g. higher salaries or higher meritocracy for government employees). For example, suppose that anticorruption policies in a country assures expected punishment of αf_1 for transgressors and that the current level of corruption in the country is such that bureaucrats are willing to break formal rules when they are offered a bribe of t_1. In that case, anticorruption policies are ineffective because the expected costs of αf_1 are insufficient to deter corruption when the bribe is t_1. Thus, policy reforms oriented to increase the expected cost to αf_2 are called for. For example, α –the probability of detection- can be raised by creating a public agency in charge of oversight that public officers follow the formal rules; and f – the legal sanction- can increase by establishing a prohibition to pursue public jobs to

individuals who have a record of participation in corruption, fees or jail. In all those cases, the expected costs of corruption increase.

Implicit in the principal-agent setup is the existence of a single institutional framework that is either upheld or transgressed by the bureaucrat. The bureaucrat is willing to break the formal procedures only if there is a net gain above and beyond his salary (i.e. when he can obtain a large enough bribe). This implies that small bribes should be atypical because even small expected costs will discourage the bureaucrat's involvement in those risky and unprofitable activities. Moreover, it would seem highly unlikely that bureaucrats would deliver benefits to some users without receiving any bribe at all. However, as shown in the case of Adanna in Nigeria, there are other rules governing social interactions that are relevant in order to understand petty corruption. Indeed, Adanna´s admission into a university, as well as many similar cases of petty corruption in underdeveloped countries, involve small bribes or none whatsoever.

Considering the ethnographic evidence, it is claimed here that whenever bureaucrats are part of dense social networks in which rules of reciprocity are working mechanisms of social control, the bureaucrat's dilemma is not (primarily) between a secure salary and a risky corrupted exchange, but between following one set of rules or another. Understanding the bureaucrat's dilemma as a choice between mutually exclusive sets of rules accounts for those cases that are deemed impossible by the standard approach and yet quite frequent according to ethnographic evidence. Factoring the informal rules of reciprocity into the analysis allows us to explain why bureaucrats may be willing to perform apparently irrational behaviors such as accepting fees that are smaller than the expected costs of being caught or breaking the formal rules without receiving a bribe or a gift in exchange. For the bureaucrat, *breaking the law can be costly in his relationship with his principal but refusing to help a user can jeopardize his relationships within*

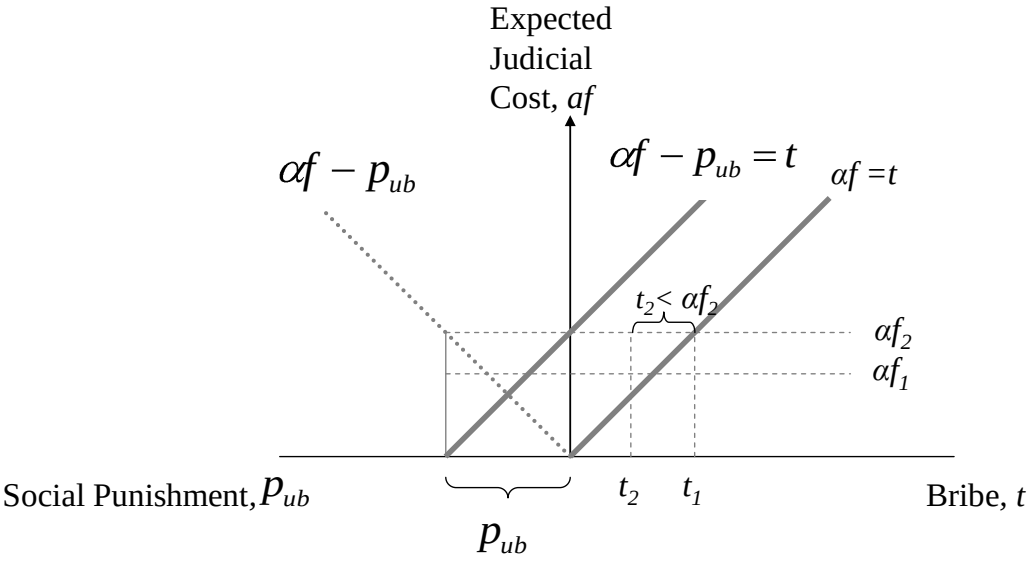
his network of reciprocity. Therefore, it can be rational to break the formal rules to avoid an even higher cost of being socially punished.

Let p_{ub} be the cost that a disappointed user *u* can impose on a bureaucrat *b* who denies him help (because he was not willing to break the formal rules for him). As shown above, under the standard approach, the bureaucrat solves his dilemma by choosing the higher prize between $t - \alpha f$ and *s*. With the inclusion of informal rules, the bureaucrat solves his dilemma by selecting the higher prize between $t - (\alpha f - p_{ub})$ and *s*.

As summarized in Figure 1.2, the inclusion of an alternative institutional framework increases the area in which corruption may happen. For instance, when the expected costs are αf_2, a bureaucrat solving the standard dilemma would request at least a transfer of t_1 to participate in the corrupted exchange. In the alternative dilemma proposed here, he can accept an amount $t_2<t_1$. It means he is willing to accept a transfer that does not cover his expected costs of being caught (a small bribe). Indeed, when the expected legal costs of dishonest behavior are low, bribes can be negative. It means the bureaucrat can be willing to make an extra effort at his own cost in order to help a particular user. For example, in Figure 1.2, suppose that the expected legal costs are αf_1. Now, consider two users with the same willingness to pay for the public service but in different relative social positions with respect to the civil servant. For simplicity´s sake, suppose that one is directly or indirectly connected with the bureaucrat and the other is not; such that, we can represent their capacity to threaten as p_{ub} and zero respectively. In these circumstances, the well-connected user will not need to bribe the bureaucrat but the unconnected one will need to bribe him in an equal or greater amount than αf_1. Thus, if their willingness to pay for the public service is greater than αf_1, we would observe a bureaucrat using his public office to spread privileged access to the service to the connected user (i.e. clientelism) and accepting

bribes from the unconnected one (i.e. bribery). On the other hand, if their willingness to pay is smaller than αf_1, the former user will get the service through a corrupted exchange and the latter will follow the formal procedures. Finally, if the administrative costs of formal procedures are too expensive, only the connected user will obtain the service (still through a corrupted deal) and the unconnected one will move forward without it.

Figure 1.2 - Social versus Judicial Punishment and Petty Corruption



Consequently, understanding the bureaucrat's dilemma as a coordination problem contributes to explaining behaviors that have been omitted by the principal-agent approach and which are essential components of the phenomenon of corruption. For that purpose, it is necessary to study the form that p_{ub} acquires for different users. This is an important point: in its effort to be universally applicable, formal rules punishes actions regardless of who committed those acts. It means that individuals demonstrating corrupt behavior in identical circumstances, in which they are playing identical roles, will face the same cost if they are caught. That is not the case within networks of reciprocity. In such networks, the social punishment imposed by

different users will vary according to their relative position vis-à-vis the bureaucrat. Thus, the bureaucrat's optimal decision in his interaction with different users will change accordingly.

The following two chapters put forth formal analyses of the ideas developed in this one. The challenge is to produce a formal setup to analyze user-bureaucrat interactions which can explain who is who in petty corruption. That is, a framework which enables us to study who can induce the bureaucrat to break the formal rules and at what price. This task has been carried out in two steps. First, in Chapter 2, variations among users in their capacity to influence a bureaucrat are formalized using tools and concepts of graph theory and social network analysis. Later, in Chapter 3, a simple strategic game between a user and a bureaucrat is proposed in which the formal expressions generated in Chapter 2 are incorporated.

CHAPTER 2: USERS´ INFLUENCE ON BUREAUCRATS

The analysis of corruption in the delivery of a good involves two complementary problems. As explained in Chapter 1, when we center the attention on the relationship between a given bureaucrat and his principal, petty corruption can be understood as a delegation problem. But, when we focus the attention on the relationship between a user and that bureaucrat, petty corruption is better understood as a coordination problem.

In the latter case, the relevant question is about the rules users and bureaucrat will select to sustain their interaction. They can either follow the formal rules (designed by the governing authority to deliver the good) or an informal rule of reciprocity embedded in ongoing social relationships. Under this framework, we cannot isolate the exchange from its embeddedness on a greater set of networks-based relationships because the extension of that embeddedness defines the mix of formal and informal rules available to coordinate them.

For example, suppose that a complete stranger knocks on the office door of a selfish bureaucrat asking him to break a formal rule for him. As studied in Chapter 1, in that scenario, the bureaucrat is free to say "no" to the user, because he realizes that the stranger cannot jeopardize his access to resources in his network of reciprocity. Thus, they do not have a mix of rules to sustain their exchange, but just the formal ones. In that particular case, the bureaucrat does not face any dilemma regarding the selection of rules in his interaction with that user (but he still faces a dilemma in his interaction with his principal due to delegation and monitoring costs). Conversely, suppose that the user who knocked at his door is connected with him through a network within which an informal rule of reciprocity operates. In that case, their relationship as a user and a bureaucrat is embedded in a network of reciprocity, and, consequently, they have a mix of formal and informal rules to sustain their interaction.

Therefore, when bureaucrat's and user's personal networks do not overlap (as in the first example), they can only sustain exchanges based on formal rules. However, when their personal networks overlap there is a mix of formal and informal rules available for them.

Thus, an analysis centered on the selection of rules allow us to explain why a bureaucrat has different behaviors in his interaction with different users even if the latter are willing to pay the same amount to induce his lawbreaking. The reason being the different mix of formal and informal rules that he shares with different users as a consequence of their belonging to social networks. As an implication, I sustained in Chapter 1 that a bureaucrat will reject to participate in petty corruption with some users, request a bribe from a second group and even accept small or non bribes from a third one. Those behaviors were explained as reactions to users with different bargaining power. And, finally, the variations on their bargaining powers ultimately rested on user´s relative positions in social networks with respect to that bureaucrat.

Now, rules bind behaviors when they impose credible sanctions on rule breakers. In the case of formal rules, that enforcement is defined in laws and administrative procedures. Instead, informal rules are enforced within the network. In this chapter, I study one mechanism through which informal rules are enforced. Briefly, information about network members continuously circulates within the network of reciprocity; hence, if the bureaucrat cares about the content of what is said about him, the users with access to his networks may have capacity to threaten him. Thus, the strategically relevant point is that the bureaucrat's awareness of the information about him flowing in the network gives some users the potential to influence his behavior by intentionally spreading messages about him along his network.

Therefore, the threat of punishment after some observable actions is a way to influence on the behavior of rational agents because, as they anticipate the cost, they discipline themselves by avoiding those actions. Within the standard rational choice approach to corruption, it is assumed that relevant threats are only those designed by the governing authority (or principal). But, as was shown in Chapter 1, in "face to face" societies, a competing network-based rule also binds bureaucrats' behavior. In other words, given that a credible threat in a network is the influence that one individual wields over another´s access to network resources, our inquiry provides a network-based variant of deterrence.

In sum, in this chapter, we study the influence that one individual (a user) wields over another (a bureaucrat) as the capacity of the former to spread (negative or positive) information about the latter throughout the network. In particular, we can study the influence of a user on the bureaucrat as the former´s threatening capacity to send negative messages about the latter. The chapter is organized as follow. Section 2.1 studies the concept of user's capacity to threaten on bureaucrats at a general level bridging the analysis of chapter 1 with the more theoretical analysis explored in subsequent sections. Section 2.2 moves one step forward showing why the capacity of threaten is a function of individuals' relative positions within networks. Through an example, section 2.3 specifies the enforcing mechanism underlying the capacity of threaten as the spread of negative messages along the network. Finally, section 2.4 develops a formal expression of user's capacity of threaten on bureaucrats.

2.1 Threats within networks of reciprocity

In the standard rational choice model, the threat on the bureaucrat consists of legal (or related) punishments. On the other hand, in the case of networks, the threat means jeopardizing

the bureaucrat's access to resources available through personal connections. Those resources can potentially be anything that represents preferential treatment for him. In general, the person who obtains resources from his network receives them because he is who he is (or because he knows who he knows). In other words, those resources are signs of his status or level of influence showing how special that individual is for those around him. A bureaucrat who refuses to give special treatment to a given user is signaling that he and/or those connecting them are not influential people and, consequently, they do not deserve any special treatment.

Thus, when a bureaucrat rejects a request for preferential treatment made by a given user, that user (who was expecting to receive it) and those making the connection between him and the bureaucrat (who were expecting to confirm that they are indeed influential people because "they can make things happen") are inclined to "pay back" the bureaucrat with the same indifference in the future. From the bureaucrat's point of view, this would imply a loss of access to network resources through them. Therefore, rational bureaucrats who anticipate those costs can be refrained from providing equal treatment to everybody (i.e. they may be motivated to give special treatment to some individuals) if they assign a sufficiently high value to network resources that they can obtain through some of them (either the user or someone else who made the link between him and the user). The result is that threats that jeopardize his access to network resources (if credible enough) are binding in his interaction with some users but not in his interaction with some others.

This is well illustrated in Adanna's example in Chapter 1. Recall that in the process to gain admission to secondary school, Daniel Smith failed to get special treatment for his niece. In his interpretation about his role in that case, Smith writes: "I believe my intervention failed precisely because I was not, in the eyes of the [school's] principal, part of a trusted social network. To her,

I was an outsider with no roots in the community, no permanent identity, and no place in a web of social relations that she had a stake in perpetuating" (Smith 2007, p.71, brackets mine). In other words, the bureaucrat did not help him because he did not represent an actual threat to her access to network resources (nor a valuable source for future network resources).

An alternative explanation may be that the school´s principal was simply following formal rules and, consequently, despite our interpretation, her rejection was based on the expectation of a formal punishment. However, that possibility can be ruled out in that particular example because the same school´s principal did help Smith's niece when an influential officer at the Ministry of Education contacted her on behalf of Adanna. The richness of Adanna's example falls precisely on this point: the same bureaucrat had two different reactions to two different intermediaries in a transaction involving the same benefit (indeed, the same user).

The second case of corruption in which Smith's niece was involved reinforces the network-based interpretation. Recall the answer that Smith got when he talked with a friend who was a bureaucrat in a university: "You are one of us. Even if I have to perform magic, your niece will get admission" (Smith 2007, p.72). My claim is that the willingness of Smith's friend to obtain admission for Smith's niece by flouting the rules was part of an exchange based on reciprocity norms embedded in networks. Helping the friend´s niece nurtured their long term relationship such that the door for future payback in the form of preferential treatment would remain open; but, at the same time, refusing to help would have been socially punished by Smith and their mutual contacts.

Although, Smith's report of that particular case of corruption does not explicitly point out the existence of that threat, he recognizes the operating mechanisms in other parts of his own

research in Nigeria (for example, see Smith, pp. 130-134). Moreover, similar mechanisms have been traced in different places, periods and types of exchanges. For instance, when referring to social networks in India, anthropologist Akhil Gupta concludes that a bureaucrat who does not use his position to help a network member is "roundly criticized by people for not fulfilling his obligations to his kinsmen and village brothers" (quoted in Smith 2007, p.15). In a different type of exchange, Macaulay (1963) reports qualitative evidence on the existence of network-based enforcement among businessmen in a developed country (United States) while McMillan and Woodruff (1999) offer quantitative evidence of its presence in an underdeveloped one (Vietnam). Finally, Grief (1989, 2003 and 2008) has extensively documented how network-based enforcement made possible overseas exchanges during the medieval era. In all these cases, mutually beneficial exchanges were based on multilateral enforcement embedded in network relationships.

In sum, a rational bureaucrat can be inclined to break formal rules as a response to a threat over his access to network resources. His reaction to that threat represents the capacity of a user's to influence over him. Now, as I have been sustained along this dissertation, the structure of a social network guarantees that different users will have different capacities to exert that influence over the bureaucrat. Or, conversely, the optimal reaction of a bureaucrat varies depending on who the user is. Next section explores this idea in detail.

2.2 Individual's position in a network structure

In section 2.1, I argued that the access that an individual (e.g. a bureaucrat) has to network resources can be threatened by another (e.g. a user). In this section, I connect this idea with the literature on social network analysis. This will help us to produce in section 2.4 a formal expression for user's capacities to threaten on a given bureaucrat.

There is a longstanding tradition in social network literature which analyzes how individuals can influence others within networks. At its core, it rests on the concept of individual or group centrality (e.g. Katz 1953, Hubble 1965, Bonacich 1973, Freeman, 1979, Burt 1992, Newman, 2004). In essence, an individual or group's centrality is a number that summarizes the influence of that individual or group in the whole network. Currently, there is a rich set of alternatives to measure centrality. The most basic one is degree centrality consisting on a rank of all individuals in a network according with the number of direct contacts that they have. Such that the most connected are more central ones. At the individual level, some measurements of centrality capture the individual's own capacity to reach and influence others, like degree centrality and eigen centrality while other measures are focused on the individual's capacity to intermediate the contacts among others, like betweenness centrality and random walk centrality (for a review of the main measures of centrality in the existing body of literature, see Borgatti and Everett 2006).

I build on the literature on centrality measurements but with a focus on the micro rather than the macro level. A common feature of all measurements of centrality is that they capture the overall impact that any given individual has within a network. Thus, in the social network analysis literature, when we calculate the centrality of an individual, we obtain an indicator of his level of influence in the whole structure of the network. As such, the concept of centrality is a macro-level concept. Regardless of how we measure it, the centrality of a given individual is a sort of average of his level of influence over all other individuals. For our purposes, this average can hide important aspects of the interaction within randomly selected pairs of individuals in the network. For instance, a user with a high centrality score may have a strong influence over many individuals and yet a negligible influence on a certain subgroup of that network; conversely, a user who does not rank high in the centrality scores can still have an important influence on that

subgroup of the network. If that is the case and a bureaucrat is part of that subgroup, the bureaucrat will be more inclined to participate in corrupt exchanges with the lower ranked user rather than with the higher ranked one. Unfortunately, any centrality score will be insufficient to capture that possibility because, as pointed out before, they consist of single scores per each individual in the network. Hence, we must keep the focus at a micro rather than macro level.

This effort implies "scrutinizing" the concept of centrality to make more explicit those details that are normally hidden behind it. For that purpose, I build on the mathematics behind Katz's measurement of status (Katz 1953) and also on the insights from recent work on communicability and flow of information along networks (Newman, 2005, Estrada, Higham and Hatano, 2008). With that basic material, I construct a measurement of any user´s capacity to threaten any possible bureaucrat that changes as we change the bureaucrat.[12]

The task is to develop a formal expression capturing the essence of the mechanisms of influence within networks. A measurement that accounts for all the ways in which a given user can threaten the access to network resources that a given bureaucrat has; such that, the expression remains valid for any pair of individuals in a given social network. In other words, we look for a formal representation of the user´s influence that is sensitive to the position of both the user and the bureaucrat in the network.

Hence, in order to move on the construction of our measure of individual's capacity to threaten, it is convenient to make two assumptions. First, it is assumed that all individuals are identical, rational subjects who only differ in their relative position in a network vis-à-vis the targeted agent. Second, it is assumed that all ties or links in the network are equally valuable.

[12] Researchers interested in macro–level extensions can aggregate all those measurements to produce centrality scores.

These assumptions together build an analytically ideal scenario in which to study and compare the magnitudes of the threats that one individual can credibly present towards a given agent when, holding all the other variables constant, he changes his relative position that separates him from that agent. Thus, we isolate the effect of individual positions over the capacity to threaten from other sources of variation that are also empirically relevant, like variations in preferences or variations in the levels of intimacy or affection. Of course, these assumptions are not mirrored in the reality. For example, for anybody the connections with some individuals are stronger than the ties with others (e.g. not all friends are equally "good" or "bad" friends). However, when the interest is centered on the relevance of relative positions in a network, it is not wise to introduce a second source of variation that contaminates the analysis. In fact, it will be shown that we do not need to assume that some links are more valuable than others because, despite the unrealistic assumption, the position of individuals within a given network will make some connections more valuable than others.

Notice that, even under our assumptions, from the bureaucrat's point of view, users are not all identical. Some of them are directly connected with him; others are acquaintances of members belonging to his reciprocity network, and others are connected through relatively weaker links. Although, his dilemma between following formal or informal rules in his interaction with these different users is the same, his rational decision is not necessarily the same. For instance, a user who participates in relationships based on reciprocity with all the bureaucrat's contacts should be in a better position to threaten him than another user who is indirectly connected with the bureaucrat's ties. The reason is that the first user can spread negative messages about the bureaucrat to a greater number of the bureaucrat's reciprocators and through more direct and indirect ways. In other words, the quality or strength of the threat posed by a better-connected

individual is greater and, therefore, the price of saying "no" to him is greater too. For this reason, a rational bureaucrat chooses a different optimal course of action in his exchanges with different users.

In other words, better-connected users can impose greater threats on the bureaucrat. Consequently, it is relatively less costly for them to obtain the bureaucrat´s participation in the corrupt deal. For instance, an extremely well- connected user who can severely jeopardize the access that the bureaucrat has to network resources may induce him to break formal rules for free. Other users who are not that well-connected can also threaten his access to those resources but to a degree that is not high enough to induce his cooperation for free. Instead, they must offer some sort of payback through gifts or certain favors. Finally, since he lacks a network mechanism allowing him to credibly commit to payback in the future, the unconnected stranger must pay in cash *if he prefers* to ensure the bureaucrat´s collaboration. I italicize the phrase "*if he prefers*" to recall that we should not infer that the theory implies that all unconnected users will bribe the bureaucrat; instead, the theory says that such a case will only happen when, in the case of all unconnected users, the willingness to pay to break formal rules is higher than the bureaucrat's own willingness to break them. In the more probable scenario where there are individuals whose willingness to pay is lower or weaker than the minimum required bribe, we will observe four situations involving the same bureaucrat: 1) free and expedient delivery to some users; 2) gifts and favors exchanged with others; 3) bribes; and 4) no interaction because the unconnected users decided to follow the formal rules. Finally, there may be some unconnected users for whom neither the formal nor the informal alternative is desirable (those users will sustain no interaction with the bureaucrat).

In sum, relative positions within networks determine the access to, and the price of, a corrupt exchange. Also, those relative positions define the dividing line between those who participate in corrupt exchanges together and those who do not. In the next section, I study the underlying mechanism of informal enforcement that create those variations among individuals.

2.3 The spread of negative messages

Negative messages flow like rumors or gossip from one connection or link to another in a random fashion. My suggestion is that the actual capacity that a user has to influence the bureaucrat depends on how many times his negative message reaches the bureaucrat's reciprocators and on the relevance they assign to it This means that a bureaucrat will not be threatened when those who give him access to network resources do not receive the message or when the message has passed through many intermediaries before it reaches them. For example, in the case of Adanna studied in Chapter 1, her parents could spread rumors and negative opinions about the school's principal through their ties but she was not part of their network of reciprocity and the information provided in the study suggests that they did not maintain any close ties with people connected to her. Hence, the social distance separating them diminished the strength of their threats, making them irrelevant in her decision to say no to Daniel Smith when Adanna´s parents first attempted to obtain the school principal´s collaboration. However, they finally found an alternative way to reach her through an influential public officer who was not directly connected to them either. This time, their request was fulfilled but their inability to pose strong enough credible threats on her network resources forced them to transfer part of their expected surplus from the exchange (i.e. they had to pay a bribe).

We need a formal expression capturing how rumors are received by the bureaucrat's reciprocators. The complexity of the exercise is greater when we take into account that, like any rumor, the user's complaints flow randomly across the network and can be received by the bureaucrat's reciprocators several times and from several sources. Thus, both the content of the information and the intensity with which it is received by the bureaucrat's ties matter greatly. For example, the following two hypothetical situations should not have the same impact on your behavior:

- Case 1: your friend Mary tells you that your friend John did not help her.
- Case 2: all your friends tell you that your friend John did not help Mary. In this case, the magnitude of the disappointment over John's behavior must be greater and, consequently, the motivation for meting out some sort of social punishment must be also greater, despite the fact that the very same message was involved in both cases.

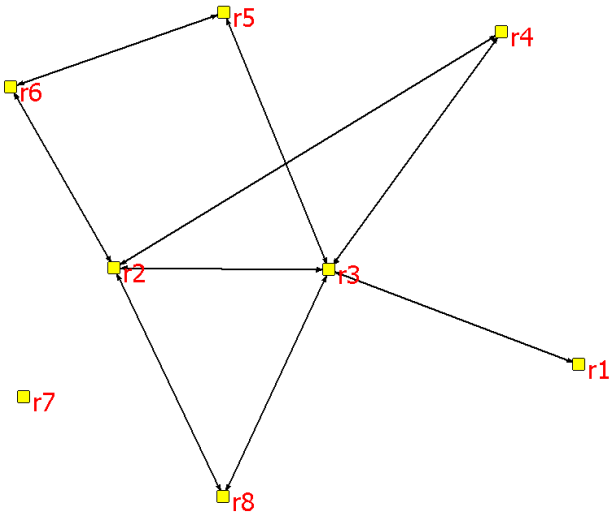
Each individual in the network receives information from his direct ties who also receive it from their ties and so on. Hence, a rumor started at some point in the network can reach another through several and redundant links. We can think of the user as the sender and the bureaucrat's reciprocators as the receivers. The more information received by each of the bureaucrat's reciprocators, the stronger its effect on his behavior. Thus, the user´s capacity to pose a threat to the bureaucrat through each of his reciprocators is a function of the total flow of information received by each of them. Such that, the aggregation of those impacts represents the user's ability to threaten the bureaucrat.

Consequently, in order to express the user´s capacity to threaten the bureaucrat, we need to identify all the ways through which he can send information to the bureaucrat´s connections. It

will be shown that the strength of the user's capacity to threaten depends on his relative position within the network vis-à-vis the bureaucrat and, consequently, some users will be more threatening to him than others.

Figure 2.1 helps to illustrate the basic idea in a hypothetical network. In the graph (known as a sociogram in the network analysis literature), there is a simple social system formed by eight individuals. Each point in the graph represents one individual. Each pair of points is connected by a line and every pair of points connected by a line are called direct reciprocators. For example, r1 is directly connected with r3 and only with him whereas r3 is also linked to other four individuals (r2, r4, r5 and r8). One of those is r2 who has four ties among which only r4 is also linked with r3. This structure allows for reciprocity-based interactions among directly and indirectly connected individuals. An example of indirect reciprocity would be a request for help from r2 to r1 (or vice versa). Despite the fact that they are not directly linked, they may sustain a reciprocal relationship in any case because each of them may request help from the other based on the implicit threat that, if a request for help is denied, this could jeopardize the ongoing relationship with r3. Now, this social system illustrates why individuals' capacities to send the same information to others vary according to their relative position in the network. Consider, for example, the different capacity of r1 and r8 to send information to r3: while r1 can only send direct information to r3, r8 can send direct information to r3 as well as indirect messages via r2 or via longer paths, for example, the path formed by r8→r2→r6→r5→r3.

Figure 2.1 – A simple social system



Now, suppose that r3 is a bureaucrat. If r1 is trying to skip formal procedures to obtain public services managed by that bureaucrat, he can directly ask r3 to break some formal rules to help him. However, he can only threaten r3 by damaging their mutual ongoing relationship but he lacks direct and indirect ways to jeopardize the access of r3 to network resources through his other ties. The reason is that, for r1, all his complaints against r3 will spread across the network if and only if r3 talks badly about himself to others (something that a rational individual would not do). Consequently, r1´s capacity to threaten r3 must be lower than that of r3's other direct ties. In fact, among the latter, there should also be differences in their ability to pose threats. For instance, r8 can threaten the bureaucrat with damaging gossip and rumors directly sent to their single shared tie (r2) whereas r2 can do the same with greater intensity given the fact that he shares more ties with r3. Consequently, an individual with more overlaps between his and the bureaucrat´s network should be in a better position to threaten the bureaucrat´s access to resources within that network. Indeed, individuals who are not directly connected to the bureaucrat also have that capacity to some extent. For instance, r6 (who is not a direct

reciprocator of r3) can directly influence r3's relationships with r2 and r5, and can indirectly jeopardize his ongoing relationships with r4 and r8.

Notice that all individuals who represent threats to the bureaucrat risk facing collateral damages themselves because their punishments also negatively impact their own access to network resources facilitated by that bureaucrat. For example, if a bureaucrat in the r3 position refuses to help r1 and the latter cuts off relations with him, not only do r3´s other ongoing relationships remain unaffected but also r1's access to this network´s resources is cut off . As a consequence, individuals like r6 who are connected to r3´s ties, but not directly to him, are in a strategically better position to threaten r3 than some of his direct ties.

Finally, consider the situation of r7 (a socially isolated agent in the graph). He does not have access to network resources and, consequently, he would be unable to threaten a bureaucrat with network-related punishments. But the converse is also true: nobody in this social system can impose social pressure on him, were he the bureaucrat.

In sum, even in a simple social system like the one depicted in Figure 2.1, there is significant variation in the direct and indirect ways through which individuals can send information to each other. Thus far, we have built justifications for (a) variations in the relative position of individuals within networks and (b) the mechanism through which information flows across the network. We can turn now to formalization.

2.4 A formal expression for the user's capacity to pose threats

Before we proceed, some definitions are required.

Definition 1: Undirected graphs

Let *g(R,H)* be an *undirected and connected graph* where *R* is the set of individuals (i.e. *R*-1 users plus the bureaucrat) and *H* is the set of links between them.

Definition 2: Adjacency matrix of undirected graphs

Let *A* be the *adjacency matrix* of *g(R,H)*; such that, the cell a_{ij} equals 1 when individuals located at *i*-row and *j*-column are connected; and it equals 0, otherwise.[13]

Definition 3: Walks

A *walk* from individual *i* to individual *j* is a sequence of individuals such that each one is linked with the previous one and the next one in the sequence.

Definition 4: Degree of a walk

The *degree of a walk* is the number of individuals in the chain minus one and it represents the social distance that a message must travel to reach the last individual in the sequence through that walk.

Definition 5: Vicinities

Part a: For all *i* in *R*, a *neighbor* is another individual *j* with whom *i* has an ongoing relationship based on reciprocity such that $a_{ij} = 1$. For all *i* in *R*, *i´*s *vicinity* is composed by all

[13] Notice that by construction, *A* is symmetric such that $a_{ij} = a_{ji}$ for any pair *i* and *j* in *R*. Also, a_{ii}=0 for all *i* in *R* because individuals are not their own reciprocators.

his neighbors and it is denoted as $R_i = \sum_{c_i} a_{ic_i}$. In general, a *k-vicinity* of individual *i* is composed by all other individuals at *k-degree* of distance from him.

Part b: Let $R_{i/j} = \sum_{c_i} a_{ic_i} - a_{ij}$. It means, $R_{i/j}$ is the vicinity of individual *i* composed by all his ties but individual *j*.

Definition 6: Powered adjacency matrices

A^k is the *k*-power of the adjacent matrix. For example: for *k*=2, A^2 =A*A.

Definition 7: Density of a social system

If the number of links of an undirected graph is *L*, the density of the graph is defined as *L**(*L*-1)/2.

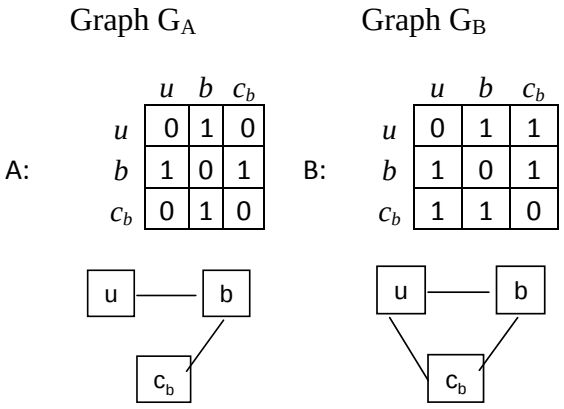
Finally, two subindexes are important in what follows: *u* for a user, *b* for the bureaucrat. Also, I use the letter *c* to identify each additional individual that is a contact such that c_u and c_b represent a contact of *u* and a contact of *b*, respectively.[14]

For example, consider the following two graph for a system of three individuals: $G_A=(R_A,H_A)=(\{u,b,c_b\},\{a_{uu=0},a_{ub=1},a_{uc=0},a_{bu=1},a_{bb=0},a_{bc=1},a_{cu=0},a_{cb=1},a_{cc=0}\})$ where the subscript of *c* has been omitted for simplicity´s sake (the same will be done hereafter whenever there is not a risk of confusion about of whom *c* is a contact). And $G_B=(R_B,H_B)=(\{u,b,c_b\},\{a_{uu=0},a_{ub=1},a_{uc=1},a_{bu=1},a_{bb=0},a_{bc=1},a_{cu=1},a_{cb=1},a_{cc=0}\})$. In graph G_A, the user is directly connected with the bureaucrat but not with the other bureaucrat's contact, c_b. Hence,

[14] Notice that, in this case, *u* could also be identified as c_b because he has a connection to the bureaucrat. To avoid confusion, I will always refer to the user as *u* regardless of his relationship with the bureaucrat.

a_{ub}=1 and a_{uc}=0, such that there is one walk of distance two connecting u and c_b passing through the public agent and R_u={b}, R_b={u,c}, R_c={b} and, $R_{b/u}$={c}. In graph G_B, the user is connected with both, such that a_{ub}=1 and a_{uc}=1 and R_u={b,c}, R_b{u,c} and R_c={u,b}. Finally, the number of possible links is 3, such that the densities of networks A and B are 2/3 and 1, respectively. Figure 2.2 show the adjacency matrices and sociograms for each graph.

Figure 2.2 – Adjacency matrices and their sociograms for two social system made up of three individuals



As mentioned before, a social punisher is a sender of negative information about the bureaucrat. For the sake of exposition, the argument assumes that the bureaucrat´s reciprocity network is reduced to his direct ties; however, the argument can be reformulated to consider any *k*-vicinity. By assuming that the bureaucrat´s reciprocity network is composed of his one-degree neighborhood, the targeted group of the user´s negative messages about him is R_b.

It is natural to think that the accuracy of a message decreases with the length of the walk through which the message flows from the sender to each receptor. An obvious reason for that is that intermediaries may not resend the information received by the user or resend it non-

accurately.[15] Thus, following Katz (1953), it is assumed that the probability that each individual resends a received message is *s* (with 1>*s*>*0*).

Consequently, each user´s capacity to spread information through the network depends on both (i) the probability that his acquaintances (and their acquaintances, etcetera) resend his messages until it reaches individuals in R_b and (ii) the number of walks through which he can send that information.

From Harary (1967, Theorem 2, page 84), the elements of *n*-powered adjacency matrices are the number of walks of length *n* between the individuals identified in each of their cells. For example, A^2 and A^k contain all *2*-degree and all *k*-degree walks between each pair of individuals in *g(R,H)*, respectively. Thus, in the A^k matrix, the cell a_{uc}^k is the number of *k*-degree walks between the user and the bureaucrat´s contact. Such that, $a_{uc}^k = \sum_{r_k}^{R} a_{ur_1} a_{r_1 r_2} \dots a_{r_k c}$.

Therefore, the total number of *k*-walks from the user to each c_b is given by:[16]

$$total\ \#\ walks\ from\ u\ to\ c_b = a_{uc_b} + s a_{uc_b}^2 + s^2 a_{uc_b}^3 + \cdots + s^k a_{uc_b}^{k+1} + \cdots$$

$$= \sum_{k=1}^{\infty} s^{k-1} a_{uc_b}^k = \sum_{k=0}^{\infty} s^k a_{uc_b}^{k+1} \qquad (1)$$

However, we need to consider the possibility that the bureaucrat is in the middle of some of those walks, because, in our context, it is unreasonable that the bureaucrat will resend bad

[15] I am also assuming that gossip and rumors are byproducts of social interaction and, as such, individuals do not need to invest time in producing them.

[16] It is an empirical question how big *k* can be to be considered in the formula. For simplicity´s sake, all *k*-walks - regardless of their length - receive positive (though decreasing) weight.

messages about himself.[17] Therefore, to account for all plausible ways through which the user can reach the bureaucrat´s ties, we need to subtract from equation (1), i.e. from the total number of walks, the subset of walks reaching a given c_b that pass through the bureaucrat.[18] For that purpose, notice that, by definition, $a_{bc_b} = 1$, because each c_b is a tie of the bureaucrat. Then, if the user can reach the bureaucrat through a walk of degree *k*, it must be true that he can reach each bureaucrat's contact through a walk of degree *k*+1 passing through the bureaucrat. Therefore, we can establish the following relationship:

$$s * a_{ub}^{k} a_{bc_b} = s * \bar{a}_{uc_b}^{k+1} \leq s * a_{uc_b}^{k+1} \qquad (2)$$

Where $\bar{a}_{uc_b}^{k+1}$ represents the total number of *(k+1)*-walks from the user to a bureaucrat c_b passing through the bureaucrat in step *k*. The expression (2) must be true because there is at least one walk of degree *k*+1 from the user to c_b (one passing through the bureaucrat in the step *k*). Consequently, for each walk of degree *k* connecting the user with the bureaucrat, there is one implausible walk of degree *k+1* connecting the user with each bureaucrat's contact.[19]

Thus, the total number of implausible walks from u to each c_b is given by the sum of all weighted walks of different degrees from the user to the bureaucrat. This is summarized in the following expression:

$$implausible\ walks\ from\ u\ to\ c_b = sa_{ub} + \cdots + s^k a_{ub}^k + \cdots = s\sum_{k=0}^{\infty} s^k a_{ub}^{k+1} \quad (3)$$

[17] In another context, like the spread of viruses, it is appropriate to study cycles of information initially sent by and, then coming back to, the same agents again and again without introducing restrictions on any agent in the system which reduces his capacity to restart the epidemic process. See for example, Bonacich (1972).

[18] For example, in the graph shown in Figure 4, there are two 2-degree walks from r8 to r4: r8→r2→r4 and r8→r3→r4. If r3 is the bureaucrat, a message transmitted through that path will not be sent to r4. Thus, only r8→r2→r4 must be added to the measurement of r8´s capacity to threaten r3.

[19] For example, if there are x 2-degree walks and y 3-degree walks from the user to the bureaucrat, there are x and y 3-degree and 4-degree walks, respectively, from the user to each bureaucrat's contact that are implausible walks.

Using, expression (2), equation (3) can also be expressed in terms of a_{uc_b} as follow:

$$\textit{implausible walks from u to } c_b = s\sum_{k=0}^{\infty} s^k a_{ub}^{k+1} = \sum_{k=0}^{\infty} s^{k+1} \bar{a}_{uc_b}^{k+2} = \sum_{k=1}^{\infty} s^k \bar{a}_{uc_b}^{k+1} \qquad (4)$$

Then, for each $c_b \in R_b$, the number of plausible walks through which the user can send him messages is given by the difference between the total number of walks from *u* to c_b minus the total number of those walks that are implausible walks. When all walks from *u* to c_b are implausible walks, the bureaucrat is in between of all of them. The following definition states this in formal terms:

Definition 8: Structural holes, adapted from Burt (1992).

The bureaucrat is a structural hole in the flow of information from the user to his tie c_b if $\bar{a}_{uc_b}^{k+1} = a_{uc_b}^{k+1}$ for all *k*.

Finally, there is a chance that the user is also a reciprocator of the bureaucrat and, therefore, he can always at least threaten to jeopardize their mutual relationship.[20] Consequently, the user´s total capacity to threaten the bureaucrat access to network resources is determined by adding up his threats to their mutual relationship (if there is any) and his threats on the relationship between the bureaucrat and his other reciprocators. I use the term p_{ub} (read: the punishment of *u* over *b*) to

[20] Notice that the mechanism of enforcement studied here considers those scenarios as particular cases. The rational choice literature has studied those scenarios as bilateral strategic games (see, for example, Lambert-Mogiliansky et al, 2007, 2008, 2009) in which the relationship between the private agent and the public one has been analyzed without any consideration given to the social context in which their relationship is embedded. The network-based enforcement studied here explicitly takes into account that there are more ways to impose costs on the bureaucrats than those emerging from bilateral relationships and the null hypothesis is that those additional sources of enforcement do matter to understand bureaucrats' behavior. It is a subject of empirical research to verify if those additional sources are strong enough to modify bureaucrats' incentives as suggested in this dissertation. The empirical evidence provided in Chapter 4 suggests that they are.

represent the user's capacity to jeopardize the bureaucrat's access to network resources. Hence, when there is at least one walk of degree *k*, p_{ub} is expressed as follows:

$$p_{ub} = \frac{a_{ub} + \sum_{c_b \in R_{b/u}} \frac{plausible\ walks\ from\ u\ to\ cb}{total\ walks\ from\ u\ to\ cb}}{R_b}$$

$$= \frac{a_{ub} + \sum_{c_b \in R_{b/u}} \frac{total\ walks\ from\ u\ to\ cb - implausible\ walks\ from\ u\ to\ cb}{total\ walks\ from\ u\ to\ cb}}{R_b}$$

$$= \frac{a_{ub} + \sum_{c_b \in R_{b/u}} \left(1 - s \frac{\sum_{k=0}^{\infty} s^k a_{ub}^{k+1}}{\sum_{k=0}^{\infty} s^k a_{uc_b}^{k+1}} \right)}{R_b}$$

Using expression (2):

$$= \frac{a_{ub} + \sum_{c_b \in R_{b/u}} \left(1 - \frac{\sum_{k=1}^{\infty} s^k \bar{a}_{uc_b}^{k+1}}{\sum_{k=0}^{\infty} s^k a_{uc_b}^{k+1}} \right)}{R_b}$$

Hence,

$$p_{ub} = \frac{a_{ub} + R_{b/u} - \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)}{R_b} \qquad (5)$$

Where $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) = \sum_{c_b \in R_{b/u}} \frac{\sum_{k=1}^{\infty} s^k \bar{a}_{uc_b}^{k+1}}{\sum_{k=0}^{\infty} s^k a_{uc_b}^{k+1}}$. Notice that, from expression (2): $\sum_{k=0}^{\infty} s^k a_{uc_b}^{k+1} \geq \sum_{k=1}^{\infty} s^k \bar{a}_{uc_b}^{k+1}$. Such that $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) \leq 1$. When all *k*-walks from the user to a bureaucrat's tie pass through the bureaucrat (i.e. when all walks are implausible walks). In that case, $\Delta_{c_b b}(u) = 1$ for a given bureaucrat's tie. Moreover, when the same happens with all bureaucrat's ties, $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) = R_{b/u}$. In the jargon of social network analysis, in that situation, the bureaucrat is a structural hole in the flow of information from the user to each of his ties in $R_{b/u}$ (see definition 8).[21] In all other cases, the term $\Delta_{c_b b}(u)$ is lower than 1 and, consequently, $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) < R_{b/u}$.[22]

Finally, when the user has no connections of any *k*-degree with the bureaucrat´s ties (and, therefore, he is also unconnected with the bureaucrat), there are no finite walks connecting them. Thus, in that case, $p_{ub} = 0$. Consequently, the capacity of the user to threaten the bureaucrat is captured by the following expression:[23]

$$p_{ub} = \begin{cases} \dfrac{a_{ub} + R_{b/u} - \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)}{R_b} & \text{if } \exists k \in \Re^+ / a_{ub}^k > 0 \\ 0 & \text{otherwise} \end{cases} \quad (6)$$

[21] For instance, in the example presented in Figure 2.1, r3 is a structural hole in his relationship with r1.

[22] Therefore, when bureaucrats are structural holes (Burt 1992) in the topography of the network (as r3 is for r1 in Figure 4), users' threats against them become ineffective. On the other hand, when the bureaucrat does not play the role of a key player linking the user with other members of the network, the user's messages can indeed be effective threats which influence the bureaucrat's behavior.

[23] In the jargon of graph theory, the expression $\exists k \in \Re^+ / a_{ub}^k > 0$ means that the geodesic from u to b is a real number.

2.4.1 Analysis of expression (6):

The value of p_{ub} reflects user's capacity to threaten the bureaucrat access to network resources. It has values in the range [0,1[and higher values mean greater capacity to threaten the bureaucrat. The term p_{ub} equals zero when the user and the bureaucrat are not connected by any finite *k*-walk. It means, $p_{ub} = 0$ when the user is an unconnected user.

Now, consider the case in which the user is connected with the bureaucrat and the latter is a structural hole for the former. In such a case $a_{ub} = 1$ and $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) = R_{b/u}$ (because all walks from the user to each bureaucrat tie in $R_{b/u}$ is an implausible walk). Consequently, when the user is connected with the bureaucrat and he is a structural hole for the former $p_{ub} = 1/R_b$. In other words, the user can only threaten to damage his interaction with the bureaucrat.

Now, when the user is not a reciprocator of the bureaucrat (i.e. $a_{ub} = 0$ and $R_{b/u} = R_b$), but there is at least a finite *k*-walk linking them, there are always plausible walks because the user can reach at least one bureaucrat's tie through a *(k-1)*-walk before reaching the bureaucrat through a *k*-walk. Consequently, in such a case $p_{ub} = \dfrac{R_b - \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)}{R_b}$. Now, the greater is the number of bureaucrat's ties that a user's message can reach before passing through the bureaucrat, the greater is the denominator in $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)$ with respect to its numerator and the smaller $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)$ becomes. However, it never can be R_b because by construction there are plausible walks. Consequently, when the user is not a bureaucrat's reciprocator $p_{ub} < 1$.

Expression (6) shows that p_{ub} is a function of four components: (a) a_{ub}, the existence of a direct relationship between the bureaucrat and the user; (b) s, the probability that the user´s messages are resent by others through indirect ties; (c) $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)$, the bureaucrat's immunity to messaging attacks; and, (d) R_b: the number of reciprocators which the bureaucrat has. Thus, we can express it as follow:

$$p_{ub} = g\left(a_{ub}, s, \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u), R_b \right) \qquad (7)$$

+, +, - , +/-

The rationale for the signs of the effects of each component in (7) is the following: First, a user who is in the vicinity of the bureaucrat can threaten him with damaging their bilateral relationship, consequently, a change of a_{ub} from zero to one, increases user's capacity to threaten the bureaucrat access to network resources.

Second, the greater the value of *s*, the more intense the flow of information across the network. A low *s* means that only local networks will be relevant to threaten non-helpers; on the other hand, a high *s* signifies that the global structure of the network also becomes relevant because longer paths from the user to the bureaucrat´s contacts become better channels to send information. This means that indirect links are important (and gain ever-increasing importance as *s* approaches 1); as a result, individuals at two, three or more degrees of distance from the bureaucrat's neighbor can credibly apply pressure on him.

However, *s* has an impact only when there are plausible walks, it means when the bureaucrat is not a structural hole for the user. In other words, the relative betweenness of the

bureaucrat in indirect walks connecting the user and his reciprocators protects him from user's negative gossips. When all indirect links from the user to a given c_b pass through the bureaucrat,[24] the bureaucrat is fully between the user and that particular reciprocator. Consequently, the user cannot threaten the bureaucrat´s access to network resources via that link. But, the proportion of plausible walks increases as $\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u)$ decreases; such that, user's capacity to threaten the bureaucrat increases, too.

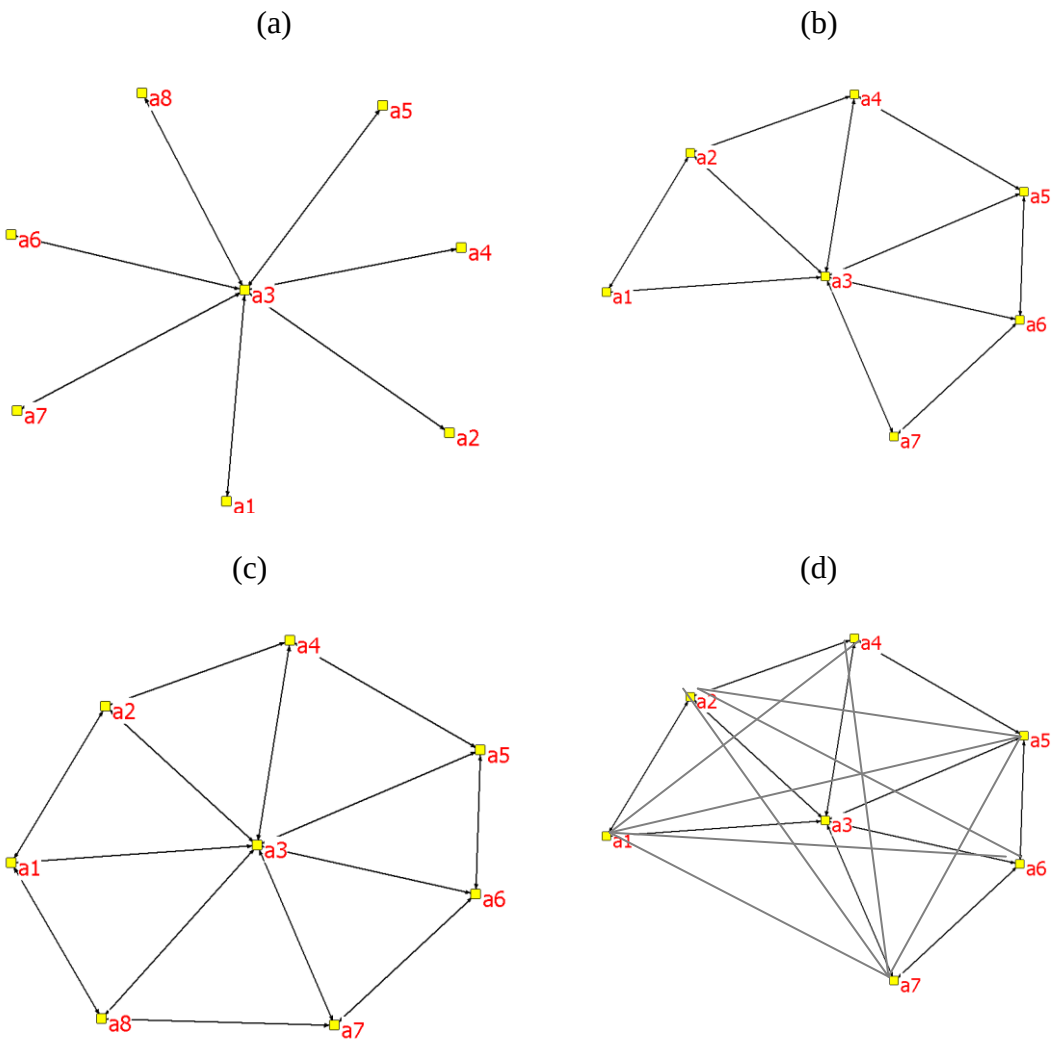
Finally, notice that a bureaucrat with many reciprocators is not necessarily exposed to more threats, because his exposure to threats depends on the proportion of plausible walks from the user to his ties. Thus, the impact of a change in the size of his vicinity on users'capacity to threaten him varies with the topology of the network.

Consider, for example, the social systems in Figure 2.3. Suppose that, in all systems, the bureaucrat is individual a3. Although a3 has more reciprocators in Figure 2.3a than in Figure 2.3b, he is more exposed in the second than in the first social system. In Figure 2.3a (known as a *star* network, see Wasserman and Faust, 1994), nobody, except the bureaucrat, has direct or plausible walks connecting them with the bureaucrat´s other reciprocators. In this case, the bureaucrat a3 is a *structural hole* and the key player to interconnect other individuals and, therefore, his network of reciprocity remains immune to messaging attacks initiated by a user. However, in Figure 2.3b, each of the bureaucrat´s reciprocators is connected with at least another acquaintance who gives them direct and indirect access to the bureaucrat´s contacts. Therefore, reciprocators in Figure 2.3b are in a better position to credibly threaten the bureaucrat´s access to network resources.

[24] For example, in Figure 4, if r3 is the bureaucrat and r6 is the user, r1 can only be reached by r6 through the bureaucrat.

However, suppose that we add an individual in Figure 2.3b and connect him with the bureaucrat plus two more individuals. This is done in Figure 2.3c. There, each user (including the new one) has more direct and indirect walks to send information that can threaten the bureaucrat and, consequently, the bureaucrat is more exposed to credible threats from any given user.

Figure 2.3 – Bureaucrat´s degree and plausible walks



In sum, p_{ub} formalizes the threatening power of one individual over another. It is sensitive to the relative position within the network of both the sender (the user) and the receiver (the bureaucrat) of the threat. And it combines four distinguishable characteristics of their relative

positions in the networks: the existence of a direct link between the user and the bureaucrat; the overlapping of their networks; the relative relevance of the local and global structure of the network; and, finally, the betweenness of the bureaucrat in the relationships among other network members. Also, for empirical or theoretical purposes, it could be relaxed the assumption that all links are equally valuable (i.e. the assumption that justifies that all links receive a value of 1) to consider particular cases such as when a user is directly connected with an influential politician. Expression p_{ub} will capture those differences by weighting walks according to their different values. In the context of our analysis, the importance of any given individual can be attributed to his position in the network; thus, instead of assuming some idiosyncratic characteristic to justify his relevance, his position gives him power and influence to the extent that he can partially control the flow of messages if he is in an intermediate position in communications with others. Consequently, for our purpose, it is still useful to hold the assumption for the rest of this dissertation.

In the next chapter, the function p_{ub} is used to formalize the dilemma that bureaucrats face when someone in their networks asks them to break formal procedures to obtain privileged access to public services. Before we proceed, it is important to explain why relative positions can be understood as exogenous factors constraining users and bureaucrats' behavior rather than endogenous factors in their relationship. With this concept clearly in mind, we will complete the logical requirements to sustain that "the user's position in networks" causes "the bureaucrat's behavior regarding his access to, and provision of, public services". The last section of this chapter will deal with this topic.

A note on the causal role of relative positions

Two central elements in this theory are, firstly, an individual´s relative position within a network is fundamental for understanding why users and bureaucrats behave in different ways with different counterparts even if the formal structure of their relationship does not vary and, secondly, that those relative positions are not endogenous to the search for privileges. Here, I briefly expand on the implications of these two assumptions.

Relative positions matter: There are two social contexts in which all users and all bureaucrats will not behave differently with alternative counterparts. Both contexts are more relevant in theory than in practice because they represent the polar cases of complete anonymity and full connectivity among individuals. The first case is the social context assumed by principal-agent approaches and discussed in Chapter 1 where informal mechanisms to induce the bureaucrat's participation in a corrupt exchange are absent. The second is the case of a fully dense network. A network is completely dense when everyone is directly connected with everyone else; that happens when there are $n*(n-1)/2$ links among the n members of the network. In such a context, the threatening effects of all potential users are identical to each other (such that the terms a_{ub},$\sum_{c_b} a_{uc_b}$, R_b are the same for everyone); and the relative immunity of the bureaucrat reaches its minimum (for example, Figure 2.3d shows a fully dense network of seven individuals). In this case, all reciprocators have a complete overlapping of their network with the bureaucrat's and each of them has a direct link with him. Thus, within a fully dense network, the bureaucrat faces the highest counterincentives to participate in a corrupt exchange. In positive terms, while informal mechanisms are useless in a social context formed by complete strangers, the efficacy of informal mechanisms of cooperation in a fully dense network is the highest possible and, consequently, the incentives to break formal rules are maximized, that is if it is true

that network-based enforcement is binding on individuals' behavior. For this reason, as we will see in the next chapter, corruption must be greater in 'face to face' societies.

Network ties as consumption or as investment: The basic observation of the previous point is that individuals are not all in the same or equivalent social position when they interact with others. The question is whether those differences emerge as a result of their search for privileged access to public goods or services or whether they differentiate themselves from others at the moment when they seek a public service. This is important because those differences, otherwise invisible, become relevant when they apply for a public service. At that moment, as in a lottery, some of them are lucky because they know the bureaucrat (either through a direct or indirect tie) who can help them to expedite their application to obtain the good or service while others do not know who can help them. As a result of that event, the former can apply for privileged access to the good or service (by breaking formal rules) while the latter cannot.

This begs the question if the relationship between networks and corruption goes in the order suggested here or in the opposite direction. It can be argued that rational agents will invest in networking to improve their chances to obtain privileges. It means that they would build a network of reciprocity around them to maximize their expected reward for being a "lottery winner". Hence, despite our interest in the comparative static, we need to consider the dynamic of network formation to be able to claim that network positions have an independent effect on corrupt behavior even when those networks are the result of an investment.

There are two fundamental traditions about the formation of reciprocity-based networks: the sociological tradition (e.g. Smith-Doerr and Powell, 2005) and the economic one (e.g. Calvo-Armengol and Jackson 2005). From the sociological point of view, networks are byproducts of

social interaction and, consequently, there are no reasons to expect that every agent will have the same access to resources in the network. Particularly, the sociological tradition claims that agents do not establish reciprocal relationships because it is in their best interest to do so; instead, it is stated that they create links with neighbors, coworkers, classmates, *etcetera* as byproducts of the circumstances governing their particular life (i.e. they are not investing but consuming time in building relationships). Consequently, within this framework, networks must be conceived as exogenous variables or endowments that rational agents have in different amounts and with different sets of individuals at a given moment in time. Therefore, the sociological perspective does not take into account the causal relationship between networks and corruption advanced here.

Now consider the case where networks are partly formed by investing efforts in networking and partly formed as a byproduct of social interaction. When we allow for idiosyncratic differences that enable some agents to build bigger networks, lesser connected agents will not necessarily invest enough to compensate for their handicap (i.e. having smaller networks) with respect to those more connected because networking does not come for free. For example, Casella and Hanaki (2006) developed a model of job searching in which they allow agents either to invest in networking or to use their non-purposive networks generated as byproducts of their daily interactions as the way to offer, and search for, jobs. They showed that, as non-purposive networks transmit information about trustworthiness at a low cost, agents are discouraged from resorting to costly networking alternatives. Thus, if social networks have both an endogenous and exogenous component, there is no reason to believe that agents with a different mix of both components will end up with networks of identical size or value. And, therefore, the idea that

users basically face an event (the need for a public service) having qualitatively different positions in networks can also be sustained by the fact that networking is costly.

However, can we still sustain the claim that an individual´s relative position within a network has an independent effect on corrupt exchanges if we rule out idiosyncratic differences among agents? The answer is yes. With endogenous networks, agents will invest in networking until the marginal benefits of developing and sustaining new ties become lower than their marginal costs. Thus, ruling out idiosyncratic differences among agents (as we are doing in this dissertation), it may be expected that all individuals end up with equivalent networks *but not necessarily with the same network.*[25] The position taken here is that, even with endogenous networking and without introducing idiosyncratic differences among users, the overlapping among the networks of different agents will not be complete. Moreover, the economic value of those networks is always latent. People may have an idea about what they can expect from their ties but they never really know the present value of their networks. Whether they invest in network relationships with an underlying purpose or whether they build them as a byproduct of their daily activities, the value of their network is always uncertain.

Thus, conceiving of networks as either endogenous or exogenous, individuals occupy different positions in networks that give them access to dissimilar resources *even* if their networks have been specifically built to obtain privileges. Individuals connected in reciprocity-based relationships with different subsets of the network will have a different capacity to threaten a bureaucrat in charge of delivering a public good or service (and those in better positions to get

[25] Bueno de Mesquita and Stephenson (2006) developed a model in which informal enforcement based on networks coexist with legal enforcement. In their model, each agent has a network of identical size. Interestingly, they show that only extremely inexpensive legal systems negatively impact the existence of networks.

privileged access to some public good and service will not necessarily be the same ones who obtain privileged access to other goods or services managed by a different bureaucrat).

In sum, users' relative positions with respect to the bureaucrat in charge of the goods and services that they want will have different capacities to influence him. Those differences will determine the choice that users and bureaucrats will make between the two alternative mechanisms to govern their interaction. One of those mechanisms is the one designed by policymakers (or the principal) that establishes a set of formal procedures, requirements, *etcetera* governing the relationship between those users and the bureaucrat. The other mechanism is the informal one embedded in their networks of reciprocity. In Chapter 3, I turn to the strategic relationship involved in that decision.

CHAPTER 3: THE PETTY CORRUPTION GAME

Corrupted bureaucrats do not engage in petty corruption with all users who are willing to pay for the services under their control. Moreover, they accept bribes from some users, but gifts or the promise of future favors from others. An explanation of these variations is important for anticorruption policies, because they may be related with incentives and rationalities that, in spite of being omitted in the analysis, may affect the efficacy of the anticorruption policymaking.

In Chapters 1 and 2, I have advanced an explanation for these behaviors by factoring in the role of social networks, and more specifically, by focusing the attention on individual's relative position within those networks. I argued that the rampant corruption affecting many countries in Latin America, Africa and Asia is hard to defeat because it is more than mere criminal activity (as it is usually depicted in the rational choice literature of the phenomenon). Instead, it is the result of the blurry separation between the public and the private spheres that is common in societies where economic and political interactions are deeply embedded in social ones. There, informal rules of reciprocity are so spread along the population that they have become social conventions (see Chapter 1, section 1.1). Naturally, those rules may be desirable for many areas of their social lives but they collide with the ideal of civil duty and equal treatment to everyone in which modern states are, supposedly, built. Thus, in those contexts it seems relevant to make explicit the behavior of users rather than to simply assume that they are victims of bureaucrat's grabbing hands. Consequently, I proposed to focus the analysis in the coordination problem between users and bureaucrats rather than the delegation problem between bureaucrats and their principals.

In particular, in the delivery of goods and services by public agencies, the spread of informal rules makes natural for users to request privileged treatment from bureaucrats in their networks. Users do not perceive their request for help as a crime, but as a justifiable and legitimate demand within networks of reciprocity. Hence, they and other network members are willing to punish non-reciprocating bureaucrats by damaging their access to resources available through their networks. Each time that a user requests bureaucrat's cooperation to break some formal rule, those threats force him into a dilemma about what rules to follow and what rules to break (Chapter 1). However, the structure of social networks guarantees that the strength of users' threats differ from user to user (Chapter 2). As a result, the bureaucrat participates in petty corruption with some users, but not with some others; and among the former, he requests smaller compensations from those users who can impose higher costs in his access to network resources.

This chapter moves forward those claims by offering a rational choice model of petty corruption in which these ideas are formalized. For that, it is important to recall the discussion in Chapter 1, section 1.3, where I make explicit three points in which the study of corruption as a coordination problem differs from its analysis under the standard rational choice approach (i.e. as a delegation problem). First, in our setting, users are also strategic players. Thus, while the question in the standard approach is how the principal creates counterincentives to bureaucrat's misbehavior, the question here is how a user and a bureaucrat select the coordinating rules for their interaction. As discussed in previous chapters, they can follow: the formal or the informal rules for that purpose; such that the selection of one rule implies the breaking of the other one.

As a result of centering the analysis in a different set of players, the information structure is also different. For instance, in the standard approach, the essence of the problem is that, for the principal, it is costly to monitor the bureaucrat. The informational structure matters to the extent

that it impacts on that delegation (i.e. making it easier or more difficult). Thus, it is a requirement of the analysis some asymmetry of information between the bureaucrat and his principal. Indeed, it is such asymmetry of information what forces the principal to share some rent with the bureaucrat to provide incentive-compatible rules that reduce corruption. Instead, in our approach here, the basic informational problem should be related with its impact on the coordination problem. Consequently, it does not need to be asymmetric. For example, in the particular specification presented below, the informational problem faced by the user and the bureaucrat is that they ignore in advance their relative position in the network. However, the model also assumes that, once in touch, both the user and the bureaucrat have thorough information about their relative position in the network; such that, there is no "elbow room" for bluffing on either side.

Finally, in the standard approach, the only strategic player in the user-bureaucrat interaction is the latter. Therefore, in that interaction, it is natural to consider him as a monopolist and to visualize the user as his victim. As a monopolist, the bureaucrat is left with all the bargaining power to subtract user's surplus. Instead, in our framework, the user is also a strategic player. Hence, the framework makes explicit that there is a bargaining problem that users and bureaucrats face in their interaction. This opens the door to study different configurations in which users and bureaucrats share the private gains of corrupt deals.

Nevertheless, in this chapter, I face the bargaining problem in an indirect way. Instead of studying how a pair of individuals solves their bargaining problem, like in a Nash-Bargaining solution (see, for example, Myerson, 1991, chapter 8). I will compare the solutions to the same strategic game played by the same bureaucrat with different users assuming that each user has all the bargaining power in his interaction with the bureaucrat, but the latter is free to accept or

refuse his participation in the interaction.[26] Thus, although all the bargaining power is at one side, the "powerless" side has an exit option. Hence, the interaction between the bureaucrat and each user is formalized as a sequential game where the user has all the bargaining power (and plays first) and the bureaucrat only moves if the user attempts to set up an informal deal with him (but he can rejects to cooperate with the user).[27]

I compare the equilibria when we hold everything constant but change the user. It is assumed that all users are identical and rational individuals who only differ in their relative position in social networks *vis-a-vis* the bureaucrat. Thus, the set of equilibria will reflect differences in users' relative positions with respect to the bureaucrat. As it was shown in Chapter 2, these differences determine their capacity to credibly threaten the bureaucrat's access to network resources if he refuses to help them. Those variations will represent the power that they have to induce his participation in petty corruption. As a result, if the bureaucrat's optimal strategy changes from user to user, it is a consequence of variations in their relative position in the network with respect to the bureaucrat.

Consequently, for each interaction with each user, the bureaucrat must compare (i) his expected costs if he breaks the formal rules to participate in a corrupted exchange with that user with (ii) his expected costs if he refuses to break them in his interaction with that user.

The analysis will offer five basic messages. Firstly, bureaucrats are willing to accept apparently "irrational bribes" (i.e. bribes that do not cover the expected costs of being caught

[26] In other words, regarding bargaining powers, the standard rational choice approaches gives it to the bureaucrat to ask what the maximum rent that the bureaucrat can obtain from corruption is. Here, I follow a complementary line, in which we can response what is the minimum compensation that the bureaucrat accept to participate in a corrupt exchange. There is room for bargaining between both extremes. The standard approach studies the upper limits of such a space; this document contributes a rationale to understand its lower limits.

[27] This analytical decision is based on the ethnographic literature and examples discussed in Chapters 1 and 2. However, the argument would also be consistent with alternatives in which a bureaucrat offers privileged access to services under his control to targeted users.

breaking the formal rules) from well-connected users. Secondly, bureaucrats will accept increasingly lower bribes from users who share increasingly more reciprocators with them (even if those users are not their direct reciprocators). Thirdly, bribery is a subset of the corrupted phenomenon employed by relatively weaker connected users. The fourth message is that, counter intuitively, friends of the bureaucrat's friend can pose more effective and credible threats on a bureaucrat than some of his own ties. And, finally, the fifth message is that the coordination through a corrupt exchange is greater in socially denser systems.

The analysis is divided in three parts. Section 3.1 studies a model in which all threats are credible. Section 3.2 expands the analysis for the case in which the credibility of a threat is not granted. Finally, section 3.3 discusses policy implications.

3.1 The petty corruption game with credible threats

The choices made by users and bureaucrats

Suppose that a user approaches a government office to apply for a service from which he would obtain a certain surplus. He has two alternatives: to stay in the queue (following the formal procedures) or to skip it (contacting the bureaucrat to offer him a personal deal). I will refer to these actions as "*formal*" and " *informal*", respectively. When the user plays *informal*, he invests time to find out which bureaucrat can help him. Once they come into contact, both the bureaucrat and the user figure out what their relative position in the network is. The user offers a deal and the bureaucrat can either cooperate (i.e. accepts the deal) or refuse (i.e. rejects it). I will refer to his cooperation as "*break formal*" and to his refusal as "*break informal*".

Hereafter, I will use the letters *b* and *u* as subscripts representing the bureaucrat and the user, respectively. Let σ_u and σ_b represent the strategic space of the user and the bureaucrat,

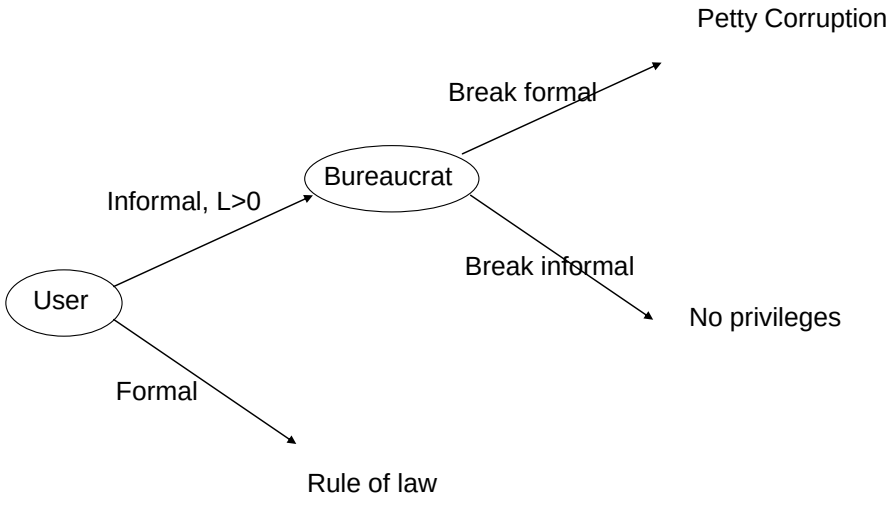
respectively. Hence, the strategic space in their interaction, denoted as $\sigma = (\sigma_u, \sigma_b)$ is given by the following three pairs:

$$\sigma = (\sigma_u, \sigma_b) = \begin{cases} (formal, \cdot) \\ (informal, break\ formal) \\ (informal, break\ informal) \end{cases}$$

Consequently, for each user-bureaucrat interaction, there are three possible outputs. First, the user can follow the formal rules (*rule of law*). Secondly, the user may propose a deal that it is rejected by the bureaucrat (*no privileges*). Finally, the bureaucrat can accept the offer (*petty corruption*). The strategic interaction is depicted in Figure 3.1 below.

As explained above, within the set of potential deals, the analysis focuses on those that are just enough to provide incentives for the bureaucrat's cooperation in petty corruption. In other words, in clear contrast to standard rational choice approaches (see, for example Shleifer and Vishny, 1993, 1999), all the bargaining power here is given to the user because our interest is to study to what degree relative social positions matter.

Figure 3.1 – The Petty Corruption Game



Notice that when the bureaucrat does not move (i.e. the user plays "*formal*"), the user-bureaucrat interaction is impersonal. Conversely, when the game reaches the bureaucrat's node, he faces a dilemma on what rules to follow in his interaction with that user. It is a dilemma because both of his options (*break formal* and *break informal*) are costly and mutually exclusive. On one hand, cooperation with the user exposed him to legal punishment. On the other hand, refusing help can be interpreted as being disloyal or not behaving with the expected reciprocity to those with whom he is connected exposing him to network-based costs.

Finally, let n_i represents the value that individual *i* assigns to resources accessed through his network. Thus, for the bureaucrat and the user, network-based resources are n_b and n_u, respectively.

In order to present the basic features of the game quickly, it is initially assumed that threats are credible. In other words, the user always punishes the bureaucrat after a refuse to help. Later, the assumption is relaxed to study who can credibly threaten the bureaucrat.

3.1.1 Payoffs

a) The User's payoffs:

Let *v* be the user's subjective value of the public service and *w* be the full costs of the formal procedures that he faces to obtain it.[28] Then, *v*-*w* is the surplus that the user obtains if he follows the formal rules. However, through an informal agreement he may save *w* or part of it; thus, the user is not necessarily motivated to follow formal rules in all circumstances. Actually,

[28] By full costs I mean all the legal fees that must be paid plus the opportunity costs for spending time in formal procedures.

his incentives to respect formal procedures depend on his capacity to coordinate with the bureaucrat under informal rules..

The informational structure is such that, at the beginning of the game, neither the user nor the bureaucrat know their relative positions. When the user plays *informal*, he can produce that information at contacting cost of *l*, by looking for a path of connection with the bureaucrat through his network. For simplicity's sake, I assume that, once generated, that information is known by both the user and the bureaucrat. Finally, the user can offer a transfer *t* to the bureaucrat to induce his cooperation.

Thus, the user's payoffs for each of three possible outcomes of the game can be characterized as follows:

$$\pi_u(formal,\cdot) = n_u + v - w$$

$$\pi_u(informal, break\ formal) = n_u + v - l - t$$

$$\pi_u(informal, break\ informal) = n_u + v - w - l$$

In this section I will assume that n_u=0, because that term acquire relevance only when threats can be non-credible. The analysis of that possibility is postponed to section 3.2.

b) The Bureaucrat's payoffs:

When the user plays *formal*, the game ends. In that situation, the bureaucrat simple obtains a payoff from his access to network resources, n_b.[29] However, when the game reaches his node, he must choose what rule to follow and what rule to break. That decision depends on the punishment associated with each alternative and the transfer that he receives from the user if he

[29] For simplicity's sake, the bureaucrat's salary is set at zero.

plays *break formal*. When he breaks formal rules, he receives a transfer *t* and faces an expected legal punishment of *α*f*, where α is the probability of being caught; and f represents legal punishment imposed on bureaucrats who break the formal rules. On the other hand, when he breaks informal rules, he faces a punishment that reduces the value of his access to network resources that depends on user's capacity to threaten his access to them. It means, when he plays *break informal*, his payoff depends on p_{ub} (the function studied in Chapter 2). Thus, the bureaucrat's payoffs can be described as follows:

$$\pi_b(\cdot, formal) = n_b$$

$$\pi_b(break\ formal, informal) = n_b + t - \alpha f$$

$$\pi_b(break\ informal, informal) = n_b(1 - p_{ub})$$

Where $p_{ub} = \begin{cases} a_{ub} + R_{b/u} - \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) & if\ \exists k \in \mathcal{R}^+\ such\ that\ a_{ub}^k > 0 \\ 0 & otherwise \end{cases}$

3.1.2 Equilibrium

There are two Perfect Nash Equilibria in this game identified as *rule of law* and *petty corruption*, respectively. Let σ^* represents the set of optimal strategies, then equilibria conditions are:

$$\sigma^* = (\sigma_u^*, \sigma_b^*) = \begin{cases} (formal, \cdot)\ \ if\ \alpha f - n_b p_{ub} \geq w - l \\ (informal, break\ formal)\ \text{if}\ \alpha f - n_b p_{ub} < w - l \end{cases} \quad \text{(E1)}$$

Proof :

The equilibrium of this finite sequential game is solved by backward induction. Bureaucrat and user's maximization problems are the following:

Bureaucrat's: $Max\{n_b + t - \alpha f, n_b\left(1 - \frac{p_{ub}}{2}\right)\}$

Thus, the bureaucrat plays *break formal* when $\pi_b(break\ formal, informal) \geq \pi_b(break\ informal, informal)$. Thus, bureaucrat's chosen rule can be expressed as follows:

Bureaucrat's chosen rule: *Play Break formal* if $t < \alpha f - n_b p_{ub}$

Play Break informal if $t \geq \alpha f - n_b p_{ub}$

Without network-based effects, that happens when the transfer compensates the expected legal punishment($t \geq \alpha f$). However, when network considerations are brought into the picture, the transfer is reduced in magnitudes that depend on the user-bureaucrat's relative positions in the network. Thus, within a network, the bureaucrat has a family of best reaction functions, one for each user, in the form of $t_u^{min} = \alpha f - n_b p_{ub}$, where the term t_u^{min} is read as "the minimum transfer that a user *u* must give to guarantees bureaucrats' participation in the corrupted exchange.

Knowing the bureaucrat's best response function for him, each user maximizes his surplus by selecting the highest between $v - w$ and *v-l-*t_u^{min}. Intuitively, a rational user will only attempt a corrupt exchange if the sum of the contacting costs plus the transfer to the bureaucrat is lower than the shadow price of the formal procedures.

Therefore, the user's best choice conditioned by the bureaucrat's best decision is expressed by the following rule:

User's choice rule: Play *formal* if $t_u^{min} > w - l$

Play *informal* if $t_u^{min} \leq w - l$

This completes the proof■

The equilibrium condition has a simple interpretation. The term $\alpha f - n_b p_{ub}$ is the net loss that the bureaucrat must sustain if he breaks the formal rules, and the term $w - l$ is the net amount saved by the user who successfully skips the queue and influences him. Thus, the equilibrium condition establishes that petty corruption only occurs when the user's savings are enough to reward the bureaucrat.

As said before, for simplicity's sake, we have assumed here that all the bargaining power is on the side of the user. However, when we set aside that assumption, it is immediately clear that the petty corruption equilibrium is a Coasian equilibrium: when the bureaucrat has all the bargaining power, he always receives the user's surplus of *w-l*; conversely, when the user has all the bargaining power, the bureaucrat receives $\alpha f - n_b p_{ub}$, an amount just enough to guarantees his participation in the informal deal. But that amount is a function of the relative position of both in the network. Interestingly, regardless of who has the bargaining power (or, in Coasian terms, regardless of who holds the initial rights in the exchange), this Coasian equilibrium is usually inefficient. Its´ inefficiency results from the fact that the costs of the bargain are paid by someone outside the bilateral interaction as has been extensively shown by the empirical research on the negative effects of corruption on economic outputs (see, for example, Mauro 1995).

Nevertheless, there is a situation in which the Coasian equilibrium is efficient: a fully dense network. In that social context, everyone has the same capacity to influence any bureaucrat; consequently, corrupt deals do not impose costs on third parties because the privileged access to public goods is given to the individual who is willing to pay more for the privilege. Thus, if all users have the opportunity to interact with the bureaucrat, all interactions will be identical: either all follow formal rules or all set up informal deals. Whatever the equilibrium selected by all pairs of users and bureaucrats, it will be the cheapest one. Now, those dense networks are possible only

within small communities. Indeed, this is the reason for the lack of formality that characterizes them: formal procedures are not upheld in small, dense communities because everyone can set up a cheaper deal through informal arrangements with anybody in the network.

A different picture emerges when more and more individuals are added to the network. Those new agents will not be connected with everyone and, therefore, asymmetries across individuals' capacity to set up informal deals will spontaneously spring up. As a consequence, in complex societies, the Coasian equilibrium is a bad equilibrium in terms of efficiency because privileges are not given to those more willing to pay for them but, rather, to those in a better position to obtain them. I will expand more on this issue and in its impact on the development of formal institutions in the concluding chapter.

Let us return now to the analysis under the assumption that the user has all the bargaining power. According to the equilibrium, the user must compensate the bureaucrat in an amount equivalent to $\alpha f - n_b p_{ub}$. This amount is a function of user's capacity to threaten the bureaucrat; consequently, it depends on the user's position with respect to him. As a result, it changes from user to user.

Our task is to study the causes of those variations in the transfer from different users to the same bureaucrat. For this, we need to analyze the bureaucrat's reaction function for each user, t_u^{min}. Using expression (7) from Chapter 2, t_u^{min} can be expressed as follows:

$$t_u^{min} = \alpha f - n_b p_{ub} = t(\alpha, f, n_b, a_{ub}, s, \textstyle\sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u), R_b) \qquad (1)$$

Incorporating equation (6) from Chapter 2 into equation (1), we obtain a family of functions for minimal transfers from each user given by:

$$t_u^{min} = \begin{cases} \alpha f - n_b \left(a_{ub} + R_{b/u} - \sum_{c_b \in R_{b/u}} \Delta_{c_b b}(u) \right) \\ \alpha f, otherwise \end{cases} if\ \exists k \in \mathcal{R}^+ \ such\ that\ a_{ub}^k > 0 \quad (2)$$

Expression (2) distinguishes between unconnected and connected users. We shall now study them in separate sections:

A) Unconnected users

Consider an unconnected user labeled as u_1. For him $p_{u_1 b} = 0$; consequently, $t_{u_1}^{min}$must be equal to αf. In other words, u_1 needs to transfer an amount that compensates for the bureaucrat´s expected legal costs to induce his participation in a corrupt exchange. As discussed in Chapter 1, that is the standard case in rational choice models of corruption. Without network-based influences, rational bureaucrats must be bribed with money or gifts valued as much as the expected costs of being caught in order for the bureaucrat to be inclined to break the formal rules governing the provision of public services.[30] Thus, to discourage this behavior, policymakers must increase monitoring and legal punishment. For example, anticorruption reforms oriented to increasing transparency in bureaucrats´ actions will raise α. In the extreme case of complete and symmetric information (i.e. when $\alpha = 1$), corruption will be limited to those who are willing to cover the legal costs that the bureaucrat can potentially face, i.e. $t \geq f$. Indeed, corruption would be eliminated if legal punishments were greater than $w - l$. In our model, the unconnected user will resort to bribes whenever $l + \alpha f < w$; in other words, whenever their costs of going the informal route ($l + \alpha f$) are smaller than the costs of choosing the formal one, *w*. Therefore,

[30] An implication relevant for other forms of corruption is that bribery will be practiced by lesser connected companies. Thus, a well-connected company in a given country will not bribe a bureaucrat from that same country but it may be willing to bribe bureaucrats in other countries to compensate for their lack of good connections there. The behavior of companies from the developed world doing businesses in the underdeveloped one seems to follow that pattern.

when marginal improvements are introduced through policies that increase sanctions (higher *f*), implement monitoring systems (higher α) and improve the efficiency with which public services are delivered (lower *w*), the first private agents to be discouraged from practicing petty corruption are the unconnected users; but better connected individuals will still be motivated to break formal rules. Let us now analyze the rationale for that.

B) Connected users

The inclusion of networks in the analysis allows us to explain why different users reach different agreements with the bureaucrat. For the sake of exposition, the main text states and discusses propositions about the impact of networks without proving them. Their proofs are compiled in an appendix at the end of the chapter.

> *Proposition 1: Users with more overlapping between their networks of reciprocity and the bureaucrat's one will transfer less to the bureaucrat.*
>
> *Proposition 2: The minimum transfer decreases as plausible walks connecting the user with the bureaucrat's ties increase.*
>
> (Proofs are in the appendix.)

From this proposition, it is possible to deduce one important corollary that uses the concept of density defined in Chapter 2 (see definition 7).

> *Corollary: For any user, when bureaucrats are not structural holes, the denser their social system is, the cheaper petty corruption becomes.*
>
> (Proof are in the appendix.)

Proposition 1 implies that a bureaucrat is willing to accept smaller transfers from users whose networks of reciprocators overlaps his own: the greater the overlapping is, the smaller the required transfer will be. In other words, users who are not in R_b but who reciprocate with the bureaucrat's reciprocators have a strategic advantage to influence his behavior over those who are in R_b but are not direct ties of the bureaucrat's other reciprocators.

In those cases, the first group of users positioned at two degrees of separation from the bureaucrat (and who are connected with several of his ties) has a greater capacity to threaten him than those users in the second group who, despite being directly connected with the bureaucrat, are not connected with his other ties. This happens because users at two degrees of separation can jeopardize more channels through which the bureaucrat can gain access to resources available on the network (because they are connected with the ties of the bureaucrat, but not with him). Their strategic positions allow them to spread rumors about the bureaucrat along several channels that the bureaucrat cannot intermediate. Indeed, as suggested in Proposition 2, the more connections they have with the bureaucrat's own ties, the greater their capacity to harness his cooperation. On the contrary, bureaucrat's ties who are not linked with his other ties can only send information to them through the bureaucrat.

The workings of the Italian *raccomandazione* and Peruvian *padrinazgo* precisely reflect that effect. Users knocking on bureaucrats´ doors in Italy or Peru asking for help introduce themselves as being recommended by someone (a *padrino*) who has ties with the bureaucrat; implicit in this ritual is the threat to speak badly about him if he does not cooperate.

An important consequence of the above is that social density (see Chapter 2, definition 7) makes petty corruption easier because it endows users with more plausible walks to be in touch with the bureaucrat's reciprocators in order to induce his cooperation (as stated in the corollary).

On the other hand, the bureaucrat will be willing to help for free (and even at his own risk)[31] when the user can jeopardize his access to network resources in magnitudes that exceed his expected cost of being caught in a corrupt exchange (i.e. when $\alpha f \leq n_b p_{ub}$). These can be interpreted as cases of bureaucratic clientelism where bureaucrats facilitate services to specific users without receiving gifts or bribes in exchange. An external observer may be inclined to believe that those bureaucrats have power and influence on their own. Hence, their behavior is interpreted as the behavior of patrons controlling a set of clients. In my view, all their power rests on their network. They can maintain their own privileges, power and influence because they contribute to sustain the value of their networks by providing privileges to others. Whenever they fail to provide those benefits or do not behave as their communities expect them to, they become socially punished and all their privileges are taken away from them.

Thus, the model offers a rational choice explanation for these practices that are common in the underdeveloped world, framing them as a problem of cooperation that forces individuals to choose from alternative institutional mechanisms. This perspective complements and, to some extent, challenges explanations founded on cultural variations among social systems, interpreting culture as idiosyncratic differences among the preferences of individuals who were born in different places. As shown above, we can explain variations in the level of petty corruption across social systems even when the formal institutions are identical and all individuals have identical

[31] Bureaucrats are willing to assume additional costs in order to help some specific users who have key roles in their access to network resources.

preferences if informal institutions are different among those systems. Naturally, at some point, it should be explained why informal institutions are different to begin with; however, those explanations do not necessarily rest on cultural factors. The topology of networks suggests that human interaction (either for economic, political or social motivations) is embedded in a context full of inequalities that endow individuals with different sets of options on which they base their exchanges with others. Future research is necessary to explore those ideas.

On the other hand, the model suggests that bureaucratic clientelism and bribery are not conceptually different phenomena. Instead, they reflect variations in the bargaining power of users and bureaucrats explained by their positions within networks. Through network-based strategies, more overlapped users are in a better bargaining position to obtain favors. Users who are connected, but in weaker positions, must transfer to the bureaucrat part of the savings that they obtain when the bureaucrat gives them privileged access to the goods and services under his control. Those transfers take the form of tips and graft. For the same services, lesser connected users can only obtain a privilege if they monetize their interaction with the bureaucrat. Finally, those unconnected with the bureaucrat at any reasonable *k*-degree of distance, and without plausible walks to influence his network relationships, have to wait in the queue or exit (trying to move forward without accessing the public service). Hence, bribery is just the tip of an iceberg made up of informal deals that include the exchange of gifts and favors through which networks of reciprocity are nurtured.

Several extensions of the model can be explored. For instance, the assumption of complete information can be set aside, allowing for a more realistic scenario where users and bureaucrats have incomplete information about one another`s position in the network. Incomplete information influences the optimal strategies eventually chosen by both the user and the bureaucrat. In the

user's case, the lack of information about the bureaucrat's position implies that he cannot be sure how much of a threat he poses. Hence, for each potential bureaucrat, we can assume that p_{ub} does not represent a single number but, rather, a random variable with some given statistical distribution. For certain users, this "noise" can induce them to mistakenly stay in the queue when they could actually be in a position to induce the bureaucrat's collaboration. For others, this same "noise" will move them to bluff it (i.e. signaling that their ability to pose a threat is greater than what it really is). From the bureaucrat's perspective, the "noise" will make him take false steps by denying help to some users who can truly jeopardize his access to network resources and helping others who were merely bluffing. Future research might explore under what conditions a separating equilibrium consistent with our analysis can be reached. Preliminary work suggests that those conditions are easily obtained because the randomness of p_{ub} for more connected individuals will be necessarily smaller than that of less connected ones. Thus, the better connected users and bureaucrats are, the lesser their uncertainty about who their counterpart is. Hence, better connected individuals (both users and bureaucrats) will be more inclined to break formal rules in their mutual deals compared to lesser connected individuals.

The next section explores a different extension of the model. Up to this point, it was assumed that users' threats were credible. The next section studies the implications involved when one sets aside that assumption.

3.2The petty corruption game with and without credible threats

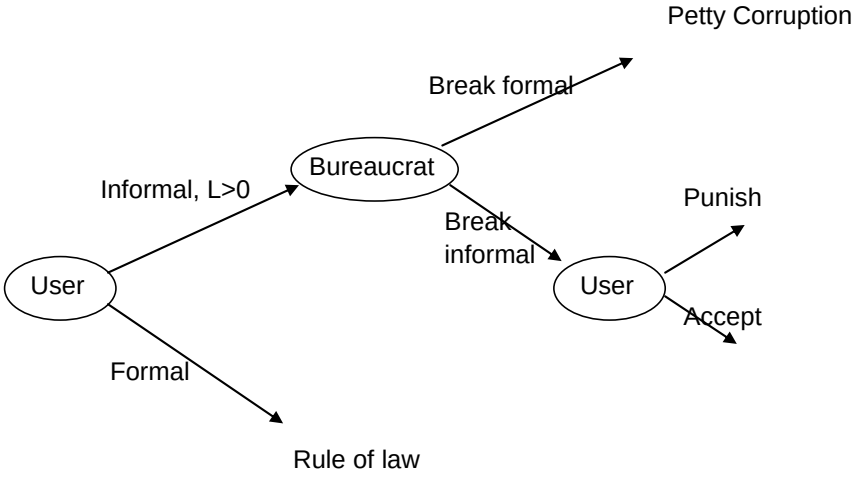
As discussed in Chapter 2 (section 2.1) the value of networks is always latent. People do not know the precise value of their networks. For example, when Daniel Smith went into a school principal's office to obtain admission for his niece (see the discussion in Chapter 1), he had a

certain expectation about his level of influence and left the office after it was demonstrated that his expectation had been unrealistic. His brother-in-law had another expectation that was reaffirmed when Mr. Smith informed him about the results of his efforts. In other words, positions in networks are forms of capital that people have in varying amounts. The value of that capital is embedded in the network in such a way that its "owner" cannot appropriate it and migrates to other places with it, and the only way to verify its actual value is by trying to use it in that network. Thus, individuals only have a belief formed by their previous experiences about the value of their position within the network. The value of their capital is updated after every attempt to use it. When their requests for help from networks´ members are denied, individuals are inclined to believe that the true value of their network is actually smaller than the value they had forecasted. The reverse happens when they successfully use their networks to obtain assistance. Thus, for each individual, the value of accessing resources via his network does not actually remain constant over time.

Now, after a rejection of help, the user may be unwilling to accept that the actual value of his network is smaller than expected. That motivates him to punish a non-reciprocating bureaucrat. However, a user who punishes the bureaucrat is, to some extent, also punishing himself because his future access to network resources via the bureaucrat will be damaged too. Consequently, the credibility of his threats depends on his capacity to convince the bureaucrat that he prefers "to close the door" to future exchanges with him rather than accepts his reluctance to collaborate with him. Thus, an analysis of the credibility of threats must consider both the capacity of the user and the bureaucrat to negatively impact on the other's access to network resources. Thus, we need to include in the analysis p_{ub} and p_{bu}.

Moreover, to study the credibility of threats, it is necessary to expand the sequential game after the bureaucrat's refusal to help. For the sake of simplicity, the different forms of social punishment meted out to bureaucrats who deny help to a user are collapsed in a single punisher. This is a convenient simplification.[32] The alternative would be to explicitly describe the strategic behavior of each bureaucrat's reciprocator to show when each of them decides to punish him after receiving negative messages about his reluctance to collaborate with someone else. That would make the formalization unnecessarily complex. A better way to proceed is to aggregate all those actions as if they were carried out by a single punisher. Now, since the aggregation will give us a different punishment for each user, the best choice is to set up the problem as if the user were that single punisher. Figure 3.2 shows how the structure of the game is modified when the user, as the single punisher, must decide whether to "punish" or "accept" the bureaucrat's rejection to help.

Figure 3.2 – Credibility of user´s threats



[32] Also, I assume that the bureaucrat's threats, p_{bu}, are always credible. The idea is to avoid a endless iteration of threats of the form: I will threaten you if you threaten me if I threaten you and so on.

To formalize this idea, we can take the value of networks as stocks of social capital (Coleman 1990). Every time individuals attempt to use their networks, the answers that they get increase or decrease that stock. Let *x* be the amount of that variation. Thus, n_u is the value of user *u* network before he attempts to use his contacts. It is in that moment when the petty corruption game starts. The amount *l* invested to contact the bureaucrat (if he skips the queue) reveals to the user and the bureaucrat what their relative position in the network is, such that p_{ub} and p_{bu} become common knowledge. When the bureaucrat cooperates, the user concludes that the value of his network is higher: $n_u + x$. On the contrary, when he refuses to cooperate, the user is inclined to believe that its value is smaller: $n_u - x$. If the user punishes the bureaucrat after his rejection, his own network will value less in proportion of the capacity of the bureaucrat to jeopardize his own access to network resources.

Reflecting these changes, the bureaucrat and user´s payoffs would be the following:

3.2.1 Payoffs

User´s payoffs:

$$\pi_u\big((formal,\cdot),\cdot\big) = n_u + v - w$$

$$\pi_u\big((informal,\cdot), break\ formal\big) = n_u + x + v - l - t$$

$$\pi_u\big((informal, accept), break\ informal\big) = n_u - x + v - w - l$$

$$\pi_u\big((informal, punish), break\ informal\big) = n_u(1 - p_{bu}) - l$$

Bureaucrat´s payoffs:

$$\pi_b\big(\cdot, (formal,\cdot)\big) = n_b$$

$$\pi_b\big(break\ formal, (informal,\cdot)\big) = n_b + t - \alpha f$$

$$\pi_b\big(break\ informal, (informal, accept)\big) = n_b$$

$$\pi_b\big(break\ informal, (informal, punish)\big) = n_b(1 - p_{bu})$$

3.2.2 Equilibria with credible and non-credible threats

There are two Perfect Nash Equilibria in this game summarized as follows:

$$\sigma^* = (\sigma_u^*, \sigma_b^*) = \begin{cases} \big((formal,\cdot),\cdot\big)\ if\ p_{bu} > \frac{x-(v-w)}{n_u} \\ \big((informal,\cdot), break\ formal\big)\ if\ p_{bu} \leq \frac{x-(v-w)}{n_u} \end{cases} \quad \text{(E2)}$$

Proof: See appendix■

The equilibrium conditions imply that credible threats are available when $\alpha f - n_u p_{ub} \leq x + w - l$. This is similar to equilibrium (E1) except in the term *x*. Now, in the case of connected users, petty corruption saves them formal costs (*w*-*l*) and increases their social capital. However, only those users whose networks are less jeopardized by punishing the bureaucrat can enjoy these benefits. Others are not able to pose credible threats on the bureaucrat. This unequal access to petty corruption has important consequences whose implications are better understood with the help of the following two propositions.

<u>Proposition 3</u>: When two users have the same overlapping of reciprocators connected to the bureaucrat, petty corruption is cheaper for the higher degree user.

<u>Proposition 4</u>: When two users have the same overlapping of reciprocators connected to the bureaucrat, the threat from the higher degree user is more credible.

(Proofs are in the appendix.)

An immediate observation from Propositions 3 and 4 is that social networks reproduce inequalities. A user who reciprocates with more people has an advantage over a lesser connected one even if both have the same kind of relationship with the bureaucrat (or even if both lack any close tie connecting them with him). Having more contacts, they have more ways to spread information across the network and, consequently, more ways to influence on others' behavior. Their threats are more credible and, therefore, bureaucrats face stronger counterincentives to reject them. Social conventions that trigger reciprocity facilitate the long-term sustainability of these effects because friends do not accept being treated as if they were strangers and neither do they like their ties being treated shabbily by someone else.

As discussed earlier (see Corollary 1), social density makes petty corruption cheaper to practice. That observation, joined with Proposition 4, implies that social density makes threats more credible because users with more ties are necessarily located in denser areas of the network´s topology. In the terminology of network analysis literature (Watts and Strongatz, 1998), more connected users live in a smaller world where the reachability of others is greater and through shorter walks. This is particularly relevant in networks of reciprocity because empirical evidence (Boguñá *et al*, 2004) has shown that those networks have *assortative mixing* (Newman, 2002), meaning that more connected individuals are also connected among them.[33] Thus, although all individuals have access to favors, the social structure is one with a center made up of relatively few individuals connected among them in dense, ongoing relationships and surrounded by a periphery of many individuals with relatively few ties. Under those conditions, it is highly probable that $p_{ub} > p_{bu}$ in the interaction between a user located at the center of the

[33] Boguñá et al (2004) studied a real network of reciprocity which emerged among users of PGP (pretty good privacy) encryption algorithms over the Internet. They found that networks of reciprocity are also assorted. For a reader interested on reviewing their work, see Figure No.3 on page 3 and related text.

network and a bureaucrat located in its periphery. In those circumstances, it proves to be very costly for the bureaucrat to reject a request for help and very easy for the user to credibly threaten him.

Thus, social networks of reciprocity reproduce inequalities already present in the social system in ways that are accepted by rational individuals to the extent that they may also be favored in some domains. For example, in Brazil, there is a social norm of reciprocity broadly shared among the population called *Jeitinho Brasileiro* (also called *Jeito*).[34] The individual asking for a *Jeitinho* and who gives it to him break formal rules on purpose. Barbosa (1992) shows that Brazilians consider the *Jeitinho* a universal and democratic social norm because everyone can resort to it. However, in spite of being accessible to all, the existence of the *Jeitinho* does not benefit all citizens to the same degree. She reports results of qualitative studies carried out from 1984 to 1986 in several Brazilian cities and in which interviewers found that the *Jeitinho* was of universal access but in magnitudes that increase with social status. She concludes: "the difference among social segments in relation to the *Jeitinho* is in its magnitude rather than in its occurrence" (Barbosa 1992, p.38).[35] Consequently, given that the *Jeitinho* is used to flout rules that are meant to be applied to everyone, what it does in fact is reproduce inequalities because better connected individuals can obtain greater benefits through a *Jeitinho*.

In sum, rampant corruption is hard to defeat because it rests on personal connections, in non-anonymous reciprocity. When someone receives special treatment in a "transaction" with a public service provider thanks to the help of an acquaintance, he is a 'winner' while those

[34] For a discussion of *Jeitinho´*s historical roots , see Rosenn (1971). For a study of its anthropological relevance, see Barbosa (1992) and, for its use in the private sector, see Duarte (2006).

[35] She writes: "a diferença que se pode establecer entre os segmentos sociais em relação ao jeito está mais ligada à sua magnitude do que à sua incidência". Translation is mine.

following the formal rules are "losers". But there is no entry barriers impeding others from obtaining privileges in some domains because there is no need for entitlement, wealth or education to have friends and acquaintances. Access to friendship is so democratic! In socially dense societies, places where people easily identify who you are and who you know, societies in which your reputation precedes you, lawbreaking is accessible to most individuals. In such societies, to some extent, all are 'winners'. All are equals. There is a trick, however. The more and better-connected individuals end up receiving special treatment in more circumstances. Thus, the dissimilar position in networks makes an Orwellian saying ironically true: in socially dense societies, all are equals but the better-connected ones are more equal than others.

3.3 Policy implications

Standard rational choice approaches to corruption focus the attention on the delegation problem between the governing authority and the bureaucrat. As was pointed out earlier in the analysis of the equilibrium in the basic model, three well-known implications of rational choice models of corruption are that stiffer sanctions, better monitoring and more expedite public services reduce the bureaucrat´s incentives to participate in corrupt deals. Let us put them together under the umbrella concept of *pro- transparency reforms*.

The analysis of the equilibrium conditions above showed that pro-transparency reforms also affects the incentives for users. But, equally relevant, it was also shown that users will be affected by those policies in different degrees. In the case of unconnected users, the petty corruption model generates results than are in line with the standard approach. To see it, consider the minimal transfer that an unconnected user must give to induce bureaucrat's cooperation (se, equation 2 in section 3.1.2). In such a case, $t_u^{min} = \alpha f$. The user will be willing to pay the

requested amount whenever it is smaller than the surplus that he obtains from consuming the good (i.e., when $\alpha f \geq v - w$). As indicated above, the standard approach assumes that the bureaucrat has all the bargaining power and the user is his victim. The proper translation of that assumption in our model is that $\alpha f = v - w$; or at least, it is closer to that. Hence, in our framework, an increase of αf induces the user to either move forward without the access to the good or to stay in the queue "forever". Naturally, that choice is not profitable for the bureaucrat who, probably, will accept a smaller bribe. In all cases, pro-transparency policies will makes corrupt exchange more costly, reducing their quantities and/or their rewards. Consequently, unconnected users are sensitive to such policies. Given that unconnected users must monetize their informal deals with bureaucrats in a corrupt exchange, as the amount of the minimum bribe they must pay increases, so do the expected costs of the bureaucrat involved.

On the other hand, for connected users, the same increase of αf do not necessarily induce them to follow formal rules. To observe it, consider two users *i* and *j*, such that their capacity to threaten a bureaucrat are such that j' is in a better position to induce bureaucrat's cooperation. It is:

$p_{ib} + \varepsilon = p_{jb}$, with $\varepsilon > 0$

Also, suppose that individual *i* is indifferent between playing *formal* or *informal*. Thus, using the results of equilibrium 1 (E1) in section 3.1:

$t_i^{min} = \alpha f - n_b p_{ib} = w - l$ and $t_j^{min} = \alpha f - n_b p_{jb} < w - l$

Thus, an increase of expected costs according with pro-transparency policies from in a magnitude smaller than ε will implies that $t_i^{min} > w - l$. As a result, *i*'s optimal choice is to

follow formal rules. But also, that $t_j^{min} < w - l$. In other words, those incentives may not be restrictive for users like *j* because they can still credibly threaten the bureaucrat to face an even higher cost in his access to network resources. Thus, despite pro-transparency reforms, some bureaucrats will still participate in corrupt deals by receiving small bribes (or none) because they gain in terms of network access. The empirical addition to this is that in dense societies there are many *j*'s, and, consequently, there are many users who will still rest on their networks to sustain privileged access to public resources. Consequently, a policy similar to those suggested by the standard literature does not necessarily reduce the bureaucrat´s participation in corrupt deals,

On the other hand, transparency reforms may impact on the value of networks. However, that impact will differ among users. For those with weaker networks, their networks will become less valuable; on the contrary, for those with better networks, theirs will become more valuable. After all, for members, there is no better club than an exclusive one, especially if it means easy access to public information.

Thus, when transparency reforms succeed, they reduce informal deals in the margin for the lesser connected users. However, corruption does not necessarily decrease when the value of networks sustained by a minority of better connected individuals increases. They will, of course, have to adapt to new conditions, presenting their illegal exchanges using new "packages", masking them in new formats.

I believe that these negative effects will be greater in systems with stable social networks. For instance, in countries with just a few metropolitan areas, where civil servant turnover is not high, where most people are born, go to school, college and enter the labor market, marry, live

and die in the same town or city, and where their relatives and friends do the same. I leave those considerations for future research.

Thinking about policy implications, the model has an obvious one: increase the cost of using social networks to obtain public services. Following this line of reasoning, the model provides new arguments for promoting the most-advocated policy reform known as the single window policy.

The single window policy has been advocated because it potentially reduces the costs of formal procedures and reduces the opportunities for bureaucrats to use their discretionary power to extract user's surplus. For instance, Lambert-Mogiliansky, Majumdar and Radner (2007) show that the single window policy does not necessarily reduce bribes because private agents ("entrepreneurs" in their analysis) still need the approval from all the public agencies involved in the delivery of the services that they want. Thus, the single bureaucrat in touch with the user can still collect all the bribes requested by different agents. Indeed, a single bureaucrat can be more effective to extract private agents' surplus (in line with the findings in Shleifer and Vishny, 1993). They keenly show that the confusion among the advocators of that policy "… reflects the common view that the risk of bribery is due to the direct contact between the entrepreneur and the various bureaucrats" when in fact "what actually matters is the actual extortion power associated with the decision" (Lambert et al, pp 362).

This research complements their findings when the power is on the private agent's side but also sheds some light on the relevance of that contact between the bureaucrat and the private agent. What matters in these personal interactions is the information provided to both the user and the bureaucrat about who they really are. Knowing who they are gives them an idea of their

relative position in networks. From there, they can infer who they know and who knows them, and thus form an expectation about how important it is that they conduct their relationship on good terms. In that scenario, threats on bureaucrats are possible if users and bureaucrats can make the connection between their current exchange and other potential interactions in other spheres of their lives.

Thus, the single window policy may reduce bribes because it minimizes the opportunities to exert power (either from the user on the bureaucrat or from the bureaucrat on the user); however, what can truly make the single window policy fully effective would be the introduction of a gap between the user and the bureaucrat. In other words, an institutional arrangement that separates the delivery of public services into two parts: the administrative process of filling forms and applications separated from the administrative act of approving the provision of services to applicants (i.e. a kind of double window policy). This gap increases the costs of using networks (by increasing the variable l in the model) because the user needs to deal with more agents to complete the procedure which begins with his application and ends by his receiving the sought-after benefit.

Moreover, when the processing of applications can introduce some randomness and anonymity, such that, those in charge of the first window (those who compile applications) are not in touch with those in charge of the second window (those approve and deliver services), the costs that the user faces in the use of his network can increase dramatically because he does not know who exactly is managing his case.

This anonymity gap can seriously decrease the use of networks for the purpose of obtaining benefits via petty corruption. The reason is that the power of networks to coordinate individuals

rests precisely on their non-anonymity. Some users can threaten bureaucrats when they contact them (and the reverse can also be true) if they can convince the bureaucrat that his refusal to help would be costly. Only in those circumstances, their coordination would be sustained by informal means. Moreover, secrecy will naturally emerge when both the user and the bureaucrat are benefited by the breaking of formal procedures.[36] The way to constrain their recourse to informal agreements is to encrypt their interaction. Once a user cannot let the bureaucrat know who he is and who he knows, their capacity to set up informal deals is seriously damaged. Consequently, public policies to deter rampant corruption in the delivery of public services must artificially create the absent or scant anonymity prevailing in countries with dense social networks. With anonymity, there are no *padrinos* who can help the user to speed up his case because there is no way for them to know who is managing it. In this scenario, even if the best connected user in the entire system becomes unconnected, a non-member and, therefore, a vigilant citizen requesting equal treatment for all under any and all circumstances.

[36] It will also emerge in the complementary case where the user realizes that he cannot do anything to avoid extortion front a powerful bureaucrat.

Appendix to Chapter 3

Let *A* be the adjacency matrix of a graph of *R* individuals and *H* links among them. The element a_{ij} of *A* equals 1 if *i* and *j* are reciprocators and it equals 0, otherwise. Let a_i and a_j be the row vectors of 1s and 0s corresponding to individuals *i* and *j*, respectively, such that $a_i = (a_{i1}\ a_{i2}\ a_{i3} \dots a_{iR})$ and $a_j = (a_{j1}\ a_{j2}\ a_{j3} \dots a_{jR})$. Individuals *i* and *j* are structural equivalents if each element in a_i is equal to each element in a_j.

Proposition 1: Users with more overlapping between their networks and the bureaucrat's will transfer less to the bureaucrat.

Lemma 1: Optimal transfers from structural equivalent users to the same bureaucrat are identical. Consider two structural equivalent individuals *i* and *j*. By definition, $a_{i1} = a_{j1}$, $a_{i2} = a_{j2}$, …, $a_{iR} = a_{jR}$. Consequently, the number of paths of degree *k* connecting them with each individual in the network is the same. Specifically, for all $c_b \in R_b$, where, as in Chapter 2, R_b is the subset of *R* containing all the bureaucrat´s direct ties: $a^k_{ic_b} = a^k_{jc_b}$ and $a^k_{ib} = a^k_{jb}$ for all $k \geq 0$. Consequently, the number of plausible walks from them to each bureaucrat´s reciprocator is identical:

$$plausible\ walks = a_{ic_b} + s\left(a^2_{ic_b} - a_{jb}\right) + \cdots + s^k\left(a^{k+1}_{ic_b} - a^k_{jb}\right) + \cdots$$

Then, $p_{ib} = p_{jb}$ such that $t_i^{min} = t_j^{min}$ ■

Proof of proposition 1: Let users u_i and u_j be structural equivalents in a connected graph, then by lemma 1: $a^k_{ic_b} = a^k_{jc_b}$; $a^k_{ib} = a^k_{jb}$ and $t_i^{min} = t_j^{min}$.

Therefore,

$$\frac{t_j^{min}-t_i^{min}}{n_b} = p_{ib} - p_{jb} = \sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j) - \sum_{c_b \in R_{b/i}} \Delta_{c_b b}(i) = 0 \quad \text{(A.1)}$$

Where, from Chapter 2:

$\sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j) = \sum_{c_b \in R_{b/j}} \frac{\sum_{k=1}^{\infty} s^k \bar{a}_{jc_b}^{k+1}}{\sum_{k=0}^{\infty} s^k a_{jc_b}^{k+1}}$, and

$\sum_{c_b \in R_{b/i}} \Delta_{c_b b}(i) = \sum_{c_b \in R_{b/i}} \frac{\sum_{k=1}^{\infty} s^k \bar{a}_{ic_b}^{k+1}}{\sum_{k=0}^{\infty} s^k a_{ic_b}^{k+1}}$.

Now, consider the addition of one link connecting user *j* to a bureaucrat´s reciprocator c_b. Superscript "old" and "new" are used to distinguish *j*´s links without and with the new connection, respectively. The addition of that link increases the number of total walks from *j* to bureaucrat´s ties (i.e. the denominator in $\Delta_{c_b b}(j)$. However, given that the new link is a direct connection with a bureaucrat's tie, the number of implausible walks do not increase in the same proportion than the increase in total walks. Therefore:

$$\sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j^{NEW}) - \sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j^{OLD}) < 0. \quad \text{(A.2)}$$

Using (A.1) into (A.2):

$$\sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j^{NEW}) - \sum_{c_b \in R_{b/j}} \Delta_{c_b b}(i) = p_{ib} - {p_{jb}}^{NEW} < 0$$

Consequently, $t_j^{min^{NEW}} < t_i^{min}$

Notice that the addition of a direct link between *j* and c_b also modifies the total number of indirect walks from both *i* and *j* to c_b. However, any new *k*-walk from *i* to each c_b is necessarily

a (*k*-1) walk from *j* to c_b because the only change in the social system is that, now, $a_{jc_b}^{NEW} = 1$. The same happens with additional walks from *i* and *j* to other reciprocators. If c_b is a path to reach other contacts connected to the bureaucrat, any extra *k*-path from *i* to that individual is intermediated by *j* and, therefore, poses less of a threat to *i* than to *j*.

The logic is the same if we take away a link from *i* to c_b. Thus, given that we arbitrarily select *i* and *j*, that completes the proof■

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<u>Proposition 2</u>: The minimum transfer decreases as plausible walks connecting the user with the bureaucrat´s ties increase.

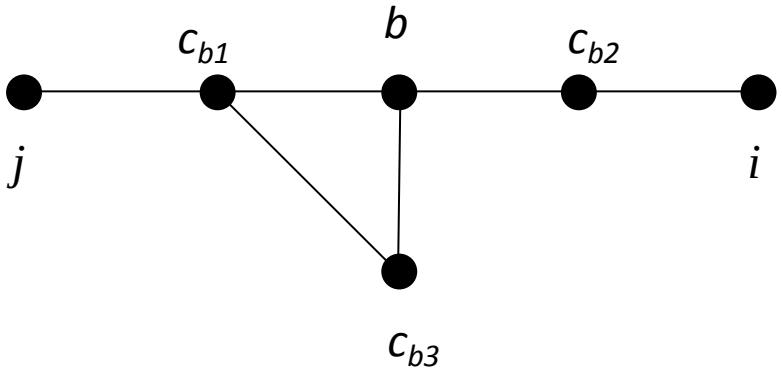
Proof of proposition 2:

Let *i* and *j* be two structural equivalent users in a connected graph. Suppose that we rewire the network by deleting one of *i*'s links with an individual in R_b; and then, we do the same for *j* with a different reciprocator. Consequently, with these changes, *i* and *j* are no longer structurally equivalent. Specifically, there should be a pair of bureaucrat´s reciprocators c_{b1} and c_{b2} , such that:

$$a_{ic_{b1}} = 0,\ a_{jc_{b1}} = 1 \text{ and } a_{ic_{b2}} = 1,\ a_{jc_{b2}} = 0$$

Let c_{b3} be a third bureaucrat's reciprocator who is only linked with the bureaucrat. Therefore, there are no plausible walks from the users to him. Now, create a link between c_{b3} and c_{b1} such that $a_{c_{b1}c_{b3}} = 1$ but $a_{c_{b2}c_{b3}} = 0$. Figure A1 presents a simple illustration.

Figure A1- Bureaucrat betweenness



Then, there is at least one extra *2*-degree walk connecting *j* with contact c_{b3} that does not pass through the bureaucrat ($a_{jc_{b1}} * a_{c_{b1}c_{b3}} = 1$). On the other hand, *i* lacks that extra 2-degree walk because $a_{ic_{b1}} * a_{c_{b1}c_{b3}} = 0$. In fact, at a theoretical minimum, any plausible walk from *i* to c_{b3} has three degrees and must pass through the bureaucrat. But any *k*-walk $a_{ir1}a_{r1r2} \dots a_{rk-1rk}a_{rkc_{cb1}}$ is also available for *j* in *k*-1 steps. Consequently, the proportion of implausible walks to bureaucrat's ties is smaller for *j* than for *i*.

Therefore:

$$\sum_{c_b \in R_{b/j}} \Delta_{c_b b}(j) - \sum_{c_b \in R_{b/j}} \Delta_{c_b b}(i) = p_{ib} - p_{jb} < 0$$

As a result, $t_j^{min} < t_i^{min}$■

Corollary: *For any user, when bureaucrats are not structural holes, the denser their social system is, the cheaper petty corruption becomes.*

Proof of corollary: Consider a system with a given number of individuals and ties. When a new tie is added to the system (i.e. when the system becomes denser), the total number of walks connecting the user with each bureaucrats´ ties increases. For any user, the proportion of plausible walks will also increase, except in the case where the bureaucrat is a structural hole (because, in that situation, all new walks for some users must pass through the bureaucrat). Consequently, according to Proposition 2, the minimum transfer for all users will decrease. ■

Proof of equilibrium with credible and non-credible threats

There are two Perfect Nash Equilibria in this game summarized as follows:

$$\sigma^* = (\sigma_u^*, \sigma_b^*) = \begin{cases} ((formal,\cdot),\cdot) \ \ if \ p_{bu} > \frac{x-(v-w)}{n_u} \\ ((informal,\cdot), break\ formal) \ if \ p_{bu} \leq \frac{x-(v-w)}{n_u} \end{cases} \quad \text{(E2)}$$

Condition 1: *Reasonability of a network-based strategy*: users have incentives to follow network-based strategies whenever they end paying less than the amount paid by an unconnected user. Thus, a reasonable transfer satisfies the following restriction: $t^{min} < \alpha f$.

Proof: By backward induction.

User decides to punish the bureaucrat if and only if $\pi_u\big((informal, punish), break\ informal\big) \geq \pi_u\big((informal, accept), break\ informal\big)$. It is, when$x - n_u p_{bu} \geq v - w$. Thus, the threat is credible when $p_{bu} \leq \frac{x-(v-w)}{n_u}$, and non-credible, otherwise.

Case 1: Credible threats: $p_{bu} \leq \frac{x-(v-w)}{n_u}$

Bureaucrat´s reaction function has not changed with respect to the previous game, because in this case the threat is credible. Such that $\pi_b(break\ formal, (informal,\cdot)) \geq \pi_b(break\ informal, (informal, punish))$ when $t^{min} \geq \alpha f - n_b p_{ub}$.

Therefore, the user skips the queue if $\pi_u((informal,\cdot), break\ formal) \geq \pi_u((formal,\cdot),\cdot)$. That is, whenever the minimum transfer *t* is such that $t^{min} \leq x + w - l$.

Case 2: Non-credible threats $p_{bu} > \frac{x-(v-w)}{n_u}$

If the threat is non-credible, the network-based strategy do not induce the bureaucrat to break formal rules. Consequently, he is only willing to break formal rules if $t^{min} \geq \alpha f$. But that amount is also reachable without the network and saving *l*. Consequently, under Condition 1, the user plays formal■

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Proposition 3: When two users have the same overlapping of reciprocity with the bureaucrat, petty corruption is cheaper for the higher degree user.

Lemma 2: For any pair of users *i* and *j* and bureaucrat *b*: if $\sum_{c_i} a_{bc_i} = \sum_{c_j} a_{bc_j}$, $a_{ib} = a_{jb}$ and $\sum_{c_i} a_{ic_i} > \sum_{c_j} a_{jc_j}$ then $p_{ib} \geq p_{jb}$ and $p_{bi} \leq p_{bj}$

When $\sum_{c_i} a_{bc_i} = \sum_{c_j} a_{bc_j}$, both users have the same overlapping between their networks and the bureaucrat's one. Moreover, when $a_{ib} = a_{jb}$, both users have the same relationship with him. Consequently, they only differ in the number of plausible indirect walks

connecting them with the bureaucrat. That difference rests on the topology of the rest of their connections. If user *i* has more extra ties, he cannot be worse than user *j* in terms of his capacity to find ways to influence bureaucrat's network such that $p_{ib} \geq p_{jb}$. On the other hand, user *i* has more alternative ways to access network resources compared to user *j* (because of his higher degree) and, therefore, $p_{bi} \leq p_{bj}$■

Proof of proposition 3: Let *i* and *j* be two structurally equivalent users in a connected graph. Suppose that we rewire the network by deleting one of *i*'s links with an individual who is not in R_b. Therefore, with the change, there is an individual *g* such that: $a_{ig} = 0$ and $a_{jg} = 1$. For each bureaucrat's contact, there are walks of the form $j \rightarrow g \rightarrow \cdots \rightarrow c_b$. Since $a_{ig} = 0$, *i* can only reach g through a third individual, such that $i \rightarrow c_j \rightarrow \cdots \rightarrow g$. Therefore, every *k*-degree walk from*j* to c_b passing through g has at least (*k*+1) degree walk from *i* to c_b. Given that the *k*-degree walk has a greater weight, it follows from lemma 2 that $p_{jb} > p_{ib}$ and from proposition 1 follows that $t_j^{min} < t_i^{min}$ ■

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<u>*Proposition 4*</u>*: When two users have the same overlapping of reciprocity with the bureaucrat, the threat from the higher degree user is more credible.*

Proof of proposition 4: Let *i* and *j* be two structurally equivalent users in a connected graph such that $p_{bi} = p_{bj} = \frac{x-(v-w)}{n_u}$ (i.e. their threats are credible). As in Proposition 3, suppose that we rewire the network by deleting one of *i*'s links with an individual who is not in R_b, identified as individual g. With the change, $a_{ig} = 0$ and $a_{jg} = 1$. Following lemma 2 and the proof of proposition 3: $p_{bi} < p_{bj}$. Therefore, for individual *i*: $p_{bi} > p_{bj} = \frac{x-(v-w)}{n_u}$ and from the proof of equilibrium E2, *j*'s threat is now credible while *i*'s is not■

CHAPTER 4: PETTY CORRUPTION IN SUB-SAHARAN AFRICA

Corruption happens both at the top and bottom levels of public administration. While corruption at the top level involves big firms (some of them foreign firms) and significant amounts of money in each interaction, corruption at the bottom level is characterized by small bribes, gifts and favors. Although researchers using rational choice tools to analyze corruption are aware of these differences, both types of corruption have been analyzed as, essentially, the same analytical problem (a delegation problem involving two players: a governmental authority and a bureaucrat).

In Chapter 1, I have sustained that there is an analytical gain if we separate the study of both types of corruption. In particular, it was sustained that the pettiness of the second type of corruption deserves a separate analysis because it is available to a bigger set of users and bureaucrats. In other words, petty corruption has lower barriers of entry to potential participants. Thus, while citizens can only be spectators of corrupt deals between top officials and, for example, managers of mining or financial companies, they can also participate in petty corruption as users of public services. As spectators, they can be important players to oversee and punish corruption and, therefore, potential collaborators of anti-corruption policies. But, as participants, they are potential parts of the problem. Therefore, their incentives to fight petty corruption are weaker than their motivation to punish top-level or grand corruption. As a result, they could be more strategic as well as ambivalent when talking about petty corruption, helping to spread it across the social system.

Having said that, an important point in the argument advanced in Chapter 1, and developed in detail in Chapter 2, is that incentives to participate in corrupt deals at the bottom level also differ

among users. Essentially, the argument sustains that users can not only bribe bureaucrats but they also have a "form of capital" (control over the access to network resources) that can be used to induce these bureaucrats to participate in corrupt deals. But this form of capital, embedded in their social connections, varies depending on their social position (in a social network) in relation to the bureaucrat.

In Chapter 3, I have developed a simple model to explain this point. For bureaucrats, breaking the formal rules to help users implies the risk of a legal or judicial sanction. Therefore, it seems logical that they would need some kind of compensation in order to be motivated to break these formal rules. The argument shows that the characteristics of that compensation vary according to the users´ position in social networks. Those positions determine whether the bureaucrat´s rejection of a request for help is or is not costly for him. When he can expect it to be costly for him, his access to network-based resources can be jeopardized, changing his incentives to follow formal procedures. Hence, in essence, the model expands the standard rational choice literature on corruption by showing that, once an individual´s relative position in networks has been taken into account, some users do not need to actually compensate the bureaucrat in order to induce him to take the risk of facing legal or judicial sanctions. In certain cases, it would be enough if a user can credibly threaten his access to network resources in the future. This idea solves the paradox around the rationality of the behavior shown by bureaucrats who accept small bribes (or none) and connects it with the anthropological literature on patron-client relationships in which bureaucrats are "patrons" who provide privileged access to public services without receiving a bribe or other material compensations in exchange.

As explained in Chapter 1, when users successfully set up their deals with bureaucrats by basing them on the social norms of reciprocity, they force the bureaucrat into a dilemma about

what rules to follow (whether the formal ones associated with his role as a civil servant or the informal ones embedded in their social relationships). Different users have different capacities to succeed in their interactions with bureaucrats under those informal rules. Specifically, it is suggested (Proposition 3 in Chapter 3) that the rate of success is greater for better connected users. Consequently, these better connected users would be at a higher risk of being involved in corrupt exchanges.

This Chapter explores this idea in empirical terms. , For this purpose, I have used data from 16 African countries located to the south of the Saharan Desert. The scope of the phenomenon of petty corruption in this region cannot be overly exaggerated. A diagnosis generally accepted about these countries is that civil servants are badly paid, public services are poorly developed and institutions that provide checks and balances do not have enough resources to carry out their mission. Consequently, from the supply side viewpoint, bureaucrats have incentives to participate in petty corruption for bribes, gifts or favors. For these reasons, considerable attention has been put on the development of anticorruption agendas centered on improving monitoring conditions, civil service and judicial systems. However, beyond declarations of principle and condemnations, progress in those agendas have been, at best, limited even in countries where some political will to implement reforms exists (Oliver de Sardan, 1999; www.transparency.org).

While scholars and policymakers´ attention has been focused on ways to improve formal institutions (the supply side), less attention has been put on the fact that citizens are not simple victims of corruption (the demand side).[37] Citizens in these countries tend to agree in their condemnation of corruption. Ethnographic studies clearly show that they are aware of the

[37] Efforts on the demand side have been centered on creating awareness among citizens (see, for example, the document "*Anticorruption Conventions in Africa: What Civil Society can do to make them work"*, available at http://www.transparency.org/regional_pages/africa_middle_east/ti_s_publications). For the reasons explained in the text, I am skeptical about the results of those efforts.

negative impact that corruption exercises on the development of their countries, but, in practice, they have a double-discourse they uphold a double standard in their discourse (Oliver de Sardan, 1999). This ambivalence is neatly summarized by Smith (2007) in his study of the perception of corruption among Nigerians. He writes that what Nigerians feel about corruption is that "It is OK when it benefits me; it is bad when it does not" (p.15). Social distance plays a key role here: citizens are more inclined to see petty corruption as a fault when the participants in a corrupt deal are socially disconnected with them but their opinion is more ambiguous when those individuals are part of their networks. I will come back to this point in the last chapter.

This chapter contributes to understanding the demand side by focusing the attention on what causes some users to participate in petty corruption while others do not. Specifically, I analyze survey data that include questions about participation in petty corruption by studying whether the probability of being involved in petty corruption varies with the size of the individual´s social network after controlling for other factors.

Data

I have chosen the *Afrobarometer Dataset*, an individual-level survey applied in 16 sub-Saharan countries.[38] The *Afrobarometer Dataset* compiles national probability samples from each of the 16 countries that represent a cross section of their voting age population. The sample design is a clustered, stratified**,** multi-stage, area probability sample and random selection is used at every stage of sampling. The primary selection units are regions or provinces within each

[38] The *Afrobarometer* is a public opinion research project which emerged from the collaboration between Michigan State University, the Institute for Democracy in South Africa and the Center for Democratic Development in Ghana (details can be found in http://www.afrobarometer.org/). Countries included in the second wave are Botswana, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

country. Strata are used to guarantee that urban/rural and male/female populations are adequately covered. Finally, data are obtained from face to face interviews in the language of respondents.[39]

I use the second wave of the *Afrobarometer Dataset*. I selected this dataset because it asks respondents about their direct experience with corruption in their interaction with bureaucrats in different circumstances (obtain a phone line for home use, obtain school admission for a child, get permits and licenses, among others).

According to the well-known Corruption Perception Index (CPI) compiled by Transparency International, this region of the world faces severe corruption problems. The CPI scores countries with values from 0 to 10. A greater number means a perception of more transparency (less corruption). According to the authors, scores under 5 suggest that the country has some problems with corruption while scores under 3 suggest that corruption is rampant in that country. The index has been published annually since 2001. Scores for the countries in the sample have not varied significantly in this 8-year period. As an illustration, Table 4.1 summarizes the scores for the countries surveyed in the *Afrobarometer Dataset* for which there is a CPI in 2006 (part a) and the average index by region (part b).[40] Nine of these fifteen countries have scores under three and fourteen of them have scores under five.

[39] For more details, see http://www.afrobarometer.org/sampling.html.
[40] The CPI does not include a score for Cape Verde.

Table 4.1 – Corruption Perception Index 2006

Part a: Countries included in Afrobarometer 2006		
Country	Corruption Perception Index	
Botswana	5.6	
South Africa	4.6	
Namibia	4.1	
Ghana	3.3	
Senegal	3.3	
Lesotho	3.2	
Tanzania	2.9	
Mali	2.8	
Mozambique	2.8	
Malawi	2.7	
Uganda	2.7	
Zambia	2.6	
Zimbabwe	2.4	
Kenya	2.2	
Nigeria	2.2	
Average in sample	3.2	
Part b: Average by Region		
Regions		# countries
Western Europe	7.0	28
Asian Pacific	4.5	25
Middle East	4.2	14
Americas	3.8	30
Africa	2.9	45
Eastern Europe	2.8	21

The dependent variables

As mentioned before, the *Afrobarometer* contains a set of questions about individuals' participation in corrupt exchanges. The questions are the following three:[41]

- In the past year, how often (if ever) have you had to pay a bribe, give a gift, or do a favor for government officials in order *to get a document or a permit*?

[41] Actually, the survey also asks a question about obtaining help from the police and crossing a border. However, the rates of response to those alternatives were too low to be used in the analysis.

- In the past year, how often (if ever) have you had to pay a bribe, give a gift, or do a favor for government officials in order *to get a place in primary school for a child*?

- In the past year, how often (if ever) have you had to pay a bribe, give a gift or do a favor to government officials in order *to get obtain household services (like pipped water, electricity, or phone)*?

There are four possible answers to these questions: "Never", "Once or Twice", "A few times" or "Often". I used these data to create the dependent variables: BREAK_PERMIT, BREAK_SCHOOL and BREAK-SERVICE. Additionally, before asking these questions, the survey also inquires if the respondent has never tried to obtain any of these services (I will expand on that point at the end of the chapter).[42] Table 4.2 summarizes the distribution of the answers for each alternative including the individuals who had never tried to obtain any of the public services and Table 4.3 shows national averages for the breaking of formal rules either once, few times or often. According to the data, 16% of the sample say that they had to pay a bribe, give a gift or do a favor to get a permit or license. Also, 9% and 10% of the sample participated in petty corruption to, firstly, get a child into a school and, secondly, to obtain a household service during the twelve months prior to the interview.

[42]There are 455 cases where respondents said that they had never tried to get a permit or license in the filtering question but their responses to BREAK_PERMIT (440 of whom said "never") were also recorded. Furthermore, 277 cases of BREAK_SCHOOL and 855 cases of BREAK_SERVICE had the same pattern (274 of 277 and 835 of 855 said "never", respectively). I performed the same analyses with and without those data, finding almost identical results. Here, I present the results without those observations.

Table 4.2 Distribution of dependent variables[43]

	corruption to get a permit		corruption to get a place for a child in a school		corruption to get a household service	
Answers	Freq	%	Freq	%	Freq	%
Never	17,194	84%	19,808	91%	14,740	89%
Once or twice	1,846	9%	1,163	5%	843	5%
A few times	864	4%	607	3%	563	3%
Often	541	3%	309	1%	369	2%
Total	20,445		21,887		16,515	
Filtering question: Never tried	3,105		1,893		5,986	
Obs	23,550		23,780		22,501	

At the country level, the data shows that the breaking of formal procedures varies significantly across countries. For instance, the average breaking of formal rules in the complete sample hides the huge differences between, let´s say, Nigeria and Botswana. Among all countries, Nigeria is the one with the greatest percentage of breaking of formal rules and Botswana is the one with the least significant amount of lawbreaking in all areas. This is fairly consistent with the corruption perception index mentioned earlier. As expected, pairwaise correlations between the average lawbreaking per country and the CPI are negative and significant, meaning that countries perceived as less corrupted actually have lower levels of petty corruption.

[43] The table presents percentages at the national level as extrapolated from the survey. The same is done in the description of the other variables and in all reported analyses except where the contrary is explicitly stated.

Table 4.3 Percentage of breaking formal rules (either once, a few times or often)

Country	% permit	% school	% service
Botswana	3%	1%	1%
Malawi	3%	2%	2%
Namibia	6%	7%	6%
Cape Verde	6%	2%	4%
South Africa	6%	5%	6%
Lesotho	8%	1%	1%
Mali	14%	7%	8%
Zimbabwe	15%	5%	11%
Tanzania	15%	5%	10%
Zambia	16%	13%	11%
Mozambique	19%	20%	18%
Uganda	20%	7%	10%
Ghana	20%	11%	19%
Senegal	24%	7%	6%
Kenya	30%	13%	15%
Nigeria	33%	31%	32%
correlation with CPI 2006	-0.665	-0.505	-0.527

In sum, the proposed dependent variables have a distribution that is consistent with country level estimates for the surveyed countries with the additional advantage of being at the individual level.

The main independent variable: the size of individuals' social networks

The survey does not include variables that directly measure the number of social contacts that the respondent has or any direct information of their involvement in social networks.[44] Thus, I follow standard empirical approaches in the social network analysis literature that use education attainment levels (e.g. Lin 1999, Mouw 2003) and the degree of involvement in voluntary organizations (Putnam, 1993, 2000) as proxies for the size of the individual's social networks.

[44] For an example of a survey including that kind of information (but, unfortunately, not including information about participation in corrupt exchanges), see ISSP Social Inequality Survey available at http://www.issp.org.

With regard to educational attainment levels, the survey asks the following question:

- "What is the highest level of education you have completed?"

There are 9 valid answers from no schooling to post-graduate studies. I collapsed them into the variable EDUCATION that contains the following 6 categories: no schooling (=0), some primary schooling (=1), primary school completed (=2), some secondary school (=3), secondary school completed (=4), postsecondary education either some or completed (=5). Table 4.4 summarizes the distribution of the variable across categories. Educational attainment levels are relatively low. The average person in the sample did not finish primary education. Table A.1 in the Appendix presents more details at the country level.

Table 4.4 - Educational attainment level of the population (percentages)

Educational level	In the sample	Corrected by survey's weights
Not formal schooling	15.1%	16.5%
Elementary school - Partial	23.0%	24.3%
Elementary school - Complete	16.5%	17.2%
High School - Partial	19.4%	18.7%
High School - Complete	15.3%	13.9%
Terciary level - Partial or Complete	10.6%	9.5%

Regarding involvement in volunteer organizations, the survey asks:

- "I am going to read out a list of groups that people join or attend. For each one, could you tell me whether you are an official leader, an active member, an inactive member, or not a member:"

The list of groups is the following: a 'religious group', a 'trade union or farmers´ association/club/cooperative', a 'professional or business association' and 'a community

development or self-help association'. For each of them, I created one categorical variable: CONN_RELIG, CONN_UNION, CONN_ASSOC, and CONN_COMUN, respectively. Each variable has values from 0 (not a member) to 3 (official leader). Table 4.5 summarizes the distribution of each variable. Participation in voluntary groups is mostly as inactive members (details per country are presented in the appendix, Table A.2 to A.5).

Table 4.5 - Participation in volunteer groups, per type of group and degree of involvement

Participation in group	Not a member	Inactive member	Active member	Official leader
Religious	26.7%	21.0%	45.6%	6.6%
Union	78.1%	7.5%	12.4%	2.1%
Professional	87.1%	4.5%	6.9%	1.4%
Community	73.6%	7.8%	15.4%	3.2%

Control variables

I include several individual and country level data as controls. The rationale for their inclusion is the following.

i. Controls at the individual level:

HEAD: I include the dummy HEAD with value 1 if the respondent is the head of the household because the responsibilities fulfilled by heads of households can make them more prone to participating in corrupt exchanges which affect their family.

FEMALE: For similar reasons, I expect that women participate less than men in those exchanges and include the dummy FEMALE (1 if the respondent is a woman). URBRUR: Also, I expect less exposure to potential corrupt deals in rural areas. Therefore, I add a dummy with value 1 if the respondent lives in a rural area and value 0 if he lives in an urban one.

INCOME: On the other hand, relatively richer individuals can offer bribes more frequently and in larger amounts. Thus, the survey contains a variable that indicates the decile in which the respondent falls (respondents provided their level of income and the research team classified them in deciles according to national aggregates). I identify that variable as INCOME.

PUBLICJOB: Another high-risk factor for potentially being involved in corrupt deals is being both a user and a government employee. Government employees and their families may have an advantage when it comes to getting privileged access to informal exchanges with other bureaucrats not because they have many contacts. It is because they are "insiders" fortunate enough to be close to a civil servant who is in a position to help them. To express that possibility, I include the dummy PUBLICJOB with value 1 if the household contains government employees.

POLIT_AFF: A similar line of reasoning makes it relevant to include POLIT_AFF, a dummy indicating the respondent's sympathy towards a political party (=1).

RELIGION: Moral variables can also play a role to explain differences in users' behavior when they tried to obtain a public service. I include a dummy with value 1 if the respondent professes a religion and 0, otherwise. Also, in some analyses, I used the frequency with which the respondent attends his/her church, an alternative variable to capture the same aspect (not reported).

NEPOTISM: Another dimension of moral values that can affect the decision of respondents is their level of tolerance for nepotism. Respondents were asked to choose between two statements to indicate which one they feel is closest to their own views (see details in the Appendix). One statement indicates that leaders must be impartial while the other states that they must help their group once in office. I created a categorical variable with four values: 4

if the individual strongly agreed with the second option, 3 if he agrees with it, and 2 and 1 if he agrees or strongly agrees with the first option.

INDIVIDUALISM: The survey also asks respondents to choose between two statements (see details in the Appendix), attempting to classify respondents as communitarians or individualistic. I created a categorical variable with four values: 4 if the respondent strongly agreed with the individualistic statement, 3 if he agrees with it, and 2 and 1 if he agrees or strongly agrees with the communitarian one.

EASY_DOC, EASY_SCHOOL, EASY_SERVICE: The survey asks for the respondent's perception about how easy it is to get permits, school admission for a child and household services. It seems logical that people who expect greater difficulties in obtaining those services will be more inclined to participate in petty corruption. Each variable has four values from 1 (very difficult) to 4 (very easy).

Finally, I included the age of the respondent (AGE) and its square (AGESQ)

In some estimations, I also include country level controls, described below.

ii. Controls at the country level:

GDPPC_REAL: From World Bank data, I obtained the Gross Domestic Product per capita in real terms for each country in the sample (GDPPC_REAL).[45]

CPIA_QPA, CPIA_TRANS: Also from the World Bank, I borrowed two assessment tools to evaluate the quality of the delivery of public services (CPIA_QPA which measures the quality of public administration and CPIA_TRANS which measures the level of transparency in public administration). These variables attempt to measure actual policy rather than users' perception (as is done, for example, in the Corruption Perception Index compiled by

[45] In some models (non-reported) I used the natural logarithm of the GDP (no relevant differences were found).

Transparency International). Consequently, they are well-suited to capture bureaucratic costs and the extent to which public service procedures are transparent.[46]

ETHNIC: According to the model, users and bureaucrats may be more inclined to practice corruption if they are part of the same groups. To capture this possibility, I took a measurement of ethnic fractionalization from Djankov *et al* (2002). This variable is 1 minus the probability that two persons in a given country, randomly chosen from a population, belong to different groups.

NEPOTISM_C: From the *Afrobarometer Dataset*, I used the national average for the question about nepotism (NEPOTISM_C) to capture the mean level of tolerance for corrupt exchanges per country.

A description of the data is provided in Table A.6 to A.9 and a summary of their main statistical characteristics in Table A.10 in the Appendix.

Results

I have organized the results as follows. In Section 4.1, using the original dataset with standard errors corrected by survey characteristics, I report the estimated impact of network size on the risk of being involved in petty corruption in order to get a license or a permit. The reported estimates use standard errors corrected by survey characteristics. These results show the impact of each proxy (CONN_ASSOC, CONN_UNION, CONN_RELIG, CONN_COMUN and EDUCATION) on petty corruption.

[46] As described in IAD (2006), CPIA_QPA is based on four criteria: (a) Policy coordination and responsiveness, (b) Service delivery and operational efficiency, (c) merit and ethics, (d) pay adequacy and management of the wage bill. On the other hand, CPIA_TRANS rests on assessments of three dimensions: (a) the accountability of the Executive power in its oversight of institutions and civil servants vis-a-vis their performance; (b) access of civil society to information on public affairs; and (c) state capture by narrow vested interests.

One warning aimed at the use of separate analysis for each proxy is the presence of measurement errors. In Section 4.2 of the results, I factor in this *caveat* using a common variable created with factor analysis techniques (FACTORNET).

A second problem in the data is that many observations are lost in several estimations. To overcome this problem, I use imputation techniques that create several estimates per missing observation and rerun the models. The results are reported in Section 4.3.

A third criticism regarding the use of these variables is that they may be proxies for other variables rather than proxies for the individual´s network size. Specifically, they may be capturing the impact of income on the dependent variable. Although the income variable is included as a control in the previous analyses; it is useful to observe if the results differ when we use subsets of the sample with the same income level. Consequently, Section 4.4 reports those results.

Section 4.5 extends the analysis when the dependent variable is BREAK_SCHOOL and BREAK_SERVICE, respectively. Finally, a criticism of the theory presented in this research may be the following: while it is true that some individuals can get privileged access to public services without bribing public agents, the possibility of bribing them is still open to all individuals in the system. I have argued, in Chapters 1 and 2, that the decision to obtain a public service depends on the expected net benefits after paying the transaction costs of either the formal or informal procedures required to obtain it. For some individuals, the expected benefits (either by following the formal rules or through an informal mechanism) do not merit the effort. This imposes an upper limit to the use of networks for the purpose of breaking formal rules. Consequently, less connected individuals would be at a higher risk of opting out from accessing to the public

services. If that is true, the size of the individual´s network should have a negative impact on the probability of "self-selecting" out of the system. I explore this idea in Section 4.6 of the results.

4.1: Results for breaking of formal rules to get a permit or license

Broadly speaking, the following results are consistent with the theory developed in previous chapters. In the estimation, given that the dependent variable is a categorical variable with four values, I ran ordered probit models. The statistical package used in the analyses was STATA 10 (using the *svy* option to account for survey characteristics). Table 4.6 summarizes the results for the full models with country dummies, for each of the proxies used for the individual network's size. More detailed versions of the models are contained in the fifth columns of Tables A.11a to A.11e. In all cases, the size of networks has the expected sign. It means that, in this sample, individuals with larger networks are at a higher risk of being involved in corrupt exchanges for the purpose of getting a permit or license when compared to individuals with smaller personal networks. Also, all estimates were statistically significant.

Table 4.6 Summary of full models with the impact of the individual's network size on the probability of breaking formal rules to obtain a license or permit

Explanatory variables	**Model 1 EDUCATION** b/se	**Model 2 CONN_ASSOC** b/se	**Model 3 CONN_RELIG** b/se	**Model 4 CONN_UNION** b/se	**Model 5 CONN_COMUN** b/se
Size of individual's network	0.057*** (0.013)	0.129*** (0.022)	0.043* (0.018)	0.051* (0.020)	0.086*** (0.019)
***Individual level controls*: head of household, gender, living in a rural or urban area, income, age, age squared, adheres to a religion, government employee in household, sympathy towards a political party, perception of the difficulty in getting permits or licenses, tolerance for nepotism, preference for individualism.**					
Constant	Yes	Yes	Yes	Yes	Yes
Country level dummies	Yes	Yes	Yes	Yes	Yes
Observations	14826	14633	14817	14685	14658
F (27,245)	30.68	31.61	32.74	30.07	31.10

Note: standard error in parenthesis. The coefficients and standard errors for all variables in each estimation are found in the appendix. For the model using: education (see Table A.11a, model4), conn_assoc (see Table A.11b model4), conn_relig (see Table A.11e model4), conn_union (see Table A11.c model4) and conn_comun (see Table A.11d model4)

Coefficients in the table above are not directly interpretable. Now, for the sake of exposition, I center the attention in this section on their sign and significance, leaving the analysis of marginal effects to the next section. In order to evaluate whether the coefficients of the individual's network size were sensitive to the addition or subtraction of control variables, I ran alternative specifications of the model using. For example, in some estimations, I used logarithms of GDP per capita while in others, I added and deleted control variables (like sympathy towards a political party, education and age), used alternative proxies for religious and ethnical variables, separated the analysis for men and women, and for urban and rural areas (see below), etc. In all cases, the sign and magnitude of the coefficient of the individual's network size were robust for those alternative specifications. Also, three of the five proxies (conn_assoc, conn_comun and conn_union) remain statistically significant under most of the alternative specifications (Tables A.11a to A.11e summarize some results).

For example, I ran models within urban and rural subsamples (summaries are shown in Tables 4.7 and 4.8). In those estimations, coefficients remained positive, although some coefficients were not statistically significant at 0.95 degree of confidence (notice that the tables include the variable "factornet" that is explained in the next section). Models look more robust in rural than in urban areas and alternative models including country level controls did not change the results (see Tables A.11a and A11e, fourth columns and Tables 12a and 12b in the Appendix). Other specifications by regions and countries (not reported) show the same picture

with positive coefficients in most cases and coefficients not significantly different than zero in others.

Table 4.7 Summary of full models with the impact of the individual's network size on the probability of breaking formal rules to obtain a license or permit in urban areas

	Pr(Break_permit|network) for urban population					
	Model 1 (factornet)	Model 2 (education)	Model 3 (con_assoc)	Model 4 (conn_relig)	Model 5 (con_union)	Model 6 (conn_comun)
	b/se	b/se	b/se	b/se	b/se	b/se
individual's network size	0.183***	0.032	0.164***	0.023	0.062	0.148***
	(0.035)	(0.020)	(0.028)	(0.037)	(0.034)	(0.029)
***Controls*: head of household, gender, living in a rural or urban area, income, age, age squared, professes a religion, government employee in household, sympathy towards a political party, perception of the difficulty in getting permits or licenses, tolerance to nepotism, preference for individualism.**						
N	5639	5739	5675	5735	5689	5677

Table 4.8 Summary of full models with the impact of the individual's network size on the probability of breaking formal rules to obtain a license or permit in rural areas

	Pr(Break_permit|network) for rural population					
	Model 1 (factornet)	Model 2 (education)	Model 3 (con_assoc)	Model 4 (conn_relig)	Model 5 (con_union)	Model 6 (conn_comun)
	b/se	b/se	b/se	b/se	b/se	b/se
individual's network size	0.202***	0.029	0.182***	0.080**	0.101***	0.125***
	-0.037	-0.019	-0.032	-0.031	-0.027	-0.032
***Controls*: head of household, gender, living in a rural or urban area, income, age, age squared, professes a religion, government employee in household, sympathy towards a political party, perception of the difficulty in getting permits or licenses, tolerance for nepotism, preference for individualism.**						
N	8895	9087	8958	9082	8981	8996

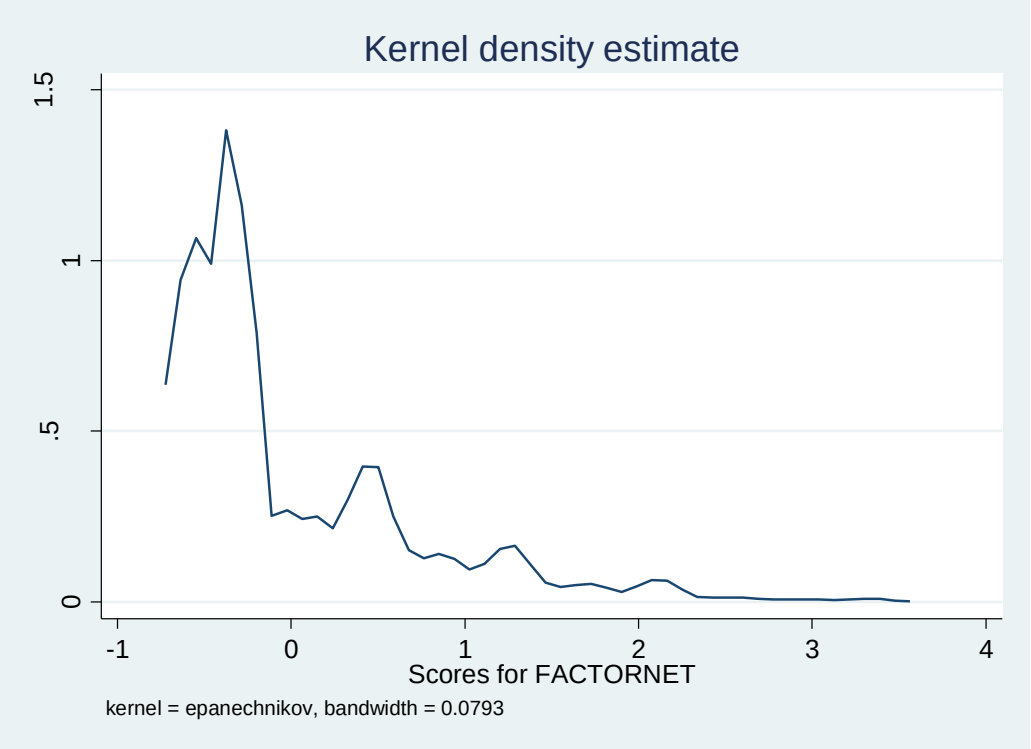
In sum, generally speaking, these data do not allow us to reject the null hypothesis that sustains that the size of individual´s social network increases his probability to be involved on petty corruption. Now, one important caveat is that all the coefficients can be biased and inefficient due to measurement errors that are common when we use proxies. I tackle this problem in Section 4.2.

4.2: Taking measurement errors into account by using factor analysis to create a new explanatory variable

When using proxies in econometric analysis, one runs the risk of getting inconsistent estimates due to covariation between the proxies and some omitted variables as well as inefficient estimates due to measurement errors. One way to reduce this risk is to combine several proxies in a single measurement; such that, the combined measurement can summarize several dimensions of the theoretical variable. For this reason, I used factor analysis to build an alternative measurement of the individual´s network size that combines the proxies studied in the previous section.[47] The result of the factor analysis created two principal components with positive eigen values of 0.93 and 0.07, respectively. There was a clear separation of the variable Education from the other four proxies.[48] As a result, I repeated the factor analysis including only the variables regarding involvement in volunteer organizations. In this second stage, only one factor was positive with an eigen value of 0.92. All models were estimated using both alternative measurements finding no significant difference. The results reported are based on a factor that only combines the effects of the four variables regarding involvement in volunteer organizations. I called that variable FACTORNET. Figure 4.1 shows the distribution of this variable. Its skewness is consistent with the structure of social networks found in the existing literature (see, for example, Newman and Park, 2003).

[47] In earlier versions, I also used several indexes (eg. average and weigthed average) with similar results.
[48] The second factor basically captured the dispersion in education while the first factor expressed the variation in the other four variables.

Figure 4.1 Distribution (kernel density) of individual's network sizes proxied by FACTORNET



The first columns in Tables 4.7 and 4.8 above show the result of using FACTORNET as a proxy for the individual's network size in urban and rural subsamples, respectively. We can conclude that the use of factor analysis to correct for measurement errors does not alter the significance nor the sign of previous estimates estimates for the impact of network. Also the estimates of FACTORNET are robust to the inclusion of other variables in the equation (see Table 4.9 below).

Table 4.9 Effect of the individual's network size on the probability of breaking formal rules to obtain a license or permit

	breaking of formal rules to get a permit			
	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
factornet	0.207***	0.196***	0.139***	0.135***
	(0.025)	(0.027)	(0.035)	(0.022)
head		0.123**	0.133*	0.169***
		(0.041)	(0.060)	(0.041)
female		-0.131***	-0.090*	-0.105***
		(0.029)	(0.041)	(0.031)
urbrur		-0.174*	-0.241**	-0.159**
		(0.079)	(0.090)	(0.049)
income		0.017*	0.021*	0.029***
		(0.008)	(0.009)	(0.007)
age		0.002	0.003	-0.004
		(0.006)	(0.007)	(0.006)
agesq		0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)
religion		0.239*	-0.101	-0.041
		(0.095)	(0.137)	(0.088)
publicjob		0.022	0.122*	0.053
		(0.045)	(0.054)	(0.040)
polit_aff		0.059	0.170**	0.136**
		(0.040)	(0.053)	(0.041)
easy_doc		-0.186***	-0.169***	-0.188***
		(0.021)	(0.028)	(0.020)
nepotism		0.021	0.031	0.026
		(0.022)	(0.024)	(0.018)
individual~m		-0.043*	-0.001	0.019
		(0.017)	(0.021)	(0.014)
gdppc_real			0.001***	
			(0.000)	
cpia_qpa			0.233	
			(0.169)	
cpia_trans			-0.532***	
			(0.138)	
ethnic			3.065***	
			(0.609)	
nepotism_c				
country dummies	Yes	Yes	Yes	Yes
constant	Yes	Yes	Yes	Yes

N	19290	14534	7647	14534
*** p<0.05, ** p<0.01, *** p<0.001**				

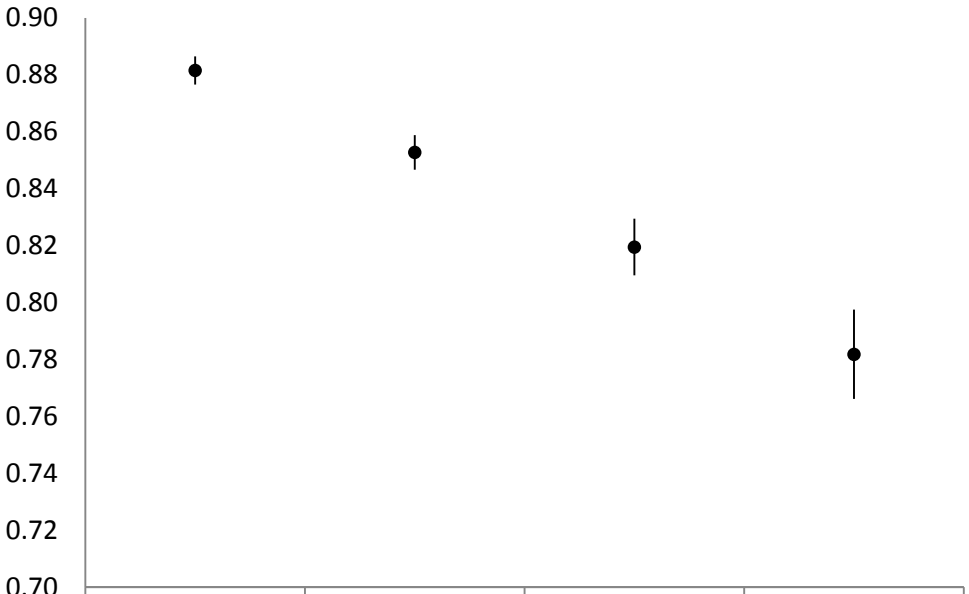
Therefore, once measurement errors are taken into account by using factor analysis, the estimation confirm the previous results, thereby making it even harder to reject the null hypothesis that the size of individuals´ networks increases the risk of practicing in corrupt behavior. For instance, holding all other variables constant, a change of two standard deviations around the mean in FACTORNET (i.e from one standard deviation below the mean to one standard deviation above it) reduces the probability of respecting formal rules in 4.19% from 0.895 to 0.853. Conversely, the probability of breaking the formal rules "once", "a few times" and "often" increase by 2.16, 1.16 and 0.87 percentage points, respectively, for the same change in FACTORNET. These results are summarized in Tables 4.10a to 4.10d.

Table 4.10 Marginal effects of the individual's network size on BREAK_PERMIT

Part a			
Pr(following formal rules|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.895	0.853	4.19%
sd	0.005	0.006	
Part b			
Pr(breaking once|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.067	0.089	-2.16%
sd	0.004	0.005	
Part c			
Pr(breaking occasionally|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.025	0.037	-1.16%
sd	0.002	0.002	
Part d			
Pr(breaking regularly|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.013	0.022	-0.87%
sd	0.002	0.003	

The magnitudes above, although statistically significant, seem small. Thus, it is useful to calculate the marginal effects for the original variables. To illustrate the point, Figures 4.2 to 4.5 show the marginal effects of CONN_ASSOC for each possible value of BREAK_PERMIT. When CONN_ASSOC is selected as the proxy for the size of the individual's network and after the use of imputation techniques that I explained in Section 3, the estimation shows that a non-member has a probability of 0.88 of following formal rules, while an official leader of a professional association has a probability of 0.78. Inactive and active members of those organizations have probabilities in between in decreasing order as predicted by the theory. The lines in Figure 4.2 represent the range of two standard deviations centered in the mean; hence, it can be observed that the ranges of the estimations do not overlap.

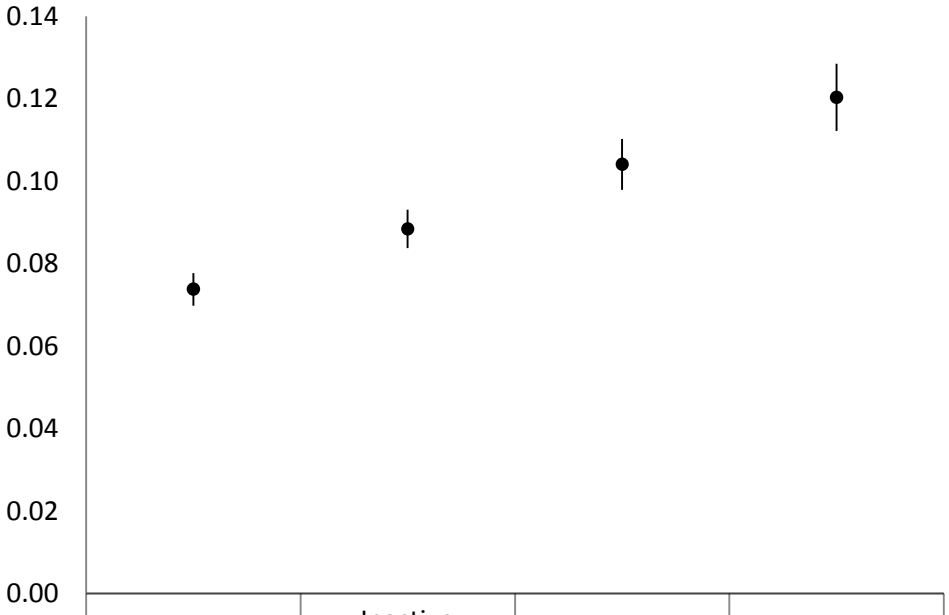
Figure 4.2 Probability of never breaking formal rules to get a permit based on involvement in professional or business associations



	Not a member	Inactive member	Active member	Official leader
● mean Pr(never)	0.88	0.85	0.82	0.78
mean+1sd	0.89	0.86	0.83	0.80
mean-1sd	0.88	0.85	0.81	0.77

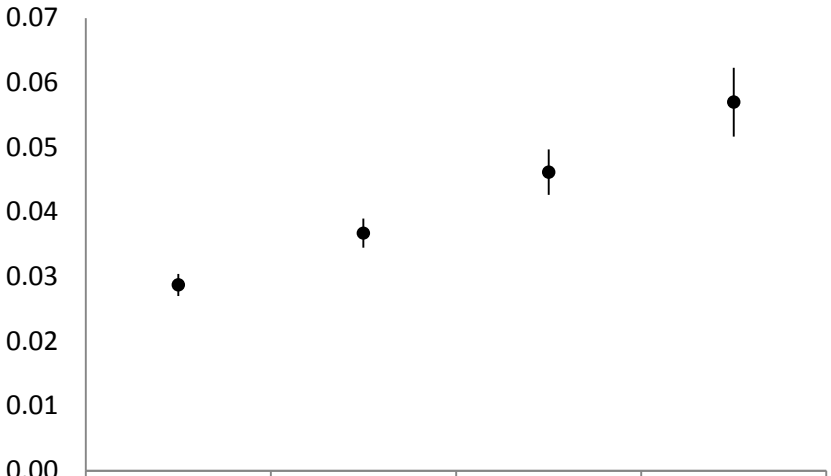
On the other hand, the larger an individual´s network is, the higher the probability of being involved in corrupt exchanges. For instance, individuals who do not participate in professional associations have smaller networks and, consequently, lower capacities to set up informal deals with a bureaucrat. Therefore, they should be less inclined to behave in a corrupt way to get a license or permit. The estimation shows precisely that effect. Non-members have a probability of 0.07 of breaking the formal rules on one occasion (see Figure 4.3), a probability of 0.03 of breaking it occasionally (see Figure 4.4) and a probability of 0.02 of breaking it on a regular basis (see Figure 4.5). On the contrary, the probabilities for an official leader (i.e. an individual with a larger network) are 0.12, 0.6 and 0.4, respectively.

Figure 4.3 Probability of breaking formal rules <u>on one occasion</u> to get a permit based on involvement in professional or business associations



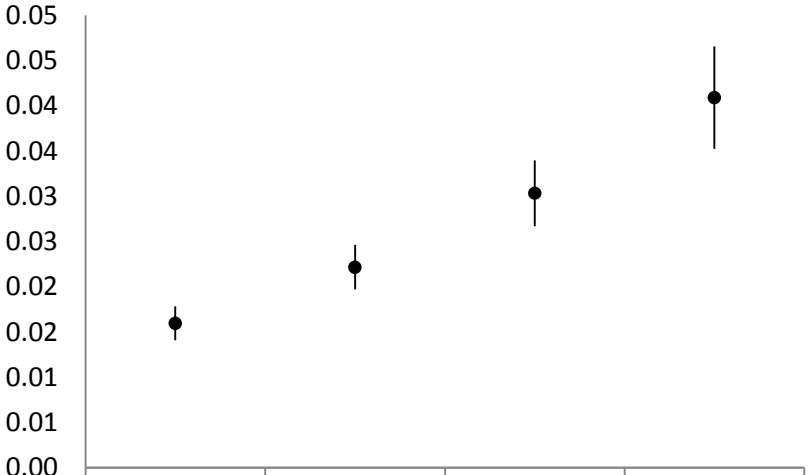
	Not a member	Inactive member	Active member	Official leader
● mean Pr(once)	0.07	0.09	0.10	0.12
mean+1sd (once)	0.08	0.09	0.11	0.13
mean-1sd (once)	0.07	0.08	0.10	0.11

Figure 4.4 Probability of occasionally breaking formal rules to get a permit based on involvement in professional or business associations



	Not a member	Inactive member	Active member	Official leader
● mean Pr(a few)	0.03	0.04	0.05	0.06
mean+1sd (few)	0.03	0.04	0.05	0.06
mean-1sd (few)	0.03	0.03	0.04	0.05

Figure 4.5 Probability of breaking formal rules on a regular basis to get a permit based on involvement in professional or business associations



	Not a member	Inactive member	Active member	Official leader
● mean Pr(often)	0.02	0.02	0.03	0.04
mean+1sd (often)	0.02	0.02	0.03	0.05
mean-1sd (often)	0.01	0.02	0.03	0.04

In sum, marginal effects show significant differences between less connected and more connected individuals (as illustrated in the case of participation in professional associations). Similar results were obtained when educational attainment levels were used in the estimation (see Table A.13) and when the estimation was based on participation in any of the other organizations (not reported). The use of factor analysis to combine these variables in a single measurement also shows the same effects (as described in Table 4.10)

Even if we accept that the problems posed by measurement errors have been reduced, the previous analyses do not avoid inefficiencies and potential biases due to missing observations. The next section takes this problem into account.

4.3: Accounting for missing data through multiple imputation

Thus far, I have focused the analysis on the subsample of the dataset for which there are complete observations. As shown in King *et al* (2001), multiple imputation techniques are statistically superior alternatives to deal with missing observations. These techniques create *m* estimations per missing observation (where the value of *m* is defined by the researcher), such that *m* imputed datasets are created in the process. Across those datasets, the completed observations are the same but the missing observations are imputed with different values that reflect the uncertainty that exists about their true value. I used the Amelia software to create those imputed datasets. The main statistical assumptions to produce them are: that missing data are lost at random and their values can be estimated by a multivariate normal distribution (see King *et al* 2001 for a detailed explanation of the algorithms used for imputation). In exploratory steps, I ran analyses using from five to seventy imputed datasets (for descriptive statistics of one of those

datasets, see Table A.14 in the Appendix). Estimations with more than five datasets produced minor improvements but exponential additions on computational time.

Consequently, I decided to focus most of the analyses on five to ten imputed datasets at a time. On those datasets, I used stochastic simulation techniques to improve the accuracy of the estimation by drawing simulation of the main and ancillary parameters from their asymptotic sampling distribution. For example, for each imputed dataset where I ran an ordered probit model, it was assumed that the main (and ancillary estimates) and their variance-covariance matrix were the mean and variance of a multivariate normal distribution, respectively. From them, I drew one thousand sets of estimates that, later, were averaged with those estimates obtained from draws in other imputed datasets. Hereafter, each analysis reports results obtained after applying this technique in five to ten imputed datasets.

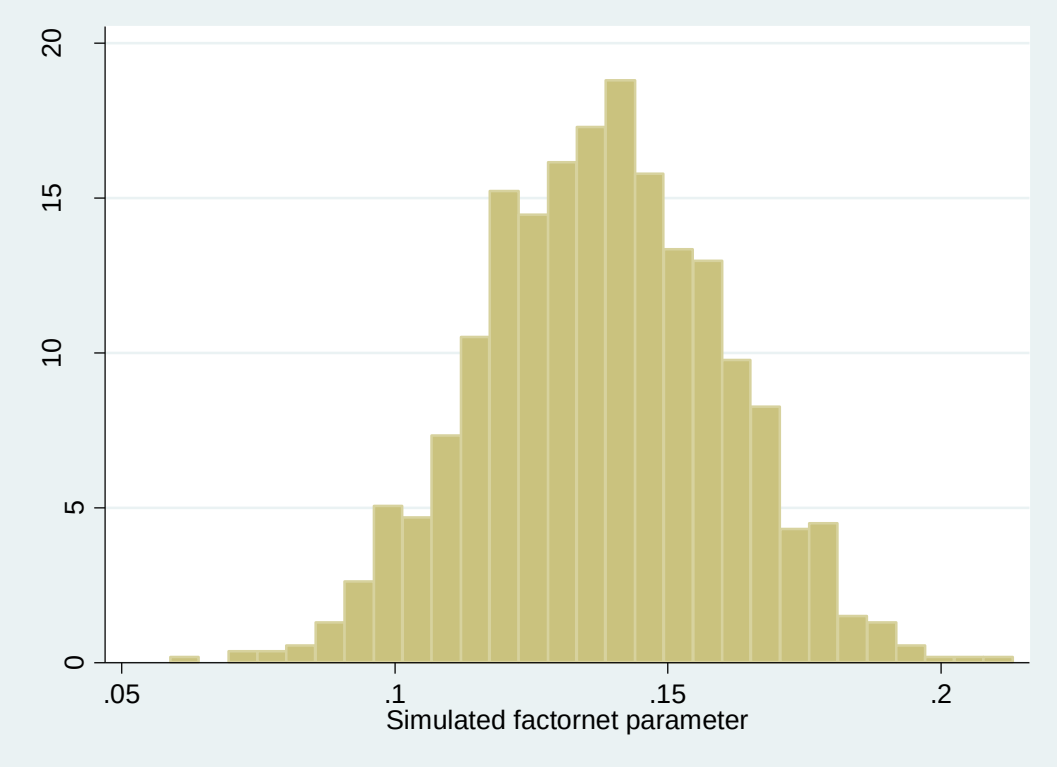
For example, Table 4.11 shows the impact of the size of individuals' networks on BREAK_PERMIT when FACTORNET is used as a proxy. This estimation reproduces Model 4 in Table 4.9 but increases the observations from which the estimation is generated from the original 14,534 units to a set of five imputed datasets, each one with 26,606 observations. As shown, the coefficients from the original dataset and the average coefficient from the imputed dataset are very similar. Figure 4.6 presents the distribution of the estimates of FACTORNET obtained through this technique. It is important to note that, in all estimations the coefficient of FACTORNET on BREAK_PERMIT is positive. Estimates from alternative specifications produced similar results. In sum, the use of multiple imputations improved the efficiency of the estimation because it allowed us to exploit the full information that was lost in previous estimations. However, it did not change the results in any substantial way.

Table 4.11 Average coefficients of the effect produced by the size of the individual's network on BREAK_PERMIT using imputed datasets.

Explanatory variables	Coefficient	Standard Deviation	t- statistic	P value	Coefficients in Table 4.9 model 4
Size of individual's network*	0.137	0.023	6.046	0.000	0.135
Urbrur	-0.183	0.040	-4.528	0.000	-0.159
Head	0.144	0.034	4.217	0.000	0.169
Female	-0.132	0.027	-4.926	0.000	-0.105
Income	0.032	0.009	3.757	0.001	0.029
Age	-0.002	0.005	-0.323	0.747	-0.004
Agesq	0.000	0.000	-0.915	0.361	0.000
Religion	-0.023	0.073	-0.31	0.756	-0.041
Publicjob	0.052	0.036	1.474	0.141	0.053
polit_af	0.107	0.036	2.955	0.003	0.136
Easy_doc	-0.200	0.018	-10.989	0.000	-0.188
Nepotism	0.029	0.016	1.788	0.075	0.026
Individualism	0.008	0.013	0.634	0.527	0.019
country dummies	Yes				
_cut1	1.232	0.183	6.73	0.000	
_cut2	1.749	0.184	9.508	0.000	
_cut3	2.200	0.183	11.992	0.000	

*/ Proxy: FACTORNET, Number of observations: 20606

Figure 4.6 Dispersion of the FACTORNET coefficient obtained through simulations



Summing up, the results thus far suggest that, for users of public services, their involvement in volunteer organizations and their educational attainment levels seem to have an impact on the risk of behaving in a corrupt way to get permits or licenses. That impact seems to be robust even after adding controls and estimations within subsamples. Also, once missing data and measurement error problems are taken into consideration, it seems that there is a gain in efficiency of the estimation without changing the general conclusion that education and participation in volunteer groups exercise a positive effect on petty corruption. The mechanism proposed here to explain these results is that the underlying variable is the effect of the size of individuals' networks.

However, alternative explanations could be proposed. In particular, it may be the case that these variables are capturing the impact of other variables rather than the impact of the size of individuals' networks. In this regard, a variable of special interest is household income. Given that families with higher incomes are more educated and more inclined to participate in volunteer organizations, an alternative interpretation of the results is that the proxies are actually showing that individuals with higher income are more willing to pay bribes to get access to permits and licenses. I take this criticism into consideration in the next section.

4.4: Results per level of income

The results in Sections 1, 2 and 3 show that after controlling by a measurement of income, the size of the individual's networks has an impact on the probability of breaking formal rules to get a license. Nevertheless, due to multicolinearity, we cannot rule out the possibility that the proxies used in the analysis are partially capturing the impact of income. Pairwise correlations between INCOME and the proxies suggest that some colinearity exists, especially between INCOME and

EDUCATION; and the comparison of coefficients in models with and without INCOME consistently show that the effect of the individual's networks increases when INCOME is not included in the analysis, reinforcing the previous point. Table 4.12 compares the coefficient of some of the models already discussed when the variable INCOME is not included in the regression. As expected, EDUCATION is the variable that has the greatest change (35%) after deleting INCOME. On the other hand, FACTORNET, which is the proxy used in Section 2, has a non-negligible change of almost 10%. In sum, there is enough evidence to be cautious about the interpretation given to the results in previous sections.

Table 4.12 Changes in the coefficients of the individual's network sizes (by proxy) in models with and without INCOME

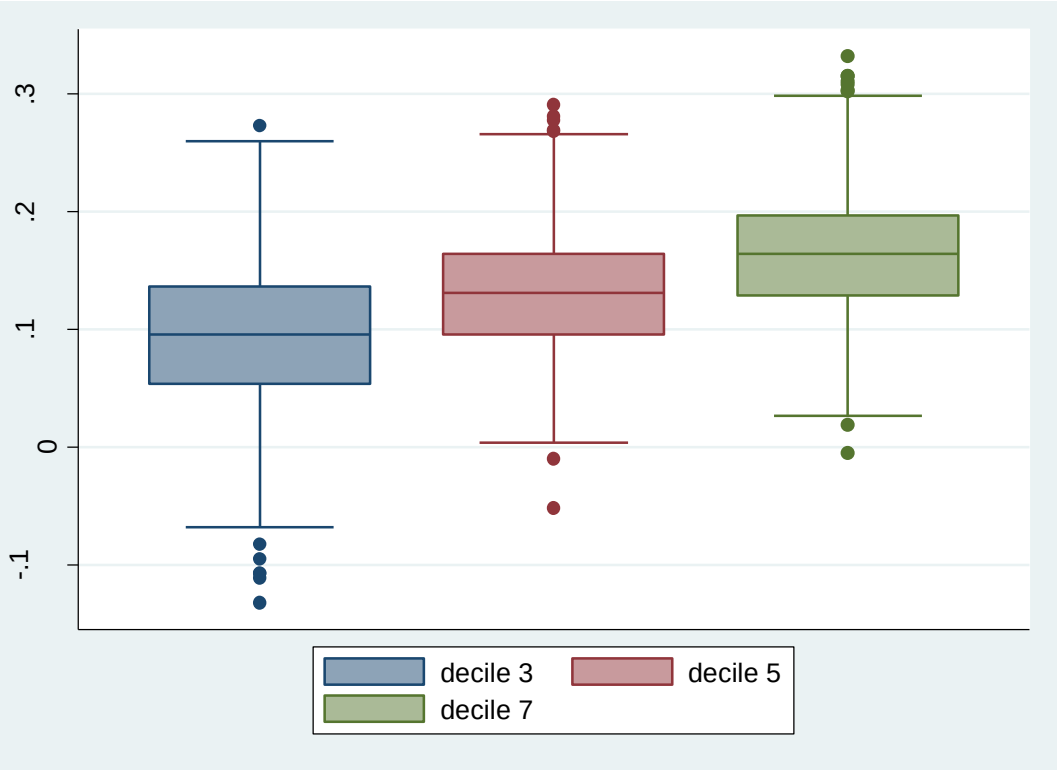
	With income		Without income		Source
education	0.057	***	0.077	***	Model 4 in Table A.11a
% change	35.1%				
conn_assoc	0.129	***	0.15	***	Model 4 in Table A.11b
% change	16.3%				
conn_union	0.051	**	0.059	**	Model 4 in Table A.11c
% change	15.7%				
conn_comun	0.086	***	0.087	***	Model 4 in Table A.11d
% change	1.2%				
conn_relig	0.043	*	0.045	*	Model 4 in Table A.11e
% change	4.7%				
factornet	0.135	***	0.148	***	Model 5 in Table 4.8
% change	9.6%				

Now, these findings are not really surprising. As I mentioned before, having access to network resources can be understood as a form of capital (or wealth) and, consequently, there is a natural link between income and the size of individuals' social networks. Better connected individuals are usually relatively richer ones. Unfortunately, the survey does not allow us to separate the respondent's answers to distinguish bribes, gifts and favors. That possibility would have been useful to discern how much of the results are driven by income and how much are driven by individuals´ network sizes because the model suggests that individuals with bigger

networks have more opportunities to get privileged access to public services at lower costs. Consequently, the model predicts that, among those who participate in corruption, individuals with relatively higher incomes have a greater probability of exchanging gifts and favors while individuals with relatively lower incomes have a greater probability of offering bribes for the same services.

Despite the limitation imposed by the structure of the data, estimations of the impact of networks in subsamples by decile of income can partially separate the effect of both variables on BREAK_PERMIT. If the individual's network size has an effect on BREAK_PERMIT, the coefficient should remain significant when the estimation is limited to subsamples of individuals within the same levels of income. Tables A.14 to A.15 show average estimates of the impact of the individual's network size within the 3rd, 5th and 7th deciles, respectively. In all cases, the coefficients are positive and, in two of them, they are statistically significant as suggested by the theory. Figure 4.7 shows the distribution of the estimates obtained for each subsample. The comparison across boxes in the figure indicates the impact of income on BREAK_PERMIT and the dispersion within each box accounts for the impact of the individual's network size within each income group. Notice that, for individuals in the 3rd decile, an important fraction of the coefficients obtained through simulation techniques are negative. As a result, the influence of the variable is not statistically significant at that level. On the contrary, it is statistically significant at higher levels of income.

Figure 4.7 Box plot of the distribution of estimates of the coefficient of FACTORNET by decile of income



Consequently, there are some indications to believe that the size of the individual's network has an independent effect from income level because the impact of the variable is still significant when the analysis is centered on individuals in the same income range; however, the fact that the strength of this effect varies with the level of income suggests that the evidence is still weak. Future research should attempt to find ways to separate both effects.

All the previous analyses use BREAK_PERMIT as the dependent variable. In the following section, I briefly summarize the results when alternative cases of petty corruption were used as dependent variables. Taken as a whole, the results were consistent with those reported before.

4.5 Robustness check: Results for breaking of formal rules to get a household service and to obtain school admission for a child.

As was shown in Table 4.2, the frequency with which formal rules are broken to get household services (BREAK_SERVICE) and school admission for a child (BREAK_SCHOOL) is considerably lower when compared to the corruption involved in trying to get licenses or permits.

Twenty five percent of respondents said that they had never tried to get a household service. Consequently the number of cases used in the models with BREAK_SERVICE as the dependent variable is smaller than the one used in the previous section (around three thousand cases less). For descriptive statistics of the imputed datasets used in models with BREAK_SERVICE as the dependent variable, see Table A.17 in the Appendix (for BREAK_SCHOOL, see Table A.18). As in previous sections, I used factor analysis to combine individuals' participations in volunteer organizations in a single measurement per dataset. Table 4.13a shows one of the estimations utilizing factor analysis on ten imputed datasets, using BREAK_SERVICE as the dependent variable (Table 4.13b shows the same for BREAK_SCHOOL). As before, the size of the individual's networks is positive and statistically significant (Tables 4.13a and 4.13b are comparable with Table 4.11).

Remarkably, the marginal effects of the size of networks on corrupt exchanges to get household services and school admission for a child look similar to those obtained in the case of license and permits.

Table 4.13a Probability of BREAK_SERVICE, imputed datasets

Explanatory Variables:	Coefficient	Standard Deviation	t- statistic	P value
Size of individual's network	0.181	0.025	7.348	0.000
Urbrur	-0.277	0.049	-5.672	0.000
Head	0.117	0.046	2.526	0.013
Female	-0.046	0.030	-1.534	0.126
Income	0.014	0.011	1.28	0.202
Age	-0.017	0.007	-2.45	0.015
Agesq	0.000	0.000	1.446	0.150
Religión	-0.076	0.080	-0.952	0.342
Publicjob	0.080	0.044	1.804	0.073
polit_afi	0.128	0.049	2.614	0.009
easy_doc	-0.087	0.016	-5.457	0.000
Nepotism	0.027	0.021	1.296	0.196
individualism	0.019	0.017	1.09	0.277
country dummies	yes			
_cut1	1.136	0.221	5.129	0.000
_cut2	1.535	0.221	6.944	0.000
_cut3	1.969	0.226	8.709	0.000

Table 4.13b Probability of BREAK_SCHOOL, imputed datasets

	Coefficient	Standard Deviation	t- statistic	P value
Size of individual's network	0.203	0.027	7.503	0.000
urbrur	-0.215	0.053	-4.033	0.000
head	0.100	0.038	2.652	0.008
female	-0.041	0.028	-1.489	0.137
income	-0.003	0.008	-0.336	0.737
age	-0.006	0.006	-0.939	0.348
agesq	0.000	0.000	0.231	0.817
religion	-0.074	0.070	-1.055	0.292
public~b	0.045	0.046	0.977	0.329
polit_~f	0.099	0.045	2.175	0.030
easy_doc	-0.068	0.012	-5.786	0.000
nepotism	0.063	0.023	2.687	0.009
indivi~m	0.026	0.015	1.718	0.086
country dummies	yes			
_cut1	1.950	0.177	11.020	0.000
_cut2	2.403	0.178	13.481	0.000
_cut3	2.875	0.190	15.160	0.000

To facilitate the comparison, Tables 4.14 and 4.15 summarize the impact of networks on BREAK_SERVICE and BREAK_SCHOOL, respectively. In both cases, factor analysis was used to create one proxy per imputed dataset as was done in the calculations presented in Table 4.9. For example, in Part 4.14 (Part a), a change of one standard deviation around the mean of network size reduces the probability of respecting formal rules to get household services by about 4% (similar to the case of licenses) and increases the probabilities of breaking the rules "once", "occasionally" and "regularly" by about 2%, 1% and 1%, respectively (also similar to the case of licenses). A similar conclusion is found for marginal effects of the individual's network sizes on BREAK_SCHOOL (see table 4.15). To facilitate the interpretation, Figures 4.8 and 4.9 present marginal effects of the individual´s network size on BREAK_SERVICE when those sizes are proxied by participation in professional associations. These figures are comparable to Figures 4.3 and 4.6, respectively. In general terms, leaders of professional organizations are around ten percent less inclined to follow formal rules and two percent more inclined to break rules on a regular basis than individuals who do not participate in such groups.

Table 4.14 Marginal effects of individual's network size on BREAK_SERVICE

Part a			
Pr(following formal rules|network size)			
	Mean– 1sd	mean+ 1sd	Dif
mean	0.935	0.895	4.01%
sd	0.005	0.006	
Part b			
Pr(breaking once|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.037	0.056	-1.87%
sd	0.003	0.004	
Part c			
Pr(breaking occasionally|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.018	0.031	-1.23%
sd	0.002	0.002	

Part d			
Pr(breaking regularly|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.009	0.019	-0.91%
sd	0.002	0.003	

Table 4.15 Marginal effects of individual's network size on BREAK_SCHOOL

Part a			
Pr(following formal rules|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.950	0.912	3.8%
sd	0.004	0.005	
Part b			
Pr(breaking once|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.032	0.053	-2.1%
sd	0.003	0.003	
Part c			
Pr(breaking occasionally|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.013	0.024	-1.1%
sd	0.001	0.002	
Part d			
Pr(breaking regularly|network size)			
	mean– 1sd	mean+ 1sd	dif
mean	0.005	0.011	-0.6%
sd	0.001	0.002	

In sum, the analysis of the causes of petty corruption in alternative public services depicts a similar pattern. Consequently, the previous analyses of the *Afrobarometer Datasets* cannot allow us to reject the null hypothesis of this dissertation. However, the results are still preliminary ones. Future research with other datasets can help to clarify the actual strength of the empirical relationship between networks and corruption.

Figure 4.8 Probability of never breaking formal rules to get a household service based on involvement in professional or business associations

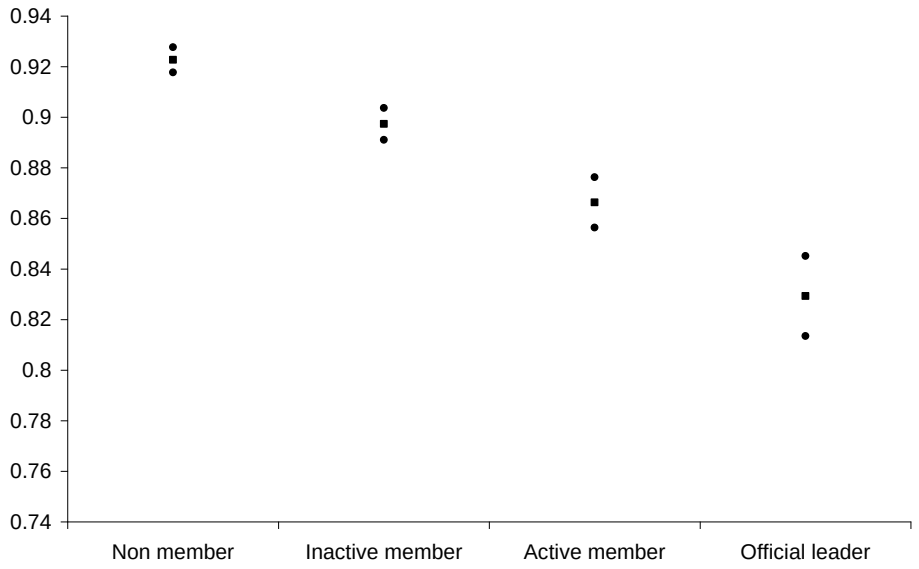
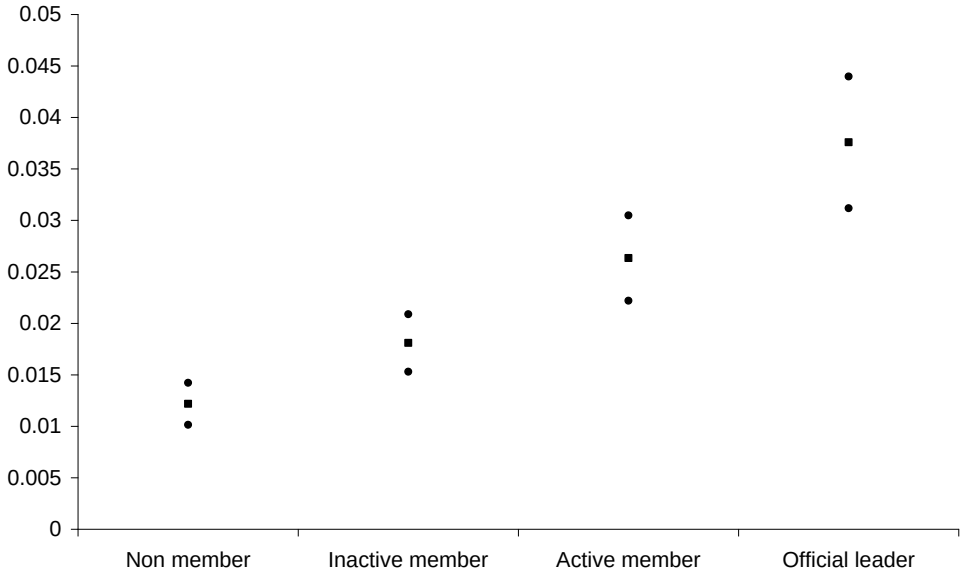


Figure 4.9 Probability of breaking formal rules on a regular basis to get a household service based on involvement in professional or business associations



To end this section, I want to present a final exploration of the *Afrobarometer* data that includes the answers of individuals who had never tried to get permits, school admission for a child or household services. It is important to remember that all previous analyses have excluded those observations from the estimations. This is the topic of the next section.

4.6 Follow the formal rules, follow the informal ones or exiting

As mentioned before, a subsample of the respondents declared that they had never tried to obtain some of the public services included in the questionnaire. There might be several reasons for that answer; for example, they did not need any of them in the past. The model in previous chapters also considers the possibility that some users rationally decide to exit from the system, such that they do not apply for some public goods or services. According to the model, the reason for their decision is that, first of all, the costs of formal procedures discourage them from "staying in the queue" and following formal procedures. Secondly, their lack of good contacts which would enable them to skip the line forces them to monetize their interaction with the bureaucrat in order to induce him to help them. In their case, the less connected they are, the greater the requested transfer or bribe needed. Thus, if those bribes are too onerous, they would also be inclined to abandon the informal deal to obtain the public service.

Consequently, we could use the answers of those individuals who had never tried to get a given public service as an approximation for that behavior. Such that, we can distinguish three kinds of behavior: (a) individuals who try to get a service and do not break the formal rules; (b) individuals who also try to obtain it but by breaking the formal rules once, a few times or often; and (c) individuals who opt out of the interaction with the bureaucrat. The first group *goes formal*

following the established procedures; the second group *goes informal* attempting an easier way to get the service; and, the third one, *exits*, in the sense that he or she moves forward without going into contact with the State to get the given service. According to the theory developed in previous chapters, the third group should have relatively smaller networks.

To explore this possibility, I have created a categorical variable with three values. When the respondent declares that he has never tried to get a permit or license, this receives the value of "1". When he sought a service and declares that he did not have to pay a bribe or give a gift or favor in exchange, this receives a value of "2". And the value is "3" when he says that he has tried to get a permit in the last 12 months and has participated in petty corruption to obtain it.

I ran multinomial logit models to test the impact of networks on the probability whereby an individual might select any of these alternatives. Table 4.16 shows the distribution of each dependent variable (licenses, services and school admission) among those who did not try to get the service (exit), tried without resorting to corruption (go formal) and tried by resorting to corruption (go informal).

Table 4.16 - User's behavior regarding the access to permits or licenses from a public agency

	Access to:					
	Licenses		Household services		School admission for a child	
	Frequencies	Percent	Frequencies	Percent	Frequencies	Percent
Exit	3,105	13.18	5,986	26.60	1,893	7.96
Go Formal	17,194	73.01	14,740	65.51	19,808	83.30
Go Informal	3,251	13.80	1,775	7.89	2,079	8.74

The reference group for the analysis is the second one ("go formal"). Therefore, according to the theory, when it comes to "going formal", as the size of the individual's network increases,

the probability of choosing the "exit" alternative should decrease and the probability of "going informal" should increase. In other words, the sign must be negative and positive, respectively.

Table A.19 in the Appendix presents the results for several models using FACTORNET as the proxy for the size of the individual's network in the case of getting licenses or permits. As projected by the theory, the sign of the probability of going informal with respect to going formal is positive and significant. With respect to the "exit" option, once control variables are included, the coefficient of FACTORNET is negative and also significant. In other words, the greater the size of the network, the smaller the probability that the individual will exit. However, marginal effects are negligible for the exit option. Figures 4.10 to 4.12 summarize the marginal effects for multinomial models covering the other two public services when CONN_ASSOC is used as the proxy for the size of the individual's network (marginal effects were calculated from Model 3 in Table A.20 and Model 3 in Table A.21, respectively).[49] Again, the signs of the coefficients are consistent with the theory advanced here. Individuals whose networks are smaller have a greater probability of voluntarily "opting out of the system". This is because that they realize that the access to public services through formal procedures is expensive and they do not have good enough contacts to try using informal mechanisms.

[49] To facilitate the comparison, I also include the marginal effects of CONN_ASSOC in the case of licenses in Figure 4.13.

Figure 4.10: Marginal effects of CONN_ASSOC in the access to household services

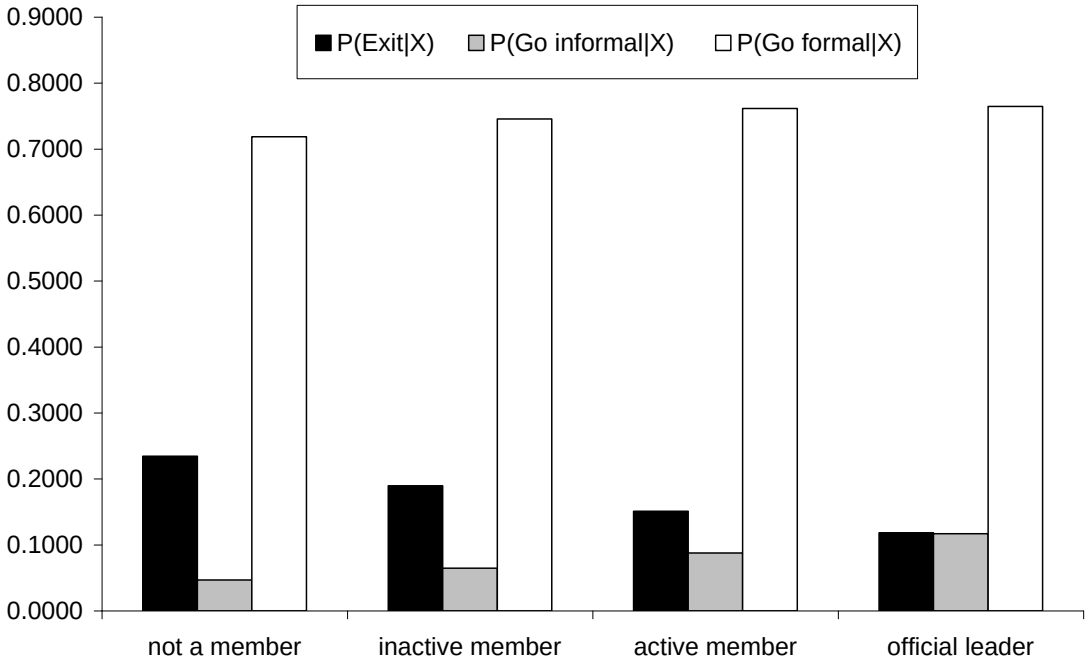


Figure 4.11 Marginal effects of CONN_ASSOC in obtaining school admission for a child

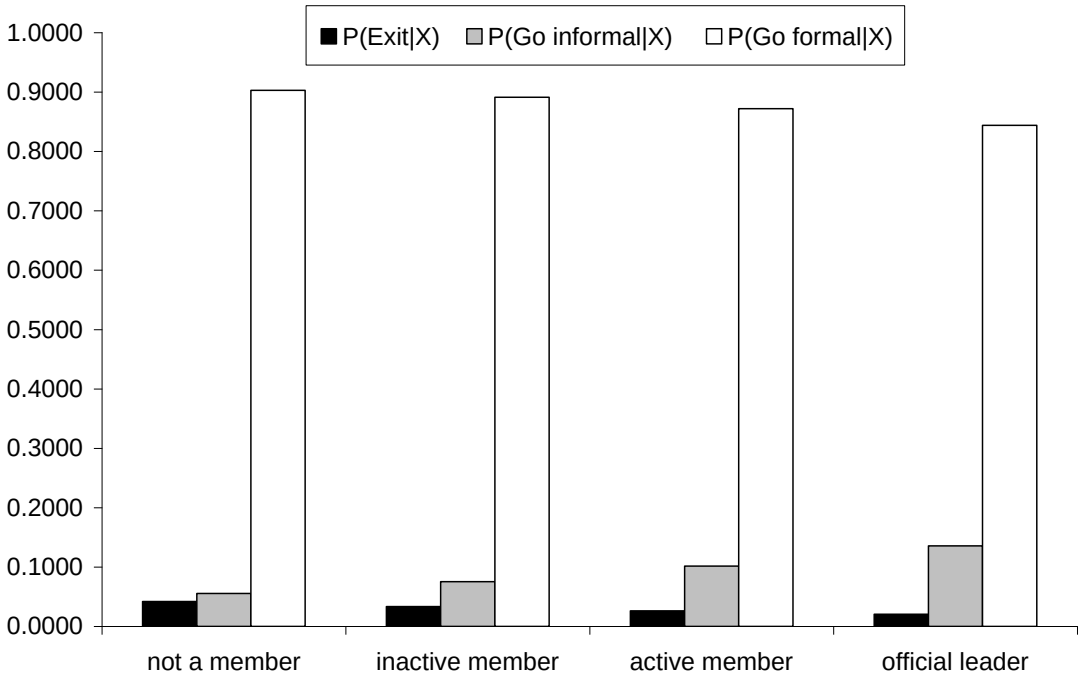
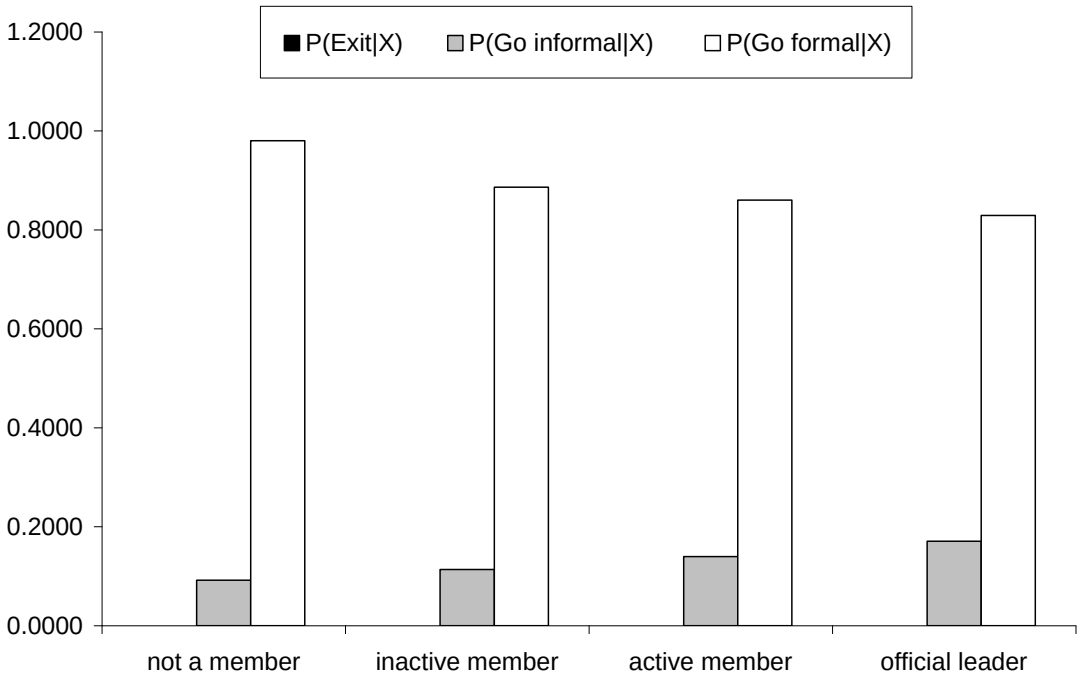


Figure 4.12 Marginal effects of CONN_ASSOC in getting a license or a permit



To conclude, the *Afrobarometer Dataset* is a well-designed survey containing individual level data relevant to test the link between petty corruption and social networks. The analyses of the *Afrobarometer* Dataset developed in this chapter cannot allow us to deny that such a link exists. Briefly, the estimation shows that the probability of following formal rules declines and the probability of following informal rules increases for more connected individuals. To reach those results, we used a set of proxies of individual's network sizes and three measures of petty corruption in the access to permits, admission to schools and household services. In all cases, the connection between network size and the probability of being involved in petty corruption was positive and, in most estimations, statistically significant (I never obtained negative signs for the estimate of the main variable) Also, the coefficient seem to be robust for several specifications and subsamples. Those results were confirmed when we used factor analysis techniques to deal with measurement errors associated with the use of single proxies. And, when we used

imputation techniques to deal with missing data problems. Along the analyses, Indeed, the relationship between petty corruption and the size of individuals' networks shown in the analysis become stronger when we exclude Botswana, South Africa and Namibia, the three countries with lower levels of corruption in the dataset.

These patterns are consistent with the theory developed in previous chapters. My proposed explanation is that more connected individuals have a better mix of formal-informal in their interaction with others. In particular, better connected users have an advantage to use their contacts to get privileged access to publicly delivered goods and services. I also found that less connected users have higher probabilities of exit. It means, the less connected users (for whom informal mechanism are ineffective and formal mechanisms are expensive) decide to "move forward" in their lives without attempting to get goods or services from the public sector. Again, that result is consistent with the theoretical work of previous chapters. The lesser and lesser connected individuals must pay bigger and bigger bribes to induce bureaucrats to participate in petty corruption but given that their willingness to pay is fixed, there is a point in which they simple conclude that the good does not deserve the effort.

Nevertheless, a note of caution is necessary. All the models tested above only explain a tiny proportion of the overall dispersion in the data. Therefore, there is ample space for endogeneity problems that must be faced in future research. With all those caveats in mind, it is also true that there is a promising line in both the theoretical and the empirical level to study the link between networks and corruption.

APPENDIX OF CHAPTER 4

Table A.1 Educational levels of respondents in the 16 countries in the sample, row data.

country	Not formal schooling	1st level partial	1st level complete	2nd level partial	2nd level completed	Third level	Total, N
Botswana	15.5%	13.7%	13.8%	19.8%	24.5%	12.7%	1199
Ghana	28.1%	15.8%	27.1%	12.5%	8.9%	7.7%	1196
Lesotho	8.9%	38.9%	22.1%	17.3%	8.1%	4.8%	1200
Malawi	16.2%	45.5%	14.2%	13.8%	6.5%	3.8%	1198
Mali	46.9%	37.5%	3.4%	4.6%	4.9%	2.8%	1276
Namibia	3.8%	13.4%	12.1%	31.5%	25.3%	14.0%	1198
Nigeria	13.8%	10.9%	11.1%	16.9%	28.7%	18.5%	2428
SouthAfrica	5.9%	14.2%	9.1%	29.7%	26.5%	14.5%	2392
Tanzania	6.2%	16.8%	47.1%	13.1%	7.1%	9.8%	1218
Uganda	11.0%	25.7%	15.5%	23.7%	9.2%	15.0%	2399
Zambia	6.3%	19.1%	15.3%	31.6%	15.4%	12.3%	1198
Zimbabwe	8.3%	15.9%	15.8%	29.9%	21.8%	8.3%	1104
CapeVerde	12.9%	24.7%	25.7%	21.0%	8.5%	7.2%	1266
Kenya	11.1%	19.6%	20.3%	13.9%	21.9%	13.2%	2394
Mozambique	30.8%	35.8%	15.9%	11.7%	2.8%	3.0%	1381
Senegal	30.9%	39.3%	6.2%	15.2%	3.2%	5.2%	1131
All sample	15.1%	23.0%	16.5%	19.4%	15.3%	10.6%	24178

Table A.2 Participation in religious group, per country, row data.

country	Not a member	Inactive member	Active member	Official leader	Total
Botswana	448	244	477	30	1199
Ghana	196	223	638	137	1194
Lesotho	498	348	319	35	1200
Malawi	144	165	667	221	1197
Mali	610	337	291	41	1279
Namibia	243	414	513	28	1198
Nigeria	377	649	1,293	106	2425
SouthAfrica	595	583	1,152	66	2396
Tanzania	197	75	820	121	1213
Uganda	500	505	1,236	159	2400
Zambia	65	250	703	179	1197
CapeVerde	695	214	350	2	1261
Kenya	286	431	1,427	247	2391
Mozambique	455	313	566	52	1386
Senegal	535	183	378	47	1143

Table A.3 Participation in trade union or farmers´ association/club/cooperative, per country, row data.

country	Not a member	Inactive member	Active member	Official leader	Total
Botswana	1,005	64	110	13	1192
Ghana	917	51	174	31	1173
Lesotho	960	92	121	13	1186
Malawi	855	70	173	77	1175
Mali	800	176	237	61	1274
Namibia	1,006	96	84	4	1190
Nigeria	1,794	232	338	45	2409
SouthAfrica	2,057	147	128	24	2356
Tanzania	857	82	254	20	1213
Uganda	1,957	153	251	38	2399
Zambia	929	97	134	30	1190
CapeVerde	1,111	70	71	3	1255
Kenya	1,717	204	398	38	2357
Mozambique	1,069	120	118	10	1317
Senegal	878	67	157	36	1138

Table A.4 Participation in professional or business association, per country, row data.

country	Not a member	Inactive member	Active member	Official leader	Total
Botswana	1,089	32	55	14	1190
Ghana	1,029	26	84	22	1161
Lesotho	1,090	34	34	3	1161
Malawi	995	45	107	19	1166
Mali	965	105	158	42	1270
Namibia	1,073	61	47	9	1190
Nigeria	1,996	159	202	43	2400
SouthAfrica	2,132	70	124	27	2353
Tanzania	1,042	55	87	18	1202
Uganda	2,004	141	234	20	2399
Zambia	1,038	43	89	17	1187
CapeVerde	1,139	70	35	5	1249
Kenya	1,932	130	276	23	2361
Mozambique	1,156	54	68	17	1295
Senegal	1,014	32	67	26	1139

Table A.5 Participation in a community development or self-help association, per country, row data.

country	Not a member	Inactive member	Active member	Official leader	Total
Botswana	1,013	68	94	18	1193
Ghana	915	55	165	39	1174
Lesotho	892	104	154	29	1179
Malawi	658	130	340	69	1197
Mali	782	177	242	72	1273
Namibia	1,042	87	52	8	1189
Nigeria	1,801	194	355	53	2403
SouthAfrica	1,934	144	234	37	2349
Tanzania	867	59	221	51	1198
Uganda	1,653	217	460	69	2399
Zambia	889	82	185	31	1187
CapeVerde	1,080	77	87	7	1251
Kenya	1,291	211	754	116	2372
Mozambique	1,113	59	55	28	1255
Senegal	736	111	221	70	1138

Table A.6: Dependent Variable Used in the Econometric Analysis

Name	variable	Description	Source
Dependent Variable			
Breaking of formal rules	brokedoc	"In the past year, how often (if ever) have to had to pay a bribe, give a gift, or do a favour to government officials in order to get a document or a permit?" (never/once/a few times/often) Dummy No = 0 Yes =1 Alternative "Yes" adds (once + few times + often)	Source: Afrobarometer Merged Dataset (AII): question q59a
	brokeschool	Similar to brokedoc, but in this case the question was "In the past year,… in order to get a child into school?"	AII: q59b
	brokeservice	Similar to brokedoc, but in this case the question was "In the past year,… in order to get a household service (like piped water, electricity, or phone)?"	AII: q59c

Table A.7: Main Independent Variable Used in the Econometric Analysis

Explanatory Variables				
Size of Individual's Social Network	Proxies			
	Education	education	It has 6 values: no schooling, some primary schooling, primary school completed, some secondary school, secondary school completed, postsecondary education (either some or completed)	AII: q84
	Participation in professional and business organizations	conn_assoc	It has 4 values: Not a member, Inactive Member, Active Member, Official Leader	q24a
	Participation in religiuous groups	conn_relig	It has 4 values: Not a member, Inactive Member, Active Member, Official Leader	q24b
	Participation in trade union or farmer associations	conn_union	It has 4 values: Not a member, Inactive Member, Active Member, Official Leader	q24c
	Member of community development association	conn_comun	It has 4 values: Not a member, Inactive Member, Active Member, Official Leader	q24d

Table A.8: Other Independent Variable Used in the Econometric Analysis – Individual level controls

Other Explanatory Variables - Controls				
Individual level controls	Being the head of the household	Head	Being head of the family or not	AII: q81
	Gender	female	Female=1, Male=0	AII: q96
	Household Income Level	Income	Organized by deciles from 1 to 10	AII: q90
	Age of respondent	Age	Population over 18 years old	AII: q80
	Adherence to a religion	Religion	Dummy that acquires the value 1 if the individual adheres to a religion	AII: q85
	Intensity of religiosity	Religiosity	Frequency with which the individual goes to his church (never if he does not adhere to a religion)	AII: q86
	Household dependence of a public job	Publicjob	"Do you or your household rely on the income of anyone who works for the government?" Original values: yes=1, no=0	AII: q91
	Closeness to a political party	polit_aff	"Do you feel close to any particular political party or political organization" Yes=1, No=0	AII: q87a
	Perception of the difficulty to get a permit or license	easy_doc	"Based on your experience, how easy or difficult is to obtain the following services? Or do you never try and get these services from government? An identity document (such as a birth certificate, driver's license or passport)	q58a
	Urban or rural area	urbrur	Urban=0, Rural=1	Urbrur
	Degree of individualism	Individualism	Which of the following statements is closest to your views? A: Each person should put the well-being of the community ahead of their own interest. B: Everybody should be free to pursue what is best for themselves as individuals. Answers can be: agree very strongly with A, agree with A, agree with neither, agree with B, agree very strongly with B). I take off the alternative "agree with neither" and create a categorical variable with for values from 1 (low individualism) to 4 (high individualism)	AII
	Nepotism	nepotism	People are asked: "Which of the following statements is closest to your view? A: Since everyone is equal under the law, leaders should not favour their own family or group. B: Once in office, leaders are obliged to help their own family or group" (Agree Very strongly with A, Agree with A, Agree with neither Agree with B, Agree Very Strongly with B)". I ordered this answers from 1 (low nepotism) to 4 (high nepotism)	AII: 69
	Easiness to obtain permits or licenses	easy_doc	Based in the experience of the respondent they were asked to evaluate how easy was to obtain this kind of service. Values from 1 (very difficult) to 4 (very easy)	AII: q58a
	Easiness to get a school-chair for a child	easy_school	Based in the experience of the respondent they were asked to evaluate how easy was to obtain this kind of service. Values from 1 (very difficult) to 4 (very easy)	AII: q58b

	Easiness to get a household service	easy_service	Based in the experience of the respondent they were asked to evaluate how easy was to obtain this kind of service. Values from 1 (very difficult) to 4 (very easy)	AII: q58c

Table A.9: Other Independent Variable Used in the Econometric Analysis – Country level controls

Country level controls	Economic development	Domestic Product per capita	gdpcap_real	Growth Domestic Product per capita - real (US$ Constant 2000)	World Development Indicators - World Bank
	Quality of Formal Institutions	Quality of Public Administration	cpia_qpa	From 1 (very weak performance) to 6 (very strong performance). <<This criterion assesses the extent to which civilian central government staffs (including teachers, health workers, and police) are structured to design and implement government policy and deliver services effectively>> IDA (2006, p39)	World Development Indicators - World Bank / International Development Association (IDA): Country Policy and Institutional Assessment (CPIA)
		Transparency	cpia_trans	<<This criterion assesses the extent to which the executive can be held accountable for its use of funds and the results of its actions by the electorate and by the legislature and judiciary, and the extent to which public employees within the executive are required to account for the use of resources, administrative decisions, and results obtained. Both levels of accountability are enhanced by transparency in decision-making, public audit institutions, access to relevant and timely information, and public and media scrutiny>> IDA (2006, p41)	World Development Indicators - World Bank / Country Policy and Institutional Assessment (CPIA)
	Quality of formal institutions	National acceptance of nepotism	nepotism_c	See nepotism above	AII: q69, average per country

Table 10 Descriptive statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
break_permit	20900	0.2497129	0.6527884	0	3
break_school	22164	0.149251	0.515267	0	3
break_service	22380	0.1461126	0.5329406	0	3
education	24178	2.287948	1.586477	0	5
conn_relig	23079	1.343516	0.9270704	0	3
conn_union	22824	0.3744304	0.7690993	0	3
conn_assoc	22723	0.2335079	0.6373842	0	3
conn_comun	22757	0.4879378	0.8670128	0	3
head	22910	0.4962025	0.4999965	0	1
female	24248	0.4992164	0.5000097	0	1
urbrur	24248	1.625412	0.4840262	1	2
income	19768	3.111847	3.002753	0	10
publicjob	22919	0.248222	0.4319907	0	1
polit_aff	24239	0.617971	0.4858936	0	1
religion	24181	0.9371821	0.2426402	0	1
nepotism	22010	1.862926	0.9921187	1	4
individualism	22179	2.51436	1.093067	1	4
easy_doc	20606	2.389304	0.9886766	1	4
easy_school	22016	3.064589	0.7995614	1	4
easy_service	22522	3.166237	0.7818715	1	4
gdppc_real	16	918.5499	1146.812	148	4035
cpia_qpa	13	3.09286	0.4680121	2	4
cpia_trans	13	3.127271	0.5632346	1.5	4.5
ethnic	12	0.7376848	0.1530024	0.39	0.93
nepotism_c	15	1.868223	0.3447746	1.44	2.99

Table A.11a Ordered Probit Models to explain Pr(BREAK-PERMIT) by individual's network size using EDUCATION as a proxy

	model0	model1	model2	model3	model4
	b/se	b/se	b/se	b/se	b/se
break_permit					
education	0.070***	0.025	0.046**	0.046**	0.057***
	(0.014)	(0.014)	(0.017)	(0.017)	(0.013)
head		0.138***	0.151*	0.191***	0.189***
		(0.039)	(0.060)	(0.055)	(0.039)
female		-0.136***	-0.080*	-0.084*	-0.090**
		(0.029)	(0.039)	(0.038)	(0.031)
urbrur		-0.111	-0.194*	-0.150	-0.100*
		(0.083)	(0.091)	(0.087)	(0.049)
income		0.017*	0.017	0.015	0.025***
		(0.008)	(0.009)	(0.009)	(0.007)
age		0.005	0.008	0.006	0.001
		(0.005)	(0.007)	(0.007)	(0.006)
agesq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
religion		0.316***	-0.059	0.010	-0.015
		(0.092)	(0.134)	(0.128)	(0.086)
publicjob		0.015	0.106	0.103	0.022
		(0.045)	(0.058)	(0.059)	(0.040)
polit_aff		0.072	0.180***	0.164**	0.146***
		(0.039)	(0.051)	(0.052)	(0.042)
easy_doc		-0.177***	-0.167***	-0.189***	-0.178***
		(0.023)	(0.027)	(0.026)	(0.019)
nepotism			0.038	0.028	0.030
			(0.025)	(0.023)	(0.018)
individual~m			-0.000	0.006	0.019
			(0.020)	(0.020)	(0.014)
gdppc_real			0.001***	0.001***	
			(0.000)	(0.000)	
cpia_qpa			0.222	0.671***	
			(0.169)	(0.189)	
cpia_trans			-0.546***	-0.919***	
			(0.135)	(0.155)	
ethnic			3.039***	2.678***	
			(0.596)	(0.580)	
nepotism_c				1.297**	
				(0.395)	
Country dummies					X
Constant	Yes	Yes	Yes	Yes	Yes
N	20849.000	15947.000	7753.000	7753.000	14826.000

* p<0.05, ** p<0.01, *** p<0.001

Table A.11b Ordered Probit Models to explain Pr(BREAK-PERMIT) by individual's network size using CONN_ASSOC as a proxy

	model0	model1	model2	model3	model4
	b/se	b/se	b/se	b/se	b/se
break_permit					
conn_assoc	0.200***	0.180***	0.120***	0.129***	0.129***
	(0.019)	(0.022)	(0.028)	(0.028)	(0.022)
head		0.125**	0.140*	0.182**	0.170***
		(0.040)	(0.062)	(0.057)	(0.040)
female		-0.140***	-0.094*	-0.097*	-0.109***
		(0.029)	(0.041)	(0.040)	(0.031)
urbrur		-0.130	-0.218*	-0.174*	-0.133**
		(0.081)	(0.091)	(0.085)	(0.048)
income		0.016*	0.021*	0.019	0.029***
		(0.008)	(0.009)	(0.010)	(0.007)
age		0.003	0.005	0.003	-0.002
		(0.006)	(0.007)	(0.007)	(0.006)
agesq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
religion		0.301**	-0.060	0.008	0.003
		(0.093)	(0.137)	(0.132)	(0.086)
publicjob		0.026	0.126*	0.122*	0.051
		(0.045)	(0.055)	(0.056)	(0.040)
polit_aff		0.080*	0.178***	0.162**	0.153***
		(0.039)	(0.053)	(0.053)	(0.042)
easy_doc		-0.184***	-0.168***	-0.191***	-0.178***
		(0.022)	(0.028)	(0.027)	(0.020)
nepotism			0.031	0.020	0.023
			(0.024)	(0.022)	(0.018)
individual~m			-0.002	0.005	0.019
			(0.021)	(0.020)	(0.014)
gdppc_real			0.001***	0.001***	
			(0.000)	(0.000)	
cpia_qpa			0.249	0.708***	
			(0.169)	(0.189)	
cpia_trans			-0.543***	-0.924***	
			(0.137)	(0.154)	
ethnic			3.093***	2.709***	
			(0.602)	(0.577)	
nepotism_c				1.332***	
				(0.380)	
Country dummies					X
_cons	Yes	Yes	Yes	Yes	Yes
N	19466.000	15707.000	7669.000	7669.000	14633.000

* p<0.05, ** p<0.01, *** p<0.001Table A.11 Participation in religious groups

Table A.11c Ordered Probit Models to explain Pr(BREAK-PERMIT) by individual's network size using CONN_UNION as a proxy

	model0	model1	model2	model3	model4
	b/se	b/se	b/se	b/se	b/se
break_permit					
conn_union	0.099***	0.090***	0.088**	0.099***	0.051*
	(0.021)	(0.022)	(0.029)	(0.027)	(0.020)
head		0.137***	0.143*	0.185**	0.178***
		(0.040)	(0.061)	(0.056)	(0.040)
female		-0.133***	-0.091*	-0.094*	-0.106***
		(0.029)	(0.041)	(0.040)	(0.032)
urbrur		-0.152	-0.237**	-0.193*	-0.140**
		(0.081)	(0.090)	(0.085)	(0.048)
income		0.022**	0.023*	0.021*	0.033***
		(0.008)	(0.009)	(0.010)	(0.007)
age		0.004	0.004	0.001	-0.002
		(0.006)	(0.007)	(0.007)	(0.006)
agesq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
religion		0.300**	-0.056	0.012	-0.000
		(0.094)	(0.139)	(0.134)	(0.087)
publicjob		0.020	0.122*	0.118*	0.051
		(0.045)	(0.055)	(0.055)	(0.039)
polit_aff		0.065	0.168**	0.150**	0.146***
		(0.039)	(0.052)	(0.052)	(0.041)
easy_doc		-0.177***	-0.171***	-0.194***	-0.179***
		(0.022)	(0.028)	(0.027)	(0.020)
nepotism		0.018	0.030	0.019	0.025
		(0.022)	(0.024)	(0.023)	(0.018)
individual~m		-0.040*	0.001	0.007	0.023
		(0.017)	(0.021)	(0.020)	(0.013)
gdppc_real			0.001***	0.001***	
			(0.000)	(0.000)	
cpia_qpa			0.240	0.707***	
			(0.169)	(0.190)	
cpia_trans			-0.534***	-0.921***	
			(0.137)	(0.155)	
ethnic			3.135***	2.741***	
			(0.601)	(0.570)	
nepotism_c				1.358***	
				(0.384)	
Country dummies					X
_cons	Yes	Yes	Yes	Yes	Yes
N	19552.000	14685.000	7695.000	7695.000	14685.000

* p<0.05, ** p<0.01, *** p<0.001

Table A.11d Ordered Probit Models to explain Pr(BREAK-PERMIT) by individual's network size using CONN_COMUN as a proxy

	model0 b/se	model1 b/se	model2 b/se	model3 b/se	model4 b/se
break_permit					
conn_comun	0.133***	0.132***	0.081*	0.101***	0.086***
	(0.022)	(0.023)	(0.031)	(0.028)	(0.019)
head		0.120**	0.143*	0.186**	0.175***
		(0.040)	(0.060)	(0.056)	(0.041)
female		-0.143***	-0.091*	-0.094*	-0.106***
		(0.029)	(0.041)	(0.041)	(0.032)
urbrur		-0.151	-0.227*	-0.180*	-0.144**
		(0.080)	(0.091)	(0.086)	(0.049)
income		0.020*	0.023*	0.022*	0.032***
		(0.008)	(0.009)	(0.010)	(0.007)
age		0.002	0.005	0.002	-0.003
		(0.006)	(0.007)	(0.007)	(0.006)
agesq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
religion		0.286**	-0.058	0.012	-0.021
		(0.091)	(0.135)	(0.131)	(0.087)
publicjob		0.035	0.129*	0.125*	0.055
		(0.045)	(0.055)	(0.056)	(0.041)
polit_aff		0.059	0.168**	0.149**	0.137***
		(0.039)	(0.052)	(0.053)	(0.041)
easy_doc		-0.186***	-0.168***	-0.192***	-0.186***
		(0.022)	(0.028)	(0.027)	(0.020)
nepotism			0.032	0.020	0.026
			(0.024)	(0.023)	(0.018)
individual~m			0.001	0.009	0.021
			(0.021)	(0.021)	(0.014)
gdppc_real			0.001***	0.001***	
			(0.000)	(0.000)	
cpia_qpa			0.252	0.739***	
			(0.171)	(0.196)	
cpia_trans			-0.539***	-0.942***	
			(0.138)	(0.158)	
ethnic			3.140***	2.704***	
			(0.617)	(0.576)	
nepotism_c				1.426***	
				(0.378)	
Country dummies					X
_cons	Yes	Yes	Yes	Yes	Yes
N	19488.000	15726.000	7695.000	7695.000	14658.000

* p<0.05, ** p<0.01, *** p<0.001

Table A.11e Ordered Probit Models to explain Pr(BREAK-PERMIT) by individual's network size using CONN_RELIG as a proxy

	model0 b/se	model1 b/se	model2 b/se	model3 b/se	model4 b/se
break_permit					
conn_relig	0.083***	0.061*	0.038	0.062*	0.043*
	(0.023)	(0.024)	(0.025)	(0.024)	(0.018)
head		0.132***	0.148*	0.190***	0.185***
		(0.039)	(0.060)	(0.056)	(0.039)
female		-0.146***	-0.098*	-0.102*	-0.108***
		(0.029)	(0.040)	(0.040)	(0.031)
urbrur		-0.133	-0.224*	-0.180*	-0.137**
		(0.080)	(0.092)	(0.086)	(0.048)
income		0.020**	0.023*	0.022*	0.034***
		(0.008)	(0.009)	(0.009)	(0.007)
age		0.004	0.007	0.004	-0.001
		(0.006)	(0.007)	(0.007)	(0.006)
agesq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
religion		0.258**	-0.081	-0.036	-0.044
		(0.097)	(0.138)	(0.134)	(0.089)
publicjob		0.029	0.131*	0.126*	0.055
		(0.045)	(0.056)	(0.057)	(0.040)
polit_aff		0.070	0.176***	0.159**	0.147***
		(0.039)	(0.052)	(0.053)	(0.042)
easy_doc		-0.176***	-0.167***	-0.191***	-0.177***
		(0.022)	(0.028)	(0.026)	(0.019)
nepotism			0.034	0.023	0.027
			(0.024)	(0.023)	(0.018)
individual~m			-0.000	0.007	0.021
			(0.020)	(0.020)	(0.014)
gdppc_real			0.001***	0.001***	
			(0.000)	(0.000)	
cpia_qpa			0.229	0.701***	
			(0.173)	(0.189)	
cpia_trans			-0.542***	-0.943***	
			(0.137)	(0.152)	
ethnic			3.094***	2.676***	
			(0.606)	(0.581)	
nepotism_c				1.394***	
				(0.398)	
Country dummies					X
_cons	Yes	Yes	Yes	Yes	Yes
N	19776.000	15937.000	7752.000	7752.000	14817.000

* p<0.05, ** p<0.01, *** p<0.001

Table A.12a Summary of full models with the impact of individual's network size on the probability of breaking formal rules to obtain a license or permit in urban areas with country dummies

Pr(Break_permit|network) for urban population						
	model1	model2	model3	model4	model5	model6
	b/se	b/se	b/se	b/se	b/se	b/se
factornet	0.107***					
	(0.03)					
education		0.060**				
		(0.019)				
conn_assoc			0.105***			
			(0.027)			
conn_union				0.026		
				(0.03)		
conn_relig					-0.012	
					(0.025)	
conn_comun						0.092**
						(0.029)
***Individual level Controls*: head of household, gender, living in a rural or urban area, income, age, age squared, adhere to a religion, public worker at household, sympathy with a political party, perception of the difficulty to get permits or licenses, tolerance to nepotism, preference for individualism**						
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
constant	Yes	Yes	Yes	Yes	Yes	Yes
N	5639	5739	5675	5689	5735	5677

* p<0.05, ** p<0.01, *** p<0.001

Table A.12b Summary of full models with the impact of individual's network size on the probability of breaking formal rules to obtain a license or permit in rural areas with country dummies

	Pr(Break_permit|network) for rural population					
	model1	model2	model3	model4	model5	model6
	b/se	b/se	b/se	b/se	b/se	b/se
factornet	0.151***					
	(0.031)					
education		0.059**				
		(0.018)				
conn_assoc			0.142***			
			(0.032)			
conn_union				0.064*		
				(0.025)		
conn_relig					0.077**	
					(0.025)	
conn_comun						0.084***
						(0.025)
***Individual level Controls*: head of household, gender, living in a rural or urban area, income, age, age squared, adhere to a religion, public worker at household, sympathy with a political party, perception of the difficulty to get permits or licenses, tolerance to nepotism, preference for individualism**						
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
constant	Yes	Yes	Yes	Yes	Yes	Yes
N	8895	9087	8958	8996	9082	8981

Table A.13 Marginal Effects of individual network size on breaking of formal rules (proxied by EDUCATION)

	Predicted probability of outcome "Never"			
Highest education level attained	Never	Once	Occasionally	Regularly
Not formal schooling	0.887	0.074	0.025	0.014
First level incomplete	0.878	0.079	0.027	0.016
First level completed	0.868	0.085	0.030	0.018
Second level incomplete	0.858	0.090	0.032	0.020
Second level completed	0.847	0.095	0.035	0.023
Third level (some or completed)	0.836	0.101	0.038	0.025

CONCLUSIONS

Corruption is a pervasive phenomenon all across the underdeveloped world. There is strong empirical evidence that its presence imposes / extracts severe costs in people´s lives in those countries. Many believe that corruption is the key factor that explains underdevelopment. Thus, it is not surprising that, in the last two decades, scholars and policymakers have intensified their efforts to understand the phenomenon in order to improve the ways to reduce its prevalence.

In the rational choice literature, the focus has been placed on the supply side of the phenomenon (i.e. the behavior of the public agents who break formal rules and procedures to obtain a private gain). The basic intuition behind those analyses is that corruption can be framed as a delegation problem and, consequently, can be studied using the tools of principal-agent models. Therefore, the social interaction that has been the focus of attention in the literature is the relationship between the bureaucrat and a benevolent principal. Using that framework to analyze corruption, it has been shown that the bureaucrat will be involved in corrupt exchanges whenever the bribes that he can obtain are big enough to cover the costs of his being caught participating in a corrupt deal . From there, the analysis of different incentives to increase both the direct and opportunity costs of being caught has produced many insights to tackle the problem of corruption.

However, the literature has paid less attention to the interaction of the bureaucrat with his private counterpart with whom he performs the corrupt act. For this reason, the literature has produced fewer insights to understand why the bureaucrat participates in corrupt deals with some users but not with others.

This dissertation contributes to fill that gap. It has been proposed that an analysis of the interaction between bureaucrats and private agents adds important insights that have not been covered in the literature. Also, it has been claimed that an alternative framework must be used for the analysis because the units of analysis (i.e. the players and their incentives) are different. In particular, instead of framing corruption as a delegation problem, I proposed to frame it as a coordination problem.

From this perspective, the simultaneous decision of the bureaucrat and the private agent is not about following or breaking the principal´s rules. Instead, it is about what set of rules they should use to coordinate their interaction. Every time, both the bureaucrat and the user will select the least expensive one at hand. The basic point is that, when they define how they must coordinate their interaction, they might choose given rule that implies breaking another. I suggest that this is what rampant petty corruption is all about in many underdeveloped countries.

When a bureaucrat gives privileged access to public services to a user in exchange for favors, gifts or money, he is not simply breaking "the" rule. Instead, he is following another rule, an informal one. Using examples from the anthropological literature, in Chapter 1 I argued that the alternative rule is based on networks of reciprocity. Later, analyzing the structure of networks, I sustained (in Chapter 2) that the capacity of users and bureaucrats to coordinate under the informal rule varies according to their relative positions in the network. Consequently, I proposed (in Chapter 3) that the bureaucrat will set up informal deals with some users and formal ones with others. Specifically, the more and better connected individuals end up receiving special treatment in more circumstances. Empirical research using data from African countries (Chapter 4) reinforces this proposition.

Thus, the main point of this research is that the variations seen in levels of petty corruption can be explained by variations in the mix of formal (law) and informal mechanisms (networks) available to rational individuals in order to coordinate and enforce their interaction. It was shown that, holding everything else equal, key features of social networks are sufficient to explain variations in individuals' formal-informal mixtures within and across countries. Those dissimilar mixtures of formal and informal coordinating alternatives available to different individuals in the same social system create spontaneously unequal opportunities for them.

This dissertation suggests that this is at the core of the explanation of why anticorruption reforms in many underdeveloped countries have failed or have been slow to reduce corruption. Rampant corruption is hard to defeat in those places because it rests on personal connections. When they meet, a bureaucrat and a user only play their roles as a public servant and a user when they are not connected through networks. But when they are connected (perhaps in indirect ways)¸ they cannot simply overlook the fact that they also interact in several other settings at the same time. Therefore, the gains and benefits generated in those other spheres of their lives cannot be fully separated from their decisions and motivations in their current interaction. In fact, the impact of those other spheres becomes more and more relevant as the social system in which their relationship is embedded becomes denser (see the corollary to Proposition 2).

This point is completely omitted in the rational choice literature because the subjects are under-socialized in the models. The omission of their social context is perfectly reasonable in some cases; after all, there are always people who are complete strangers to one another. For them, the mixture of formal-informal rules to coordinate their interaction is unbalanced by the formal ones. In other words, they do not have an option. In those cases, but only in those cases, the underlying assumption used in the standard model – i.e. the irrelevancy of the social context - is completely true. When a bureaucrat and a user are two complete strangers who perform corrupt

deals together, the user must transfer to the bureaucrat an amount big enough to cover his potential loss if he is caught. However, in the same social system, the same bureaucrat may be inclined to break formal rules for other users at lower prices. Indeed, when those users can credibly jeopardize his access to network resources, the bureaucrat may be inclined to help without an explicit compensation.

Thus, the demand size of the corruption phenomenon matters. Users and citizens are victims of corruption when they are "non-members", strangers, unconnected individuals, new migrants, tourists, in other words, whenever they cannot choose between formal and informal mechanisms of coordination (because their informal mechanisms are weak). The rest, I fear, are part of the problem.

In societies where people migrate often, where attractive places to live and work are spread all over the country, there is a lower chance that the networks of reciprocity maintained by users and bureaucrats could overlap. In those countries, most users and bureaucrats are strangers to one another. Consequently, the mixture of formal-informal institutions simply does not matter. Most users cannot use informal rules to set up corrupt deals with the public agent. To some extent, they are on equal terms. Still, there might be a few who can obtain privileges. But it is not surprising that, in those countries, the rest of the users are watchdogs helping to sustain the credibility of the formal procedures.

In contrast, in societies where people live and die in the same cities, work and get married in circles where everyone knows each other, the mix of formal-informal institutions do matter. In those places, the individual´s position in the network becomes relevant. Again, all are equals but in a different sense. All are equals because everyone can set up informal deals in some circumstances. The curse of those countries is that everyone criticizes corruption while,

simultaneously, many of them can sustain corrupt exchanges in a regular basis. Thus, all have good informal mechanisms to coordinate with others. The trick is, though, that the structure of the social network guarantees that the better connected ones have better informal mechanisms than the rest. Coordination through networks of reciprocity excludes non-members; in contrast, coordination through formal rules is, in its noblest spirit, available for everyone in identical conditions. Thus, once networks are factored in, corruption is revealed as a highly relevant chapter in the study of social inequality.

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