Monitoring Corruption: From the "Top" or the "Bottom"? Evidence from a Bribery Experiment

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Abstract

Monitoring corruption typically relies on top-down interventions aimed at increasing the probability of external controls and the severity of punishment. An alternative approach to fighting corruption is to induce bottom-up pressure for reform. This paper investigates the effectiveness of bottom-up anti-corruption measures as opposed to top-down interventions, using data from a specifically designed economic experiment. In particular, we explore whether public servants' tendency to ask for bribes is more affected by the presence of external controls or by the possibility for the victims of bribery to formally report the corrupt agents, knowing that formal reports are associated with a fixed probability of punishment. We find that bottom-up anti-corruption measures can be highly effective in curbing corruption, even when citizens' "voice" leads to formal punishment with a relatively low probability. In contrast, conventional top-down interventions may prove ineffective and, in addition, have adverse effects on corruption by inducing corrupt officials to demand higher bribes.

Key Words: Corruption, monitoring, bottom-up, experiment

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1 Introduction

Monitoring corruption typically relies on top-down interventions aimed at increasing the probability of external controls and the severity of punishment. However, such interventions may fail (and have indeed failed) to improve governance in countries where legal and judicial institutions are deficient, and public officials enjoy full discretionary power and lack of accountability. An alternative approach to fighting corruption, which is receiving increasing attention among development economists and practitioners, is to induce bottom-up pressure for reform. However, the effectiveness of grass-roots monitoring in reducing corruption still needs to be fully assessed (see Olken, 2007).

This paper uses data from a specifically designed economic experiment to test the effectiveness of bottom-up anti-corruption interventions as compared to top-down interventions. Working with a sample of 180 individuals, we run an experiment in which: a "public official" must decide whether and how much to demand from a "private citizen" as a bribe in exchange for a corrupt service, and the "private citizen" has to decide whether and how much to pay as a bribe. If a bribe is demanded and paid, the briber-bribee pair benefits, while "other members" of society suffer a loss. We investigate the effectiveness of bottom-up versus top-down interventions by comparing public officials' willingness to demand a bribe under: 1) no monitoring, 2) the presence of external controls, in the form of a fine applied with a very low probability, and 3) the presence of institutions which give the citizens the possibility to formally "report" the corrupt officials, knowing that formal reports lead to the same probablistic punishment described under 2.

We found that bottom-up anti-corruption mechanisms can be highly effective in curbing corruption, even when citizens' "voice" leads to formal punishment with a low probability (set equal to 4 per cent in the experiment). Indeed, the possibility for the citizens to report corrupt officials significantly reduced bribe-demanding behaviour in the game: 30 per cent of the officials decided to abstain from corruption under bottom-up monitoring against only 5 per cent under no punishment. In contrast, the presence of top-down controls had adverse effects on corrupt behaviour. In the game, with a 4 per cent probability of external punishment—set low to simulate a weak institutional environment — officials were not only no less willing to demand bribes, but actually demanded higher bribes.

We conclude that bottom-up interventions which: 1) give citizens information on how and where to report corrupt officials, 2) provide full protection/anonymity to the citizens who report corrupt officials (or "whistle-

blow"), and 3) create institutions that with some, even low, probability impose sanctions on the officials following the citizens' reports, are highly effective in curbing corruption. And in contrast, conventional top-down interventions may prove ineffective in a weak institutional environment and, in addition, have adverse effects on corruption by inducing corrupt officials to demand higher bribes.

The paper is organized as follows: Section 2 reviews the recent literature on bottom-up interventions and their effectiveness, with a special focus on anti-corruption measures. Section 3 describes the experimental methodology and presents some theoretical predictions. Section 4 introduces our subject pool and Section 5 presents our results. Finally, Section 6 concludes with a brief discussion of our findings and some policy implications.

2 Top-down vs. bottom-up interventions

The 2004 World Development Report is entirely centered around the idea that development interventions would be more effective if poor people were put "at the center of service provision: by enabling them to monitor and discipline service providers, by amplifying their voice in policy making, and by strengthening the incentives for providers to serve the poor". People "voice" can take three main forms: 1) participation at the early stage of a project, in the form of consultation, 2) social pressure for reform, following disclosure of information on the operation of state institutions, and 3) direct monitoring of public policy-making and implementation. Anti-corruption bottom-up interventions typically belong to the third category.

The emphasis on community-driven development in general, and community-driven monitoring in particular, has grown in the last few years, following decades of top-down interventions which have often failed to reach the citizens who are most in need, especially in poorly governed countries (see World Bank, 2007). If we restrict our attention to accountability in the public sector and corruption, we can easily recognize that, when the institutional environment is weak, formal monitoring based on auditing from "above" can easily be captured by local elites and therefore prove ineffective. In a country characterized by systemic corruption, and lacking a clear anti-corruption commitment from the very top of the bureaucratic hierarchy, any intervention aimed at increasing the probability of external auditing – for example by increasing the number of auditors and top-down controls – may paradoxically increase corruption, since more auditors will be bribed in exchange for turning a blind eye.

It has been argued [World Bank (2007) and Banerjee and Duflo(2005)] that bottom-up, community-based monitoring can be more effective in curbing corruption for three reasons: 1) the beneficiaries of the services provided by corrupt officials, *i.e.* the citizens, are likely to have better information about the quality of the service provided, and also about corruption if a bribe is extracted from them; 2) citizens may impose informal sanctions on corrupt officials, *i.e.* bad looks, verbal complaints, or even social ostracism, which are not available to external monitors; and 3) citizens may have stronger incentives to monitor the providers of corrupt services, since they may suffer the costs of corruption directly.

However, several factors can limit citizens' willingness and/or ability to express "voice" and keep officials accountable. First of all, citizens may not have enough information on the quality of the service provided, the standard that such service should meet, or, more generally, their rights as beneficiaries of a public service. Secondly, there needs to be some mechanism in place for the beneficiaries of a public service to punish corrupt providers. Thirdly, citizens/beneficiaries may be captured by local elites and give up their "voice", especially in the presence of illiteracy, social conflict and general distrust in formal institutions. This is especially true when citizens feel socially inferior to service providers. Finally, grass-root monitoring is subject to free-riding as, on the one hand, it requires effort from a sufficient number of citizens in order to be effective, and, on the other hand, negative repercussions may affect those who decide to monitor if they are too few in number.

Empirically, the effectiveness of bottom-up anti-corruption interventions versus top-down monitoring still needs to be fully evaluated. A few studies investigate the effectiveness of top-down and bottom-up interventions aimed to address absence and performance of teachers [Banerjee and Duflo (2005) and Kremer and Chen (2001)] and health professionals [Banerjee, Deaton and Duflo (2005), and Bjorkman and Svensson (2007)] . With the exception of Bjorkman and Svensson (2007), these studies give a discouraging overview of the effectiveness of grass-root interventions on public service delivery (see Banerjee and Duflo, 2005, for a review).

Only three studies, Ferraz and Finan (2005), Reinnika and Svensson (2005), and Olken (2007) specifically evaluate the impact of grass-root interventions directly aimed at curbing corruption. They all investigate whether and how the availability of relevant information can influence citizens' willingness to monitor public service providers and whether this translates into lower corruption and better outcomes. Ferraz and Finan (2005) find that disclosure of information on corruption of local governments in Brazil, following an anti-corruption program based on external auditing, significantly

reduced the probability for the citizens to re-elect the local (corrupt) incumbents in the 2004 elections. Reinnika and Svensson (2005) focus on corruption in the delivery of education funds to local schools in Uganda. They find that a newspaper campaign aimed at disclosing information on the rules governing the funds was highly effective in reducing capture and increasing the amount of the funds reaching the local schools.

Finally, Olken (2007) compares the effectiveness of bottom-up anti-corruption interventions versus external auditing in a road construction project in Indonesia. The bottom-up intervention relied on citizens' participation in village-level meetings where project officials documented their expenses in relation to the use of public funds for the construction of local roads. In one of the bottom-up experiments, citizens were invited to participate in the village meetings, whereas in a different bottom-up experiment citizens where not only invited but also given an anonymous comment form which would be collected and read during the village meeting. The purpose of these experiments was to give citizens the opportunity to directly participate and express "voice" in the monitoring process. The top-down experiment consisted in informing the treated villages that the road construction expenses would be closely monitored by local officials; indeed, in these villages formal auditing took place with a 100% probability.

Olken compares corruption outcomes, in the form of missing materials' and labour's expenditures, in the villages that were subject to bottom-up interventions, and in the villages that were subject to external auditing. He shows that top-down auditing significantly reduced overall missing expenditures, whereas grass-root monitoring was effective only in reducing missing labour's expenditures, and had no significant effect on overall missing expenditure (which comprise total materials' and labour expenses).

Olken's results suggest that bottom-up monitoring can be effective only when: 1) citizens are directly and visibly affected by the cost of corruption[1] , and therefore have a strong incentive to monitor corruption and 2) have access to information on the final outcomes[2]. Additionally, the evidence on grass-root monitoring provided by studies of health workers and teacher's absence (see Banerjee and Duflo, 2005) suggests that bottom-up monitoring may not be effective unless: 3) the disclosure of corruption-relevant information is coupled with mechanisms that give the beneficiaries of the corrupt

[1] In Olken's case the the citizens who participated in the road construction would lose a portion of their wages in the presence of corruption.

[2] In Olken's case the citizens who participated in the road construction could perfectly observe their own wages, while they had only imperfect information on the cost of the materials needed for the road construction.

services the possibility to formally punish the corrupt providers.

In this paper I compare the effectiveness of top-down and bottom-up monitorng using data from a specifically designed lab experiment. In particular, I present an experiment in which a public official may choose to demand a bribe from a private citizen in exchange for enhanced service, and apply two treatments, one allowing top-down auditing and the other bottom-up monitoring satisfying two of the three conditions above.

Although a study of corruption based on lab experiments, like the present one, may be subject to limitations in terms of "external validity", it also presents some significant advantages over field experiments. On the one hand it makes it possible to measure corruption in the most direct way possible, and on the other hand it makes it possible to observe how different individuals may respond to the same (anti-)corruption incentive systems. The challenge is to design a corruption experiment which allows us to compare the effectiveness of top-down and bottom-up monitoring in the cleanest possible way, while retaining "corruption salience" to the participants in the experiment. I believe that I succeed in designing such an experiment.

3 Experimental methodology

Building on a previous bribery experiment (see Barr and Serra, 2007) I designed a game in which "private citizens" and "public officials" strategically interact for the provision of a public service. Contrary to previous bribery experiments (see Abbink 2006, for a review) in the game presented here it is the public official and not the private agent who initiates the corrupt exchange.

The game simulates the following situation. Imagine a private citizen which requires a service from a public official and imagine that the public official offers to provide the service quicker and better if the private citizen pays him a specified bribe. If the bribe is paid both the private citizen and the public official gain - the former gets a quicker and better service and the latter gets the bribe - but the society as a whole may be worse off because the official's preferential treatment of the private citizen represented an inefficient allocation of resources or because the 'norm' of corruption was more deeply embedded as a result.

In the experiment this scenario is represented as follows. A private citizen engages with a public official in order to receive a public service. The public official may offer to provide the service quicker or better in exchange for a bribe. In this case, the public official has to specify the amount of the bribe

he or she requires, and the private citizen has to decide whether and how much to pay as a bribe. If a bribe is demanded and paid, the official-citizen pair benefits, whereas "other members of society" suffer a monetary loss. Each session of the game is played by 5 public officials, 5 private citizens and 5 other members of society. Play is anonymous and one shot, and roles of citizen, official and other member of society are randomly allocated at the beginning of the session.

3.1 Experimental treatments and theoretical predictions

I conducted three different versions, or treatments, of the game: 1) a "no monitoring" treatment, 2) a "top-down external monitoring" treatment, and 3) a "bottom-up monitoring" treatment. I run 4 sessions per treatment, involving 15 subject per session. The instructions of the game in each treatment were presented either in abstract terms (referring to the participants as Player As, Player Bs and Player Cs) or using a corruption frame (referring to the participants as "public officials", "private citizens" and "other members of society", and to the money exchange as a "bribe"). The 12 experimental sessions are summarized in Table 1.

- Table 1 here -

The no monitoring treatment

In the "no monitoring" treatment the public official's decision to demand a bribe is not subject to any formal monitoring, therefore corrupt officials are immune from formal sanctions.

A public official can offer to provide the service to the citizen better or quicker in exchange for a bribe b. The provision of the bribe involves an administrative cost K. If a corrupt transaction takes place, "other members of society" suffer a negative externality generated by corruption in the form of a monetary loss. If corruption does not take place the official receives a payoff equal to Y_o, the citizen gets a payoff equal to Y_c and the other members of society are unaffected by the transaction.[3]

If we assume that individuals only care about their monetary payoffs, then the official will initiate a corrupt transaction only if his[4] payoff from engaging in corruption is larger than the "outside option" payoff Y_o, *i.e.*

[3] We set $Y_0 = Y_c$.

[4] For convenience I assume that the public official is a male and the private citizen is a female.

$Y_o + b - K > Y_o$. Therefore, the minimum bribe the public official is willing to demand needs to cover the administrative cost associated with corruption: $b > K$.

However, the official needs to demand a bribe which the citizen is willing to pay. Paying the bribe gives the citizen a monetary gain equal to G. It follows that the citizen will be willing to pay a bribe b only if $(Y_c - b + G) > Y_c$. In other words, the citizen will pay the bribe demanded by the official only if the bribe is smaller than the monetary gain generated by the corrupt transaction: $b < G$.

If the gain that corruption generates on the citizen is greater than the administrative cost sustained by the corrupt official, $G > K$, the Subgame Perfect Nash Equilibrium is as follows: the public official demands a bribe equal to $(G - \varepsilon)$, where ε is the smallest posible positive amount; the citizen pays the bribe, and the other members of society suffer the negative externality generated by corruption. If $G < K$ the official abstains from corruption.

The external monitoring treatment

In the top-down monitoring treatment the public official is subject to an external probability of punishment, p_e, if corruption take place. If the official provides a corrupt service in exchange of a bribe and is detected, he needs to pay a sanction equal to S. Therefore, if we keep the assumption that official and citizen only care about their own monetary payoff, a risk-neutral official will now demand a bribe if and only if the expected payoff from corruption, $[(1-p_e)(Y_o + b - K) + p_e(Y_o - K - S)]$, is larger than the payoff he would get from not demanding the bribe, Y_o. It follows that the minimum bribe that the official is willing to take under external monitoring is larger than the minimum bribe he is willing to take in the absence of monitoring. Indeed, the minimum bribe under top-down monitoring is greater than $\frac{K+p_eS}{(1-p_e)}$, whereas the minimum bribe in the absence of monitoring was simply larger than K.

If $G > \frac{K+p_eS}{(1-p_e)}$, corruption takes place and, as before, the official demands the maximum bribe that will induce the citizen to pay, *i.e.* $(G - \varepsilon)$; the citizen pays the bribe, and the other members of society suffer the negative externality generated by corruption. If $G < \frac{K+p_eS}{(1-p_e)}$ the official abstains from corruption.

The bottom-up monitoring treatment

In the bottom-up monitoring treatment the citizen is given the possibility to anonymously report the corrupt official who demanded a bribe from her, if any. If there is a corrupt exchange between the citizen and the official, and the citizen decides to report the official afterwards, there is an external

probability, p_e, for the official to be sanctioned.

Here we assume that: 1) the probability of punishment activated by the citizen's report is the same as the probability of punishment under top-down monitoring[5], 2) reporting the official is not costly to the citizen[6], and 3) the citizen's decision to report the official is independent of the amount of the bribe; in other words, the official decides whether to report or not the official if he demands a bribe, before knowing the specific amount of the bribe.[7] Finally, the citizen and the other members of society do not financially gain from the citizen's report nor from the eventual punishment of the official.

In this setting, if the official expects the citizen to report him with some probability $\widetilde{p}_c$, and he is risk-neutral, he will now engage in bribery if and only if the expected payoff from corruption, which is now equal to $[(1 - \widetilde{p}_c p_e)(Y_o + b - K) + \widetilde{p}_c p_e (Y_o - K - S)]$, is larger than Y_o. Equivalently, he will engage in corruption only if he can demand a bribe which is larger than the expected cost of corruption: $b > \frac{K + \widetilde{p}_c p_e S}{(1 - \widetilde{p}_c p_e)}$.

It should be noted that if the official expects the citizen to report him with certainty, *i.e.* $\widetilde{p}_c = 1$, the monetary incentives associated with corruption under bottom-up monitoring are the same as under top-down monitoring. If instead the official expects the citizen to not report him with certainty, *i.e.* $\widetilde{p}_c = 0$, the monetary incentives associated with corruption under bottom-up monitoring are the same as under no monitoring. Now, if $G > \frac{K + \widetilde{p}_c p_e S}{(1 - \widetilde{p}_c p_e)}$ the Subgame Perfect Nash Equilibrium predicts that the official demands the maximum bribe that will induce the citizen to pay, which is still equal to $(G - \varepsilon)$; the citizen pays the bribe, and the other members of society suffer the negative externality generated by corruption. If $G < \frac{K + \widetilde{p}_c p_e S}{(1 - \widetilde{p}_c p_e)}$ the official abstains from corruption.

It is worth noting that the bottom-up monitoring system simulated here satisfies two of the three conditions which, according to the literature, could

[5] This is clearly a simplification, which is intrumental to providing a clean comparison of top-down and bottom-up monitoring. In reality, we would expect the external probability of punishment activated by the citizens' report to be higher than the external probability of punishment generated by top-down auditing.

[6] This is also a simplification, which aims to simulate the best-case scenario, where citizens have full information on how to whistle-blow, they are fully protected from punshment, and the whistle-blowing procedure is as easy as possible.

[7] Such a design allows us to make the official's decision to demand a bribe, but not the specific amount of the bribe, dependent on the presence of bottom-up monitoring. Once again, this is a simplification which allows us to conduct the cleabest possible analysis of the public official's decision to engage in corruption under top-down and bottom-up monitoring.

make grass-root monitoring effective. In particular: 1) citizens have full information on public officials' involvement in corruption, and 2) there is a mechanisms in place which allows citizens to induce formal punishment of corrupt public officials. It should also be noted that citizens in the game do not directly suffer the cost of corruption; on the contrary, they benefit from corruption, whereas other members of society are harmed by it. In this way, we are simulating corruption in the form of collusive bribery rather than extortion.[8]

Given the theoretical framework above, and, in particular, the assumptions of pure self interest and risk neutrality, under top-down and bottom-up monitoring the higher the probability of detection p_e and the higher the sanction S, the lower the probability for a corrupt transaction to take place. Moreover, since $0 \leq \widetilde{p}_c \leq 1$, we expect top-down monitoring to be more effective in reducing corruption than bottom-up monitoring.

3.2 Parametrization and Predictions

In the game we set:

$Y_o = Y_c = 35$

$K = 6$

$G = 15$

In the top-down and the bottom-up monitoring treatments we set:

$p_e = 0.04$

$S = 10$

The external probability of punishment and the amount of the sanction are set relatively low to simulate a weak institutional environment. The effectiveness of a high probability of formal detection (equal to unity) has been recently documented by Olken (2007). However, weak legal and judicial institutions, and lack of political commitment in the fight against corruption, especially in highly corrupt countries, make a very high probability of detection and/or severe punishment often unfeasible, too costly to implement or simply ineffective. By setting the probability of punishment and the sanction low, the present study aims to assess the effectiveness of top-down and bottom-up interventions in environments where corruption is endemic and severe punishment of corrupt officials is unlikely.[9]

[8] See Lambsdorff (2007) for a review of the different kinds of corruption.

[9] Experimentally, the effectiveness of severe external punishment has been documented by Abbink, Irlenbush and Renner (2002). They conducted a repeated bribery game, where the briber - a firm - could initiate a corrupt transaction by offering a bribe to a public official. Contrary to the present study, their game was centered on trust and reciprocity

Given the parameters above we can make the following prediction:

Prediction 1. If both official and citizen only care about their monetary payoffs, the official will demand a bribe equal to 14, the citizen will pay the bribe, and each of the 5 other members of society will lose a positive amount, which we set equal to 4. This constitutes the Subgame Perfect Nash Equilibrium of the game[10]. Given that the monetary incentives are identical under the three monitoring treatments, *we expect to observe no differences in the officials' behaviour under no monitoring, top-down monitoring and bottom-up monitoring.*

3.2.1 Introducing additional non-monetary costs

A number of additional non-monetary costs may affect the public official's decision to engage in or abstain from corruption. In particular: 1) the official may suffer an intrinsic moral cost from causing harm to others; 2) the official may have preferences for fairness, which would affect the amount of the bribe demanded from the private citizen; 3) the official may be averse to risk.

In this section we look at each of these additional costs separately.

1) Intrinsic moral cost

Barr and Serra (2007) provided evidence that social preferences for not engaging in corruption *because it is harmful to others* or because *it is illegal/immoral* may induce individuals' to abstain from corruption. They conducted a bribery game in which a private citizen had to decide whether and how much to offer as a bribe to a public official in exchange for a corrupt service. If corruption took place the citizen and the official gained money, whereas other participants in the experimental session suffered some monetary costs; such costs were set either low or high. The authors found that when the harms done to others were higher and when the game was framed as corruption significantly fewer private citizens and fewer private officials decided to engage in corruption.

In the current game we set the negative externalities generated by corruption on each member of society equal to 4 in all experimental sessions, and we conduct half of the sessions using abstract framing and the other half using corruption framing.

between the briber and the bribee, and simulated a long-term corrupt relationship.

[10] We are assuming that when individuals are indefferent between honesty and corruption, they choose honesty. If this was not the case, the Subgame Perfect Nash Equilibtium would be for the official to offer either 14 or 15.

The possibility that the public official suffers a moral cost from harming others or from engaging in an illegal or immoral activity can be easily taken into account in our theoretical framework by adding an additional cost C_o^M to the actual or expected cost of engaging in corruption. It is reasonable to assume that such cost is heterogeneous across public officials and is distributed according to some distribution function over the interval $[0, \overline{C}]$, where $\overline{C}$ is the moral cost suffered by the most intrinsically honest public official in the population. The presence of a moral cost increases the minimum bribe that intrinsically motivated officials would be willing to take in exchange for the provision of a corrupt service. In turn, this would make it relatively less likely for a corrupt transaction to take place. Our second prediction follows:

Prediction 2. If the public official suffers a non-monetary cost from harming other members of society or from engaging in an illegal or immoral activity, he may abstain from corruption. Since the negative externalities generated by corruption are kept constant across the experimental treatments, *we expect to observe no differences in the officials' behaviour under no monitoring, top-down monitoring and bottom-up monitoring.* On the other hand, we expect public officials to be be *less likely to engage in corruption when the game is presented in abstract terms than in corruption terms.*

2) *Preferences for fairness*

Experimental evidence from ultimatum games (see Camerer 2003, for a survey) suggests that fairness motives, or inequity aversion, plays a significant role in the decision-making of many individuals in a number of diverse situations. In an ultimatum game a proposer and a responder bargain over the distribution of a given pie. The proposer moves first and has to decide the share of the pie that he or she would like the responder to get. In turn, the responder has to decide whether to accept or reject the share decided by the proposer. If the responder accepts, proposer and responder divide the pie according to the shares decided by the proposer; if the responder rejects, both proposer and responder get a payoff equal to zero. This game has been conducted in different countries and regularities of behaviour have been found with respect to preference for fairness: the share offered by the majority of proposers is constantly between 40 and 50 per cent of the pie (see Fehr and Schmidt 1999, for a review)[11].

[11] Note that offering the "fair" share of 50 per cent in an ultimatum game could also be partially or entirely caused by the fear that an "unfair" offer will be rejected (Huck and Oechssler, 1999).

We could easily include preferences for fairness in our theoretical framework by introducing an additional cost C_o^F which, for pro-fairness officials, would be positive for bribes that give the official a final (actual or expected) payoff which exceeds the citizen's final corruption payoff. Under no monitoring such bribes are those larger than half the total corruption pie, *i.e.* larger than $\frac{G+K}{2}$, or larger than 10.5 given our parametrization. When we introduce top-down monitoring a public official who has preferences for fairness is likely to consider "fair" a bribe greater than $\frac{G+K}{2}$, *i.e.* greater than 10, since only he, and not the citizen also involved in corruption, is subject to the risk of punishment. Formally, he will now suffer a cost $C_o^F > 0$ if $b > \frac{G+K+p_eS}{2-p_eS}$, or $b > 10.9$, given our parametrization. Our third prediction follows:

Prediction 3. If the public official has preferences for fairness, and he is risk-neutral, he will demand bribe equal to 10 from the citizen. Given our parameters, *we still expect to observe no differences in the officials' behaviour under no monitoring, top-down monitoring and bottom-up monitoring.*[12]

3) *Risk aversion*

So far we have assumed that public officials are risk neutral, *i.e.* their expected utility from corruption is equal to the utility generated by their expected payoff from corruption. Under top-down monitoring, for instance, this implies that $U_o[(1-p_e)(Y_o+b-K)+p_e(Y_o-K-S)] = (1-p_e)U_o[Y_o+b-K]+p_eU_o[Y_o-K-S]$.

However, a public official may be averse to risk. If this were the case, the official's expected utility from corruption, except under the no-punishment treatment, would be lower than the utility generated by the expected payoff. Consequently, the value of the corrupt transaction to the official, or the "certainty equivalent" CE_o, would be lower than the expected payoff $[(1-p_e)(Y_o+b-K)+p_e(Y_o-K-S)]$. It follows that if the official is risk averse he will engage in corruption under top-down and bottom-up monitoring only if the certainty equivalent of the corrupt transaction is larger than the outside option: $CE_o > Y_o$. By definition, the certainty equivalent is the difference between the expected payoff from corruption and the risk premium that the official requires in order to take the risk associated with corruption, R_o. Therefore, if the official is risk averse the condition for the official to engage in corruption under top-down monitoring becomes: $[(1-p_e)(Y_o+b-K)+p_e(Y_o-K-S)]-R_o > Y_o$, or, equivalently, $b > \frac{K+R_o+p_eS}{1-p_e}$. In other words,

[12] Public officials in the game could only demand round amounts between 1 and 20 as bribes.

the minimum bribe that a public official is willing to take is larger if he is risk averse than if he is risk neutral. Our fourth prediction follows:

Prediction 4. If the public official is risk averse: *the more risk averse he is, the more likely he is to either demand a high bribe or abstain from corruption under external monitoring and bottom-up monitoring.* Moreover, for any given level of risk aversion*, the public official is more likely to demand a high bribe or abstain from corruption under external monitoring than under bottom-up monitoring.*

It should be noted that if a risk averse public official has also preferences for fairness, the bribe that he will consider "fair", under either of the two punishment treatments, will be larger than the "fair" bribe of a risk neutral public official, *i.e.* larger than $\frac{G+K+p_eS}{2-p_eS}$, or 10.9 in the specific of our game. Therefore, under top-down and, to a less extent, bottom-up monitoring, we expect that both risk aversion and preferences for fairness will push the bribe demanded by risk and inequity averse public officials up or will induce them to abstain from corruption, depending on the magnitude of the additional cost generated by their risk and inequity aversion.

Under **bottom-up monitoring** there might be still further non-monetary costs associated with corruption. Indeed, the official may be averse to ambiguity, averse to betrayal, or afraid of social disapproval, as explained in what follows.

4) *Ambiguity aversion*

Ambiguity aversion refers to preferences for events which happen with some known probability– and therefore generate a known risk – over events which happen with some unknown, or ambiguous, probability – and therefore generate an unknown or uncertain risk (Ellsberg, 1961). Following the seminal experimental work by Becker and Brownson (1964), a number of studies have provided evidence that individuals may be ambiguity averse (see Camerer and Weber,1992, for a review) and may require ambiguity premiums on top of risk premiums in order to undertake risky choices whose probabilities of success are unknown.

Under the specific bottom-up monitoring considered in the present study, a public official who decides to engage in corruption is subject to punishment with an ambiguous probability. Indeed, the probability for the citizen to report the official in case of corruption is unknown to the official. If the official is risk averse and ambiguity averse, the risk premium that he requires in order to engage in corruption under bottom-up monitoring is larger than the risk premium in the absence of ambiguity, *i.e.* under top-down moni-

toring. Consequently, the minimum bribe that an ambiguity averse official requires in order to behave corruptly is larger under bottom-up monitoring than under top-down monitoring. Additionally, a large enough degree of ambiguity aversion could induce public officials to abstain from corruption under bottom-up monitoring.

5) *Betrayal cost*

A few recent experimental studies have pointed at the existence of betrayal costs in interactions which rely (at least partially) on trust. Betrayal averse individuals may be less willing to take a chance on another individual being trustworthy, as opposed to taking a chance on a random device [see Bohnet and Zeckhauser (2003) and Bohnet et al. (2006)].

In the context of corruption, a betrayal averse public official may be less averse to risky punishment when punishment depends on a random device, than when it partly depends on the private citizen's decision to report him in case of corruption. Therefore, as before, the risk premium (and the minimum bribe) required to induce a betrayal averse public official to engage in corruption is larger under bottom-up than under top-down monitoring. Additionally, a large enough degree of betrayal aversion could induce public officials to abstain from corruption under bottom-up monitoring but not under top-down monitoring.

6) *Fear of social disapproval*

When facing the possibility of being reported by a private citizen, a public official may suffer a larger intrinsic cost, in the form of shame or guilt, due to fear of social disapproval in case of corruption. If this were the case, the moral cost associated with corruption C_o^M (if any) would be larger under bottom-up than under top-down monitoring.

Our fifth and last prediction[13] follows:

Prediction 5. If the public official is ambiguity averse, or incurs a betrayal cost, or fears social disapproval, *he is more likely to demand a*

[13] The desire to maintain in control over risk may generate an additional non-monetary cost under bottom-up monitoring. Studies of risk perceptions and behaviour under risk [see Slovic et al. (1986)] have suggested that some individuals have preferences for having or feeling in control over risk. When the outcome of a transaction depends on the behaviour of another indidual, the "risk controllers" may suffer from the loss of control deriving from having to trust another person. In the case of corruption, the public official may suffer an additional non-monetary cost from engaging in corruption under bottom-up monitoring, as they realize that their final payoff depends on the trustworthiness of the private citizen, and is therefore outside their control.

high bribe or abstain from corruption under bottom-up than under top-down monitoring.

4 Experimental participants

A total of 180 Oxford University students participated in the 12 experimental sessions. The recruitment of participants started during the last week of October 2007 through advertisements in colleges and departments, using mailing lists, colleges' weekly newsletters and posters. I conducted the experiments during November 2007 in seminar rooms in the Department of Economics, Oxford University.[14]

Students were randomly allocated the roles of public official, private citizen and other member of society (or Player A, Player B and Player C) at the beginning of the session, and kept their role during the game. Although Officials and Citizens were randomly paired in the game, nobody knew who was playing with whom. Each participant only knew his or her own role and had to decide how to play the game individually and independently from the other participants. Decisions were recorded by the participants on specifically designed forms [15] behind privacy screens, in order to assure anonymity.

Participants played the game with an experimental currency called Gilpet, where the conversion rate between Gilpet and Pound was 5 to 1. After playing the game, the students were asked to fill in a questionnaire, while their payoffs from the game were computed and converted them into Pounds. Each session lasted about 1 hour and the individual payoff from the game was 7 GBP on average, which added up to 10 once a show-up fee of 3 GBP was accounted for.[16] None of the officials who were subject to either top-down or bottom-up monitoring was sanctioned.[17]

- Table 2 here -

[14] Three sessions were conducted at the Said Business School, Oxford University.

[15] The decision forms, the scripts, the tables (with all possible payoffs from the game) and all the additional material used during the experiment are available on request from the author.

[16] An amount of 10 GBP corresponds to the standard hourly rate for a research assistant in Oxford.

[17] 55% of the citizens who played under bottom-up monitoring were willing to report the public official if he demanded a bribe from them. However, citizen's reports were not followed by formal punishment in any of the 4 bottom-up monitoring sessions.

Table 2 shows age, gender and other relevant demographic characteristics of our 180 participants. The age ranges between 18 and 36, however only 5% of the participants are older than 30. The proportions of graduate and undergraduate students are roughly the same, whereas we have more male than female participants (61 vs. 39 per cent). Only a very small proportion (4 per cent) of students is married, 16 per cent are an only child, and 31 per cent consider themselves a religious person.[18] In terms of the discipline of study, I tried to recruit students from most Oxford departments by using official mailing lists. However, almost all of the students who decided to participate in the study are Social Sciences students. Economists represent 32 per cent of the subject pool; the remaining participants are mainly students of Sociology, Politics and Law.

5 Results

Figures 1 and 2, and Table 3 give a first overview of the experimental data with respect to the public officials' decision to engage in bribery.

- Table 3 here -

Only 5 per cent of the officials decided not to demand a bribe when there was no monitoring system in place. The proportion of officials who decided to abstain from corruption raises to 10 per cent in the presence of external monitoring, and reaches 30 per cent under bottom-up monitoring. The first column of Table 3 shows that while the difference in the proportion of "honest" officials under no monitoring and external monitoring is not statistically significant, the difference between no monitoring and bottom-up monitoring is statistically significant. These first descriptive results suggest that officials were more responsive to bottom-up than top-down monitoring.

Figure 2 and the the second column of Table 3 provide us with information on the amount of the bribe demanded in each of the three treatments. In the no monitoring version of the game only 10 per cent of the public officials (10.5 of those who decided to demand a bribe) played the Subgame Nash Equilibrium and requested an amount equal to 14, whereas 85 per cent

[18] We ask our participants whether, independent of their specific religious affiliation (if any) they considered themselves a "religious person" or not. We also have information about their specific religious affiliation. In particular 52% of the students do not belong to any religious affiliation, 16% are Protestant and 12% are Catholic. The remaining 20% is constituted by Buddhists, Hindus, Muslims and Ortodox Christians.

demanded a lower bribe. Moreover, 63 per cent of the officials who decided to demand a bribe required the "fair" bribe of 10.

The picture changes considerably if we look at bribery behaviour under top-down monitoring. Here the mode corresponds to the Subgame Perfect Nash Equilibrium bribe; indeed, 35 per cent of the officials (39 per cent if we consider only the ones who decided to demand a bribe) asked a bribe equal to 14. There is also a small fraction of officials who demanded a bribe equal to 15, *i.e.* the highest possible bribe, which would give the citizen a payoff equal to the outside option. In contrast, 50 per cent of the officials who engaged in corruption under top-down auditing demanded a bribe lower than 14, showing preferences for fairness; in particular, 22 per cent demanded the "risk-neutral fair bribe" of 10.

Finally, Figure 2 shows that under bottom-up monitoring the mode for the amount of the bribe demanded corresponds to a bribe equal to zero, *i.e.* no corruption. Of the 70 per cent of officials who decided to demand a bribe, 44 per cent behaved in accordance with the Subgame Perfect Nash Equilibrium, demanding either 14 or 15. An additional 29 per cent demanded the "risk neutral fair bribe" of 10, and 10 per cent demanded an amount equal to 11, which may reflect either risk aversion or both risk and inequity aversion. The second column of Table 3 confirms that the demanded bribe is on average lowest under no monitoring treatment and highest under top-down monitoring. The risk of being sanctioned seems to have induced the public officials either to abstain from corruption or demand a higher bribe.

The last two rows of Table 3 compare bribe-demanding behaviour in the six experimental sessions which were framed using abstract terms and the six experimental sessions which were framed using corruption terms. There does not seem to be a significant reduction in corruption when the game was presented as corruption, in contrast with our Prediction 2. However, the corruption frame induced corrupt officials to demand a lower bribe.[19]

To summarize, descriptive statistics and non-parametric tests suggest that bottom-up monitoring significantly reduced the fraction of officials who decided to engage in corruption. In contrast, top-down monitoring was not effective in reducing corruption; moreover, it induced corrupt officials to demand higher bribes than under no monitoring.

In what follows I conduct probit regressions on the official's decision to demand a bribe and OLS regressions on the amount of the bribe demanded,

[19] A comparison of officials' behaviour in the three treatments under the abstract and the corruption frame does not show more or less responsiveness to treatments in the corruption framed sessions. Results are not reported in the paper but are available from the author.

as reported in Table 4.

- Table 4 here -

Columns (1) and (2) of Table 4 show that bottom-up monitoring significantly reduced the probability for a public official to demand a bribe. This result is robust to the inclusion of control variables, such as age, gender, being an economics student and defining themselves a religious person. The presence of top-down monitoring and the specific frame employed in the game do not seem to affect bribe-demanding decision of the public officials.[20] Going back to our theoretical framework and predictions, the results in the first two columns of Table 4 suggest that public officials are more responsive to bottom-up monitoring than top-down auditing, providing support to our Prediction 5. Non-monetary costs activated by bottom-up monitoring and not by top-down monitoring appear to be highly effective in hampering corruption. In contrast, risk aversion, which we expected to induce a negative coefficient of the top-down monitoring dummy, does not seem to play a significant role in the official's decision to demand a bribe.

The results presented in columns (3) and (4) are generated by OLS regressions on the amount of the bribe demanded by the public officials who decided to engage in corruption. The statistical significance and the positive sign of the external monitoring dummy indicates that public officials who were exposed to top-down monitoring demanded a significantly higher bribe than those who were exempt from monitoring, providing support to our Prediction 4. Column (3) suggests that bottom-up monitoring had a similar positive effect on the amount of the bribe demanded; however, as we would expect, this result is not as robust as top-down monitoring's and does not hold when we control for participants' individual characteristics. Columns (3) and (4) also show a significant negative framing effect on the amount demanded; when the game was framed as corruption the officials demanded a significantly lower bribe. This result suggests that preferences for fairness (which we expect would lower the bribe below 14, toward 10) were stronger when the game was presented in abstract terms than in corruption terms. This result is perfectly plausible if we think that the official and the citizen

[20] Among the control variables it is worth noticing that economics students and individuals who defined themselves as religious persons are more likely to demand a bribe. Controlling for additional individual characteristics does not affect the significance of the treatment variables. Controlling for the respondent being Protestant, Catholic, or Atheist also does not provide significant insights into the individual determinants of corrupt behaviour in the game.

held more symmetric roles in the game when they played as "Player A" and "Player B" than as "public official" and "private citizen".

Finally, columns (5) and (6) present results from OLS regressions on the amount of the bribe demanded by all public officials, including those who decided to abstain from corruption and therefore demanded a bribe equal to zero. A positive coefficient in these regressions reflects public officials' propensity to both engage in corruption and demand a high bribe, whereas a negative coefficient reflects public officials' propensity to abstain from corruption or demand a low bribe. As expected, bottom-up monitoring presents a negative coefficient and is borderline statistically significant, whereas top-down monitoring presents a positive coefficient, yet is not statistically significant.

6 Conclusions

In the last decade development practitioners and policy-makers, as well as academics, have given increasing attention to grass-root development interventions, aimed at increasing citizens' participation in the planning, implementation and monitoring stages of public spending and service delivery. The failure of decades of top-down anti-corruption interventions in countries characterized by systemic corruption has led development institutions such as the World Bank to advocate the implementation of grass-root bottom-up interventions also in the fight against corruption. However, with the sole exception of a recent work by Olken (2007), studies which systematically evaluate the effectiveness of bottom-up anti-corruption strategies as opposed to top-down auditing still missing.

In this paper I conduct a specifically designed economic experiment which investigates the effectiveness of top-down and bottom-up anti-corruption mechanisms in a weak institutional environment. In particular, I run a bribery game, involving a total of 180 individuals, where "private citizens" and "public officials" interact for the provision of a public service, and where the "official" can offer to provide a better or quicker service in exchange for a bribe. I explore the officials' decision to engage in bribery when they are either: 1) subject to no punishment, 2) subject to a 4 per cent probability of being detected and "softly" punished, and 3) subject to possible citizens' reports, where a report would activate a 4 per cent probability for the corrupt official to be detected and "softly" punished.

I find that bottom-up interventions, in the form of citizens' anonymous reports and consequent possible punishment of corrupt officials, can be

highly effective in curbing corruption, even in a weak institutional environment where both the probability of formal punishment and the sanction induced by grass-root monitoring are low. In contrast, top-down monitoring may be not effective in a weak institutional environment; moreover, it may have adverse effects on corruption by inducing corrupt officials to demand higher bribes from the citizens.

I argue that the reason for bottom-up monitoring to be a more effective anti-corruption strategy than top-down monitoring is to be found in the presence of additional non-monetary costs which are activated by bottom-up monitoring but not by top-down monitoring. Further work will explore the relative importance of each of these additional non-monetary costs in the corruption decision process. Ideally, I will be able to: 1) explore the impact of social pressure on public officials' behaviour by controlling for any personal links among participants in each experimental session, and 2) isolate the effect of ambiguity aversion and betrayal aversion by conducting an additional experimental treatment in which the probability of punishment under top-down monitoring is also made ambiguous.

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Figure 1: Public Official's decision to demand a bribe

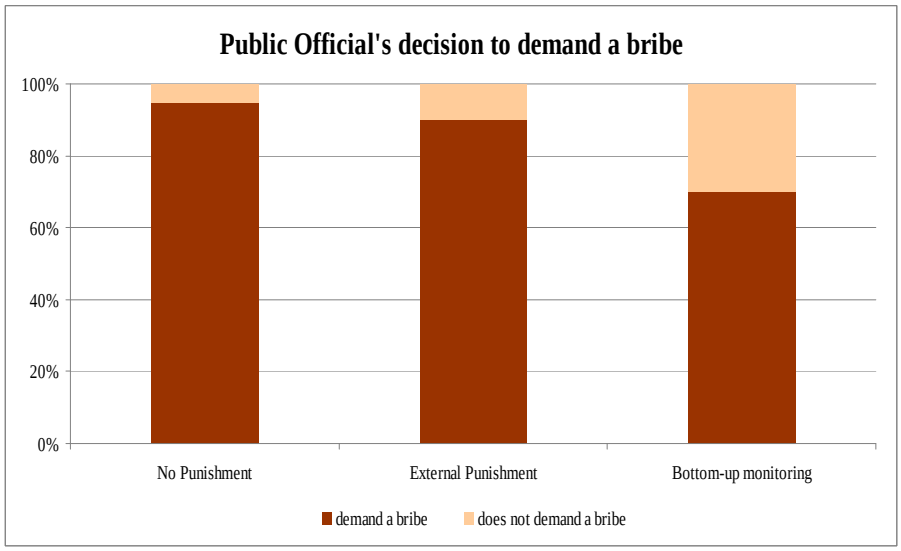

Figure 2: Public Official's decision to demand a bribe

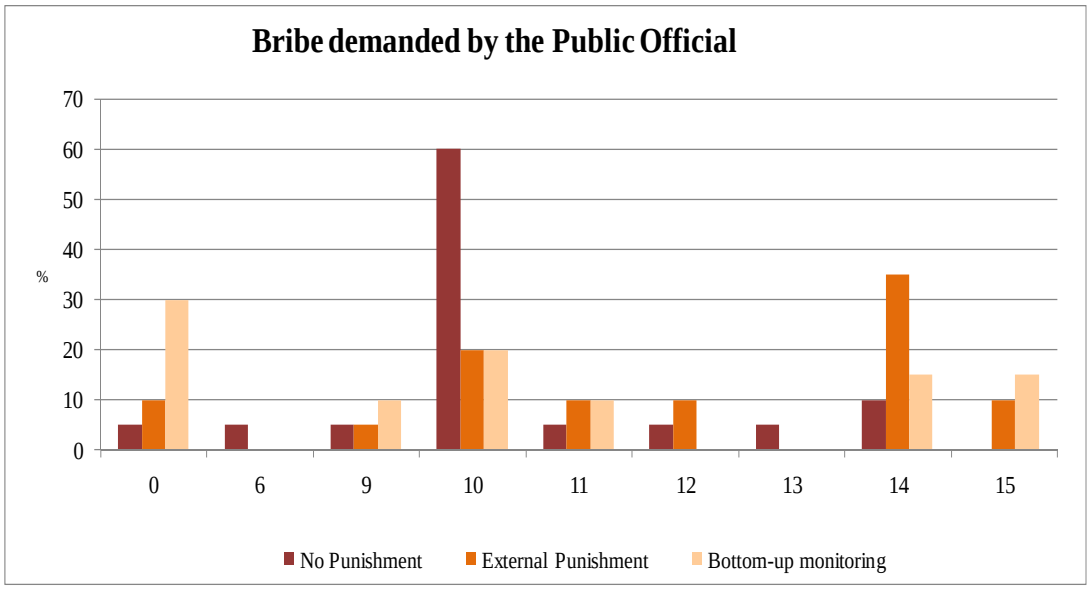

Table 1: Experimental sessions

	Abstract frame	**Corruption frame**
No external punishment	2 sessions (30 participants)	2 sessions (30 participants)
External punishment (p=0.04)	2 sessions (30 participants)	2 sessions (30 participants)
Bottom-up monitoring (citizens' reports and p=0.04)	2 sessions (30 participants)	2 sessions (30 participants)

Table 2: Participants' characteristics

	Mean or proportion	**Standard Deviation**	**Minimum**	**Maximum**
Graduate student	0.52			
Female	0.39			
Age (years)	22.53	3.93	18	36
Married	0.04			
Economics student	0.32			
Described self as religious	0.31			
Only child	0.16			

Table 3: The official's decision to demand a bribe

Summary Statistics

	Did not demand a bribe	**Mean bribe**
No Monitoring (NM)	5%	10.47
External Monitoring (EM)	10%	12.39
Bottom-up monitoring (BM)	30%	11.93
p-values: EM vs. NM	0.55	0.32
p-values: BM vs. NM	**0.02**	0.29
p-values: BM vs. EM	**0.06**	0.28
Abstract	17%	12.20
Corruption framed	13%	10.92
p-values: Abstract vs. Framed	0.36	**0.02**

Comparisons of the proportions of officials who did not demand a bribe are based on one-tail Chi-Square p-values. Comparisons of mean bribes are based on ttest p-values.

Table 4: The official's decision to demand a bribe

Probit and OLS regressions

	Dependent variable: "demanded a bribe"		**Dependent variable: Amount of the bribe**		**Dependent variable: Amount of the bribe**	
	dprobit		OLS		OLS on all sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Corruption frame	0.03	0.05	-1.21**	-1.097*	-0.70	-0.51
	(0.39)	(0.61)	(2.10)	(1.88)	(1.07)	(0.52)
External Monitoring	-0.08	-0.15	1.82***	1.732**	1.20	0.66
	(0.73)	(1.18)	(3.18)	(3.07)	(1.53)	(0.54)
Bottom-up	-0.28**	-0.33**	1.51	1.32	-1.6*	-1.9
	(2.39)	(2.51)	(1.82)*	(1.36)	(1.78)	(1.73)
Economics student		0.13*		-0.59		0.71
		(1.87)		(0.81)		(0.57)
Female		0.04		-0.95		-0.79
		(0.54)		(1.50)		(0.56)
"religious person"		0.11*		0.09		1.34
		(1.89)		(0.12)		(1.01)
age		-0.01		-0.09		-0.23
		(1.40)		(1.27)		(1.23)
Constant			11.11***	13.66***	10.30	15.24
			(26.01)	(9.13)	(11.75)**	(3.34)**
Observations	60	60	51	51	60	60
R-squared			0.23	0.31	0.07	0.13

Robust z statistics in parentheses in (1) and (2). Robust t statistics in parentheses, in (3) and (4). Regressions are clustered by session.

* significant at 10%, ** significant at 5%; *** significant at 1%