UNIVERSITÀ DEGLI STUDI DI PADOVA

Dipartimento di Scienze Economiche "Marco Fanno"

SELF REPORTING REDUCES CORRUPTION
IN LAW ENFORCEMENT

ALFREDO BURLANDO
Boston University

ALBERTO MOTTA
Università di Padova

December 2007

"MARCO FANNO" WORKING PAPER N.63

Self Reporting reduces corruption in law enforcement

Burlando Alfredo,* Motta Alberto†

This version: January 19,2008
First version: January 2007

Abstract

We consider a model of law enforcement where homogenous, risk neutral, and corruptible inspectors are responsible for monitoring firms' adoption of pollution prevention technology. A welfare maximizing government can implement appropriate wage policies to prevent collusion, but we find that governments characterized by high administrative costs in administrating fines, or by a low ability to spot and prosecute corruption, may prefer to let corruption happen. By allowing firms to purchase pollution permits in lieu of the technology, the government is able to increase welfare by reducing red tape, keeping a leaner monitoring force, and eliminating rents to its force. The use of permits further benefits society by allowing the country to fully eliminate corruption. This theory can be applied in a variety of law enforcement situations.

1   Introduction

The literature on law enforcement has long noted the widespread presence of self-reporting of criminal acts, or the admission of culpability by a law breaker prior of being caught by a law enforcer. In practice, offenders choose to admit their misdeeds when they are certain the government will be lenient to them: they are better off paying a reduced fine for certain than facing the chance of getting caught and suffer a harsh sentence. The theory behind self reporting in law enforcement has already been explored by Malik (1993) and Kaplow and Shavell (1994)

---

*Boston University, Department of Economics, Bay State Road, Boston, USA E-mail: burlando@bu.edu

†University of Padua, Department of Economic Sciences, 33 via del Santo Padua, Italy, E-mail: alberto.motta@unipd.it .

(henceforth KS)[1]; using a model à la Becker (1964) they demonstrate that law enforcement with self reporting is more efficient than law enforcement without it.

We take the model of KS as a point of departure into another issue that is of key interest in the literature of law enforcement: the possibility that law officers may accept bribes from those who they are supposed to apprehend. In practice, what we mean by corruption is a process in which an individual who is apprehended by a police officer for having committed an unlawful act pays the officer a bribe. This bribe guarantees that the officer would not report the individual to the judiciary[2]. When we expand the basic setup introduced by KS to account for side payments between officer and offender, we demonstrate that self reporting can reduce the costs incurred in the fight against corruption, and therefore, make this fight cheap enough to be always worthwhile. In particular, our model identifies three benefits of self reporting, which translate into savings in law enforcement expenditures. The first source of savings derives from the need to hire fewer law enforcement officials when criminals self report, precisely the point made by KS. When self-reporting is effective, offenders prefer to use it, and since crimes are solved without the aid of investigations, fewer law officials are needed to monitor the population of innocent civilians. A second advantage of self reporting may come from a reduction of judicial expenditures: it is cheaper to prosecute self-reported crimes than equivalent crimes which were not self reported, since guilt is already established without the need to thorough investigation and litigation. Finally, and most importantly for our paper, self-reporting reduces the actual rents paid to law officers in order to keep them honest. Without self-reporting, officers must be induced to refuse bribes that are offered to them. The government achieves this by providing bonuses to officers who indeed report offenders to the judiciary system. In order for the bonuses to be effective, they must be of a higher value than whatever bribe an offender is willing to offer; a bidding war ensures that rents to officials are high. Self-reporting provides an alternative strategy to the offender, who now can simply avoid paying the bribe or the full fine by paying directly to the government. When the individual chooses this alternative, he avoids entirely the confrontation with the law officer, who cannot claim either bribe or bonus. Clearly, this mechanism also eliminates bribes, since it eliminates the possibility of bribe exchange.

---

[1] See also Polinsky and Shavell (2000) for a more general discussion on the theory behind law enforcement.

[2] Polinsky and Shavell (2001) also consider corruption in law enforcement which include the possibility for extortion of innocent civilians.

An important issue that we consider in our analysis is that bribery, because costly to the offender, in itself helps enforcing the law and may therefore be desirable: by providing an alternative fine that competes with the official sanction, it discourages committing unlawful acts. Because of that, certain governments may in fact prefer an enforcement system based on bribe exchanges than one based on legal fines (Besley and McClaren 1993)[3]. This preference may arise when legal enforcement is too costly relative to "corrupt" enforcement. The introduction of self reporting may change the preferences of the government by reducing the cost of legal enforcement, and therefore may be used to clean up the entire system.

Our theory has important implications for the practice of law enforcement when the enforcers are corrupt. Enforcement agencies which suffer from widespread corruption within the ranks are fairly common in many countries of the world, one reason being that cleansing it would be at once painful and expensive. Our paper suggests that when reform is implemented in conjunction with self-reporting, some of the costs of reform can be eliminated. We temper this statement by immediately suggesting caveats: this result is true under the strict assumptions of the model, and indeed may fail under some other assumptions; in the later portion of the paper, we explain where the limits to the applicability of the theory lie. We clearly cannot span all desirable modeling choices here, and we hope that our contribution will bring forth more research in the area of self-reporting, law enforcement, and moral hazard[4].

The rest of the paper is organized as follows. Section 2 discusses the baseline model. Section 3 introduces the possibility of extortion. Section 4 notes important limitations of the theory. Section 5 concludes.

2   The model

2.1   Structure

There is a measure 1 of risk-neutral citizens who can commit an unlawful act or crime that causes a harm to society of h. Each citizen derives a private gain x from committing the act, which is distributed with a continuous density function $g(.)$ and cumulative distribution function

---

[3]While bribery discourages unlawful acts, it is true that it is not necessarily an effective deterrent when compared with a system based on fines (Becker and Stigler, 1974; Polinsky and Shavell 2001)

[4]A different issue is the effect of self-reporting, or leniency programs, in deterring long term illegal relationships (Motta and Polo, 2003) by creating a prisoner's dilemma. In this regard, Buccirossi and Spagnolo (2005) show that leniency programs could help sustaining occasional sequential illegal transactions by solving the hold-up problem.

$G(.)$. Clearly, society faces a social loss whenever an act is committed by a person whose private gain is $x < h$. To minimize the number of crimes the government employs a police force responsible to monitor the population and report violators to a court of law, which in turn imposes fines to the violators.

In the absence of any other consideration, citizens choose to commit the unlawful act only when their private benefit exceeds the expected sanction. In equilibrium, enforcement determines a threshold level of gain $\hat{x}$ such that only individuals whose private benefit exceeds $\hat{x}$ commit the act. The harm to society due to criminality will then be

$$[1 - G(\hat{x})]\, h$$

2.1.1 The police force and Corruption

Monitoring by the police force is not costless; the government employs a force of p officers, and must pay wages $w > w^*$, where w^* is the officers' reservation wage. Officers are risk neutral individuals who are potentially corruptible, meaning that they will consider accepting bribes. They are also credit constrained: the base pay that they can receive cannot fall below their reservation wage[5].

Each officer visits one randomly chosen individual, whereupon she learns whether the person is an offender. When an offense is uncovered, the officer can report the violation to the judiciary system, which levies a fine f to the offender. Alternatively, the offender may agree to pay a bribe b to the officer in exchange for her silence. We assume that when the value of the bribe is less than a certain fraction of the fine σf, where $\sigma \in [0, 1]$, such bribe goes undetected or, if detected, unprosecuted[6]. If a bribe is larger than σf, then the collusion is uncovered, the officer loses his wage, and the offender is made to pay the full fine f. Because of this, officers are willing to consider bribes

$$b \leq \sigma f$$

The parameter σ plays an important role in the comparative statics of the model. We think of σ as a parsimonious description of how easy it is to detect collusion. The case where σ is small or zero corresponds to transparent societies where even small bribes are not tolerated; a high

---

[5]This assumption is not necessary for some of our results to hold, as we discuss in section 5. Nonetheless, it is a reasonable assumption when wages are understood in a more general sense to include 'per officer costs', which include expenditures on equipment (cars, computers, weapons) that cannot be skimped over.

[6]It is often said that bribe-takers can avoid being punished when a superior or auditor detects the bribe by bribing the superior who himself may be corruptible (Cadot 1987, Andvig and Moene 1990)

σ instead corresponds to potentially more corrupt societies, where even outrageous instances of bribery are not prosecuted. With this parameter, we want to distinguish between countries where, be them developed or underdeveloped, it is unthinkable to give even small bribes to officials, and other countries where bribery is acceptable[7].

Aside from this exogenously given detection function, the government has no other 'sticks' to prevent corruption. The only anti-corruption measure would be a 'carrot': the payment of incentives i that are conditional on the report submitted by the officer. Because acceptance of the bribe implies foregoing the incentive, the inspector will consider only bribes that have the following characteristic:

$$b \geq i$$

Finally, consider the choices available to an offender: if he is caught, he will prefer the payment of the bribe when such payment is less than the fine:

$$b \leq f$$

The agreement on the bribe is reached through Nash bargaining, with weights of μ. Equilibrium bribe then is

$$b^* = \min\left[\sigma f, (1 - \mu)i + \mu f\right] \tag{1}$$

This bribe has similar characteristics to other found in the literature (..........): it increases with the size of the incentive, and decreases with the likelihood of detection, σ. To fully eliminate corruption, the government must set incentives high enough according to the no-collusion condition:

$$i^{nc} \geq \sigma f \tag{2}$$

In this simple model with homogeneous inspectors, there are only extreme outcomes. when $i < i^{nc}$, all inspectors accept bribes, and all law offenders offer them. Since reports of offenders are never filed, the

---

[7]It is common in the literature on corruption to assume that the probability of detecting bribe exchanges is a choice variable of the government. We abstract from it in order to keep the model simple. For an analysis of endogenous bribe detection, see Mookherjee and Png (1995), Polinsky and Shavell (2001). In Adving and Moene (1990), the probability of detection depends by how corrupt the overall system is. Overlapping responsibilities among different bureaucrats may also increase the chances of detection and the size of bribes, since officials may need to solve a coordination game (Rose-Ackerman 1994). See Bhardan (1997) for an insightful review.

government neither pays incentives, nor levies fines. When $i \geq i^{nc}$, no bribes are ever exchanged, and therefore all violations are reported, all fines are levied, and all incentives are paid. We label these two events by the index $j \in \{c, nc\}$.

2.1.2 Government Expenditures

Government expenditures consist of wage payments net of revenues from fines collected and is defined by B_j when in state j. B_j is raised through distortionary taxation from the citizenship as a hole. Taxes costs taxpayers $(1 + \lambda)B_j$, where λ is a parameter that measures the size of the dead weight loss. When $\lambda = 0$, resources are costlessly shifted from taxpayers to the government, resulting in no welfare losses; when $\lambda > 0$, there is a welfare loss equivalent to λB_j.

2.1.3 Social Welfare

The government maximizes a weighted average of the welfare of all members of society, which include both civilians and enforcement officers. The overall social welfare takes the form of

$$W_j = \int_{\hat{x}_j}^{\infty} (x - h)g(x)dx - \lambda B_j \tag{3}$$

This formulation differs from the canonical approach in KS or Polinsky and Shavell (2001), and more similar in nature to setups more commonly found in the literature of corruption, such as in Besley and Mc-Claren (1993) and Laffont and Tirole (1993). This departure is justified by the nature of the problem we are analyzing: it is precisely the 'cost of fighting corruption' that people talk about when discussing corruption.

In the next section, we construct the welfare functions for $j = c, nc$ under the assumption that self reporting is not possible. The government can affect the state j and the level of welfare W_j by changing its wage policies w and i and by choosing the number of inspectors p[8].

---

[8]The fine f is also a policy instrument that is optimally set by the government. As in the rest of the enforcement literature, the fine is always maximal: f is set to coincide with the wealth of the citizen. For a proof, Becker (1968), Kaplow and Shavell (1994), Polinksy and Shavell (2001). There are some exceptions to this: Malik (1990) shows that when criminals engage in detection avoidance, fines are not maximal; however, Ines (2001) shows that when self reporting is introduced, there is no need to engage in avoidance and therefore the Becker principle of maximal fines applies again.

2.2 No Self Reporting

2.2.1 Honest inspectors

Consider the choice faced by a citizen when the p inspectors are not corrupted (because they are paid high incentives, $i \geq i^{nc}$). Since his probability of being audited is p, by committing the act he expects to pay a fine of pf; this determines the threshold gain from the act, $\hat{x}_{nc}$:

$$\hat{x}_{nc} = pf$$

The threshold determines the number of unlawful acts, $1 - G(\hat{x}_{nc})$, and the expected payoff received by the officer, which is the wage received plus the incentive pay received if an offender is found:

$$w_{nc}^{E} = w + i\left[1 - G(pf)\right] \qquad (4)$$

Where E denotes the fact that this is the ex-ante payoff, before audit is conducted.

Next, consider the government budget. The government hires p inspectors, pays them an average of w_{nc}^{E}, and collects fines from citizens who were caught. We assume that, while all every guilty audited person pays the full fine f, it is only after some red tape and a lengthy bureaucratic process; guilt must be assessed in front of a court of law, and such time and resource consuming activities end up destroying part of the fine income. At the end of the bureaucratic process, only αf is left of it to be used by the government[9].

Accounting for wage expenses and fine income, the budget takes the form

$$B_{nc}(p, w, i) = p\left[w_{nc}^{E} - \alpha f[1 - G(pf)]\right]$$

Where w_{nc}^{E} is defined by (4), and subject to the no-collusion bonus pay (2). The budget is minimized when w_{nc}^{E} is minimized, that is, when inspectors' base pay is the reservation wage w^{*} and the no-collusion constraint (2) binds. The objective function to be minimized is then reduced to a function of p only:

$$W_{nc}(p) = \int_{pf}^{\infty} (x - h)g(x)dx - \lambda p\left\{w^{*} + f(\sigma - \alpha)[1 - G(pf)]\right\} \qquad (5)$$

The three terms in the welfare function are the following: the first term is the welfare loss due to criminality; the second term is the base pay w^{*} paid to the p officers; the last term is the net revenues to the government, that is, fine income minus incentive pay.

---

[9]A modified version of costly imposition of fines is found in Polinsky and Shavell (2000)

2.2.2 Corrupted Inspectors

Consider the case in which incentives are too low, and there is scope for bribe exchange. The potential law breaker's choice is then to do nothing, or commit the act and pay with probability p an expected bribe b^* as defined by (1). The threshold condition is

$$\hat{x}_c = \min[\sigma pf, p[(1 - \mu)i + \mu f]] \tag{6}$$

In this scenario, the government pays only base wages to its inspectors and receives no fine income, so the government budget is

$$B_c(p, w, i) = pw$$

Note that, in this case, incentives are offered but never paid out. However, they do play a role: they raise the equilibrium bribe and therefore increase the compliance threshold (6). In equilibrium, the government increases i to the point where $\hat{x}_c = \sigma pf$[10]. The corrupted loss function is then

$$W_c(p) = \int_{\sigma pf}^{\infty} (x - h)g(x)dx - \lambda pw^* \tag{7}$$

2.2.3 When is corruption optimal?

The government can move from one equilibrium to the other by simply modifying the incentive pay i. The final outcome is determined by maximizing both W_{nc} and W_c in equations (5) and (7), and then choosing whichever is larger. Both outcomes could happen in our model.

In this stylized model, the choice is dictated most directly by the relative values of α and σ. In fact, $\alpha - \sigma$ determines how much of the fine collected by the honest officer ends up in the hands of the government (as opposed to given out in incentive pay). When $\alpha \geq \sigma$, officers are efficient in the sense that they collect in fines more than they cost in incentive pay, and it is never optimal to let these highly efficient workers collect bribes from law offenders. When $\alpha < \sigma$, officers are inefficient, in the sense that each fine they collect is not sufficient to cover the expense to keep them honest. It may not be optimal to keep these officers honest. It is then possible that one officer corp keeps high standards of honesty, while another does not, even within a nation which keeps different enforcement agencies. Often, great effort is exerted to keep highly profitable corps (tax administration, customs) as honest as possible, amid the widespread corruption of other forces (police forces and anti-crime units).

---

[10]Strictly speaking, $\hat{x}_c$ must be as high as possible without ever reaching σpf; it is $\sigma pf - \varepsilon$, where ε is an arbitrairly small positive number.

The relative profitability of the average officer is not the only aspect taken into consideration when choosing the type of enforcement: corrupted enforcement limits deterrence, and therefore it is less desirable. However, when society is highly tolerant of corruption (σ is high), overall bribe levels will remain high, and that in itself provides a relatively large deterrence. Since deterrence is less of an issue in high-σ societies, the expenditure motive will dominate the choice between corruption and honesty.

An important point of the discussion so far is that in either regime inspectors are paid above their reservation wage, in expectation. Their base wage w^* can be supplemented by an extra bonus, or a bribe. Their corruptibility allows them to capture some of the revenues accrued by the state.

2.3   Allowing Self Reporting

We now introduce self reporting in both regimes, starting with $j = nc$. Our treatment of self reporting follows Kaplow and Shavell: an individual who committed the unlawful act may admit of it by reporting his crime to the police; as a reward for the admission, the judiciary imposes a reduced or discounted fine r, which is less than the fine f. Furthermore, this citizen is exonerated from further examination, since he cannot commit the crime twice. By self reporting and paying r, the individual avoids paying either the fine f or a bribe b.

The reduced fine that is implemented follows a different judicial path than the full fine. A citizen who is reported to the judiciary by a law enforcer has the right to defend himself through the court of law, and therefore demonstrating his culpability is at once time consuming and expensive. The same cannot be said when a person reports his unlawful act: by confessing, he gives up the right to demonstrate his innocence. As a consequence, the bureaucratic procedure needed to process the reduced fine is more efficient and less expensive. For simplicity, we assume that the government is able to appropriate all of the reduced fine collected.

2.3.1   Honest Inspectors

Suppose inspectors are honest. Then, an individual who commits an unlawful act can either accept the chance of being reported and paying a fine f, or reporting himself the act and pay the reduced fine r - whichever is more convenient (less expensive) in expectation to him. An individual with private gain x may commit the act if his private benefit from the act exceeds the cost:

$$x \geq \min[r, pf] \equiv \hat{x}_{nc}^{sr}$$

When self reporting is allowed, the government adds r to the set of policy instruments. To get the optimal level of r, consider first the case in which $r > pf$. Because self reporting is more expensive than the expected full sanction, criminals do not report their act, and welfare remains unchanged to W_{nc} in (5). In this case, self reporting is possible, but no one employs it.

Now suppose $r < pf$. Now all unlawful acts are reported, and individuals pay only reduced fines to the government. Since $\hat{x}_{nc}^{sr} = r$, the total number of crimes committed is $1 - G(r)$, and thus the fraction of the population who does not report having committed the act is $G(r)$; this is also the fraction of the population that is subject to audits by law enforcers. The welfare achieved is

$$W_{nc}^{sr}(r, p, w, i) = \int_r^\infty (x - h)g(x)dx - \lambda \left\{ pw_{nc}^{sr,E}G(r) - r[1 - G(r)] \right\} \quad (8)$$

Where $w_{nc}^{sr,E}$ is again the expected wage paid per officer.

The first result of the paper is encapsulated in the corollary that follows the next proposition:

Proposition 1 *When self reporting is adopted and corruption is not allowed:*

(i) $r = pf$ (the reduced fine is equal to the expected full fine when bribing is not possible);

(ii) $i \geq \sigma f$ (the no-collusion condition (2) remains unchanged from the case without self reporting);

(iii) $w_{nc}^{sr,E} = w^*$ (average wages, including incentive pay, are equal to the officers' outside option).

Proof. *(i): Suppose $r < pf$. Then, the government could slightly decrease p without changing the inequality. Then, the integral in (8) would not change, but the second term would decrease: welfare would go up. Since $r < pf$ is not optimal, it must be that $r \geq pf$. For the case of $r > pf$, we have already shown that self reporting is not binding, and therefore the proper welfare function that applies is still (5). Thus, the only case in which self report binds is when $r = pf$.* ■

Proof. *(ii) suppose $i < \sigma f$. Then, if the officer confronts a person who committed an unlawful act, she could accept a bribe b^* as defines in equation (1) instead of reporting, since the bribe is larger than the reward offered by the state. Now consider the possible actions available to a person who committed the act. If he chooses to report the act, he pays a reduced fine $r = pf$. Otherwise, he can expect to pay a bribe $(1 - \mu)i + \mu f < \sigma f < f$. Hence, he prefers to pay the bribe instead of*

self reporting. In this case, corruption happens and officers are dishonest. Therefore, to keep them honest the state needs to pay an incentive $i \geq \sigma f$. ∎

Proof. *(iii) So far, all criminal acts are reported to the government directly from those responsible of committing them. Thus, inspectors only inspect honest citizens, and therefore they earn no incentive pay: the only salary paid is $w \geq w^*$. To maximize equation (8), the government sets base wage as low as possible, to w^*.* ∎

With this proposition, we can replace r with pf, and $w_{nc}^{sr,E}$ with w^*. The welfare function to be maximized becomes

$$W_{nc}^{sr}(p) = \int_{pf}^{\infty} (x - h)g(x)dx - \lambda \left\{ pw^*G(pf) - pf[1 - G(pf)] \right\} \quad (9)$$

The first term indicates the welfare loss due to crime; the second term represents the wage bill w^* paid to the $pG(pf)$ officers; the third term is the revenues from self reporting. The main aspect of self reporting that we want to highlight here is that self reporting as a policy is able to separate honest citizens against citizens responsible for illegal actions without the direct intervention of the police force, and is therefore able to deprive the police of any information rents. We make a similar point in a separate mechanism design working paper (Burlando and Motta 2007).

While the police do not intervene directly in the identification of offenders, it does so indirectly, by providing a threat against those criminals who fail to self report. Consider, for instance, the implementation of parking violations. Cities allow drivers to park in certain areas only if they pay a certain reduced fine at the curb. The only reason why people pay that fine is because they know that the city employs parking inspectors who randomly monitor cars and fine more heavily those that fail to self report. Without the threat, people would not pay into parking meters.

We now proceed by proving that the government always chooses to implement a self reporting rule that is binding: $r = pf$.

Corollary 2 *When inspectors are honest, it is better to have self reporting than not, i.e., $r = pf$. Self reporting is superior for three reasons: it reduces the number of inspectors, it eliminates information rents, and it eliminates bureaucratic costs.*

To see why, it is sufficient to show that for any p that is chosen under a policy that does not allow self reporting of behavior, the same level of p yields greater social benefit under a self reporting policy. Denote by

$\tilde{p}$ the level of p that is chosen under the welfare function (5) when self reporting is not possible. Suppose now that the government chooses to implement self reporting, where $\tilde{r} = \tilde{p}f$. The change in welfare will be:

$$W_{nc}^{sr}(\tilde{p}) - W_{nc}(\tilde{p}) = \tilde{p}[1 - G(\tilde{p}f)]\left\{w^* + (1 - \alpha)f + \sigma f\right\} > 0$$

Note that there are three components, premultiplied by a positive number, and each component is greater than zero: without a doubt, welfare increases with the adoption of the new policy. Note that the increase is caused only by savings in enforcement expenditures, while crime rates remain constant. $\tilde{p}[1 - G(\tilde{p}f)]$ is the total number of officers that were employed when there was no self reporting and who would have caught an offender. For each case that would have been prosecuted without the aid of self reporting, the government saves in three ways: first, from the fact that the officers needed to identify the offenders were not hired because they were not needed (the point made by Kaplow and Shavell); second, from greater efficiency in the process of offenders; third, from incentives that are not paid out to inspectors any longer.

Note that the presence of each component does not depend on the other two, because they are born out of different assumptions. If officers were not able to target citizens who reported directly to the government (say, because self reporting is unobservable), the first source of savings would be eliminated, but self reporting would still matter because it eliminates rents and bureaucratic inefficiencies. Similarly, our argument works when self reporting does not yield bureaucratic efficiencies, or when officers are unable to earn rents (more on this last point in the discussion section).

2.3.2 Corrupted inspectors

Suppose now that officers are corruptible: they may accept bribes from individuals. In that case, the choice facing a guilty individual is between self reporting r_c and paying the bribe b, where b is still defines as equation (1). The threshold level of gain needed to choose between committing and not committing the act is

$$\hat{x}_c^{sr} = \min[b, r].$$

so that in order for self reporting to work, $r \leq b$. As before, if self reporting binds ($r = b$), then the welfare achieved is

$$W_c^{sr}(r_c, p, w, i) = \int_{r_c}^{\infty}(x - h)g(x)dx - \lambda\left\{pw_c^{sr,E}G(r_c) - r_c[1 - G(r_c)]\right\}$$

$$(10)$$

Where in this case, $w_c^{sr,E}$ is expected income from wages and expected bribes, and $r_c[1 - G(r_c)]$ is income earned from self reporting fines. We now establish a proposition that mirrors *proposition 1*:

Proposition 3 *When officers are corrupt, and self reporting is allowed:*
$\quad$ *(i)* $i = \sigma p f$
$\quad$ *(ii)* $r_c = \sigma p f$
$\quad$ *(iii)* $w_c^{sr,E} = w^*$

Since the proof of this proposition is similar to the prior proof, we leave in the appendix.

With this proposition, we are able to reduce the objective function to a function which depends on p alone:

$$W_c^{sr}(p) = \int_{\sigma p f}^{\infty} (x - h)g(x)dx - \lambda \left\{ p w^* G(\sigma p f) - \sigma p f[1 - G(\sigma p f)] \right\} \quad (11)$$

Again, the first term is the social loss due to criminality, and the term in parenthesis is the wage paid minus the revenues from self reporting.

Corollary 4 *When inspectors are dishonest, it is more efficient to have self-reporting than not.*

Proof of corollary: For any $\tilde{p}$ that is chosen under a policy without self reporting, the government can introduce self reporting by choosing $r_c = \sigma \tilde{p} f$. The gain in welfare is given by the difference between (11) and (10):

$$W_c^{sr}(\tilde{p}) - W_c(\tilde{p}) = \tilde{p}[1 - G(\sigma \tilde{p} f)] \left\{ w^* + \sigma f \right\} > 0$$

Moving to a regime of self-reporting allows the government to save from two sources. First, the government saves by employing fewer officers. Second, the government is able to earn the bribes that would have been paid to its officers had they been in charge of uncovering offenders. The principle established for the clean regime then translates also to the corrupted regime: officers cannot earn rents under self reporting.

2.3.3 When is corruption optimal?

We have proved so far that self reporting should be employed in the two states that we consider, namely, when officers are honest and when they are not. We now establish the third result, which is that once self reporting is introduced, it is always strictly better to eliminate bribe exchanges. For a little intuition, consider a policy where $r_c = \sigma p f$,

and incentives are not high enough to eliminate corruption. Suppose now that the state raises incentives to a point where the no-collusion constraint (2) is met. Without changing anything else, the trade off faced by the individual is changed from paying bribes to paying full fines. This change allows the government to re-optimize in a way that increases welfare.

Proposition 5 *For any p_c chosen under a corrupt state with self reporting, there exists a policy p_{nc} under a clean state with self reporting that is strictly preferable.*

Proof. Consider a regime of corruption with self reporting, where the number of inspectors is $\tilde{p}$ and the reduced fine is $r_c = \sigma\tilde{p}f$. We now show that the government would be strictly better off if it were to eliminate corruption (by choosing $i \geq i^{nc}$), reduce the workforce from $\tilde{p}$ to $\bar{p} = \sigma\tilde{p}$, and keep the self reporting fine at r_c. The change in welfare is then

$$W_{nc}^{sr}(\bar{p}) - W_c^{sr}(\tilde{p}) = \tilde{p}[1 - G(\sigma\tilde{p}f)]\{w^* + \sigma f\} > 0$$

∎

The fact that corruption is never optimal should not come as a surprise: the main reason for allowing corruption when there is no self reporting is that the government would forgo the expense of paying bonuses to its officials; but under self-reporting, bonuses are never paid, and in either regime inspectors earn their outside wage w^* only. With the main benefit of corruption gone, what is left is the negative aspect of corruption, namely, that it reduces deterrence. But the level of deterrence under a corrupt regime can be achieved with lesser expense under a clean one.

2.4 Summary of Results

We can summarize the theory in a simple diagram that shows the four choices of the government, and the optimization problem embedded in each choice:

	No self reporting	*Self reporting*
Uncorruptible officials	$\max_p W_{nc}(p)$ (1)	$\max_p W_{nc}^{sr}(p\|r = pf)$ (3)
Corruptible officials	$\max_p W_c(p)$ (2)	$\max_p W_c^{sr}(p\|r = \sigma pf)$ (4)

When self reporting is not allowed, the government may find itself either in a clean system (1) or corrupted system (2). However, self

reporting cases (3) and (4) improve on (1) and on (2), and finally, if self reporting is adopted, (3) is superior to (4). Corruption is thus fully eliminated.

3 Discussion and Limits to the theory

3.1 Weakening of enforcement effort

The first limitation of self reporting in law enforcement is that it may create moral hazard problems of its own among the officers. In our theory, the probability of detection does not depend on the effort exerted by the officer. In reality, the intensity of effort exerted is likely to change the chance that an unlawful act is uncovered. If self reporting were to eliminate unreported violations, then law enforcers would see no benefit in exerting effort, and this would reduce the probability of detection for everyone. How this weakening in enforcement impacts the overall equilibrium and the implementation of self reporting depends on how effort is modeled. While this limitation may be substantial in some settings where effort strongly affects enforcement, it may not be as important in other settings where either effort is unimportant or it can be easily monitored by the enforcement agency. Effort may be unimportant when the officer must perform many tasks, and only one of them is to check whether an individual has committed the crime. For example, a customs official at a port of entry performs a series of tasks on a random selection of incoming containers, such as ensuring that contents match the documentation. In the process, she may determine whether other regulations have been violated without making significant extra effort: whether all import duties have been paid, whether illegal substances or restricted materials are found. In other instances, where effort matters, the government can monitor effort. For example, many tasks can be standardized and reduced to checklists or forms that must be completed by the officers. Many instances of tax evasion are captured in this way, since officers must first of all check that forms sent from different sources match the income report.

3.2 Adverse selection of officers

A second aspect worth considering is adverse selection among officers. Officers may have different degrees of ability in performing their job: some may have a higher probability of uncovering offenders than others. Clearly, self reporting eliminates these differences, since the chance of encountering an unreported violation is zero for both 'good' and 'bad' officials. This may be a problem for the enforcement agency if selection is important in other aspects of its activities: for example, the agency may

want to observe individual ability so that it can promote good workers to higher ranks. In that case self reporting is still worth it if the agency has other means to measure ability.

3.3 Failure to self report

In practice, it is often the case that agents fail to self report even when such option is available and optimally designed. We can think of three reasons for this. First, it may be that the probability of getting caught is heterogeneous and varies from individual to individua (Innes 2000)[11]. When this is the case, only high probability individuals choose to self report. Second, a person may have more to hide than the crime itself: self reporting on one crime may lead investigators to audit more thoroughly other aspects of a person's life, the cost of which is not 'priced in' the self reporting fine. Thus, a driver may prefer to 'hit and run' a bystander than stopping to help if he is carrying a stash of drugs with him, for which he is liable to a harsh punishment. A related issue is the uncertainty faced by the individual due to the complexity of the law. He cannot be sure that, having self reported for one crime, the resulting scrutiny would cause him to be held accountable for another act which he did not think was illegal.

Whenever these circumstances arise in a way that cannot be priced into the reduced fine[12], some individuals will not self report, and therefore the government will not be able to avoid paying incentives to some of its officers. This reduces the benefit of self reporting, and increases the benefit of corruption.

3.4 Dynamic transions

Our model is an equilibrium model: we had shown no interest in how people learn the equilibrium bribes, or the probabilities of detection. But dynamics are important when the government is moving from an equilibrium of corruption without self reporting to a clean self reporting one. People take some time to believe that corruption is not a problem any longer, and because of that they may not want to self report if they think that they can pay a more advantageous bribe instead - even when that option is no longer available.

The transition can be expensive, because it would require the payment of incentives to officials and may involve a self reporting fine that

---

[11] It is also possible that individuals actively engage in avoidance (Malik 1990, Innes 2001); however, unless individuals have different cost functions of avoidance, there is no reason for agents to avoid self reporting.

[12] The pricing in can be accomplished only under the condition that all offenders have homogeneous circumstances.

is not initially binding. Because of this, the government would be worse off (otherwise they would not have had corruption to begin with). These transition costs may be so high that they outweigh the future advantages of self reporting, in which case there is no reason to fight corruption.

3.5 Unconstrained officers

So far we have assumed that inspectors are credit constrained and their base pay cannot fall below their outside option. A consequence of this action is that in expectation their wages exceed the outside option – in other words, they derive rents either from collusion, or from the prevention of collusion.

We now consider the opposite extreme: suppose for instance that the government can always adjust the base pay such that in expectation inspectors are paid their outside option in either corrupt or not corrupt regime:

$$w_{nc}^E = w + E(i) = w^*$$
$$w_c^E = w + E(b) = w^*$$

Inspectors are then willing to accept a base pay w that is lower than their outside option, because they can make up the difference with either incentives or bribes. Because the wage can be adjusted downward, corruption does not lead to rents to inspectors. Since the elimination of rents to inspectors was a primary advantage of permits, permits are not as useful here as they were in the base model. Nonetheless, they still reduce bureaucratic costs through two channels. The first is the reduction in the number of officers needed to monitor businesses. The other is the elimination of red tape when fines are assessed through a court of law. Because self reporting still have an advantage over the status quo, the key finding of the paper – that a shift towards self reporting can eliminate corruption – remains unchanged[13].

3.6 More complex anti-corruption policies

We have kept the policy space in our paper as simple as possible, in order to reduce notational complexity (a problem that vexes to some extent the literature on corruption). Our theory does not allow the

---

[13]In particular, it remains true that self reporting under no corruption strictly dominates self reporting under corruption, and therefore self reporting can 'clean' a corrupt regime. We work out this model in a prior version of our paper, available upon request.

government to increase the probability of detecting bribe exchanges, nor do we fully allow for fines from bribery[14]. Some other credible aspects of law enforcement explored elsewhere, such as framing of innocent civilians by law enforcers, should also be included in the theory of self reporting.

References

[1] Andvig, Jens Christopher and Karl Moene. "How Corruption may Corrupt." *Journal of Economic Behavior and Organization*, 1990, 13(1), pp. 63-76

[2] Bardhan, Pranab. "Corruption and Development: A Review of Issues," *Journal of Economic Literature*, 1997. 35(3) pp. 1320-1346.

[3] Becker, Gary S. 1968. "Crime and Punishment: An Economic Approach." *Journal of Political Economy*, 76, 169-217

[4] Becker, Gary and George J. Stigler, 1974. "Law Enforcement, Malfeasance, and Compensation of Enforcers." *Journal of Legal Studies,* 3, pp 1-18

[5] Besley, Timothy and John McClaren. "Taxes and Bribery: the Role of Wage Incentives," *The Economic Journal*, January 1993, v.103, 119-141

[6] Buccirossi, Paolo and Giancarlo Spagnolo. "Leniency Policies and Illegal Transactions," GESY Discussion Paper No. 74, September 2005.

[7] Burlando, Alfredo and Alberto Motta. "Self-Reporting in Regulatory Capture," MIMEO. September 2007

[8] Cadot, Oliver, "Corruption as a Gamble." *Journal of Public Economics*, 1987, 33(2), pp. 223-44

[9] Innes, Robert, 2000. "Self Reporting and Optimal Law Enforcement When Violators have Heterogeneous Probabilities of Apprehension," 29 *Journal of Legal Studies* 287-300

[10] Innes, Robert. 2001. "Violator Avoidance Activities and Self-Reporting in Optimal Law Enforcement." *Journal of Law, Economics, and Organization* v.17(1) pp. 239-56.

[11] Kaplow, Luois, and Steven Shavell. "Optimal Law Enforcement with Self Reporting of Behavior," *Journal of Political Economy*, June 1994, 102(3), 583-606.

[12] Malik, Arun S. 1990. "Avoidance, Screening, and Optimum enforcement. RAND *Journal of Economics*, 21. pp 341-53

[13] Malik, Arun S. 1993. "Self Reporting and the Design of Policies for Regulating Stochastic Pollution," 24 *Journal of Environmental Economics and Management* 241-257

---

[14]See Mookherjee and Png (1995) and Besley and McClaren (1993)

[14] Mookherjee, Dilip and I.P.L. Png. 1995. "Corruptible Law Enforcers: How Should They Be Compensated?" *The Economic Journal*, 105 (428), pp. 145-159

[15] Motta, Massimo, and Michele Polo. "Leniency Programs and Cartel Prosecution," *International Journal of Industrial Organization*, March 2003, 21(3), 347-379

[16] Polinksy, Mitchell and Steven Shavell. 2000. "The Economic Theory of Public Enforcement of Law." *Journal of Economic Literature*, 38(1). Pp. 45-76

[17] Polinsky, Mitchell and Steven Shavell, 2001. "Corruption and Optimal Law Enforcement." *Journal of Public Economics* 81, pp 1-24

[18] Rose-Ackerman, Susan. "Reducing Bribery in the Public Sector," in Corruption and democracy: Political institutions, processes and corrution in transition states in East-Central Europe and in the former Soviet Union. Ed: Duc V. Trang. Budapest: Institute for Constitutional and Legislative Policy, 1994.