To Give In or Not To Give In To Bribery?  
Setting the Optimal Fines for Violations of Rules when the Enforcers are Likely to Ask for Bribes

Gorkem Celik
University of British Columbia  
Department of Economics  
Vancouver, BC  
V6T 1Z1, CANADA

Serdar Sayan
Bilkent University and Ohio State University  
Department of Economics  
Dept. of Agr.,Env.&Dev. Econ.  
06800 Bilkent, Ankara  
Columbus, OH 43210  
Turkey USA

August 3, 2005

ABSTRACT
In this paper, we develop a model of law enforcement with the possibility of corruption between the enforcer and the potential offender. We study how the violation rate changes with the level of the fine imposed on violations. We show that there is always equilibrium violation regardless of the fine level. Moreover, we find, in contrast to the conventional wisdom, that the fine level that minimizes violations can be intermediate rather than large.

Keywords: Corruption, Law enforcement
JEL Classification: K42, D73, D78, D82

1 We acknowledge useful questions and comments by Mehmet Bac, Parimal Bag, Mauricio Drelichman, Patrick Francois, Ferhan Salman, Tolga Yuret, and participants at the “Corruption and Governance” workshop of the Sixth Mediterranean Social and Political Research Meeting organized by the Robert Schuman Centre for Advanced Studies at the European University Institute (Florence, Italy, March 16-20, 2005) where an earlier version of this paper was presented. We thank Ali Shourideh for valuable research assistance.

2 Contact author.
E-mail: celik@interchange.ubc.ca ; Phone: +1(604) 822-5941 ; Fax: +1(604) 822-5915
I. INTRODUCTION

Anecdotal evidence and media accounts as well as surveys conducted indicate that petty corruption is common in many developing and transition countries to varying degrees (Mocan (2004), Thampi (2004), Razafindrakoto and Roubaud (2004), Tanzi (1998)). One form of petty corruption involves bribing low-level civil servants or middle-ranking government officials to get them disregard violation of certain rules and regulations that are profitable to violate although this would normally result in punishment in the form of a fine. The apparent winners here are the parties at both ends of the corrupt transaction and the apparent loser is the government that is left in the dark about uncollected fines/revenue. However, depending upon the circumstances, the public at large may fall victim to this type of petty corruption with more severe consequences and much higher costs than the losses in potential revenues of the government, as in the cases of violations of traffic rules and environmental safety regulations or defiance of building safety codes developed against earthquakes, floods, fire hazards etc. The consequences of this type of petty corruption may indeed be grave, involving casualties and property damage incurred in a wide range of circumstances from an accident caused by a drunk driver who is kept on the road to an earthquake causing thousands of people to fall victim to the violations of safety codes by contractors (see UN/ISDR (2004) for examples to the latter).

The possibility of corruption complicates the task of designing a deterrence policy for these violations, since only some of the offenders will pay the designated fine while others will get away by paying a bribe which is typically smaller than the fine. In this paper, we develop a model to study how the deterrence policy (specifically, the level of the fine) changes the offenders’ and the enforcers’ attitudes towards corruption and therefore the resulting violation rate. First, we show that, under the possibility of corruption, there is no fine level that would wipe out violations. Then, we provide an example where, in contrast to the conventional wisdom, an intermediate fine minimizes the violation rate rather than a large fine.

The intuition behind this example follows from different effects that the level of the fine would have on different types of potential offenders: An increase in fines is certainly more effective on individuals who would never accept to pay a bribe as compared to individuals who might consider paying a bribe rather than paying the fine.
Then, increased fine levels may change the attitudes of offenders towards corruption, increasing the proportion of individuals (within the offenders) who view bribes as an acceptable alternative to high fines. This change in the offender profile simultaneously affects the incentive structure for the enforcers. Now facing more corruptible offenders, the enforcers become more likely to ask for a bribe, turning bribes into even more tempting alternatives to fines for the potential offenders. Hence the resulting equilibrium may induce more corruption and more violation than under the lower fine.

There is an extensive literature on the economics of law enforcement, pioneered by Becker (1968). Our paper is related to earlier papers by Mookherjee and Png (1995) and Polinsky and Shavell (2001), who study the effect of corruption on law enforcement.

In Mookherjee and Png’s model, there is costly monitoring. The enforcer has to be motivated (through a “reward” out of the collected fine) to look for evidence of a violation by the potential offender. The offender can also bribe the enforcer to suppress the evidence discovered by her. In the framework of this model, Mookherjee and Png show that a small increase in the penalty for giving or receiving a bribe can increase the violation rate, since it will reduce the monetary value of finding the evidence for the enforcer and consequently her motivation to monitor. However, a large enough increase in the penalty completely wipes out corruption and reduces the violations for sure.

Polinsky and Shavell study a setup where the enforcer can threaten to “frame” non-violators in order to “extort” bribes from them. They show that imposing a punishment on extortion either increases the bribe that the enforcers demand, or eliminate the benefits of extortion and make the enforcers frame the individuals (to get the reward out of the fine) without even asking for a bribe. In either case, such a punishment increases the cost of being a non-violator and therefore increases the violation rate. On the other hand, a punishment on the act of framing reduces violations.

The present paper differs from these two earlier papers since the focus of the analysis here is on the optimal level of punishment for violations rather than the

---

3 See also Bac and Bag (2001, forthcoming), and Khalil and Lawarree (forthcoming) for similar models, where a corruptible enforcer (supervisor/auditor) exerts an effort to monitor an agent. Bac and Bag (forthcoming) argue that corruption between the enforcer and the agent can be a good motivator for the enforcer to monitor the agent. Under this scenario, the policy maker may have to reduce the penalty on the agent’s violations to give the enforcer a reason to monitor. Bac and Bag show that this “bounty hunter” scheme may be preferable to a reward - punishment scheme if the latter one involves non-monetary (therefore inefficient) transfers.
punishment on corruption. We will also abstract the model from costly monitoring and framing considerations. Instead, we will highlight the violation decision for the potential offender, and the corruption decision for the enforcer.

Starting with Becker, one common theme on the law enforcement literature has been the optimality of keeping the fines on violations as large as possible. However, excessively high fines are rarely observed in real life. One justification for not implementing excessive fines is due to the “proportionality principle” which stipulates that the penalty imposed should be compatible with the gravity of the offense—as measured by the potential or actual damage/harm inflicted. Furthermore, large fines may not be optimal in setups with risk aversion and heterogeneous wealth levels across potential offenders as shown by Polinsky and Shavell (1979, 1991). Here, we offer corruption as another explanation for imposing intermediate fines.

The rest of the discussion is organized as follows. The next section describes the setup we work with. Section III lays out the model and Section IV discusses the results derived from the example we consider. Finally, Section V concludes the paper.

II. THE SETUP

Our model will build on a game theoretic setup with a potential offender (he) and an enforcer (she) as its players. In line with earlier studies on the economics of crime, we assume that different types of potential offenders have different valuations for the

---

4 While the present paper is also related to the literature on multi-agent mechanism design with collusion between the privately informed agents, our approach differs from the mechanism design approach since the “policy maker” we conceptualize has discretion only on the level of the fine, rather than on all possible dimensions of individual compensations. See Kofman and Lawarree (1993), Laffont and Martimort (1997, 2000), Mookherjee and Tsumagari (2004), Celik (2004, 2005), Che and Kim (2005).

5 Even when the government is willing to allow for certain types of violations on account of excess private benefits over social costs, it may be preferable to keep the fine level high and adjust the level of the costly monitoring activity.

6 The possibility of corruption was in fact cited by a member of the Turkish Parliament as the reason behind the need to cut down the substantial hike in fines proposed in a draft bill aiming to curb the growth in the number of accidents on highways. The MP argued, in a rather diplomatic language, that the suggested increases would probably not be as effective as the authors of the draft thought, since they would create incentives for highway patrol officers to accept bribes from drivers getting caught as offenders. After some debate, the bill was modified to lower the originally proposed amounts of fines. Vereeck and Deben (2003) provide support to this view by pointing to the negative correlation between corruption and the effectiveness of traffic rules in the EU.
violation of a certain rule. We diverge from the earlier literature by introducing a second dimension of differentiation for the potential offenders. In our model, potential offenders are allowed to have different attitudes toward corruption as well. Specifically, a potential offender is either cooperative (i.e., he does not mind paying a bribe in order to avoid the fine for his violation), or uncooperative (i.e., he would rather pay the fine instead of engaging himself in a corrupt activity). A potential offender’s valuation from a violation and his attitude towards corruption are both private information.

The distinction we make between cooperative and uncooperative offenders could be justified along the following lines. First, some people are observed to subjectively judge certain rules as fair to violate as long as they do not get caught. Perhaps the best examples are traffic violations such as exceeding speed limits or driving under the influence. Many people feel that the speed limits or tolerable levels of blood alcohol are set with inept drivers in mind and hence are too low for skilled drivers like themselves. They therefore do not see any harm in exceeding these limits as long as they do not get caught by the highway patrol, and they certainly do not see these violations as ethical misconducts. Some of these drivers would presumably get offended by the suggestion that they should pay a bribe to be let go without getting a ticket. These individuals may very well choose to pay the associated fine and report the officer asking for a bribe rather than take part in a corrupt transaction. Moreover, an increasing number of countries take measures to encourage reporting of demands for bribes varying from the creation of hotlines and establishment of special agencies to investigate reports (such as Singapore and South Africa) to incorporating special provisions into their penal codes to provide some sort of immunity to those who report corrupt enforcers (such as Hungary and Czech Republic) to increase the number of uncooperative individuals (Commission of the European Communities, 2002; MVCR, 1999). Whatever the underlying reason is, treating part of the individual offenders as uncooperative in our model seems consistent with real life observations.7

---

7 In fact, this uncooperative behavior is what lies behind the relatively small number of convictions that corrupt officers receive in courts in different countries, often through the use of marked bills in payments of bribes by individuals who collaborate with the police or anti-corruption agency staff after getting asked for bribes.
Coming to the enforcers, we model them as players who are ready to ask for bribes as long as they know that they are facing a cooperative offender. However, asking a bribe from an uncooperative offender is costly for an enforcer, since such an offender may report the enforcer’s demand to the authorities. An enforcer’s decision whether to ask for a bribe depends on her expectation on the cooperativeness of the offender and the cost of being reported as a corrupt enforcer. Our model allows for different types of enforcers to have different costs of detection.

The present paper also follows a different approach in modeling the process that determines the bribe level. Earlier studies of corruption employ the assumption that the proceeds from corruption are proportionally shared by the parties involved in the corrupt transaction. In our environment, this would imply a constant bribe/fine ratio regardless of the level of the fine. To capture possible interactions between posted fines and the bribe/fine ratio, we adopt an alternative assumption and let the bribe level be determined so as to maximize the bribe revenue. We assume that this level is decided after the fine level is observed and is made known to potential offenders before they make their violation decisions. This treatment allows for the possibility that an increase in the fine can be countervailed with a reduction in the bribe, thus permitting the bribe level to be non-monotonic in the fine level.

III. THE MODEL

A potential offender \((O)\) decides whether to violate a rule or not. An enforcer \((E)\) detects the violation, whenever there is one. After detection, \(E\) decides whether to report

---

8 Anecdotal evidence suggests that enforcers have creative ways of committing to a bribe level and making it public. In Lebanon, for example, newspapers sometimes print tariffs informing readers how much public employees must be paid in “tips” \((bakhsheesh)\) for various types of “services.” (Leenders and Sfakianakis, 2003). In Turkey, traffic patrol officers may refuse a portion of a bribe, offered by a traffic rule violator, that they deem excessive.

9 It can be argued that setting the bribe level to maximize the enforcers’ revenue from the bribes rather than the offenders’ gain from corruption amounts to giving the upper hand to the enforcers in the bargaining process. This asymmetry can be justified by the relative ease for the enforcers of getting organized.

10 Many earlier papers such as Becker (1968), Polinsky and Shavell (1979, 1991, 2001), Garoupa (2001) study the tradeoff between the level of the fine and the detection rate. The general conclusion is that increasing the fine level is a “cheaper” instrument for deterring violations than increasing the detection rate. In this paper, we abstract our analysis from this tradeoff and fix the detection rate. The certainty of
the violation – in which case \( O \) will be forced to pay a fine, or to ask for a bribe from \( O \) instead.

- **Potential offender**

  Let \( v \) denote the monetary equivalent of the value of violating the rule for \( O \). \( v \) is a random variable with support \([v, \overline{v}]\) and cumulative distribution function \( F \), where \( \overline{v} \geq v \geq 0 \). The realization of \( v \) is private information for \( O \). There is also a second component to \( O \)'s private information: How \( O \) responds to a bribe offer is determined by whether he is cooperative or uncooperative. \( O \)'s cooperation state is independent from his valuation for the violation. With probability \( p \), \( O \) is cooperative and accepts to pay the bribe if asked for. With probability \( 1 - p \), \( O \) is uncooperative and prefers to pay the legal fine and report the corrupt enforcer to the authorities.

  The punishment of the violation is a fine \((f > 0)\) that \( O \) has to pay to the government.\(^{11} \) The level of \( f \) is announced prior to \( O \)'s decision whether to violate the rule. Similarly, \( O \) observes the ongoing bribe rate \((b \leq f)\) he will be asked to pay for not to be reported as an offender. \( O \) also knows the probability \((q)\) that he will be asked to pay this bribe. The variables \( b \) and \( q \) are equilibrium variables, and how these variables are determined endogenously will be discussed below in detail. \( O \) is assumed to be risk neutral. Therefore he will violate the rule if the expected value of the fine and/or the bribe he has to pay is lower than the value of the violation. As a convention, we assume that \( O \) does not violate the rule if the value of the violation equals the expected cost of it. Accordingly, an uncooperative potential offender violates the rule if \( v > f \) and a cooperative potential offender violates the rule if \( v > f - q(f - b) \). For an outsider who does not observe \( O \)'s private information, the probability that he will violate the rule is

  \[
  p[1 - F(f - q(f - b))] + (1 - p)[1 - F(f)].
  \]

  Conditional on violating the rule, the probability that \( O \) is cooperative is

---

\(^{11}\) The term \( f \) also incorporates in the monetary equivalent of the non-monetary repercussions of getting fined (such as the establishment of a criminal record, accumulation of demerit points, etc.). If the offense is punishable by imprisonment or some other penalty rather than a fine, then \( f \) should be taken as the monetary equivalent of such penalty.
\[
\frac{p[1-F(f-q(f-b))]}{p[1-F(f-q(f-b))] + (1-p)[1-F(f)]}.
\]

This last expression is a measure of the offender’s attitude towards corruption, and it will be a determinant of \( E \)'s decision to ask for a bribe. To guarantee monotonicity of the last expression with respect to \( b \) and \( q \), we assume that it is equal to 1 if both the numerator and the denominator are equal to 0.\(^{12}\)

**Enforcer**

Let \( c \) be the monetary equivalent of the cost of being reported as a corrupt enforcer for \( E \). This cost can depend on the characteristics of the enforcer such as rank, social standing, and prior misconduct. To reflect this variation in the cost of detection, \( c \) is a random variable with support \([\underline{c}, \overline{c}]\) and cumulative distribution function \( G \), where \( \overline{c} \geq \underline{c} \geq 0 \). The realization of \( c \) is private information for \( E \). Like the potential offender, \( E \) takes the ongoing level of the bribe as given.

After a violation, there will always be room for mutually beneficial corruption between a cooperative type of \( O \) and \( E \). A cooperative offender prefers to pay a bribe rather than the (weakly larger) fine and \( E \) prefers to take the bribe rather than reporting the violation. However, \( E \) cannot distinguish the cooperative types of offenders from the uncooperative types who would reveal her as a corrupt enforcer after getting asked for a bribe.\(^{13}\) Nevertheless, after observing the fine and bribe levels, she can infer the probability \( (r) \) that \( O \) is cooperative conditional on violating the rule. \( E \) is assumed to be risk neutral. Therefore, she asks for the bribe if her expected gain is higher than 0 (which is the normalized value of the benefit to \( E \) from reporting \( O \) as an offender). Accordingly, \( E \) asks for a bribe if \( rb - (1-r)c > 0 \).\(^{14}\) For an outsider who does not observe \( E \)'s private information, the probability that \( E \) asks for a bribe\(^{15}\) is

---

\(^{12}\) That is, if neither the cooperative nor the uncooperative types are violating the rule, any off the equilibrium violation is attributed to cooperative types.

\(^{13}\) For simplicity, the probability of being revealed as a corrupt officer after asking for a bribe from an uncooperative offender is assumed to be 1. This is without loss of generality since a smaller reporting probability would have the same effect as shifting the support of \( c \).

\(^{14}\) \( E \) is assumed not to ask for a bribe if her expected gain is exactly equal to zero.

\(^{15}\) Even though our underlying assumption is to take the enforcer as the instigator of the corrupt transaction, the analysis here is also relevant for environments where the offender initiates corruption by offering a
\[
G \left( \frac{r}{1-r} \right).
\]

- **Consistent beliefs**

In order for the beliefs on the corruption probability of an enforcer and the cooperation probability of an offender to be consistent with how these agents actually behave, \( r \) should be equal to expression (2) and \( q \) should be equal to expression (3). We refer to a pair \((r,q)\) satisfying these equations as consistent beliefs. Note that expression (3) is weakly increasing in \( r \) and assumes values on the interval \([0,1]\). (If \( r = 0 \) then it is equal to 0, if \( r = 1 \) then it is equal to 1.) Similarly, expression (2) is weakly increasing in \( q \). The values that (2) can assume are larger than or equal to \( p \) and smaller than or equal to 1. (If \( q = 0 \) then it is equal to \( p \), if \( q = 1 \) then it is equal to \( p[1-F(b)] \) \( p[1-F(b)]+(1-p)[1-F(f)] \), which is in-between \( p \) and 1.) This monotonic nature of (2) and (3) guarantees the existence of at least one consistent pair of beliefs for any given fine \( f \) and bribe \( b \) (Figure 1). With a slight abuse of notation, we denote these consistent beliefs as \( r(f,b) \) and \( q(f,b) \).\(^{16} \)

\(^{16}\) It is conceivable to observe more than one pair of consistent beliefs for given levels of \( f \) and \( b \). That is, the curves that depict \((r,q)\) pairs that satisfy two consistency equalities can intersect more than once. This indicates that the same fine and bribe levels may support different levels of corruption and violation rates and that the enforcement parameters are not always sufficient to explain the violation levels. This is consistent with Schrag and Scotchmer’s (1997) observation of the self-reinforcing nature of the crime. In case of such a multiplicity, we will assume that among the pairs of consistent beliefs, the pair with the highest level of equilibrium corruption \( q \) will be selected.

bribe. After receiving this offer, an enforcer’s consent to corruption may still depend on the perceived proportion of cooperative types within the offenders, since the bribe offer can also be a setup to detect corrupt enforcers.
- **Determination of the bribe**

We have already established that there is always room for mutually beneficial corruption between the cooperative offender and the enforcer. The question that remains is how the level of the bribe that will change hands is determined.

Earlier studies on corruption in enforcement adopt the assumption that the bribe level increases proportionally with the fine level, where the ratio of the two depends on the relative bargaining powers of the parties involved.\textsuperscript{17} If we were to employ the same assumption here, there would always be a fine level such that the corresponding bribe level exceeds $\bar{v}$ and hence fully deters violations for cooperative and uncooperative potential offenders alike. However, sustaining such a large bribe level is not compatible with the cooperative nature of the corruption phenomenon we aim to study. To see this, note that if the bribe level were to be reduced below $\bar{v}$ for the same fine level, then all types of $E$ would ask for a bribe knowing that there is no uncooperative type of $O$ violating the rule. Similarly, some cooperative types of $O$ would violate the rule, knowing that they will get away by paying the bribe rather than the prohibitively high fine. As a result, both parties would be better off with a lower level of bribe. To accommodate such mutually beneficial corrections in the bribe level, we diverge from the earlier models and

\textsuperscript{17} See Mookherjee and Png (1995) and Polinsky and Shavell (2001).
assume that the bribe level is determined so as to maximize the expected bribe revenue, in advance of a potential violation.

Recall that \( p \) and \( q(f, b) \) are the probabilities that \( O \) is cooperative and \( E \) is corrupt respectively and that \([1 - F(f - q(f, b)(f - b))]\) is the probability that a cooperative potential offender is violating the rule. Therefore, after \( f \) is announced, \( b \) is set to maximize

\[
pq(f, b)[1 - F(f - q(f, b)(f - b))]b
\]
subject to \( b \leq f \).\(^{18}\)

For a given level of \( f \) we refer to the revenue maximizing level of \( b \) and the corresponding levels of \( r(f, b) \) and \( q(f, b) \) as an **equilibrium**.

• **Positive violation rate**

The discussion above reveals an interesting feature of our model. There is no fine level that fully deters violations by both cooperative and uncooperative types of \( O \). For lower levels of the fine \((f < \bar{v})\), potential offenders who value the violation higher than \( f \) would violate regardless of the level of the bribe.

For higher levels of the fine \((f \geq \bar{v})\), all uncooperative types of \( O \) will be deterred. Therefore any violation would be attributed to cooperative types. Knowing that no offender is willing to report her corrupt behavior, the enforcer asks for a bribe regardless of her detection cost. Since the bribe level will be low enough to motivate at least some cooperative types of \( O \), the equilibrium will induce a positive violation rate. The following proposition formalizes this reasoning.

**Proposition:** Regardless of the value of \( f \), the equilibrium level of \( b \) is lower than \( \bar{v} \). (There is positive violation by cooperative types of \( O \).)

**Proof.** The claim is trivial for fine levels strictly smaller than \( \bar{v} \), since \( b \) is weakly smaller than \( f \). For higher fine levels \((f \geq \bar{v})\), no uncooperative type of \( O \) is violating the rule. Therefore \( r(f, \cdot) = 1 \) regardless of the value of \( b \). Consistency requires \( q(f, \cdot) = 1 \) as well. The expected revenue from the bribe can be rewritten as \( pq(1 - F(b))b \). The bribe level that maximizes this expression is lower than \( \bar{v} \).

---

\(^{18}\) We assume that the distributions of valuations and costs are “well behaved,” i.e., there exists a solution to this maximization problem.
There are earlier models of enforcement that sustain crime as equilibrium behavior. However, in those models violations are deliberately allowed by the policy maker due to the private benefits accruing to the offenders and/or the costs of enforcement. In contrast, our model outlines a situation, where the policy maker cannot eliminate crime rather than does not.

With the result above, we have shown that there is no fine level to fully deter violations. Whatever the fine level is, there will always be some equilibrium violation. This observation does not reveal the optimal fine level that would minimize the violation probability of $O$. In the following section, we address this question with the help of a specific example.

IV. THE EXAMPLE

Here, we study a specific parameterization of our model, where $O$'s value from violation ($v$) is uniformly distributed on the interval [0,1] and $E$'s cost of being revealed as a corrupt enforcer ($c$) is uniformly distributed on the interval [0,2]. $O$ is cooperative with probability 1/2. It follows from the definition of consistency and expressions (2) and (3) that for every fine and bribe level combination, there is only one pair of $(q, r)$ that can be sustained as consistent beliefs:

\[
q(f, b) = \min \left\{ \frac{(1 - f)b}{2(1 - f) - b(f - b)}, 1 \right\},
\]

\[
r(f, b) = \frac{(1 - f) + q(f, b)(f - b)}{2(1 - f) + q(f, b)(f - b)}
\]


20 Multiplicity of consistent beliefs, mentioned earlier in footnote 16, is not an issue under this parameterization.
For fine and bribe combinations that are on or to the right of the curve \( f = \frac{1}{2} b^2 - \frac{1}{2} b + 1 \), \( E \) asks for a bribe regardless of her cost from detection. Formally, consistency requires \( q(f,b)=1 \) for these fine and bribe levels. For other levels of \( f \) and \( b \), the probability of matching with a corrupt enforcer is non-degenerate.

The second step of the analysis is finding the equilibrium bribe level which maximizes the bribe revenue \( \frac{1}{2} (1 - f + q(f,b)(f-b))q(f,b)b \), given the fine level. This bribe level obeys

\[
b(f) = \begin{cases} 
  f & \text{if } f < 0.732 \\
  \sqrt{2(1-f)} & \text{if } 0.732 \leq f < 0.875 \\
  0.5 & \text{if } f \geq 0.875
\end{cases}
\]

and is plotted against \( f \) in Figure 3.

For modest values of the fine \( f < 0.732 \), the revenue maximizing level of the bribe is as large as the fine itself. Within this range of fines, a small increase in the fine level reduces violations of both the uncooperative and cooperative types of potential offenders at the same rate, since the bribe will increase at the same rate as the fine. For large values of the fine \( f \geq 0.875 \), violations are deterred for the uncooperative types, whose valuations are below \( f \). Due to the elimination of most of the uncooperative types from the pool of offenders, all enforcer types find it optimal to ask for a bribe. In this case, the bribe level that maximizes the bribe revenue is \( b=0.5 \).
What is more interesting for our analysis is the existence of an intermediate range of fines \((0.732 \leq f < 0.875)\), where the bribe level falls with an increase in the fine. On this range, a decline in the bribe countervails a rise in the fine to give the cooperative types an additional incentive to violate the rule and to increase the probability of cooperation conditional on a violation.

Owing to the non-monotonicity of the function \(b(f)\), the same equilibrium bribe can be observed under two different fine levels (e.g. the equilibrium bribe equals 0.5 under fine levels 0.5 and 0.875). In that case, the higher of the two fine levels is preferable if the aim is to reduce the violations.

Given the equilibrium bribe level, we can also pin down the probability of violations as a function of the fine (Figure 4). Violations by the uncooperative potential offenders monotonically decline in the fine level. Violations by the cooperative potential offenders are also decreasing for small fine levels. In contrast, for larger fine levels, higher corruption among the enforcers and lower bribe levels make the cooperative offenders more likely to violate the rule.
The total violation rate is minimized (approximately) under the intermediate fine level of 0.82. The bribe level that corresponds to this fine is 0.6. Consistency of beliefs requires that the cooperation probability conditional on violating the rule is \( r(0.82,0.6)=0.61 \), and corruption rate among the enforcers is \( q(0.82,0.6)=0.47 \). The resulting minimized rate of violation is around 0.23 (Figure 5).
In contrast, if the fine level is set at a level that deters all the uncooperative type violations ($f \geq 1$), then the equilibrium bribe level will be lower ($b=0.5$), all violators would be cooperative types ($r(1,0.5)=1$), and all enforcers will choose to ask for a bribe ($q(1,0.5)=1$). The resulting violation rate under this high fine level will be higher ($0.25$), since half of the cooperative types will violate the rule.

Of course, this example does not necessarily imply that the fine level that minimizes violation rate will always be moderate. For instance, if we modify our example such that the detection cost for the enforcer ($c$) is distributed uniformly on $[0,1]$, the violation minimizing fine level turns out to be $f \geq 1$. Still, the parameterization we consider serves well to illustrate that the effectiveness of large fines may sometimes be limited in reducing the number of violations when law enforcers are corruptible.

V. CONCLUSIONS

In this paper, we have sought an answer to whether it is possible to set fines for various types of violations in such a way to make rules more effective, while taking the resulting incentives for corruption into account. For this purpose, we developed a theoretical model and explored the ranges of fines that might be needed to strike the right balance between effectiveness and enforceability.

We showed that, as long as there is a potential for corruption, there is no fine level that completely eliminates all violations. Moreover, the fine level that minimizes violations may be an intermediate one rather than the seemingly prohibitive fine. Thus, our findings imply that substantial increases in the fine levels associated with certain violations may not be the most effective strategy to reduce the incidence of these violations in settings where law enforcement officers are likely to be corrupt.

Our major departure point from the existing literature has been the separation of the intensity of a potential offender’s willingness/tendency to violate the rule and his willingness/tendency to engage in corruption. We have shown on the basis of this separation that the policy maker can use the offenders in the incorruptible segment of the population to curb the corruption potential within the other segment. We have assumed, perhaps unrealistically, that the intensities of the willingness to violate and to engage in corrupt activities are independent. While it is conceivable for potential offenders with
higher valuations for the violation of the rule to be more agreeing to corrupt offers in real life settings, the policy implication of our analysis would continue to hold even in the presence of such a positive correlation between violation and corruption potentials of individuals. In fact, such a positive correlation would make the need for policy maker’s use of low valuation offenders even stronger.
BIBLIOGRAPHY


