

## **Public Outcry and Police Behavior**

Gregory DeAngelo  
West Virginia University &  
Center for Free Enterprise

Bryan C. McCannon  
West Virginia University &  
Center for Free Enterprise<sup>±</sup>

5 November 2015

### **Abstract**

Numerous empirical studies have documented policing behavior and response to public opinion, social norms, changing laws, neighborhood context and a litany of other subject areas. What is missing from this literature is a general theoretical framework that explains the conflicting goals of properly applying the law and responding to social norms and the consequences of the law. We build a theoretical framework where law enforcement officials care about both reputation and performance. Outside evaluations assess the quality of the decision making of the officers, but can be influenced by strategic challenging of the sanctioning by the suspected violators. We first establish that reputational concerns can distort law enforcement, encouraging either over-enforcement or under-enforcement of the law, depending on the prior beliefs of violations and the observed signal. Introducing strategic challenging by the violator eliminates over-enforcement and allows for an even larger reduction in application of the law by less-skilled officers. Connections to empirical findings of distortions in law enforcement, along with an extension to deterrence are highlighted.

---

<sup>±</sup> 1601 University Avenue, Morgantown, WV 26506, DeAngelo: gregory.deangelo@gmail.com; McCannon: bryan.c.mccannon@gmail.com

## 1. Introduction

The economic analysis of deterrence emphasizes the role of expected sanctions in creating costs to illegal behavior.<sup>1</sup> Typically, the enforcement of the law is compressed into a single probability. This variable is intended to summarize all relevant information regarding not only the chance of observing the violation, but also includes the decisions of police officers, prosecutors, defense attorneys, judges, jurors, parole boards, etc. While a substantial literature has been developed for assessing the objectives of and influences on judges and prosecutors,<sup>2</sup> the incentives facing law enforcement agents have been relatively neglected. Our objective is to develop a theoretical environment to assess determinants of sanctioning decisions.

We are specifically motivated by a variety of accounts regarding policing behavior. These range from police-citizen interactions that have resulted in the death of citizens and significant public outcry<sup>3</sup> to law enforcement agents abusing their authority<sup>4</sup> to a plethora of recent empirical work on police discretion.<sup>5</sup> While the social impact across this range of police behavior is highly variable, the discretion that both police and citizens exercise during and in the aftermath of police-citizen interactions is of critical importance. If police have an accurate understanding of a citizen's rights and exercise care in their interactions, the law enforcement system can operate fluidly. If, however, errors are committed during police-citizen interactions (e.g. wrongly citing a driver, illegally searching a person walking down the street, planting evidence, etc.), the role of the citizen(s) in contesting misconduct is vitally important in order for the quality of an officer's work to be exposed.

Given limited observability on the part of the chief of a police precinct, aspects of the principal-agent problem can be mitigated by increasing exposure to police behavior. Whether it

---

<sup>1</sup> For the purposes of this paper we will use sanctions as a catchall term that is meant to include citations, enforcement, sanctions and any other type of enforcement activity that is intended to deter proscribed behavior. We make this distinction to highlight the fact that sanctions can be altered by a legal authority after a sanction has been issued.

<sup>2</sup> For example, Shepherd (2009) analyzes the impact of retention motivations on state Supreme Court justices. Bandyopadhyay and McCannon (2014, 2015) investigate how re-election concerns affect the decisions of state-level prosecutors.

<sup>3</sup> Examples include the deaths of Michael Brown in Ferguson, MO, Eric Garner in New York, and Walter Scott in Charleston, SC to name a few.

<sup>4</sup> There are far too many instances where police utilize their authority to exhaustively list, but these range from stealing drugs and money confiscated during an arrest to the use of excessive force during an apprehension to extorting prostitutes for sex, as Levitt and Venkatesh (2007) note in their street-level analysis of prostitution.

<sup>5</sup> See DeAngelo and Owens (2014), Alpert et al. (2006), and Bronnitt and Stenning (2011) for a few articles on the role of discretion.

is the prevalence of recording equipment to document police-citizen interactions (e.g. cell phones, body cameras, etc.), eye-witness accounts, law suits that are brought against specific enforcement agents/agencies or fighting a traffic sanction in court, these instances provide the chief of police with an opportunity to evaluate the behavior and quality of the work being conducted by the officers that they supervise.

Investigations into behavior of law enforcement agents have typically focused on the public choice considerations involved in enforcing the law. These frameworks consider the principals of policing directing the activities of the officers (agents). Prominent examples include distortions created by asset seizure policies used in the war on drugs (Benson, Rasmussen, and Sollars, 1995) and heightened ticketing in municipalities facing budget tightness (Makowsky and Stratmann, 2009). Along with questioning the narrow self-interest assumption in the principal-agent framework, pure benevolence can be rejected. Empirical investigations into the officer-specific characteristics that are associated with elevated citizen complaints about excessive force (Brandl, Strohshine, and Frank, 2001) and the determinants of officer leniency in issuing sanctions (Schafer and Mastrosfics, 2005) highlight that individual character and social factors drive policing decisions as well. DeAngelo and Owens (2014) empirically examine the role of experience on police productivity (issuing citations), finding that when laws change there is substitutability between general and task-specific experience such that when there has been a recent change in a law more senior officers are less impacted.

Thus, there is a healthy literature identifying empirical regularities regarding police officer behavior. What has not been provided is an explanation for these behaviors. How does private gain, social capital, and external incentives explain the observed outcomes?

To accomplish this we develop a model where law enforcement officials differ in their ability to accurately assess violations of the law and have reputational concerns. The model is an adaptation of that developed by Leaver (2009) to analyze enforcement choices when decision makers are concerned about how third-party evaluators perceive the quality of their decisions. In our environment the officer cares about doing her job effectively as well as her reputation. The suspected violator of the law can strategically challenge this enforcement. The challenging behavior can convey information to third-party evaluators (e.g. captain, police chiefs, public

perceptions, voters, etc.), which acts to compensate accurate enforcement while deterring a less-skilled officer from issuing a sanction since she is more likely to make a mistake.<sup>6</sup>

Reputation of a law enforcement official can, in practice, take numerous forms. An officer might be interested in what her superiors, who are imperfectly able to monitor, think about her performance on the job. Along with social capital, this could affect retention, promotion, and pay considerations. Alternatively, law enforcement officials may have in their utility function a social-standing component i.e., they directly care about what others believe about their decision making. This concept has been introduced and formalized as psychological game theory by Geanakoplos, Pearce, and Stacchetti (1989) and Battigalli and Dufwenberg (2009) and previously applied to policy enforcement decisions by Huang and Wu (1994). Finally, as discussed above, the officer might care about their reputation within the community that they police. Hence, we develop a theoretical framework that is flexible enough to capture any number of applications and, therefore, can be used to provide explanation for the empirical observations discussed.

First, we establish that, in fact, reputational concerns have the potential to distort sanctioning decisions. An enforcement official, less knowledgeable about the law (e.g. adjustment in the scope of the law or lack of training), who believes the suspect has not violated the law sanctions him with a positive probability. This outcome arises if her reputational concerns are great and her prior beliefs of unlawful behavior are high. Hence, ironically, reputational motivated officers may sanction those they believe are not in violation of the law. Reputational concerns about one's skill also open up the possibility of insufficient sanctions. If her prior beliefs of unlawful behavior are low and reputational concerns are great, but her signal is that the law has been broken, she sanctions with a probability less than one. We then establish that if the suspected violator can strategically challenge the enforcement of the law, this last effect is enhanced. Strategically challenging sanctions can expose wrongful sanctions. This encourages even less sanctioning, specifically by those who are less-skilled at applying the law. Hence, the strategic exposure of erroneous sanctions discourages officers from applying the law accurately. As a consequence, the results in DeAngelo and Owens (2014) can be rationalized as

---

<sup>6</sup> This work also complements Prendergast (2003, 2007) by examining the relationship between citizen complaints and efficient enforcement, while our work differs from his by detailing the importance of pushback from citizens in identifying the quality of enforcers, rather than focusing on effort exertion in monitoring.

coming from changes in the scope of the law deterring those less familiar with the new law when they care substantially about their reputation.

The framework is extended to consider the impact of reputation on deterrence. If law enforcement is less interested in applying the law, then potential violators will be more interested in breaking the law. In fact, in this extended framework we show that enhanced reputational concerns affect the frequency of violations. This increased rate of violation, which encourages more sanctions, counteracts the reduced enforcement of the law so that in equilibrium the change in the scope of the law has no effect on sanction rates.

Social norms regarding laws and citizen behavior relating to laws has received considerable attention.<sup>7</sup> Norms regarding law enforcement behavior are less well understood, however. Terrill and Paoline (2007) discuss the tradeoff that law enforcement agents face between arresting versus warning citizens, noting that nonarrest behavior is much more prevalent than arresting a person, and that the reasons for nonarrest are becoming increasingly broader in scope. Schafer and Mastrofski (2005) discuss leniency in issuing sanctions for traffic citations. In particular, they find that individuals being pulled over who recognized and admitted to the infraction that they had committed, ultimately resulted in leniency on the part of the police officer. Finally, Tonry (1996) provides examples of instances in which law enforcement agents take matters into their own hands. For example, the Boston police “avoided application of a 1975 Massachusetts law calling for mandatory one-year sentences for persons convicted of carrying a gun by decreasing the number of arrests made for that offense and increasing (by 120 percent between 1974 and 1976) the number of weapons seizures without arrest.” Moreover, Tonry (1996) notes that in the aftermath of the change in gun laws in Massachusetts, the police became more selective about whom to frisk.

Perhaps in response to the unintended consequences that Tonry (1996) discussed, Kahan (2000) examined the tradeoff that legislators face when attempting to get law enforcement agents to comply by properly enforcing laws in the aftermath of legal changes. The author notes that “...as states adopt more severe laws, police grow more reluctant to arrest, prosecutors to charge, juries to convict and judges to punish. As a result, such reforms do nothing to reduce the incidence of these offenses.” Kahan (2000) argues that these “sticky norms” will result in law

---

<sup>7</sup> See McAdams (1997) for an overview of the regulation of norms. Goldstein (1960) offers one of the first assessments of police discretion to not invoke the criminal process.

enforcement agent discharging their duty to enforce laws when they attack a social norm. To overcome this problem, the authors prescribe a “gentle nudges” rather than “hard shoves” approach when changes in legal codes make current social norms illegal.

More current research by Braman *et al.* (2010) discusses the tradeoff between *Punishment Naturalism* and *Punishment Realism*.<sup>8</sup> This research notes that naturalism ignores empirical research that demonstrates disagreements over what constitutes a wrongful act. Alternatively, realism “offers a more complete account of agreement and disagreement over the criminal law and provides a more detailed and credible account of the social and cognitive mechanisms that move people to either agree or disagree with one another on whether a given act should be praised or punished and how much praise or punishment it deserves.”

Edwards (2006) discusses parameters of acceptable deviance, noting that they are constructed from the interplay between formal law and normative sensibilities of the enforcers/enforcees. While this research discusses reluctance, on the part of law enforcement agents, to carry out the letter of the law, dynamics within the workplace could also lead to the so-called “blue flu.” Most notably, law enforcement agents face organizational concerns, such as reputational and promotional matters, that can lead an officer to be more selective of which laws that they enforce and, of those laws that they do enforce, which laws they enforce with more or less vigor. Chappell and Piquero (2004) offer a potential explanation for police misconduct in social learning theory, which is the idea that people utilize observational learning and modeling in deciding upon which behavior is appropriate/in pursuit of social acceptance. While this approach offers some perspective on police misconduct, it is unlikely to explain strategic sanctioning behavior on the part of law enforcement agents.

Thus, the literature on police behavior documents conflicting goals. Law enforcement agents are motivated to do their job as described by the law, along with social norm compliance. How strategic challenging of sanctioning affects policing behavior, through the mechanism of reputational concerns, is the object of inquiry here.

---

<sup>8</sup> Punishment naturalism is the notion that highly nuanced intuitions about most forms of crime and punishment are broadly shared and that this agreement is best explained by a particular form of evolutionary psychology. Alternatively, punishment realism is based on the premise that while individuals do hold deep and abiding intuitions regarding wrongdoing and responses to it, these intuitions depend on social constructs that are demonstrably plastic (see Braman *et al.* 2010).

Section 2 introduces the theoretical model. Section 3 analyzes the equilibrium comparing the environment without a change in the law to the outcome with the change. Also, a discussion of the comparative statics is undertaken. Section 4 extends the framework endogenizing the rate of violation, while Section 5 concludes.

## 2. Theoretical Environment

The objective is to present a model of law enforcement with a reputation-motivated official. A flexible framework that allows for the public choice considerations and changes in the scope of the law, as two examples, is developed.<sup>9</sup> We build a theoretical model that is an adaptation of the *Minimal Squawk Hypothesis* environment developed by Leaver (2009). We first develop the base model analyzing both the scenario where all law enforcement officials are equally skilled at identifying violations, along with the scenario where there is heterogeneous skills. After completing this analysis we introduce the decision to break the law to identify how skill and reputation affect deterrence.

There are three players: a law enforcement official, L, a citizen, C, and an evaluator, E. Consider, first, the environment where L believes C may have violated the law and must choose to either issue a sanction or not. The citizen knows with certainty his actions. Due to imperfections in monitoring technology, mistakes, and incomplete information on the scope of the law, L is uncertain as to whether he actually violated the law.<sup>10</sup>

Hence, one may think of the state variable as  $\sigma$  taking values of either  $v$  (the law has been violated) or  $nv$  (the law has not been violated),  $\sigma \in \{v, nv\}$ . Let  $\gamma$  denote the (true) probability C has broken the law,  $\gamma \in [0,1]$ . The law enforcement official observes (imperfectly) the activity of C. Thus, one may think of this observation as a noisy signal,  $\sigma'$ , of the state. Hence,  $\sigma' \in \{v, nv\}$ . Denote  $\theta$  as the ability to correctly monitor the legality of C's activity. Specifically,  $\theta = \text{Prob}(\sigma' = \sigma) \in (0,1)$ .

---

<sup>9</sup> While we focus on a change in the scope of the law as a form of "skill loss", the model can be generalized to account for losses or gains in ability that are the result of learning-by-doing. We use a change in the scope of the law as a placeholder for any situations where knowledge acquisition/destruction occurs.

<sup>10</sup> See Png (1986) and Lando (2006) for discussions of the effect of wrongful convictions on deterrence and optimal subsidies or damages. While this research is related to ours, it focuses on the effect of mistakes on outcomes (e.g. deterrence, damages, etc.), whereas the current work focuses on the incentives that lead to incorrect sanctions being applied.

L has a binary choice to make. She may either enforce the law,  $l$ , or not,  $nl$ . Hence,  $\lambda \in \{l, nl\}$ . The citizen knows the true state and, regardless of whether he actually broke the law, would prefer that the law enforcement official not punish him. Since L is concerned about her reputation, C can challenge the sanction. This challenge is observable to the third-party evaluator. Thus, C, if he receives the sanction, may either challenge it,  $c$ , or not challenge it,  $nc$ . Hence,  $\kappa \in \{c, nc\}$ .<sup>11</sup>

Consider the following: suppose officers differ in their skill at enforcing the law. This comes from, for example, a change in the scope of the law where newly-trained officers have more comfort enforcing it. Activities that before were allowed are now illegal. Alternatively, choices that were previously unacceptable are now legal. Given the complexity of the law, adjustments in the scope have the potential to differentiate law enforcement officials in their ability to correctly identify whether the activity of an individual is legal or not. As an example, law enforcement officials with experience under one set of laws may find changes to the law difficult. New graduates from the police academies, trained in the new laws, may be more effective. As a consequence of the change in the scope of the law, some law enforcement officials are skilled,  $s$ , in the application of the law, while others are not,  $ns$ . In other words, their ability,  $a$ , affects the quality of the signal they receive. Hence, assume the probability a skilled law enforcement official correctly identifies the legality of the citizen behavior as  $\theta_s$ , while the probability a not-skilled law enforcement official is correct after the change in the scope of the law is  $\theta_n$ .<sup>12</sup>

The evaluator observes the sanctioning decision of L and the challenging decision of C, but does not know the true state (i.e., the legality of the actual activity) or the ability of the law enforcement official. E, though, does make an assessment of her skills.<sup>13</sup> This can be made contingent on the choices made by the two players. Denote  $\mu$  as the updated beliefs of E regarding L's skill. Rather,  $\mu = \text{Prob}(a = s | \kappa, \lambda)$ .

---

<sup>11</sup> The challenging of a sanction is similar to a regulated firm "squawking" about the regulation of its prices in Leaver (2009).

<sup>12</sup> To simplify the analysis we assume  $\gamma$  does not take extreme values;  $1 - \theta_{ns} < \gamma < \theta_{ns}$ .

<sup>13</sup> In the model presented we assume zero information by the evaluator regarding the skill of L so that the prior beliefs of E match that of C. This is realistic given the monitoring limitations in many settings. The model can be easily extended by allowing E's priors to diverge. Since the main results continue to hold in this extended environment, only the base model is presented here.

The payoff of the citizen depends not only on its activity, but also the sanctioning decisions of L. Denote  $w(\sigma, \lambda)$  as its payoff. Assume that C is hurt by sanctions;  $w(\sigma, l) < w(\sigma, nl)$  for either value of  $\sigma$ . The payoff of the law enforcement official also depends on its sanctioning decision and the activity of C. Additionally, though, she cares about the evaluator's assessment of her ability. The evaluator may be, for example, the chief of police whose job it is to oversee the police officers. Salaries, promotions, and other gains from the job are controlled by this evaluator. Alternatively, one may think of L as caring about both the quality of the job she does along with her reputation. When doing one's job well potentially conflicts with reputation, a tradeoff occurs between the two outcomes. Hence, denote L's payoff as  $u(\sigma, \lambda) + \delta\mu$ . The parameter  $\delta$  captures the weight placed on the evaluator's assessment.<sup>14</sup>

To tie down the value of  $u(\sigma, \lambda)$ , suppose there is a benefit,  $\beta > 0$ , of correctly sanctioning a violator of the law. Also suppose there is a benefit,  $\eta\beta$ , of correctly not sanctioning a non-violator.<sup>15</sup> Consequently,  $u(v, l) = \beta$ ,  $u(nv, nl) = \eta\beta$ , and  $u(v, nl) = u(nv, l) = 0$ . Therefore, the timeline of the model can be presented.

- 1: Nature selects the state  $\sigma \in \{v, nv\}$  and L's type  $a \in \{s, ns\}$ .
- 2: C observes  $\sigma$  and  $a$  and selects a challenge strategy  $\kappa \in \{c, nc\}$ , which can be made contingent on  $\sigma$  and L's action.
- 3: L observes  $a$  and a noisy signal of  $a$ ,  $\sigma' \in \{v, nv\}$ , and selects whether to enforce the law,  $\lambda \in \{l, nl\}$ .
- 4: E observes  $\lambda$  and  $\kappa$  (but not  $a$ ) and updates its beliefs  $\mu$ .

### 3. Analysis

The objective of the analysis is to assess the impact of the skill of law enforcement officers on their behavior given that they care about their reputation, along with the quality of the

---

<sup>14</sup> The recent interactions between Michael Brown and Eric Garner with police officers has brought significant attention to the role that reputation effects play on citizen "pushback" as well as continued employment for officers.

<sup>15</sup> For example, a utility of  $\psi$  can be generated from doing one's job correctly and a bonus of  $\chi$  is gained by also achieving a proper sanction. Hence,  $\beta = \psi + \chi$  and  $\eta = \psi/(\psi + \chi)$ . Thus,  $0 < \eta < 1$ . The benefit terms  $\psi$  and  $\chi$  can be thought of as the surplus generated, or rather, assume the payoff of being incorrect is normalized to zero. To simplify the analysis we assume  $\eta$  is not too small;  $\eta > (1 - \theta_{ns}) / \theta_{ns}$ . Otherwise, for values of  $\eta$  close to zero, officers of all skills care little about accurately not enforcing the law. Consequently, they would have a dominant strategy to sanction, regardless of their signal.

job they are doing. First, the benchmark case, where there is no difference between law enforcement officials, needs to be identified. This represents the scenario where all officers are equally trained and knowledgeable about the law. Rather, it represents the outcomes before the change in the scope of the law has occurred.

### 3.1 *Without Differences in Skill*

Consider, first, the scenario where  $\theta_s = \theta_{ns} = \theta^* > 1/2$  so that all have the same skill. An immediate consequence is that the beliefs of the evaluator become irrelevant. One may either think of this scenario as one where  $\mu(l, c) = \mu(nl, c) = \mu(l, nc) = \mu(nl, nc) = \mu^*$  (the evaluator's beliefs are not affected by the decisions made by either C or L) or one where  $\delta = 0$  (no reputation concerns affect the officers). Regardless of how one models the benchmark, the behavior of the law enforcement official is straightforward. L simply follows her signal when deciding whether to sanction or not. Consequently, C chooses not to challenge since doing so is unable to change L's behavior.

**PROPOSITION 1:** Suppose either  $\delta = 0$  or  $\mu(\lambda, \kappa) = \mu^* \forall \lambda, \kappa$ . There is a unique equilibrium. L follows her signal sanctioning if  $\sigma' = v$  and not sanctioning if  $\sigma' = nv$ . C chooses not to challenge,  $\kappa = nc$ .

Since it is assumed that conditional on the law enforcement official believing a violation of the law has arisen, it is likely that a violation has occurred,  $\theta > 1/2$ , it is in the best interest of the officer to make the sanction decision based solely on that signal.

### 3.2 *Skill and Reputation*

Now, consider heterogeneous skills of law enforcers: those who are better skilled at identifying violations,  $a = s$ , and those who are less skilled,  $a = ns$ . One can think of the skilled, for example, as those officers who complete the training and put effort into learning the impact of the legal change on the successful application of the amended law. Skill can also entail knowledge of the decision making of other agents in the criminal justice system. For example,

prosecutor offices differ in their policies regarding filing of charges and prosecution. Additionally, officers may differ in their understanding of judicial applications of rules of evidence.<sup>16</sup>

To proceed we first identify the optimal behavior of the law enforcement official in subgames with different challenging behavior of the citizens. Then, we will identify the equilibrium outcome.

Consider the subgame where C does not challenge the sanction. Any deviations in behavior from the scenario presented in the previous subsection represent the effect of reputation alone on officer decision making.

How might reputation matter? Suppose it is more likely that a citizen has violated the law than not. A skilled law enforcement official will more accurately identify this activity correctly. Therefore, if each type of officer simply followed her signal, then sanctions, for example, will more likely arise from skilled officers. The evaluator recognizes this and places more esteem on those actually enforcing the law. Hence, when reputation is important, a less-skilled law enforcement official may be interested in punishing a citizen even when she believes he was not violating the law. Alternatively, if it is more likely that a violation has not occurred, the potential for distortion is reversed. If all types follow their signals, sanctions come more from mistaken, low-skilled officers. Therefore, one whose signal is that the law is violated is tempted to not enforce the law even when she believes he likely broke it. Lemma 1 formalizes this intuition.

**LEMMA 1:** Consider the subgame where C chooses to not challenge if sanctioned.

There is a unique equilibrium. There are critical values of  $\delta$ ,  $\delta_1$  and  $\delta_2$ , such that a skilled law enforcement official ( $a = s$ ) sanctions the citizen when her signal is that a violation has occurred ( $\sigma' = v$ ) and does not sanction otherwise ( $\sigma' = nv$ ).

- (i) If  $\gamma < 1/2$ , then L with  $a = ns$  and a signal  $\sigma' = nv$  chooses to not sanction and
  - (a) if  $\delta \leq \delta_1$ , then L with  $a = ns$  and a signal  $\sigma' = v$  chooses to sanction

---

<sup>16</sup> The heterogeneous skills can arise with differing abilities to adapt to change. Also, there is the possibility of differing incentive effects of investing in learning how to accurately apply the new law. For example, an officer that sees little-to-no room for job advancement within the agency would be unlikely to put in effort beyond that required to learn the new law.

- (b) if  $\delta > \delta_1$ , then L with  $a = ns$  and a signal  $\sigma' = v$  chooses to sanction with probability  $p \in (0,1)$ .
- (ii) If  $\gamma = 1/2$ , then L with  $a = ns$  and a signal  $\sigma' = nv$  chooses to not sanction while one with a signal  $\sigma' = v$  does not.
- (iii) If  $\gamma > 1/2$ , then L with  $a = ns$  and a signal of  $\sigma' = v$  chooses to sanction and
  - (a) if  $\delta \leq \delta_2$ , then L with  $a = ns$  and a signal of  $\sigma' = nv$  chooses to not sanction
  - (b) if  $\delta > \delta_2$ , then L with  $a = ns$  and a signal of  $\sigma' = nv$  chooses to sanction with probability  $q \in (0,1)$ .

Hence, reputational concerns alone affect the behavior of law enforcement officials. Less-skilled officers are more willing to sanction even if their information leads them to believe the citizen is not likely violating the law. Hence, sanctioning can be excessive and additional errors are introduced, thereby lowering the quality of the enforcement of the law. This occurs if the ex ante beliefs of violation are high. Alternatively, if these beliefs are low, under-enforcement arises as less-skilled officers sanction or arrest violators with a probability less than one.

There exist numerous subgames where challenging takes place. In the analysis, we focus on a particularly important subgame. The citizen can choose to adopt a plan to challenge if and only if an improper sanction is given. Obviously, numerous plans can be adopted that all result in the true state being identified when sanctions are issued. We simply identify these plans by referring to them as a *revelation* (since mistaken punishments are revealed). This particular plan seems quite valuable for C. With reputational concerns it acts as a threat to a law enforcement official who sanctions him, but does not impose any cost on those mistakenly not punishing unlawful acts.

Of course, the revelation plan and the *no-challenge* plan of Lemma 1 are just two of many potential plans. Another, for example, is a *full disclosure* plan where all mistakes are challenged. Following this tactic, full information is revealed to the evaluations. Additionally, C may adopt a *generous revelation* plan that only challenges on mistaken non-sanctions. While formally verified in the Appendix, these other plans do not arise along the equilibrium path.

They generate less-favorable outcomes for C since they add potential costs to not sanctioning, which C would like to discourage.

Hence, consider the decision making of a law enforcement official who knows that incorrect sanctions will be revealed to the evaluator. A highly-skilled officer is more confident in her abilities and does not change her decisions. In fact, because she is likely to be correct, sanctions issued provides her enhanced reputational rewards. When her signal is of no violation, again since she is usually correct, she and arrests made will be punished if she deviates. Thus, a skilled officer follows her signals.

A less-skilled officer, on the other hand, should be reasonably concerned about mistaken sanctions. Obviously, if her information points to no violation, then she has no incentive to write a ticket. On the other hand, she is less inclined to enforce the law when her signal says a violation has occurred. This effect is enhanced because of the information provided by the challenge. Hence reputation and challenging combine to magnify the distortions to the proper enforcement of the law. Lemma 2 verifies this intuition.

**LEMMA 2:** Consider the subgame where C chooses to challenge if sanctioned. In the unique equilibrium (with the assumption of  $1 - \theta_{ns} < \gamma < \theta_{ns}$ ), a critical value of  $\delta$  exists,  $\delta^*$ , such that a skilled law enforcement official ( $a = s$ ) sanctions the citizen when her signal is that a violation has occurred ( $\sigma' = v$ ) and does not otherwise ( $\sigma' = nv$ ). A low-skilled L ( $a = ns$ ) without a signal of the law being broken ( $\sigma' = nv$ ) does not sanction, while L with  $a = ns$  and a signal  $\sigma' = v$

- (i) sanctions if reputation is of low importance,  $\delta \leq \delta^*$
- (ii) sanctions with a probability  $r \in (0,1)$  if reputation is of high importance,  $\delta > \delta^*$ .

The result in Lemma 2 is derived under the assumption that  $\gamma$  is not too large. If it was, then the prior beliefs can drive the evaluator to believe that anyone who does not issue a sanction or make an arrest must very likely be of low-skill. This may induce such law enforcement officers to sanction even when its signal is that the law was not violated with probability one. While the main results continue to hold, to simplify the analysis this environment is not considered.

The results of Lemma 1 and Lemma 2 can be compared to assess the impact of the strategic *revelation* plan on law enforcement. First, notice that the only type whose behavior adjusts is the one with lower abilities. Skilled officers, who more accurately apply the law, always have the incentive to follow their more accurate information. Those less familiar with the law can be swayed by the combination of reputation and strategic challenging of mistakes.

Second, if  $\gamma > 1/2$ , then with reputational concerns alone a less-skilled officer who cares greater about her reputation and receives a signal that the law was not violated, punishes with a probability less than one. When strategic *revelation* is utilized this probability drops to zero. Thus, challenging the decision switches the behavior towards one more favorable to C. Interestingly, the new behavior is in line with the socially optimal sanctioning decision, as it prevents over-sanctioning behavior on the part of enforcement agents.

Third, if  $\gamma < 1/2$ , then in both the scenario with reputational concerns and the scenario with reputational concerns and strategic challenging, a low-skilled law enforcement official who receives a signal of a violation of the law sanctions the suspect with a probability less than one. It is straightforward to verify, though, that this probability is less when the *revelation* plan is employed. Intuitively, the reputation effects of sanctioning are more severe for a less-skilled officer because mistakes, which are more likely, will be identified. This enhanced cost reduces the amount of sanctioning that occurs in equilibrium.<sup>17</sup>

Turning to the equilibrium of the game, it has already been described that there are numerous strategies the citizen can take with regards to his decision to challenge. These can be compressed into four plans: *no-challenge*, *revelation*, *generous revelation*, and *full disclosure*. The *revelation* plan is appealing for the citizen as it promotes not punishing while discouraging incorrect sanctions. The other plans either fail to identify incorrect sanctions or add a cost to not sanctioning. Both of these effects make C worse off. Hence, the equilibrium outcome consists of C announcing and following through with the *revelation* plan and L behaving as described in Lemma 2.

---

<sup>17</sup> In the proof of Lemma 2 this result arises since it was shown that  $\Delta^2(ns) < \Delta^1(ns)$ , then the value of the probability of sanctioning needed to set the net payoff equal to zero must be less for the former than the later (since  $\Delta$  is decreasing in  $p/r$ ).

**PROPOSITION 2:** C selects the *revelation* plan. L's equilibrium outcome is as is characterized in Lemma 2.

Consequently, the ability to strategically challenge the enforcement decisions eliminates the over-sanctioning caused by reputation concerns.

As in any theoretical analysis, a number of assumptions are employed to simplify the analysis. Two assumptions used, in particular, may cause concern regarding the applicability of the model to actual law enforcement decision-making contexts. One is that the model does not allow for challenging of sanctions to be costly. Contesting a sanction involves going to court, which comes with a non-trivial opportunity cost. Organizing a public protest of inappropriate policing behavior is labor intensive. How does a cost to challenge affect behavior?

A cost only affects the payoff to the citizen when the law has not been broken,  $\sigma = nv$ , there is an inaccurate signal received by the officer,  $\sigma' = v$ , and she chooses to enforce the law by sanctioning. If criminal behavior is not that prevalent ( $\gamma$  is low) and policing is rather accurate ( $\theta$  is high), then even for moderate costs to challenging, the benefit to citizens of eliminating over-sanctioning makes the strategic challenging worthwhile.<sup>18</sup>

A second assumption is that in the timing of the game, citizens move first and select a challenging strategy, to which law enforcement respond. In the case of a regulated industry, as studied by Leaver (2009), repeated interaction can justify this assumption. For the single-shot nature of, say, a traffic stop, the commitment by citizens to such a tactic prior to the decision to enforce may be unrealistic.

If we, alternatively, have the law enforcement official first make a sanctioning decision, followed by a challenge decision by the citizen, it is straightforward to verify the equilibrium outcome described in Proposition 2 remains an outcome of the altered game. Suppose citizen challenges the punishment in and only in subgames where improper sanctions arise. Anticipating this, the officer behaves as described in Proposition 2. While not the unique equilibrium, the outcome presented remains.

---

<sup>18</sup> There is a potentially interesting affect on crime. Section 4 considers deterrence. If costs are moderately (but not prohibitively) high to challenge improper sanctioning, then  $w(nv)$  decreases. Consequently, law violation becomes relatively more attractive.

### 3.3 *Effect on Enforcement*

Law enforcement behavior has, empirically, been shown to adjust to changes in the law and the public choice considerations prevalent in law enforcement institutions. How exactly does the theoretical model allow us to explain these effects? The comparison of Proposition 1 and Proposition 2 identifies the effect of reputation of officer skill alone on law enforcing decisions, while the comparison of Lemma 1 and Lemma/Proposition 2 illustrates the effect of strategic challenging of the law enforcement.

An officer with high reputational concerns is expected to under-utilize sanctions. This effect will be concentrated amongst those with less skill at applying the law. This effect distortion is magnified when challenges can be undertaken.

If reputation alone is important to law enforcement officials, then it is possible to observe excessive sanctions by lower ability officers. If such an officer knows that the prior beliefs are that the suspect is likely breaking the law, but the officer's private information points to a violation being less likely, then reputational concerns could distort enforcement. This effect is eliminated when the suspect is given the opportunity to challenge. This again illustrates the importance of the strategic behavior of the citizens. By challenging only wrongful sanctions, the law enforcement official less-skilled at applying the law eliminates the potential for such errors by reducing the frequency of sanction.

Which factors lead to larger reductions in the frequency of enforcing the law? There are three exogenous parameters of importance in the model. First, consider the degree of the reputational concern,  $\delta$ . One might expect, for example, an officer in a leadership position to care more about what others (e.g. subordinates) think about his/her abilities. Similarly, an officer interested in a promotion may have a higher value of  $\delta$ . Thus, security in one's position can be argued to correlate with lower reputational concerns.

First, with higher reputational concerns it is more likely that a given law enforcement official will be in the environment where sanctioning is discouraged. This acts to reduce the amount of sanctions. Second, it is straightforward to verify, given that the disincentive is significant enough, that an increase in reputational concerns reduces the frequency of punishment. An increase in  $\delta$  acts as an increased cost, which is offset by the officer reducing her enforcement. One might think of the first effect as an adjustment in the *extensive margin*

encouraging more officers to reduce sanctions, while the second effect can be considered a change in the *intensive margin* reducing the amount of sanctions by each officer.

A second important exogenous parameter in the model is the benefit to doing a good job,  $\beta$ . As stated, this is the surplus generated by accurately responding to the legality of the suspect's activity. One could expect, for example, that some crimes are more "serious" than others. Sanctions for violent offenses are typically quite high. Hence, not arresting an innocent individual is valuable. Similarly, the sanctions are high likely because it is important to punish (and deter) those who commit the crime. An increase in the benefit of doing one's job correctly, again, affects both the extensive and intensive margins.

First, an increase in  $\beta$  increases the threshold  $\delta^*$ . Officers less knowledgeable about the proper application of the adjusted law are less likely to find themselves in the environment where they feel they need to distort their decision making. This acts to increase the number of sanctions of an illegal activity. For those who do feel that reputational concerns require that they adjust their behavior, the enhanced benefit  $\beta$  leads to an increase in the intensive margin improving the probability the law is enforced. It is important to keep in mind that those who find themselves in this scenario are those with prior beliefs of wrongdoing greater than one-half. Consequently, the suspect is more likely to have actually violated the law, which encourages a reputation-concerned officer to increase her enforcement.

The third exogenous parameter of note is  $\eta$ . Recall,  $\eta$  measures the impact of wrongful lack of sanctioning relative to wrongful sanctions. An increase in  $\eta$  represents a situation in which wrongful convictions are not much worse than incorrectly not punishing, while a low value of  $\eta$  corresponds to especially damaging incorrect punishments. It follows that an increase in  $\eta$  corresponds to a decrease in the net benefit to issuing a sanction (since the cost to not punishing has decreased). A reduction in the net benefit to sanction naturally, then, leads to a decrease in both the extensive and intensive margin. One would expect, for an application, that crimes with lower penalties to have higher values of  $\eta$ . Consequently, fewer sanctions arise for violations that come with lighter sanctions.

### 3.4 Applications to Empirical Studies of Policing

The theoretical model has many potential applications. First, DeAngelo and Owens (2014) illustrate the effect of changes in the scope of the law, which can be thought of as causing heterogeneity in the skill of police officers. Challenging of tickets issued on newly-changed laws would lead to fewer sanctions, which coincides with their empirical results.

Benson, Rasmussen, and Sollars (1995) discuss the shifting of enforcement to drug offenses when asset seizures were allowed. The expanded budgets of the bureau can be thought of as an expansion in  $\beta$ . As illustrated, an increase in  $\beta$  increases the arrest rate as the benefit to making the arrest overcomes the officer's reputational concerns of improper application of the law being assessed by the public.

Similarly, the increased rate of sanctions when municipalities find themselves in fiscal shortcomings, as documented by Makowsky and Stratmann (2009), can also be thought of as an increase in the benefit to making a (correct) sanction,  $\beta$ . One would also expect reputational concerns to be greater for citing locals than those who do not live in the municipality and, therefore,  $\delta$  would take higher values for those in the community. As a consequence, both the intensive and extensive margins adjust and sanctions rise, specifically, for those who do not live in the locality.

The empirical results on individual officer behavior can also be applied to the theoretical framework developed. For example, the decision to be lenient, as investigated by Schafer and Mastrofski (2005), can arise when values of reputational concern,  $\delta$ , and disutility from errors,  $\eta$ , vary within a population. The study of the covariates of excessive force (Brandl, Stroshine, and Frank, 2001) again can be explained by officers either responding to low reputational concerns or disutility from errors.

It should be noted that although we have applied this work to a more traditional law enforcement environment, this research can be applied more generally to the entire law and regulatory enforcement literature. As Leaver (2009) points out, regulatory offices such as the Immigration and Customs Enforcement, the Environmental Protection Agency, Occupational Safety and Health Administration, Securities and Exchange Commission and a variety of other agencies experience nearly identical dynamics to those observed amongst more traditional law enforcement agencies.

#### 4. Reputation and Deterrence

Thus far, we have investigated how policing incentives influence the decision to enforce the law. But, how do reputational concerns affect deterrence? For example, how effective are changes in the scope of the law at reducing proscribed behavior?

As illustrated, reputational concerns and strategic challenging of law enforcement decrease the likelihood that a low-skilled law enforcement official sanctions an individual violating the law. If individuals are not able to directly observe the skill of the officer, then one would expect an increase in the expected value of law violation from the citizen's perspective. Consequently, one would anticipate an increase in the violation of the law, as compared to the environment where there is no disclosure of the accuracy of the sanctioning decisions as well as the environment with no reputational concerns.

This, though, is not the end of the story. Anticipating the lack of deterrence, a less-than-fully informed law enforcement official should expect the probability that the suspect in fact did break the law is higher, regardless of the official's skill. This, in turn, would encourage more sanctioning, which would discourage violations, thereby increasing compliance with the law. What is the net effect?

To address this issue, consider an extension to the previous framework by adding a stage 0 decision. Suppose, first, that C selects whether to violate the law or not. In other words, let  $\sigma$  be an endogenous variable. Consequently,  $\gamma$  can be interpreted as the mixed strategy of C. Maintain the assumption that L imperfectly observes the violation and receives a signal  $\sigma'$ . In stage 2, given the actual violating decision and the enforcement, C can challenge or not challenge the choice by L.

Given the results presented in Section 3, regardless of the value of  $\gamma$ , C will choose the *revelation* plan of challenging.<sup>19</sup> Therefore, the analysis can be limited to the game between C who chooses whether to violate the law and L who imperfectly observes the action and makes a sanction decision.

---

<sup>19</sup> We are solving for the perfect Bayesian Nash equilibrium of the game under the imposition that L's beliefs conform to the commonly known distribution of  $\gamma$  and accuracy of signal,  $\theta$ . See Battigali and Dufwenberg (2009) for a discussion of the equilibrium concept and existence of sequential equilibrium in psychological games.

The important distinction to understand is how reputation affects the sanctioning and violating decisions of L and C, respectively. Proposition 3 provides the result.

**PROPOSITION 3:** Reputational concerns do not affect the probability L (with  $a = ns$ ) sanctions C (when  $\sigma' = v$ ). Instead, enhanced reputational concerns affect the behavior of C encouraging more violations of the law.

Proposition 3 highlights the impact of endogenizing the violations. It was argued in Section 3.3 that an increase in reputational concerns (an increase in  $\delta$ ) decreases the probability of punishing an expected violator of the law. The logic behind the result is that the expected cost to being wrong is enhanced and, thus, a lower-skilled law enforcement official is less interested in sanctioning. This, though, assumes that the probability the suspect actually violated the law is held constant. Proposition 3 illustrates that this is not likely the case. The increased cost to enforcement leads M to violate the law more. In equilibrium, the incentive to reduce sanctioning is offset by an increase in the probability of violation.

Hence, reputational concerns act to reduce deterrence. Citizens take advantage of the reduced incentive to punish by increasing their violations of the law. Consequently, adjustments in the scope of the law, for example, that expand coverage may not be as effective as hoped at reducing the targeted activities.

The result of Proposition 3 is an application of the *Robinson Crusoe Fallacy* identified and elaborated upon by Tsebelis (1989, 1990). He illustrated that in competitive games (i.e., those without a pure strategy equilibrium) the equilibrium mixed strategy of one player is not affected by that player's payoff variables, but rather by the payoff variables of the competitor. Hence, anything that directly affects the payoff of L will, in equilibrium, affect the mixed strategy of C; and it will not affect the equilibrium mixed strategy of L. This idea has been applied to and discussed in the context of deterrence (Friehe, 2008) and has been shown to have empirical support by analyzing rule changes in basketball (McCannon, 2011).

In fact, McCannon (2011) refers to this effect as the *Strategic Offsetting Behavior Hypothesis*. A policy change intended to affect the behavior of one agent instead encourages another, who is strategically interacting with him, to offset the impact of the policy.<sup>20</sup> Law

---

<sup>20</sup> This is, in effect, a game-theoretic extension of Peltzman's (1975) *Offsetting Behavior Hypothesis*.

changes intended to deter violators will adjust enforcement decisions instead, while policy intended to adjust behaviors of police result in changes in violations.

As a result, deterrence can be achieved by affecting the payoff of the law enforcement official. This can be done directly by rewarding sanctioning or by mitigating the skill loss by reducing the frequency and severity of the unfamiliarity with the law.

Regarding welfare, if violation of the law is exogenous, then a cost associated with enforcement would lead to no-enforcement as being the optimal outcome. With endogenous violations, the benefits to deterrence trade off with the costs of enforcement in a welfare calculation. The magnitude of the benefit to deterrence is driven, then, by the accuracy of the law enforcement. If  $\theta$  is larger, then both type I and type II errors are reduced and, consequently, sanctioning provides more of a benefit. While increased reputational motivations encourage more crime, as shown above, stiffer penalties decrease sanctioning and, consequently, improve welfare as it mitigates type I and type II errors. Thus, from a welfare perspective, increasing punishments may be a better policy tool when enforcement quality is poor. If  $\theta$  is sufficiently low and the disutility associated with errors is high, then increased severity of sanctions may outperform improving welfare by more than other policy interventions.

## **5. Conclusion**

A theory of law enforcement decision making with reputational concerns and the potential for strategic challenging is developed. How does reputation affect the incentives and behaviors of law enforcement and how can suspected violators of the law use strategic revelation of information to influence this decision making? It is shown that reputation can create excessive enforcement of the law. This occurs when officers, who are less able to accurately identify whether a crime has actually been broken, have prior beliefs of violations but a signal that no law breaking has been done by the suspect. On the other hand, reputation can also create insufficient enforcement of the law when these officers have prior beliefs of innocence, but have observed (noisy) information that he is guilty. Our results both mirror and extend those of Prendergast (2003, 2007) by noting that citizen complaints can lead to under-enforcement, but also serve the important task of identifying errors and signaling the quality of the regulator.

The main contribution of the paper is to illustrate that these reputational affects are adjusted if one also incorporates strategic challenging of the law enforcer. It is shown that the former, excessive-enforcement effect disappears; while the latter, insufficient-enforcement effect is enhanced. These adjustments to law enforcement occur when the suspected violator challenges incorrect sanctions, but stands mute on correct choices or incorrect non-sanctioning. This strategic challenging of enforcement punishes incorrect sanctions and rewards incorrect non-sanctioning.

This behavior leads to less enforcement of the law. The factors that may influence the magnitudes are also investigated. It is shown that the reduction in enforcement is greatest when reputational concerns are high, the severity of the crime committed is less, and type II errors (wrongful non-sanctions) are relatively more important.

As a final extension, the effect of reputation is extended to the potential deterrent effects. It is shown that such concerns lead potential violators to increase the likelihood of their law breaking. Therefore, as an application, adjustments to the scope of the law can not only reduce sanctions by officers, but encourage violations.

This work contributes to a growing literature on reputational concerns on public office holders. As stated, Leaver (2009) investigates regulators. Bandyopadhyay and McCannon (2014, 2015) study how re-election concerns affect behavior of prosecutors, while Daughety and Reinganum (2014) consider how social sanctions affect prosecutors.

An alternative potential explanation for increased sanctions by a newer police officer (or other distortions in behavior documented in the results from the empirical literature) is signaling. In such an environment, one would expect excessive enforcement as the high-quality type over-sanctions to separate from a low-quality type, or the low type increases behavior to pool. As a consequence, though, signaling alone is unable to explain decisions to under-enforce the law. Thus, it is the strategic information transmitted by the “squawking” of the monitored party that can explain decreased sanctions.

While the theoretical model is developed to provide an explanation for the empirical regularities identified, future work can focus on direct tests of the theory developed. The work differs from a standard signaling or principal-agent framework through the mechanism of strategic challenging by the regulated. Empirical or experimental work could provide further confirmation of the theoretical framework considered here.

## Appendix

The appendix provides the proofs of the results presented in the text. Since the law enforcement official differs in both the signal she observes and her skill, denote  $(\sigma', a)$  as the type.

**PROOF OF LEMMA 1:** The expected net payoff for  $(\sigma', a)$  choosing  $l$  is

$$[\Pr(\sigma = v \mid \sigma', \theta) - \eta \Pr(\sigma = nv \mid \sigma', \theta)]\beta + \delta \{\mu(l) - \mu(nl)\}. \quad (\text{A1})$$

It is first useful to identify a few properties of this expression. First, subtracting the net payoff of  $(nv, a)$  from the net payoff of  $(v, a)$  gives

$$[\Pr(\sigma' = \sigma \mid \sigma', \theta) - \Pr(\sigma' \neq \sigma \mid \sigma', \theta)](1 + \eta)\beta > 0. \quad (\text{A2})$$

Since the beliefs of E cannot be conditioned on L's signal they cancel out and (A2) is positive since it is assumed that  $\theta_a > 1/2$ . Second, subtracting the payoff of  $(v, ns)$  from that of  $(v, s)$  gives

$$[\Pr(\sigma = v \mid \sigma' = v, \theta_s) - \Pr(\sigma = v \mid \sigma' = v, \theta_{ns})](1 + \eta)\beta > 0. \quad (\text{A3})$$

Again, the beliefs of E cannot be conditioned on L's ability so they cancel out and (A3) is positive since  $\theta_s > \theta_{ns}$ . Finally, subtracting the  $(nv, s)$  net payoff from that of  $(nv, ns)$  gives

$$\Pr(\sigma = nv \mid \sigma' = nv, \theta_s) - \Pr(\sigma = nv \mid \sigma' = nv, \theta_{ns})](1 + \eta)\beta > 0. \quad (\text{A4})$$

Now, consider the possibility of a pure strategy Nash equilibrium – where every agent follows her signal. From Bayes' Rule we know that

$$\Pr(\sigma = v \mid v, \theta) = \theta\gamma / [\theta\gamma + (1 - \theta)(1 - \gamma)],$$

$$\Pr(\sigma = v \mid nv, \theta) = (1 - \theta)\gamma / [(1 - \theta)\gamma + \theta(1 - \gamma)],$$

and  $\Pr(\sigma = nv \mid \sigma', \theta) = 1 - \Pr(\sigma = v \mid \sigma', \theta)$ . Thus, consider the term in the square brackets of (A1), which, for simplicity, will be denoted  $\pi(\sigma', a)$ . It follows that

$$\pi(v, a) = [\theta\gamma - \eta(1 - \theta)(1 - \gamma)] / [\theta\gamma + (1 - \theta)(1 - \gamma)],$$

which is greater than zero, for any value of  $\eta$ , since it is assumed that  $\gamma > 1 - \theta_{ns}$ . Additionally,

$$\pi(nv, a) = [(1 - \theta)\gamma - \eta\theta\gamma] / [\theta\gamma + (1 - \theta)(1 - \gamma)].$$

There exists a cutoff value of  $\eta$ , denoted  $\eta^*$ , where if  $\eta > \eta^*$  then  $\pi(nv, a) < 0$ , while if  $\eta < \eta^*$  then  $\pi(nv, a) > 0$ . It follows that  $\eta^* = (1 - \theta)/\theta$ , which is positive and less than one since  $\theta > 1/2$ . Since it is assumed that  $\eta > (1 - \theta_{ns})/\theta_{ns}$ , then  $\pi(nv, a) < 0$ .

Define  $\Delta$  as the term in the curly brackets of (A1). The beliefs of E depend on the equilibrium being selected. Consider, first, beliefs in the pure strategy equilibrium where all law enforcement officials follow their signal. It follows that

$$\mu(l) = [\gamma\theta_s + (1 - \gamma)(1 - \theta_s)] / [\gamma\theta_s + (1 - \gamma)(1 - \theta_s) + \gamma\theta_{ns} + (1 - \gamma)(1 - \theta_{ns})] \quad (\text{A5})$$

and

$$\mu(nl) = [\gamma(1 - \theta_s) + (1 - \gamma)\theta_s] / [\gamma(1 - \theta_s) + (1 - \gamma)\theta_s + \gamma(1 - \theta_{ns}) + (1 - \gamma)\theta_{ns}]. \quad (\text{A6})$$

It follows immediately that  $\Delta > 0$  if  $[\gamma\theta_s + (1 - \gamma)(1 - \theta_s)] \times [\gamma(1 - \theta_{ns}) + (1 - \gamma)\theta_{ns}] > [\gamma(1 - \theta_s) + (1 - \gamma)\theta_s] \times [\gamma\theta_{ns} + (1 - \gamma)(1 - \theta_{ns})]$ . It is straightforward to verify that if  $\gamma > 1/2$ , then this inequality holds and  $\Delta > 0$ , while if  $\gamma < 1/2$  then  $\Delta < 0$  (and if  $\gamma = 1/2$  then  $\Delta = 0$ ).

Hence, consider the proposed pure strategy equilibrium. It follows from (A3) that if L with  $a = ns$  is interested in sanctioning with the signal  $\sigma' = v$ , then so too must L with  $a = s$ . It follows from (A4) that if L with  $a = ns$  is not interested in sanctioning with the signal  $\sigma' = nv$ , then so too is L with  $a = s$ . As a consequence, we need only verify that L with  $a = ns$  is interested in following her signal.

Consider, first, the environment where  $\gamma < 1/2$ . If  $\sigma' = nv$ , then both types do not sanction since  $\pi(nv, s)$ ,  $\pi(nv, ns)$ , and  $\Delta < 0$ . Suppose  $\sigma' = v$ . Define  $\delta_1 = \pi(v, ns)\beta / (-\Delta)$ . If  $\delta \leq \delta_1$ , then

(A1) is positive for both types and both choose to sanction. If  $\delta > \delta_1$ , then (A1) is negative and L in the state  $(v, ns)$  is not interested in sanctioning.

To identify the mixed strategy Nash equilibrium in this scenario, let  $p$  denote the probability of selecting  $\lambda = l$  by L with  $(v, ns)$ . As in any mixed strategy equilibrium, the player must be indifferent between the strategies it selects with a positive probability. This implies that  $p$  is determined as the value that sets (A1) equal to zero. Rather,  $\pi(v, ns)\beta / \delta = -\Delta_p$  where  $\Delta_p$  is the value of  $\mu(l) - \mu(nl)$  with  $(v, ns)$  sanctioning with only a probability  $p$ . The derivation of  $\Delta_p$  is rather straightforward. Let A denote the numerator in (A5), while the denominator is  $A + B$ . Let C denote the numerator in (A6), while the denominator is  $C + D$ . Consequently,  $\Delta_p = A / [A + pB] - C / [C + D + (1 - p)B]$ . It is straightforward to verify, then, that  $d\Delta_p / dp < 0$  and that  $\Delta_{p=1} = \Delta$ . Since (A1) is negative for  $p = 1$  and  $\Delta_p$  is decreasing and continuous, we need only to verify that (A1) is nonnegative for  $p = 0$  (to be able to apply the Intermediate Value Theorem) to guarantee that a mixed strategy equilibrium exists. At  $p = 0$ ,  $\Delta_{p=0} = 1 - \{C / [C + D + B]\}$ . Since  $B, D > 0$ ,  $\Delta_{p=0} > 0$ .

Consider, second, the environment where  $\gamma > 1/2$ . If  $\sigma' = v$ , then both types sanction since  $\pi(v, s)$ ,  $\pi(v, ns)$ , and  $\Delta > 0$ . Suppose  $\sigma' = nv$ . Define  $\delta_2 = -\pi(nv, ns)\beta / \Delta$ . If  $\delta \leq \delta_2$ , then (A1) is negative for both types and neither choose to sanction. If  $\delta > \delta_2$ , then (A1) is positive and L in the state  $(nv, ns)$  is interested in sanctioning.

Again, to identify the mixed strategy Nash equilibrium in this scenario let  $q$  denote the probability of selecting  $\lambda = l$  by L with  $(nv, ns)$ . As argued before,  $q$  is determined by the value that sets (A1) equal to zero. Rather,  $-\pi(nv, ns)\beta / \delta = \Delta_q$  where  $\Delta_q$  is the value of  $\mu(l) - \mu(nl)$  with  $(nv, ns)$  sanctioning with probability  $q$ . Consequently,  $\Delta_q = A / [A + B + qD] - C / [C + (1 - q)D]$ . It is straightforward to verify that  $d\Delta_q / dq < 0$  and that  $\Delta_{q=0} = \Delta$ . Since (A1) is positive for  $\Delta_{q=0}$  and  $\Delta_q$  is decreasing and continuous, we need only to verify that (A1) is nonpositive for  $q = 1$ . At  $q = 1$ ,  $\Delta_{q=1} = A / [A + B + D] - 1$ . Since  $A, B, D > 0$ ,  $\Delta_{q=1} < 0$ .

Finally, if  $\gamma = 1/2$ , then it follows from above that  $\Delta = 0$  so that it is optimal for each type to follow her signal. ■

**PROOF OF LEMMA 2:** The expected net payoff for  $(\sigma', a)$  choosing  $l$  is

$$[\Pr(\sigma = v \mid \sigma', \theta) - \eta \Pr(\sigma = nv \mid \sigma', \theta)]\beta + \delta \{ \Pr(\sigma = v) \times \mu(\sigma = v, l) + [1 - \Pr(\sigma = nv)] \times \mu(\sigma = nv, l) - \mu(nl) \}. \quad (\text{A7})$$

Subtracting the net payoff of one with  $\sigma' = nv$  from that of  $\sigma' = v$  gives

$$[\Pr(\sigma' = \sigma) - \Pr(\sigma' \neq \sigma)]((1 + \eta)\beta + \delta \{ \mu(\sigma = v, l) - \mu(\sigma' = nv, l) \}) > 0. \quad (\text{A8})$$

Subtracting the net payoff of one with  $\sigma' = nv$  and  $\theta = \theta_{ns}$  from that of one with  $\sigma' = nv$  and  $\theta = \theta_s$  gives

$$[\Pr(\sigma = v \mid \sigma' = v, \theta_s) - \Pr(\sigma = v \mid \sigma' = v, \theta_{ns})]((1 + \eta)\beta + \delta \{ \mu(\sigma = v, l) - \mu(\sigma = nv, c) \}) > 0. \quad (\text{A9})$$

Finally, subtracting the  $(nv, s)$  net payoff from that of  $(nv, ns)$  gives

$$[\Pr(\sigma = nv \mid \sigma' = nv, \theta_s) - \Pr(\sigma = nv \mid \sigma' = nv, \theta_{ns})]((1 + \eta)\beta + \delta \{ \mu(\sigma = v, l) - \mu(\sigma = nv, l) \}) > 0. \quad (\text{A10})$$

Now, consider the proposed pure strategy equilibrium. It follows from (A9) that if L with  $a = ns$  is interested in sanctioning with the signal  $\sigma' = v$ , then so too must L with  $a = s$ . It follows from (A10) that if L with  $a = ns$  is not interested in sanctioning with the signal  $\sigma' = nv$ , then so too is L with  $a = s$ . As a consequence, we need only verify that L with  $a = ns$  is interested in following her signal.

First, though, notice that the expression in the square brackets of (A7) is identical to  $\pi(\sigma', a)$  in Lemma 1. Hence,  $\pi(v, a) > 0$  and  $\pi(nv, a) < 0$ . Define the term in the curly brackets of (A7) as  $\Delta^2(a)$ , which is not the same expression as in (A1) (which we now label  $\Delta^1(a)$ ). Our first objective is to illustrate that for every value of  $\gamma$ ,  $\Delta^2(s) > \Delta^1(s)$  and  $\Delta^2(ns) < \Delta^1(ns)$ .

From the law of total probability it follows that

$$\mu(l) = \Pr(\sigma = v \mid l) \times \Pr(\theta = \theta_s \mid \sigma = v, l) + \Pr(\sigma = nv \mid l) \times \Pr(\theta = \theta_s \mid \sigma = nv, l).$$

Additionally, when the evaluator expects skilled officials to follow their signal,

$$\Pr(\sigma = v | l) > \Pr(\sigma = v | \sigma' = v, \theta_{ns}) > \Pr(\sigma = v | \sigma' = nv, \theta_{ns}).$$

The second inequality holds since  $\theta_{ns} > 1/2$ . The first inequality holds since  $a = s$  is more likely to correctly apply the law, which implies that from the evaluator's perspective the chance of the true state being a violation is higher observing a sanction than a low-skilled officer assesses.

Again assuming the evaluator expects each type to follow her signal,

$$\Pr(\theta = \theta_s | \sigma = v, l) > \Pr(\theta = \theta_s) = 1/2 > \Pr(\theta = \theta_s | \sigma = nv, l).$$

This result follows from the assumption that  $\theta_s > \theta_{ns}$  so that if each type is following her signal a correct sanction is more likely to come from  $a = s$ . Combining these expressions we can establish the following:

$$\Pr(\sigma = v | \sigma', \theta_{ns}) \times \mu(\sigma = v, l) + [1 - \Pr(\sigma = v | \sigma', \theta_{ns})] \times \mu(\sigma = nv, l) - \mu(l) < 0.$$

Hence,  $\Delta^2(ns) < \Delta^1(ns)$ . A similar argument for  $a = s$  establishes the result that  $\Delta^2(s) > \Delta^1(s)$ .

Since  $\Delta^2(ns) < \Delta^1(ns)$  it follows immediately that there exists a value of  $\gamma$ , denoted  $\gamma^*$ , where  $\gamma^* > 1/2$  and  $\Delta^2(ns) < 0$  for  $\gamma < \gamma^*$ . Since attention is focused on not-extreme values of  $\gamma$ , we assume  $\gamma < \gamma^*$ . Consider, first, L in the state  $(nv, ns)$ . Since  $\pi(nv, ns) < 0$  and  $\Delta^2(ns) < 0$ , (A7) is negative and she does not sanction. Now, consider L in the state  $(v, ns)$ . Define  $\delta^* = \pi(v, ns)\beta / [-\Delta^2(ns)]$ . It follows that (A7) is nonnegative if  $\delta \leq \delta^*$ . In this case she sanctions expected violators. If  $\delta > \delta^*$ , then the expression in (A7) is negative and she is not interested in enforcing.

To identify the mixed strategy Nash equilibrium in this scenario let  $r$  denote the probability of selecting  $\lambda = l$  by L with  $(v, ns)$ . Hence  $r$  is determined as the one that sets  $\pi(v, ns)\beta / \delta = -\Delta_r$  where  $\Delta_r$  is the value of  $\Delta^2(ns)$  with  $(v, ns)$  sanctioning with probability  $r$ . It is straightforward to verify that  $d\Delta_r / dr < 0$ ,  $\Delta_r$  is continuous, and  $\Delta_{r=0} = 1 - C / [C + D + \gamma\theta_{ns}]$ , which is positive. Hence, applying the Intermediate Value Theorem such a mixed strategy outcome exists. ■

**PROOF OF PROPOSITION 1:** The proof under the scenario of  $\delta = 0$  is undertaken. That for  $\mu(\lambda, \kappa) = \mu^*$  is equivalent since both eliminate effects from the beliefs. The net payoff for  $(\sigma', a)$  choosing  $l$  is equal to (A1) in the proof of Lemma 1 setting  $\delta = 0$ . Consider the pure strategy Nash equilibrium. It follows immediately from the proof of Lemma 1 that  $\pi(v, a) > 0$  and  $\pi(nv, a) > 0$ . Hence, if  $\sigma' = v$  then both  $a = s$  and  $a = ns$  enforce the law, while if  $\sigma' = nv$  then both do not. ■

**PROOF OF PROPOSITION 2:** The challenging strategies can be simplified to the four describe: *revelation*, *no challenge*, *full disclosure*, and *generous revelation*. First, it is straightforward to verify that *generous revelation* is not optimal for C. The difference between the *generous revelation* strategy and the *no challenge* strategy is whether incorrect non-enforcements are pointed out by C. Doing so encourages more sanctions with an increased probability even when the signal says otherwise. This is worse for C and hence, *no challenge* dominates. Similarly, *revelation* is preferable to *full disclosure*. The difference between these two challenging strategies is whether wrongful non-enforcements are pointed out. A strategy of disclosing these mistakes, again, adds to the benefit of sanctioning, which makes C worse off. Hence, *revelation* dominates *full disclose*. Thus, focus can be directed on the comparison of those tactics discussed in Lemma 1 and 2.

The expected payoff to C if  $\sigma = v$  is  $w(v) = \theta[p_v w(v, c) + (1 - p_v)w(v, nl)] + (1 - \theta)[p_{nv} w(v, l) + (1 - p_{nv})w(v, nl)]$ , while the expected payoff to C if  $\sigma = nv$  is  $w(nv) = \theta[p_{nv} w(nv, l) + (1 - p_{nv})w(nv, nl)] + (1 - \theta)[p_v w(nv, l) + (1 - p_v)w(nv, nl)]$  where  $p_{\sigma'}$  is the probability L sanctions given she receives the signal  $\sigma'$ . The *revelation* strategy reduces  $p_v$  and  $p_{nv}$ . It follows, then that both  $w(v)$  and  $w(nv)$  are higher with *revelation* than *no challenge*. Hence, the equilibrium involves C selecting *revelation* and L playing as described in Lemma 2. ■

**PROOF OF PROPOSITION 3:** Given that the final, challenging stage leads to a *revelation* plan, attention can be focused on the first two stages. Since L does not directly observe the decision of C the interaction between the two is a normal-form game where C selects  $\sigma = v$  or  $nv$  and L selects  $\lambda = l$  or  $nl$  (given the signal  $\sigma'$ ). Consider the payoffs to C. The expected payoff to violating the law is

$$w(v) = w(v, l)[a\theta_s + (1 - a)\theta_{ns}r] \\ + w(v, nl)[a(1 - \theta_s) + (1 - a)\{(1 - \theta_s) + \theta_{ns}(1 - r)\}]$$

where  $a$  is the probability the law enforcement official is skilled ( $a = s$ ) and  $r$  is the mixed strategy of L with  $a = ns$ ; i.e. the probability she chooses to sanction when  $\sigma' = v$ . Similarly, the expected payoff to not violating the law is

$$w(nv) = w(nv, l)[a(1 - \theta_s) + (1 - a)(1 - \theta_{ns})r] \\ + w(nv, nl)[a\theta_s + (1 - a)\{\theta_{ns} + (1 - \theta_{ns})(1 - r)\}].$$

The mixed strategy equilibrium consists of the  $r$  that equates  $w(v)$  and  $w(nv)$ . Under the typical assumption in inspections games such as this that at  $r = 0$   $w(v) > w(nv)$  – without enforcement, violations are preferred – while at  $r = 1$   $w(v) < w(nv)$ ,<sup>21</sup> the mixed strategy equilibrium can be derived. At this equilibrium  $r^*$ , its value is driven by the parameters  $a$ ,  $\theta_a$ , and  $w(\sigma, \lambda)$  and not the parameters  $\beta$ ,  $\eta$ , and (most importantly) for the analysis  $\delta$ .

If the typical inspection game assumption does not hold, then even L with  $a = ns$  has a pure strategy. In this scenario C has a dominant strategy. In this degenerate outcome,  $\gamma$  takes on a value of either zero or one. ■

---

<sup>21</sup> Formally, letting  $w(v)$  and  $w(nv)$  take the forms  $w(v) = X - (1 - a)\theta_{ns}A$  and  $w(nv) = Y - (1 - a)(1 - \theta_{ns})B$ , assume  $0 < X - Y < (1 - a)[\theta_s A - (1 - \theta_{ns})B]$ .

## References

Alpert, Geoffrey, Roger Dunham, Meghan Stroschine, Katherine Bennett, John MacDonald (2006), Police Officers' Decision Making and Discretion: Forming Suspicion and Making a Stop, *Department of Justice*, 1-151.

Bandyopadhyay, Siddhartha and Bryan C. McCannon (2014), The Effect of the Election of Prosecutors on Criminal Trials, *Public Choice*, 161(1-2), 141-156.

Bandyopadhyay, Siddhartha and Bryan C. McCannon (2015), Prosecutorial Retention: Signaling by Trial, *Journal of Public Economic Theory*, 17(2), 219-256.

Battigali, Pierpaolo and Martin Dufwenberg (2009), Dynamic Psychological Games, *Journal of Economic Theory* 144(1), 1-35.

Benson, Bruce L., David W. Rasmussen, and David L. Sollars (1995), Police Bureaucracies, Their Incentives, and the War on Drugs, *Public Choice* 85, 21-45.

Braman, Donald, Dan M. Kahan, and David A Hoffman (2010), Some Realism about Punishment Naturalism, *University of Chicago Law Review* 77(4), 1531-1610.

Brandl, Stephen G., Meghan S. Stroschine, and James Frank (2001), Who are the Complaint-Prone Officers? An Examination of the Relationship Between Police Officers' Attributes, Arrest Activity, Assignment, and Citizens' Complaints about Excessive Force, *Journal of Criminal Justice* 29, 521-529.

Bronitt, Simon and Philip Stenning (2011), Understanding Discretion in Modern Policing, *Criminal Law Journal* 35(6), 319-332.

Chappell, Allison T. and Alex R. Piquero (2004), Applying Social Learning Theory to Police Misconduct, *Deviant Behavior* 25, 89-108.

Daughety, Andrew F. and Jennifer F. Reinganum (2014), Informal Sanctions on Prosecutors and Defendants and the Disposition of Criminal Cases, Working Paper.

DeAngelo, Gregory and Emily G. Owens (2014), Learning the Ropes: Task Specific Experience and the Output of Idaho State Troopers, Working Paper.

Edward, Mark A. (2006), Law and the Parameters of Acceptable Deviance, *Journal of Criminal Law and Criminology* 97(1), 49-100.

Friehe, Tim (2008), Correlated Payoffs in the Inspection Game: Some Theory and an Application to Corruption, *Public Choice* 137(1-2), 127-143.

Geanakoplos, John, David Pearce, and Ennio Stacchetti (1989), Psychological Games and Sequential Rationality, *Games and Economic Behavior* 1(1), 60-79.

Goldstein, Joseph (1960), Police Discretion not to Invoke the Criminal Process: Low-Visibility Decisions in the Administration of Justice, *Yale Law Journal* 69(4), 543-594.

Huang, Peter H. and Ho-Mou Wu (1994), More Order without More Law: A Theory of Social Norms and Organizational Cultures, *Journal of Law, Economics, and Organization* 10(2), 390-406.

Kahan, Dan M. (2000), Gentle Nudges vs. Hard Shoves: Solving the Sticky Norms Problem, *University of Chicago Law Review* 67, 607-645.

Lando, Henrik (2006), Does Wrongful Conviction Lower Deterrence?, *Journal of Legal Studies* 35(2), 327-337.

Leaver, Clare (2009), Bureaucratic Minimal Squawk Behavior: Theory and Evidence from Regulatory Agencies, *American Economic Review* 99(3), 572-607.

Levitt, Steven and Sudhir Venkatesh (2007), An Empirical Analysis of Street-Level Prostitution,” *Unpublished manuscript*.

Makowsky, Michael D. and Thomas Stratmann (2009), Political Economy at any Speed: What Determines Traffic Citations?, *American Economic Review* 99(1), 509-527.

McAdams, Richard (1997), The Origin, Development, and Regulation of Norms, *Michigan Law Review*, 338, 351-432.

McCannon, Bryan C. (2011), Strategic Offsetting Behavior: Evidence from National Collegiate Athletic Association Men’s Basketball, *Contemporary Economic Policy* 29(4), 550-563.

Peltzman, Sam (1975), The Effects of Automobile Safety Regulation, *Journal of Political Economy* 83(4), 677-726.

Png, Ivan (1986), Optimal Subsidies and Damages in the Presence of Judicial Error, *International Review of Law and Economics* 6(1), 101-105.

Prendergast, Canice (2003), The Limits to Bureaucratic Efficiency, *Journal of Political Economy*, 111(5), 929-958.

Prendergast, Canice (2007), The Motivation and Bias of Bureaucrats, *American Economic Review* 91(1), 180-196.

Schafer, Joseph A. and Stephen D. Mastrofski (2005), Police Leniency in Traffic Enforcement Encounters: Exploratory Findings from Observations and Interviews, *Journal of Criminal Justice* 33(3), 225-238.

Shepherd, Joanna M. (2009), The Influence of Retention Politics on Judges’ Voting, *Journal of Legal Studies* 38(1), 169-206.

Terrill, William and Eugene A. Paoline III (2007), Nonarrest Decision Making in Police – Citizen Encounters, *Police Quarterly* 10(3), 308-331.

Tonry, Michael (1996), *Sentencing Matters (Studies in Crime and Public Policy)*, Oxford, Oxford University Press.

Tsebelis, George (1989), The Abuse of Probability in Political Analysis: The Robinson Crusoe Fallacy, *American Political Science Review* 83(1), 77-91.

Tsebelis, George (1990), Are Sanctions Effective? A Game-Theoretic Analysis, *Journal of Conflict Resolution* 34(1), 3-28.