

STATUS-SEEKING IN CRIMINAL SUBCULTURES  
AND THE DOUBLE DIVIDEND  
OF ZERO-TOLERANCE

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# STATUS-SEEKING IN CRIMINAL SUBCULTURES AND THE DOUBLE DIVIDEND OF ZERO-TOLERANCE

## Abstract

This paper offers a new argument for why a more aggressive enforcement of minor offenses ('zero-tolerance') may yield a double dividend in that it reduces both minor offenses and more severe crime. We develop a model of criminal subcultures in which people gain social status among their peers for being 'tough' by committing criminal acts. As zero-tolerance keeps relatively 'gutless' people from committing a minor offense, the signaling value of that action increases, which makes it attractive for some people who would otherwise commit more severe crime. If social status is sufficiently important in criminal subcultures, zero-tolerance reduces crime across the board.

JEL Code: K14, K42.

Keywords: status concerns, street crime, subcultures, penalties, zero-tolerance, broken windows policing.

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# 1 Introduction

The ‘zero-tolerance’ or ‘broken windows’ approach to crime fighting holds that a more aggressive enforcement of minor offenses leads to a reduction in both minor offenses and more serious crime. This approach, first articulated by Wilson and Kelling (1982), has been pursued in New York City and, since recently, in several other US cities including Boston, Chicago, and Los Angeles. Although the effectiveness of zero-tolerance policies in fighting serious crime is still open to debate (see for instance Levitt (2004), Weisburd and Eck (2004), and Harcourt and Ludwig (2006)), a growing body of empirical evidence indicates that zero-tolerance indeed generates a double dividend. For instance, using cross-sectional data of US cities, Sampson and Cohen (1988), MacDonald (2002), and Kubrin et al. (2006) find a significant negative effect of police activity aimed at disorderly conduct on robbery rates, which can only be partly attributed to the indirect effect of zero-tolerance on the probability of arrest for robbery. Braga et al. (1999) conduct a randomized field experiment in Jersey City, New Jersey, and find that policing disorder has a negative effect on crime incidents, with little evidence of displacement to other areas. Corman and Mocan (2005) use monthly time-series data between 1974 and 1999 from New York City and find – after controlling for several potentially confounding variables including police presence and crime-specific arrests – support for negative effects of stricter enforcement of minor offenses on more serious crime. Funk and Kugler (2003) and Vollaard (2006) obtain similar results using Swiss and Dutch data, respectively.

The prevailing explanation for a double dividend of zero-tolerance relies on a signaling argument. In the words of former New York City mayor Rudolph W. Giuliani: “There’s a continuum of disorder. Obviously murder and graffiti are two vastly different crimes. But they are part of the same continuum, and a climate that tolerates one is more likely to tolerate the other.”<sup>1</sup> Likewise, Kahan (1997) argues that lax enforcement of lower-level crimes signals tolerance of more severe crime, and so increases both lower-level and more severe crime. The recent evidence in Lochner (2005) is not supportive of this signaling argument. Using longitudinal survey data for the US, he finds that young males’ beliefs about the probability of arrest for various crimes are not affected by local neighborhood conditions like general lawlessness and disarray.

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<sup>1</sup>See the Archives of Rudolph W. Giuliani, Major Addresses, "The Next Phase of Quality of Life: Creating a More Civil City," Wednesday, February 24, 1998. <http://www.nyc.gov/html/rwg/html/98a/quality.html>

This paper offers a new argument for a double dividend of zero-tolerance policies, one that holds even when enforcement policies and public tolerance of crime are common knowledge. We develop a model in which criminal behavior is, at least partly, motivated by status concerns. In particular, we assume that individuals in criminal subcultures care about their status for being ‘tough.’ Individuals differ in innate toughness, which may reflect differences in nerve, physical fitness, or sensitivity to guilt. Tougher individuals have an absolute advantage in crime as well as a comparative advantage in more severe crime. Importantly, innate toughness is not observable, and so individuals make inferences about an individual’s toughness from his actions. We show that, if social status is sufficiently important in criminal subcultures, there is a double dividend of zero-tolerance in that it reduces both minor offenses and more serious crime.

The intuition behind this result is as follows. When minor offenses are punished harder, some individuals are deterred from committing those acts, and instead choose not to take action. Since these individuals are relatively ‘gutless’ individuals, the signaling value of committing a minor offense increases. This makes committing a minor offense more attractive for some people who would otherwise commit more severe crime. If people in criminal subcultures care sufficiently about status, this effect dominates a positive substitution effect of zero-tolerance on more severe crime, and so stiffer penalties for minor offenses reduce crime across the board.

The paper is organized as follows. The next section discusses some stylized facts on status concerns and social norms in criminal subcultures and describes how the paper relates to the literature. Section 3 presents the model. Section 4 characterizes the equilibrium and Section 5 analyzes the effects of zero-tolerance. Section 6 concludes.

## **2 Some stylized facts and related literature**

Recent studies in criminology, law, and economics have emphasized the role of social status and social norms in criminal behavior. Most of these studies consider negative stigma-effects of committing crime, and argue that stigma, in addition to imprisonment and fines, can be an important deterrent of criminal activity (e.g. Rasmusen (1996), Posner (2000), Bar-Gill and Harel (2001), Blume (2004), Funk (2004), and Arbak (2005)). While social norms that condemn criminal behavior are adhered to by a large part of the population, they are not universally shared. Indeed, in some subcultures, criminals are actually glorified. Meares, Katyal, and Kahan (2004) note that

criminals “develop subnorms that may be antiethical to those of the law-abiding world. [...] The subnorms of this group reward the criminal activity that the law-abiding world punishes, and devalues the lawful alternatives that the law-abiding world celebrates.” (pp. 1184-1185).

Violent subcultures are a case in point. Anderson (1999)’s ethnographic study *Code of the Street* on violence in Philadelphia’s poor inner-city neighborhoods finds that residents are confronted with a “local hierarchy based on toughness” in which a reputation for being willing and able to fight earns respect among peers (p. 67). Based on interviews with 191 uncaught violent street offenders in St. Louis, Missouri, Topalli (2005) concludes that these offenders “operate in an environment in which oppositional norms catering to ethics of violence, toughness and respect dominate the social landscape” and that they “strive to protect a self-image consistent with a code of the streets orientation rather than a conventional one” (p. 797). Fagan, Wilkinson, and Davies (2000), in their study of violence in New York City, state that: “‘toughness’ has always been highly regarded and a source of considerable status among adolescents in a wide range of adolescent subcultures, from street corner groups to gangs. [...] Violence often is used to perpetuate and refine the pursuit of ‘toughness,’ and to claim the identity of being among the toughest. [...] The status and reputations earned through violent means provide inner city adolescent males with positive feelings of self worth and ‘large’ identities especially when other opportunities for identity development are not available.” (pp. 32-34).<sup>2</sup> Lastly, Matsueda et al. (2006) test a rational choice model of theft and violence using data from the Denver Youth Survey. They find that “youth who expect to be seen as cool (and value being seen as cool) if they commit theft or violence tend to commit substantially more acts of theft and violence, on average, in the coming year.” (p. 115). Matsueda et al. (2005) obtain similar results using survey data from Seattle neighborhoods.

Our analysis is closely related to studies of social status, in particular to Bernheim (1994) and Bénabou and Tirole (2006). In Bernheim (1994), individuals conform to a standard of behavior so as to avoid being seen as having extreme preferences, which would reduce their status or popularity. In Bénabou and Tirole (2006), there is no such desire to resemble the mainstream. Instead, individuals want to signal their altruism and aim to appear as altruistic as possible. Likewise, in this paper, individuals who ap-

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<sup>2</sup>Similar findings are reported by Hughes and Short (2005) studying street gangs in Chicago and by King (2001) discussing studies on violence among football fans in European countries.

pear more ‘tough’ earn more respect from their peers. We share with these papers the focus on how external incentives may interfere with the desire to signal one’s personality traits.

The idea that people may engage in costly signaling so as to gain esteem or acceptance by peers is also prominent in Austen-Smith and Fryer (2005). They develop a model in which individuals signal their social compatibility by underinvesting in education.<sup>3</sup> Glaeser, Sacerdote, and Scheinkman (1996) and Patacchini and Zenou (2005) study models in which individuals want to minimize the social distance between their crime level and that of their reference group. Their empirical analyses show that decisions to commit crime are strongly affected by social interaction. Silverman (2004) studies a matching game with two-sided reputation in which some people directly benefit from violence, whereas others may participate in violence to acquire a ‘street reputation,’ which provides protection from future assault. One of his main results is that varying levels of participation in violence may be sustained by the same economic and social fundamentals. Further, he argues that the effects of enforcement policy may depend on how policy affects the visibility of a criminal action to peers, as visibility affects the reputational gain from crime.

### 3 The model

Individuals choose between three possible actions denoted by  $x \in \{0, m, e\}$ , where  $x = 0$  represents abstaining from crime,  $x = m$  represents committing a minor crime, and  $x = e$  represents committing a serious crime. Apart from social status gains or losses, an individual who commits crime suffers an expected net utility loss of  $c_x$ . This expected net utility loss, which can be negative for some individuals, reflects among others the expected pecuniary gain or loss from crime, the risk of being arrested and punished, the risk of injury or death, and anticipated feelings of fear and guilt.

Individuals differ in innate ‘toughness’  $\sigma$  (a composite of nerve, physical fitness, insensitivity to guilt, and so on) and so expect a different net utility loss from committing a criminal act. Tougher individuals have higher  $\sigma$  and face lower net cost of committing a crime:  $c'_x(\sigma) < 0$  for  $x = m$  and  $x = e$ . Besides an absolute advantage in both forms of crime, tougher individuals also have a comparative advantage in serious crime:  $c'_e(\sigma) < c'_m(\sigma)$ . For

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<sup>3</sup>Our study also relates to papers in which education signals ability, in particular to Bedard (2001) who argues that greater university access may reduce the signaling value of high school, and so may increase high school dropout rates.

convenience, we assume that  $\sigma$  is uniformly distributed, with lower bound  $\sigma_l$ , upper bound  $\sigma_h$ , and density  $f = 1/(\sigma_h - \sigma_l)$ .

Individuals care about their social status for being tough. That is, an individual cares about other people's belief about his  $\sigma$ . People cannot observe each other's type, but they know the distribution of  $\sigma$ . They observe each other's actions, and update beliefs according to Bayes' rule.<sup>4</sup> The posterior belief about an individual's  $\sigma$  is denoted by  $\hat{\sigma}$ . Since there are three possible actions ( $0, m, e$ ), an individual's  $\hat{\sigma}$  can take three values, which we denote by  $\hat{\sigma}_0, \hat{\sigma}_m,$  and  $\hat{\sigma}_e$ . Following Bénabou and Tirole (2006), we assume that an individual's utility from social status depends linearly on the posterior belief about his type. Thus, the utility from social status is given by  $s(\hat{\sigma})$ , with  $s'(\hat{\sigma}) > 0$  and  $s''(\hat{\sigma}) = 0$ . By the latter assumption,  $s'(\hat{\sigma})$  is a constant and can be described as the weight on social status in the utility function.

## 4 Equilibrium

Throughout, we focus on a partially-separating Perfect Bayesian Equilibrium where some individuals abstain from crime, some commit a minor crime, and some commit a serious crime. Without loss of generality, we assume that if an individual is indifferent between actions, then he chooses the least serious crime.

Let us first consider what happens when individuals do not care about their social status for being tough. Clearly, all individuals who expect a net utility loss from committing crime ( $c_x(\sigma) \geq 0$  for  $x = m$  and  $x = e$ ) abstain from crime. Individuals who expect a net utility gain from minor crime ( $c_m(\sigma) < 0$ ) which is larger than or equal to the expected net utility gain from serious crime ( $c_m(\sigma) \leq c_e(\sigma)$ ) commit a minor crime. Lastly, individuals expecting a net utility gain from serious crime ( $c_e(\sigma) < 0$ ) which is larger than the expected net utility gain from minor crime ( $c_e(\sigma) < c_m(\sigma)$ ) commit a serious crime. Clearly, given that  $\sigma_l$  is sufficiently low and  $\sigma_h$  is sufficiently high, the assumption of absolute advantage ( $c'_x(\sigma) < 0$ ) implies that some people choose to abstain from crime whereas others choose to commit crime. If  $c_e(\tilde{\sigma}) = c_m(\tilde{\sigma}) \leq 0$ , then the assumption of comparative advantage ( $c'_e(\sigma) < c'_m(\sigma)$ ) implies that among those who prefer crime some choose minor crime while others choose serious crime. Such a situation is

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<sup>4</sup>Silverman (2004) discusses evidence showing that a majority of violent crimes is committed in public. Also, many of the studies discussed in Section 2 stress the presence of peers when committing crime.

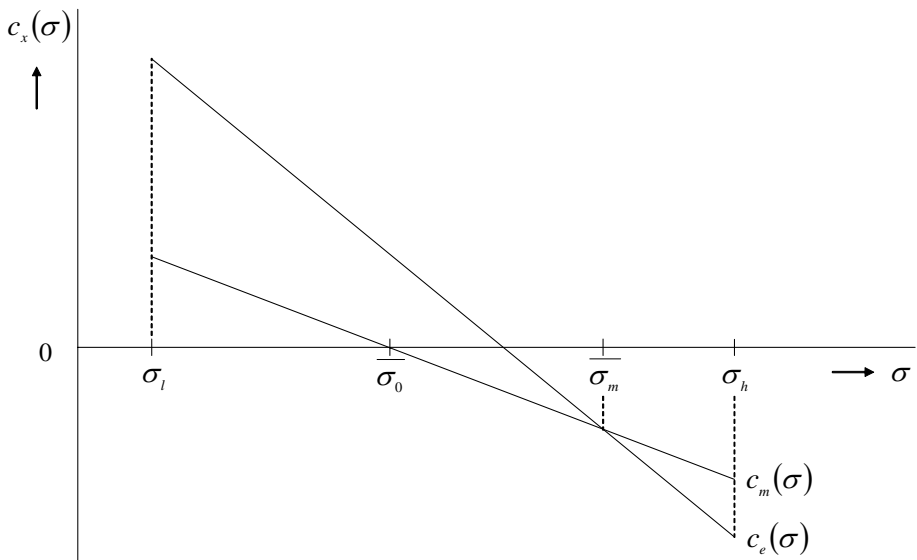


Figure 1: Crime in the absence of status concerns

depicted in Figure 1, where  $\bar{\sigma}_0$  denotes the toughness of individuals at the margin between abstaining from crime and committing a minor crime and  $\bar{\sigma}_m$  denotes the toughness of individuals at the margin between minor and serious crime.<sup>5</sup> Since tougher individuals have an absolute advantage in crime as well as a comparative advantage in serious crime ( $c'_e(\sigma) < c'_m(\sigma) < 0$ ), the toughest individuals will commit serious crime while the least tough individuals abstain from crime. A group in the middle will commit minor crime.

Crime in equilibrium when individuals care about their social status for being tough is described in the following Proposition.

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<sup>5</sup>Notice that if  $c_e(\tilde{\sigma}) = c_m(\tilde{\sigma}) > 0$ , then all individuals who prefer committing a crime to abstaining from crime choose serious crime, and so nobody commits minor crime. Clearly, if the expected penalty for serious crime is sufficiently high compared to the expected penalty for minor crime, then  $c_e(\tilde{\sigma}) = c_m(\tilde{\sigma}) \leq 0$ . This can also be seen from Figure 1 by noticing that an increase in the expected penalty for serious crime shifts the  $c_e(\sigma)$ -curve upwards. Likewise, an increase in the expected penalty for minor crime shifts the  $c_m(\sigma)$ -curve upwards.



**Proposition 1:** *In an equilibrium where each action  $x \in \{0, m, e\}$  is chosen by a strictly positive number of people, individuals committing serious crime enjoy highest status and individuals committing minor crime enjoy higher status than individuals who abstain from crime. Such an equilibrium exists if  $\sigma_l \leq \bar{\sigma}_0 < \bar{\sigma}_m < \sigma_h$  where  $\bar{\sigma}_0$  and  $\bar{\sigma}_m$  are implicitly defined by:*

$$\begin{aligned} -c_m(\bar{\sigma}_0) + s\left(\frac{\bar{\sigma}_0 + \bar{\sigma}_m}{2}\right) &= s\left(\frac{\sigma_l + \bar{\sigma}_0}{2}\right), \\ -c_m(\bar{\sigma}_m) + s\left(\frac{\bar{\sigma}_0 + \bar{\sigma}_m}{2}\right) &= -c_e(\bar{\sigma}_m) + s\left(\frac{\bar{\sigma}_m + \sigma_h}{2}\right). \end{aligned}$$

**Proof:** See Appendix.

Clearly, when crime is also motivated by a concern to signal one's toughness, some individuals who would otherwise abstain from crime commit minor crime. Even though, apart from status concerns, minor crime yields an expected net utility loss to these individuals, this is compensated by a gain in social status. Likewise, some individuals who would otherwise commit minor crime, choose serious crime instead so as to increase their social status. Social status concerns thus induce more people to commit crime. Moreover, among those who commit crime, more people commit serious crime than when social status plays no role.

## 5 Double dividend of zero-tolerance

This section examines the effects of a more aggressive enforcement of minor crime (zero-tolerance) on minor and serious crime. Zero-tolerance may take the form of an increase in the probability of punishment for minor crime or an increase in the punishment for minor crime itself. Recall that the expected net utility loss from crime,  $c_x(\sigma)$ , includes the risk and severity of punishment. Hence, zero-tolerance can be represented by an increase in  $c_m(\sigma)$  for all  $\sigma$ . Clearly, in the absence of status concerns, this gives rise to two effects. First, it induces some individuals to abstain from crime rather than to commit minor crime. Second, some individuals choose serious crime rather than minor crime.<sup>6</sup> Hence, in the absence of status concerns, zero-tolerance decreases minor crime and increases serious crime. Because of

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<sup>6</sup>This can also be seen from Figure 1 by noting that a stiffer penalty for minor crime shifts the  $c_m(\sigma)$ -curve upwards and hence increases  $\bar{\sigma}_0$  and decreases  $\bar{\sigma}_m$ , implying a decrease in the number of people committing minor crime,  $(\bar{\sigma}_m - \bar{\sigma}_0)f$ , and an increase in the number of people committing serious crime,  $(\sigma_h - \bar{\sigma}_m)f$ .

social status concerns, the last effect may be reversed, and so zero-tolerance may yield a double dividend. This is shown in the following Proposition.

**Proposition 2:** *Zero-tolerance always decreases the number of people committing minor crime. It also decreases the number of people committing serious crime if:*

$$\frac{1}{2}s'(\hat{\sigma}) > -c'_m(\bar{\sigma}_0),$$

*that is, if the weight on social status in the utility function is sufficiently high.*

**Proof:** See Appendix.

The intuition behind Proposition 2 is straightforward. Given the people's beliefs ( $\hat{\sigma}_0$ ,  $\hat{\sigma}_m$ , and  $\hat{\sigma}_e$ ), zero-tolerance induces some people to abstain from crime rather than to commit minor crime. Since these individuals are relatively 'gutless' individuals (that is, have relatively low toughness), the social status gained through committing minor crime increases. This makes minor crime more attractive for individuals at the margin between minor and serious crime, and so gives them an incentive to choose minor crime.<sup>7</sup> In other words, by deterring some relatively gutless people, being tough on minor crime makes minor crime a tougher act, and so it becomes more attractive for some people who would otherwise commit more serious crime.

Obviously, for a double dividend to arise, people in criminal subcultures must care enough about their social status ( $s'(\hat{\sigma})$  should be sufficiently high). Moreover, the deterrent effect of zero-tolerance at the lower ends of the toughness distribution must be sufficiently large (that is,  $-c'_m(\bar{\sigma}_0) > 0$  should be sufficiently low). The reason is that if individuals at the margin between inaction and minor crime are more responsive to enforcement policies, then the increase in the signaling value of minor crime in response

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<sup>7</sup>Recall that, given the posterior beliefs, zero-tolerance also induces some individuals to choose serious crime instead of minor crime. As a result of this, the status gained through committing minor crime as well as the status gained through committing serious crime decrease. The reason is that those who choose serious crime rather than minor crime in response to zero-tolerance are relatively tough among the group of people committing minor crime, but relatively gutless among the group of people committing serious crime. In sum, the attractiveness of minor crime compared to the attractiveness of serious crime is not affected by the change in  $\bar{\sigma}_m$ , because the posteriors  $\hat{\sigma}_m$  and  $\hat{\sigma}_e$  change to the same extent, see equation (A3) in the Appendix. Obviously, if  $\sigma$  is distributed non-uniformly, the effects of  $\bar{\sigma}_m$  on  $\hat{\sigma}_m$  and  $\hat{\sigma}_e$  may be of different sizes. The condition for a double dividend of zero-tolerance will then generally put a constraint on the distribution function  $f(\sigma)$  too.

to zero-tolerance is larger. When  $s'(\hat{\sigma})$  is sufficiently high and  $-c'_m(\bar{\sigma}_0)$  is sufficiently low so that the condition in Proposition 2 is satisfied, the increase in the utility from status gained through minor crime dominates the direct utility effect of the increased risk and severity of punishment for minor crime. As a result, some people who would otherwise commit serious crime are induced to commit minor crime. Hence, zero-tolerance reduces the number of individuals committing serious crime as well as the number of people committing minor crime.

## 6 Concluding remarks

We have studied the effects of law enforcement on crime when crime is, at least partly, motivated by social status concerns. We have shown that, when status concerns are sufficiently important, zero-tolerance may yield a double dividend in that it reduces both minor crime as well as more severe crime. Obviously, an alternative way to reduce crime across the board is to increase the penalties for both minor and serious crime. It is straightforward to verify that, in our model, such a policy can simultaneously reduce minor and serious crime. However, increasing penalties across the board may not always be optimal or feasible. One reason is that zero-tolerance policies may be less costly than e.g. longer terms of imprisonment for severe crime (Kahan (1997)). Another reason is that some forms of punishment may be considered immoral, which puts a limit on the harshness of punishment of serious crimes.<sup>8</sup>

In line with the evidence cited in Section 2, we have assumed that individuals care directly about status. It is easy to think of alternative interpretations, though, where status is a means to obtain e.g. protection, attention, or sex. Anderson (1999), Bandiera (2003), and Silverman (2004) stress the importance of acquiring a reputation for being tough so as to protect oneself or others against future attacks. Fagan, Wilkinson, and Davies (2000) find in their sample of 125 young men in New York City that “criminals and males who exhibit tough qualities and behavior are the “populars” and get

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<sup>8</sup>In a previous draft of this paper, we have also examined the effects of stricter enforcement of serious crime while keeping constant the enforcement of minor crime. While this always reduces the number of people committing serious crime, the total number of people committing crime increases when people care about social status. The reason is that, in response to stricter enforcement of serious crime, some relatively tough individuals commit minor crime rather than serious crime, which raises the signaling value of minor crime, and so induces some people to commit minor crime who would otherwise abstain from crime. See Dur (2006).

the most attention.” (p. 37). Relatedly, in Poutvaara and Priks (2005)’s model of hooligan groups, some of the members fight so as to retain the social benefits from being part of the group. Drawing on literature from evolutionary psychology and biology, Rebellon and Manasse (2004) argue that criminal behavior by males may signal positive adaptive qualities like nerve and bravery and so may attract females. Using US panel data, they find some evidence for a causal effect of delinquency on romantic involvement (see also Palmer and Tilley (1995)).

We have restricted the analysis by assuming that individuals can only take one of three actions: abstaining from crime, committing a minor crime, and committing a serious crime. While this is clearly a restrictive assumption, the resulting status hierarchy consisting of three broad groups is well in line with the findings in Fagan, Wilkinson, and Davies (2000)’s empirical study of violent events in New York City. Based on narrative reconstructions of violent events reported by 125 young men, they find a hierarchy of social identities consisting of three broad types with ‘wild’ individuals (who have performed extraordinary acts of violence) at the top, ‘cool’ individuals (who do what it takes in ‘heated’ situations) in the middle, and ‘herbs’ (who cannot fight or do not prove their toughness) at the bottom of the status hierarchy. (See also Fagan and Wilkinson (1998).) Clearly, extending the model to allow for a richer action space will result in a larger number social identities arising in equilibrium. The spirit of our main result does not change, however, as long as the equilibrium remains partially separating.

Critical for our results is the assumption that people in criminal subcultures care about their social status for being ‘tough.’ In Section 2, we discussed several studies stressing the relevance of status hierarchies based on toughness and the prevalence of antiethical norms in a wide range of subcultures. An important question that we did not deal with in this paper is how such norms and subcultures come into being and evolve over time? Empirical studies suggest that a lack of alternative opportunities for identity development may be responsible (e.g. Fagan, Wilkinson, and Davies (2000)). Work along the lines of Oxoby (2004) may shed more light on this important issue as well as on the implications for optimal enforcement policies of endogenous formation of subcultures and norms.

## Appendix

**Proof of Proposition 1:** Given the posterior beliefs  $(\hat{\sigma}_0, \hat{\sigma}_m, \hat{\sigma}_e)$ , individual  $i$  prefers  $x = m$  to  $x = 0$  if:

$$-c_m(\sigma_i) + s(\hat{\sigma}_m) > s(\hat{\sigma}_0). \quad (\text{A1})$$

From  $c'_m(\sigma) < 0$  (absolute advantage), it follows that if individual  $i$  prefers action  $x = m$  to action  $x = 0$ , then all individuals with  $\sigma \geq \sigma_i$  prefer action  $x = m$  to action  $x = 0$ , and vice versa. Denote by  $\bar{\sigma}_0$  the value of  $\sigma_i$  for which (A1) holds with equality. Clearly, in an equilibrium where some people abstain from crime it must hold that  $\bar{\sigma}_0 \geq \sigma_l$ .

Given the posterior beliefs  $(\hat{\sigma}_0, \hat{\sigma}_m, \hat{\sigma}_e)$ , individual  $i$  prefers  $x = m$  to  $x = e$  if:

$$-c_m(\sigma_i) + s(\hat{\sigma}_m) \geq -c_e(\sigma_i) + s(\hat{\sigma}_e). \quad (\text{A2})$$

From  $c'_e(\sigma) < c'_m(\sigma)$  (comparative advantage), it follows that if individual  $i$  prefers action  $x = m$  to action  $x = e$ , then all individuals with  $\sigma \leq \sigma_i$  prefer action  $x = m$  to action  $x = e$ , and vice versa. Denote by  $\bar{\sigma}_m$  the value of  $\sigma_i$  for which (A2) holds with equality. Clearly, in an equilibrium where some people choose to commit serious crime it must hold that  $\bar{\sigma}_m < \sigma_h$ .

From (A1) and (A2) and our assumptions on absolute and comparative advantage, it follows that an equilibrium where some people choose to commit minor crime must have  $\bar{\sigma}_m > \bar{\sigma}_0$ . For if  $\bar{\sigma}_m \leq \bar{\sigma}_0$ , then individuals always prefer either  $x = 0$ , or  $x = e$ , or both  $x = 0$  and  $x = e$  to  $x = m$ .

Summarizing, if  $\sigma_l \leq \bar{\sigma}_0 < \bar{\sigma}_m < \sigma_h$ , then given the posterior beliefs  $(\hat{\sigma}_0, \hat{\sigma}_m, \hat{\sigma}_e)$  individuals with  $\sigma_l \leq \sigma_i \leq \bar{\sigma}_0$  prefer abstaining from crime to committing minor crime and to committing serious crime; individuals with  $\bar{\sigma}_0 < \sigma_i \leq \bar{\sigma}_m$  prefer committing minor crime to abstaining from crime and to committing serious crime; and individuals with  $\bar{\sigma}_m < \sigma_i \leq \sigma_h$  prefer committing serious crime to abstaining from crime and to committing minor crime. Hence, if  $\sigma_l \leq \bar{\sigma}_0 < \bar{\sigma}_m < \sigma_h$ , the posterior beliefs in equilibrium are given by:

$$\hat{\sigma}_0 = \frac{\sigma_l + \bar{\sigma}_0}{2} < \hat{\sigma}_m = \frac{\bar{\sigma}_0 + \bar{\sigma}_m}{2} < \hat{\sigma}_e = \frac{\bar{\sigma}_m + \sigma_h}{2}. \quad (\text{A3})$$

The final step is to find out whether the condition  $\sigma_l \leq \bar{\sigma}_0 < \bar{\sigma}_m < \sigma_h$  holds given the posterior beliefs (A3). Following the definition above,  $\bar{\sigma}_0$  and  $\bar{\sigma}_m$  are given by:

$$\begin{aligned} -c_m(\bar{\sigma}_0) + s(\hat{\sigma}_m) &= s(\hat{\sigma}_0), \\ -c_m(\bar{\sigma}_m) + s(\hat{\sigma}_m) &= -c_e(\bar{\sigma}_m) + s(\hat{\sigma}_e). \end{aligned}$$

Substituting (A3) yields the two equations in the Proposition. If the solutions to these equations for  $\bar{\sigma}_0$  and  $\bar{\sigma}_m$  satisfy  $\sigma_l \leq \bar{\sigma}_0 < \bar{\sigma}_m < \sigma_h$ , then an equilibrium exists in which each action  $x \in \{0, m, e\}$  is chosen by a strictly positive number of people. In such an equilibrium, it follows from (A3) and  $s'(\hat{\sigma}) > 0$  that

$$s(\hat{\sigma}_0) < s(\hat{\sigma}_m) < s(\hat{\sigma}_e).$$

Hence, individuals committing serious crime enjoy highest status and individuals committing minor crime enjoy higher status than individuals who abstain from crime.  $\square$

**Proof of Proposition 2:** We consider the effects of increasing the expected net utility loss from minor crime by  $\mu$  for all types. (It is straightforward to let  $\mu$  depend on  $\sigma$ . When  $\mu'(\sigma) < 0$ , the condition under which a double dividend arises becomes milder.) The equilibrium values of  $\bar{\sigma}_0$  and  $\bar{\sigma}_m$  become:

$$\begin{aligned} -c_m(\bar{\sigma}_0) - \mu + s(\hat{\sigma}_m) &= s(\hat{\sigma}_0), \\ -c_m(\bar{\sigma}_m) - \mu + s(\hat{\sigma}_m) &= -c_e(\bar{\sigma}_m) + s(\hat{\sigma}_e), \end{aligned}$$

where  $\hat{\sigma}_0$ ,  $\hat{\sigma}_m$ , and  $\hat{\sigma}_e$  are functions of  $\bar{\sigma}_0$  and  $\bar{\sigma}_m$  as described by (A3). Applying the implicit function theorem, we obtain after some rewriting:

$$\frac{d\bar{\sigma}_0}{d\mu} = -\frac{c'_e(\bar{\sigma}_m) - c'_m(\bar{\sigma}_m) - \frac{1}{2}s'(\hat{\sigma})}{[c'_e(\bar{\sigma}_m) - c'_m(\bar{\sigma}_m)]c'_m(\bar{\sigma}_0) + [\frac{1}{2}s'(\hat{\sigma})]^2}, \quad (\text{A4})$$

$$\frac{d\bar{\sigma}_m}{d\mu} = \frac{c'_m(\bar{\sigma}_0) + \frac{1}{2}s'(\hat{\sigma})}{[c'_e(\bar{\sigma}_m) - c'_m(\bar{\sigma}_m)]c'_m(\bar{\sigma}_0) + [\frac{1}{2}s'(\hat{\sigma})]^2}. \quad (\text{A5})$$

Using (A4) and (A5), the effect of zero-tolerance on the number of individuals committing minor crime,  $(\bar{\sigma}_m - \bar{\sigma}_0) f$ , is given by:

$$\left( \frac{d\bar{\sigma}_m}{d\mu} - \frac{d\bar{\sigma}_0}{d\mu} \right) f = \frac{c'_m(\bar{\sigma}_0) + [c'_e(\bar{\sigma}_m) - c'_m(\bar{\sigma}_m)]}{[c'_e(\bar{\sigma}_m) - c'_m(\bar{\sigma}_m)]c'_m(\bar{\sigma}_0) + [\frac{1}{2}s'(\hat{\sigma})]^2} f,$$

which is negative because  $c'_m(\sigma_i) < 0$ ,  $c'_e(\sigma_i) - c'_m(\sigma_i) < 0$ , and  $f > 0$ .

The number of individuals committing serious crime is described by  $(\sigma_h - \bar{\sigma}_m) f$ . Since  $\sigma_h$  and  $f$  are constants, it suffices to examine the effect of  $\mu$  on  $\bar{\sigma}_m$ , which is given by (A5). Note that the denominator of (A5) is positive since  $c'_e(\sigma_i) - c'_m(\sigma_i) < 0$  and  $c'_m(\sigma_i) < 0$ . If the condition in the Proposition is satisfied, then the numerator is also positive, implying that  $\bar{\sigma}_m$  increases with  $\mu$ , and so the number of individuals committing serious crime decreases with  $\mu$ .  $\square$

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