The international platform of Ludwig-Maximilians University's Center for Economic Studies and the Ifo Institute

CESifo Working Papers

www.cesifo.org/wp

Status Concerns as a Motive for Crime?

Florian Baumann
Tim Friehe

CESIFO WORKING PAPER NO. 4225
CATEGORY 1: PUBLIC FINANCE
APRIL 2013

Presented at CESifo Area Conference on Applied Microeconomics, March 2013

CESifo
Center for Economic Studies & Ifo Institute

CESifo *Working Paper No. 4225*

Status Concerns as a Motive for Crime?

Abstract

This paper analyzes the implications of potential offenders caring about their relative status. We establish that subjects' status concerns can result in multiple-equilibrium crime rates and may modify the standard comparative-statics results regarding how the crime rate changes in response to a higher detection probability and higher sanctions. In addition, we argue that the socially optimal level of the detection probability and the sanction will often be higher when potential offenders care about their relative positions. Our analysis can be linked to one of the most important criminological theories of crime, namely strain theory.

JEL-Code: H230, K420.

Keywords: crime, status, deterrence, multiple equilibria, strain theory.

Florian Baumann
Duesseldorf Institute for Competition Economics (DICE)
Heinrich-Heine-Universitaet Duesseldorf
Universitaetsstrasse 1
Germany - 40225 Düsseldorf
fbaumann@dice.hhu.de

Tim Friehe
Center for Advanced Studies in Law & Economics / University of Bonn
Adenauerallee 24-42
Germany - 53113 Bonn
tim.friehe@uni-bonn.de

1 Introduction

1.1 Motivation and main results

Crime is a social phenomenon of great importance, adversely affecting society as a whole and the countless individuals who are victimized each day. It is thus no surprise that surveys consistently rank crime at or near the top of the list of social maladies (see, e.g., Helsley and Strange 1999). When it comes to explaining why criminals offend, there is overwhelming support for the theory that specific kinds of crime are undertaken for material gain, that is, to generate additional income for consumption (e.g., Foley 2011, Grogger 1998, Lin 2008, Raphael and Winter-Ebmer 2001, Williams and Sickles 2002).[1] With respect to such criminal acts, the standard approach in the literature analyzes the decision of each potential offender in isolation (e.g., Becker 1968, Polinsky and Shavell 2009). In this paper, we will consider this decision in context. More precisely, we will explore the consequences of individual utility as a function of both the absolute consumption level *and* the consumption level relative to a reference point. In our contribution, the reference point is the level of average consumption in the relevant peer group (i.e., the population of potential offenders), and is itself influenced by individuals' decisions regarding crime. Our analysis of status concerns is motivated by convincing evidence showing that people compare themselves to others in a wide variety of aspects of life, with important repercussions on well-being and behavior.[2]

We establish that the status concerns of potential offenders can result in multiple-equilibrium crime rates. This evidence supporting multiple crime rates is of great interest because crime in the real world is very unevenly distributed across space and time, despite

[1] In the present paper, we will focus on income-generating crime, thereby excluding rape and other crimes without monetary motivation.

[2] For instance, Dohmen et al. (2011) provide evidence of the importance of relative income for subjective well-being using functional magnetic resonance imaging (fMRI). Further empirical evidence of the importance of relative income positions for individual happiness and behavior can be found in, e.g., Stutzer (2004) and Frey et al. (2008).

similar characteristics of respective locations. For example, there are numerous cases of "twin" cities in the US – cities with similar characteristics that nevertheless exhibit very different crime rates (see, e.g., Marceau and Mongrain 2011). The explanation for the existence of multiple crime rates in our setting is quite intuitive. Concerns regarding relative consumption introduce an interdependency between the decision of a given potential offender of whether to participate in crime and the decisions of all other individuals regarding the criminal opportunity. When many other individuals engage in criminal activity and thereby increase their expected income available for consumption, an individual who complies with the law will be disadvantaged in terms of status (which may motivate criminal behavior). In contrast, when only a few individuals engage in crime, then average consumption will not differ much from what a norm-compliant individual can afford, such that the status utility of a law-abiding individual need not adversely affect the individual's total utility (potentially supporting a low-crime outcome). Interestingly, we find that crime may be either higher or lower in comparison to a scenario in which potential offenders do not have status concerns.

In addition, this paper shows that the status concerns of potential offenders may call into question the standard comparative-statics predictions regarding changes in the levels of the sanction and the detection probability. Indeed, it may be the case that an increase in the detection probability will result in an increase in the crime rate. This possibility follows from the fact that higher law-enforcement parameters decrease the reference level of consumption, which may make crime more beneficial at the margin. The influence of the strictness of enforcement on the reference consumption level is also central to our argumentation when we turn to the welfare and policy implications. We argue that the influence of status concerns will often imply higher marginal benefits for stricter law enforcement: By depressing the reference consumption level, stricter enforcement improves the relative standing of all individuals (offenders and non-offenders).

Our analysis of potential offenders with status concerns can be linked to strain theory, one of the principal sociological explanations for the emergence of crime (see, e.g., Agnew 2006a). Famously, Merton (1938) argues that crime offers the possibility to mitigate the disparity between the (in many societies) overwhelming desirability of economic success and the (for many individuals) limited access to legitimate means of attaining economic success, such as an elite education. Hence, for many individuals, offending may very well be the response to the question of "which of the available procedures is most efficient in netting the culturally approved value" (Merton 1968, 189). Relative deprivation (e.g., a negative discrepancy resulting from a comparison of wealth or status) is an important cause of strain and may be a powerful motivator of crime (see, e.g., Young 2006); empirical work has shown that people are more likely to engage in crime when they experience a sense of relative deprivation (see, e.g., Baron 2004, Stiles et al. 2000). This transfers to our setup as follows: Potential offenders are concerned about their absolute level of consumption and about how their consumption compares to that of similar others, where lagging behind the reference level of consumption (i.e., relative deprivation) depresses status utility (i.e., causes strain). The possibility of obtaining higher status utility from achieving a consumption level higher than that of the reference group similarly dovetails with strain theory, as Merton suggests that personal success and satisfaction derive not only from goal attainment but also from surpassing others (Lee and Cohen 2008). In this way, our paper may reconcile economic and sociological approaches to crime, which have often been perceived as incompatible.[3]

In summary, our article contributes to the literature in the following ways. First, we provide an analysis of potential offenders with status concerns, discussing the possibility of multiple equilibria for crime rates and our counterintuitive comparative-statics results. Thereby, the present paper provides an explanation for the variation in real-world crime

[3]For example, Kelly (2000) summarizes his findings by stating that "Property crime is well explained by the economic theory of crime, while violent crime is better explained by strain and social disorganization theories."

rates, in response to a recent assertion by Ferrer (2010) that "differences in crime rates across locations ... remain an open question in the law enforcement literature". Our explanation is complementary to those established in the literature (see the discussion in the next section). Second, our analysis may be interpreted as exploring certain implications of one of the principal criminological theories – namely, strain theory. One of our central findings in this regard is that the existence of positional concerns need not necessarily induce more crime, as is often suggested in the literature. Finally, we establish status gains and losses as additional aspects that should be considered in co-determining optimal law enforcement. In this regard, we argue that in many circumstances, stricter law enforcement is likely to be the adequate response to potential offenders' caring about their relative positions.

1.2 Related literature

In addition to the literature on optimal law enforcement, which does not yet include an analysis of potential offenders with status concerns (see, e.g., Polinsky and Shavell 2009 for a recent survey), the present paper is related to (i) articles exploring the implications of the status concerns of individuals, (ii) contributions that establish the possibility of multiple crime equilibria, and (iii) literature in the field of strain theory.

The idea that relative positions influence well-being and behavior has become widely accepted in the field of economics. Both the fact that relative concerns are important and the fact that goods differ with regard to their positionality (i.e., certain goods have a higher relevance for relative standing in society) have been confirmed in several empirical studies, among them Alpizar et al. (2005), Carlsson et al. (2007), Carlsson and Qin (2010), Caporale et al. (2009), Clark et al. (2008), Clark and Senik (2010), Johansson-Stenman et al. (2002), Solnick and Hemenway (1998, 2005), and Solnick et al. (2007). When it comes to the identification of the reference point, there is evidence that the respect and admiration resulting from face-to-face interactions with groups such as colleagues and friends are

a major determinant of status concerns (see Anderson et al. 2012, Clark and Senik 2010, Senik 2009). Our study complements this literature by exploring the repercussions of status concerns for the decision regarding crime.[4]

This paper establishes that the interdependence between potential offenders introduced by status concerns may allow more than one crime rate to represent an equilibrium. Crime is distributed unevenly across space and time, even in cases in which regional characteristics are similar (see, e.g., Glaeser et al. 1996). This has created a long-standing interest in the possibility of multiple equilibria. Research has succeeded in showing that there are circumstances that permit multiple crime rates in equilibrium, thereby contributing to an explanation of the empirical finding regarding the distribution of crime. One explanation relies on the fact that a given enforcement budget creates a high detection probability when there is little criminal activity, but only a small detection probability when many individuals engage in crime (see Bar-Gill and Harel 2001, Bond and Hagerty 2010, Conley and Wang 2006, Fender 1999, Ferrer 2010, Freeman et al. 1996, Helsley and Strange 1999, Sah 1991). Another possible explanation is based on asymmetric information about individuals' characteristics and self-fulfilling beliefs (Rasmusen 1996, Verdier and Zenou 2004). In contrast, the positive covariance between the individual decisions to commit or refrain from committing crime in our framework is due to the fact that subjective well-being depends in part on the comparison of one's own consumption level to that of others. Other social interaction models (such as Glaeser et al. (1996), Sah (1991), Schrag and Scotchmer (1997), Silverman (2004), and Traxler (2010)), rely on different reasons to explain this interdependence. For example, Glaser et al. (1996) consider the case in which some individuals imitate their neighbors, while Schrag and Scotchmer (1997) examine the consequences of several potential criminals with access to an opportunity for crime in a setting in which an individual with access

[4]We abstract from the possibility of policy instruments that can dampen positional concerns. See, e.g., Frank (2008).

may be sanctioned erroneously. In another line of inquiry, Burdett et al. (2003), Huang et al. (2004), and Marceau and Mongrain (2011) incorporate potential labor market influences. The present paper provides a complementary explanation for the empirically observed variance of crime across time and space, building on the empirically supported assumption regarding the positional concerns of subjects, in an approach that can be linked to strain theory.

Strain theory started with Merton (1938); since then the theory has been elaborated in several ways. More recent contributions concerning the relationship between strain and crime include the general strain theory developed by Agnew (2006b) and the institutional anomie theory proposed by Messner and Rosenfeld (2001). Strain theory has accumulated a considerable amount of empirical support (Lee and Cohen 2008). Our analysis may be interpreted as a simple formal operationalization of important aspects of the theory, as it closely mirrors the concept of relative deprivation referred to above.

The results of our paper rely on the importance of the comparison of an individual's consumption level with that of similar peers, where an asymmetry in consumption is rooted in an asymmetry in available income (despite an assumption of symmetric legal income). It may thus be argued that there is some relation to studies that explore the interconnection between crime and inequality. In this realm, certain theoretical contributions address the fact that law enforcement may also succeed by granting social transfers, because this influences the opportunity costs of crime (Benoit and Osborne 1995, Demougin and Schwager 2000, 2003). The empirical literature on the association between inequality and crime has in most contributions established a positive link between the two (see Dahlberg and Gustavsson 2008, Demombynes and Özler 2005, Fajnzylber et al. 2002, Whitworth 2012, forthcoming), although other results have also been found (see Kelly 2000 and Chintrakarn and Herzer 2012).

The remainder of our paper is organized as follows. In Section 2, we describe the model used for our analysis. Section 3 presents our equilibrium analysis, and Section 4 discusses findings from a comparative-statics exercise. Potential welfare implications are addressed in Section 5. The final section concludes.

2 The model

Consider a group of individuals who are identical regarding their preferences for consumption and status. We assume that individual well-being can be represented by the following utility function:

$$U = v(c) + gw(S), \tag{1}$$

where c is the individual's consumption level and S is the individual's status. The utility from consumption is increasing at a diminishing rate (i.e., $v' > 0 > v''$). The marginal utility from an improvement in relative standing is weakly positive (i.e., $w' \geq 0$) and may be constant, decreasing or increasing. For example, Robson (1992) assumes that utility is strictly convex in status, whereas Corneo (2002) supposes a strictly concave relationship.[5] The parameter g indicates the relative importance of status in comparison to absolute consumption. Our specification of U implies that we consider utility to be additively separable, a case between absolute consumption and relative standing constituting complements or substitutes.

Status is determined by comparing an individual's own level of consumption with the reference group's average level of consumption $\bar{c}$. With respect to the reference group, we assume that a potential offender considers other potential offenders to be relevant peers. This is consistent with the empirical literature on the identification of the reference point (as discussed in Section 1.2). In order to focus our study on crime decisions based on given

[5] According to Robson (1992, p. 839), "... it seems plausible that the difference between a gold medal and silver medal should be greater than that between a silver medal and a bronze medal".

status concerns, we do not consider the possibility that reference groups may be endogenous.[6] We follow Card et al. (2012), Falk and Knell (2004), and Konrad and Lommerud (1993), among others, when we specify

$$S \equiv c - \bar{c}. \tag{2}$$

Individual consumption is constrained by available income. All individuals in the reference group obtain income $I > 0$ from legal work.[7] In addition, individuals may take advantage of a criminal opportunity with gain b. In other words, in our model, the decision regarding crime is binary, as is standard in the literature on optimal law enforcement (see, e.g., Polinsky and Shavell 2001, 2009). The level of the criminal gain differs between individuals, where $b \in [0, B]$ according to the cumulative distribution function $F(b)$. Note that the consideration of individuals who are symmetric apart from their payoffs from crime is a standard procedure in the economic analysis of crime (see, e.g., Bond and Hagerty 2010). Undertaking crime entails the risk that with probability p, $0 < p < 1$, the criminal benefits will be surrendered and a sanction $s > 0$ will be imposed. As a result, we must distinguish between three different levels of available income for an individual with criminal benefits b:

$$I_n = I + b \tag{3}$$

$$I_d = I - s \tag{4}$$

$$I_L = I \tag{5}$$

where the subscript n represents 'no detection', d 'detection', and L denotes the case in which the individual is law-abiding and does not take advantage of the illegal opportunity.

This concludes our discussion of the elements of the model. We now elaborate on the two main building blocks of our analysis: First, an individual's decision of whether or not to

[6] For example, Falk and Knell (2004) and Wichardt (2008) refer to the possibility of endogenous reference groups.

[7] The assumption that all individuals (offenders and non-offenders) have legal income has empirical support, since most criminals also participate in lawful employment (see, e.g., Kleiman 2009).

commit the crime, and second, the determination of average consumption (which constitutes the reference point for individual well-being).

Individuals' crime choices

Refraining from crime implies expected utility EU_L, given by

$$EU_L(\bar{c}) = v(I_L) + gw(I_L - \bar{c}). \tag{6}$$

In contrast, individuals who opt to commit the offense have expected utility EU_O, as described by

$$EU_O(b, \bar{c}) = (1-p)[v(I_n) + gw(I_n - \bar{c})] + p[v(I_d) + gw(I_d - \bar{c})]. \tag{7}$$

In making a decision regarding the commission of a crime, the individual views the reference consumption level $\bar{c}$ as exogenously given. The utility from complying with the law is the same for all individuals, whereas EU_O varies across the population, since $b \in [0, B]$ is randomly drawn for each subject. An individual's gain in expected utility obtained from committing an illegal act with a criminal benefit b is defined by $\Delta(b, \bar{c})$, where

$$\Delta(b, \bar{c}) = EU_O(b, \bar{c}) - EU_L(\bar{c}). \tag{8}$$

As a result, for a given average consumption level, a crime rate between zero and one would result when there is some individual with criminal gain $\tilde{b}$ for whom it holds that

$$\Delta(\tilde{b}, \bar{c}) = EU_O(\tilde{b}, \bar{c}) - EU_L(\bar{c}) = 0. \tag{9}$$

Since $\partial\Delta/\partial b > 0$, we can conclude that individuals (do not) offend for a given level of reference consumption when b $(<)$ $\geq \tilde{b}$. A critical gain level $\tilde{b}$ implies a crime rate of $1 - F(\tilde{b})$.[8]

[8]In the event of indifference, we assume that the individual commits the criminal act. However, this assumption has no bearing on our overall analysis.

With regard to an individual's choice, it is interesting to note that offending implies a gamble with respect to both consumption utility and status utility. Although potential offenders are risk-averse in terms of variations in the level of absolute consumption, it is possible that they are risk-seeking with regard to status. Examining a given potential offender with criminal gains b, we can calculate the implicit risk premium R from

$$(1-p)[v(I_n)+gw(I_n-\bar{c})]+p[v(I_d)+g(I_d-\bar{c})]=v(I_L-R)+gw(I_L-R-\bar{c}), \qquad (10)$$

where $R<\ (>)0$ for individuals who do (not) offend for given parameter values. In other words, individuals who would like to offend given the parameters must be paid $-R>0$ in order to refrain from the criminal activity. In the following analysis, the reference consumption will be of critical importance, because the decisions of others regarding crime enter the individual trade-off via this variable. As a result, it is interesting to observe how the risk premium changes with the level of reference consumption. Starting from the definition in (10), we arrive at

$$\frac{\partial R}{\partial \bar{c}}=-g(w'_L-(1-p)w'_n-pw'_d)\Gamma=-g\kappa\Gamma \qquad (11)$$

where w'_j is shorthand for $w'(I_j-\bar{c})$, $j=n,d,L$. The same logic applies to v'_j, with $\Gamma=v'_L+gw'_L>0$. With

$$\kappa=w'_L-(1-p)w'_n-pw'_d \qquad (12)$$

we denote how the status lottery is influenced at the margin by an increase in the level of reference consumption; the sign of κ cannot be unambiguously established given our assumptions. Since status decreases with the level of average consumption, a positive value of κ implies that an increase in reference consumption lowers status utility in the case of law-obedience by more than the expected status utility from the commission of the criminal act. Overall, the marginal effect κ describes how the attractiveness of the criminal opportunity is influenced by changes in the level of reference consumption.

Lemma 1 *Due to the status lottery implied, crime is more (less) beneficial for the potential offender when reference consumption increases and* $\kappa > (<) 0$.

Proof. The proof follows from (11). For $\kappa > (<) 0$ the risk premium decreases (increases) with $\bar{c}$, implying that the criminal opportunity becomes more (less) favorable. ■

The ambiguous influence of a higher reference consumption level on the attractiveness of crime may be explained as follows. A higher level of reference consumption makes it more difficult to stand out even when engaging in crime, and it exacerbates disadvantageous status in the detection state. This makes crime less attractive. On the other hand, higher reference consumption results in a lower status utility for individuals who refrain from crime, which makes crime more attractive. Which of the two effects dominates depends – *inter alia* – on the individual's risk preferences regarding status.

Returning to the risk premium and how it is influenced by changes in parameters exogenous to the potential offender, we conclude with respect to the weight placed on status, law enforcement parameters, and legal income that

$$\frac{\partial R}{\partial g} = -\left((1-p)w_n + pw_d - w_L\right)\Gamma \tag{13}$$

$$\frac{\partial R}{\partial p} = -\left(v_d + gw_d - v_n - gw_n\right)\Gamma > 0 \tag{14}$$

$$\frac{\partial R}{\partial s} = p(v_d' + gw_d')\Gamma > 0 \tag{15}$$

$$\frac{\partial R}{\partial I} = -\left((1-p)v_n' + pv_d' - v_L' - g\kappa\right)\Gamma. \tag{16}$$

Whether more weight placed on status increases or decreases the risk premium depends on how the status lottery is evaluated by the individual at the outset. In contrast, an increase in one of our law-enforcement parameters always increases the risk premium and makes crime less attractive for a given level of reference consumption. Finally, with an increase in legal income affecting all three possible states for a given level of reference consumption, crime

will become more (less) attractive if the overall degree of absolute risk aversion with respect to combined consumption and the status lottery is decreasing (increasing).

The level of reference consumption

Up to this point, we have considered an individual's decision for a given level of reference consumption. In fact, the level of reference consumption is defined by[9]

$$\bar{c} = I + (1-p)\int_{\bar{b}}^{B} b dF(b) - ps(1 - F(\bar{b})), \tag{17}$$

where it is assumed that the individual who is just indifferent between committing the offense and obeying the law obtains criminal gain $\bar{b}$. The first term on the right-hand side of (17) represents legal income. The second and third terms can be explained as follows: All individuals with $b \geq \bar{b}$ offend, either obtaining the benefits from the crime (in the 'no detection' state of the world, i.e., with probability $1-p$) or experiencing a reduction in available income due to the imposition of the sanction s (in the 'detection' state, i.e., with probability p). Reference consumption will be equal to the level of legal income when $\bar{b} = B$ (i.e., when no crimes are committed), and maximal at $I + (1-p)\int_{b^*}^{B} b dF(b) - ps(1 - F(b^*))$ with $\bar{b} = b^* = ps/(1-p)$ (when we assume that $B > b^*$). The latter follows from

$$\frac{\partial \bar{c}}{\partial \bar{b}} = f(\bar{b})[ps - (1-p)\bar{b}] \tag{18}$$

$$\frac{\partial^2 \bar{c}}{\partial \bar{b}^2} = f'(\bar{b})[ps - (1-p)\bar{b}] - (1-p)f(\bar{b}). \tag{19}$$

It is intuitive that the level of reference consumption will increase when there is a positive level of deterrence ($ps > 0$) and the critical gain level increases starting from a small level (i.e., starting from $\bar{b} < b^*$) since the forgone expected criminal benefits will be exceeded by the saving in expected sanctions. Similarly, reference consumption decreases when $\bar{b}$ is increased starting from a value that is high relative to what would be required to maximize expected

[9] We assume that the number of individuals in the reference group is sufficiently large in order to allow use of the expected value.

payoffs (i.e., when starting from $\bar{b} > b^*$).[10] Reference consumption is also a function of legal income and the law-enforcement parameters. Reference consumption increases one-to-one with legal income, whereas the effects of law enforcement are described by

$$\frac{\partial \bar{c}}{\partial p} = -\int_{\bar{b}}^{B} b dF(b) - s(1 - F(\bar{b})) < 0 \tag{20}$$

$$\frac{\partial \bar{c}}{\partial s} = -p(1 - F(\bar{b})) < 0, \tag{21}$$

for a given level of $\bar{b}$.

Lemma 2 *The reference consumption level decreases in the strictness of law enforcement for a given level of* $\bar{b}$.

Proof. The proof follows from (20) and (21). ■

This concludes the discussion of the two building blocks of our model, the critical gain level resulting from individual utility maximization for a given reference consumption and the level of reference consumption as a function of the critical gain level.

3 Equilibrium

In this section, we first establish that there is at least one equilibrium crime rate, and then discuss the possibility of multiple equilibria. The subsequent section will present the results of a comparative-statics analysis.

Existence of an equilibrium

An individual with a crime opportunity that pays b in the 'no detection' state of the world decides whether or not to commit the offense given the reference consumption level $\bar{c}$. The latter is a function of the critical gain level, legal income, and the enforcement parameters,

[10] Note that average consumption $\bar{c}$ is larger than legal income I as long as $\int_{\bar{b}}^{B} ((1-p)b - ps)\, dF(b) > 0$; this is fulfilled for a wide range of values when $\bar{b} < b^*$.

$\bar{c} = \bar{c}\left(\bar{b}, I, p, s\right)$. We assume that all individuals choose simultaneously between offending and not offending. Their decision-making yields a critical gain level for a given level of average consumption (i.e., for an assumed critical gain level). Accordingly, the critical gain level in equilibrium must be consistent in the sense that $\bar{b}$ results from individual decision-making that takes $\bar{c} = \bar{c}\left(\bar{b}, I, p, s\right)$ as given.

Proposition 1 *There exists at least one equilibrium critical gain level* $\bar{b}^* \in [0, B]$*, implying a crime rate* $1 - F(\bar{b}^*)$*, such that*

$$\Delta\left(\bar{b}^*, \bar{c}\left(\bar{b}^*\right)\right) = 0 \tag{22}$$

for an interior solution, or

$$\Delta\left(0, \bar{c}(0)\right) > 0 \text{ or } \Delta\left(B, \bar{c}(B)\right) < 0 \tag{23}$$

for corner solutions.

Proof. Individual decision-making yields a critical level $\tilde{b}$ as a function of $\bar{b}$ (which appears in the reference consumption level), where both $\tilde{b} \in [0, B]$ and $\bar{b} \in [0, B]$. Defining $y(\bar{b}) = \bar{b} - \tilde{b}(\bar{b})$, we obtain $y(0) \leq 0$ and $y(B) \geq 0$, such that there is at least one $\bar{b}^*$ for which $y(\bar{b}^*) = 0$ since $y(\bar{b})$ is a continuous function. ■

The fixed-point equations (22) and (23) express the requirement that individuals' expectations regarding the crime rate must materialize in equilibrium.

Existence of multiple equilibria

In addition to caring about absolute consumption, individuals compare their personal consumption to the reference level of consumption. This creates an interaction among the individuals in our framework, in which the privately optimal decision made by an individual is co-determined by how the other subjects decide. It may be that an individual's consumption when restricted to the level of legal income will compare relatively unfavorably because

others are resorting to illegal means to increase their consumption possibilities.[11] Given the dependence of individual well-being on status utility and the specifics of the status lottery, it is possible that there will be alternative equilibrium outcomes – for example, an outcome in which only a few people commit crimes (which will not persuade many additional individuals to become offenders), and a high-crime scenario in which most individuals attempt to raise their individual consumption by resorting to crime. It is thus interesting to investigate the possible existence of more than one equilibrium in our model, in order to determine whether a necessary condition for such an outcome can be readily identified in our framework.

The function $\Delta\left(\bar{b}, \bar{c}\left(\bar{b}\right)\right)$ reflects whether or not it is advantageous for an individual with criminal gains given by $\bar{b}$ to engage in crime when the reference consumption amounts to $\bar{c}\left(\bar{b}\right)$, expressing the expectation that individuals with benefits $b \geq \bar{b}$ will commit the offense. For an interior equilibrium, we require that $\Delta\left(\bar{b}, \bar{c}\left(\bar{b}\right)\right) = 0$, as in (22), whereas $\Delta\left(0, \bar{c}(0)\right) > 0$ and $\Delta\left(B, \bar{c}(B)\right) < 0$ indicate corner solutions. Considering $\Delta\left(\bar{b}, \bar{c}\left(\bar{b}\right)\right)$ as a function of $\bar{b}$, we obtain

$$\begin{aligned} \frac{d\Delta\left(\bar{b}, \bar{c}\left(\bar{b}\right)\right)}{d\bar{b}} \equiv D &= \underbrace{(1-p)[v'_n + gw'_n]}_{X} + \underbrace{\frac{\partial \bar{c}}{\partial \bar{b}} g[w'_L - (1-p)w'_n - pw'_d]}_{Y} \\ &= \underbrace{(1-p)[v'_n + gw'_n]}_{X} + \underbrace{\frac{\partial \bar{c}}{\partial \bar{b}} g\kappa}_{Y}. \end{aligned} \tag{24}$$

The direct effect represented by Term X (reflecting higher income in the no-detection state n) is always positive. For a given level of reference consumption, higher expected benefits make crime more attractive. The existence of more than one equilibrium would require that the indirect effect expressed by Term Y is – over some range of $\bar{b}$ – oppositely signed and that it dominates the direct effect. The indirect effect results from the comparison of status

[11] Note that for the individual, resorting to crime may also entail a further deterioration in consumption due to the imposition of the sanction in the detection state of the world; however, for the population of potential offenders, the presence of criminal opportunities raises average consumption over a wide range of critical benefit levels.

lotteries at respective critical benefit levels. Accordingly, Term Y includes κ that determines whether or not crime will be more or less attractive as a result of an increase in reference consumption (see Lemma 1). This is intuitive, as the decisions of other potential offenders enter the individual trade-off via the level of reference consumption.

Lemma 3 *When reference consumption is given by $\bar{c}(\bar{b})$, an increase in the criminal benefit level $\bar{b}$ may decrease the difference in expected utilities from crime and no crime at $\bar{b}$, $\Delta(\bar{b}, \bar{c}(\bar{b}))$, when $\kappa \partial \bar{c}/\partial \bar{b} < 0$.*

Proof. The proof follows from (24). ■

The existence of multiple equilibria thus depends on whether the effect resulting from reference consumption (when negative) can for some levels of $\bar{b}$ dominate the direct effect from higher criminal gains. The effect via the reference consumption may be negative when an increase in $\bar{b}$ induces a lower (higher) equilibrium $\bar{c}$ and a higher reference consumption argues for (against) the crime option, such that $\kappa > 0$ ($\kappa < 0$). The intuition for this can best be described in the following way. Assume that a decrease in $\bar{b}$ (that is, more crime) increases reference consumption. For $\kappa > 0$, this increase in crime will itself make crime more profitable for individuals, due to their status concerns. In this way, status concerns may justify both high and low crime outcomes. The possibility of the indirect effect dominating the direct effect will be demonstrated by examples below.

Having alluded to the possible existence of multiple equilibria, we should also consider the stability of these equilibria. With regard to the distinction between stable and unstable equilibria, we assume that $D > 0$ must hold in order for an equilibrium with $\Delta\left(\bar{b}, \bar{c}\left(\bar{b}\right)\right) = 0$ to be stable. In this case, to the left of the root, crime is not worthwhile at the given benefit level (because $\Delta < 0$); accordingly this implies a movement toward the equilibrium level $\bar{b}$. A similar argument can be made in cases on the right of the root.

In the absence of status considerations (i.e., when $g = 0$), our model has only one equilibrium, since in this case $Y = 0$. Because $D > 0$, the equilibrium is stable. We obtain $\Delta(0, \bar{c}(0)) > 0$, $\Delta\left(\bar{b}^*, \bar{c}(\bar{b}^*)\right) = 0$, or $\Delta(B, \bar{c}(B)) < 0$, which determines the unique equilibrium crime rate. The intuition is clear. The crime opportunity is only evaluated by trading off the material benefit and the expected sanction (and the associated risk implied); thus, crime always becomes more attractive when the material benefit is higher. Similarly, there is only one equilibrium crime rate when $w'(S) > 0$ and $w''(S) = 0$ for all S. In this scenario, we obtain $\kappa = 0$, which rules out a negative Term Y. In other words, a linear status utility that is equally relevant in all states of the world precludes changes in the attractiveness of crime due to a change in the valuation of the status lottery.

We will now briefly refer to an example that will serve to establish the possibility of multiple stable equilibria and will also be useful in our later comparative-statics analysis. We assume $v(I_j) = 1 - e^{-2I_j}$, $I = 7/4$, $g = 3/2$, $B = 1$, and a uniform distribution for b on $[0, 1]$. In other words, we make use of a standard CARA utility function regarding utility from absolute consumption with a coefficient of absolute risk aversion equal to two. With respect to status utility, we utilize

$$w(S) = \begin{cases} \eta_+(|S|)^u & S > 0 \\ -(|S|)^u & S \leq 0 \end{cases} \tag{25}$$

where the parameter η_+ is equal to one when above-average consumption is relevant to status concerns ($\eta_+ = 1$) and zero otherwise. In this way, we can examine whether it would make a difference if only relative deprivation contributed to utility, with high status conferring no advantage. We illustrate the equilibrium outcomes for two specifications of the remaining variables.

Specification 1: We assume $\eta_+ = 0$, $u = 1/2$, $p = 1/4$, and $s = 1/2$. For this specification, we obtain one equilibrium at $\bar{b} = 0.128$ and another at $\bar{b} = B = 1$, as can be seen in Figure 1,

which depicts the function $\Delta(\bar{b}, \bar{c}(\bar{b}))$.[12] A first interior equilibrium results as the function Δ intersects the horizontal axis. This equilibrium is stable, since at this point Δ is increasing in $\bar{b}$. The second intersection of Δ and the horizontal axis is an unstable equilibrium, as Δ is decreasing in the neighborhood of the intersection. Finally, the corner solution $\bar{b} = 1$ represents an equilibrium, since $\Delta(1, I) < 0$. In contrast, without status concerns (for $g = 0$), the equilibrium critical benefit level is given by 0.425, which is necessarily unique. Accordingly, given status concerns, the crime rate may be either higher or lower than when status concerns are irrelevant. In the high-crime scenario, law-abiding individuals find themselves in an unfavorable position, motivating additional individuals with intermediate criminal benefits to opt for criminal behavior. However, in the no-crime equilibrium, it is precisely the loss in status associated with a conviction that serves as an additional element of deterrence and thereby stabilizes the no-crime equilibrium.

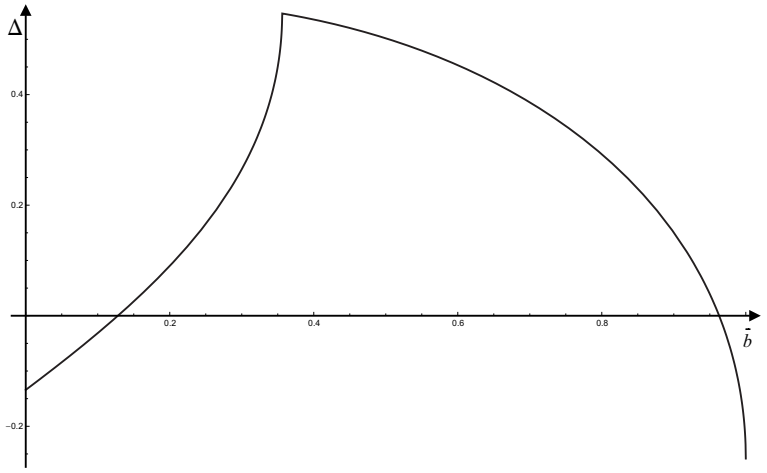

Figure 1: Multiple crime equilibria for $\eta_+ = 0$

Specification 2: Using $\eta_+ = 1$, $u = 2$, $p = 0.112$, and $s = 3/4$, we obtain the outcome represented in Figure 2 with three interior crime rate equilibria ($\bar{b}^* = .286$, $\bar{b}^* = .399$, and

[12]Note that assuming $u = 1/2$ represents the case of loss aversion widely discussed in the literature (see, e.g., Köbberling and Wakker 2005).

$\bar{b}^* = .457$), whereas $\bar{b}^* = 0.289$ would result without status concerns. Applying the stability argument detailed above, the two stable equilibria are at $\bar{b}^* = .286$ and $\bar{b}^* = .457$, whereas the equilibrium at $\bar{b}^* = .399$ is unstable (because $D < 0$).

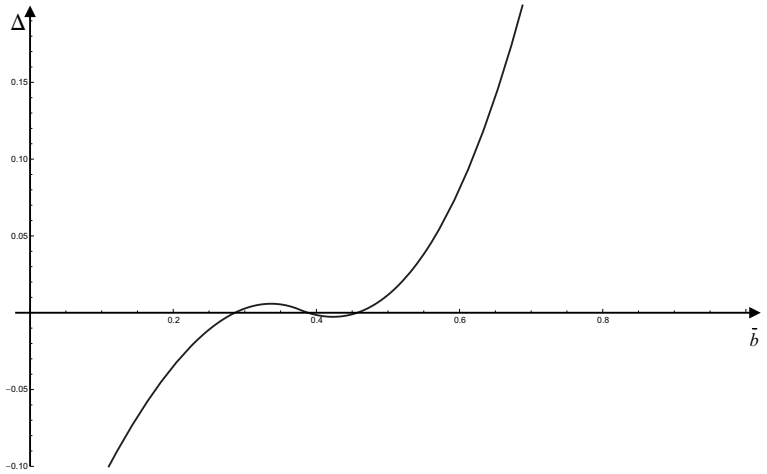

Figure 2: Multiple crime equilibria for $\eta_+ = 1$

We content ourselves with this illustration and summarize our analysis of the possible existence of multiple equilibria as follows.

Proposition 2 *(1) The equilibrium crime rate is unique when $D > 0$ for all $\bar{b}$ (with D defined in* (24)*). (2) There may be multiple stable equilibrium crime rates in a framework in which potential offenders have status concerns (i.e., when $g > 0$). A necessary condition is $\kappa \partial \bar{c}/\partial \bar{b} < 0$ over some range of $\bar{b}$.*

Proof. Follows from the above. ■

The basic intuition for multiple stable crime rates in equilibrium is based on the fact that the attractiveness of the criminal opportunity is determined not only by the criminal gain but also by the extent to which others engage in crime (since this influences the point of reference for status considerations).

4 Comparative-statics analysis

In this section, we present the results of a comparative-statics analysis. We will first consider small variations in the exogenous parameters, starting from a stable interior equilibrium. The focus on stable equilibria will be ensured by requiring that $D > 0$ must hold. We then briefly discuss the possible repercussions that follow from the existence of multiple equilibria.

Marginal variations in parameters

The equilibrium critical gain level is a function of the detection probability, the level of the sanction, the level of legal income, and the importance attached to relative standing. Reference consumption is directly affected by the first three of these exogenous variables; in addition, it reacts to changes in the equilibrium critical gain level. In order to determine how the critical benefit level responds to variations, we start from

$$\Delta\left(\bar{b}^*\left(p,s,I,g\right),\bar{c}\left(p,s,I,\bar{b}^*\left(p,s,I,g\right)\right)\right)=0 \tag{26}$$

In the absence of interaction effects, an increase in the level of the detection probability and the level of the sanction unambiguously lead to an increase in $\bar{b}^*$, which is synonymous with a decrease in the crime rate. When we consider individuals who are motivated in part by status considerations, we obtain

$$\frac{d\bar{b}^*}{dp}=D^{-1}\left[v_n+gw_n-(v_d+gw_d)-g\frac{\partial\bar{c}}{\partial p}\kappa\right] \tag{27}$$

$$\frac{d\bar{b}^*}{ds}=D^{-1}\left[p(v_d'+gw_d')-g\frac{\partial\bar{c}}{\partial s}\kappa\right], \tag{28}$$

which leads to the following proposition.

Proposition 3 *(i) For $g \to 0$, an increase in the level of the sanction and the level of the detection probability lowers the crime rate.*

(ii) For $g > 0$, an increase in the level of the sanction and the level of the detection probability

lowers the crime rate when $\kappa > 0$.

(iii) For $g > 0$*, an increase in the level of the sanction and the level of the detection probability may increase the crime rate when* $\kappa < 0$.

Proof. The claims (i)-(iii) follow from (27) and (28). ■

The analysis of our framework thus produces standard comparative-statics results whenever the weight g assigned to status utility is negligible or when crime becomes more attractive due to a higher reference consumption (i.e., $\kappa > 0$). However, a counterintuitive comparative-statics result is possible whenever $\kappa < 0$, i.e., whenever the implied decrease in the reference consumption due to stricter enforcement makes the crime opportunity more appealing.[13]

Figure 3 highlights the possible counterintuitive comparative-statics effect for variations in the level of the detection probability, relying on the example specification described above in combination with $u = 1/2$, $\eta_+ = 1$, and $s = 1$. For some intermediate levels of p between 0.3 and 0.4, an increase in the detection probability actually entails a decrease in $\bar{b}$, concomitant with an increase in the crime rate.[14]

Next, we investigate possible wealth effects by examining the response to an increase in the level of legal income.

$$\frac{d\bar{b}}{dI} = D^{-1}\left[v'_L - (1-p)v'_n - pv'_d\right] \tag{29}$$

This leads to the intuitive conclusion that because status considerations cancel out (given that both individual and reference consumption are similarly affected by the change in legal income), the curvature of the consumption utility v is critical in determining the response

[13]Note that $D > 0$ always follows when $\partial\bar{c}/\partial\bar{b}g\kappa > 0$, where $\partial\bar{c}/\partial\bar{b} < 0$ for $\bar{b} > b^*$. In other words, the necessary condition for a non-standard comparative-statics result is compatible with the sufficient condition for a stable equilibrium.

[14]In the example, note that the equilibrium crime rate is unique for $p < 0.45$. For higher values of the detection probability, a second stable equilibrium with $\bar{b}^* = 1$ emerges. For even higher values of detection probability $\bar{b}^* = 1$ becomes the only equilibrium.

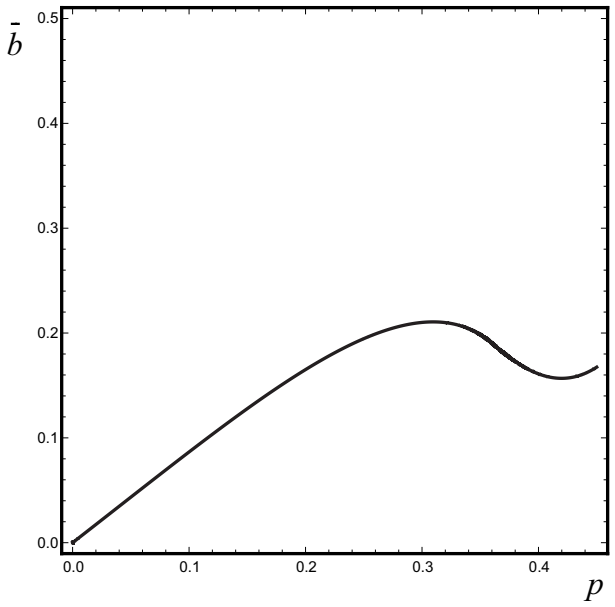

Figure 3: Equilibrium critical gains as a function of the detection probability

of the critical gain level to a variation in the level of legal income; however, in general, this response is ambiguous.

Finally, we seek to establish the consequences of increasing the weight assigned to status considerations for the level of crime in equilibrium.

$$\frac{d\bar{b}}{dg} = -D^{-1}\left[(1-p)w_n + pw_d - w_L\right] \tag{30}$$

We obtain a finding that is in line with the central result of Konrad and Lommerud (1993). An increase in the weight g will increase the level of risk-taking (that is, induce more crime) whenever individuals are relatively less risk-averse with regard to variations in status than they are with respect to variations in absolute consumption. This follows from the fact that for $\Delta = 0$, a positive term $(1-p)w_n + pw_d - w_L$ implies that $(1-p)v_n + pv_n - v_L$ will be negative, which indicates that the marginal offender considers the status lottery desirable but is not motivated by the consumption lottery.

Implications of multiple equilibria

In the comparative-statics analysis described above, we have considered only small variations starting from a stable equilibrium. In Figure 4, which depicts only stable equilibria, we return to the example introduced at the end of Section 3 and assume $u = 2$, $\eta_+ = 1$, and $s = 3/4$ in order to argue that the presence of multiple equilibria may allow discontinuous changes in the level of deterrence. When the detection probability is continuously increased over the interval between .1 and .12, at some point a discrete increase in the level of deterrence must occur. Additionally, the figure shows that status concerns may again result in more or less crime, as is evident from a comparison of the equilibrium crime rate represented by the strictly monotonous curve with $g = 0$ to the up to two stable equilibrium crime rates we obtain when $g = 3/2$. A similar picture would emerge for variations in the level of the sanction.

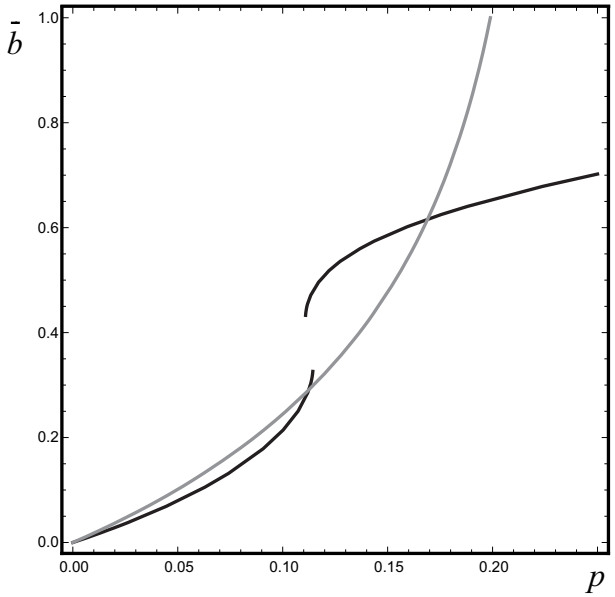

Figure 4: Equilibrium critical gains as a function of the detection probability

In Figure 5, which again concentrates on stable equilibria, we show that there is a min-

imum level of the weight of status considerations that permits multiple equilibria, which corresponds with Proposition 2. The detection probability is again set to $p = 0.112$. When $g \to 0$, there is only one equilibrium crime rate (represented by the horizontal line). An increase in g away from zero clearly increases crime in this example. However, there is a threshold for g at which a second stable equilibrium with a lower crime rate materializes, such that status concerns may result in more or less crime; this is evident from a comparison of the equilibrium crime rate when $g = 0$ to the two stable equilibrium crime rates we obtain when $g = 3/2$. A marginal increase in the importance assigned to status causes crime to decrease in this second stable equilibrium, as demonstrated by the positive slope of the line representing this equilibrium.

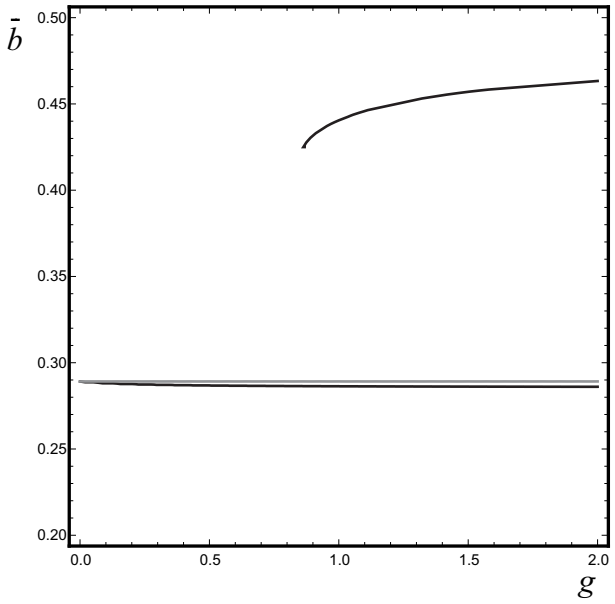

Figure 5: Equilibrium critical gains as a function of the weight g

5 Welfare

In this section, we briefly speculate about the implications of potential offenders' status concerns for the socially optimal levels of the sanction and the detection probability. Our discussion will not consider discrete changes in the crime rate that may be possible when there are multiple equilibria (as discussed at the end of Section 4); instead, we concentrate on small variations starting from a stable interior equilibrium that produce standard reactions in the crime rate. The level of social welfare will be represented by a utilitarian welfare function that takes potential offenders' utility into account and specifies that every criminal act implies social harm h; this function is thus in accordance with the standard representation used in the literature (see, e.g., Polinsky and Shavell 2009). Consequently, the policy maker seeks to maximize

$$\begin{aligned} W =& F(\bar{b})\left[v(I_L) + gw(I_L - \bar{c})\right] \\ &+ \int_{\bar{b}}^{B} \left[(1-p)\{v(I_n) + gw(I_n - \bar{c})\} + p\{v(I_d) + gw(I_d - \bar{c})\}\right] dF(b) \\ &-(1 - F(\bar{b}))h - \big(K(p) - p(1 - F(\bar{b}))s\big) \end{aligned} \tag{31}$$

by means of the sanction s and the detection probability p, where $\bar{c} = \bar{c}(p, s, I, \bar{b})$ and $K(p)$, $K', K'' > 0$, denotes enforcement costs from which the collected sanctions are deducted.

The change in the level of welfare in response to a variation in one of the law-enforcement parameters will be composed of a direct effect and the consequences of the variation in both the critical gain level and the level of reference consumption. Introducing $\mu = s, p$ and the

indicator variable χ which is equal to one (zero) should μ represent p (s), we obtain

$$\begin{aligned}\frac{\partial W}{\partial \mu} = &- \chi \underbrace{\left[\int_{\bar{b}}^{B} (v_n + gw_n - v_d - gw_d) dF(b) + \left(K'(p) - (1 - F(\bar{b}))s\right)\right]}_{x_1} \\ &- (1-\chi) \underbrace{p\left[\int_{\bar{b}}^{B} (v'_d + gw'_d) dF(b) - p(1 - F(\bar{b}))\right]}_{x_2} \\ &+ \underbrace{\frac{\partial \bar{b}}{\partial \mu}\left[f(\bar{b})(h - ps) - g\frac{\partial \bar{c}}{\partial \bar{b}}\left\{F(\bar{b})w'_L + \int_{\bar{b}}^{B}((1-p)w'_n + pw'_d)dF(b)\right\}\right]}_{y} \\ &- \underbrace{g\frac{\partial \bar{c}}{\partial \mu}\left[F(\bar{b})w'_L + \int_{\bar{b}}^{B}((1-p)w'_n + pw'_d)dF(b)\right]}_{z}, \end{aligned} \tag{32}$$

using that $\Delta = 0$ at the critical equilibrium gain level.

The direct effect of the change in law enforcement is represented by the terms x_1 and x_2 for p and s, respectively. A higher detection probability makes the loss in utility resulting from a conviction more likely for actual offenders and increases enforcement costs as well as sanctions collected. A higher sanction lowers utility for actual offenders in the detection state of the world and entails an increase in revenue for the state. The term y represents the consequences of the implied change in the critical gain level. In addition to its influence on the likelihood of incurring social harm h and its effect on the total amount of sanctions, the change in the critical benefit level also results in a change in the average consumption level. Regarding the effect on reference consumption of an increase in $\bar{b}$, it holds that $\partial \bar{c}/\partial \bar{b} < 0$ when $\bar{b} > b^*$. Significantly, a lower reference consumption level implies marginal status gains for all individuals (both compliant and non-compliant). The same applies to the indirect effect represented by the term z, which reflects the repercussions of the decrease in reference consumption due to the change in enforcement.

In summary, an increase in the strictness of law enforcement has the direct effect of lowering the level of reference consumption. This is beneficial for all individuals. The

individuals negatively affected by the marginal increase in the strictness are concentrated among offenders. These individuals will have a higher probability of experiencing a utility loss (when the detection probability is increased) and will be worse off when their crime is detected (when the level of the sanction is increased). In addition, the change in enforcement implies greater deterrence when crime rates react in the standard fashion. This allows us to make the following remark.

Remark: *Assume that the marginal productivity of the detection probability and the sanction in terms of the level of deterrence measured by the corresponding change in* $\bar{b}$ *is relatively unaffected by the existence of status concerns, and that standard comparative-statics effects apply. Then, status effects justify stricter law enforcement (i.e., relatively higher levels of the detection probability and the sanction) when* $\partial\bar{c}/\partial\bar{b} < 0$ *holds at the optimum and the additional costs imposed on offenders are not dominant.*

It is clear from (32) that stronger status concerns (i.e., a higher level of g) magnify the additional marginal benefits of an increase in the law-enforcement parameter represented by term z and the second part of term y. At the same time, greater weight placed on relative standing will imply direct costs for actual offenders (represented by either x_1 or x_2). The fact that the marginal productivity of the detection probability and the sanction will be influenced by the existence of status concerns further complicates the comparison for the general case.

6 Conclusion

This paper analyzes potential offenders with status concerns, motivated by convincing empirical evidence that utility in many if not most cases depends on the context. The positional concerns of potential offenders create an interdependence between them that may result in multiple stable crime rates. When many people resort to crime to raise their expected in-

come, this results in an unfavorable position for law-obedient individuals and may thereby encourage such individuals to pursue criminal opportunities. Likewise, when most individuals refrain from crime, then average consumption does not excessively outpace legal income, potentially reinforcing a low-crime outcome. Moreover, the status concerns of potential offenders influence how crime responds to changes in law-enforcement parameters. Indeed, the standard comparative-statics results regarding the deterrence effects of higher detection probabilities or higher sanctions no longer follow unambiguously. A change in law enforcement influences the reference level of consumption – thereby exerting indirect influence on the attractiveness of the crime option – and may thus trigger an increase in the crime rate. For the case in which stricter law enforcement yields higher deterrence, we discuss reasons to implement higher levels of the detection probability and the sanction in comparison to a setting without status concerns. Such steps may be beneficial, as stricter law enforcement lowers the reference consumption level, which thereby improves status utility for all individuals.

In addition, our analysis can be interpreted as an exploration of the implications of strain theory, one of the leading criminological theories. A comparison of an individual's outcome with that of the reference group may create strain that can justify crime as a coping behavior. Interestingly, we find that positional concerns need not result in more crime, as suggested in the literature on strain theory. This can be attributed to the fact that engaging in crime implies a status lottery with both favorable and unfavorable status outcomes.

The present paper presents a first attempt to study the implications of social comparison for criminal behavior, building on both the standard law-enforcement framework (in which individuals differ only in terms criminal gain) and the effect of comparisons to a reference group. Future research could seek to add variation in the level of legal income as an additional dimension of heterogeneity. Moreover, the fact that potential offenders can (within limits

and at some costs) select their peer group so as to avoid excessive strain suggests another interesting avenue for research.

References

Agnew, R., 2006a. Strain theory. In: McLaughlin, E., and J. Muncie (Eds.). The Sage dictionary of Criminology. London: Sage

Agnew, R., 2006b. Pressured into crime: An overview of general strain theory. Cary: Roxbury Publishing.

Alpizar, F., Carlsson, F., and O. Johansson-Stenman, 2005. How much do we care about absolute versus relative income and consumption? Journal of Economic Behavior and Organization 56, 405-421.

Anderson, C., Kraus, M.W., Galinsky, A.D., and D. Keltner, 2012. The local-ladder effect: Social status and subjective well-being. Psychological Science 23, 764-771.

Bar-Gill, O., and A. Harel, 2001. Crime rates and expected sanctions: The economics of deterrence revisited. Journal of Legal Studies 30, 485-501.

Baron, S.W., 2004. General strain, street youth and crime: A test of Agnew's revised theory. Criminology 42, 457-483.

Becker, G.S., 1968. Crime and punishment: An economic approach. Journal of Political Economy 76, 169-217.

Bond, P., and K. Hagerty, 2010. Preventing crime waves. American Economic Journal: Microeconomics 2, 138-159.

Benoit, J.P., and M.J. Osborne, 1995. Crime, punishment, and social expenditure. Journal of Institutional and Theoretical Economics 151, 326-347.

Burdett, K., Lagos, R., and R. Wright, 2003. Crime, inequality, and unemployment. American Economic Review 93, 1764-1777.

Caporale, G.M., Georgellis, Y., Tsitsianis, N., and Y.P. Yin, 2009. Income and happiness across Europe: Do reference values matter? Journal of Economic Psychology 30, 42-51.

Card, D., Mas, A., Moretti, E., and E. Saez, 2012. Inequality at work: The effect of peer salaries on job satisfaction. American Economic Review 102, 2981-3003.

Carlsson, F., Johansson-Stenman O., and P. Martisson, 2007. Do you enjoy having more than others? Survey evidence of positional goods. Economica 74, 586-598.

Carlsson, F. and P. Qin, 2010. It is better to be the head of a chicken than the tail of a phoenix: Concern for relative standing in rural China. Journal of Socio-Economics 39, 180-186.

Chintrakarn, P., and D. Herzer, 2012. More inequality, more crime? A panel cointegration analysis for the United States. Economics Letters 116, 389-391.

Clark, A.E., Frijters, P., and M.A. Shields, 2008. Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. Journal of Economic Literature 46, 95-144.

Clark, A.E., and C. Senik, 2010. Who compares to whom? The anatomy of income comparisons in Europe. Economic Journal 120, 573-594.

Corneo, G., 2002. The efficient side of progressive income taxation. European Economic Review 46, 1359-1368.

Conley, J.P., and P. Wang, 2006. Crime and ethics. Journal of Urban Economics 60, 107-123.

Dahlberg, M., and M. Gustavsson, 2008. Inequality and crime: Separating the effects of permanent and transitory income. Oxford Bulletin of Economics and Statistics 70, 129-153.

Demombynes, G., and B. Özler, 2005. Crime and local inequality in South Africa. Journal of Development Economics 76, 265-292.

Demougin, D., and R. Schwager, 2000. Excess burden of criminality and redistribution.

International Review of Law and Economics 20, 329-351.

Demougin, D., and R. Schwager, 2003. Law enforcement and criminality: Europe vs. USA. International Review of Law and Economics 23, 217-225.

Dohmen, T., Falk, A., Fliessbach, K., Sunde, U., and B. Weber, 2011. Relative versus absolute income, joy of winning, and gender: Brain imaging evidence. Journal of Public Economics 95, 279-285.

Fajnzylber, P., Lederman, D., and N. Loayza, 2002. Inequality and violent crime. Journal of Law and Economics 45, 1-39.

Falk, A., and M. Knell, 2004. Choosing the Joneses: Endogenous goals and reference standards. Scandinavian Journal of Economics 106, 417-435.

Fender, J., 1999. A general equilibrium model of crime and punishment. Journal of Economic Behavior and Organization 39, 437-453.

Ferrer, R., 2010. Breaking the law when others do: A model of law enforcement with neighborhood externalities. European Economic Review 54, 163-180.

Foley, C.F., 2011. Welfare payments and crime. Review of Economics and Statistics 93, 97-112.

Frank, R.H., 2008. Should public policy respond to positional externalities? Journal of Public Economics 92, 1777-1786.

Freeman, S., Grogger, J., and J. Sonstelie, 1996. The spatial concentration of crime. Journal of Urban Economics 40, 216231.

Frey, B.S., Schmidt, S.L., and B. Torgler, 2008. Relative income position, inequality and performance: An empirical panel analysis. In: Andersson, P., Ayton, P., and C. Schmidt (Eds.). Myths and facts about football: The economics and psychology of the world's greatest sport. Cambridge: Cambridge Scholars Publishing.

Glaeser, E.L., Sacerdote, B., and J.A. Scheinkman, 1996. Crime and social interactions.

Quarterly Journal of Economics 111, 507-548.

Grogger J., 1998. Market wages and youth crime. Journal of Labor Economics 16, 756-791.

Helsley, R.W., and W.C. Strange, 1999. Gated communities and the economic geography of crime. Journal of Urban Economics 46, 80-105.

Huang, C.C., Laing, D., and P. Wang, 2004. Crime and poverty: A search-theoretic approach. International Economic Review 45, 90-938.

Johansson-Stenman, O., Carlsson, F., and D. Daruvala, 2002. Measuring future grandparents' preferences for equality and relative standing. Economic Journal 112, 362-383.

Kelly, M., 2000. Inequality and crime. Review of Economics and Statistics 82, 530-539.

Kleiman, M., 2009. When brute force fails. Princeton: Princeton University Press.

Köbberling, V., and P.P. Wakker, 2005. An index of loss aversion. Journal of Economic Theory 122, 119-131.

Konrad, K.A., and K.E. Lommerud, 1993. Relative standing comparisons, risk taking, and safety regulations. Journal of Public Economics 51, 345-358.

Lee, D.R., and J.W. Cohen, 2008. Examining strain in a school context. Youth Violence and Juvenile Justice 6, 115-135.

Lin, M.J., 2008. Does unemployment increase crime? Evidence from US data 1974-2000. Journal of Human Resources 43, 413-436.

Marceau, N., and S. Mongrain, 2011. Competition in law enforcement and capital allocation. Journal of Urban Economics 69, 136-147.

Merton, R.K., 1938. Social structure and anomie. American Sociological Review 3, 672-682.

Merton, R.K., 1968. Social theory and social structure. New York: Free Press.

Messner, S.F., and R. Rosenfeld, 2001. Crime and the American dream. Belmont: Wadsworth.

Polinsky, A.M., and S. Shavell, 2001. Corruption and optimal law enforcement. Journal of Public Economics 81, 1-24.

Polinsky, A.M., and S. Shavell, 2009. Public enforcement of law. In: Garoupa, N. (Ed.). Criminal Law and Economics. Northhampton, MA: Edward Elgar.

Raphael, S., and R. Winter-Ebmer, 2001. Identifying the effect of unemployment on crime. Journal of Law and Economics 44, 259-283.

Rasmusen, E.B., 1996. Stigma and self-fulfilling expectations of criminality. Journal of Law and Economics 29, 519-543.

Robson, A.J., 1992. Status, the distribution of wealth, private and social attitudes to risk. Econometrica 60, 837-857.

Sah, R.K., 1991. Social osmosis and patterns of crime. Journal of Political Economy 94, 1272-1295.

Schrag, J., and S. Scotchmer, 1997. The self-reinforcing nature of crime. International Review of Law and Economics 17, 325-335.

Senik, C., 2009. Direct evidence on income comparisons and their welfare effects. Journal of Economic Behavior and Organization 72, 408-424.

Silverman, D., 2004. Street crime and street culture. International Economic Review 45, 761-786.

Solnick, S., and D. Hemenway, 1998. Is more always better?: A survey on positional concerns. Journal of Economic Behavior and Organization 37, 373-383.

Solnick, S., and D. Hemenway, 2005. Are positional concerns stronger in some domains than in others? American Economic Review 95, 147-151.

Solnick, S., Hong, L., and D. Hemenway, 2007. Positional goods in the United States and China. Journal of Socio-Economics 36, 537-545.

Stiles, B.L., Liu, X., and H.B. Kaplan, 2000. Relative deprivation and deviant adaptations: The mediating effects of negative self-feelings. Journal of Research in Crime and Delinquency 37, 64-90.

Stutzer, A., 2004. The role of income aspirations in individual happiness. Journal of Economic Behavior and Organization 54, 89-109.

Traxler, C., 2010. Social norms and conditional cooperative tax payers. European Journal of Political Economy 26, 89-103.

Verdier, T., and Y. Zenou, 2004. Racial beliefs, location and the cause of crime. International Economic Review 45, 731-760.

Whitworth, A., 2012. Inequality and crime across England: A multilevel modeling approach. Social Policy and Society 11, 27-40.

Whitworth, A., forthcoming. Local Inequality and crime: Exploring how variation in the scale of inequality measures affects relationships between inequality and crime. Urban Studies.

Wichardt, P.C., 2008. Identity and why we cooperate with those we do. Journal of Economic Psychology 29, 127-139.

Williams, J., and R.C. Sickles, 2002. An analysis of the crime as work model: Evidence from the 1958 Philadelphia birth cohort study," Journal of Human Resources 37, 479-509.

Young, J., 2006. Relative deprivation. In: McLaughlin, E., and J. Muncie (Eds.). The Sage dictionary of Criminology. London: Sage.