

STREET CRIME AND STREET CULTURE*

BY DAN SILVERMAN¹

Department of Economics, University of Michigan

A model shows how reputation concerns can support widespread street crime, a street culture, where the direct incentives for such behavior are weak. There are social benefits to street reputations, but those benefits are dominated when reputation concerns draw into crime those who obtain no direct gain from it. The model matches facts about violent crime that a standard model cannot easily explain including low monetary returns, disproportionate victimization of the young and poor, and high variance in rates across small distances. The model generates novel implications for policy and social science, including a negative effect of social capital.

1. INTRODUCTION

Since Becker (1968), crime has become a subject of increasing study by economists. In the Becker framework, an independent decision maker weighs the costs and benefits of a criminal act, choosing to commit the crime only when the expected gain exceeds the expected cost of punishment. This, now standard, framework has guided a great deal of empirical work, and has met with mixed success. In particular, the data on violent and nonpecuniary crimes such as murder, assault, and robbery pose challenges for the standard model.

Table 1 shows how violent and nonpecuniary crimes represent a large and economically important fraction of crime in the United States. Assaults and robberies alone accounted for nearly a quarter of all criminal victimizations in 2000, with an estimated cost in terms of medical care, administrative expenses, and lost wages of more than \$17 billion.² Table 1 also shows that the victims of violent crime are disproportionately young, male, and poor. A young man is more than six times more likely to be the victim of a murder than a middle-aged woman, and more than three times more likely to be the victim of an assault. Robberies are much more common among the poor than among those with more income.

These patterns of violent crime pose a number of challenges for the standard economic model. One challenge is the lack of direct pecuniary gain from the

* Manuscript received May 2003; revised April 2004.

¹ I thank Elijah Anderson, Luis Araujo, Jan Eeckhout, Hanming Fang, Johannes Hörner, Justin Johnson, Antonio Merlo, Olivia Mitchell, Ted O'Donoghue, Lones Smith, and especially George Mailath, Nicola Persico, and Andrew Postlewaite for many helpful comments and discussions. I gratefully acknowledge financial support from the Social Science Research Council. Please address correspondence to: D. Silverman, Department of Economics, University of Michigan, 319 Lorch Hall, 611 Tappan St., Ann Arbor, MI 48109-1220. E-mail: dansily@umich.edu.

² A robbery is the completed or attempted theft of property, directly from a person, by force or threat of force. An assault is a completed or attempted physical attack.

TABLE 1
VIOLENT CRIME VICTIMIZATION, BY CHARACTERISTICS OF THE VICTIM, FROM THE 2000 NATIONAL CRIMINAL VICTIMIZATION SURVEY

Number of Criminal Victimizations in 2000			
All Victimizations	Murders	Assaults	Robberies
25,893,340	12,225	5,330,010	731,780
Average cost per victimization*	\$894,848	\$2,791	\$2,993
Victimization Rates per 1,000, by Victim Characteristics			
	Murder	Assault	Robbery
Men ages 16–24	0.188	57.39	9.65
Men ages 35–49	0.073	20.37	3.76
Women ages 16–24	0.034	38.58	3.89
Women ages 35–49	0.029	17.17	1.69
Annual family income less than \$15K	n.a.	37.35	5.56
Annual family income more than \$15K	n.a.	22.75	2.98

*Average cost includes only medical and administrative costs and lost wages.

SOURCE: Miller et al. (1993).

crimes. On their face, the high rates of robbery and assault among the young, male, and poor suggest low returns from many of these crimes as these groups have, on average, less to steal and may be more able or willing to protect their belongings. More precisely, the assaults summarized in Table 1 do not involve theft. Thus, by definition, these crimes generated no direct monetary reward. Robberies represent at least an attempted theft, but the typical robbery is not particularly lucrative. One-third of robberies resulted in thefts worth less than \$50, and nearly half resulted in thefts worth less than \$100. Finally, and more generally, there is a tendency for violent crime to be committed in public, and in front of witnesses.³ Together, these facts imply that many violent crimes offer, if anything, a small expected, direct pecuniary reward. This article is concerned with the many violent crimes that appear to provide their perpetrators no direct economic gain.

The standard framework could accommodate a lack of direct pecuniary benefit from violent crime if we allow, for example, a utility from violence. However, even if a direct utility from violence motivated such activity, there remain several aspects of the data on violent crime that are difficult to reconcile with a standard model. First, (violent) crime rates vary sharply across small geographic distances.⁴ One might argue that the direct incentives for such crime also vary substantially across small distances depending on, for example, the income of the residents of those

³ In the United States, 54% of violent crimes occur during daylight hours including 57% of all assaults and 44% of robberies (USDOJ, 2000). Qualitative studies of crime such as Katz (1988) and Polk (1999) emphasize the common presence of witnesses and the lack of effort by perpetrators to escape detection.

⁴ See Glaeser et al. (1996) for a more detailed discussion of this phenomenon. One could, of course, explain this variation in crime rates with variation in tastes for violence, but such a theory would have no predictive power.

TABLE 2
WITHIN-STATE, BETWEEN-COUNTY VARIATION IN REPORTED CRIME RATES, EXPLAINED
BY INCOME

Average Within-State, Between-County Coefficients of Variation for Crime Rates				
Murder	Assault	Robbery	Burglary	Larceny
1.56	0.84	1.68	0.54	0.59
Percent of Within-State, Between-County Variation Explained by the Income Distribution*				
Murder	Assault	Robbery	Burglary	Larceny
5.0	6.0	16.0	9.7	19.7

*Represents the additional variation explained by controls for the median income of the county and the fraction of the county in each of 17 income categories.
SOURCE: Author's calculations from the 2000 FBI Uniform Crime Reports.

neighborhoods. This argument is made problematic, however, by the fact that violent crime is even more variable than strictly pecuniary crime. Table 2 presents the coefficients of variation for within-state variation in county-reported crime rates. Cross-county variation is substantially higher for violent crimes like assault and robbery than it is for strictly pecuniary crimes like burglary and larceny. Finally, the variation in (violent) crime is not well explained by variation in economic fundamentals. Table 2 shows the extent of within-state variation in county-reported crime rates explained by the income distributions in those counties. As with most analyses of this kind, the variation in crime explained by variation in income is not substantial.

These patterns of criminal behavior and the lack of direct economic benefit from many violent crimes suggest that, as a framework for understanding such crime, the standard economic model is incomplete. Social scientists outside economics have, however, offered an alternative theory of violent crime, a theory of *reputation*, that, as this article will show, is both consistent with the facts about violent crime outlined above and may be reconciled with a rational, instrumental model. Anthropologists, psychologists, and sociologists have described individuals participating in violent crime not only to derive material goods, but also to demonstrate to others that they are worthy of respect.⁵ This finding is common both to studies of low-income communities in the United States, such as Anderson (1990, 1999) and Newman (1999), and to research focused on criminal behavior, such as Butterfield (1996), Daly and Wilson (1988), Katz (1988), and Polk (1999).⁶ This research points both to the intrinsic value of being feared or respected, especially high when there are few other sources of self esteem, and to an instrumental

⁵ Social scientists have offered several other theories of violent crime including theories of social strain or anomie (see, e.g., Merton, 1968), and theories of deviant subcultures (see, e.g., Wilson and Herrnstein, 1985; Bennett et al., 1996).

⁶ Anthropologists have also documented the value of a reputation for brutality in traditional and shepherd societies. See Peristiany (1966) for an early collection of examples.

value of reputation. The sociologist Elijah Anderson's ethnographies provide especially comprehensive descriptions of how a reputation for brutality is valued in some U.S. cultures. According to Anderson's representations, a reputation for violence is often pursued in these "street" cultures both because reputation and respect directly produce satisfaction, *and* because a reputation provides its owner protection from future assault.

This article formalizes an instrumental, reputation-based theory of crime to explain street crime in the absence of direct economic incentives. It is a model of rational public attacks instead of visceral or private violence such as many murders and rapes. The theory is consistent with the facts that:

1. Violent crime often lacks a direct pecuniary motive.
2. Violent crime is often committed in public and in front of witnesses.
3. Violent crime is more common among the young than among the old.
4. Violent crime rates may vary sharply across small geographic spaces with the same economic fundamentals but different social fundamentals.
5. Violent crime rates may vary sharply across essentially identical neighborhoods.
6. This variation is greater for violent crimes than for strictly pecuniary crimes.

The model shows that, although there is a social benefit to the information summarized in street reputations, important social costs arise when reputation concerns draw those who expect no direct gain from street crime to nevertheless commit such crime. The incentives to acquire a street reputation are stronger when the future is more relevant; in this way the model explains why the young are involved in more street crime than the old. This article shows how the social structure of a community interacts with the direct returns to crime to determine the value of a street reputation, and, therefore, street crime. It thus explains why violent crime rates may differ across communities with the same economic fundamentals but different social fundamentals such as density or social connectedness. The model also permits multiple equilibria and thus explains why even identical communities may have very different crime rates, and why the local variation in violent crime may exceed that of strictly pecuniary crime. Finally, as a model of social effects on demonstrative crime, the article shows why violent crimes would be so often committed in public.

The model draws on a reputation literature motivated largely by questions in industrial organization and extends it to a community-level matching game with two-sided reputation. I consider a community in which there exists a small "street" element, a fraction of the population for whom a violent crime against a passive victim generates a direct benefit.⁷ A street type does not, however, invariably pursue crime; he rationally chooses victims depending both on how likely he thinks they are to resist his assault, and on how likely they are to enhance his street

⁷ The term street, and its alternative, decent, are taken from sociologist Elijah Anderson's ethnographies of Philadelphia neighborhoods (Anderson, 1990, 1999). These are the labels used by Anderson's low-income subjects to describe the basic typology of their communities.

reputation. I assume the remainder of the community has a strict preference for passivity, types are private information, and the community's information about an individual's past behavior is imperfect.

How do reputation concerns lead someone who expects no direct benefit from street crime, a decent type, to commit crime? Consider the problem of a decent who makes regular trips from an apartment to shops and back.⁸ He, like the rest of the community, knows there is a street element; but no one knows who is a true street and who merely appears like one. His goal is to make it to and from the shops without incident. The way to avoid an assault is either to be lucky and escape trouble by chance, or to signal the would-be assailant that the costs of an attack on *this* victim are probably too high. The signal is his reputation. His reputation summarizes his past and thus indicates, both to real streets and to street poseurs, how likely he is to initiate or resist an assault. By participating in violence himself he may acquire a street reputation; and that reputation will have value if it encourages others to defer to him. If the cost of participating in street crime is small enough, or if the future value of a street reputation is large enough, then even the decent type is violent. At the community level, the result is what appears like a culture of violence, a "street culture," where most seem to have nothing directly to gain from assaulting each other.

By providing insights into the forces behind violent crime, the model generates novel implications for policy and social science. First, when reputation concerns drive street crime, increased law enforcement and stiffer criminal penalties for violent crime may *increase* such crime if the policies strengthen the signal of a violent encounter or lower the gains from violence to street types. Second, and consistent with the quality of life policies recently implemented by some U.S. police departments, stronger enforcement of strictly *pecuniary* crime may change the type composition in a neighborhood and, thereby, have a disproportionate effect on *violent* crime by reducing incentives for reputation-based violence. Finally, this model offers a different perspective on the effects of interpersonal connections from that in standard theories of social capital. Standard theories of social capital emphasize how better interpersonal connections facilitate community cooperation and the provision of local public goods such as safety. This model captures a countervailing effect of social connectedness and shows how a community with better social connections, and with higher rates of social interaction, may be more likely to support a street culture.

1.1. *Related Literature.* This article belongs to the literature on social interactions and their roles in determining economic outcomes.⁹ Previous research provides both theories and evidence of social effects on criminal behavior. Reputation concerns, and the dynamics inherent in reputation building, distinguish

⁸ Alternatively, consider the problem of a high school student maneuvering between classes, lunch room, and home.

⁹ On crime see Case and Katz (1991), Sah (1991), Akerlof and Yellen (1994), Glaeser et al. (1996), and Ludwig et al. (2001). Studies of social effects on other economic outcomes include Cole et al. (1992) on savings, Borjas (1995) on human capital investment, Bagwell and Bernheim (1996) on conspicuous consumption, and Bertrand et al. (2000) on welfare program participation.

this article from existing theories.¹⁰ Previous studies assume a common and direct payoff to committing crime and concentrate on either the perceived probability of apprehension and punishment (Sah, 1991) or on the private incentive to punish, or inform the police of, deviations from lawful activity (Akerlof and Yellen, 1994).¹¹ In this article, only a potentially small fraction of the population expects to gain directly from a street crime. Taking penalties as given, the focus is on how reputation concerns may lead those who expect a direct loss from assaulting someone young, poor, and able-bodied to nevertheless adhere to a street culture.

The setting studied in this article is similar to those in the literature on reputation in random-matching models (Rosenthal and Landau, 1979; Kandori, 1992; Okuno-Fujiwara and Postlewaite, 1995). The primary goal of those studies is to understand how reputation could facilitate cooperative outcomes with only weak information requirements. This article differs from those prior studies by taking an incomplete-information approach to reputation, and by focussing on how reputation may generate *in* efficient outcomes of community interaction.¹²

By studying reputation's perverse incentives, this article also relates to a literature started by Holmström and Ricart i Costa (1986), who showed how career concerns may lead managers to choose projects that will enhance their reputation at the cost of firm profits. More recently, Morris (2001) shows how valuable information may be lost to the reputation concerns that characterize political correctness. Anderson and Smith (2004) analyze how incomplete information and two-sided reputations for productivity lead to inefficiencies from matches that are assortative by reputation, and can indeed make such matching patterns impossible. This article adds to this reputation literature by studying the consequences of two-sided reputation for crime in a community setting with imperfect public monitoring.

The remainder of the article is structured as follows: Section 2 describes the model. Section 3 presents benchmark analyses of essentially static versions of the model to demonstrate the social value of reputations. Section 4 characterizes a street-culture equilibrium (SCE) in which the participation in street crime by decent types importantly affects the local crime rate, and matches the basic features of that equilibrium to the distinctive facts about violent crime. Section 5 describes the implications of multiple equilibria. Section 6 presents some implications for policy and Section 7 offers some conclusions.

¹⁰ Empirical research in this area leaves the foundations for social effects unmodeled and focuses instead on the difficult task of identifying their magnitudes.

¹¹ Higher crime rates in poor neighborhoods are often attributed to lower levels of private surveillance. Some evidence suggests, however, that private surveillance is not substantially lower among the poor. According to the National Criminal Victimization Survey (NCVS), from 1992 to 2000 48% of violent crimes against households with less than \$15,000 were reported to police, including 55% of robberies and 58% of aggravated assaults. These fractions should be compared with 42, 57, and 53% among those households earning \$15,000–75,000.

¹² Those articles do not model types; reputation is not related to differences in preferences or action sets. Instead they assume public information about a player's prior actions is summarized by a state variable interpreted as reputation.

2. MODEL

2.1. *Environment.* Consider a community initially composed of a continuum of individuals (players) of mass one. Time is discrete. Each player i is one of three types: street, decent, or weak. Denote i 's type by $\tau \in \{s, d, w\}$. Types are private information. Each player lives in the community for exactly two periods and then exits. Players are "young" in their first period and "old" in their second. Generations of players overlap in the community. Initially, half the community is young and half old. When a player exits, he is simultaneously replaced by a random draw from the underlying population of young people. Let the distribution over types in the underlying population be denoted by the vector $\mathbf{f} = (f_s, f_d, f_w)$, so that f_τ gives the fraction of type τ 's in both the underlying population and, given the continuum of players, in the community.

2.2. *Stage Game.* At the beginning of every period, each player i is matched with an opponent j to play a one-time simultaneous action stage game. The matching is random and uniform. Upon matching, streets and decents choose an action a that is either violent V , or passive P . Weak types are incapable of violence and, therefore, have no choice to make. These two actions, V and P , allow several interpretations. For example, V may be interpreted as a single violent action, "attack," whose outcome depends upon the action of the player's opponent; or V may represent a relatively violent mixed strategy over several actions of different intensities such as shout, shove, punch, bludgeon, knife, and shoot. Alternatively, V may be understood as a choice of contingent strategy that conditions such actions on the response of the opponent.¹³

Each player in a match observes both his own action and that of his opponent; the rest of the community, however, receives only a noisy signal of the actions taken in the match.¹⁴ In particular, each match is observed to be either violent or not. Let $x \in \{v, nv\}$ denote this common signal to the community concerning i 's and j 's meeting, where v represents violence, and nv no violence. The probability that a match generates a violent signal depends on the actions taken in the match. If both players choose violence, then the match generates a violent signal with probability $\rho \in (0, 1)$. If, however, *either* player chooses to be passive, then the match always generates a nonviolent signal.¹⁵

$$\Pr(x = v \mid a_i, a_j) = \begin{cases} \rho, & \text{if } a_i = a_j = V \\ 0, & \text{otherwise} \end{cases}$$

¹³ For this last interpretation, the ability to commit to a contingent strategy is important; otherwise, strategies and off-equilibrium path payoffs will be improperly specified. However, the commitment assumption may be appropriate for violent encounters because decisions must be made quickly, and moving first may provide a decisive advantage. In violent encounters the lack of commitment to be violent may, in effect, represent a commitment to be passive.

¹⁴ The players in the match also observe the realization of this signal.

¹⁵ Allowing for a more elaborate relationship between actions and probabilities of a violent signal complicates the analysis without changing the basic effects of reputation on violence.

This information structure is motivated by the following logic: First, when two people have a violent street encounter, the actions taken during the altercation are likely to be unclear to outsiders. The situation is analogous to the scene of an auto accident where it is indisputable that two cars have just collided, but often unknown to outsiders what events led up to the collision or what actions taken during the incident would have changed the outcome. Thus actions are private to the match. Second, when two people have a violent interaction, the community is likely to receive imperfect information about the encounter. The average accuracy of information transmission in the community is captured by ρ , and by the fact that unilateral passive behavior always generates a nonviolent signal. The information parameter ρ will also be interpreted as a measure of the community's social connectedness. A larger ρ implies a better connected community.

Payoffs. The outcome and payoffs of the match depend on the actions taken in the match. I do not model the outcome process but instead focus on the (expected) payoffs from each combination of actions. The payoffs of the stage game differ by type. Let $u_\tau(a_i, a_j)$ denote the stage game payoff to a type- τ player choosing action a_i against an opponent choosing a_j . To capture the idea that youth and adulthood may be of different lengths, the weight on payoffs when old equals κ times the weight on payoffs when young.

Decents have stage game payoffs that satisfy the following assumptions:

A1. A decent strictly prefers that his opponent is passive.

$$u_d(a, P) > u_d(a, V) \quad \text{for } a \in \{V, P\}$$

A2. A decent strictly prefers to be passive himself.

$$u_d(P, b) > u_d(V, b) \quad \text{for } b \in \{V, P\}$$

Assumption A1 is natural given that being subject to (more) violence increases the probability of both pain and the loss of possessions. Assumption A2 implies that decent types expect no direct gain from violence. One may interpret this second assumption in several ways. It may be that the human capital of decent types, including their physical and psychological assets, imply that the costs of aggression, including the expected disutility of imprisonment, exceed the returns in terms of goods expropriated. Alternatively, decents may simply find aggression intrinsically distasteful.

Behavior depends on the differences between payoffs, instead of on payoff levels. It is, therefore, convenient to normalize to zero the payoff from a mutually passive match, $u_d(P, P)$, and to denote by C the *cost* to a decent type of violence against a passive opponent. Let a decent's *benefit* from deference (i.e., the benefit of having his opponent choose passivity over violence) be denoted by B . To simplify calculations, I will assume that a decent's expected cost of violence against a

violent opponent is the same as against a passive opponent. Thus a decent's stage game payoffs are given (for $B, C > 0$) as follows:

		a_j	
		V	P
a_i	V	$-C - B$	$-C$
	P	$-B$	0

expected payoff to decent type playing a_i vs. a_j

Streets have stage game payoffs that satisfy an analogue of Assumption A1 and the following assumptions:

A3. $u_s(V, P) > u_s(P, P)$

A4. $u_s(P, V) > u_s(V, V)$

Thus streets gain directly from violence against a passive victim, but lose from violence against a violent opponent. Again normalize to zero the payoff from a mutually passive encounter, and denote the *gain* from attacking a passive victim by G . To simplify calculations, I assume a symmetric loss G from being the passive victim of violence. The additional *loss* from choosing violence against a violent opponent is given by L ; thus a street's stage-game payoffs are (for $G, L > 0$):¹⁶

		a_j	
		V	P
a_i	V	$-G - L$	G
	P	$-G$	0

expected payoff to street type playing a_i vs. a_j

The relationship between gains and losses will prove important, and we will denote by R the ratio

$$\frac{G}{G + L} \equiv R$$

Weaks. Because weak types do not make decisions, their payoffs play no role in determining equilibrium behavior. However, in equilibria where decents and streets are pooling, the presence of weaks makes the updating of beliefs nontrivial and generates incentives for both decents and streets to participate in reputation building.¹⁷ Weaks will not participate in violence, but they can be the victims of violence. I will assume that they too expect a benefit B from deference.

¹⁶ These payoffs imply that if streets met in a static setting with complete information, they would play a game of "chicken." The Nash equilibria of that game are the pure strategy equilibria (V, P) and (P, V) , and a mixed strategy equilibrium in which streets choose violence with probability $\frac{G}{G+L}$.

¹⁷ The role of weaks is clarified by considering equilibria in which decents mimic streets in the absence of weaks. In this case, regardless of public signals, beliefs remain at the prior, since each type is equally likely to have generated the observed signals. But if this is the case, then decents have a

2.3. *Information Structure and Model of Reputation.* Following Kreps and Wilson (1982) and Milgrom and Roberts (1982), this article relies on a distribution of types with different payoff schedules or action sets to give reputation its value in equilibrium. A player's reputation is the community's common belief about his type. This type-based approach represents a natural model of the ethnographic evidence about reputation's role in high-crime neighborhoods. Another goal of the modeling strategy is to capture an environment in which each person is the subject of a public evaluation that is relevant both to his choices and to his treatment by others. With this goal in mind, I assume beliefs about a player, when old, are based only on the player's reputation when young, the reputation of his opponent, and the signal generated by their match. Beliefs about the young are simply the prior \mathbf{f} .

2.4. *Strategies, Beliefs, and Equilibrium.* Behavior is assumed to be symmetric by type and time invariant. A *strategy* σ maps age, type, own reputation, and opponent's reputation into a probability of choosing violence. The *beliefs* function φ maps prior beliefs about a player's type and that of his opponent, and the signal from their match into a posterior belief about the player's type. The belief that player i is a *street* is denoted by ϕ_i . An *equilibrium* is a pair (σ, φ) such that σ maximizes expected payoffs for all types and for all beliefs φ that, according to Bayes' rule, are consistent with σ . The analysis will consider the community in a steady state where the type distribution and the equilibrium reputation distribution are stationary.¹⁸

3. THE SOCIAL BENEFITS OF REPUTATION

This section analyzes two special cases of the model: an unconnected community and a myopic community. Analysis of these cases will illuminate two competing effects of reputations on welfare: the positive effect of information revelation and the negative effect of strategic reputation concerns.

3.1. *An Unconnected Community.* Suppose the community has no social connections ($\rho = 0$). This environment is equivalent to a static model in which there is no public information about players' actions. Because no information about types is revealed, the common belief about each player is the prior; there is no updating and reputation concerns are absent. The behavior of decents is, therefore, simple. Violence is strictly dominated in the stage game so decents are never violent. As in a standard model of crime, therefore, the community's street crime rate is determined only by those who expect a direct gain from such crime: streets.

profitable deviation: choose passivity since there is no reputation cost from a nonviolent signal. Thus no equilibrium with perfect pooling by streets and decents can exist in the absence of weak types.

¹⁸Stationarity of the type distribution derives mechanically from the two-period lives of players, and the random replacement of exiting old from an underlying population of young people with a fixed type distribution. A stationary reputation distribution is supported by the continuum of players with a stationary type distribution and stationary strategies.

In this setting, streets are always violent if they believe themselves to represent a fraction of the population smaller than a threshold value. The location of this threshold depends the relationship between a street’s gain from attacking a passive victim, G , and his loss from violence against a violent opponent L . When priors cross the threshold, street types become increasingly passive, choosing violence with decreasing probability as they believe themselves to represent more and more of the population.

PROPOSITION 1. *If $\rho = 0$, then there exists a unique equilibrium, decents are never violent, and streets choose violence with probability 1 if $f_s \leq R$ and with probability R/f_s otherwise.*

PROOF. The hypothesized behavior of decent types trivially represents their unique equilibrium strategy. If $f_s \leq R$, the hypothesized strategy is optimal for streets if

$$\overbrace{(1 - f_s)G - f_s(G + L)}^{\text{expected payoff from } V} \geq \overbrace{(1 - f_s)0 - f_sG}^{\text{expected payoff from } P}, \quad \text{or}$$

$$\frac{G}{G + L} \equiv R \geq f_s$$

The optimality of this strategy when $f_s < R$ also implies that there exists no mixed strategy equilibrium in this case, as no such strategy could make streets indifferent between V and P .

Trivially, there exists no symmetric equilibrium in which streets never choose violence. Thus there exists no other pure strategy equilibrium when $f_s \leq R$; and if $f_s \in (R, 1)$ then the strategy for streets σ_s^* must be fully mixing and satisfy the indifference condition:

$$(1 - f_s)G + f_s[(1 - \sigma_s^*)G - \sigma_s^*(G + L)] = (1 - f_s)0 - f_s\sigma_s^*G, \quad \text{or}$$

$$\sigma_s^* = \frac{R}{f_s} \quad \blacksquare$$

3.2. A Myopic Community. In an unconnected community street types are the only criminals and, if they are sufficiently rare, streets are always violent. Comparing this behavior with behavior in a connected but myopic community ($\rho > 0, \kappa = 0$) shows the social value of reputations and the social connections they require. In a connected but myopic community, reputations evolve with behavior but the young choose without regard for their future reputations. In other words, reputations exist but strategic reputation concerns are absent. As might be expected from the literature on social capital, in this connected community if streets are sufficiently rare the information summarized in reputations leads to less violence and higher welfare than in the unconnected community. Indeed, the greater the social connections the less violence.

Because they are unconcerned about future reputations, and violence is strictly dominated in the stage game, decents never commit crime in a myopic community. Streets are still the only criminals. It is, therefore, useful to distinguish between two categories of the old depending on their matches when young. The first category of old player is *established*. An established player was, when young, in a match that generated a violent signal. The belief he is a street, ϕ , equals 1 because only streets choose violence and thus only streets are capable of generating violent signals in equilibrium. The second category of old player is *unestablished*. Unestablished players did not generate violent signals when young and thus may be of any type.

PROPOSITION 2. *If $\rho > 0$, $\kappa = 0$ and $f_s < R$, then there exists a unique equilibrium. Decents are never violent. Streets are always violent when matched with the young or the unestablished. Young and old unestablished streets are never violent when matched with the established. When two established streets are matched, each chooses violence with probability R . The fraction of matches in which violence occurs, i.e., the crime rate, is declining in ρ .*

PROOF. The behavior of decent types again trivially represents their unique equilibrium strategy. For streets, because $\kappa = 0$, the game is static and thus the conditions for optimality are the same as in Proposition 1 if we replace f_s with the street reputation of the opponent ϕ_j . All young players have ϕ_j given by the prior f_s . All unestablished players have, by Bayes' Rule, $\phi_j < f_s$, and all established streets have $\phi_j = 1$. From logic of Proposition 1 it follows that the equilibrium behavior of old streets is uniquely determined when $f_s < R$, and that behavior is as hypothesized.

Because the established randomize with each other, the fraction of matches in which any violence occurs is declining in the size of the established population. The size of the established population is given by $\frac{f}{2}\pi$ where π is the probability a young street becomes established and is the solution to

$$\pi = \left(f_s - \frac{f_s}{2}\pi \right) \rho \quad \text{or}$$

$$\pi = \frac{2f_s\rho}{2 + f_s\rho}$$

Because π is increasing in ρ , the fraction of matches in which any violence occurs is declining in ρ . ■

The important difference between behavior in an unconnected and a connected but myopic community is that streets, while behaving myopically, generate violent signals. By thus revealing information about their type, streets are better able to recognize themselves and avoid violent interactions. To varying degrees, all streets defer to the established. As a result, violent interactions are both less common and, on average, less intensely violent. Direct comparisons of welfare between these communities are problematic because the young in a myopic community do

not value the future. However, if we use expected per-period payoffs as a metric, the myopic community's outcome Pareto dominates that in the unconnected community. All of the strict welfare benefits, however, accrue to street types only.

4. THE SOCIAL COSTS OF REPUTATION: A STREET CULTURE

The preceding analysis of unconnected and myopic communities shows the social benefits of reputations and social connections when streets are the only criminals. The remainder of the analysis will show, however, that these benefits are typically outweighed when reputation concerns drive both streets and *decents* into street crime.

4.1. *Street-Culture Equilibrium.* To demonstrate the effects of reputation concerns on community crime and welfare, we analyze a simple but particularly violent equilibrium: a *street-culture equilibrium*. In this equilibrium, decent types are as violent as they will ever be. When young, streets and decents *always* choose violence. Because decents and streets are behaving identically when young, following a violent signal there is a unique belief about the probability a player is a street. Let ϕ^E denote this established street reputation resulting from a violent signal, equaling the fraction of streets among nonweak types $\frac{f_s}{f_s + f_d}$. In a SCE ϕ^E is such that all old streets defer to those with established reputations. More precisely, ϕ^E is such that (1) an unestablished street is passive when facing an established opponent, and (2) an established street chooses violence with probability strictly less than 1 when facing another established player. The strategies for a player i in a SCE are summarized in Table 3. They are described in terms of his type, age, and prior signal, and the age (and signal) of his opponent.

Let D_τ denote the difference in expected payoffs to a type τ player from having an established instead of an unestablished reputation when old. This difference represents the expected gain from generating a violent signal when young. With this notation, Proposition 3 provides necessary and sufficient conditions for the existence of a SCE.

TABLE 3
STREET CULTURE EQUILIBRIUM: PROBABILITY THAT PLAYER i CHOOSES VIOLENCE WHEN MATCHED WITH OPPONENT j

Type	Age/Reputation	Opponent Age/Reputation			
		Young	Unestablished	Established	
Player decent	young	1	1	1	
	old	0	0	0	
	street	young	1	1	1
		unestablished	1	1	0
	established	1	1	R/ϕ^E	

PROPOSITION 3. *A SCE exists if and only if*

$$(1) \quad \phi^E \geq R \geq f_s + f_d$$

$$(2) \quad \kappa \rho D_s \geq \frac{\phi^E L - (1 - \phi^E)G}{\phi^E}$$

$$(3) \quad \kappa \rho D_d \geq \frac{C}{\phi}$$

where $\phi^E = \frac{f_s}{f_s + f_d}$ is the street reputation of an established player and $\phi = f_s \left(\frac{1 - \phi^E \rho}{1 - f_s \rho} \right)$ is the street reputation of a player who, when young, was matched with an established player and generated a nonviolent signal.

See Appendix for proof.

Condition (1) reflects that the fraction of streets among nonweak types $\frac{f_s}{f_s + f_d} = \phi^E$ must be large enough to ensure that the established player, with his street reputation ϕ^E , earns the deference of old streets, and thus give an established reputation its value in equilibrium. In addition, the fraction of nonweak types, $f_s + f_d$, must be small enough to ensure that street types of each age have incentive to behave violently against the young, and thereby generate opportunities for young people to establish their reputations. Condition (2) guarantees that the weighted future benefit of an established reputation exceeds the cost of acquiring it for young street types, no matter how *strong* their opponent appears. Similarly, condition (3) assures that the weighted future benefit of an established reputation exceeds the cost of acquiring it for young decent types, regardless of how *weak* their opponent appears.¹⁹

Analysis of this SCE shows how a reputation-based model of street crime is consistent with many of the facts about such crime that the standard model cannot easily explain.

4.1.1. *Widespread violent crime that has no direct pecuniary rewards.* The SCE is distinguished by three basic features. First, despite the fact that they derive no direct reward from violence, the behavior of young decents is indistinguishable from that of young streets. Thus, as it draws decents into street crime, the social force of reputation may raise the crime rate substantially above the level supported by fundamental economic motives. A second feature is that streets too are drawn by reputation concerns to choose violence against those who, with very high probability, will be violent with them. The value of an established reputation is sufficiently large that it justifies what would otherwise seem like senseless behavior. Finally, the street culture is distinguished by the extremity of behavior in

¹⁹ As an example, the following set of parameters satisfy conditions (1)–(3): $f_s = f_d = \frac{1}{4}$, $G = L = B = 100$, $C = 1$, $\kappa = 1$, $\rho = \frac{1}{2}$.

this equilibrium. Despite its simplicity, a SCE is especially violent. Decents are choosing violence as often as they ever will.

4.1.2. *Violent crime more prevalent among the young.* Another important feature of reputation-motivated violence is the relationship between age and violent crime that it generates. In a street culture, both decents and streets are less violent when old than when young. Young decents and streets choose violence against all opponents. Old decents are never violent; and, relative to young streets, the behavior of old streets is tempered in two situations. First, the unestablished defer to all established players, streets and decents alike. Second, established streets defer with probability $(1 - \frac{R}{\phi^E})$ to all other established players.

Reputation's influence on individual propensities for street crime by age naturally generates aggregate differences in the relative rates of violence within age groups. Crime rates are highest among the young. Of the meetings between two young people, only those involving two weaks are lacking in violence. Every other interaction among youths includes at least one violent participant; and extremely violent (V, V) encounters represent a potentially large fraction of all their interactions $(1 - f_w)^2$. Contrast this level of street crime with that characterizing interactions between the old. In these old-old meetings, street crime is perpetrated only by streets, and even they are not always violent. Only when unestablished streets are paired, and with probability $(\frac{R}{\phi^E})^2 < 1$ when established streets are paired, is there an extremely violent (V, V) interaction.

4.1.3. *Violent crime more prevalent among the poor.* The model allows several reasons why reputation-based violence would be less common in wealthier communities. For example, greater levels of police enforcement, combined with higher opportunity costs of being caught and punished for violent crime, may simply generate higher costs of participation C in richer communities. Alternatively, given their low marginal utilities from wealth, richer people may have lower benefits from deference B . It may also be that, given the opportunity costs of violence among those with higher wages, there are very few who would derive a direct gain from violent crime (street types) in richer communities.

Less obvious is that the reputation-based violence of a SCE cannot be supported where the stakes for street types (G) are too large. This result derives from two related effects. First, the value of a reputation derives from obtaining the deference of streets. If the direct stakes for streets are too high, streets will no longer defer to the established, meaning $\frac{G}{G+L} \equiv R > \phi^E$, condition (1) fails, and the street culture unravels. Second, suppose instead that condition (1) continues to hold as G increases. The value of an established reputation for decent types is given by

$$D_d = \frac{f_s}{2} \left(1 - \pi \frac{R}{\phi^E} \right) B$$

where π denotes the probability a young street or decent type becomes established. This value of an established reputation is decreasing in R and, therefore,

decreasing in G . Thus, as the stakes for streets increase, even if unestablished streets would continue to defer to the established, established streets would defer less frequently and thus diminish the value of an established reputation. If the value of an established reputation falls too low, condition (3) fails and the street culture unravels. Thus a street culture cannot be sustained in a community where the stakes for street types are too large.

4.1.4. *Negative social capital: The social costs of reputation-based crime.* To see the welfare costs of reputation concerns, compare the payoffs in a SCE to those in a community where reputations cannot be built through violence, i.e., the unconnected community characterized in Proposition 1. Because decents are as violent as they will ever be, in many interactions they are worse off in a street culture than they would be in an unconnected community where they are always passive. Decents are worse off in these interactions both because of the direct costs of perpetrating violence and, more important, because of the increased likelihood of victimization attributable to the violence of young decents. Relative to the unconnected community there are, however, some interactions in which decents are better off in the street culture. Those improved interactions are with old streets when old. These interactions are improved because, unlike in the unconnected community, decents become established in a street culture and thereby earn the deference of old streets. If, however, decents are sufficiently common, victimization by decents outweighs the benefits of better treatment from streets. Then, decents are worse off in a street culture than in an unconnected community.

LEMMA 1. *There exists an \underline{f} such that if $f_d \geq \underline{f}$ then the expected payoff for decent types is lower in a SCE than in an unconnected community ($\rho = 0$).*

PROOF. Let the cost of violence become vanishingly small ($C \rightarrow 0$), and the future infinitely important ($\kappa \rightarrow \infty$). In this case, the expected payoffs to decents in a street culture are highest relative to those in an unconnected community. This case makes payoffs in street culture as high as possible relative to the setting where $\rho = 0$ because decents are never violent in the unconnected community, and the only interactions that have higher payoffs in the street culture are those when old. Even in this case, a street culture nevertheless generates lower welfare for decents if

$$(4) \quad \frac{f_s}{2} \pi \left(1 - \pi \frac{R}{\phi^E} \right) B \leq \frac{f_d}{2} B$$

where $\pi = (f_s + \frac{f_d}{2})\rho$ is the probability a young street or decent becomes established. The left hand side of inequality (4) represents the expected gain to decents, relative to the unconnected community, when old from interactions with old streets. The right hand side is the loss, when old, from interactions with young

decents. Substituting for π and rearranging yields

$$(5) \quad \left(f_s + \frac{f_d}{2}\right) \rho \left(f_s - \left(f_s + \frac{f_d}{2}\right) R\rho(f_s + f_d)\right) \leq f_d$$

Inequality (5) always holds if

$$\left(f_s + \frac{f_d}{2}\right) \rho f_s \leq f_d$$

or

$$\frac{2f_s^2\rho}{2 - f_s\rho} \leq f_d$$

The result follows directly. ■

An analogous result holds for street types.

LEMMA 2. *There exists an \underline{f} such that if $f_d \geq \underline{f}$ then the expected payoff for street types is lower in a SCE than in an unconnected community ($\rho = 0$).*

PROOF. Assume, again, the case where expected payoffs to streets are highest in the street culture relative to the unconnected community ($\kappa \rightarrow \infty$). This case makes payoffs in street culture as high as possible relative to the setting where $\rho = 0$ because there are no gains relative to the unconnected community when streets are young. Even in this case, a street culture nevertheless generates lower welfare for streets if

$$\begin{aligned} & \pi \frac{f_s}{2} \left[\pi \left(1 - \left(\frac{R}{\phi^E} \right)^2 \right) (G + L) + (1 - \pi)(2G + L) \right] + (1 - \pi) \frac{f_s}{2} \pi L \\ & \leq \frac{f_d}{2} (2G + L) + \frac{f_d}{2} \pi \left[(1 - \pi) + \pi \left(1 - \frac{R}{\phi^E} \right) \right] G \end{aligned}$$

where, again, $\pi = (f_s + \frac{f_d}{2})\rho$ is the probability a young decent or street becomes established. The left hand side of the inequality is the expected gain to streets, relative to the unconnected community, when old from interactions with old streets. The first term on the right hand side is the loss, when old, from interactions with young decents. The second term is the loss, when old, from interactions with old decents. Some rearranging yields

$$(6) \quad \frac{f_s}{2} \left(2\pi - \pi^2 \left(1 + \left(\frac{R}{\phi^E} \right)^2 \right) \right) (G + L) \leq \frac{f_d}{2} (2G + L) + \frac{f_d}{2} G \pi_d \left(1 - \frac{\tilde{\phi}}{\phi_s^E} \pi_s \right)$$

Inequality (6) always holds if

$$f_s \pi(G + L) \leq \frac{f_d}{2}(2G + L)$$

Substituting for π yields

$$\frac{2f_s^2 \rho Q}{1 - f_s \rho Q} \leq f_d$$

where $Q = \frac{G+L}{2G+L}$. The result follows directly. ■

It follows from Lemmas 1 and 2, and the fact that the increased violence in a street culture relative to the unconnected community makes weak types worse off, that when decent types are sufficiently common we can Pareto rank the outcomes in a street culture and an unconnected community.

PROPOSITION 4. *There exists an f such that if $f_d \geq f$, the expected outcome in an unconnected community Pareto dominates the expected outcome in a SCE.*

5. MULTIPLE EQUILIBRIA

The relevance of reputation concerns for street crime rates depends on whether equilibria with decents participating in violence are compelling. Could, for example, an equilibrium in which decent types never participate in street crime exist along side the SCE characterized by Proposition 3? In what follows, we see that if a SCE exists, and with some reasonable refinements of the set of equilibria, then decents are violent in every equilibrium.

In this section, we will restrict attention to strategies that are monotone in the opponent's street reputation, i.e., strategies are such that for each age and every feasible own reputation, the probability of choosing violence is either weakly increasing or weakly decreasing in the belief that the opponent is a street.²⁰ Why, if a SCE exists, is it difficult to support an equilibrium in which decent types are never violent? Suppose only streets were violent when young. Then if the conditions for the existence of the SCE hold, anyone who generates a violent signal when young will earn the most complete form of deference from old streets. But if this is the case, then unless young streets can coordinate and choose violence *more* often against those with established reputations, the benefit of an established reputation will be strictly greater than it was before, and decent types will find it profitable to choose violence. The intuition developed in previous sections suggests that it will be difficult to get young streets to be gentler with those who they think less likely to fight them back, and indeed this is the case.

²⁰ Restricting attention to strategies of this form precludes behavior where a street, when confronting opponents with street reputations $\phi_j > \phi'_j > \phi''_j$, would be most violent with the opponent posing the greatest potential threat ϕ_j , least violent with ϕ'_j , and choose an intermediate level of violence against the least threatening, ϕ''_j .

TABLE 4
 LOWER VIOLENCE EQUILIBRIUM: PROBABILITY THAT PLAYER i CHOOSES VIOLENCE WHEN MATCHED WITH OPPONENT j

Type	Age/Reputation	Opponent Age/Reputation				
		Young	Unestablished	Established	Completely Established	
Player	decent	young	0	0	0	1
		old	0	0	0	0
	street	young	1	1	1	1
		unestablished	1	1	0	0
		established	1	1	R/ϕ^E	0
		completely established	1	1	1	R

PROPOSITION 5. *If a SCE exists, and if off the equilibrium path street reputations equal 1, then in every equilibrium in monotone strategies decent types participate in violence.*

See Appendix for proof.

Thus the incentives that reputation generates for participation in violent crime may be compelling, making at least some crime by decent types unavoidable. Nevertheless, there may exist multiple equilibria with decent types participating in violence to varying degrees. An example is an equilibrium in which young decent types choose violence only against the “completely established,” i.e., those who are presumed to be streets ($\phi = 1$). A completely established player is someone who had a violent interaction with an opponent, such as an unestablished old player, who in equilibrium only a street type would have attacked. Established players are, as in the street culture, those who had a violent interaction with an opponent who both streets and decent types would have attacked with equal probability ($\phi = \phi^E = \frac{f_s}{f_s + f_d}$). The strategies for this equilibrium are summarized in Table 4.

Given Proposition (5), it may seem surprising that this lower violence equilibrium could exist along with a street culture.²¹ In particular, there would seem to be strong incentives for young decent types to deviate, choosing violence against the young or the old and merely established and thereby completely establish themselves as presumed streets. The intuition for why this lower level of violence can be supported as an equilibrium is the following: When young decents coordinate on relatively low levels of violence, the coordination has two effects. First, the coordination makes it harder to obtain an established reputation from violence with a young person. Since reputations are obtained from violence against

²¹ For example, both equilibria exist for the following parameters: $f_s = 0.3$, $f_d = 0.2$, $G = 150$, $L = 100$, $B = 75$, $C = 1$, $\kappa = 1$, $\rho = \frac{1}{2}$. For some parameter values street culture exists but the lower violence equilibrium does not, and vice versa.

a violent opponent, when decents refrain from violence with other youth, then violence by a decent youth against another youth has a lower expected return. Second, the coordination reduces relative value of a *completely* established reputation because young decents do not choose violence against the old and less than completely established. In other words, the strategies of this equilibrium are tailored to minimize the amount of violence by decents against each other, and ensure the greatest benefits from reputation building come from attacks on known streets.

Because multiple equilibria with varying levels of violence by decent types may be sustained by the same economic and social fundamentals, the model is consistent with extreme variation in violent crime rates across very small geographic distances. Some communities may be stuck in particularly violent equilibria, whereas others have coordinated on less reputation-based violence.

6. IMPLICATIONS FOR POLICY

By providing insights into the forces behind violent crime, this model of crime and reputation generates novel implications for policy and social science. First, when reputation concerns drive street crime, increased law enforcement and stiffer criminal penalties for violent crime may actually *increase* such crime. Consider, for example, a community where the expected gains for street types are too high, and the social structure is too weak to support a street culture. Then suppose a new enforcement policy lowers the expected payoff from crime for streets (G), increases the expected costs for decents (C), but also increases the strength of a violent signal (ρ). The signal is stronger because, given the community's social structure, the police presence and arrests generate more public information about violent events. If the decrease in G and increase in ρ outweigh the increase in C we could see a street culture emerge where there was none before, and thus a dramatic increase in street crime from an increase in enforcement of laws against such crime.

Second, by distinguishing between public and private crimes the model also suggests a novel rationale for the quality of life policies recently implemented by some U.S. police departments (see Rashbaum, 2002). Quality of life policies strictly enforce laws against nonviolent misdemeanors in order to have an indirect impact on violent crime rates. Enforcement of laws against turnstile jumping, shoplifting, and panhandling are typically thought to affect violent crime because many turnstile jumpers, shoplifters, and panhandlers are also violent criminals. Thus when a shoplifter is jailed, there is one less mugger on the street too. The model presented here indicates, however, that policies that disproportionately affect those with a direct pecuniary interest in crime, such as turnstile jumpers, shoplifters, and panhandlers, may have a multiplier effect on violent crime through their influence on reputation-based crime. Consider a community in which reputation concerns draw the decent population into violence. Now introduce policies that disproportionately affect street types. For example, unlike street types, decents presumably have no incentive to commit crime out of public view. Strict enforcement of laws against turnstile jumping, shoplifting, and

certain forms of panhandling could, therefore, effectively identify and remove real streets from the community. If such reductions were substantial and widely publicized, disproportionate decreases in violent crime levels could result as decent types come to find a street reputation less valuable, and a street culture unravels.

Finally, this model offers a different perspective on the effects of interpersonal connections from that taken by standard theories of social capital. Standard theories of social capital focus on how better interpersonal connections facilitate community cooperation and the provision of local public goods such as safety. This model captures a countervailing effect of social connectedness. In this context, a community with better social connections, and with higher rates of social interaction, is *more* likely to support reputation-based violence. Thus, in this context, it may be better to bowl alone.

The model analyzed here is highly stylized. Many aspects of community life that may influence street crime rates are omitted. I highlight two missing aspects of particular interest. The first is endogenous meetings. If, in fact, walking the street exposes a decent type to considerable risk, then it is logical for him to avoid the street as much as possible. If time spent in the street were a choice, the community could make inferences about type based not just on an individual's history of violent signals, but also on the fraction of his time he spends in the street. Importantly, if the street cannot be sufficiently avoided, reputation concerns may make it optimal to spend much more than the minimum amount of time in the street. The implications of this kind of reputation effect may be substantial. If reputations are maintained in part by spending time in the street then, by extension, time spent at school or work may negatively impact street reputations; and thus reputation concerns may influence investment in human capital.

The logic of the preceding paragraph suggests a second missing feature: endogenous types. This article treats types as though they were permanent and given exogenously. A richer model would allow past actions to influence direct payoffs. If, for example, by committing a street crime an individual went to prison with greater probability, and that prison time influenced his options in the legitimate labor market, then his direct payoffs from future street crimes would change.

7. CONCLUSION

This article developed a model of social interactions to explain how reputation concerns can support widespread crime where the direct incentives for such behavior are weak. In doing so, the article formalized an instrumental, reputation-based theory of street crime that is consistent with facts that the standard model cannot easily explain.

The model showed that, although there can be a social benefit to reputations, that benefit is dominated when reputation concerns draw those who expect no direct gain from street crime to nevertheless commit such crime. The incentives to acquire a street reputation are stronger when the future is more relevant; so reputation concerns draw the young to be involved in more street crime than the

old. The article showed why violent crime rates may differ across communities with the same economic fundamentals but different social fundamentals such as social connectedness. The model also permitted multiple equilibria and thus explained why even identical communities may have very different crime rates and why the local variation in violent crime may exceed that of strictly pecuniary crime. Finally, as a model of social effects on demonstrative crime, the article showed why violent crimes would be committed in public.

By providing insights into the forces behind violent crime, the model generated novel implications for policy and social science. When street reputations drive crime, increased law enforcement and stiffer criminal penalties for violent crime may *increase* such crime if the policies strengthen the signal of a violent encounter or lower the gains from violence to street types. On the other hand, stronger enforcement of strictly *pecuniary* crime may change the type composition in a neighborhood and, thereby, have a disproportionate effect on *violent* crime by reducing incentives for reputation-based violence. Finally, this model offered a different perspective on the effects of social connections from that in standard theories of social capital, which emphasize how interpersonal links facilitate community cooperation. This model captured a countervailing effect of social connectedness and showed how a better connected community may be more likely to support a street crime culture.

APPENDIX

PROOF OF PROPOSITION 3. The proposed strategy for old decent types is trivially optimal. The following describes the conditions under which the rest of the strategy profile is optimal (given consistent beliefs).

Consider first the behavior of street types when old. As in the unconnected and myopic communities, the game is static for old streets. Old streets would therefore choose violence against all *young* players if

$$\begin{aligned} \overbrace{f_w G - (1 - f_w)(G + L)}^{\text{expected payoff from } V} &\geq \overbrace{f_w 0 - (1 - f_w)G}^{\text{expected payoff from } P} \\ \iff R &\geq 1 - f_w = f_s + f_d \end{aligned}$$

This gives the right-hand side of inequality (1). Similarly, old streets are willing to choose violence against all old, unestablished players with reputations ϕ_j if $\phi_j \leq R$. By Bayes' Rule, such reputations $\phi_j < f_s$. By definition, $f_s \leq f_s + f_d$. Therefore, if $f_s + f_d \leq R$, then violence is optimal for all old streets against all unestablished players. The same optimality condition indicates that old unestablished streets will defer to established players if

$$\begin{aligned} (1 - \phi^E)G - \phi^E(G + L) &\leq (1 - \phi^E)0 - \phi^E G \\ \iff R &\leq \phi^E \end{aligned}$$

This gives the left-hand side of inequality (1). If $R \leq \phi^E$ then, following the logic of Proposition 2, symmetric equilibria must have established streets choosing violence with probability $\frac{R}{\phi^E}$ when facing each other.

Consider next the possible matches for young streets. Let E_τ denote the expected payoff to a type τ player when old if established, U_τ the payoff if unestablished, and $D_\tau = E_\tau - U_\tau$. If young streets optimally choose violence against other young players then

$$\begin{aligned} & f_w G - (1 - f_w)(G + L) + \kappa[(1 - f_w)\rho E_s + (1 - (1 - f_w)\rho)U_s] \\ & \geq f_w 0 - (1 - f_w)G + \kappa U_s \\ \iff & \kappa \rho D_s \geq \frac{(1 - f_w)L - f_w G}{1 - f_w} \end{aligned}$$

Similarly if young streets optimally choose violence against all old players with street reputations ϕ_j then

$$(A.1) \quad \kappa \rho D_s \geq \frac{\phi_j L - (1 - \phi_j)G}{\phi_j} \quad \text{for all feasible } \phi_j$$

The right-hand side of inequality (A.1) is increasing in ϕ_j . Condition (1) for optimality requires $f_s + f_d \leq \phi^E$. It follows that the binding constraint for young streets is with respect to established players where $\phi_j = \phi^E$. This gives condition (2).

Last we consider the possible scenarios for young decent types. Young decents will optimally choose violence against the young if

$$\begin{aligned} & -f_w C - (1 - f_w)(C + B) + \kappa[(1 - f_w)\rho E_d + (1 - (1 - f_w)\rho)U_d] \\ & \geq f_w 0 - (1 - f_w)B + \kappa U_d \iff \kappa \rho D_d \geq \frac{C}{(1 - f_w)} \end{aligned}$$

Similarly, young decents will choose violence against the established if $D_d \geq \frac{C}{\kappa \rho \phi^E}$ and against the unestablished if $D_d \geq \frac{C}{\kappa \rho \phi_j}$ for all feasible ϕ_j . By Bayes' Rule, all such unestablished $\phi_j < f_s$, and by definition $f_s \leq 1 - f_w$. The binding constraint will, therefore, be determined by the old and unestablished with the smallest street reputation.

LEMMA 3. *The maximum feasible belief in a SCE is the posterior belief following a violent signal, denoted by $\phi^E = \frac{f_s}{f_s + f_d}$. The minimum feasible belief, denoted by ϕ , equals $\frac{f_s(1 - \phi^E \rho)}{1 - f_s \rho}$.*

PROOF. Since young streets and decents are pooling when young, after a violent signal the posterior belief is simply the fraction of streets among the nonweak types, $\frac{f_s}{f_s + f_d}$. It is a direct consequence of the two-period lives of agents that this is

the maximum belief. The minimum belief after a nonviolent signal when matched with old player is given by $\underline{\phi} = \frac{f_s(1-\phi^E\rho)}{1-(1-f_w)\phi^E\rho} = \frac{f_s(1-\phi^E\rho)}{1-f_s\rho}$. It is the minimum because beliefs are strictly decreasing in ϕ_j . The belief after a nonviolent signal when matched with another young player is given by $\frac{f_s(1-(1-f_w)\rho)}{1-(1-f_w)(1-f_w)\rho} > \frac{f_s(1-\phi^E\rho)}{1-f_s\rho}$ because $\phi_s^E > (1 - f_w)$.

It follows that the binding constraint is $D_d \geq \frac{C}{\kappa\rho\phi}$. ■

PROOF OF PROPOSITION 5. First, three observations about the structure of equilibria when the conditions for the existence of a SCE hold:

1. The strategies of players when old are the same across all equilibria since condition (1) of the SCE is met, and when old the game is static.
2. If decents never participate in violence, and street reputations equal 1 off equilibrium path, then all equilibria must have young streets generating violent signals and earning reputations $\phi = 1$ either on or off equilibrium path. If not, it would be profitable for a young street to deviate and play V against other youths because this action could make him no worse off with respect to future meetings and only better off against this opponent.
3. If an equilibrium in which decents are never violent exists then young streets must choose V against established streets with a probability strictly greater than that against the unestablished. This condition must hold because, given the assumption on off-equilibrium path beliefs, by generating a violent signal a player is established as a street, $\phi = 1$. Thus, by generating a violent signal, a young player would earn even greater deference from older players than he would in the SCE. Thus, unless young streets are less violent with those with $\phi < 1$, D_τ must be at least as large as under the SCE. But if D_τ is as large in this separating equilibrium, then by the arguments in the proof of Proposition 3 young decents would choose to deviate and play V against established streets, a contradiction.

It remains to show that if strategies are monotonic then the necessary condition (described in observation (3)) for such a strictly separating equilibrium cannot be met. If young streets are willing to fight established streets with positive probability then

$$(A.2) \quad E_s - U_s(1) \geq \frac{L}{\kappa\rho}$$

where $U_s(1)$ is the expected payoff to an unestablished old street who was matched with an established player when young. Because the behavior of old streets is

invariant, condition (A.2) implies

$$\begin{aligned} & \sigma(\varphi_1^u) \frac{f_s}{2} (2G + L) \\ & \geq \frac{L}{\kappa\rho} + \left[\sigma(1) \frac{f_s}{2} (2G + L) - \frac{f_s}{2} (2G + L) + \frac{f_s}{2} \pi (1 + R^2) (L + G) \right] \end{aligned}$$

where $\sigma(\phi)$ is the probability a young street chooses violence against an old opponent with street reputation ϕ , φ_ϕ^u is the belief about an unestablished street whose match when young was with an old player with street reputation ϕ , and π is the probability a young street becomes established. If, in addition, the probability of playing violently against an old player with reputation φ_1^u must be less than that against an established street, then it must also be that

$$\begin{aligned} \sigma_s(\varphi_{\varphi_1^u}^u) \frac{f_s}{2} (2G + L) & \leq \frac{\varphi_1^u L - (1 - \varphi_1^u) G}{\varphi_1^u \kappa\rho} \\ & + \left[\sigma(1) \frac{f_s}{2} (2G + L) - \frac{f_s}{2} (2G + L) + \frac{f_s}{2} \pi (1 + R^2) (L + G) \right] \end{aligned}$$

An application of Bayes' Rule shows that $\varphi_1^u < \varphi_{\varphi_1^u}^u < 1$. Given $R \geq 1 - f_w$, it follows that $\frac{\varphi_1^u L - (1 - \varphi_1^u) G}{\varphi_1^u \kappa\rho} < 0$. If $\frac{\varphi_1^u L - (1 - \varphi_1^u) G}{\varphi_1^u \kappa\rho} < 0$ then $\sigma_s(\varphi_{\varphi_1^u}^u) < \sigma(\varphi_1^u)$. By hypothesis $\sigma(\varphi_1^u) < \sigma_s(1)$, which contradicts the assumption that strategies are monotonic in the opponent's street reputation. ■

REFERENCES

- AKERLOF, G., AND J. YELLEN, "Gang Behavior, Law Enforcement, and Community Values," in H. Aaron, T. Mann, and T. Taylor, eds., *Values and Public Policy* (Washington, DC: Brookings Institution, 1994).
- ANDERSON, A., AND L. SMITH, "Assortative Matching and Reputation," Mimeo, University of Michigan, 2004.
- ANDERSON, E., *Streetwise: Race, Class, and Change* (Chicago, IL: University of Chicago Press, 1990).
- , *Code of the Street: Decency, Violence, and the Moral Life of the Inner City* (New York: W.W. Norton, 1999).
- BAGWELL, L., AND B. D. BERNHEIM, "Veblen Effects in a Theory of Conspicuous Consumption," *American Economic Review* 86 (1996), 349–73.
- BECKER, G. S., "Crime and Punishment: An Economic Approach," *Journal of Political Economy* 76 (1968), 169–217.
- BENNETT, W., J. DI IULIO, AND J. WALTERS, *Body Count: Moral Poverty and How to Win America's War against Crime and Drugs* (New York: Simon and Schuster, 1996).
- BERTRAND, M., E. P. LUTTMER, AND S. MULLAINATHAN, "Network Effects and Welfare Culture," *The Quarterly Journal of Economics* 115 (2000), 1019–56.
- BORJAS, G., "Ethnicity, Neighborhoods, and Human-Capital Externalities," *American Economic Review* 85 (1995), 365–90.
- BUTTERFIELD, F., *All God's Children: The Bosket Family and the American Tradition of Violence* (New York: Avon Books, 1996).

- CASE, A., AND L. KATZ, "The Company You Keep: The Effects of Family and Neighborhood on Disadvantaged Youth," NBER Working Paper 3705, 1991.
- COLE, H., G. MAILATH, AND A. POSTLEWAITE, "Social Norms, Savings Behavior, and Growth," *Journal of Political Economy* 100 (1992), 1092–125.
- DALY, M., AND M. WILSON, *Homicide* (New York: A. de Gruyter, 1988).
- GLAESER, E., B. SACERDOTE, AND J. SCHEINKMAN, "Crime and Social Interactions," *The Quarterly Journal of Economics* 111 (1996), 507–48.
- HOLMSTRÖM, B., AND J. RICART I COSTA, "Managerial Incentives and Capital Management," *The Quarterly Journal of Economics* 101 (1986), 835–60.
- KANDORI, M., "Social Norms and Community Enforcement," *Review of Economic Studies* 59 (1992), 63–80.
- KATZ, J., *Seductions of Crime: Moral and Sensual Attractions in Doing Evil* (New York: Basic Books, 1988).
- KREPS, D., AND R. WILSON, "Reputations and Imperfect Information," *Journal of Economic Theory* 27 (1982), 253–79.
- LUDWIG, J., G. DUNCAN, AND P. HIRSCHFELD, "Urban Poverty and Juvenile Crime: Evidence from a Randomized Housing-Mobility Experiment," *The Quarterly Journal of Economics* 116 (2001), 655–80.
- MERTON, R., *Social Theory and Social Structure* (New York: Free Press, 1968).
- MILGROM, P., AND J. ROBERTS, "Predation, Reputation, and Entry Deterrence," *Journal of Economic Theory* 27 (1982), 280–312.
- MILLER, T. R., M. COHEN, AND S. ROSSMAN, "DataWatch: Victim Costs of Violent Crime and Resulting Injuries," *Health Affairs* Winter (1993), 187–97.
- MORRIS, S., "Political Correctness," *Journal of Political Economy* 109 (2001), 231–65.
- NEWMAN, K. S., *No Shame in My Game: The Working Poor in the Inner City* (New York: Knopf and the Russell Sage Foundation, 1999).
- OKUNO-FUJIWARA, M., AND A. POSTLEWAITE, "Social Norms and Random Matching Games," *Games and Economic Behavior* 9 (1995), 79–109.
- PERISTIANY, J. G., *Honour and Shame* (Chicago, IL: The University of Chicago Press, 1966).
- POLK, K., "Males and Honor Contest Violence," *Homicide Studies* 3 (1999), 6–29.
- RASHBAUM, W. K., "In New Focus on Quality of Life, City Goes after Petty Criminals," *The New York Times* May 22, 2002, A1.
- ROSENTHAL, R., AND H. LANDAU, "A Game-Theoretic Analysis of Bargaining with Reputations," *Journal of Mathematical Psychology* 20 (1979), 233–55.
- SAH, R., "Social Osmosis and Patterns of Crime," *Journal of Political Economy* 99 (1991), 1272–95.
- U.S. DEPARTMENT OF JUSTICE (USDOJ), "Criminal Victimization 1999," Bureau of Justice Statistics. National Criminal Justice (2000), Reference Number 182734.
- WILSON, J. Q., AND R. J. HERRNSTEIN, *Crime and Human Nature* (New York: Simon and Schuster, 1985).