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Plea Bargaining and Deterrence: An Institutional Approach

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Abstract

Previous economic analyses of plea bargaining have largely ignored its impact on the deterrence of crime. Instead, they have focused on the bargaining between a defendant and a prosecutor once a crime has been committed. This article remedies this deficiency by asking how the practice of plea bargaining influences the determination of criminal punishment and thereby the supply of crime by rational offenders. The key question examined is, how do the ex post objectives of prosecutors affect the ability of legislatures to implement criminal punishments aimed at achieving optimal deterrence? Various prosecutorial objectives are considered in answering this question.

> Penalties which we believe are required as a threat to maintain conformity to the law at its maximum may convert the offender . . . into a hardened enemy of society; while the use of measures of Reform may lower the efficacy and example of punishment on others.
>
> —H.L.A. Hart (1968, p. 27)

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1. Introduction

The vast majority of criminal convictions in the United States are achieved by a guilty plea rather than by trial. For example, of the 48,392 criminal convictions in U.S. district courts in 1992, 42,339, or 87.5 percent, were by plea (*Statistical Abstract*, 1994, p. 206, Table 333). Although several economists have examined the practice of plea bargaining, few have paid attention to its impact on deterrence.[1] This neglect is strange given that the economic model of crime beginning with Becker (1968) has highlighted the deterrent effect of criminal punishment. The purpose of this article, therefore, is to examine how the institution of plea bargaining affects the goal of deterrence of crime.

An analysis of the effects of plea bargaining on deterrence must take an ex ante perspective. Specifically, how does the practice of plea bargaining affect the expected punishment potential offenders perceive when contemplating a crime?[2] In contrast, previous models of plea bargaining have focused primarily on the pretrial bargaining process between the defendant and prosecutor following apprehension.[3] Thus, the issues raised in these models are ex post considerations—that is, they arise after a crime has been committed and a defendant apprehended.

This dichotomy between ex ante and ex post considerations points to an important institutional feature of the criminal justice system in the United States—namely, that enforcement policies are determined in a sequential manner and by different decision makers. For example, criminal punishments are first determined in broad terms by a legislature, which I will assume, consistent with the economic model of crime, pursues the objective of optimal deterrence. However, once crimes are committed, actual punishments are determined by judges and prosecutors, whose objectives may be quite different. This institutional structure of the process whereby punishments are set is neglected in standard economic models. The crucial question examined in this article, therefore, is, do the ex post objectives of prosecutors result in punishment practices that counteract the deterrence objective of legislatures? If so, then a potential agency problem exists whereby the interests of the prosecutor (the agent) diverge from the interests of the legislature (the principal).

The analysis of this question proceeds as follows. Section 2 outlines the standard economic model of crime based on optimal deterrence, offers an institutional perspective on the criminal justice system in the United States, and describes the social objectives of the practice of plea bargaining according to the U.S. Supreme Court. Section 3 then formalizes the plea bargaining model and derives the equilibrium punishments in the context of two different specifications of the prosecutor's objective function. In each case, the implications of the equilibrium for deterrence are examined. Finally, Section 4 discusses the implications of the results for the economic theory of crime and suggests how they relate to criminal prosecution in civil law countries.

2. The economic theory of deterrence and the structure of the criminal process

This section begins by outlining the standard model of deterrence, first developed by Becker (1968), which is employed in most economic models of crime. It then offers a perspective on the model based on the institutional structure of the criminal justice system. This perspective lays the groundwork for the model of plea bargaining and deterrence to be developed in the next section.

2.1. The model of deterrence

To formalize the economic model of deterrence, let

b = benefit of committing a crime for potential offenders;
$F(b)$ = distribution of b across the population of individuals, where $b \in [b_0, b_1]$ and b_0 may be negative;
E = punishment imposed on conviction for a crime;
δ = probability that the offender is apprehended. For example, δ might represent the (exogenous) accuracy of the arrest process.[4]

A potential offender therefore commits a crime if $b \geq \delta E$ and does not commit a crime if $b < \delta E$. The total quantity, or supply, of crime is therefore given by $Q(\delta E) = 1 - F(\delta E)$,

normalizing the population to one. (Note that if $b_0 < 0$, some people will not commit crimes even if the expected punishment is zero—that is, $Q(0) = 1 - F(0) < 1$.) It obviously follows from this model that as the expected punishment increases, the amount of crime declines (i.e., $Q' < 0$ given $F' > 0$). Thus, greater deterrence is associated with higher values of δ and E.

Given this hypothesized relationship between crime and punishment, most models go on to derive the optimal punishment scheme by maximizing a social objective function that includes the cost of crime to victims (and possibly the benefits of crime to offenders) plus the costs of enforcement. The latter usually include the cost of achieving a given probability of apprehension plus the costs of imposing punishment when it takes the form of imprisonment. The principal results that arise from this model are, first, that punishment should take the form of fines whenever possible because they have very low administrative costs compared to prison and, second, that fines should be set as high as possible while simultaneously lowering the probability of apprehension in order to achieve the desired deterrence at lowest cost (Becker, 1968).[5] Prison should therefore be used only if an offender's wealth does not permit attainment of the desired level of deterrence (Polinsky and Shavell, 1984).

2.2. An institutional perspective

Although the standard model of deterrence as just described yields valuable insights both about the actual nature of the criminal process (a positive view) and the way that it should be structured (a normative view), it abstracts from various institutional features that significantly affect its functioning. An important example is the manner in which actual punishments are determined. For example, most models implicitly assume that the punishment for a crime is determined at a given point in time and by a single decision maker with a well-defined objective function. In reality, however, punishments are determined sequentially in a multitiered structure and by various decision makers whose objectives may differ (Wittman, 1974; Adelstein, 1979, 1981; Schulhofer, 1988). In this article, I take a first step at modeling this structure. First, I assume that legislatures establish punishment guidelines for crimes before they are committed based on the goal of achieving optimal deterrence. This ex ante objective most closely resembles the theoretical view taken in deterrence models. Once a crime is actually committed and a suspect apprehended, however, determination of actual punishments becomes the task of the judicial process, and there is evidence that different objectives become paramount.[6] These ex post objectives involve appropriate treatment of defendants as determined by the circumstances of the crime, the identity of the offender, and the likelihood that he or she is truly guilty. (I will be more specific about the ex post objectives in the discussion of plea bargaining below.) Finally, even after an offender's punishment is set, it can be further adjusted by an appeals court or, in the case of imprisonment, a parole board.[7]

The point is that recognition of these various stages of the punishment process, and how the objectives of decision makers change, is essential if a positive model of the effects of punishment on deterrence is to be constructed. To that end, this article examines the practice of plea bargaining, given that it is the principal manner in which criminal convictions

are obtained in the United States. The primary question motivating the analysis is, how does the practice of plea bargaining affect the ability of a legislature to pursue the ex ante objective of deterrence (assuming that is its goal)?

2.3. The practice of plea bargaining

Before addressing this question, we need to examine in more detail the objectives that are pursued by prosecutors when they engage in plea bargaining. These objectives have been set out in several U.S. Supreme Court decisions that have validated the practice. For example, in *Santobello v. New York*, the Court argued that "If every criminal charge were subject to full-scale trial, the United States and the Federal Government would need to multiply by many times the number of judges and court facilities."[8] The Court cautioned, however, that the use of plea bargaining to conserve judicial resources must be balanced against the more lofty objectives of appropriately punishing the guilty and avoidance of punishing the innocent. In *Brady v. United States*, for example, the Court argued that an advantage of plea bargaining for the State is that "the more promptly imposed punishment after an admission of guilt may more effectively attain the objective of punishment,"[9] but it went on to add that "We would have serious doubts about this case if the encouragement of guilty pleas by offers of leniency substantially increased the likelihood that defendants, advised by competent counsel, would falsely condemn themselves."[10]

Based on these arguments, we can identify the following ex post objectives of prosecutors: (1) appropriate punishment of the guilty, (2) avoidance of punishment of the innocent, and (3) conservation of judicial resources. These are essentially the goals attributed to prosecutors in existing models of plea bargaining, which commonly assume that prosecutors internalize society's objectives rather than pursuing their own.[11] In the analysis of the next section, actual punishments imposed on offenders will be determined by the plea bargaining process according to these ex post objectives. The key issue is how the resulting punishments affect the ex ante goal of deterrence. Alternatively stated, how does the plea bargaining process "filter" legislatively set punishments? Moreover, do (or should) legislatures set ex ante punishment levels differently, given their goals, knowing how those punishments will be filtered by plea bargaining? With these questions in mind, I turn to the model.

3. A model of plea bargaining and deterrence

Consider the following scenario. A crime has been committed and a single suspect has been apprehended. The guilt of the defendant is uncertain, but the prosecutor believes that he is guilty with probability δ, which, recall, is the true probability that the actual offender is apprehended. Given δ, the prosecutor offers the defendant a punishment of severity a, measured in dollars, which he can accept or refuse.[12] If he refuses, he goes to trial where he is either convicted or acquitted. The model makes use of the following additional notation:

P_G = probability that a truly guilty defendant is convicted at trial,
P_I = probability that a truly innocent defendant is convicted at trial, where $P_G < P_I$ (all parties take P_G and P_I as given),
t = cost of a trial to the defendant,
T = social cost of a trial,
s = dollar value of the punishment imposed on conviction at trial

I assume that s is set by the legislature in accordance with the ex ante objective of minimizing the expected cost of crime as described in the deterrence model above. Although in reality legislatures set a range for s over which judges have discretion, I assume here that a single value is set.[13]

Plea bargaining between the prosecutor and defendant takes place against the background of a trial. That is, both parties pursue their own interests, taking s as given. The defendant's objective is to minimize his expected sentence given the available options. Thus, the maximum offer that a defendant of type j will accept rather than go to trial is

$$a_j = P_j s + t, \quad j = G, I, \tag{1}$$

where $a_G > a_I$ follows from the fact that $P_G > P_I$. Notice, therefore, that any offer $a > a_G$ will be rejected by both types of defendants; any offer $a_I < a \leq a_G$ will be accepted by guilty defendants but rejected by innocent defendants; and any offer $a \leq a_I$ will be accepted by both types of defendants. Included in the latter are cases dropped by the prosecutor (i.e., $a = 0$).

Given this behavior by the two types of defendants, the prosecutor makes an offer to maximize her objective function, which I assume reflects the three goals described above. Since these are ex post objectives aimed at appropriate treatment of defendants given that a crime has already been committed, the question is whether they are consistent with the ex ante objective of the legislature, which I take to be optimal deterrence.[14] The answer, it turns out, depends on the particular form of the prosecutor's objective function. I thus consider two versions based on the models of Reinganum (1988) and Grossman and Katz (1983).

3.1. Reinganum's model

I consider the version of Reinganum's model in which the prosecutor has limited discretion. That is, I assume she must offer the same sentence to defendants charged with the same crime. The utility function for the prosecutor that arises from the above objectives is derived as follows. If punishment equal to x (in dollars) is imposed on a guilty defendant, the prosecutor receives positive utility of γx, but if it is imposed on an innocent defendant, she receives disutility of λx. A trial for either type of defendant results in social costs of T.

Given these objectives, a "pooling" offer $a \leq a_I$ that both types of defendants accept yields prosecutorial utility of

$$U_p = [\delta\gamma - (1-\delta)\lambda]a, \tag{2}$$

where, recall, δ is the probability that the true offender is apprehended. Notice that the value of a that maximizes (2) depends on whether the bracketed term is positive or negative. If it is positive (that is, if $\delta > \lambda/(\gamma + \lambda)$), $a = a_I$ is the optimal separating offer since it is the largest penalty acceptable to both types of defendants. However, if the bracketed term is negative (that is, if $\delta < \lambda/(\gamma + \lambda)$), $a = 0$ is the optimal pooling offer, and the case is dropped.

A "separating" offer $a_I < a \leq a_G$, on the other hand, is accepted by guilty defendants and rejected by innocent defendants. It therefore yields prosecutorial utility of

$$\begin{aligned} U_s &= \delta\gamma a - (1-\delta)[T + \lambda(P_I s + t)], \\ &= \delta\gamma a - (1-\delta)(T+\lambda a_I). \end{aligned} \tag{3}$$

Note that the second term represents the disutility of taking an innocent defendant to trial.[15] Since a_I is independent of the prosecutor's offer, the optimal separating offer is the largest possible—that is, $a = a_G$ given $\partial U_s/\partial a = \delta\gamma > 0$.

A third possible offer noted above is a pooling offer that both types of defendants reject—that is, $a > a_G$. The prosecutor will never find this offer optimal, however, because it is dominated by the optimal separating offer, $a = a_G$. The reason is that both defendants end up receiving the punishment that they would receive at trial under the separating offer, but the social costs of actually trying guilty defendants are saved by inducing them to plead guilty.

I now examine the prosecutor's choice between the optimal pooling and separating offers as a function of δ and s. With regard to δ, I consider two cases: $\delta > \lambda/(\gamma + \lambda)$ and $\delta < \lambda/(\gamma + \lambda)$. After deriving the optimum for each case, I consider how it varies with changes in s, the punishment set by the legislature.

3.1.1. Case 1: $\delta > \lambda/(\gamma + \lambda)$. In this case, the bracketed term in U_p is positive, so $a = a_I$ is the optimal pooling offer, and the prosecutor's maximized utility is $U_p^* = [\delta\gamma - (1 - \delta)\lambda]a_I$. Thus, the prosecutor chooses whether to make a pooling offer of a_I or a separating offer of a_G by comparing U_p^* and $U_s^* = \delta\gamma a_G - (1 - \delta)(T + \lambda a_I)$. To examine this comparison I form the difference

$$\begin{aligned} U_s^* - U_p^* &= \delta\gamma(a_G - a_I) - (1-\delta)T \\ &= \delta\gamma(P_G - P_I)s - (1-\delta)T. \end{aligned} \tag{4}$$

It follows from (4) that $U_s^* > (<) U_p^*$ as $s > (<) s' = (1 - \delta)T/[\delta\gamma(P_G - P_I)]$, given that both U_s^* and U_p^* are increasing in s.[16] Harsher punishment is always better for the prosecutor when $\delta > \lambda/(\gamma + \lambda)$ because the expected benefit of punishing the guilty more than offsets the expected costs of punishing the innocent. The results in this case are thus identical to what would occur with a purely self-interested prosecutor whose utility is increasing in the expected sentence (whether imposed by trial or by plea), regardless of whether the defendent is guilty or innocent.[17]

The prosecutor's utility curves under the optimal pooling and separating strategies are illustrated in the upper panel of Figure 1. The graph shows that for low s, the prosecutor prefers the optimal pooling offer, $a = a_I$, but as s increases, she eventually switches to the

optimal separating offer $a = a_G$. Intuitively, the pooling offer is prefered for low s because, according to (4), the cost of a trial more than offsets the benefit of imposing a harsher punishment on guilty defendents. When s is large, however, the latter benefit dominates. Thus, the actual punishment imposed on a guilty defendent is a_I for $s < s'$, and a_G for $s > s'$, both as a result of plea bargains. This result is shown by the darkened segments in the middle panel of Figure 1.

Finally, consider the impact of plea bargaining on deterrence where, recall, the supply of crime is given by $Q(\delta E) = 1 - F(\delta E)$. To this point we have shown that the actual punishment on conviction of guilty defendents is $E = a_I$ for $s < s'$ and $E = a_G$ for $s > s'$, and we know that both a_I and a_G are increasing in s by (1). The bottom panel of Figure 1 thus shows that $1 - F(\delta E)$ is everywhere decreasing in s, with a discrete drop at s', the point where the equilibrium switches to a separating type. As a result, legislative increases in s are successful in deterring crime in this case. The reason is that the threat of harsher punishment at trial enhances the bargaining position of prosecutors toward defendents, thereby forcing the latter to accept less favorable (that is higher) penalties. We may conclude, therefore, that there

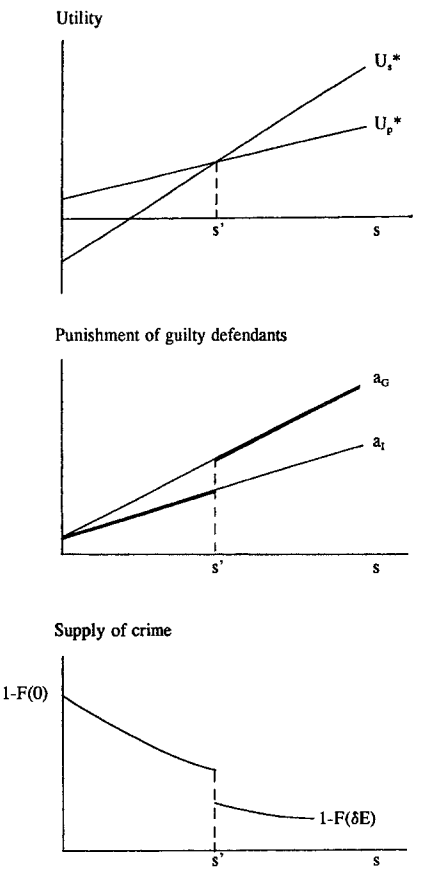

Figure 1. The Reinganum model, Case 1: $\delta < \lambda/(\gamma + \lambda)$.

is no fundamental conflict between the prosecutor's ex post goals and the ex ante goal of deterrence in the present case. That is, an agency problem does not exist.

3.1.2. Case 2: $\delta < \lambda/(\gamma + \lambda)$. In this case, the bracketed term in U_p is negative, so the prosecutor always finds it optimal to drop the case (that is, set $a = 0$) under a pooling equilibrium. This is true either because the fraction of guilty defendants (δ) is too low to offset the cost of incorrectly punishing the innocent or because the cost of punishing the innocent (λ) is high relative to the benefit of punishing the guilty (γ). As a result, $U_p^* = 0$ in this case. As for the separating strategy, $\partial U_s/\partial s = \delta\gamma > 0$ continues to hold, so a_G remains the optimal separating offer.

Because $U_p^* = 0$ for all s when $a = 0$, the threshold between the two strategies in this case is determined by setting $U_s^* = 0$ given $a = a_G$. This yields

$$s' = \frac{(1-\delta)T - t\,[\delta\gamma - (1-\delta)\lambda]}{\delta\gamma P_G - (1-\delta)\lambda P_I} \tag{5}$$

Note that the numerator of (5) is positive given $\delta < \lambda/(\gamma + \lambda)$, and the denominator is positive if and only if $\delta > \lambda P_I/(\gamma P_G + \lambda P_I)$, where $\lambda P_I/(\gamma P_G + \lambda P_I) < \lambda/(\gamma + \lambda)$. Assume first that the denominator is positive (that is, $\lambda P_I/(\gamma P_G + \lambda P_I) < \delta < \lambda/(\gamma + \lambda)$, in which case $s' > 0$. Thus, the prosecutor drops the case ($a = 0$) when $s < s'$, and chooses the optimal separating offer ($a = a_G$) when $s > s'$. In the latter case, guilty defendants accept the offer of a_G while innocent defendants go to trial. Figure 2 summarizes the outcome for the case where $s' > 0$. As the darkened segments in the middle panel show, the actual punishment of guilty defendants is zero for $s < s'$, and jumps to a_G at s'. As a result, the bottom panel shows that when $s < s'$, an increase in s does not achieve additional deterrence, but when $s > s'$, increases in s do deter crime. Thus, ex ante and ex post goals for setting criminal punishments are in conflict for low values of s but not for high values of s.

Now suppose $\delta < \lambda P_I/(\gamma P_G + \lambda P_I)$. In this case, U_s^* is decreasing in s and is never positive for $s \geq 0$. Thus, $s' < 0$. Consequently, the prosecutor will never pursue a case against a defendant. The reason is that the expected cost of incorrectly punishing an innocent defendant is too high. Notice that this is more likely the larger is the critical value $\lambda P_I/(\gamma P_G + \lambda P_I)$, which is increasing in λ, the marginal cost of punishing an innocent defendant, and P_I, the probability that an innocent defendant will be convicted at trial. Thus, given δ, the larger is either of these parameters, the more likely it is that the prosecutor will drop the case. When this outcome occurs, the ex post goals of the prosecutor prevent the legislature from pursuing a policy of optimal deterrence. The reason is that increases in s with no accompanying increase in the accuracy of the system (for example, with no increase in δ or decrease in P_I) will fail to result in higher *actual* penalties.

3.2. Grossman and Katz's model

The prosecutor's objective function in the Grossman and Katz (1983) model differs slightly, though crucially, from that in Reinganum (1988). Specifically, the benefit from punishing the guilty does not increase monotonically with the punishment imposed as in

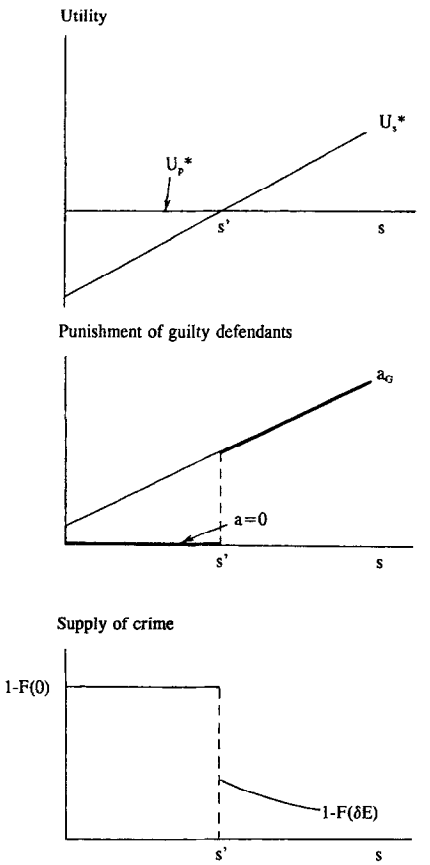

Figure 2. The Reinganum model, Case 2: $\delta > \lambda/(\gamma + \lambda)$.

to the crime. Let s^* represent the "best" punishment level for the crime in question. Incorporating this change in the prosecutor's goal, we may write her revised objective functions under the pooling and separating strategies, respectively, as follows:[18]

$$U_p = \delta\gamma(a - s^*) - (1-\delta)\lambda a, \tag{6}$$

$$U_s = \delta\gamma(a - s^*) - (1-\delta)[T + \lambda(P_I s + t)], \tag{7}$$

where γ is now a *function* that rises in a until $a = s^*$ and declines in a thereafter. Formally, $\gamma' > 0$ for $a < s^*$ and $\gamma' < 0$ for $a > s^*$. The function $\gamma(a - s^*)$ is shown in Figure 3.

Given the revised objective function for prosecutors, consider first the pooling strategy under which the prosecutor maximizes U_p subject to $a \leq a_I$. First define a_p^* as the unconstrained maximand of U_p. That is, a_p^* solves

$$\partial U_p/\partial a = \delta\gamma' - (1 - \delta)\lambda = 0. \tag{8}$$

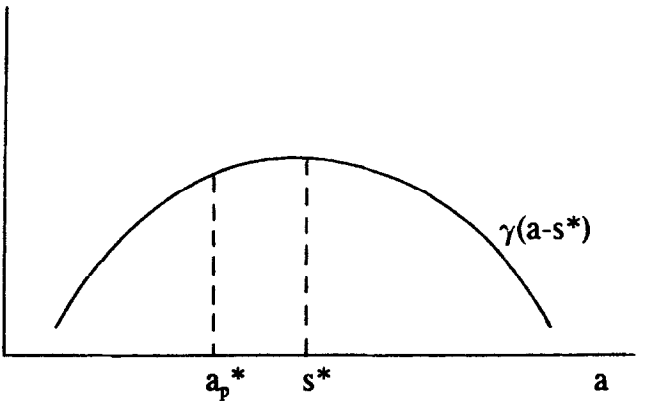

Figure 3. The function $\gamma(a - s^*)$.

It follows from (8) that $\gamma' > 0$ at a_p^*.[19] Thus, $a_p^* < s^*$ (see Figure 3). Given the constraint that $a \leq a_I$, the optimal pooling offer is therefore given by min $[a_I, a_p^*]$.

Next consider how the optimal pooling strategy varies with changes in s. Note first that because a_I is increasing in s by (1) while a_p^* is independent of s, there is a critical value s_p' such that a_I is optimal for $s < s_p'$, and a_p^* is optimal for $s > s_p'$, where s_p' solves $a_I = a_p^*$. Specifically, using (1), $s_p' = (a_p^* - t)/P_I$.[20] Finally, substituting the optimal values of a into (6) and differentiating with respect to s yields

$$\partial U_p/\partial s = \begin{cases} [\delta\gamma' - (1-\delta)\lambda]P_I > 0, & s < s_p' \\ 0, & s > s_p' \end{cases} \tag{9}$$

Note that the expression in the top line is positive since, for $s < s_p'$, $a = a_I < a_p^*$. According to (9), U_P^* is increasing in s over the range where a_I is the optimal offer but constant when a_p^* becomes optimal. The top panel in Figure 4 illustrates U_P^* as a function of s.

Consider next the separating strategy. In this case, the prosecutor maximizes U_s subject to $a_I < a \leq a_G$. Since the derivative of U_s with respect to a equals $\delta\gamma'$, the optimal offer is given by min$[a_G, s^*]$ (for now I ignore the constraint that $a > a_I$). As in the pooling case, a_G is increasing in s, and s^* is independent of s. Thus, a_G is optimal for $s < s_s'$ and s^* is optimal for $s > s_s'$, where the switch point s_s' solves $a_G = s^*$ (that is, $s_s' = (s^* - t)/P_G$).

Substituting the optimal values of a into U_s and taking the derivative with respect to s yields

$$\partial U_s^*/\partial s = \begin{cases} \delta\gamma' P_G - (1-\delta)\lambda P_I > < 0, & s < s_s' \\ -(1-\delta)\lambda P_I < 0, & s > s_s' \end{cases} \tag{10}$$

The first line says that $\partial U_s^*/\partial s$ is ambiguous in sign when a_G is optimal. However, if we suppose that γ' is large initially, then this expression is positive when s is small and

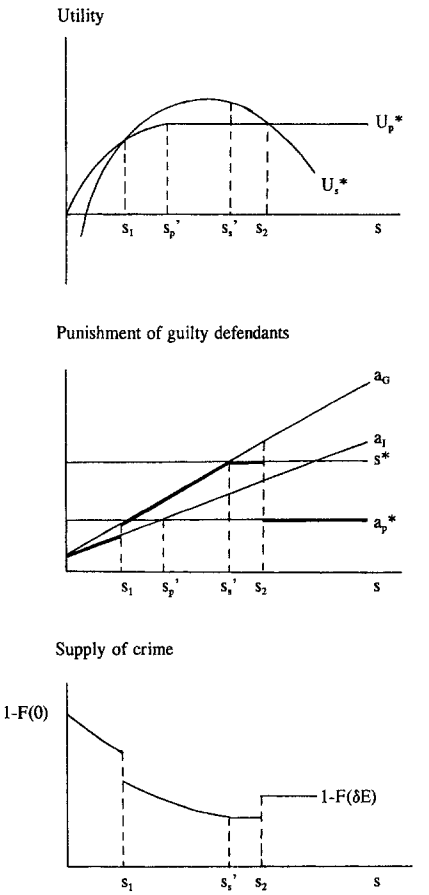

Figure 4. The Grossman and Katz model.

becomes negative as a_G approaches s^*. The second line is unambiguously negative since $\gamma' = 0$ when s^* is the optimal offer.

So far I have assumed that $a > a_I$ in the optimal separating solution. Note, however, that as s increases, it will eventually be true that $a_I > s^*$. When this occurs, innocent defendants will no longer reject the prosecutor's offer of s^*. Thus, the outcome becomes a pooling solution at s^*. However, the prosecutor never prefers a pool at s^* to a pool at a_p^* given that a_p^* maximizes U_p. Consequently, a separating equilibrium can never arise once s exceeds the point where $a_I = s^*$—that is, once $s > (s^* - t)/P_I$.[21]

Based on the preceding analysis, the prosecutor's maximized utility under the separating strategy is graphed as a function of s in the top panel of Figure 4. The graph is drawn under the assumption that U_s^* exceeds U_p^* over some range of s (specifically, between s_1 and s_2). In the middle panel of Figure 4, the darkened segments show the resulting punishments actually imposed on guilty defendants over the different ranges of s. Notice that the punishment rises initially, with a jump when the equilibrium switches to a separating type at s_1 (that is, when punishment switches from a_I to a_G); reaches a peak at s^*; and then drops back to a_p^* when the equilibrium switches back to a pooling type at s_2.[22]

The bottom panel of Figure 4 graphs the crime rate that results from the equilibrium punishments in this case. The graph shows that increases in s succeed in deterring additional crime up to a point (s_2) but that further increases in s actually result in *less* deterrence. The reason is that beyond s_2, prosecutors are unwilling to negotiate excessive sentences for guilty defendants or to go to trial with innocent defendants in the face of stiff penalties. Thus, they negotiate more lenient sentences with all defendants. The result is that legislatures can increase deterrence by raising s only up to a point but that further increases in s after that point actually deter less crime due to the response of prosecutors.

4. Conclusion: Implications for the economic analysis of crime

One of the earliest results arising from the economic model of crime was that if punishment takes the form of a fine, optimal deterrence is achieved by making the fine as large as feasible (for example, equal to the offender's wealth) and then setting the probability of apprehension as small as possible (Becker, 1968). The fact that actual punishment schemes rarely resemble this prescription has led several authors to attempt to reconcile theory and practice (Polinsky and Shavell, 1979, 1991; Malik, 1990; Andreoni, 1991).

The results in this article also offer an answer to this paradox. Recall that the analysis began with the presumption that legislatures have an objective function resembling Becker's—namely, attainment of optimal deterrence. Once prosecutors are introduced as independent agents, however, the analysis showed that if legislatures raise the magnitude of punishment too high in an effort to implement Becker's prescribed policy, prosecutors will resist imposing what society believes are excessive punishments—that is, the punishment will not "fit the crime" for the particular offender. As a result, legislatures may recognize that greater deterrence can actually be achieved by not raising punishments too high.[23]

The principal reason for the preceding conclusion was the presence of a potential agency problem in criminal punishment, given that the preferences of prosecutors may diverge from those of the legislature. This was especially true of the Grossman and Katz specification of the prosecutor's objective function, which prevented the implementation of a low-probability, high-penalty punishment scheme. Ironically, it turned out that a purely self-interested prosecutor who is concerned only with maximizing expected punishments irrespective of guilt (as was true of Reinganum's Case 1) better served the ex ante interests of the legislature by *not* blocking schemes of this sort. An important question, therefore, is, which characterization of prosecutorial behavior is closer to reality? Two recent empirical studies of the criminal process provide some insight.

In the first study, Snyder (1990) examined the response of the criminal process to a 1974 legislative increase in penalties for violation of antitrust laws.[24] His hypotheses were, among others, that (1) courts would reduce conviction probabilities (conditional on a not guilty plea) to offset the higher potential penalties for fear of overly punishing innocent defendants and (2) prosecutors would file fewer suits and take fewer of those filed to trial. Generally, these hypotheses were borne out by the data. They suggest that ex post objec-

tives—whether implemented by the courts, prosecutors, or the two in combination—have an important effect on the actual implementation of criminal punishments, at least in antitrust cases.

In contrast, a second study by Waldfogel (1993) suggests that ex ante objectives based on optimal deterrence seem to describe better actual sentences than do ex post objectives based on "proportional justice."[25] Waldfogel reached this conclusion by calculating the "implicit harms" of various criminal acts implied by actual sentences for those acts under two different models of the criminal process—one based on optimal deterrence and one based on proportional justice. He found that the former yielded estimates of harms that corresponded more closely to measures of harms obtained by an independent procedure. Although this is far from evidence that actual punishments are based on deterrence, it offers a counterpoint to Snyder's results, and provides support for the self-interested model of prosecutorial behavior (Reinganum's Case 1).

A final point concerns the twin assumptions (1) that legislatures and prosecutors are independent agents and (2) that they might pursue different objectives. Regarding the latter, Adelstein has developed an institutional model of the criminal justice system in the United States that views it as an attempt to "price" crime efficiently given the lack of a market for doing so (Adelstein, 1981). In this model, legislatures and prosecutors pursue the *same* objective—namely, to fit punishments to crimes—but they differ in their abilities to do that because they act at different points in time: the legislature sets punishments before a crime is committed, and the prosecutor charges defendants after the crime has been committed. The economic problem for the legislature, therefore, is to set an ex ante price in order to induce potential offenders to choose the optimal level of crime (an ex ante goal), whereas the problem for the prosecutor (and the court) is to exact the correct payment from those offenders actually apprehended (an ex post goal). However, because crimes are necessarily "heterogeneous goods" (the identity and characteristics of offenders and victims differ), and because only a fraction of offenders are ever actually punished, there is a necessary conflict between these goals. Specifically, it is impossible to set a price ex ante to achieve the "efficient" level of crime and at the same time to set an ex post price that fits the particular crime. The institutional view suggests that the criminal justice system has evolved (and is still evolving) in an effort to balance these conflicting goals.

One function of plea bargaining in this view is to ensure that a single-minded goal of optimal deterrence (the ex ante objective) does not prevent criminal punishments from being sensitive to case-specific judgments after a crime is committed (Adelstein, 1978b). The fact that prosecutors are independent agents allows them to pursue the ex post objective of individualized punishments (prices), which legislatures, in their ignorance of case-specific facts, cannot. (Legislatures could in principle specify ex ante complete contingent penalty schedules that would account for all possible circumstances, but in practice this would be prohibitively costly.)

Yet another view of the criminal justice system follows from the European or civil law tradition in which plea bargaining plays little (if any) role and in which all parties in the process (theoretically) pursue a common objective. For example, Langbein (1979) notes that the German system is characterized by compulsory prosecution for serious crimes in the pursuit of the objective of "treating like cases alike, obeying faithfully the legislative

determination to characterize something as a serious crime, [and] preventing political interference or other corruption from inhibiting prosecution" (Langbein, 1979, pp. 211–212). Thus, in sharp contrast to the U.S. system, the prosecutor is prohibited from exercising discretion ex post. Of course, this obviates any conflict between the actions of legislatures and prosecutors that might arise from different objective functions, different information, or both. Indeed, the prosecutor is compelled to pursue the same objective as the legislature. Consequently, to the extent that the German and other civil law systems strictly adhere to the principle of compulsory prosection, and to the extent that they succeed in aligning the interests of prosecutors with those of the legislature, the sort of agency problem that I have modeled in this article may not arise. This conjecture suggests a fruitful area for comparative institutional analysis.

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Notes

1. Exceptions include Reinganum (1993) and Kobayashi (1992), though the focus of those models is quite different from the present article.
2. A recent analysis of the differential effects of settlements and trials in civil litigation by Polinsky and Rubinfeld (1988) confronts a similar issue. However, plea bargaining differs from settlement of civil litigation in several respects. First, civil cases involve two private parties seeking to advance their private interests, whereas the prosecutor in a criminal case represents the interests of society. Second, the problem of distinguishing innocent from guilty defendants is important in criminal cases but not usually in civil cases. Finally, there generally are costs of imposing criminal punishment (at least when it is imprisonment) that are not associated with civil liability.
3. See, for example, Landes (1971), Adelstein (1978a), Grossman and Katz (1983), Reinganum (1988), and Kobayashi and Lott (1992).
4. More generally, suppose that q is the probability that a suspect is apprehended for a given crime, and δ is the probability that the suspect is the actual offender. Then, from the offender's perspective, $q\delta$ is the probability of apprehension. Henceforth, I assume for simplicity that $q = 1$—that is, a single suspect is apprehended for each crime.
5. This conclusion is not true, however, if offenders are risk averse (Polinsky and Shavell, 1979).
6. For example, Dawson (1969, p. 201) notes that "there is judicial resistance to imposition of mandatory maximum sentences that seem unduly long in relation to the circumstances of the case." Also see Hart (1968, pp. 24–27), Harris (1970), Adelstein (1981, pp. 32–33, 42), Mermin (1982, p. 54), Andreoni (1991), and Miceli (1991).
7. See Miceli (1994) for an analysis of the impact of parole on deterrence.
8. Santobello v. New York, 404 U.S. 257, 260 (1971).
9. Brady v. United States, 397 U.S. 742, 752 (1970).
10. Brady v. United States, 758.
11. For early models of prosecutorial objectives see Landes (1971) and Forst and Brossi (1977). For a more recent model see Rubinfeld and Sappington (1987). Most models of plea bargaining cited in the introduction

assume the prosecutor internalizes social objectives identified in the text. For analyses in which the prosecutor follows private objectives instead, see Miceli (1990) and Schulhofer (1988).

12. Punishment can either be a fine or imprisonment.
13. Recent federal sentencing guidelines have removed much of a judge's discretion in sentencing (Freed, 1992), thus making the assumption in the model somewhat more realistic.
14. For general analyses of this question that do not focus specifically on plea bargaining, see Wittman (1974) and Miceli (1991).
15. The reader might note that, in a perfect separating equilibrium, all trials involve innocent defendants. Thus, the court should automatically acquit them. This result, however, would destroy the equilibrium, for guilty defendants then would opt for trial as well. I avoid this problem by assuming that the trial outcome is exogenous and independent of the plea bargaining process.
16. Specifically, $\partial U_s^*/\partial s^* = \delta\gamma P_G - (1 - \delta)\lambda P_I$, and $\partial U_p^*/\partial s = [\delta\gamma - (1 - \delta)\lambda]P_I$, both of which are positive given $\delta > \lambda/(\gamma + \lambda)$ and $P_G > P_I$.
17. It has been argued that such an objective function for prosecutors reflects their desire to attain a reputation for a high conviction rate (Landes, 1971; Miceli, 1990; Grossman, 1969).
18. Note that Grossman and Katz did not include the costs of trial in their welfare function as I have done here.
19. Specifically, (8) implies that $\gamma' = (1 - \delta)\lambda/\delta > 0$.
20. I assume that $a_p^* > t$ so that $s_p' > 0$.
21. Notice that the critical point $(s^* - t)/P_I$ exceeds s_s', given that $P_G > P_I$.
22. The graph assumes that $a > a_I$ over the entire range that the separating strategy is optimal—that is, between s_1 and s_2.
23. See Miceli (1991), Andreoni (1991), and Kobayashi and Lott (1992) for similar arguments relating high-probability, low-penalty enforcement strategies to ex post objectives of the criminal process.
24. This increase in penalties resulted from a shift of criminal antitrust violations from the misdemeanor to the felony category.
25. It should be noted that antitrust violations were not among the crimes Waldfogel studied. Thus, a comparison of his results with those of Snyder is suggestive at best.

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