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**Plea Bargaining with
Budgetary Constraints**

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Plea Bargaining with Budgetary Constraints*

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Abstract: In this paper, we construct a simple model that illustrates a perverse effect associated with plea bargaining in which an increase in sanctions can lead to reduced deterrence. This finding is derived from the interaction of binding budgetary constraints and plea bargaining. In an environment with these institutional features, higher sanctions are not always optimal when resources are limited, even if such sanctions are costless. Such potential phenomena may be useful in explaining the fact that many states have introduced limitations on plea bargaining. Career-concerned prosecutors are necessary for such a result to be present.

JEL Classification: K42; K14

Key Words: Plea Bargaining; Budget Constraint; Crime; Prosecutor

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1. Introduction

In the present U.S. judicial system, few criminal cases are determined by trial. In fact, approximately 90% of cases are resolved by guilty pleas.¹ Although television has popularized the idea that many plea bargains are made in exchange for information, the large majority of the plea bargains in reality are done to save resources. As highlighted by Fisher (2000) or Landes (1971), because of severe budgetary pressure on prosecutors, this method of resolving cases is viewed as an essential tool for managing large case loads. Plea bargaining saves money, or perhaps we should more precisely say that it saves time, by reducing the time spent in court by both prosecutors and judges. Court time is often seen as the most significant constraint to a smoothly functioning legal system. In fact, empirical evidence, dating as early as Alshuler (1968), reveals that plea bargaining became more prevalent as these types of constraints became more binding.

Despite these advantages, there is large opposition to plea bargaining. In a 2004 memo on sentencing to all federal prosecutors, the Justice Department imposed restrictions on plea bargaining.² Five states³ have partial bans on plea bargaining, while eleven states⁴ have some form of restrictions. In 1975, Alaska even introduced a total ban on plea bargaining.⁵ Some lobby groups like Mother's Against Drunk Driving (MADD)

¹ United States Sentencing Commission Data. Resolved cases are defined as those dealt with by guilty plea, dismissal or trial.

² See the memo (<http://news.findlaw.com/hdocs/docs/doj/ashcroft92203chrgmem.pdf>) by Attorney General J. Ashcroft. In his memo, Ashcroft stated that it is a prosecutor's duty "to charge and to prove the most serious, readily provable offense." Plea-bargaining is only admissible if it is consistent with such goal.

³ CA, FL, MI, OR and PA.

⁴ AZ, AR, CO, KS, KY, ME, MS, NM, NY and WY.

⁵ Rubinstein and White (1979) mention that even if formal plea bargaining is banned, some bargaining takes place in the form of offense bargaining, where the type of offense charged is what is bargained one. They show that, following Alaska's ban on plea bargaining, sentences for Class 3 (burglary, larceny, etc) increased by 53%, while sentences for Class 4 (Fraud, forgery, etc) and Class 5 (drug felonies) increased by 117% and 223% respectively. This suggests that reduced sanctions were a consequence of plea bargaining. The Alaskan Judicial Council (1991) concluded (<http://www.ajc.state.ak.us/Reports/pleaframe.htm>)

advocate for a total ban of plea bargaining in drinking and driving cases. According to Fisher (2000), people are concerned that plea bargaining is unfair and undermines the legitimacy of the legal system.

In this paper, we demonstrate that plea bargaining may introduce some perverse outcomes. In particular, counter-intuitively in an environment with plea bargaining, *increasing* sanctions can lead to more crime when the prosecutor is resource constrained. In other words, excessive use of plea bargaining can reduce the effectiveness of higher sanctions.

Increased penalties have long been believed to be a crucial strategy for decreasing the incentives to commit crime, and thereby, reducing the level of crime. However, empirical evidence casts some doubt on the responsiveness of criminal activities to changes in sanctions.⁶ There is a long literature addressing the relative ineffectiveness of sanctions. Stigler (1970) and Mookherjee and Png (1994) argue that extreme sanctions reduce marginal deterrence, and thus encourage criminals to commit crimes that are more severe, or to commit crimes more intensely. Malik (1990) argues that criminals increase expenditure on socially wasteful avoidance activities as sentences rise. Andreoni (1991) shows that the probability of conviction may fall as sentences rise if jurors use a reasonable doubt test. A similar argument can be generated by an institutional feature: Prosecutors with restricted resources may make plea bargains with defendants. This paper suggests that, in the presence of resource-constrained prosecutors who enter into plea bargains to relax these constraints, the presence of these agreements can diminish, or even completely offset the deterrence effect of increased legislated sanctions.

In this paper, we construct a simple model that incorporates a constrained prosecutor

that even if some bargaining actually continues to take place in Alaska for budgetary reasons, it is seriously limited in effect.

⁶ Ehrlich (1996) discusses these empirical findings on deterrence. He also discusses many issues in this empirical work including identification issues, mismeasurement of data, and difficulties in separating incapacitation and deterrence effects. Although empirical issues make these results difficult to judge, the findings still do suggest an small effect of increased severity of punishments on the crime level.

and show that increased sanctions may lead to reduced deterrence when plea bargaining is taken into consideration. Plea bargaining is characterized by a guilty plea, in which the defendant and the prosecutor agree to a division of the surplus created by the savings generated by avoiding trial. This leads to a reduced sanction. When sanctions are *increased*, a prosecutor who is socially benevolent, in the sense that minimizing criminal activity is her goal, internalizes all of the effects of plea bargaining. Consequently, a benevolent prosecutor is able to take advantage of the increase in sanction to reduce crime.

However, when prosecutors have different objectives, this may no longer be the case. Many lawyers and economists acknowledge the fact that prosecutors may have career concerns. In particular, prosecutors may wish to signal their competence in order to win re-election or to earn promotion. An easily measured signal of performance is the conviction rate. Early critics of plea bargaining noted this potential. Raymond Moley in 1928 noted:⁷

Equally important is the advantage which a plea of guilty gives to the prosecuting attorney. He is not compelled to carry through an onerous and protracted trial. He does not run the risk of losing his case in the trial court. He runs no risk of having to oppose an appeal to a higher court in case he wins the trial ... What is much more important to the prosecutor is the fact that in such records as most prosecutors make of the work which they have performed, a plea of guilty of any sort is counted as a conviction, and when he goes before the voters for re-election he can talk in large terms about securing convictions when, in reality, these ‘convictions’ include all sorts of compromises. The district attorney’s “record”, as he usually interprets it to the public, rests upon the ratio of convictions to acquittals and means as much to him as a batting average means to a baseball player.

This concern with ‘batting averages’ does not seem to have diminished.⁸ A simple

⁷ Moley (1928), p. 103.

⁸ Rabin (1971) and Eisenstein (1978) show some interview evidence of this objective among federal prosecutors. Albonetti (1987) shows that the decision to prosecute is made with a preference to avoid uncertainty. Raghav, Ramseyer, and Rasmusen (2005) show that appointed prosecutors have lower conviction rates than elected ones, suggesting that high conviction rates may be believed to have an electoral reward.

Google search on conviction rates yields many District Attorney's webpages that report information on conviction rates. For example, a website from the County of San Diego reports:⁹

The District Attorneys Office is very proud of the fact that it has a 94.2 percent conviction rate - one of the highest in the State of California. This figure is based upon the total number of felony cases filed and the outcome of those cases; that is, whether these cases were resolved by way of conviction (guilty plea or guilty verdict), not guilty verdict, or dismissal. Officewide statistics for the year 2005 show that there were 18,763 felony cases closed, 17,668 convictions, 31 verdicts of not guilty, and 1,064 dismissals.

These statistics are easy to present and interpret and are often used by prosecutors as a measure of their performance and effectiveness.

Of course, prosecutors are not solely concerned with conviction rates. However, they may value both a traditional deterrence objective and the more easily evaluated conviction rate objective.¹⁰ When prosecutors have these motivations and are faced with a higher sanction, they will want to increase trial effort in order to increase conviction probabilities. Given that prosecutorial resources are limited, in order to provide more trial effort, the prosecutor must plea bargain a larger fraction of cases. However, each plea bargain entails a reduced sanction, offsetting the benefit of the increased sanction. In this environment, as long as sanctions cannot be raised to the point where no one commits any crime (avoiding the limiting case), raising sanctions can lead to an increase in crime levels.

Instead of increasing the legislated sanction, a better strategy for reducing crime may be to increase the expenditure on prosecutorial services. Increasing this expenditure reduces the pressure to offer attractive plea bargains for administrative reasons. An interesting alternative policy to mitigate this problem, is the introduction of procedural

⁹ See the webpage, <http://www.sdca.org/prosecuting/conviction.php>

¹⁰ Boylan (2005) shows that prosecutors career outcomes are not affected by conviction rates, but rather by the length of prison sentences. In this paper, we will suppose that prosecutors care about both of these objectives and look at the consequences of varying the relative intensity of these objectives.

policies that limit the number or attractiveness of plea bargains like the ones discussed at the beginning of this paper.

In the next section of the paper, we discuss the basic model and derive agent behavior. We, then, in section 3, characterize the equilibrium level of crime in our simple economy. Section 4 deals with the effects of increasing sanctions. Lastly, we discuss the implications for the prosecutor's office of restricting the resources devoted to trial. All proofs are in the appendix.

2. The Model

There is a measure of agents indexed by their criminal aptitude $\theta \in [0, 1]$, which is uniformly distributed.¹¹ More able agents are assumed to extract more rents from criminal activities. There is one possible criminal activity which has a payoff of θ . If agents do not commit a crime, they receive a reservation utility which is normalized to zero.

If an agent commits a crime, he will be caught with probability $\mu > 0$. For simplicity, we assume that no innocent agents are charged.¹² We assume that prosecutors cannot observe θ ; and, therefore, no sentences or plea bargains are conditioned on the agent's ability. The expected sanction from going to trial is the product of the legislated sanction S and the probability of conviction.¹³ The probability of conviction is given by

¹¹ This criminal aptitude can simply be interpreted as the gain from a specific crime an individual contemplates committing, or the gain an individual with a specific criminal ability gets from a certain type of crime.

¹² This assumption allows us to abstract from information based arguments about the guilt of a defendant in designing plea bargaining. This type of arguments has been widely investigated in the literature, for example see Grossman and Katz (1983). In reality, a defendant does not have to be objectively innocent to avoid conviction. For example, the prosecutor could fail to turn exculpatory evidence in violation of *Brady vs. Maryland*, 373 U.S. 83 (1969), or the defense may show that the police conducted an unreasonable search or seizure. Effort by both the defendant and the prosecutor can consequently affect the probability of conviction, even if the defendant is in fact guilty.

¹³ Since we want to discuss judicial procedures, we assume that there is always some level

$P(e)$, where e is the effort provided by the prosecutor in charge of the case. Naturally, $P'(e) > 0$ and $P''(e) < 0$. The cost of going to trial for the prosecutor is simply the effort level e . With some probability λ , the defendant is offered a plea bargain by the prosecutor's office. The resulting sentence B is the outcome of a bargaining game between the defendant and the prosecutor's office.

Agents are risk neutral. Their expected payoff from committing a crime can be written as

$$\theta - \mu[(1 - \lambda)P(e)S + \lambda B].$$

Let $\bar{\theta}$ denote the agent who is indifferent between committing a crime and receiving his reservation utility. This agent is implicitly defined by

$$\bar{\theta} = \mu[(1 - \lambda)P(e)S + \lambda B]. \tag{1}$$

All agents with $\theta \geq \bar{\theta}$ choose to commit a crime, and all agents $\theta < \bar{\theta}$ choose not to. Therefore, $1 - \bar{\theta}$ is the total proportion of criminals in the economy.

The timing of the game is as follows. First, all agents choose whether or not to commit a crime. A fraction μ of all criminals is arrested. The prosecutor's office chooses to bargain with λ of the arrested criminals subject to its budget constraint.¹⁴ If an agreement is reached during plea bargaining, the defendant pleads guilty and the agreed sanction B is imposed. The cost of such a plea for the prosecutor's office is assumed to be zero. If the two parties are unable to reach an agreement, the case is transferred to court. The court process is simple, the assigned prosecutor chooses her effort levels e . The defendant is found guilty with probability $P(e)$, in which case the sanction S is imposed.

The prosecutors aim to maximize the expected average sanction net of the effort cost,

of crime in equilibrium. Assuming that $S < 1$ is one way to ensure it.

¹⁴ We assume that the prosecutor's office takes the level of crime as given when choosing the level of plea bargaining.

plus a weighted conviction rate $\delta P(e)$, where δ captures the degree of this incentive. In previous work, prosecutors have been modeled as maximizing total expected sentences¹⁵ or social welfare.¹⁶ However, if a prosecutor maximizes total sentences, she may have an incentive to promote crime, thus, having more criminals to prosecute. A prosecutor maximizing average expected sentences net of the effort cost can be thought of as having one of two motives. First, the prosecutor may be maximizing deterrence net of its cost and, therefore, acting in the social interest. Second, the prosecutor may be self-interested and associate professional status and electoral success with being “tough on crime”. We allow the prosecutor to independently also care about their conviction rate in trial cases. Overall, the prosecutor’s office is resource constrained, which can be interpreted as the total time or financial resources. When the prosecutor’s office chooses the proportion of defendants to enter into plea bargains with, it faces the following problem:

$$\max_{\lambda} (1 - \lambda)P(e)S + \lambda B - e(1 - \lambda)\mu[1 - \bar{\theta}] + \delta P(e)$$

$$\text{Subject to } M \geq \mu(1 - \bar{\theta})(1 - \lambda)e ; \quad 1 \geq \lambda \geq 0$$

where $\mu(1 - \bar{\theta})$ is the number of captured criminals, M is the available budget, and $(1 - \lambda)e$ is the total trial cost. Before being able to solve for the optimal λ , we need to know the level of effort e each prosecutor will provide in court and the sanction B that will be negotiated during the plea bargaining stage.

2.1 Trial

At the trial stage, the game is very simple. Given the budgetary constraint and the concavity of $P(e)$, the prosecutor’s effort level e at each trial is chosen as a function of λ . More precisely the level of effort at each trial is given by:

¹⁵ For example, the prosecutor maximizes total expected sentences in Landes (1974).

¹⁶ As in Grossman and Katz (1983) and Reinganum (1988).

$$e(\lambda) = \frac{M}{\mu(1-\lambda)(1-\bar{\theta})}. \quad (2)$$

Obviously, an increase in the number of cases that are plea bargained allows the prosecutor to devote more effort in each trial, so $e(\lambda)$ is increasing in λ .

2.2 Plea Bargaining

A plea bargain is the outcome of a bargaining game between a defendant and a prosecutor. Entering into a plea bargain results in the defendant pleading guilty and receiving an agreed upon sentence, which we denote by B . A plea bargain divides the surplus generated by foregoing trial. In particular, the defendant benefits from having his sentence reduced: $P(e(\lambda), S)S - B$. The prosecutor loses from receiving a lower expected sentence, but saves the cost of the trial, $e(\lambda)$.

We assume a Nash bargaining solution, where the resulting plea bargain is given by $B = P(e(\lambda))S - \alpha e(\lambda)$, where α represents the defendant's bargaining power and therefore the share of the bargaining surplus he receives. The bargaining surplus in this case is a result of the cost savings generated by avoiding trial. Note that an increase in the legislated sanction S leads directly to an increase in the plea bargained sanction B .

2.3 Trials versus Pleas

When choosing how many cases to plead versus to take to trial, the prosecutor's office is able exploit the trade off that exists between the number of plea bargains and the amount of effort at each trial. In this section, we illustrate how this trade-off operates. The prosecutor, according to the budget constraint, chooses a proportion of cases to plea bargain, and ultimately the level of effort for each court case.

The prosecutor takes the level of crime as given and maximizes her objective function

given the anticipated effort $e(\lambda)$. Substituting in the budget constraint yields the following maximization problem:

$$\max_{\lambda} P(e(\lambda))S - \lambda\alpha e(\lambda) + \delta P(e(\lambda)).$$

The optimal amount of plea bargaining (and implicitly the level of effort in each court case provided by the prosecutor) is given by:

$$-\alpha e(\lambda) + [P'(e(\lambda))(S + \delta) - \lambda\alpha] \frac{\partial e(\lambda)}{\partial \lambda} = 0. \quad (3)$$

Equation (3) defines the fraction of cases that are resolved by guilty pleas. Increasing the number of plea bargains offered has a direct negative impact on deterrence because plea bargaining reduces the expected sanction by $\alpha e(\lambda)$. However, when the prosecutor's office chooses to plea bargain more, it relaxes its resource constraint and increases the probability of conviction in the cases that ultimately do go to court. This increase in deterrence is captured by the second term. Using the fact that $e'(\lambda) = e(\lambda)/(1 - \lambda)$, we can define $\lambda(S)$ as the proportion of cases the prosecutor's office pleads with for a given sanction S , where $\lambda(S)$ is given by

$$P'(e(\lambda(S))) [S + \delta] = \alpha. \quad (4)$$

Note that when a prosecutor is more concerned with her "batting average" ($\delta > 0$), she will plea bargain with an even larger fraction of cases. By bargaining more, the prosecutor can put extra effort into the remaining cases that go to court.

Lemma 1: *The proportion of cases resolved through plea bargaining is an increasing function of the sanction S .*

When the sanction S increases, the marginal benefit of increasing the probability of winning a case for the prosecutor goes up. So, the prosecutor prefers to plea more often and benefit from the higher probability of winning cases taken to trial.

3. Equilibrium Level of Crime

The equilibrium level of crime in this economy can be solved by using agents' optimal behaviors described in the previous section. Given a number of cases, the prosecutor's office will plea bargain with a proportion $\lambda(S)$. The effort in each trial case is given by $e(S) = \frac{M}{\mu[1-\lambda(S)](1-\theta)}$. For cases resolved by plea bargain, the reduced sanction is $B = P(e(s))S - \alpha e(S)$. Finally, only individuals with $\theta > \bar{\theta}$ choose to a commit crime, where $\bar{\theta} = \mu [P(e(s))S - \lambda(S)\alpha e(S)]$. The equilibrium level of crime $1 - \bar{\theta}(S)$ satisfies all of these conditions.

Proposition 1: *There exists a unique equilibrium with a positive crime rate $1 - \bar{\theta}(S)$, given by the following equation:*

$$\bar{\theta}(S) = \mu [P(e(S))S - \alpha e(S)] + \alpha \frac{M}{1 - \bar{\theta}(S)}. \quad (5)$$

4. Consequences of Increasing the Sanction

Obviously, an increase in the legislated sanction directly changes the expected outcome of a trial, as well as the resulting sanction from a plea bargain. It also alters the likelihood of trial relative to a guilty plea. Through these avenues, it influences the crime rate, $1 - \bar{\theta}(S)$. Only if $\bar{\theta}(S)$ is negatively related to the sanction S does an increase in the trial sanction S lead to an increase in the overall level of crime $1 - \bar{\theta}$.

Proposition 2: *The crime rate is increasing with the legislated sanction S if the prosecutor is sufficiently career concerned ($\delta > 0$).*

When the prosecutor is benevolent ($\delta = 0$), there is no conflict between her objective and deterrence maximization. Therefore, a benevolent prosecutor cannot do worse when the sanction increases. She will only increase plea bargaining to the point where it maximizes crime reduction. However, if the prosecutor is concerned with her conviction rate, this result may change. Recall that an increase in the sanction will lead to a higher level of plea bargaining when the prosecutor has career concerns. This is due to the

fact that, as S increases, increasing trial effort is desirable. Therefore, it is necessary to free up resources. This high rate of plea bargaining can have a detrimental effect on deterrence when plea bargaining is present.

Obviously, when this effect is larger, plea bargaining is more likely to be detrimental. However, other aspects of the judicial system contribute to this result. For example, how much extra effort can be allocated per case following an increase in the sanction ($\frac{\partial e(\lambda)}{\partial \lambda} \frac{\partial \lambda(S)}{\partial S}$) and the effectiveness of such increase in effort ($P'(\cdot)$) also contribute to this result. Intuitively, when effort is very effective at trial, career concerned prosecutors have a larger benefit from plea bargaining. This translates into too few cases going to trial, and to lower overall expected sentences. Through this avenue, the direct effect of increasing the legislated sanction is entirely undone, and overall deterrence falls.

5. Conclusion

Given the observation that some agents receive plea bargains, this model suggests that increasing sanctions may lead to increased incentives to commit crime. Although it is difficult to discern how many plea bargains are made solely for the purpose of conserving resources, the large proportion of cases resolved in this manner suggests that this is an important factor. Obviously, this model lacks important features of the judicial process that motivate the use of plea bargains. Most importantly, we do not incorporate risk aversion which is a primary reason why prosecutors and defendants reach agreements. In this model, we also do not consider the problems of asymmetric information about agents' guilt or innocence. If some agents are innocent, they might want to go to trial in order to separate themselves from guilty defendants as in Grossman and Katz (1983). Prosecutors and defendants could also possess different information about the strength of the prosecutor's case, as discussed in Reinganum (1988). Baker and Mezzetti (2001) also consider a game of asymmetric information. But even if all those features were to be introduced, it would still be true that a reduction in

deterrence could be driven by an increase in trial costs and binding budgets.

Policies to limit plea bargaining have been implemented. For example, thirteen US states have done so for DWI infractions. Another method of deterring crime may be to increase the budgets and number of prosecutors or to even decrease the legislated criminal sanctions. However, given the current judicial system, where less than 10% of cases go to trial, the budget necessary to take every case to trial seems infeasible. Alternatively, one could reduce the cost of trial directly: for example, by reducing the burden of proof. However, this possibility has other obvious disadvantages in a system where guilt is to be ascertained.

Mandatory minimum sentences, which are currently used for many drug and violent crimes, may serve as a method of increasing criminal sanctions without increasing the costs of a trial. In these cases, the cost of a trial may not be increasing in the sanction, since the quantity of evidence that must be prepared and presented is limited to only a few dimensions (*i.e.* the quantity of drugs possessed).

“Three strikes” laws, like those in California, where a third felony conviction results in life-imprisonment may reduce the benefits of plea bargaining to career criminals. Even if the defendant is risk-neutral, and the expected sentence from plea bargaining is less than that of going to trial, the defendant may not wish to plead guilty to a felony, and may rather risk being sentenced to a much more severe sanction in the hope of being found innocent. The benefit to being found innocent is now much higher than in a system where punishment increases more slowly following previous guilty decisions.

This paper also highlights a weakness of relying on conviction rates as a measure of prosecutor performance. Of course, too much concern with high conviction rates has obvious disadvantages in a system where prosecutors are relied upon to ascertain guilt. However, even in this environment where all defendants are guilty, such a reliance on conviction rate measures may have a perverse effect on the level of deterrence by encouraging too many and too generous plea bargains.

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7. Appendix

Proof of Lemma 1: Equation (4) determines $\lambda(s)$, and comparative static analysis on equation (4) shows that:

$$\frac{\partial \lambda(S)}{\partial S} = -\frac{P'(\cdot)[1 - \lambda(S)]}{(S + \delta)P''(\cdot)e(\lambda(S))}.$$

The expression above is positive.

Proof of Proposition 1: The crime rate in this economy is given by

$$1 - \bar{\theta}(S) = 1 - \mu [P(e(S))S - \lambda(S)\alpha e(S)], \quad (A1)$$

and from the prosecutor's budget constraint we know that $\lambda(S) = 1 - \frac{M}{\mu[1 - \bar{\theta}(S)]e(S)}$. Consequently, the equilibrium level of $\bar{\theta}(S)$ solves the following equation:

$$\bar{\theta}(S) = \mu [P(e(S))S - \alpha e(S)] + \alpha \frac{M}{1 - \bar{\theta}(S)}. \quad (A2)$$

First, note that the left hand side of this equation is an increasing linear function of $\bar{\theta}$, while the right hand side is an increasing convex function of $\bar{\theta}$. More importantly, note that at $\bar{\theta} = 0$, the left hand side of (A2), is smaller than the right hand side. This implies that the cost of being a criminal for the least able agent always exceeds the benefit. Since we assumed that $S < 1$, the left hand side of (A2) is larger than the right hand side for $\bar{\theta} = 1$, implying that the benefit of committing crime for the most able agent always exceeds the cost. Consequently, there exists one equilibrium with positive crime rate. Given that we have a unique equilibrium, the stability condition will be satisfied. It is to say that the slope of the right hand side of (A2) is smaller than one. This property will be used in the proof of proposition 2.

Proof of Proposition 2: Comparative statics on (A2) reveal that

$$\frac{\partial \bar{\theta}(S)}{\partial S} = \mu \frac{P(\cdot) + [P'(\cdot)S - \alpha] \frac{\partial e(S)}{\partial S}}{1 - \alpha \frac{M}{[1 - \bar{\theta}(S)]^2}}.$$

First, note that given the stability condition, the denominator has to be positive. Using the prosecutor's first order condition, we can easily show that $[P'(\cdot)S - \alpha] = -\delta P'(\cdot)$. Consequently, the derivative above can be re-written as

$$\frac{\partial \bar{\theta}(S)}{\partial S} = \mu \frac{P(\cdot) - \delta P'(\cdot) \frac{\partial e(S)}{\partial S}}{1 - \alpha \frac{M}{[1 - \bar{\theta}(S)]^2}}.$$

Since the crime rate is given by $1 - \bar{\theta}$, if $\delta P'(\cdot) \frac{\partial e(S)}{\partial S} > P(\cdot)$, then the crime rate would be an increasing function of the sanction S . A necessary condition for crime to be increasing in S is that δ be large enough.