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Convictions versus Conviction Rates: The Prosecutor's Choice*

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Abstract

It is natural to suppose that a prosecutor's conviction rate— the ratio of convictions to cases prosecuted— is a sign of his competence. Prosecutors, however, choose which cases to prosecute. If they prosecute only the strongest cases, they will have high conviction rates. Any system which pays attention to conviction rates, as opposed to the number of convictions, is liable to abuse. As a prosecutor's budget increases, he allocates it between prosecuting more cases and putting more effort into existing cases. Either can be socially desirable, depending on particular circumstances. We model the tradeoffs theoretically in two models, one of a benevolent social planner and one of a prosecutor rewarded directly for his conviction rate as well as caring about convictions and personal goals. We also look at anecdotal evidence from Japan and detailed U.S. data drawn from county-level crime statistics and a survey of all state prosecutors by district. We find that prosecution rates vary little with budget, but conviction rates do increase, and that the conviction rate declines in the number of cases prosecuted and with the crime rate of a district.

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1 Introduction

Attorney Thomas Broderick Jr. will formally announce Tuesday that he is a candidate for the Democratic nomination for Madison County prosecutor. He was chief deputy for Prosecutor William F. Lawler Jr. for more than seven years, claiming a 98 percent personal conviction rate on cases ranging from drugs to murder.¹

So reads a typical press release in an election for a county prosecutor. The prosecutor's office is the part of the criminal justice system most neglected in academic research and popular discussion alike, yet it is one of the most important. Standing between criminal and police on the one hand and courts and prisons on the other, the prosecutor has two roles. One, the role Attorney Thomas Broderick emphasizes, is convincing the court to convict criminals. The other is deciding which cases to prosecute.

Other things equal, it is good to have a prosecutor who wins cases. But other things are not equal. What if the prosecutor maliciously brings cases against innocent people? Then we would prefer him to be too incompetent to persuade a jury that they are guilty. Or what if he brings very few cases, concentrating on the ones that he is sure to win? If he spends the entire year on one case, he should be able to easily obtain not a 98 percent personal conviction rate, but a 100 percent one.

It is this second problem, case selection, that will be our focus here. We will introduce a formal theory of the tradeoff which seems to explain the difference in conviction rates between the United States and Japan (as previously suggested in Ramseyer and Rasmusen [2001]) and see whether the theory can explain how prosecution rates and conviction rates vary across state prosecutorial districts in the United States.

Case selection is indeed important. There were 11,556,854² index crimes reported to the police in 2005, but just 2,212,830 arrests.³ The Bureau of Justice Statistics collects data on case processing in the "State Court Processing Statistics, 1990-2002: Felony Defendants in Large Urban Counties." This covers a sample of about 40 of the nation's most populous 75 counties in 1990, 1992, 1994, 1996, 1998, 2000, and 2002. Those 75 counties contain about a third of the United States population and half of all reported crimes.⁴ For those 75 counties, in 2002 there were an estimated 30,703 index crime defendants (of 56,146 total felony defendants when crimes such as drug dealing, fraud, and weapons offenses are included). Of all felony defendants, 57% were convicted of a felony, 54% by plea and 3% by trial. 11% pleaded guilty to a misdemeanor instead, 25% were not convicted, 24% were dismissed, 1% were acquitted, and 7% were diverted or adjudication was deferred (in addition to cases pending at the end of the year, which are not included in these figures).⁵

¹Attorney Says He'll Be Candidate for Prosecutor, *Indianapolis Star*, January 17, 1998, at N02.

²Table 1, "Crime in the United States, by Volume and Rate per 100,000 Inhabitants, 1986-2005," http://www.fbi.gov/ucr/05cius/offenses/standard_links/national_estimates.html.

³Table 29, "Estimated Number of Arrests, United States, 2005," http://www.fbi.gov/ucr/05cius/arrests/national_est.html.

⁴This and most other numbers in this paragraph are from "Felony Defendants in Large Urban Counties, 2002," <http://www.ojp.usdoj.gov/bjs/pub/pdf/fdluc02.pdf> 02/06 NCJ 210818, Table 1 and 23 on pages 8 and 30.

⁵For a simple description of typical criminal procedure from arraignment to trial, see Allen Cowling "Basic Criminal Procedure From

As these numbers make clear, the vast majority of felonies do not lead to arrest, and the majority of arrests do not lead to prosecution. The police need enough evidence to be willing to make an arrest, and the prosecutors need a higher level of evidence to be willing to prosecute. Prosecution is the critical decision. Once the prosecutors take on cases, most defendants are convicted. Thus, the key question is how some criminals come to be defendants and some do not.

The point that selection of cases matters to victory rates at trial has been made most famously in Priest and Klein (1984). They point out that most civil cases end in settlement rather than a completed trial, and which cases reach trial depends on the settlement bargaining process. If we observe plaintiffs winning 90% of cases at trial, we have not learned about the strength of plaintiffs' cases generally, but about the kind of cases on which the plaintiff and defendant cannot reach agreement on what would happen if they went to trial. Thus, it could be that most plaintiffs know they would probably (though not certainly) lose at trial, so they accept small settlements and never go to trial.

Applied to criminal cases, this logic says that victory rates at trial say as much about which cases end in failure of plea bargaining as about whether prosecutors are skilled or bring strong cases. In the data discussed above, 61% of the actual trials were bench trials and 39% jury trials. 85% ended with guilty verdicts and 15% with acquittals.⁶ Bench trials had 81% conviction rates, jury trials only 74%. But all this does not tell us much about the skill of prosecutors. Only 4% of defendants go to trial. A prosecutor's effectiveness is much better measured by how well he plea bargains: how many defendants plead guilty, and what sentences they receive. As stated earlier, only 1% of defendants are acquitted, while 24% have their cases dismissed. The trial rates for the crime of murder illustrate the importance of selection effect. Around 44% of murder defendants went to trial, compared to less than 5% of all defendants, so plea bargaining seems to have failed much more often despite the high cost of murder trials. Around 39% of murder cases ended in felony conviction at trial, 1% resulted in a misdemeanor conviction, and 4% ended in acquittal, for a much higher conviction rate at trial than for index crimes generally. Perhaps defendants were more willing to gamble; perhaps prosecutors were less willing to make concessions in high-profile cases; in any case, the victory rate at trial is different.

Thus, we will not be looking at victory rates at trial. Instead, we will look at overall conviction rates, whether achieved by plea bargaining or by trial. This has more meaning, because we know at least that if a case is never prosecuted, the prosecutor has completely failed to punish the criminal (though the police may have, via the less formal method of arrest) A high conviction rate might still indicate lenient plea bargains, but the prosecutor has done better than if he simply ignoring most cases.

Arrest Through Trial," <http://www.allencowling.com/false04B.htm>.

⁶This implies the percentage of hung juries was close to zero, which is surprising. One study of state and federal courts found that 6.2% of juries were hung. Nicole L. Mott, "Part II: The Role of Juries in State Courts," p. 101, Brian Ostrom, Neal B. Kauder, and Robert C. LaFountain, "Examining the Work of State Courts, 2001" (Williamsburg, VA: National Center for State Courts, 2002) http://www.ncsconline.org/D_Research/csp/2001_Files/2001_Part_II_Section.pdf.

A second selection effect, however, makes even a high overall conviction rate (in plea bargaining and trial combined) unreliable as an indicator of prosecutor success. This second effect is in choice of cases to prosecute. It is analogous to plaintiff selection of cases to file in civil cases. A prosecutor can decide to prosecute just the easiest cases. That is the effect studied in this paper.

We will begin with two models of prosecutorial behavior, one in which the prosecutor acts as social planner, maximizing criminal sentences achieved, and one in which he balances that goal against personal objectives and against the goal of a high conviction rate. We follow that with an empirical analysis combining data on counties with data on state prosecutorial districts to try to determine the relationship between prosecution rates, conviction rates, and budgets. We will show that although the use a social planner makes of extra resources might increase his conviction rate, it might equally well cause him to lose more often because he brings more cases. An elected prosecutor, on the other hand, would use extra resources to increase his conviction rate if that is what voters focus on, or might use them simply to make his life more comfortable, if voters are sufficiently inattentive.

2 The Literature on Prosecutors

A complaint at least as old as Forst & Brosi (1977) is that prosecutors have been insufficiently studied, either with theory or empirics. That article did build a theoretical model of the prosecutor as attempting to achieve penalties based on the seriousness of the crime and the past record of the criminal given limited resources and the possibility of plea bargaining. Their article built from the simpler model of Landes (1971) and also tested the theory with regressions on individual-level data. Other studies have also looked at the variables determining which cases are prosecuted. Myers & Hagan (1979) and Albonetti, (1986) run regressions on individual case data, and Rainville (2001) uses a survey of 77 prosecutors that asked them about their policies of when to prosecute and when to drop. Boylan (2004) looks at the internal workings of federal prosecutor offices and finds that more experienced U.S. Attorneys put priority on crimes that have longer prison sentences. Glaeser, Kessler & Piehl (2000) look at how cases are handled depending on whether the defendant is represented by private counsel instead of a public defender. They find that in districts with high lawyers' salaries, defendants represented by private counsel are more likely to be prosecuted by assistant U.S. attorneys than by state and local prosecutors.

The closest paper to the present one is Rhodes (1976). Rhodes looks at how the prosecutor uses increased budget to bring more prosecutions and reduce the leniency of his plea bargains. He uses data from 84 federal district courts to run regressions of case dispositions on prosecutor resources and variables such as the fraction of defendants with criminal records in the district. He acknowledges the endogeneity problem for the budget,

but does not attempt to instrument for it.

Boylan (2005) has examined the incentives of federal prosecutors by seeing what affects the likelihood that U.S. Attorneys (the chief attorneys in federal prosecution offices) later become federal judges, a common career goal for them. He finds that a prosecutor's conviction rate and number of indictments do not affect prosecutor's success, but the number of prison months achieved does matter. As we will see, the results of Boylan (2005) tend to support our model below of the prosecutor acting purely in the public interest, in his special context of U.S. federal prosecutors. Federal prosecutors are appointed, not elected, and the crimes they prosecute are different from those in the state courts, so in the empirical work below we should not be surprised if state prosecutors are differently rewarded.

Miceli (1996) makes the important point that prosecutors (like judges) might well care about fair sentences but not about deterrence, in contrast to legislatures. Thus, prosecutors might frustrate Becker-style high penalties, infrequently imposed and cheap to administer, because those penalties seem unfair for the individual criminals who do get caught. Snyder (1990) looks empirically at one example where prosecutors and courts might be expected to differ from the legislature: their response to an increase by Congress in penalties for federal antitrust laws.

Other work exists on optimal prosecution, but that is a rather different topic than prosecutors themselves. Miceli (1990), for example, looks at how prosecutors and judges (together) should behave when the guilt of defendants is uncertain. That is an important topic, but it is a different one from the decision of how to allocate resources or operate under institutional constraints. Much economic analysis has also been done concerning plea bargaining (e.g. Adelstein, (1978a, 1978b), Reinganum (1988, 1993), Baker and Mezzetti (2001), but less to the career incentives of prosecutors as agents of the public. One exception is Huber and Gordon (2002), which formally models the incentives of elected prosecutors. They focus on what performance measure voters should reward in order to induce the prosecutor to optimally investigate the guilt or innocence of defendants rather than bring to court cases he knows are dubious. In the present model, our focus will be quite different: it will be on the prosecutor's decision, forced by limitations of time and resources, to drop some cases, prosecute others, and to prosecute some more intensely than others.

3 Theory I: The Model with the Social Planner as Prosecutor

In this section, we construct the Social Planner Model of prosecutorial decisionmaking in which there are no agency problems: the prosecutor is the social planner.⁷ There is

⁷The starting point for this model is the graphical argument in Appendix A, Chapter 6 of Ramseyer and Rasmusen (2001). This model formalizes that argument and extends it to consideration of agency slack, length of sentence, and the conviction rate.

a continuum of potential cases that could be prosecuted, all involving the same crime.⁸ Thus, each case has little importance compared to the aggregate. Potential cases will be indexed by “strength,” θ , where θ varies from 0 to 1. The number of cases of type θ is represented by a density function $f(\theta)$, where $\int_0^1 f(\theta)d\theta = 1$, which is to say that we will normalize so the universe of possible cases has size 1. Figure 1 shows one way the cases might be distributed. If the prosecutor decides to prosecute the strongest 1/3 of cases, he takes all the cases in the interval $[\bar{\theta}, 1]$ in the diagram.⁹ We will assume that the prosecutor has no evidence of innocence that he can conceal from the court, so a case being “strong” also means that the defendant is more likely guilty, and that the resources available to the prosecutor are low enough that he is far from being able to prosecute cases too weak to be worth prosecuting from a social point of view. (Put differently, we will assume that social welfare is maximized by spending the entire prosecutorial budget rather than leaving some unspent.)

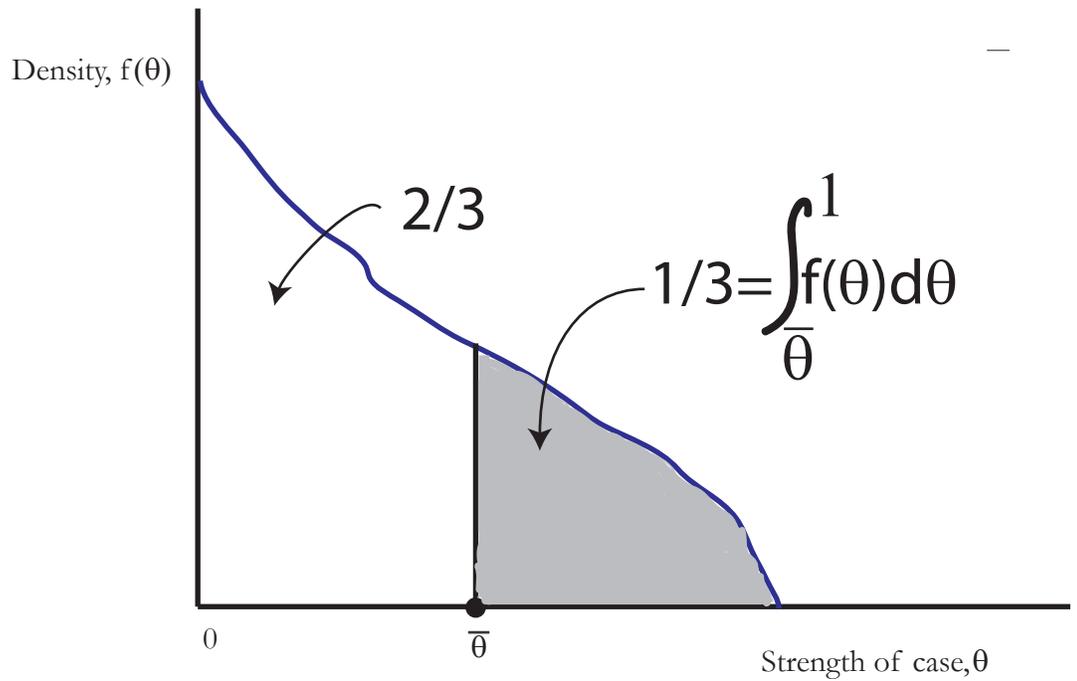


Figure 1: The Distribution of Cases

⁸The assumption of a single type of crime is innocuous. If there were n types of crime, with different values for conviction, we would simply repeat the same objective n times with different production functions and a value coefficient for each, e.g. a tough conviction function but a value of 10 for convicting a murderer, an easy conviction function but a value of 2 for convicting a thief.

⁹We will assume that the interval $[0,1]$ only includes cases the prosecutor would like to win. Thus, a case having $\theta = .1$ does not mean the defendant was less likely to have committed the crime, only that the prosecutor’s evidence is weak. As with adding different types of crimes, adding concerns about whether convictions for some crimes are really in the public interest would not alter the model’s implications.

Each case that is prosecuted incurs a fixed cost of C and a variable cost of e . Let the probability of winning a case be

$$\text{Probability of winning} = \theta P(e(\theta)) \tag{1}$$

where $P(0) = 0$, $P' > 0$, $P'' < 0$, and $P(\infty) < 1$, so additional effort always helps but there are decreasing returns to effort in a particular case and the prosecutor can never be sure of winning. Figure 2 shows what this would look like.

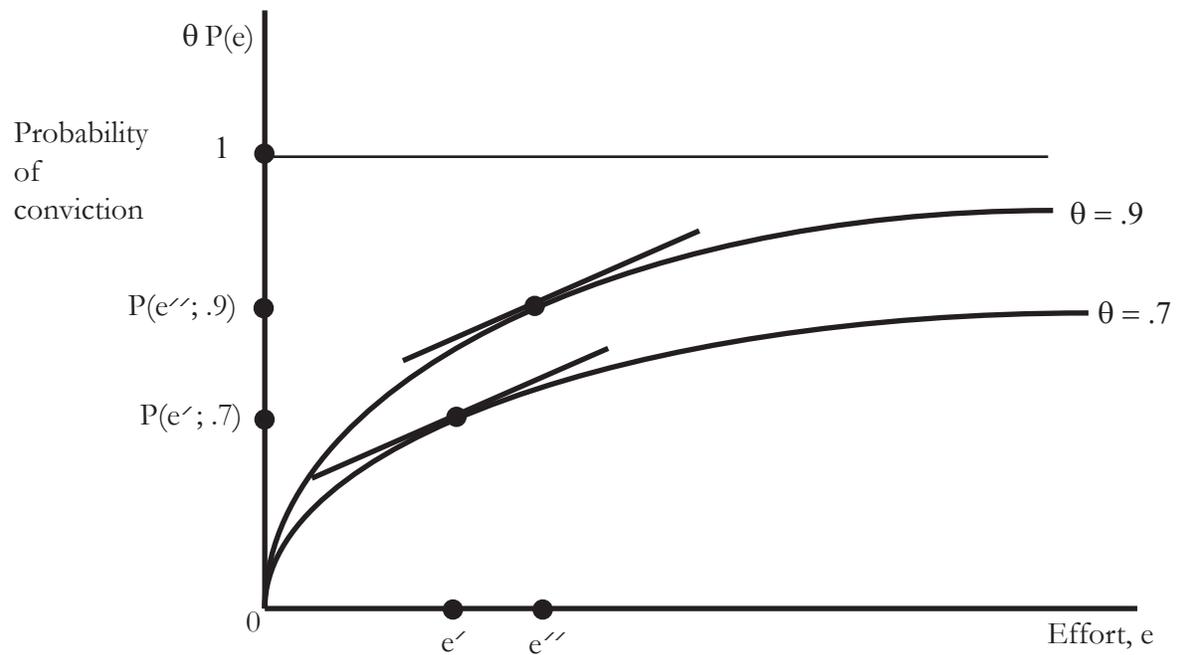


Figure 2: The Conviction Function

These assumptions say that the probability of winning is scaled up or down by case strength, θ . This means that if effort e^* is the same for two types of case, the one with the bigger θ has the greater probability of winning.¹⁰

Let the social planner's ideal sentence be \bar{V} , and the expected penalty for a case of strength θ be

$$\text{Expected Penalty} = \theta V(e(\theta)) \tag{2}$$

where $V(0) = 0$, $V' > 0$, $V'' < 0$, and $V(\infty) < \bar{V}$, so additional effort always helps, but there are decreasing returns to effort in a particular case and no amount of effort can achieve the optimal penalty.¹¹

We have assumed that the social planner's ideal sentence is \bar{V} . Let us denote his valuation of an expected sentence of θS by $\theta U(S)$ with $U' > 0$ and $U'' < 0$ in the range $[0, \bar{V}]$, so the penalty has diminishing marginal returns. We can then write $\theta V(e(\theta)) = \theta U(S(e(\theta)))$ for the expected value to the social planner of exerting effort e on case θ , where $V(0) = 0$, $V' > 0$, $V'' < 0$, since V is an increasing concave function of another increasing concave function.

¹⁰The specification also implies that if effort is the same for two types of cases, the marginal product of effort is bigger for the case with the bigger θ . That effect is not important to our results, however.

¹¹We are ruling out the possibility that the social planner would exert high effort so as to fool the court into imposing a sentence higher than \bar{V} with some probability, thus putting the expected sentence at \bar{V} .

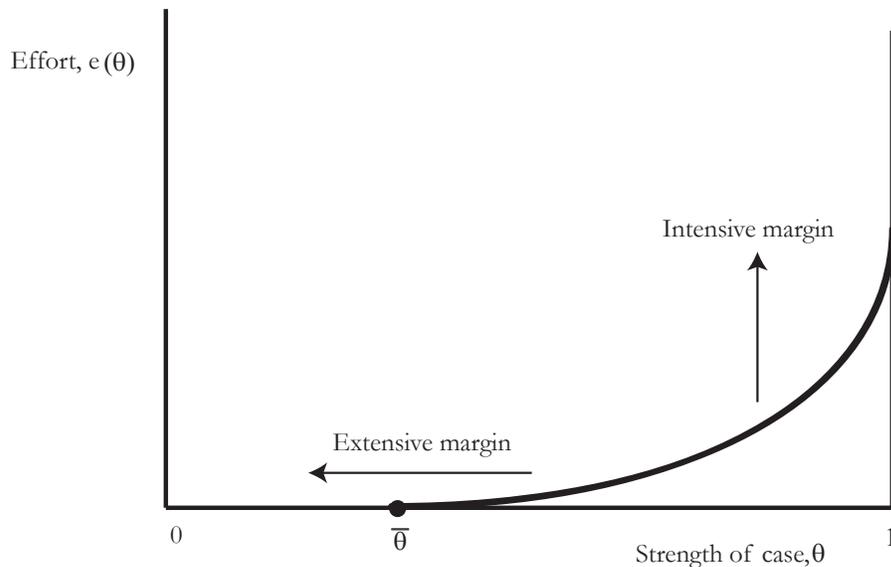


Figure 3: The Prosecutor's Choices of $e(\theta)$ and $\bar{\theta}$

We now come to our social planner prosecutor's problem. He has two choices. First, he must decide which cases to prosecute. He will want to prosecute the easier cases first, which amounts to choosing a lower cutoff $\bar{\theta}$ for the interval of types $[\bar{\theta}, 1]$ that he prosecutes. The spending on this weakest case prosecuted is the extensive margin, analogous to the least fertile land that under cultivation. Second, he needs to pick the $e(\theta)$ function, which shows how much he spends on each type θ of case. This is the intensive margin, analogous to the marginal unit of fertilizer used on cultivated land. Figure 3 shows these choices graphically. His decisions lead to the following four expressions.

$$\text{Prosecution rate} = \int_{\bar{\theta}}^1 f(\theta) d\theta = 1 - F(\bar{\theta}). \quad (3)$$

$$\text{Number of convictions} = \int_{\bar{\theta}}^1 f(\theta) \theta P(e(\theta)) d\theta. \quad (4)$$

$$\text{Value of convictions} = \int_{\bar{\theta}}^1 f(\theta) \theta V(e(\theta)) d\theta. \quad (5)$$

(The value takes account of the sentence as well as the fact of conviction.)

$$\text{Conviction Rate} = \left(\frac{1}{1 - F(\bar{\theta})} \right) \int_{\bar{\theta}}^1 f(\theta) \theta P(e(\theta)) d\theta \quad (6)$$

The prosecution rate sums up the amount of case density, g , above the prosecution threshold, $\bar{\theta}$. In Figure 1, $(1 - F(\bar{\theta})) = 1/3$.

The number of convictions sums up over all the prosecuted cases (those on interval $[\bar{\theta}, 1]$) the density f of the number of cases of each type, times the probability of conviction for that type, θP .

The value of convictions sums up over all the prosecuted cases (those on interval $[\bar{\theta}, 1]$) the density $f(\theta)$ of the number of cases of each type, times the value of convictions for that type, θV .

The conviction rate is the average probability that a prosecution results in a conviction (which will be smaller than the probability that a *crime* results in a conviction). It divides the probability of convictions from equation (4) by the number of cases prosecuted, from equation (3).

What is the prosecutor's payoff function? Let us start with the social planner as prosecutor. He would maximize the value of the expected penalties, i.e.,

$$\int_{\bar{\theta}}^1 f(\theta) \theta V(e(\theta)) d\theta \quad (7)$$

by choice of $e(\theta)$ and $\bar{\theta}$, subject to the budget constraint,

$$\int_{\bar{\theta}}^1 f(\theta) [e(\theta) + C] d\theta \leq B. \quad (8)$$

The Lagrangian for the maximization problem is

$$\begin{aligned} \underset{e(\theta), \bar{\theta}}{\text{Maximize}} \quad L &= \int_{\bar{\theta}}^1 f(\theta) \theta V(e(\theta)) d\theta \\ &+ \lambda \left\{ B - \int_{\bar{\theta}}^1 f(\theta) [e(\theta) + C] d\theta \right\}. \end{aligned} \quad (9)$$

Note that

$$\frac{dL}{dB} = \lambda, \quad (10)$$

which is to say that λ equals the marginal value of relaxing the budget constraint.

There are two optimality conditions if we are at an interior solution (that is, if not all or no cases are prosecuted). First, there is the choice of the $e(\theta)$ function. For each value θ in the interval of prosecuted cases, $[\bar{\theta}, 1]$,

$$\frac{dL}{de(\theta)} = f(\theta)\theta V'(e(\theta)) - \lambda f(\theta)(1) = 0. \quad (11)$$

Rearranging, we see that the marginal payoff of effort has to be the same for each case prosecuted. For any θ ,

$$\theta V'(e(\theta)) = \lambda. \quad (12)$$

The second optimality condition concerns the choice of $\bar{\theta}$. It says that

$$\frac{dL}{d\bar{\theta}} = -f(\bar{\theta})\bar{\theta}V(e(\bar{\theta})) + \lambda f(\bar{\theta})[e(\bar{\theta}) + C] = 0 \quad (13)$$

This implies that

$$\frac{\bar{\theta}V(e(\bar{\theta}))}{e(\bar{\theta}) + C} = \lambda \quad (14)$$

The amount $(e(\bar{\theta}) + F)$ is the total cost of a case of the marginal strength $\bar{\theta}$, and $\bar{\theta}V(e(\bar{\theta}))$ is the total benefit. Thus, we have that λ equals the average cost of the marginal case. Moreover, since we found earlier that the marginal benefits of all cases prosecuted are equal and equal to λ , we can conclude that the marginal benefit of any case prosecuted equals the average benefit of the marginal case.

This implies that at the margin, the prosecutor would get the same benefit from adding a new case as he would from increasing spending on an existing case. It also implies that as his budget increases (which reduces λ) he will prosecute more cases as well as spending more on existing cases. The result will be to increase the expected penalty from both the new cases brought and the increase in success of the old cases. Formally:

Proposition 1: *In the Social Planner Model, an increase in the budget, B , increases effort on existing cases ($e(\theta)$ for $\theta > \bar{\theta}$), increases the prosecution rate (reduces $\bar{\theta}$), and increases the size of the expected penalty.*

Proof. We will use the implicit function theorem. First, differentiating first-order condition (11) gives us:

$$\frac{d^2L}{de(\theta)^2} = f(\theta)\theta V''e(\theta) < 0 \quad (15)$$

and

$$\frac{d^2L}{de(\theta)d\lambda} = -f(\theta) < 0, \quad (16)$$

Since

$$\frac{de(\theta)}{d\lambda} = - \left(\frac{\frac{d^2L}{de(\theta)d\lambda}}{\frac{d^2L}{de(\theta)^2}} \right) = - \left(\frac{-f(\theta)}{f(\theta)\theta V''(e(\theta))} \right), \quad (17)$$

we can conclude that $\frac{de(\theta)}{d\lambda} < 0$. Equation (10) and the concavity of L tells us that λ falls with B . Thus, $\frac{de(\theta)}{dB} > 0$.

Second, dividing first-order condition (13) by $f(\bar{\theta})$, we know it is true that we can define a variable Z such that

$$Z = -\bar{\theta}V(e(\bar{\theta})) + \lambda[e(\bar{\theta}) + F] = 0 \quad (18)$$

Differentiating expression (18) and substituting from equation (12) for $\bar{\theta}V'(e(\bar{\theta}))$ yields

$$\begin{aligned} \frac{dZ}{d\bar{\theta}} &= -V(e(\bar{\theta})) - \bar{\theta}V'(e(\bar{\theta}))e'(\bar{\theta}) + \lambda e'(\bar{\theta}) \\ &= -V(e(\bar{\theta})) - \lambda e'(\bar{\theta}) + \lambda e'(\bar{\theta}) \\ &= -V(e(\bar{\theta})) > 0. \end{aligned} \quad (19)$$

and

$$\frac{dZ}{d\lambda} = e(\bar{\theta}) + C > 0 \quad (20)$$

Since

$$\frac{d\bar{\theta}}{d\lambda} = - \left(\frac{\frac{dZ}{d\lambda}}{\frac{dZ}{d\bar{\theta}}} \right) = - \left(\frac{-V}{e(\bar{\theta}) + C} \right), \quad (21)$$

we can conclude that $\frac{d\bar{\theta}}{d\lambda} > 0$. Equation (10) and the concavity of L tell us that λ falls with B . Thus, $\frac{d\bar{\theta}}{dB} < 0$.

Finally, the amount of expected penalty rises because it is an increasing function of $e(\theta)$ and a decreasing function of $\bar{\theta}$. Q.E.D.

We cannot, however, say how an increase in the budget will affect the conviction rate.

Proposition 2: *In the Social Planner Model, an increase in the budget, B , might either increase or reduce the conviction rate.*

Proof. From equation (6) the conviction rate is

$$\left(\frac{1}{1 - F(\bar{\theta})} \right) \int_{\bar{\theta}}^1 f(\theta)\theta P(e(\theta))d\theta \quad (22)$$

We have seen in Proposition 1 that when the budget increases, $\bar{\theta}$ falls (reducing the conviction rate) and $e(\theta)$ rises (increasing the conviction rate). Since these changes

have opposite effects on expression (6), the outcome is ambiguous. From the proof of Proposition 1, the effect of $\bar{\theta}$ is proportional to $\frac{V}{e(\bar{\theta})+C}$ for marginal changes. Thus, if the fixed cost C is large enough, the change in $\bar{\theta}$ will have little impact, and the conviction rate will rise. The proof of Proposition 1 also tells us that the effect of changes in $e(\theta)$ is proportional to $\frac{1}{\theta V''(e(\theta))}$. Thus, if $V''(e(\theta))$ is large enough for all $e(\theta)$, the change in $e(\theta)$ will have little impact, and the conviction rate will fall. Thus, depending on C and V'' the conviction rate might increase or might fall after a budget increase. Q.E.D.

Proposition 2 says that the conviction rate can fall because two things matter as the budget B increases. First, how big is the fixed cost of prosecuting a case, C ? If it is big, then most of the extra budget will go to existing cases, and the conviction rate will rise, not fall. Second, how big is $\bar{\theta}V''(e(\bar{\theta}))$, the change in the marginal product of spending on existing cases? If it is very negative, then there are sharply diminishing returns to increased spending on existing cases. As a result, the average probability of success should fall when the budget rises, because the extra money goes mostly to prosecute new, weaker, cases.

An increase in the fixed cost C is similarly ambiguous. It will certainly increase $\bar{\theta}$, reducing the prosecution rate (which is easily proved using the method of Proposition 1 and the fact that $\frac{dZ}{dC} = \lambda > 0$). It reduces the amount of variable effort e that the prosecutor can expend for a given number of prosecutions, so the effect on his objective, total value of prosecutions, cannot but be negative. The effect of a higher fixed cost on the conviction rate, however, is ambiguous. The average product of the marginal case will fall, and the prosecutor will shift resources towards the other cases. He has to spend more on the fixed cost of those cases, so we cannot tell in the end, however, whether spending on the marginal effort e increases or falls. Normal intuition tells us that the conviction rate should fall if costs rise, but if it is a fixed cost, that might not be the case. Instead, it could happen that the prosecution rate falls so much that enough resource are freed up for the remaining cases that the conviction rate rises.

Particularly surprising is the possibility that having juries more hostile to police and prosecutors might raise the conviction rate. This can be interpreted as an increase in C if it means more must be spent to attain even a base-level probability of success. The effect of a district having more skeptical juries might as a result be to make prosecutors more selective about which cases they bring, to such an extent that they win a higher fraction of them. This is just one way in which skeptical juries could enter the model, and the way they affect variable costs, fixed costs, and the probability of success is crucial. If the effect is to multiply the expected penalty $\theta V(\theta)$ by a constant such as 0.8, for example, the conviction rate will fall without any effect on the prosecution rate or the allocation of effort. But the possible perverse effect of C on shows how difficult it would be to predict the effect of variables such as political climate on conviction rates. We must resort to empirical estimation unless we are willing to make assumptions about how the prosecution rate affects the conviction rate.

Theory II: The Prosecutor as Agent of the Voters— The Political Model

When the prosecutor uses the social welfare function for his payoff, we can at least predict the effect of a budget change on the prosecution rate, if not the conviction rate. Once agency problems are introduced, even this becomes difficult. Two central problems in any principal-agent relationship are that (a) the agent will want to use his effort for personal goals unrelated to the principal's goal, and (b) if the principal rewards the agent based on a rough proxy for the principal's true objective, the agent will pursue the proxy and not the real thing. The more the principal tries to solve problem (a) with a high-powered incentive contract, the more he must worry about problem (b). Here, the principal is the public and the agent is the prosecutor. Problem (a) takes the form of the prosecutor wanting to use his office's resources for things such as perks for himself, higher wages for his subordinates, and prosecutions or other use of office personnel that are intended to further his post-prosecutorial career in the public or private sector. Problem (b) takes the form of the prosecutor focusing too much on variables the principal can measure well and too little on other goals.

Here, we will focus on the conviction rate as that well-measured variable, something some voters will reward despite its imperfections as a measure of performance. Prosecutor agents must please their principals, however, whether they are appointed or elected, and they have personal objectives too. If the prosecutor must run for re-election, however, his payoff function may also include the conviction rate, as suggested in the Introduction. Elected prosecutors— and perhaps appointed ones too—must appeal to people who do not know how many potential cases exist, and so have difficulty evaluating the number of convictions he achieves, not to mention the average sentence for those convictions. The absolute number of prosecutions is meaningless to a voter by itself, and given the small number of arrests and prosecutions that occur anywhere in the United States relative to the amount of crime, even the prosecution rate is not a helpful number. A conviction rate, however, conveys some meaning, and will have even more impact on voters who have not thought of the effect of careful selection of which cases to prosecute. It will not be the only variable that affects voters— if the prosecution rate falls enough, the change will be noticeable, and by continuity even a small change will have some impact on voters; if a person had absolutely no perception of a temperature decline of one degree, he could not perceive a decline of fifty degrees either. But voters, even more than administrative superiors, will look to clear measures such as conviction rates, as Gordon & Huber (2002) argue. We might expect that if an elected prosecutor's term of office is short or the degree of political competition is high, the prosecutor would put more weight on acquiring a high conviction rate. Conviction rates should thus be correlated with short terms or frequent turnover in the office, something we will look at below.

We will put these two agency problems together into what we will call the Political Model. If we denote effort spent on personal goals as e_a and the utility of personal goals and slack as $S(e_a)$ with $S' > 0$ and $S'' < 0$ (so increased effort devoted to slack has

diminishing marginal utility), we can write the payoff function as

$$\begin{aligned} \text{Payoff}(\text{prosecutor}) &= U[\alpha(\text{conviction rate}), (1 - \alpha)\beta(\text{personal goals}), \\ &\quad (1 - \alpha)(1 - \beta)(\text{convictions})] \\ &= U[\alpha W[e(\theta), \bar{\theta}], (1 - \alpha)\beta S(e_a), (1 - \alpha)(1 - \beta)C[e(\theta), \bar{\theta}]], \end{aligned} \quad (23)$$

where

$$W = \left(\frac{1}{1 - F(\bar{\theta})} \right) \int_{\bar{\theta}}^1 f(\theta)\theta P(e(\theta))d\theta \quad C = \int_{\bar{\theta}}^1 f(\theta)\theta V(e(\theta))d\theta \quad (24)$$

In the Political Model payoff function, α parameterizes the importance of a high conviction rate to the prosecutor and β parameterizes the importance of low effort spent on prosecutions, where if $\alpha = \beta = 0$ we return to the original model of the social planner. These parameters have been introduced in a particular way. The parameter α represents political pressure by voters who vote on the basis of the conviction rate. To the extent that the prosecutor does not care about them, $(1 - \alpha)$, his payoff is split between slack effort and the number of convictions. Thus, a way to represent loose political pressure is a low value of α , and a way to represent a prosecutor who will follow the public interest if he is not under political pressure is with a low value of β .

The budget constraint changes also, to reflect the cost to the budget of effort on personal goals:

$$e_a + \int_{\bar{\theta}}^1 f(\theta)[e(\theta) + C]d\theta \leq B. \quad (25)$$

The Lagrangian for the maximization problem is

$$\begin{aligned} \underset{e_a, e(\theta), \bar{\theta}}{\text{Maximize}} \quad L &= U[\alpha W[e(\theta), \bar{\theta}], (1 - \alpha)\beta S(e_a), (1 - \alpha)(1 - \beta)C[e(\theta), \bar{\theta}]] \\ &+ \lambda \left\{ B - e_a - \int_{\bar{\theta}}^1 f(\theta)[e(\theta) + C]d\theta \right\}. \end{aligned} \quad (26)$$

The Political Model has three optimality conditions. First, there is the choice of agency slack, e_a :

$$\frac{dL}{de_a} = U_2(1 - \alpha)\beta S' - \lambda = 0. \quad (27)$$

The first optimality condition says that the prosecutor's gain from extra slack must equal its cost in terms of foregone budget that might have been spent on a higher conviction rate or more convictions.

Second, there is the choice of the $e(\theta)$ function. For each value θ ,

$$\frac{dL}{de(\theta)} = U_1 \left(\frac{\alpha}{1 - F(\bar{\theta})} \right) f(\theta)\theta P' + U_3(1 - \alpha)(1 - \beta)f(\theta)\theta V' - \lambda f(\theta)(1) = 0. \quad (28)$$

Rearranging and combining these last two conditions, we see that the marginal payoff of effort must be the same for each case prosecuted, as in the social planner model, though now the payoff is more complicated. For any θ ,

$$U_2(1 - \alpha)\beta A' = U_1 \left(\frac{\alpha}{1 - F(\bar{\theta})} \right) \theta P' + U_3(1 - \alpha)(1 - \beta)\theta V' = \lambda. \quad (29)$$

As α rises, the prosecutor slackens less and puts more effort into each case he chooses to prosecute, for a higher conviction rate. Unlike earlier, however, it is the probability of conviction in a case, P , rather than the expected penalty, V , which matters, so we would expect the number of generous plea bargains to increase. As β rises, more effort is diverted to personal goals, leaving less for prosecutions. As λ rises, indicating a greater marginal utility of money and a lower budget, effort per prosecution and slack both fall.

The third optimality condition concerns the choice of $\bar{\theta}$. It says that

$$\begin{aligned} \frac{dL}{d\bar{\theta}} &= \alpha U_1 \left(\left[\frac{f(\bar{\theta})}{(1 - F(\bar{\theta}))^2} \int_{\bar{\theta}}^1 f(\theta)\theta P d\theta \right] - \left[\frac{1}{(1 - F(\bar{\theta}))} \right] f(\bar{\theta})\bar{\theta}P(e(\bar{\theta})) \right) \\ &\quad - U_3(1 - \alpha)(1 - \beta)f(\bar{\theta})\bar{\theta}V(e(\bar{\theta})) + \lambda f(\bar{\theta})[e(\bar{\theta}) + C] \\ &= 0. \end{aligned} \quad (30)$$

Again the the average payoff of expenditure on the marginal case prosecuted equals λ , the marginal payoff on any case. At the margin, the prosecutor should get the same benefit from adding a new case as he would from increasing spending on an existing case.

Introducing the conviction rate into the payoff function and allowing the payoff function to have three arguments instead of one means the objective function is no longer concave in the prosecution threshold $\bar{\theta}$. Indeed, we can say very little now about comparative statics, which is the point of Proposition 3.

Proposition 3: *In the Political Model, the conviction rate and prosecution rate might either rise or fall with the budget.*

Proof. The conviction rate depends on the number of cases prosecuted, $\bar{\theta}$. Proposition 2 showed that if more cases are prosecuted, the conviction rate can fall. Here, we have changed the objective function by adding the conviction rate directly and by adding slack. If the weight put on these two objectives is chosen to be small enough, then Proposition 2's conclusion will still apply, because the effect of these two objective variables on the optimal choice of control variables is continuous. Thus, the budget has an ambiguous effect on the conviction rate.

We similarly know from Proposition 1 that the prosecution rate might rise with the budget. To prove that it can fall, consider the following example. Suppose that at the

level of the choice variables optimized for the initial budget the marginal payoff to the prosecutor of convictions, C is falling in the size of the conviction rate, W , so $U_{13} < 0$ (e.g. because a higher conviction rate reduces the importance of a high number of convictions to win re-election), and that convictions has greater diminishing payoff than the conviction rate (U_{11} is small relative to U_{33}). An increase in the budget will then be spent more on increasing the effort on existing cases, increasing the conviction rate, and reducing the value of convictions, so that the optimal $\bar{\theta}$ would fall: fewer prosecutions would result from a higher budget. Q.E.D.

Proposition 2 showed how the conviction rate might either rise or fall with increased budget because the prosecutor might start taking on more difficult cases. What is different in Proposition 3's Political Model is that now the prosecutor has two new objectives besides getting convictions: a high conviction rate, and low personal effort on prosecution. If we reduce the parameters that represent the importance of these new goals to the prosecutor, we will be increasing the importance he puts on convictions. The Social Planner Model is the limit of the Political Model as the importance of the two new goals goes to zero, so we should expect Proposition 2's reasoning for an ambiguous effect of budget on conviction rate to also be possible in the Political Model. We might expect somewhat greater conviction rates in the Political Model because the prosecutor cares directly about the Win Rate, but we also might expect both fewer prosecutions and lower win rate because of a gency slack.

Proposition 3 also says that it is impossible to say generally how an increase in the budget will affect the prosecution rate. This is surprising, because Proposition 1 said that in the Social Planner Model we could confidently predict that prosecutions would rise with the budget. The reasoning there was that an increase in the budget allowed improvements on two margins, the extensive margin of prosecuting more cases and the intensive margin of prosecuting existing cases more heavily, and that with diminishing returns to each margin some of the extra budget should be devoted to each. The analogous reasoning here would be that although we now have three goals (convictions, conviction rate, and slack) instead of just one (convictions), there are diminishing returns to each and the extra budget should be spent on all three. But that reasoning is fallacious.

The fallacy is that the three goals can interact with each other in complicated ways, unlike the two means (marginal and extensive) to the one goal of maximizing convictions. The prosecutor's choice among goals is like that of a consumer among goods. Just as a higher income can result in a consumer buying less margarine, an inferior good, so a higher budget could result in a prosecutor "buying" fewer convictions. Instead, he might spend all of the increase in his budget, and more, on increasing the conviction rate and advancing his personal goals of slack effort or effort towards non-prosecution goals that aid his re-election.

The theory just laid out tells us that from the normative point of view it is difficult to say whether a prosecutor's conviction rate should be high (from Proposition 2), and

from the positive point of view it is hard to predict whether it will increase with the budget (Propositions 2 and 3). If the Social Planner model is not just normative, but also describes how prosecutors behave, then a budget increase will be spent partly on the intensive margin of prosecuting the existing number of cases with extra resources and partly on the extensive margin of prosecuting more cases. The number of convictions will rise, and the number of prosecutions, but the conviction rate might fall. The Political Model is a positive model which adds the conviction rate and slack to the prosecutor's objective function. These new goals both conflict with spending on the extensive margin of new prosecutions. As a result, not only does the effect of increased budget on the conviction rate remain ambiguous (Propositions 2 and 3), but we cannot even say that the number of prosecutions or convictions will rise (Proposition 3). Thus, when we look at anecdotal or numerical data, if the personal goals of prosecutors depend on the conviction rate we should not be surprised if high budgets are not always associated with high conviction rates.

Proposition 3 does say that in the Political Model the effect of a budget increase is ambiguous for both the conviction rate and the prosecution rate, unlike the effect for the prosecution rate in the Social Planner Model stated in Proposition 1. Thus, we can try to test between the two models based on whether prosecutions rise with budgets. Whether the conviction rate rises with the budget is ambiguous in both models, but we would expect the conviction rate to rise more (or fall less) in districts where the Political Model is more likely to apply because prosecutors are elected rather than appointed or where they are elected with shorter terms.

4 Conviction Rates in Japan and the United States

Evidence for the possibility of a perverse effect of budgets on conviction rates comes from the differences between prosecution in the United States and Japan. Conviction rates are high in both countries. In 2001, American state prosecutors win 85.21 percent of their felony cases and 89.81 percent of their misdemeanors, while American federal prosecutors win 90 percent of their cases in 2003. Japanese prosecutors, on the other hand, win 99.9 percent of their cases.¹²

Ramseyer and Rasmusen's 2001 article (revised with additional statistical results in Chapter 6 of their 2003 book) was motivated by a desire to test whether this was because Japanese judges were concerned about the effects on their future job postings of thwarting a government prosecution. Statistical estimation and examination of individual cases found that judges' careers did not suffer if they found a defendant innocent.

¹²The conviction rates of the state prosecutors are obtained from Census of Prosecutors, 2001. The conviction rate of the federal prosecutors is taken from <http://www.ojp.usdoj.gov/bjs/pub/press/fcjt03pr.htm>. For sources, see Ramseyer and Rasmusen (2003), chapter 6. Newer Japan data is from the Police White Paper and the annual report of the courts.

One explanation for the high conviction rates could be Japanese criminal procedure. The conviction rates of 85 to 99.9 percent given above include guilty pleas. Thus, they depend on the rate at which defendants plead innocent. Two features of Japanese procedure would make settlement more likely. First, Japan has trials broken into separate stages over time, which by revealing information to both sides increase the likelihood of a mutually-agreed outcome, whether that be a guilty plea or a dropped case. Second, Japan also uses judges as triers of fact rather than juries, which also reduces unpredictability and thus encourages settlement. This is true even if, as Chris Guthrie Jeffrey Rachlinski and Andrew Wistrich (2001) found in their survey, judges make the same kinds of cognitive mistakes as the rest of us. At least there are only one or three judges on a Japanese panel, and the lawyers can discover their track record.

Against this might be set another feature of Japanese criminal procedure: it does not allow plea bargains. All defendants who are prosecuted face trial and the court convicts them only if prosecutors prove their guilt beyond a reasonable doubt. But in 2004 Japanese defendants contested prosecution in only 6.7 percent of cases, compared to innocent plea percentages of 11 percent in U.S. state and 22 percent in U.S. federal courts. Despite the lack of formal plea bargains, Japanese defendants seem to confess even more than American ones.

But a look at the conviction rate for contested cases shows that the difference is not in the uncertainty of American trials. In 2004, Japanese defendants contested 5,472 cases and were acquitted in 89, a contested conviction rate of 98.4 percent. In 2003, 4,639 cases were tried by jury out of which 3,857 cases resulted in convictions, resulting in a contested conviction rate of 83%¹³. Thus, Japanese courts really do seem much tougher, a different explanation for the smaller proportion of contested cases.

Our model, however, suggests the possibility that the Japanese courts are not tougher. Rather, could it be that prosecutors in Japan drop all but their strongest cases?

Japan employs about 1,200 prosecutors. The United States, with twice the population, employs about 32,000 prosecutors—almost 25 times as many. Japan does have much less crime than the United States, so we would expect fewer prosecutors, but that does not fully explain the difference. Each year, police in the U.S. make about 14 million arrests, excluding traffic offenses. That comes to 438 crimes per prosecutor. Japanese police clear about 1.4 million Criminal Code violations per year. This comes to 1,166 crimes per prosecutor. Crime is low in Japan, but the number of prosecutors is even lower.

What data we have seems to show that differences in prosecution rates reflect these differences in workload. In 1994, state courts in the U.S. convicted 870,000 people of felonies, and the federal courts another 44,000. Given the conviction rates cited earlier, prosecutors must charged slightly more than 1 million defendants with felonies. If we use the FBI's 2.4 million index crime arrests as a rough indicator of the number of felony

¹³Table 12 of <http://www.ojp.usdoj.gov/bjs/pub/pdf/fcjt03.pdf>

arrests, we obtain a 42 percent prosecution/arrest ratio. In Japan, by contrast, of the 1.4 million people arrested for Criminal Code violations in 2002, prosecutors filed charges against just 14.4 percent (87,841 with full prosecutions, 115,013 with abbreviated prosecutions). This difference is weak evidence because the crime data is not strictly comparable. U.S. index crimes both include some misdemeanors and exclude some felonies, and felony arrests are often plea bargained down to misdemeanor convictions, and the Japanese figures include both serious and non-serious crimes. Nonetheless, it is plausible that in the absence of a confession or evidence almost as strong, Japanese prosecutors decide not to spend their scarce time bringing cases to trial.¹⁴

It would be interesting to compare other countries to Japan and the United States. The United Nations Office on Drugs and Crime provides data on international crime and prosecution rates, but we have doubts about its reliability. We have chosen, instead, to look at prosecution in different state prosecutorial districts in the United States.

5 State Prosecutions in the United States

We can do simple tests for the Social Planner Model versus the Political Model using state-level data from the United States. In 2001, 2,341 prosecutor's offices handled felony cases in state courts of general jurisdiction. They employed some 79,000 people and had a budget of about 4.7 billion dollars. The size of offices increased markedly over the previous decade. From 1994 to 2001, budgets grew 61% after inflation, and the number of assistant prosecutors grew 26%. Of these offices, 1,809 employed full-time chief prosecutors and 532 had part-time chief prosecutors (in 29 states), an increase in the number of full-time chief prosecutors to 77% compared to the 53% in 1990. Figure 4 is a map of the districts and which had part-time prosecutors.¹⁵ 3% of the personnel were chief prosecutors, 30.5% were assistant prosecutors, and the rest such people as support staff and investigators.

87% of chief prosecutors were elected or appointed to four-year terms. Chief prosecutors are elected everywhere except Alaska, Connecticut, the District of Columbia, and New Jersey. In Alaska, Delaware, and Rhode Island criminal prosecution is the primary responsibility of the state's attorney-general, and in the District of Columbia the U.S. Attorney has jurisdiction over felonies and misdemeanors.

Half of the offices received at least 85% of their funding from the county government, and a third relied entirely on the county. Half received some state funding, and 6% had their entire funding from the state. City governments and grant funds also supplied funding.

By definition, these offices handle felonies. The percentages also handling misde-

¹⁴For a dissenting view, see Saxonhouse (2001). For more on the prosecutorial system in Japan, see the book by Johnson (2001).

¹⁵Figure 4 and the numbers in this and the next three paragraphs are from DeFrances (2002).

meanors, juvenile matters, and traffic violations were 91%, 89% and 84%. 51%, handled felony appeals (including 77% of the 34 with district populations of over one million), and 54% represented the government in civil suits.¹⁶

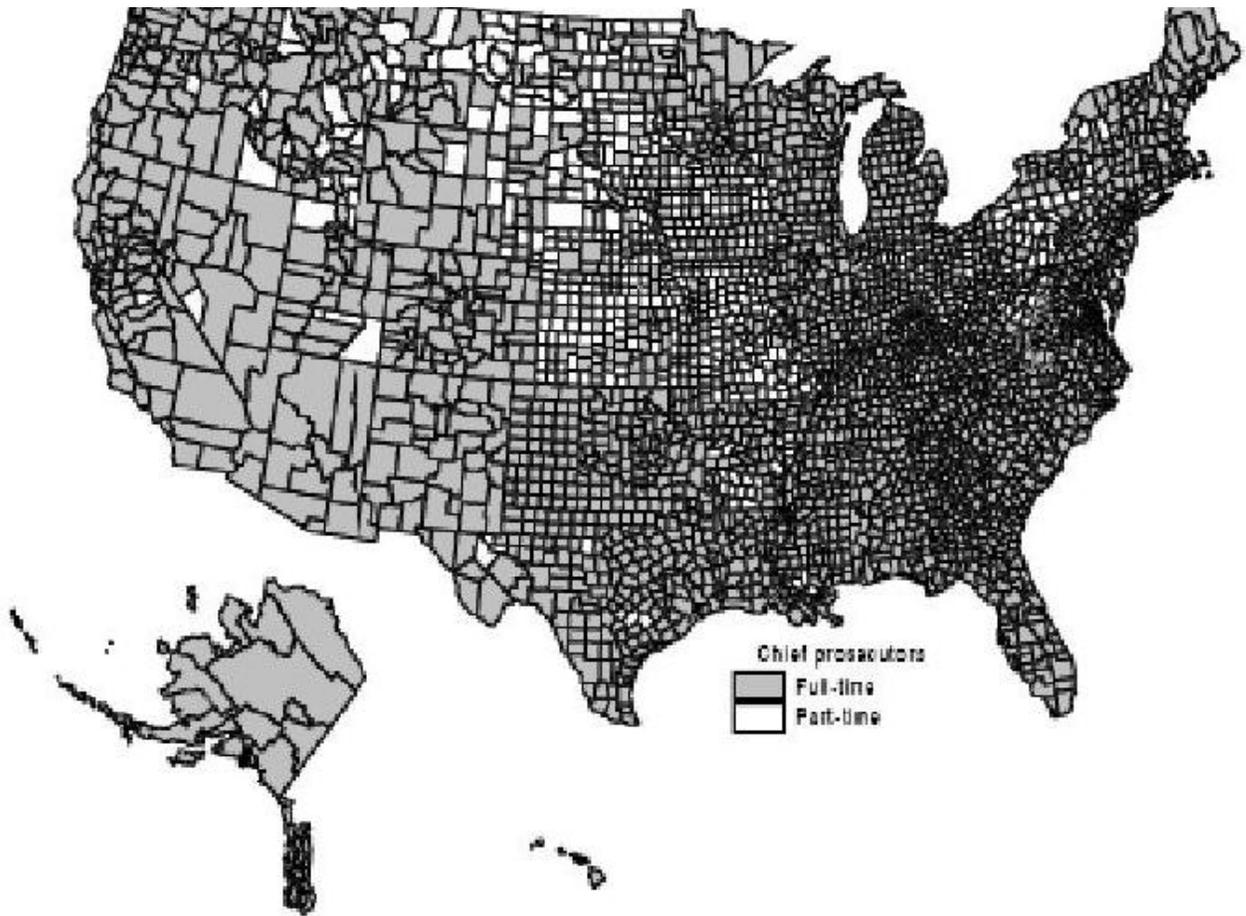


Figure 4: Prosecutorial Districts in the United States

6 Data and Endogeneity

If we are to study American prosecutors, our unit of observation should be the state prosecutorial district. These are often the same as counties, but not always. Alaska, for example, has just one prosecutorial district but many counties; and some counties are

¹⁶The distribution of these by size is interesting. The percentage of full-time prosecutors representing the government in civil suits was 41% in districts with over a million people, 27% in districts with between 250,000 and 1,000,000 people, and 51% in districts with fewer than 250,000 people. The figure for part-time prosecutors, however, was 75%.

split between prosecutorial districts.

Our task is see what explains conviction rates and prosecution rates in this data.

Our data source for variables involving prosecutors' offices (e.g. conviction rates, salaries) is the 2001 National Prosecutor's Survey by the Bureau of Justice Statistics, U.S. Department of Justice. This was a mail survey with telephone follow-up. 96% of the 2,341 offices responded, and 98 did not. The Survey tried to find data on the 98 missing offices from secondary sources such as the county budget office. It also imputed missing values for various variables using the "hot deck" method, which copies values from observations having similar values for non-missing variables. These included 288 values for felony cases closed (DeFrances [2002]). The National Prosecutor's Survey occurs every few years, but in the 1992, 1994, 1996, and 1998 surveys it only included a representative sample of about 300 districts, not the entire population of districts.

Our second major data source is the 2001 Uniform Crime Reporting Program Data of the Federal Bureau of Investigation, U.S. Dept. of Justice. This is published annually and contains detailed data on the amount of crime reported to police.

The crime data, which is arranged by county, is well known and much used; the prosecutor dataset, arranged by prosecutorial district, is much less known. Our dataset merges them, using the district as the unit of observation.

Another of our variables, a measure of political conservatism, the percentage of the November 2000 presidential vote received by George Bush, is from the Center for Presidential and Congressional Studies at American University. We also obtained demographic information, from the Bureau of Census. This includes information about population, racial composition of counties, per-capita income, median rent, population density, housing density, educational attainment of population in different counties, the age composition of population in different counties, and the total area of each county. Each of these variables were at the county level, which we aggregate to the level of prosecutorial districts that usually consist of several counties.

We conduct empirical investigation to see if the predictions from our theoretical model matches the results from the real world. To this end, we run regressions on the conviction rate (felony convictions divided number of prosecutions times 100) and a measure of the prosecution rate (number of felony prosecutions/number of index crimes * 100). The latter is only a proxy rather than the actual prosecution rate because we do not have data for all reported felony crimes, just the number of index crimes, whereas our prosecutions number is for all felonies. We run a tobit regression for conviction rate because it always lies between 0 and 100(%). Since our measure of the prosecution rate can exceed 100, however, we use only the lower limit of 0 here while running that tobit regression.

The Census of Prosecutors data has some districts for which the conviction rate is greater than 100% or less than 0%, which we dropped. This deletion is unlikely to

introduce to a bias in our estimates since those districts are spread all over the United States and do not exhibit any peculiar pattern which sets them apart from the other districts.

Table 1 contains summary statistics for the quantitative variables.¹⁷

Table 1: Summary Statistics

Variable	Min	25th percentile	Median	Mean	75th percentile	Max
Conviction Rate (%)	0	79	90	85	96	100
Number of Felony Cases Closed	0	70	205	584	580	15,639
Prosecutorial Budget (\$/year)	6,000	125,000	295,189	770,001	750,000	13,113,000
Number of Index Crimes	0	26	129	463.419	473	14,445
Chief Prosecutor's Salary (\$/year)	10,500	52,884	80,000	77,260	99,322	174,000
Chief Prosecutor Appointed (yes = 1)	0	1	1	0.777	1	1
Years in Office	0	4	8	9.246	14	40
Term of Office (Years)	1	4	4	4.098	4	10
Number of Staff (Secretaries etc.)	0	1	3	5.9	6	121
Presidential Vote for Bush in 2000 (%)	19.21	50.74	57.46	64.35	64.35	90.87
Rural Population (%)	0	36	58	58	81	100
Per-capita Income (Thousands of \$)	5,213	15,659	17,195	17,663	19,052	44,962
Metropolitan Area (yes = 1)	0	0	0	0.204	0	1
Density of Population (Population per Hundred Square Miles)	0.271	16.158	43.431	130.602	100.351	8450.79
House Density (Housing Units per Square Mile)	0.177	7.533	19.047	55.181	42.796	4232.608
Area of the District (Square Miles)	6.83	512.41	743.79	1310.812	1391.49	21159.85
African-American Population (%)	0	.4	1.3	6.3	6.3	78.4

The prosecutorial budget and the number of index crimes are likely to be endogenous. We have accordingly used instrumental variables in our regressions. We have used the aggregate pay of the full time and part time employees, the number of full time and part time employees of the local government, and the hours worked by the part time employees of the local government as our instruments for the prosecutorial budget. These variables are highly correlated with the prosecutorial budget because the prosecutor gets most of his budget from the local government. They are beyond his control, unlike the prosecutorial budget, which he can request to increase from year to year.

As instruments for the crime rate we have used the percentage of males between 15 and 24, percentage of people who are employed, percentage of males with no schooling, percentage of houses that occupied. We did not use the percentage of African-American population as an instrument of crime because we include it in the main regression because of its possible effect on the conviction and prosecution rates. Since African-Americans are

¹⁷As for the qualitative variables: In 902 of 2023 districts for which we have data the prosecutor's office takes civil cases. In 19 of 2,195 districts the chief prosecutor is appointed, and in 447 of 2,195 districts the district includes part of a Metropolitan Statistical Area.

disproportionately both victims and perpetrators of crime, we might well expect a direct effect of race on the prosecutor’s win rate (as Butler [1995] suggests), though its direction would be unclear.

7 Regression Results

Proposition 1 says that in the Social Planner Model an increase in the prosecutor’s budget increases his prosecution rate for a given crime rate, but Proposition 2 says that his conviction rate might either rise or fall. Proposition 3 says that in the Political Model the effect of a budget increase is ambiguous for both the conviction rate and the prosecution rate. Thus, we can try to test between the two models based on whether prosecutions rise with budgets. Whether conviction rates rise with budgets is ambiguous in both models, but we would expect the conviction rate to rise more (or fall less) in districts where the Political Model seems more likely to apply because prosecutors are elected rather than appointed or where they are elected with shorter terms.

Table 2 look at how the conviction rate is related to the prosecutor’s budget, the number of prosecutions, and other variables. Regression (1) uses instrumental variables for both budget and crime as described above, while Regression (2) instruments only for the prosecutorial budget, and hence assumes that the conviction rate has no effect on the amount of crime.

The conviction rate does rise with the budget, keeping the number of prosecutions (the “cases closed” variable) constant. The statistical significance is well above the 5% level both in specification (1) and specification (2). If one calculates the elasticities of how the conviction rate changes with respect to prosecutions, (using the STATA `mf` command evaluated at the variable means), it is 0.083 for regression (1): a 10% rise in the budget increases the conviction rate by . 83%. That means that if the conviction rate is at the median of 90%, a rise in the number of prosecutions by 10% will increase it to about 90.75%. That amount may not seem large, but given the high rate of diminishing returns we would expect in the process of prosecution it is not surprising.

The conviction rate also fall with the number of prosecutions (the “cases closed” variable), at a very significant level statistically, and both in specification (1) and specification (2). This is not an implication of the theory, but one of its assumptions. Yet if one calculates the elasticity of how the conviction rate changes with respect to prosecutions, it is only -0.022 for specification (1): a 10% rise in the number of prosecutions reduces the conviction rate by .22%. If the conviction rate is at the median of 90%, a rise in the number of prosecutions by 10% will reduce it to about 89.98%. What our statistical significance establishes is that the size of the effect is definitely small, if nonzero. This implies that in the average United States district the prosecutor has a large enough stock of potential cases that increasing his number of prosecutions would scarcely reduce his con-

viction rate. We conclude from the budget and number of prosecutions coefficients that the chief limiting factor for the number of prosecutions is the fixed cost of an additional prosecution.

The chief prosecutor's salary and years in office are insignificant in Table 2. Whether the chief prosecutor is appointed is highly significant, both statistically and in magnitude. As the Political Model would predict, appointed prosecutors, less worried about poorly informed public opinion, have lower conviction rates. The Political Model predicts that the effect of a longer term of office would also be negative because it would ease voter pressure, but it comes in positive and marginally significant at the 10% level. We have no explanation for this. The coefficient for the number of staff is negative and significant, which says that increasing the number of non-lawyer staff for a given budget reduces the conviction rate. This might be interpreted as evidence of slack and support for the Political Model: at the margin, it seems that allocating the average share of the budget to staff is too much.

The other variables in the regression are control variables which do not help distinguish between the Social Planner Model and the Political Model but can nonetheless be interesting. The amount of crime reduces the conviction rate in specification (1), where we instrument for it as being affected by the conviction rate, but not in specification (2) where we do not. Rural districts have lower conviction rates, perhaps because prosecutor candidates do not have to rely so heavily on summary statistics in their campaigns. The values of the other control variables are insignificantly different from zero.

Table 2: Explaining the Conviction Rate

	(1)	(2)
Prosecutorial Budget	6.738** (2.351)	4.509** (1.969)
Number of Felony Cases Closed	-0.002** (-2.288)	-0.003*** (-3.630)
Chief Prosecutor's Salary	0.009 (0.344)	0.024 (0.927)
Chief Prosecutor Appointed	-32.276** (-2.562)	-22.345** (-2.285)
Years in Office	0.090 (1.169)	0.078 (1.020)
Term of Office	1.210* (1.902)	0.889 (1.545)
Number of Staff	-0.330** (-1.974)	-0.429*** (-2.665)
Aggregate Number of Index Crimes (x1000)	-8.621** (-2.153)	-1.143 (-0.599)
Presidential Vote for Bush in 2000	-0.010 (-0.155)	-0.022 (-0.363)
Percentage of Rural Population	-7.201** (-2.371)	-3.958 (-1.515)
Metropolitan Area	-0.864 (-0.601)	-1.710 (-1.199)
Density of Population (x100)	1.070 (1.315)	1.144 (1.548)
House Density	-0.021 (-1.246)	-0.022 (-1.482)
Total Area of the District	-0.000 (-1.207)	-0.000 (-1.305)
Percentage of African-American Population	-0.031 (-0.448)	-0.080 (-1.277)

Notes: In parenthesis are z- statistics. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Three regional dummies are included but not reported. Robust standard errors are used. The lower limit of the dependent variable in this regression is 0, while the upper limit is 100. Regression (1) has two endogenous variables—prosecutorial budget and index crime— while in regression (2) only the prosecutorial budget is endogenous. See the text for discussion of the instruments.

Table 3 looks at how the prosecution rate changes with the budget and other variables. As before, the first two columns represent regressions instrumenting for both budget and crime (3) and for just budget (4). What is noteworthy about Table 3 is how little explanatory variables any of its variables have. Except for the percentage of the rural

population, which raises the prosecution rate, nothing seems to explain how many prosecutions a district has in proportion to its crime level.

Table 3 gives us a useful negative result, because it says that the prosecution rate has no clear connection to the prosecutor's budget. In conjunction with Table 2, one would conclude that districts with higher budgets have higher conviction rates, and perhaps more slack, but prosecution rate no higher than low-budget districts. That conclusion is contrary to Proposition 2, rejecting the Social Planner Model, and in accordance with Proposition 3's ambiguous prediction for the Political Model.

Thus, our U.S. evidence fails to support the Social Planner Model but is consistent with the Political Model. Prosecutor conviction rates do rise with budgets and are higher where prosecutors are elected rather than appointed, but prosecution rates have no clear correlation with budgets. In addition, conviction rates are slightly lower in high-crime districts and where the prosecution rate is higher.

Table 3: Explaining the Prosecution Rate (Felony Cases Closed/Index Crimes*100)

	(3)	(4)
Prosecutorial Budget	-18.967 (-0.344)	-24.943 (-0.425)
Chief Prosecutor's Salary	1.393 (0.736)	1.407 (0.724)
Chief Prosecutor Appointed	-114.823 (-0.611)	-83.641 (-0.554)
Years in Office	0.222 (0.085)	0.177 (0.067)
Term of Office	16.115 (0.508)	15.379 (0.488)
Number of Staff	16.353 (1.481)	15.861 (1.495)
Aggregate Number of Index Crimes	-112.904 (-1.282)	-90.592* (-1.735)
Percentage Vote for Bush in 2000	4.372 (0.831)	4.333 (0.842)
Percentage Rural Population	698.344*** (3.600)	708.651*** (3.456)
Metropolitan Area	-13.457 (-0.547)	-17.065 (-0.667)
Density of Population (x 100)	7.776 (0.313)	7.852 (0.321)
House Density	0.004 (0.008)	0.002 (0.003)
Total Area of the District	-0.012** (-1.966)	-0.012** (-1.969)
Percentage African-American Population	0.897 (0.414)	0.706 (0.336)

Notes: In parenthesis are z-statistics. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Three regional dummies are included but not reported. Robust standard errors are used. Regression (3) instruments for two endogenous variables– prosecutorial budget and index crime– while in regression (4) only the prosecutorial budget is instrumented. See the text for discussion of the instruments.

Conclusions

A prosecutor's high conviction rate may not be a sign that he is tough on crime and doing a good job. Instead, he might just be taking easy cases and letting too many criminals go without prosecuting them. We have explored the implications of this idea for a theory of prosecutors and used it to think about prosecutions in Japan and the United States. Prosecutors have a choice between using extra resources to prosecute their current level of cases harder, the intensive margin, or to increase the prosecution rate,

the extensive margin. A social planner would want both margins increased if the budget expands. Prosecutors are agents of the voters, however, which means they are subject to the temptation of agency slack and that they are monitored using imperfect summary statistics such as the conviction rate. As a result, we do not necessarily see increases in the budget spent on increasing the conviction rate, or even on increasing the prosecution rate. This may be particularly true for prosecutors who are elected, as in most of the United States, but appointed. Japanese prosecutors seem, with their low budget compared to American prosecutors, to have low prosecution rates and high conviction rates. We do not find that higher budgets are associated with higher prosecution rates, contrary to what our normative model would prescribe. We do find that appointed prosecutors in the United States do have lower conviction rates than elected ones, and we find that an increased budget does increase conviction rates.

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