

Convictions versus Conviction Rates: The Prosecutor's Choice

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Abstract

Prosecutors choose which criminal cases to prosecute. If they prosecute more and thus weaker cases of a given type, the ratio of conviction to prosecutions (the “conviction rate”) will fall. If their budgets increase, they can choose either to prosecute more cases or to put more effort into existing cases. Either can be rational, depending on particular circumstances. We model the tradeoffs theoretically, apply them to the difference between Japan and the United States, and do econometric analysis using U.S. county-level crime data and prosecution data drawn from state prosecutorial districts.

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For the most recent draft, see:

<http://www.rasmusen.org/papers/prosecutors-raghav-ramseyer-rasmusen.pdf>.

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This draft is still ragged. Do not be surprised if the regression results look different when you next see the paper. Also, note that this was prepared hurriedly for a seminar and may show signs of not being proofread or reviewed by more than one co-author.

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

¹xxx Add citation. For similar publicity about win rates, but by a private firm, see <http://www.michigantrialattorneys.com/CriminalLaw.shtml>.

There were 11,877,000 index crimes reported to the police in 2002, but just 1,711, 000 arrests (not charges) for serious crimes (index offenses).

In 75 counties with about a third of the United States population and half of all reported crimes. there were an estimated 54,000 felony defendants. Of those,

52% were convicted of a felony, 49% by plea and 3% by trial.

12% pleaded guilty to a misdemeanor instead,

26% were dismissed,

1% were acquitted,

and 9% were diverted or adjudication was deferred (in addition to cases pending at the end of the year, which are not included in these figures)

57% of the actual trials were bench trials and 43% jury trials.

78% ended with guilty verdicts and 22% with acquittals.²

Bench trials had 81% conviction rates, jury trials only 74%.

Murder was a special crime. 34% of murder defendants went to

²This implies the percentage of hung juries was close to zero, which is surprising.

trial, compared to less than 10% of other defendants. 33% of their cases ended in conviction at trial, and 2% ended in acquittal.

2. Theory

There is a continuum of potential cases that could be prosecuted.

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 $g(\theta)$, where $\int_0^1 g(\theta) d\theta = 1$.

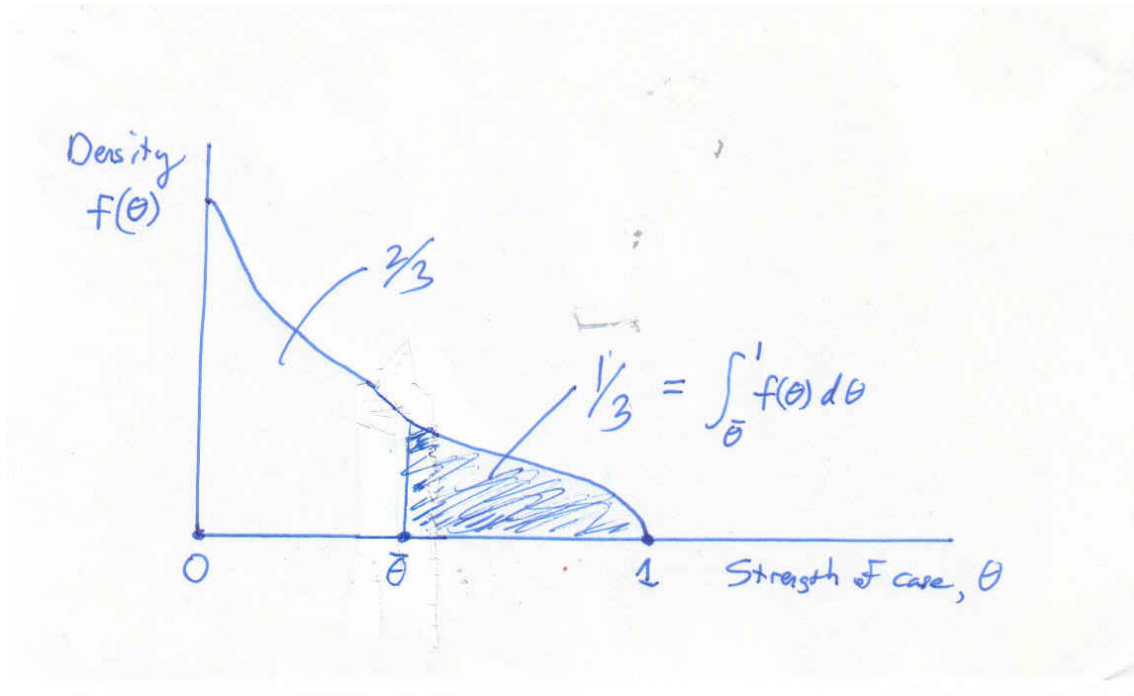


Figure 1: The Distribution of Cases

The prosecutor has a budget of B . Each case that he prosecutes incurs a fixed cost of F and a variable cost of e .

The probability of conviction is

$$\text{Probability of conviction} = \theta P(e(\theta)), \quad (1)$$

where we will assume that $P(e, \theta)$, where $P(0) = 0$, $P' > 0$, $P \in [0, 1)$, and $P(\infty) < 1$, and $P'' < 0$.

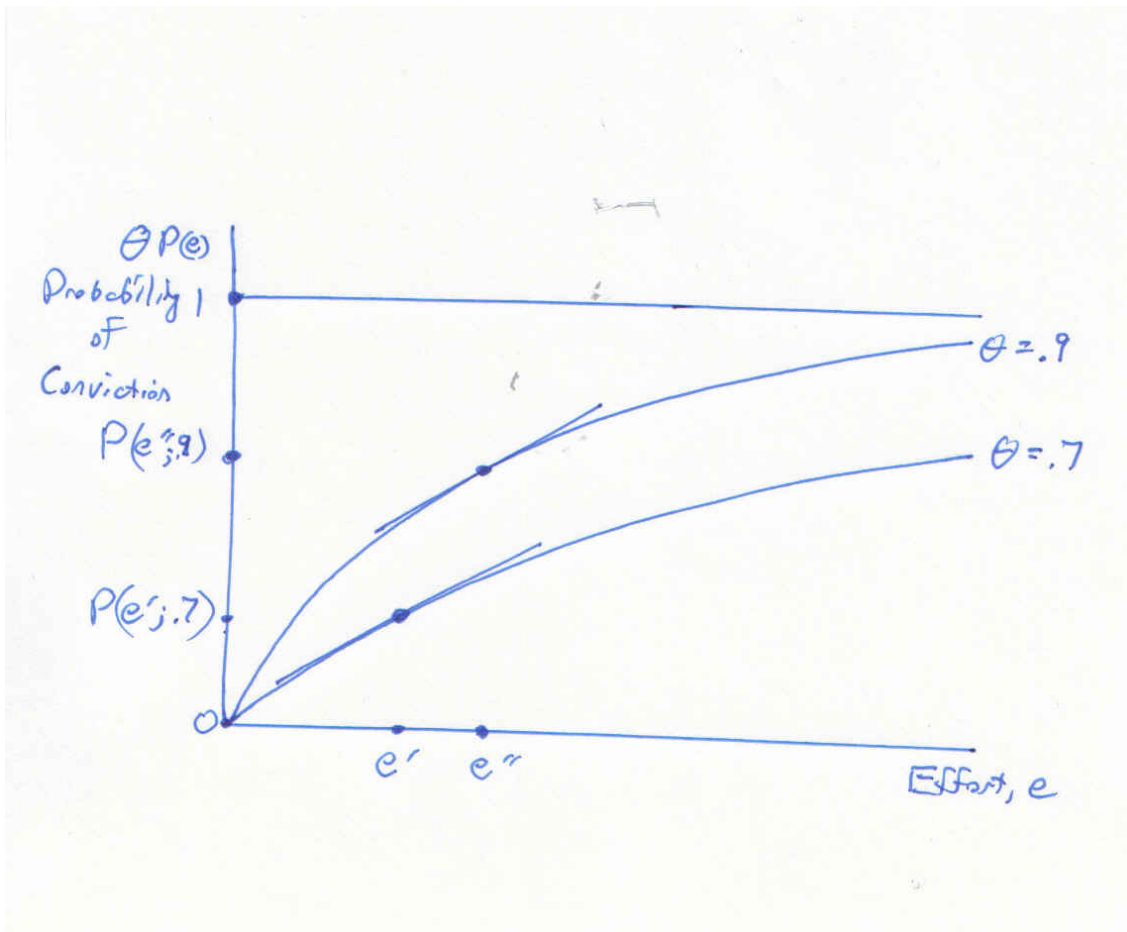


Figure 2: The Conviction Function

We now come to the 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. Second, he needs to pick the $e(\theta)$ function, which shows how much he spends on each type θ of case. These decisions lead to the following three numbers.

$$\text{Probability of prosecution} = \int_{\bar{\theta}}^1 g(\theta) d\theta = 1 - \bar{\theta}. \quad (2)$$

$$\text{Expected number of convictions} = \int_{\bar{\theta}}^1 g(\theta) P(e(\theta)) d\theta. \quad (3)$$

$$\text{Conviction rate} = \frac{\int_{\bar{\theta}}^1 g(\theta) P(e(\theta)) d\theta}{1 - \bar{\theta}} \quad (4)$$

We will write the payoff function for the prosecutor as

$$\alpha \int_{\bar{\theta}}^1 g(\theta)P(e(\theta))d\theta + (1 - \alpha) \left(\frac{\int_{\bar{\theta}}^1 g(\theta)P(e(\theta))d\theta}{1 - \bar{\theta}} \right). \quad (5)$$

The budget constraint is

$$\int_{\bar{\theta}}^1 g(\theta)[e(\theta) + F]d\theta \leq B. \quad (6)$$

The Lagrangian for the maximization problem is

$$\underset{\bar{\theta}, e(\theta)}{\text{Maximize}} \quad L = \alpha \int_{\bar{\theta}}^1 g(\theta)P(e(\theta))d\theta + (1-\alpha) \left(\frac{\int_{\bar{\theta}}^1 g(\theta)P(e(\theta))d\theta}{1 - \bar{\theta}} \right) + \lambda B \quad (7)$$

Note also that

$$\frac{dL}{dB} = \lambda, \quad (8)$$

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

Using loose calculus of variations/maximum principle methods that we will have to refine later, there are two kinds of optimality conditions. First, there is the choice of the $e(\theta)$ function, which yields

$$\frac{dL}{de(\theta)} = \alpha g(\theta)P' + (1 - \alpha)g(\theta) \left(\frac{P'}{1 - \bar{\theta}} \right) - \lambda g(\theta)(1) = 0. \quad (9)$$

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

$$\alpha P' + (1 - \alpha) \left(\frac{P'}{1 - \bar{\theta}} \right) = \lambda. \quad (10)$$

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

$$\frac{dL}{d\bar{\theta}} = -\alpha g(\bar{\theta})P(e(\bar{\theta})) + (1 - \alpha) \left(\frac{\int_{\bar{\theta}}^1 g(\theta)P(e(\theta))d\theta}{(1 - \bar{\theta})^2} - \frac{g(\bar{\theta})P(e(\bar{\theta}))}{(1 - \bar{\theta})} \right) \quad (11)$$

This implies that

$$(\alpha) \left(\frac{\bar{\theta}P(e(\bar{\theta}))}{e(\bar{\theta}) + F} \right) + \frac{(1 - \alpha) \left(\frac{\int_{\bar{\theta}}^1 P(e(\theta))d\theta}{(1 - \bar{\theta})^2} - \frac{P(e(\bar{\theta}))}{(1 - \bar{\theta})} \right)}{e(\bar{\theta}) + F} = \lambda. \quad (12)$$

We can conclude that the marginal product of effort expenditure for any case equals the expected value of total expenditure on the marginal case.

We can conclude that 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.

CONJECTURE: As the budget B increases, the average probability of conviction rises.

We can disprove this conjecture. But the opposite conjecture is not true either.

Two things will matter a lot as B increases. First, how big is F ? If it is big, then extra budget would best go to existing cases, and the average will rise, not fall.

But maybe if F is big, then most existing cases are at $P=1$ anyway, so they won't rise at all, and since some new projects will be adopted, the average will fall, so the conjecture is correct.

Moreover, if F is very small, then the prosecutor will prosecute ALL cases— another corner solution— and an increase in the budget will increase the average probability of success for sure

The same goes with P'' . If P'' is very big and negative, then there are sharply diminishing returns to spending on existing cases. Then, the average probability of success would fall with new spending, because it goes mostly to new cases.

If P'' is near zero, though, so there are almost constant returns to scale, then there will be a lot of $P = 1$ cases. Then, the probability of success also falls with new cases. In the extreme, with $P'' = 0$, every prosecuted case will have $P = 1$, and the average probability of success will certainly fall with increased spending.

It may be helpful to note that if B gets slightly bigger, λ gets smaller, because the marginal payoff value of extra budget gets smaller. $\frac{d}{dB} \frac{dL}{dB} = \frac{d\lambda}{dB} < 0$.

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— a low α in the model. Conviction rates should thus be correlated with short terms or frequent turnover in the office, something we will look at below.

We should do some formal comparative statics here. One author has tried them out using the implicit function theorem on the marginal effort optimality condition to get $\frac{d\bar{\theta}}{d\alpha} < 0$ and $\frac{d\bar{\theta}}{dB} < 0$, and, using the average product equals marginal product condition, $\frac{d\bar{\theta}}{dF} > 0$. We should try it for $\frac{de}{d\alpha}$ and $\frac{de}{dB}$, and $\frac{de}{dF}$ too.

3. Conviction Rates in Japan and the United States

American state prosecutors win 87 percent of their felony cases and 88 percent of their misdemeanors, and American federal prosecutors win 85 percent of their cases. Japanese prosecutors, on the other hand, win 99.9 percent of their cases.

In 1994 Japanese defendants contested prosecution in only 7.3 percent of cases, compared to innocent plea percentages of 11 percent in U.S. state and 22 percent in U.S. federal courts.

In 1994, Japanese defendants contested 3,648 cases and were acquitted in 45, a contested conviction rate of 98.8 percent. In 1995, U.S. federal defendants pleaded innocent in 11,877 cases. Courts acquitted or dismissed the charges in 8,207, a contested conviction rate of 30.9 percent. In state courts, the contested conviction rate apparently is even lower.

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 arrests, we obtain a 42 percent prosecution/arrest ratio. In Japan, by contrast, of the 919,000 people arrested for Criminal Code violations in 1995, prosecutors filed charges against just 17.5 percent.

THE INSTITUTIONS IN THE U.S.

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. 3% of the personnel were chief prosecutors, 30.5% were assistant prosecutors, and the rest such things as support staff and investigators.

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

The 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%.

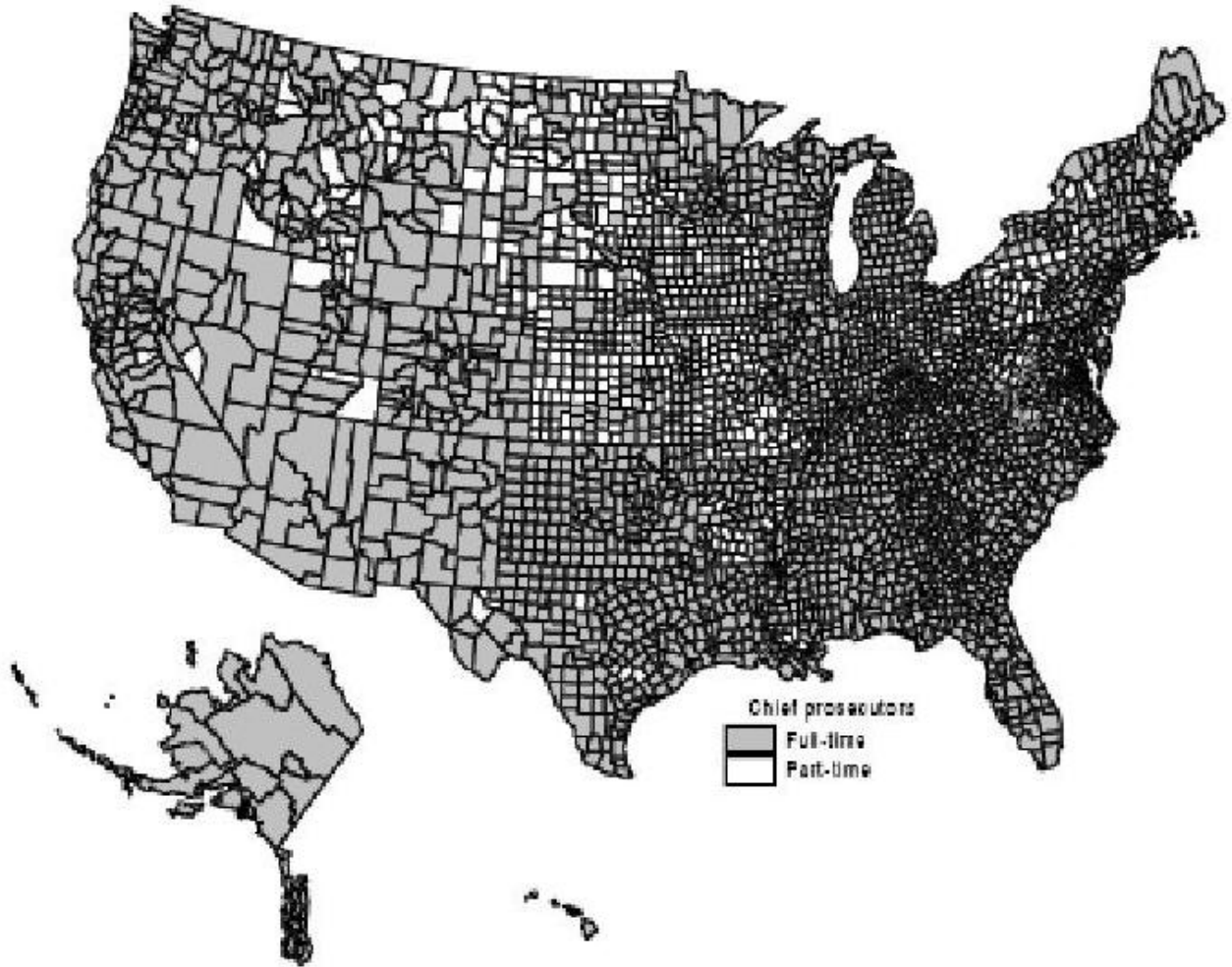


Figure 3: Prosecutorial Districts in the United States

The unit of observation is the state prosecutorial district in the United States. When we say “district” it is a state prosecutorial district that we mean. 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 split between prosecutorial districts.

The data has two main sources.

One is the 2001 National Prosecutor's Survey by the Bureau of Justice Statistics, U.S. Dept. of Justice. This was a mail survey with telephone follow-up. 96% of the 2,341 offices responded, and 98 did not.

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 with full-time prosecutors, not the entire population.

The other source is the 2001 Uniform Crime Reporting Program Data by the Federal Bureau of Investigation, U.S. Dept. of Justice. The Uniform Crime Reporting Program Data is annual.

Our data begins with the 1,809 offices which had full-time prosecutors. It falls to some 1,400 observations once we omit observations with missing crime or prosecution variables.

Our variables are as follows:

- Felclosed: Felony cases prosecuted (in thousands)³
- Felconv: Felony convictions (in thousands)
- Pop: Population of the district (in thousands)
- Indexcrime: Number of FBI index crimes (in thousands) (murder, rape, aggravated assault, robbery, burglary, larceny, motor vehicle theft, and arson, of which larceny is the most common)
- appointed: A dummy variable equalling 1 if the chief prosecutor is appointed, 28 districts in DC, CT, AK, and NJ.
- Murder: Number of murders (in thousands)
- Term: Term length of the chief prosecutor in years
- Inoffice: Years the chief prosecutor has been in office
- Budget: The budget for the prosecutor's office, in thousands of dollars
- Income: Personal income per capita (in thousands of dollars)
- Bush2000: Percentage of the vote that went to George W. Bush in 2000.
- Black: Percentage of the population that is black.

³The questionnaire says,

“Closed case: Any case with a judgment of conviction, acquittal, or dismissal with or without prejudice, entered by the court.

Felony case: Please use your State definition of felony. If this term is not used in your State, please interpret “felony” to mean any case in which the defendant, if convicted, could be sentenced to more than one year in a State prison facility. Include as a felony case any defendant who had at least one felony filing charge.”

From these variables, we constructed other variables:

$$\text{Prostrate} = 100 * \text{felclosed} / \text{indexcrime}$$

$$\text{Convrate} = 100 * \text{felconv} / \text{felclosed}$$

$$\text{Budcrime} = (\text{budget} / \text{index crimes})$$

$$\text{Inccrime} = (\text{income} * \text{pop} / \text{budget})$$

$$\text{Budpros} = (\text{budget} / \text{felclosed})$$

$$\text{Incpros} = (\text{income} * \text{pop} / \text{felclosed})$$

$$\text{Crimerate} = \text{indexcrime} / \text{pop}$$

$$\text{Murderfraction} = 100 * \text{murders} / \text{indexcrime}$$

The National Prosecutor Survey has other variables that might come in useful too.

Salary of the chief prosecutor

Number of assistant prosecutors

Number of misdemeanor cases closed, and convictions

Whether the office handles government civil cases

Whether the office handles appeals, juvenile cases, and traffic offenses

How the office defines “case” – by person or by charge.

Where the budget comes from (county, city, state...)

There are lots of districts where the conviction rate is an even number— 75, 80, 85, 90, 95. Probably that is their guess. That’s okay, if they’re being honest.

Lots of Indiana and Kansas districts report 100% conviction rates.

Here are two correlation matrices.

		winrate	prosrate	budcrime	budpros	term	crime
winrate		1.0000					
prosrate		-0.0348	1.0000				
budcrime		0.0088	0.4967	1.0000			
budpros		0.1564	-0.0167	0.2043	1.0000		
term		-0.0025	-0.0035	-0.0106	-0.0438	1.0000	
crimerate		0.0118	-0.0403	-0.0244	0.0489	-0.0241	1.0
murderfrac~n		-0.0509	0.0038	-0.0083	-0.0493	-0.0470	-0.0
pop		-0.0750	0.1782	0.2112	0.0571	0.0214	-0.0

	winrate	prosrate	inoffice	term	appoin~d	crime
winrate	1.0000					
prosrate	-0.0348	1.0000				
inoffice	0.0097	-0.0179	1.0000			
term	-0.0025	-0.0035	0.0095	1.0000		
appointed	-0.1026	-0.0090	-0.0241	0.1711	1.0000	
crimerate	0.0118	-0.0403	0.0103	-0.0241	-0.0182	1.0
murderfrac~n	-0.0509	0.0038	-0.0377	-0.0470	-0.0144	-0.0
pop	-0.0750	0.1782	-0.0281	0.0214	0.0781	-0.0

Table 1: Summary Statistics

Variable	Minimum	25th p	Median	Mean	75th p	Maximum
Income	15.10	21.74	24.18	24.83	26.98	40.00
Black	0.00	0.49	1.68	6.60	7.03	70.75
Bush2000	11.77	49.85	57.16	57.37	64.42	90.72
Convrate	30.00	80.00	90.00	85.11	95.45	100.00
Prosrate	0.02	0.08	0.13	0.16	0.21	0.91
Budcrime	0.29	1.17	2.05	2.78	3.46	15.98
Budpros	220.34	918.72	1613.49	2210.31	2861.20	11818.29
Term	1.00	4.00	4.00	4.19	4.00	8.00
Appointed	0	0	0	0	0	1
Inoffice	0	3	7	8.94	14	33
Crimerate	0.56	3.48	5.36	5.97	7.76	22.08
Murderfraction	0.00	0.00	0.00	0.36	0.58	2.50
Pop	1.16	16.76	40.27	116.82	98.72	9329.99

Table 2: Regressions Explaining the Prosecution Rate

	(1)	(2)	(3)
y= Prostate	IV	IV	OLS
Convrate	0.01 (0.60)		
Budcrime	0.04*** (3.95)	0.03*** (6.27)	0.02*** (11.01)
Term	0.00 (0.10)	-0.00 (0.12)	-0.00 (0.31)
Appointed	-0.16*** (3.83)	-0.14*** (4.19)	-0.13 (1.15)
Inoffice	-0.00 (0.71)	-0.00 (0.51)	-0.00 (0.54)
Murderfraction	0.00 (0.51)	0.01 (0.61)	-0.00 (0.07)
Crimerate	-0.00 (0.07)	-0.00** (2.13)	-0.01*** (6.78)
Bush2000	-0.00 (0.77)	-0.00 (0.29)	-0.00 (0.38)
Pop	-0.00 (1.36)	-0.00 (1.62)	-0.00 (1.41)
Income	-0.00** (2.46)	-0.00*** (3.20)	-0.00*** (3.21)

$N = 1,259$. State dummies and a constant are included. The regressions use Stata 9.1's XI:IVREG and XI:REGRESS commands. In (1), Black instruments for Convrate (correlation:-.13). In (1) and (2) robust standard errors are used and Inccrime instruments for Budcrime (correlation:.67). In parenthesis are t-statistics. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 3: Regressions Explaining the Conviction Rate

	(1)	(2)	(3)
y= Convrate	IV tobit	tobit	OLS
Budpros	0.00** (2.03)	0.00*** (3.32)	0.00 (1.02)
Prosrates	-4.61 (1.15)	-4.05 (1.08)	-11.27*** (2.82)
Term	0.54 (1.01)	-0.21 (0.15)	-0.20 (0.16)
Appointed	-9.41** (2.43)	-9.88* (1.84)	1.97 (0.14)
Inoffice	0.10* (1.67)	0.19*** (3.19)	0.16*** (2.87)
Murderfraction	-0.37 (0.41)	-0.02 (0.02)	0.41 (0.46)
Black	-0.10** (2.26)		0.05 (0.88)
Bush2000	-0.06 (1.27)	(2.51)	0.13**
Pop	-0.00 (0.75)	(0.00)	-0.00
Income	0.04 (0.75)	29	0.03 (0.61)

$N = 1,259$. A constant was included. Regressions (2) and (3) include state dummies (but not [1], due to software limitations). In (1), Incpros instruments for Budpros (correlation: .68). The regression used Stata 9.1's IVTOBIT, TOBIT, and REGRESS commands. In parenthesis are t-statistics based on non-robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.