

USING SENTENCE ENHANCEMENTS TO DISTINGUISH BETWEEN DETERRENCE AND INCAPACITATION*

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ABSTRACT

Differentiating empirically between deterrence and incapacitation is difficult since both are a function of expected punishment. In this article we demonstrate that the introduction of sentence enhancements provides a direct means of measuring deterrence. Because the criminal would have been sentenced to prison even without the law change, there is no additional incapacitation effect from the sentence enhancement in the short run. Therefore, any immediate decrease in crime must be due to deterrence. We test the model using California's Proposition 8, which imposed sentence enhancements for a selected group of crimes. Proposition 8 appears to reduce eligible crimes by 4 percent in the year following its passage and 8 percent 3 years after passage. These immediate effects are consistent with deterrence. The impact of the law continues to increase 5–7 years after its passage, suggesting that incapacitation may be important as well.

I. INTRODUCTION

SINCE Gary Becker's seminal paper on the economic model of crime,¹ there have been more than 100 published studies attempting to test for deterrence.² While there is disagreement on the topic, many studies published

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¹ Gary Becker, *Crime and Punishment: An Economic Approach*, 76 *J. Pol. Econ.* 169 (1968).

² Surveys of this literature include Samuel Cameron, *The Economics of Crime Deterrence: A Survey of Theory and Evidence*, 41 *Kyklos* 301 (1988); Isaac Ehrlich, *Crime, Punishment, and the Market for Offenses*, 10 *J. Econ. Persp.* 43 (1996); and Daniel Nagin, *Criminal Deter-*

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in recent years have found results that are at a minimum *consistent* with the presence of an important deterrence effect using a range of different measures.³

One important shortcoming associated with almost all of these empirical analyses, however, is the difficulty in distinguishing between deterrence and incapacitation. As long as the primary means of punishment is imprisonment, policy changes that increase the expected punishment per crime lead to both greater deterrence and greater incapacitation. Consequently, most empirical tests of deterrence are, in practice, joint tests of deterrence and incapacitation. For example, reductions in crime associated with increased arrest rates or rising prison populations are consistent with the presence of deterrent effects, incapacitation, or both. Given the strong evidence in support of incapacitation effects,⁴ caution is warranted in attributing a causal role to deterrence in such contexts.⁵

In this article, we present a novel approach to separating deterrence from incapacitation. We exploit the unique transition path associated with what are commonly termed "sentence enhancements." With sentence enhancements, additional prison time is tacked on to the basic sentence for crimes of a particular type, for example, crimes committed with a gun or

rence Research: A Review of the Evidence and a Research Agenda for the Outset of the Twenty-First Century (unpublished manuscript, Carnegie Mellon Univ. 1997).

³ Isaac Ehrlich, Participation in Illegitimate Activities: A Theoretical and Empirical Investigation, 81 J. Pol. Econ. 531 (1973); Jeff Grogger, Certainty vs. Severity, 29 Econ. Inquiry 297 (1991); Steven Levitt, Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime, 87 Am. Econ. Rev. 270 (1997); Thomas Marvell & Carlisle Moody, Prison Population Growth and Crime Reduction, 10 J. Quant. Criminology 109 (1994); Thomas Marvell & Carlisle Moody, Police Levels, Crime Rates, and Specification Problems, 34 Criminology 609 (1996); Patricia Mayhew *et al.*, Crime in Public View (Home Office Research Study No. 49, London 1979); Helen Tauchen, Anne Witte, & Harriet Griesinger, Criminal Deterrence: Revisiting the Issue with a Birth Cohort (unpublished manuscript, Univ. North Carolina at Chapel Hill, Dep't Econ. 1993); Ann Witte, Estimating the Economic Model of Crime with Individual Data, 94 Q. J. Econ. 57 (1980).

⁴ Christy Visher, The RAND Inmate Survey: A Reanalysis, in Criminal Careers and Career Criminals (A. Blumstein *et al.* eds., vol. 2 1986); John DiIulio & Anne Piehl, Does Prison Pay? The Stormy National Debate over the Cost-Effectiveness of Imprisonment, 1991 Brookings Rev. 28; William Spelman, Criminal Incapacitation (1994).

⁵ There are a few studies that make an attempt to carefully differentiate between deterrence and incapacitation. Robert McCormick & Robert Tollison, Crime on the Court, 92 J. Pol. Econ. 223 (1984), analyzes the impact of increasing the number of basketball referees on the frequency with which fouls are committed. Because the punishment in this context is not incarceration, the effects are solely deterrence related. Steven Levitt, Why Do Increased Arrest Rates Appear to Reduce Crime: Deterrence, Incapacitation, or Measurement Error? 36 Econ. Inquiry 353 (1998), attempts to distinguish between deterrence and incapacitation using the impact of increased arrest rates for one crime on the frequency with which other crimes are committed.

third convictions for qualifying crimes in the presence of “three strikes” laws.⁶ The key insight of the analysis is that initially such laws may have a deterrent effect but will not have any impact on the amount of incapacitation. The criminal is already required to serve the basic sentence. Only after that term⁷ has elapsed and the sentence enhancement takes effect will there be an added incapacitation effect. Any deterrent effect, however, will arise immediately as the criminal incorporates the increased punishment associated with the sentence enhancement into the decision calculus. Thus, by looking at changes in crime immediately following the introduction of a sentence enhancement, it is possible to isolate a pure deterrent effect that is not contaminated by incapacitation.

We begin the article by developing a theoretical model that formalizes the intuition of the preceding paragraph. We then provide an empirical test of the model using California’s experiences with Proposition 8, a popular referendum passed in 1982 that increased the scope and severity of repeat-offender enhancements. In the years immediately following Proposition 8, crime rates for those offenses covered by the sentence enhancements fell sharply, both in absolute terms and relative to a set of similar offenses that were excluded from Proposition 8. In the years preceding passage of Proposition 8, the time path of eligible and noneligible crimes in California mirrors that of the United States as a whole. Immediately following Proposition 8, California’s crime pattern diverges from that of the rest of the United States. These results are consistent with the presence of a deterrent effect of the sentence enhancements. Furthermore, the continued decline over the ensuing years in relative crime rates for the offenses covered by Proposition 8 are consistent with the model’s prediction that the transition to a new steady state will involve a continued fall in crime as the incapacitative impact of the enhancements slowly takes effect.

Differentiating between deterrence and incapacitation is not merely an academic exercise. Rather, the distinction between those two forces is critical to determining the costs and benefits associated with sentence enhancements, particularly for three-strikes laws that entail extremely long sentences. If incapacitation is the primary force, than three-strikes laws will lead to enormous increases in the number of prisoners and eventually to a

⁶ As discussed in the following section of the article, there has been a substantial movement toward a variety of sentence enhancements in the United States in recent years. For instance, since 1993, three-strikes laws have been adopted in 24 states and have been added to the federal sentencing guidelines. These laws are in addition to a range of repeat-offender and gun enhancements already in place in the great majority of states.

⁷ Or more precisely, the proportion of that sentence that would have actually been served.

geriatric prison population that has largely aged out of crime, poses little threat to society, and requires costly health care.⁸ In contrast, as demonstrated in the model, if deterrence is the operative force, then three-strikes laws will lead to an equilibrium with both lower crime and lower levels of incarceration, making them a very attractive policy. Our results provide mixed support for three-strikes laws. Although the lower bound on deterrence effects that we estimate from Proposition 8 are nontrivial (4–8 percent), we also find large lagged declines in crime that are consistent with incapacitation effects associated with a rising prison population. Thus, there is not clear evidence that increasing punishment in this instance led to a “golden” equilibrium with both lower crime and lower levels of incarceration.

The structure of the article is as follows. Section II presents the theoretical model of sentence enhancements, demonstrating formally how deterrence and incapacitation can be distinguished. The third section examines the use of sentence enhancements in the United States. Section IV provides an empirical test of the theoretical model using the response of crime rates to Proposition 8 in California and compares crime patterns in California to the rest of the United States. The final section considers the broader implications of our findings, particularly with respect to three-strikes laws.

II. THEORETICAL MODEL

In this section we develop a stylized economic model of crime incorporating sentence enhancements into the analysis. We characterize the steady-state equilibria with and without sentence enhancements, as well as the transition path when sentence enhancements are introduced into an economy.

A. *The Basic Model*

For simplicity, we consider a model with a continuum of infinitely-lived agents.⁹ In every period, each individual chooses either to engage in a single criminal act or in the noncrime alternative (except those who are currently incarcerated, who do neither). If the agent commits a crime in period t , there is an exogenously given, predetermined likelihood of detection (p_t).

⁸ Alfred Blumstein, Prisons, in Crime (J. Q. Wilson and J. Petersilia eds. 1995); Edith Flynn *et al.*, Three Strikes Legislation: Prevalence and Definitions in Critical Criminal Justice Issues: Task Force Reports from the American Society of Criminology to Attorney General Janet Reno (1997).

⁹ The results that we derive would continue to hold in an overlapping generations framework or in a model with finite-lived agents. Limiting the focus to one cohort, however, greatly simplifies both the notation and calculations.

The punishment, conditional on being caught committing a crime, is a prison sentence of S periods that begins in period $t + 1$ and runs through period $t + S + 1$.¹⁰ While incarcerated, the agent is unable to commit further crimes. The utility loss associated with this prison sentence is denoted $J_t(S)$. Initially, the sentence length S is assumed to be one period. Later, when sentence enhancements are introduced, the enhancement will raise the sentence length to two periods.

The private return to crime (not including the punishment if detected) is denoted r and is the only factor that varies across individuals. The return to the noncrime alternative is normalized to zero for all individuals. Agents are assumed to be risk neutral and future utilities are not discounted, although either of those factors could be incorporated into the present framework.¹¹ Thus, the agent's maximization problem in any period is simply

$$\text{MAX}_{C_{it} \in \{0,1\}} (r_i - p_t J_t(S)) C_{it}, \quad (1)$$

where i indexes individuals; C_{it} is an indicator variable equal to one if a crime is committed by agent i in period t , and zero otherwise. An agent commits crime if and only if the private return to crime r exceeds the expected punishment ($p_t J_t$).¹² For simplicity, it is assumed that r_i is uniformly distributed over agents with a range from zero to R and a density of $1/R$. If there were no punishment, all agents would engage in criminal activities, and the total crime rate C_t would be equal to one. With a positive expected punishment, some agents will be deterred. In order to ensure an interior solution, R is chosen such that $R > p_t J_t$. Thus, some agents will commit crimes in all periods, assuming they are not already incarcerated.

Because prison sentences from one period are served in the following period(s), crime in period t depends not only on expected punishment in period t (deterrence), but also on actual levels of crime and punishment in

¹⁰ Both the likelihood of punishment and the length of the prison sentence could be endogenized to allow for optimal policy determination as is standard in the literature; see, for example, Becker, *supra* note 1; Louis Kaplow & Steven Shavell, Optimal Law Enforcement with Self-Reporting of Behavior, 102 J. Pol. Econ. 583 (1994); John Lott, Should the Wealthy Be Able to Buy Justice? 95 J. Pol. Econ. 1307 (1987); A. Mitchell Polinsky & Daniel Rubinfeld, A Model of Optimal Fines for Repeat Offenders, 46 J. Pub. Econ. 291 (1991); A. Mitchell Polinsky & Steven Shavell, The Optimal Use of Fines and Imprisonment, 24 J. Pub. Econ. 89 (1984). Our interest, however, is not in deriving the optimal policy but, rather, in examining how individual criminal decisions respond to changes in observed policy, regardless of whether the policies implemented are optimal.

¹¹ A. Mitchell Polinsky & Steven Shavell, On the Disutility and Discounting of Imprisonment and the Theory of Deterrence (Working paper, Harvard Law School 1997).

¹² Implicit in equation (1) is the assumption that the criminal receives the utility of the criminal act even if caught and punished. This assumption is not necessary to obtain the results presented below.

the preceding period(s) (incapacitation).¹³ It is relatively straightforward to demonstrate that the steady-state level of crime is as follows:¹⁴

$$C_t = 1 - \frac{p_t J_t}{R} - p_{t-1} C_{t-1}. \quad (2)$$

If there were neither deterrence nor incapacitation, all agents would commit crime, leading to $C_t = 1$. The second term on the right-hand side of equation (2) is deterrence; anyone with $r_t < p_t J_t$ decides against committing the crime. The final term in equation (2) is the number of crimes that do not occur as a result of incarceration (that is, the incapacitation effect). In a steady state, all agents who committed crime in the previous period will commit crime in the current period unless they are behind bars. Therefore the incapacitation effect is simply equal to the size of the prison population.

Setting crime in the current and preceding periods equal, the steady-state solution to the model solely in terms of parameters is

$$C_t = \frac{\left(1 - \frac{p_t J_t}{R}\right)}{1 + p_t}. \quad (3)$$

B. Adding Sentence Enhancements to the Model

We model sentence enhancements as an increase in the prison sentence from one period to two periods. We assume that the probability of detection remains constant.¹⁵ In analyzing the effect of introducing sentence enhancements, it is critical to identify not only the new steady state but also the transition path.

Assume that sentence enhancements are introduced in period t . Also, let the disutility of a two-period prison sentence be $(1 + d)J$, where $d > 0$; there is disutility associated with the second period in prison. We allow for the marginal disutility associated with increases in the prison term to be increasing ($d > 1$), decreasing ($d < 1$), or constant ($d = 1$). Crime in the first period with sentence enhancements in place is given by

¹³ Initially we consider prison sentences that are exactly one period in length. Thus, this period's crime depends only on last period's crime and punishment levels.

¹⁴ Out of steady state, the equation becomes more complicated because the pool of prisoners may be composed of some agents who committed a crime last period but would not engage in crime this period due to changes in the expected punishment.

¹⁵ Although from the perspective of optimal policy design, holding p fixed would not necessarily be optimal.

$$C_t = 1 - \left[\frac{p_t J_t}{R} + \frac{dp_t J_t}{R} (1 - p_{t-1} C_{t-1}) \right] - p_{t-1} C_{t-1}. \quad (4)$$

The only difference between equations (2) and (4) is in the deterrence term, which is in square brackets in equation (4). With sentence enhancements all agents who were previously deterred continued to be deterred. In addition, some additional agents are also deterred by the increased expected punishment. Note, however, that some agents who would be deterred if free are actually incarcerated, necessitating the $1 - p_{t-1} C_{t-1}$ term in the square brackets.

The two important observations emerging from a comparison of equations (2) and (4) are as follows. *First, crime is lower in equation (4) due to the increased deterrence associated with longer sentences resulting from the sentence enhancements. Second, in the first period following the introduction of sentence enhancements, the incapacitation effect is unaffected.* Not until the original sentence expires does the increased incapacitation associated with sentence enhancements materialize. Thus, any immediate reduction in crime associated with sentence enhancements is attributable to deterrence rather than incapacitation.

The steady-state level of crime after the introduction of sentence enhancements is

$$C_t = 1 - \frac{(1 + d)p_t J_t}{R} - (p_{t-1} C_{t-1}) - (p_{t-2} C_{t-2}). \quad (5)$$

Comparing equations (2) and (5), the steady-state deterrence effect (the second term on the right-hand side of both equations) is greater after the sentence enhancement. This, of course, is a straightforward outcome of any economic model of crime. Comparing the first period after sentence enhancements to the steady state with such enhancements (eqq. [4] and [5]), a more subtle result emerges. *The deterrence effect associated with sentence enhancements increases over time.* The explanation for this result is that initially some of those who could be deterred are incarcerated and therefore cannot respond to the change in incentives. Over time, those agents will be released from prison and deterred thereafter.¹⁶ Note that this channel for rising deterrence is separate from lags in behavioral changes on the part of

¹⁶ In some sense, the last italicized point is a relatively minor one from a public policy perspective since these agents are not committing crime either immediately after the sentence enhancements or in the steady state. The only difference is whether the reduction in crime is assigned to deterrence or incapacitation. The reason that this distinction is important, however, is that the measured reduction in crime directly following the introduction of sentence enhancements captures only the immediate rise in deterrence, not the long-run rise.

criminals that are likely to be empirically relevant but are not explicitly modeled.

Thus, for both of these reasons, the initial change in crime represents a lower bound on the long-run increase in deterrence. This will have implications for the interpretation of the empirical results presented in later sections.

Solving for the steady-state crime rate in equation (5) solely in terms of parameters yields

$$C_t = \frac{\left(1 - \frac{(1+d)p_t J_t}{R}\right)}{1 + 2p_t}. \quad (6)$$

Comparing equations (3) and (6), the steady-state crime rates before and after the sentence enhancements, crime is unambiguously lower with the enhancements. The change in deterrence is easily computed from equations (2) and (4) as dpJ/R . Tedious algebraic manipulation of equations (3) and (6) (not shown) demonstrates that the change in the crime rate can either be greater than or less than the change in deterrence. *Therefore, the introduction of sentence enhancements has an ambiguous impact on the incapacitation effect.* Translated into more meaningful terms, this implies that the size of the prison population may either rise or fall with sentence enhancements. There are two countervailing forces affecting the prison population. Sentences are longer, but fewer crimes are committed, so there are fewer criminals being sentenced.

III. AN OVERVIEW OF THE USE OF SENTENCE ENHANCEMENTS IN THE UNITED STATES

In recent years, many of the changes in sentencing policy that have been adopted have had one thing in common: they all impose mandatory, statutory increases in prison sentences on individuals who were already going to be incarcerated. Whether the new policies were called determinate sentencing laws, sentencing guidelines, gun enhancements, or repeat-offender enhancements, they all shared this common feature. By 1994, all 50 states and the federal government had adopted one or more mandatory sentencing laws.¹⁷ In particular, repeat-offender enhancements were in use in 41 states and in the federal sentencing guidelines as of 1993.¹⁸

¹⁷ Michael Tonry, *Sentencing Matters* (1996).

¹⁸ United States Sentencing Commission, *The Federal Sentencing Guidelines: A Report on the Operation of the Guidelines System and Short-Term Impacts on Disparity in Sentencing, Use of Incarceration, and Prosecutorial Discretion and Plea Bargaining* (1991); Bureau of Justice Assistance, *National Assessment of Structured Sentencing* (1996).

In addition to those existing laws, 24 state legislatures enacted a new, more stringent breed of repeat-offender enhancements called “Three Strikes and You’re Out” laws¹⁹ between 1993 and 1995. Repeat-offender enhancements can be characterized along two dimensions: the range of current crimes and criminal histories that qualify for the enhancement (scope) and the magnitude of the enhancement imposed (severity). Three-strikes laws toughened existing repeat-offender enhancements in both dimensions, expanding the scope of the enhancements beyond the most serious felons and increasing the severity of the enhancements. In many states, three-strikes laws impose life imprisonment without parole for a third-time offender.

Furthermore, with the passage of the Violent Crime Control and Law Enforcement Act of 1994, the U.S. Congress made three-strikes sentencing a fundamental part of federal sentencing policy. First, the Act created a federal three-strikes law. The Act mandates life imprisonment for all serious violent federal felonies, if the defendant has been sentenced for two or more prior separate serious violent felonies or serious drug offenses in state or federal court.²⁰ Second, the Act provided incentives to states for increasing state penalties for repeat violent offenders. One way that a state can become eligible for a Truth-in-Sentencing Grant is to have in effect at the time of application laws requiring that violent felons who have been convicted of at least one prior separate serious violent felony or serious drug offense in state or federal court serve at least 85 percent of their sentence.²¹

Previous research on the impact of enhancements has reported conflicting findings on the aggregate impact of enhancements on crime. One of the few studies of the effect of a three-strikes law, undertaken by RAND, predicted that California’s 1994 law would have a substantial incapacitative effect on crime.²² Although some studies of the effect of gun enhancements report that adoption of enhancements reduces some or all gun-related crimes,²³

¹⁹ John Clark, James Austin, & D. Alan Henry, “Three Strikes and You’re Out”: A Review of State Legislation (NCJ 165369, U.S. Dep’t of Justice, Office of Justice Statistics, 1997).

²⁰ 18 U.S.C. §3559(c)(1).

²¹ 42 U.S.C. §13702(a)(2)(D).

²² Peter W. Greenwood *et al.*, Three Strikes and You’re Out: Estimated Benefits and Costs of California’s New Mandatory Sentencing Law (RAND 1994); but see James Austin, “Three Strikes and You’re Out”: The Likely Consequences on the Courts, Prisons, and Crime in California and Washington State, 14 St. Louis U. Pub. L. Rev. 239 (1994), for a critique, and James Austin (presentation at the meetings of the American Criminological Society, San Diego, Cal., November 1997), for evidence that these predictions have not been realized.

²³ For example, Glen L. Pierce & William J. Bowers, The Bartley-Fox Gun Law’s Short-Term Impact on Crime in Boston, 455 *Annals Am. Acad. Pol. & Soc. Sci.* 120 (1981); David

other studies of gun enhancements report no effect.²⁴ Disagreement in the literature extends to the existence and magnitude of the impact of increasing mandatory sentences on crime generally.²⁵

Previous research, however, has failed to recognize both the importance and possibility of distinguishing between deterrence and incapacitation.²⁶ Thus, further investigation of the effects of repeat-offender enhancements is essential to the analysis of recent changes in state and federal sentencing policy. Guided by our theoretical model, we exploit the transition path associated with the adoption of sentence enhancements. Short-run declines in crime are likely to be attributable largely or solely to deterrence since the incapacitative effect of sentence enhancements will occur only with a lag. Over time, continued declines in crime should continue as the full extent of deterrence is realized and incapacitation becomes operative. In the following section, we test the predictions of the model using California's experience with Proposition 8.²⁷

IV. PROPOSITION 8 IN CALIFORNIA: THE EFFECTS OF REPEAT-OFFENDER ENHANCEMENTS²⁸

Proposition 8 was passed directly by California voters through the initiative process on June 8, 1982, and went into effect the next day. By adding Sections 667(a) and 1192.7(c) to the California Penal Code, Proposition 8 substantially increased both the scope and the severity of California's existing repeat-offender enhancement.²⁹ Before the passage of Proposition 8,

McDowall, Colin Loftin, & Brian Wiersema, A Comparative Study of the Preventive Effects of Mandatory Sentencing Laws for Gun Crimes, 83 *J. Crim. L. & Criminology* 378 (1992).

²⁴ For example, Colin Loftin, Milton Heumann, & David McDowall, Mandatory Sentencing and Firearms Violence: Evaluating an Alternative to Gun Control, 17 *L. & Soc'y Rev.* 287 (1983).

²⁵ See, for example, Michael Tonry, Mandatory Penalties, in 16 *Crime and Justice: A Review of Research* (Michael Tonry ed. 1992); Tonry, *supra* note 17; and Bureau of Justice Assistance, *supra* note 18, for studies finding no effect.

²⁶ Indeed, the RAND study discussed above (Greenwood *et al.*, *supra* note 22) assumes that the California three-strikes law will have no deterrent effect at all in its assessment of the benefits and costs of the law.

²⁷ As discussed in the concluding section of the article, we have also examined states' experiences with three-strikes laws. Unlike Proposition 8, however, three-strikes laws have generally not been rigorously enforced. Consequently, there is no evidence that punishments have actually increased as a result of three-strikes laws, except in California.

²⁸ The introduction to Section IV draws heavily on Daniel Kessler & Anne Morrison Piehl, The Role of Discretion in the Criminal Justice System, 14 *J. L. Econ. & Org.* 256 (1998).

²⁹ Before the passage of Proposition 8, California's Determinate Sentencing Law provided for several types of sentence enhancements: enhancements for causing great bodily injury, gun enhancements, and repeat-offender enhancements. At that time, § 667.5 of the California Penal Code governed repeat-offender enhancements.

the existing law required a 3-year enhancement of violent felony offenders' sentences for each prior prison term served for a violent felony or a 1-year enhancement of nonviolent felony offenders' sentences for each prior prison term served for a nonviolent felony, whichever was greater. With Proposition 8, all "serious" felony offenders under Section 1192.7(c) received a 5-year enhancement for each prior *conviction* of a "serious" felony offense or a 1-year enhancement for each prior prison term served for any offense, whichever was greater.³⁰ In addition, Proposition 8 expanded the scope and severity of the enhancement by eliminating the statute of limitations in Section 667.5 that only considered a defendant's record for at most the past 10 years, by prohibiting judges from sentencing defendants to serve their enhancements concurrently with their base sentence and by requiring that each of the enhancements be served consecutively.³¹

Kessler and Piehl³² show that Proposition 8 increased sentences for repeat offenders charged with serious felonies but not for repeat offenders charged with certain nonserious felonies.³³ Thus, because Proposition 8 affected punishment levels for some crimes but not for others, its passage provides an experiment with which we can evaluate the deterrent effect of repeat-offender enhancements.

The raw data for our analysis are presented in Table 1. For California, crime categories are divided into two groups: those eligible for enhancements under Proposition 8 (murder, rape, robbery, aggravated assault with a firearm, and burglary of a residence) and those that are not eligible (aggravated assault without a firearm, burglary of a nonresidence, motor vehicle

³⁰ Cal. Penal Code § 1192.7(c); "serious" felonies include all "violent" felonies covered under the previous law as well as some nonviolent felonies, in particular burglary of a residence.

³¹ The only data available are aggregated by crime category. Thus we are able to make comparisons between eligible and noneligible crime categories, but not to differentiate between criminals who are or are not eligible for sentence enhancements.

³² Kessler & Piehl, *supra* note 28.

³³ In *id.*, Kessler and Piehl also find small spillover effects of Proposition 8 affecting repeat offenders charged with "similar" nonserious felonies, where "similar" nonserious felonies are nonserious felonies that have legal elements in common with one or more serious felonies. However, spillover effects only strengthen our finding that increases in the scope and severity of repeat-offender enhancements attributable to Proposition 8 lead to decreases in crime. Because spillover effects increase sentences for "control" group crimes, they could only lead to decreases in the number of "control" group crimes, and therefore only lead to decreases in the magnitude of the estimated deterrent effect of Proposition 8 relative to rates of "control" group crimes. In contrast to Kessler and Piehl's findings, *id.*, it should be noted that earlier research found no effect of Proposition 8 on sentence lengths; see, for example, Candace McCoy & Robert Tillman, Controlling Felony Plea Bargaining in California: The Impact of the "Victims' Bill of Rights" (Cal. Dep't of Justice, Bureau of Criminal Statistics, 1986); and Robert Tillman & Candace McCoy, The Impact of California's "Prior Felony Conviction" Law (Cal. Dep't of Justice, Bureau of Criminal Statistics, 1986).

TABLE 1

CRIME RATES IN CALIFORNIA AND THE REST OF THE UNITED STATES, 1977-89

	1977	1979	1981	1983	1985	1987	1989
California:							
Eligible crimes:							
Murder	11.1	12.6	12.9	10.4	10.6	10.6	10.9
Rape	47.9	52.5	55.8	47.8	43.4	43.8	41.1
Robbery	278.3	325.3	385.9	339.1	328.1	301.5	331.8
Aggravated assault with firearm	77.6	93.0	95.6	74.8	73.7	92.0	114.4
Burglary of residence	1,418.4	1,411.1	1,521.6	1,221.7	1,141.0	1,001.8	894.1
Noneligible crimes:							
Aggravated assault with no firearm	268.8	306.6	307.6	296.4	310.9	471.1	479.1
Burglary of nonresidence	652.0	716.4	703.0	597.6	562.9	517.5	517.1
Motor vehicle theft	644.4	719.2	668.7	627.9	672.9	830.6	1,026.7
Larceny	3,388.3	3,627.0	3,791.7	3,425.9	3,387.0	3,242.7	3,344.8
United States, excluding California:							
Murder	8.6	9.4	9.5	8.0	7.6	8.0	8.4
Rape	26.9	32.4	33.2	32.0	35.8	36.6	37.7
Robbery	176.3	198.7	234.5	198.6	193.8	201.3	219.9
Aggravated assault with firearm	53.6	60.8	62.8	55.9	63.4	73.0	78.2
Burglary of residence	859.4	906.1	1,043.0	838.8	823.8	872.1	845.7
Aggravated assault with no firearm	175.9	204.0	203.7	205.5	229.5	251.1	277.4
Burglary of nonresidence	475.7	518.8	519.2	436.0	412.1	433.2	412.9
Motor vehicle theft	424.4	472.3	445.0	405.1	435.9	490.9	577.9
Larceny	2,649.9	2,911.1	3,042.7	2,798.3	2,842.3	3,060.8	3,148.6

NOTE.—Values in the table are reported crime rates per 100,000 residents. California data are taken from *Crime and Delinquency*, published annually by the California Bureau of Criminal Statistics. Data for the rest of the United States are from *Crime in the Nation*, the Uniform Crime Reports published annually by the Federal Bureau of Investigation.

theft, and larceny). Because Proposition 8 was passed by popular referendum, observed changes in crime around the time of its passage may reflect a combination of the true deterrent impact of harsher repeat-offender enhancements and of other factors correlated with but not caused by the law change, such as changes in demographics, in other state policies, and in broad social norms against crime. This makes the availability of a control group of noneligible crimes critical to the analysis. Rates for these crimes in the rest of the United States are also presented.³⁴ These nine crime categories exhaust the set of crimes for which comparable data are available from California and the rest of the United States. The years presented, 1977–89, provide 5 years of data before the passage of Proposition 8 and 7 years after.

Inspection of Table 1 reveals that levels of crime rates in California are higher than those in the rest of the nation, but increases and decreases in California's crime rates tend to closely parallel those of the nation. Crime rates were generally rising until 1981, falling between 1981 and 1983, and mixed thereafter. Identifying a causal impact of Proposition 8 on eligible crimes in California requires differentiating between the impact of the law change and the widespread decline in crime outside California that happens to coincide with its passage in 1982.

Table 2 presents a number of alternative estimates of the impact of Proposition 8 using a "natural experiment" framework. Eligible crimes in California are the "treatment" group. Ineligible crimes in California make up one "control" group. In addition, eligible and ineligible crime categories in the rest of the United States are also presented. The extent to which eligible and ineligible crimes outside California (neither of which should be affected by California's law change) exhibit differential time paths provides another potential control.

The first two columns of the table contain percent changes in crime rates before passage of the law; the final four columns show crime patterns after the law change. As the top row of Table 2 demonstrates, eligible crimes were rising in California before the passage of Proposition 8, then dropped sharply with the law change (a 17.5 percent decline) between 1981 and 1983, and remained roughly stable thereafter. A naive interpretation of the data might conclude that Proposition 8 had an enormous immediate effect that did not increase over time. Such a conclusion, however, is likely incor-

³⁴ Reported crime data in California include information on all of the crime categories listed. Uniform Crime Reports, which provide data on reported crime for the United States as a whole, only include overall burglary and aggravated assault for individual states. The percentage of burglaries that involve a residence for the nation as a whole, however, is reported, as is the fraction of aggravated assaults with a handgun.

TABLE 2
ESTIMATES OF THE IMPACT OF PROPOSITION 8 ON CALIFORNIA CRIME RATES

GEOGRAPHIC REGION AND CRIME CATEGORY	PRE-PROPOSITION 8		POST-PROPOSITION 8			
	1977-81	1979-81	1981-83	1981-85	1981-87	1981-89
California:						
Crimes eligible for Proposition 8	20.4	7.6	-17.5	-20.7	-19.9	-15.6
Crimes not eligible for Proposition 8	9.5	-1.0	-8.6	-7.2	9.1	17.8
California eligible - California ineligible	10.9	8.6	-8.9	-13.5	-29.0	-33.3
Rest of United States:						
Crimes that would be eligible for Proposition 8 in California	21.1	7.9	-13.0	-9.8	-4.0	.3
Crimes that would not be eligible for Proposition 8 in California	11.1	-.3	-8.0	-4.1	4.4	12.3
Rest of U.S. eligible - Rest of U.S. ineligible	10.0	8.2	-5.0	-5.7	-8.4	-12.0
(California eligible - California ineligible) - (Rest of U.S. eligible - Rest of U.S. ineligible)	.9	.4	-3.9	-7.8	-20.6	-21.3

NOTE.—Table entries are average percent changes in crime rates per 100,000 residents over the relevant crime categories in the years listed. Crimes eligible for sentence enhancements in California under Proposition 8 are murder, rape, robbery, aggravated assault with a firearm, and burglary of a residence. Ineligible crimes included in the table are aggravated assault with no firearm, burglary of a nonresidence, motor vehicle theft, and larceny. Values in the third row are the difference between rows 1 and 2. Values in the sixth row are the difference between rows 4 and 5. Values in the bottom row are the difference between rows 3 and 6. Proposition 8 took effect in June 1982.

rect given the pattern of noneligible crimes in California (row 2). These crimes also fell between 1981 and 1983. Unlike eligible crimes, ineligible crimes sharply increased in 1987 and 1989.

Row 3 of Table 2 computes the difference between patterns in eligible and ineligible crime for each time period, providing one estimate of the impact of Proposition 8 on eligible crimes. Before the passage of the law, eligible crimes were increasing at a faster rate than ineligible crimes. After passage, there is an immediate 8.9 percent reduction in eligible crimes that steadily grows over time to 33.3 percent. Under the assumption that other determinants of the two crime categories were uncorrelated with the scope and passage of Proposition 8, this approach provides an unbiased estimate of the impact of the enhancement.

Examination of the pattern of eligible and ineligible crimes in the rest of the United States, however, calls into question that assumption. The penultimate row of Table 2 presents the relative time pattern of eligible and ineligible crimes outside of California. The rest of the United States experiences changes in crime that parallel California, but with a smaller magnitude. Before 1982, eligible crimes outpace ineligible crimes, after 1982 the trend reverses.

Given that eligible and ineligible crimes exhibit systematic changes outside of California, the most convincing estimate of the true impact of Proposition 8 is the change in eligible crimes relative to ineligible crimes in California minus the corresponding change outside California (a "differences-in-differences" estimator). The bottom row of Table 2 presents that estimate. Before Proposition 8, crime patterns inside and outside of California for eligible and ineligible crimes match up closely: eligible crimes are growing less than one percentage point faster in California. After the passage of Proposition 8, an immediate decline of 3.9 percent in eligible crimes occurs. Three years after the law change, the decline has doubled to 7.9 percent. The immediacy with which crime in the eligible categories responded to the passage of Proposition 8 implies the presence of a deterrent effect. All of the immediate 3.9 percent decline in eligible crime is likely attributable to deterrence (as may be some of the later declines). It is worth noting that this finding with respect to the effectiveness of increasing the severity of punishment is unusual; most of the previous literature has found that changes in the certainty of punishment are much better predictors of changes in crime rates than are changes in severity.³⁵

³⁵ For example, Grogger, *supra* note 3. Past findings of a greater impact of punishment certainty relative to punishment severity are consistent with our arguments earlier in the article that typical estimates of the economic model of crime confound deterrence and incapacitation. Increases in punishment certainty will result in an immediate increase in both deter-

Our theoretical model predicts not only an immediate fall in crime with the adoption of sentence enhancements, but also a continued decline over the longer run as incapacitation effects and further deterrence incrementally take hold. This pattern appears in the data. By 1989, a total decline of over 20 percent is observed. This result suggests that crime does not fall immediately to its steady-state level, but rather falls steadily along a transition path as the incapacitation effect is incorporated.

While the results in Table 2 are consistent with an impact of Proposition 8, it is important to consider other possible explanations for the observed patterns. One possible explanation for the patterns observed in Table 2 would be an increase in the certainty of punishment for eligible crimes relative to noneligible crimes after the passage of Proposition 8. In practice, however, just the opposite appears to have occurred. Between 1981 and 1985, the arrest rate (arrests in a crime category divided by reported crimes in that category) in California fell for two of the three eligible crime categories (homicide and robbery) for which we are able to obtain comparable arrest data.³⁶ In contrast, arrest rates rose between 1981 and 1985 for larceny and motor vehicle theft, the two noneligible crimes for which comparable arrest data are available.

A second possible explanation for the results involves the differential responsiveness of violent and property crimes to economic conditions. Previous research³⁷ finds that property crime is countercyclical, whereas violent crime is not strongly affected by the economy. Over the period analyzed, however, unemployment rates in California tracked those of the United States as a whole very closely, rising between 1981 and 1983 and then falling. Thus, while changing economic conditions might explain some of the differential trends in eligible and ineligible crime *within* California (row 3 of Table 2), the situation inside and outside of California was similar, so our preferred estimator (the bottom row of Table 2) would not be affected.

One final factor that could overstate the impact of Proposition 8 is substitution across crime categories. The more similar the crime categories, the more likely it is that criminals will substitute away from eligible crimes

rence and incapacitation. Increases in punishment severity, on the other hand, will only have immediate deterrence effects, with incapacitation effects occurring only with a lag.

³⁶ Arrest data are available only for the seven FBI Index I crime categories, not the more detailed crime categories reported in Table 1. Consequently, in the arrest data we cannot distinguish between aggravated assaults with and without a handgun, or burglaries of residences and nonresidences.

³⁷ David Cantor & Kenneth Land, Unemployment and Crime Rates in the Post-World War II United States: A Theoretical and Empirical Analysis, 50 *Am. Soc. Rev.* 317 (1985); Joel Devine, Joseph Sheley, & Dwayne Smith, Macroeconomic and Social-Control Policy Influences on Crime Rate Changes, 1948-1985, 53 *Am. Soc. Rev.* 407 (1988); and Levitt, *supra* note 3.

toward noneligible crimes because of the increased penalties for the former.³⁸ This would lead to an exaggerated increase in the ineligible crime category. In particular, aggravated assault with and without a firearm, as well as burglary of a residence and a nonresidence, are likely to be close substitutes. Empirically, the results for aggravated assault and burglary mirror the more general pattern of results. Replicating the bottom row of Table 2, but only for these four crimes (the two types of aggravated assault and the two burglary measures), in the year after Proposition 8 the eligible crimes are 4.0 percent lower, by 1985 the eligible crimes are 9.8 percent lower, and by the end of the sample period the eligible crimes are reduced by 24.8 percent. Including all crimes, the corresponding numbers are -3.9, -7.8, and -21.3. Thus, substitution from eligible to ineligible crimes does not appear to be of a magnitude great enough to substantially alter the conclusions.

V. DISCUSSION AND CONCLUSIONS

This article demonstrates theoretically that sentence enhancements provide a means of distinguishing deterrence from incapacitation. Because enhancements are tacked on to prison sentences that would have been served anyway, there is no immediate incapacitation effect associated with such enhancements. Thus any immediate decrease in crime that is observed is attributable to deterrence. In the long run, however, both the full deterrent and the incapacitation effects of sentence enhancements become operative. Consequently, crime will not fall immediately to the new steady state, but rather will decline gradually over time. The predictions of the model are borne out in an empirical application using eligible and noneligible crimes for California's Proposition 8. Crimes that were affected by the sentence enhancements in Proposition 8 fall by 4 percent relative to crimes that were not covered in the first year after the law change. The impact of the law change increases to a decline of over 20 percent in eligible crimes 7 years after it is passed. These results suggest the presence of a deterrent effect, but also a potentially important role for incapacitation.

Our results suggest that criminals respond to the severity and not just the certainty of sentences, a result that is predicted by the economic model of crime but has proven elusive empirically. This suggests that the increasing reliance on sentence enhancements in both state law and the federal sentencing guidelines may represent an effective means of reducing crime. To the extent that sentence enhancements target the most frequent and dangerous offenders, such measures may be more cost effective than further ex-

³⁸ Levitt, *supra* note 5.

panding the prison population through the incarceration of the marginal criminal who, given the skewed distribution of crime involvement,³⁹ is likely to impose relatively low crime-related costs on society.

These results, if generalizable, have important implications for three-strikes laws. If deterrence is the primary reason for crime reduction with such laws, then they represent an attractive public policy option: both equilibrium crime rates and prison populations will fall. In contrast, if all of the reduction in crime were due to incapacitation, three-strikes laws would be inefficient because they lead to the long-term incarceration of individuals who are no longer criminally active. Our findings suggest that the answer likely lies somewhere in the middle. There are important behavioral responses to increased punishments on the part of criminals, but the delayed response to the law change suggests that incapacitation associated with rising prison populations may explain more than half of the drop in crime.

Unfortunately, a direct empirical test of the impact of three strikes is not possible because of the failure of states to enforce such laws in spite of having them on the books. Of the 24 states passing three-strikes laws since 1993, only California has widely applied these statutes. In California, 3,281 individuals had been sentenced under three-strikes laws as of June 1, 1997.⁴⁰ Washington, the first state to pass a three-strikes law and after California the most active state in applying the law, has sentenced only 97 prisoners under the statute. In most states, three-strikes statutes have never been enforced. Consequently, it is not surprising that passage of three-strikes laws is not associated with any discernible change in either crime rates or imprisonment rates, except perhaps in California. Between 1993 and 1996 (three-strikes laws were implemented in 1994), California has seen a 20 percent decline in violent crime per capita and a 19 percent decline in property crime per capita. In comparison, violent crime has fallen 13 percent in the rest of the nation, and property crime is down only 4 percent over the same period. California's prison population has grown at roughly the same rate as the nation as a whole since adoption (22 percent vs. 21 percent). In fact, contrary to the dire predictions of an explosion in California's prison population as a consequence of three strikes, the current prison population is at almost exactly the level projected without the passage of three-strikes law.⁴¹ Without further investigation, however, it is difficult to know whether

³⁹ DiIulio & Piehl, *supra* note 4.

⁴⁰ Austin, "Three Strikes and You're Out": The Likely Consequences on the Courts, Prisons, and Crime in California and Washington State, *supra* note 22.

⁴¹ In defense of Greenwood *et al.*, *supra* note 22, one partial explanation for the lack of impact of three strikes on the prison population is the uneven application of the law by judges and prosecutors.

declining crime in California can be causally attributed to the presence of three strikes.⁴²

The reasons underlying the failure to enforce three-strikes laws in most states merits greater attention, especially given that a wide variety of other enhancements are frequently enforced at both the state and federal level. The two notable differences between three-strikes laws and other enhancements are (1) the much narrower applicability of three strikes in most states and (2) the extremely harsh penalties associated with three strikes. Together, these two features lead to horizontal inequity, that is, offenders convicted of relatively similar offenses being treated in radically different manners. Combined with the fact that the third-strike penalty is often out of line with the third-strike offense (almost 40 percent of third strikes in California were for property offenses, and another 11 percent were for drug possession), prosecutors and judges appear to exercise discretion in circumventing the statutes.⁴³ The observed failure of most jurisdictions to enforce three-strikes laws suggests that from the perspective of fighting crime, sentence enhancements that are broader in scope and less punitive, such as Proposition 8, may ultimately prove more effective.

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⁴² Unfortunately it is not possible to conduct an analysis of the three-strikes law in California paralleling that for Proposition 8 because conviction of any felony triggers the application of the enhancement. Thus, for three strikes, there is no good counterpart to the noneligible crimes used as controls in the Proposition 8 analysis.

⁴³ James Andreoni, Reasonable Doubt and the Optimal Magnitude of Fines: Should the Penalty Fit the Crime? 22 *Rand J. Econ.* 385 (1991).

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