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HAVE SENTENCE ENHANCEMENTS HAD A DETERRENT EFFECT ON CRIME AND WHAT ARE THE SOCIAL WELFARE IMPLICATIONS OF THESE LAWS?

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HAVE SENTENCE ENHANCEMENTS HAD A
DETERRENT EFFECT ON CRIME AND WHAT ARE THE
SOCIAL WELFARE IMPLICATIONS OF THESE LAWS?

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the Graduate School of
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Master of Arts
Economics

by
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Accepted by:
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Abstract: In the early 1990s many states adopted some form of sentence enhancement law for repeat offenders. A three-strike law in many states, most notably California's, was a common form of these laws. Using a difference-in-difference methodology, this thesis demonstrates that sentence enhancement laws reduce property crime rates by 10 percent or more. A basic cost-benefit analysis, however, leaves open the question of whether social welfare is enhanced by sentence enhancements.

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Introduction:

The story of the three-strikes laws is one that is both long and controversial. It is controversial because critics view many third strike sentences as disproportionate to the severity of the crime. Consider, for example, on July 15th, 1995, Curtis Wilkinson, 33, stole a \$2.50 pair of socks from a department store in a California mall. He had two other convictions, both of them more than 13 years before. Under the three-strike law enacted in California a year earlier, Wilkinson was sentenced to 25 years to life in prison (Taibbi, 2013, 1). Anecdotes, such as Wilkinson's can highlight the inequalities imposed by the law, but proponents of the law believe that 3-strike laws are effective deterrents, incapacitate repeat offenders, and take dangerous criminals off the streets.

The history of sentencing enhancements and guidelines provide a good framework for understanding why such laws are in place, what they responded to, and the overall effect that they have on crime. By 1994, all 50 States had enacted one or more mandatory sentencing laws, and Congress had enacted numerous mandatory sentencing laws for Federal offenders. There are many different types of sentence enhancements that states have enacted, although, the most notable type probably being three-strike laws.

Whether sentence enhancement laws serve as an effective deterrent is critical piece in determining their overall effectiveness. If sentencing enhancements mainly reduce crime through incapacitative effects, then the social cost of those policies will be significantly higher than if these laws act primarily as deterrents. Incarcerating a prisoner is costly, which will be the burden to the taxpayer. But, if enhancements are deterrents,

the social cost of crime is reduced if enhancements deter and prison populations do not rise, which reduces the aggregate cost of punishment. Levitt (1999) finds evidence that the threat of keeping inmates incarcerated for long periods of time has a significant deterrent effect.

My study shows that the three-strike laws enacted in the mid-1990s did have an appreciable deterrent effect. Looking at 6 states (California, Arizona, Pennsylvania, New York, Georgia, and Alabama), I compare states that implemented some form of sentence enhancement to neighboring states that did not. There was a marked decrease in crime between the sentence enhancement states (California and Georgia) relative to their neighbors (Alabama and Arizona). Moreover, a placebo test of Pennsylvania, which adopted a set of guidelines, but did not enhance the severity, to New York, which did nothing over the same period, reveals that the Pennsylvania revision had no deterrent effect.

But, statewide comparisons may not fully capture the deterrent effects because states are not readily comparable. That is, comparing large California with smaller Arizona may not be an appropriate test. I use city-level data to analyze the deterrent effects across comparable cities (for example, Atlanta and Mobile). That data, too, reveals that sentence enhancements have notable deterrent effects. Finally, I compare the social cost and social benefits of the additional incarceration, following from sentence enhancements, and find that the net effect of sentence enhancements is contingent on the estimates of cost of crime.

Literature Review:

Gary Becker (1968) models crime as a rational act. He proposes that criminals like everyone else, are rational, though they tend to be “risk preferers.” Essentially, criminals choose to enter the crime market because the perceived benefits outweigh the perceived costs. Becker’s model describes utility in terms of income and effectiveness in terms of the net social gain, as measured as a function of increase (or decrease) in income based on any policies and their subsequent results.

The intuition behind Becker’s crime model is the same as the intuition that is fundamental to the study of economics: People respond to incentives. Theoretically, as the incentive not to commit a crime goes up (based on longer prison sentences), the number of these crimes committed should go down. The question that comes up when the idea of sentence enhancements or sentencing guidelines are introduced is “Does this theory bear itself out in practice?” and “Are the sentencing enhancements introduced in the U.S. a socially optimal policy?”

Becker defines effectiveness of a policy based on two behavioral relations: the costs of apprehension and conviction and the elasticity of offenses to changes in probability (p) and punishment (f). The smaller the costs of the policy or the greater the elasticities of the crime, the smaller the cost of achieving any given reduction in offenses and thus the greater probability that the offense will be reduced through any given policy (Becker 42). The goal of most crime policies is to increase social welfare through crime reduction. The policies that come into place as a result of this ideal have varying degrees

of effectiveness. “Sentence enhancement” policies became an increasingly popular way to reduce crime in the last quarter of the 20th century. Sentence enhancements can take different forms, from three-strike policies to mandatory minimums to “sentencing guidelines” that sometimes serve as enhancements. Theoretically, with any of these policies, the goal is to decrease crime to the point where the marginal benefit of the reduction in crime is equal to the marginal cost of the implementation of the enforcement and all operate under the premise that increases in punishment, for a given probability and payoff, will act as a deterrent.

Previous research on enhanced sentence’s effect on crime reveals differences between deterrence and incapacitation effects. Abrams (2011) uses the introduction of state add-on gun laws, with enhanced sentences for defendants possessing a firearm during the commission of a felony to isolate the deterrent effect of incarceration. He uses data from prisoners that would have been sentenced to prison anyway for the crime committed. He argues that if we observe a decrease in crime after the enhancement, but before the onset of an additional term, then the enhancements’ immediate effect is deterrence, rather than incapacitation. He finds is a 5% reduction in gun-related robberies within 3 years of the implementation of the law (Abrams, 2011, 25-26). From this, he concludes that enhancements have some deterrent effect.

Abrams found that sentence enhancements for gun related crimes reduced crime because potential criminals shifted to legitimate work. Non-gun robberies and larcenies are the two crimes that gun-robbers are most likely to shift to, following the passage of these gun laws. If there was a substitution effect at work, we would expect that both of

these types of crime would increase, following the passage of the enhanced sentences for gun related felonies. Abrams' finds that the opposite happened; the substitution into legitimate employment replaced what would have been a substitution into alternative criminal behavior. Thus, the reduction in gun robberies does not encourage criminals to substitute to other types of crime.

Owens (2009, 554) studies a Maryland enhancement law to determine whether sentence enhancements offer deterrent effects or incapacitation effects. A Maryland law, which went into effect on July 1, 2001, expunged juvenile records at age 23 instead of age 26, as the previous law had allowed. Owens then considers how 23 through 25 year olds responded. Because a 23 year-old no longer faced prior conviction enhancements from a juvenile offense, there should have been an increase in 23 year olds offending. Owens finds that there is a appreciable deterrent effect at work and additionally, the social benefit of incarceration for this study is greater than the social cost of incarceration. That is, the additional time that would have been levied on the 23,24, and 25 year olds in this study would have reduced crime by 1.4-1.6 index crimes per person per year.

In one of the most cited studies in this literature, Kessler and Levitt (1999) study California to determine the difference between deterrence and incapacitation. To determine the effectiveness of sentence enhancements, there must be a mechanism to isolate just the effect of the "enhancement" part of the sentence. Therefore, the sentence enhancement must be from a sentence where the criminal is sentenced to prison anyway, as to not have any additional incapacitation effect in the short-run. California's

Proposition 8, which imposed a sentence enhancement for a select group of crimes appear to have a large deterrent effect in California.

The big component of California's three-strike law is the mandatory life sentence for a third felony offense. Like Owens (2009), Levitt and Kessler (1999) look for a deterrent effect by considering only those cases in which a criminal would have received a sentence. The short-run effect of the law will be the deterrent effect because the incapacitation effect will not yet come into play. That is, a three-strike criminal will be sentenced to life in prison, but a normal sentence would last for only two years. The incapacitation effect does not start until year three. If, however, we observe a reduction in crime in years one and two, one can be confident that it is due to deterrence, rather than incapacitation. By their calculator, Proposition 8, the three-strikes law, generated a 4% reduction in crime in the first year after its implementation and an 8% reduction in crime 3 years after its implementation.

While much of the literature speaks to the deterrent vs. incapacitation effect of sentence enhancement laws, less has been written about the welfare implications of these laws. Understanding whether these laws primarily target the "worst" offenders is key to identifying their social impact.

Data and Trends in Crime in 1990s:

Looking at the effect of sentence enhancements at the aggregate level allows us to see where sentence enhancements had the biggest impact. John Hipp (2011) provides a study where he looks at crime rates and deterrent effects. The data for his study comes

from two sources: State-level crime data are taken from the Justice's Departments Uniform Crime Reports between 1970 and 2004. The Uniform Crime Report provides consistent information on index crimes by state. This data is commonly used in the economics of crime literature. This data's strengths are its all-encompassing nature and its consistency over time. The UCR's data weakness is that it does not account for unreported crime so the data we have is not necessarily the true amount of crime committed.

My study also uses city-level data on a number of index crimes (aggravated assaults, robberies, murders, burglaries, and motor vehicle thefts), including independent incorporated suburban areas surroundings, from John Hipp's data for what he labeled "Boomburg Cities." (352 municipalities, 14 metropolitan areas. "Boomburg" cities are: Atlanta, Dallas, Denver, Houston, Las Vegas, Miami, Orange County, Orlando, Phoenix, Riverside, San Bernardino, San Diego, Silicon Valley (Santa Clara), and Tampa/St. Petersburg.) He chose these cities because they all experienced similar post- World War II growth and faced similar issues of urban sprawl and rapid increases in urban density.

Table 1: Summary of Boomburg Data 1994/1996- Arrest rate per 100,000

	Year	Arrest Rate	Standard Deviation
Robbery*	1994	167.4	199.4
	1996	150.7	175.8
	Difference	16.7	23.6
Motor Vehicle Theft***	1994	644.8	577.1
	1996	533.9	458.9
	Difference	110.9	118.2
Assault**	1994	420.7	393.6
	1996	362.8	360.9
	Difference	57.9	32.7
Burglary***	1994	1143.5	714.9
	1996	1004.2	579.8
	Difference	139.3	135.1

*** = Significant at 1% level

** = Significant at 5% level

* = Significant at 10% level

^ Number of observations = 215

Looking at the 4 of the 5 types of crimes in the Boomburg cities (aggravated assaults, robberies, burglaries, and motor vehicle thefts), significant changes show up in the crime rates between 1994 and 1996. Robberies dropped by 10.3%, motor vehicle thefts dropped by 17.2%, the murder rate dropped by 32.7%, assaults dropped by 13.8%, and burglaries dropped 12.6%, on average. While this is strong evidence of a deterrent effect, it is not enough, by itself, to come to the conclusion that sentence enhancements

have a direct effect on lowering crime rates because crime rates were declining throughout the 1990s.

Criminologists have documented the decline, but have yet to reach agreement on its principal causes. (Levitt, 2004). Two states that adopted sentence enhancement laws around the same period were California (1994) and Georgia (1994). Pennsylvania (1995) adopted sentencing guidelines, but not enhancements. We need to isolate these states against similar states that did not enact such policies or did so at a different time. Taking Arizona, Alabama, and New York as ‘control states’ we can isolate out any other effect that could have caused the sharp decrease in crime that we see around the enactment of these three-strike laws. Neighboring states did not enact three strike laws at this time, but they are similar to their neighboring state counterparts that did enact three-strike laws. For example, the comparison should be between Alabama and Georgia, or Arizona and California, and New York and Pennsylvania.

Property Crime Rate- 1990-2005

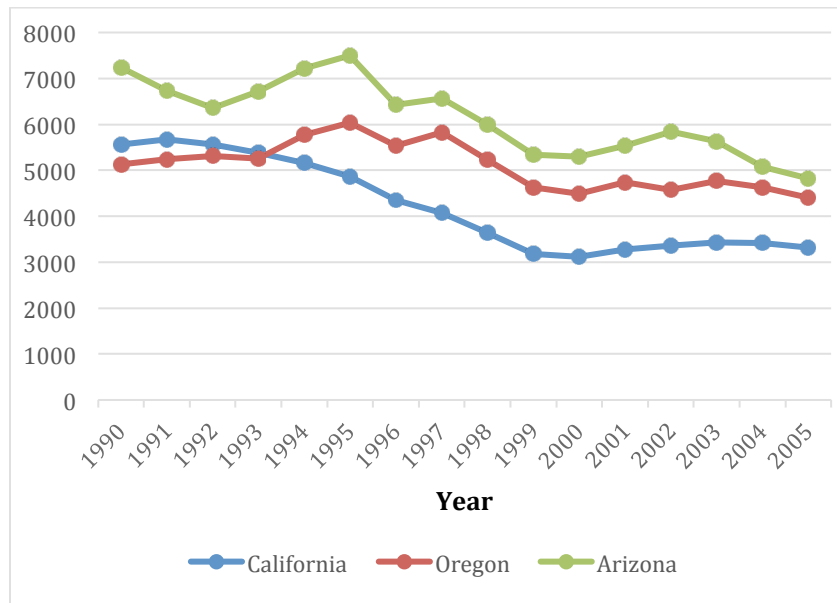


Figure 1

When we look at the data from property crime rates in California and Arizona, we see a marked difference in change in property crime rate in the two states. By applying a basic difference-in-difference model, we can come up with the actually numerical difference between the two and find whether the difference seem in the graph shown here is statistically significant. The graph is consistent with are earlier data. That is we see a drop off form 5379.1 to 4345.1 (crimes per 100,000 people) in the property crime rate in California in the three years following the implementation of the law. While, In Oregon, we see a slight increase in crime over the same period. In Arizona, we also see a similar increase over the period, similar to what we see in Oregon. While the raw data suggest a deterrent effect, a more formal test is needed to identify such an effect and its magnitude.

Variations in Sentence Enhancements:

California's three-strike (which was signed into law on March 7th, 1994) makes any third felony punishable by a sentence of 25 years to life. Proposition 184 stated that the three strike laws would target specifically "murderers, rapists, and child molesters." But, the practical application of this is quite different. Under the three-strikes law, if the offender has any two previous "serious" felonies (a list of California's "serious" felonies is listed in the footnotes), any third felony is grounds for a mandatory 25 to life sentence. Crimes such as petty theft can be and sometimes are punishable by a 25 to life sentence. It is often the case that misdemeanors are punishable under the three strikes law because some of the "wobbler" offenses (theft, assault, burglary) can be prosecuted as either a misdemeanor or a felony. A "wobbler" offense is one that is regularly prosecuted as a misdemeanor, but can be prosecuted as a felony, based on the discretion of the prosecutor.

Under Georgia's law, a criminal can be sentenced to 25 to life for one of 7 "violent or serious" felonies if a previous felony was committed. The felonies in Georgia that are subject to its sentence enhancement law are murder, armed robbery, kidnapping, rape, aggravated child molestation, aggravated sodomy and aggravated battery. The first of any of these offenses is subject to a mandatory 10-year sentence minimum. Georgia's law punishes a smaller set of crimes than does California's indiscriminate felony rule. This is important, as the difference in the law is reflected in the crime rates, which will be discussed further in the empirical results.

Pennsylvania, adopted a three-strike law in 1995. But, for two reasons, the law is

not as severe as the law in California or Georgia. A sentencing guideline was enacted in 1980 that was similar to the three-strike law that was implemented 15 years later.

Second, the law is rarely applied. The crimes that count as a “strike” in Pennsylvania are “murder, voluntary manslaughter, rape, kidnapping, and the most serious aggravated assaults and robberies.” Pennsylvania’s law targets a minority of cases and a minority of those individuals actually get it," said Mark Bergstrom, executive director of the Commission on Sentencing, which advises the state on sentencing policy. The entire state of Pennsylvania had just 56 offenders sentenced under the three-strike law from 2003-2012. Pennsylvania is not light on sentencing, but the qualification for the third strike is so hard to obtain, an opportunity to sentence an offender under those guidelines rarely happens. For example, a murder charge would qualify, but the offender would already likely be sentenced to a tougher sentence (life mandatory) if there were two other strikes that qualified him. The sentence enhancement would not apply because the enhancement would give the offender a sentence of 25 to life, where the offender would already be sentence to life, based on previous Pennsylvania statutes.

Empirical Results:

The relevant effect of any sentencing act is measured in terms of its deterrent effect, not its incapacitation effect. Any increase in sentence severity will decrease the crime rate, due to more people being in jail or people being in jail longer. This is not the issue. The goal is to separate out the incapacitation effect from the deterrent effect. That is, to find out how much of the reduction in crime comes about as a result of individuals making a decision not to enter the crime market as a result of the increase in the penalties

of committing offenses. To identify this effect we use the year of implementation of the three strikes law (1994) and consider crime rates in that year. This should separate out any incapacitation effect in the years immediately following the implementation of the law. So for instance comparing the crime rate for the years 1992-1993 versus 1994-1995 should isolate the deterrent effect because those sentenced would be in prison even without the enhancement. The further we go past 1994, the more of a shift we will have towards incapacitation. Also, comparing California to both the national crime rate over the same period and other control states, we should identify the true effect of the law. We are looking at the data from a time-series perspective and a panel perspective.

Moreover, we only want to look at the crimes that a three-strike law should effect. Therefore, murder, rape, and assault will be taken out of our study because these crimes typically receive long sentences, even without enhancements. It is also not clear that crimes of passion are as responsive to incentives as economic crimes, such as burglary and theft. The following chart compares the crime rates in California versus the national average, and the Arizona crime rates over the same period.

Table 2: State, Overall Crime Rates

	1 year before/after % change	2 years before/2 years after % change	4 years before/4 years after % change
California vs. Arizona			
<u>Property Crime</u>			
California	-4.00%	-8.30%	-16.80%
Arizona	3.86%	0.00%	-1.94%
California-Arizona Difference	-7.86%	-8.30%	-18.74%
<u>Robbery</u>			
California	-11.90%	-17.00%	-23.90%
Arizona	-3.45%	5.10%	4.47%
California-Arizona Difference	-8.45%	-22.10%	-28.37%
Georgia vs. Alabama			
<u>Property Crime</u>			
Georgia	-2.30%	-4.00%	-5.90%
Alabama	2.90%	0.00%	-1.20%
Georgia-Alabama Difference	-5.20%	-4.00%	-4.70%
<u>Robbery</u>			
Georgia	-10.20%	-14.10%	-18.40%
Alabama	7.30%	10.00%	10.20%
Georgia-Alabama Difference	-17.50%	-24.10%	-28.60%
Pennsylvania vs. New York			
<u>Property Crime</u>			
Pennsylvania	3.20%	5.50%	0.00%
New York	-9.00%	-17.70%	-27.00%
Pennsylvania- New York Difference	12.90%	23.20%	7.00%
<u>Robbery</u>			
Pennsylvania	1.30%	3.40%	5.50%
New York	-16.20%	-28.70%	-41.50%
Pennsylvania- New York Difference	17.50%	32.10%	36.00%

Table 2 show that there was both an overall decrease in crime over the time period studied, but also that there was an appreciable difference between the decrease in property crime and robbery in California compared to the rest of the United States and Arizona. The most impactful year to look at when looking for a deterrent effect of the policy of the three-strike laws is the first row which details the change in crime for 1994 specifically, which was the year the three-strike law was enacted. What we see is a 7.86% and 8.45% decrease in crime specifically when it comes to property crime and robbery. This is significant because these are the crimes where the deterrence effect should be biggest, because they are crimes that are covered under the three-strike law, but they are not “crimes of passion.”

According to Becker’s utility model, the impact of the three-strike law is that it made criminals operating at the margins between entering the crime market and “legitimate job market” opt more towards the latter, instead of the former. Also, comparing a state that has enacted a three-strike law, to a similar one that does not (California vs. Arizona), allows for a better understanding of the true impact of a law. This is because states that have enacted such laws are calculated into the national statistics, biasing the results.

The change in robbery rate for Georgia shows a remarkably similar impact to that of California. The change in property crime was relatively lower, relative to its neighbor, at 5.2%. But, the relative decline in robbery was a notable 17.5%. What we do see, however, is that there is once again a significant difference in the change in crime rates between a state that has implemented a two-strike law (Georgia) versus a state that has

not implemented one (Alabama). This is important because the effects in different regions of the country generate the same results. That is, the sentence enhancement law has an appreciable negative impact on crime; with the effect occurring before the incapacitation effect kicks in. The decline in crime is primarily deterrent.

The difference between the relative robbery rate decline and the property crime rate decline is an important aspect of the results table shown above. In my discussion of the variations of the laws by state, Georgia is shown to have a harsh penalty for robbery (10 years- 1st offense, 25 to life- 2nd offense). However, there is no additional enhancement imposed for any type of non-violent property crime. This suggests that the Georgia law is doing what it was intended to do. The sentence enhancement law in California, which punishes more indiscriminately (and can be seen in Appendix 1), also does what it is intended to do, as the property crime rate drops are relatively similar to the robbery rate drops over the same time period. Whether or not one policy is more optimal will be discussed more in the Policy Implications section.

The last two states I look at are Pennsylvania and New York, namely because they tell a different story than the first two sets of states. The Pennsylvania law was enacted in 1995. This part of the table would appear to directly contradict evidence in the first two charts. But, it does account for the fact that there was already a similar statute enacted in Pennsylvania. This is, in effect a placebo test. Pennsylvania enacted a law in 1978, which became fully effective in 1982 that had included sentence enhancements. A subsequent three-strikes law enacted in the state in 1995 did not really change the

penalties already in effect. The 1978 law was similar to the California and Georgia laws enacted in 1994.

The sentencing guideline established a matrix based on the type of crime the offender committed and the types of number of prior offenses that were committed by the offender in question. That matrix gives a recommended sentence (in terms of number on months) based on those criteria. The judge has some discretion but is expected to sentence within the recommended sentencing guidelines established by the matrix (Kramer 153-154).

What we see in the years following the enacting of this statute is a similar reduction in property crime rate and robbery that is exhibited in California and Georgia during the period after those states enacted in their three-strike laws in 1994. *(See Note 4 in Appendix) In the year following the full implementation of the law, the robbery rate in Pennsylvania in 1982 decreased 6.0% and the property crime rate decreased 6.6%, consistent with a deterrent effect similar to the ones seen in California and in Georgia.

This is where the placebo effect comes into play. The Pennsylvania law that was put into place in 1995 was, in effect, already put into place 13 years earlier. The matrix for Pennsylvania law (fully enacted in 1982, see note 4 for matrix) works as a sentence enhancement. Therefore, no additional reduction in crime should be anticipated as a result of the new law, as the crime-punishment structure did not really change much.

State-level crime rates can be informative, but looking at the city rates and will offer a clearer picture of the effect of the sentencing acts. The following table depicts the

same analysis as above, except this time we only looked at the cities, within each of the states, with populations of 250,000 and above.

Table 3: Cities within States Rates, per 100,000 people

	1 year before/after % change	2 years before/ 2 years after % change	4 years before/4 years after % change
<u>Property Crime</u>			
California	-4.30%	-13.00%	-20.30%
Arizona	7.40%	13.90%	3.20%
California-Arizona Difference	-11.70%	-26.90%	-23.50%
<u>Robbery</u>			
California	-10.60%	-21.50%	-24.50%
Arizona	0.60%	9.40%	9.90%
California-Arizona Difference	-11.20%	-30.90%	-34.40%
<u>Property Crime</u>			
Georgia	-5.75%	-3.10%	-11.02%
Alabama	10.66%	-1.97%	-4.38%
Georgia-Alabama Difference	-16.41%	-5.07%	-6.64%
<u>Robbery</u>			
Georgia	-13.40%	-10.90%	-19.40%
Alabama	5.40%	8.90%	16.60%
Georgia-Alabama Difference	-18.80%	-19.80%	-36.00%
<u>Property Crime</u>			
Pennsylvania	-3.20%	-11.20%	-12.40%
New York	-8.90%	-15.80%	-24.30%
Pennsylvania- New York Difference	5.70%	4.60%	11.90%
<u>Robbery</u>			
Pennsylvania	-0.50%	-6.70%	-14.20%
New York	-13.90%	-20.40%	-32.50%
Pennsylvania- New York Difference	13.40%	13.70%	18.30%

**Note: All rates are for cities with populations of 250,000 and above*

***Note: The number of cities by state are included in appendix*

Table 3 offers a similar analysis to what we see depicted in Table 2. The relative drop in crime in California (compare to Arizona) is even greater for this city analysis than what we see in the preceding state analysis. In Georgia cities, crime rates are about 16-19% lower than in comparison cities. For Pennsylvania, again we see that the new law is ineffective, as was suggested above.

Breaking down the crime rates even further, we can turn our attention to cities with similar characteristics. Table 4 takes 3 sets of cities (San Diego/Phoenix, San Francisco/Portland, Atlanta/Mobile) to look to see if the patterns between individual cities match the patterns that we see above.

Table 4: City Crime Rates, per 100,000 people

	1 year before/after % change	2 years before/ 2 years after % change	4 years before/ 4 years after % change
San Diego vs. Phoenix			
Property Crime			
San Diego	-16.32%	-22.94%	-34.12%
Phoenix	9.42%	7.75%	2.28%
San Diego- Phoenix Difference	-25.74%	-30.69%	-36.40%
Robbery			
San Diego	-17.89%	-29.38%	-36.96%
Phoenix	-3.02%	2.49%	2.00%
San Diego-Phoenix Difference	-14.87%	-31.87%	-38.96%
San Francisco vs. Portland			
Property Crime			
San Francisco	-2.42%	-11.02%	-29.91%
Portland	2.30%	-1.12%	-3.61%
San Francisco- Portland Difference	-4.72%	-9.90%	-26.30%
Robbery			
San Francisco	-22.20%	-21.38%	-25.18%
Portland	0.00%	-7.84%	-18.49%
San Francisco-Portland Difference	-22.20%	-13.54%	-6.69%
Atlanta Vs. Mobile			
Property Crime			
Atlanta	-5.75%	-3.10%	-11.02%
Mobile	10.66%	-1.97%	-4.38%
Atlanta-Mobile Difference	-16.41%	-5.07%	-6.64%
Robbery			
Atlanta	-13.40%	-10.90%	-19.40%
Mobile	5.40%	8.90%	16.60%
Atlanta-Mobile Difference	-18.80%	-19.80%	-36.00%

*Note: The rates for the cities Atlanta and Mobile are the same as the cities within states of Georgia and Alabama in the preceding graph. This is because Atlanta and Mobile are the only states included in that analysis (Cities of 250,000+) re: UCR

The most startling aspect of Table 4 is the robbery rates in Atlanta over time compared to Mobile. What we see is that Atlanta's robbery rate decreases significantly in the years following the passage of their two-strike law. However, we do not see near the decrease in property crime that we see in robbery. Georgia's law, targeting 7 specific crimes (murder, armed robbery, kidnapping, rape, aggravated child molestation, aggravated sodomy and aggravated battery), would serve to explain the deterrence difference. Between July 1994 and April 1998, 54% of the defendants sentenced under Georgia's three-strike law were convicted of armed robbery, suggesting robbery accounts for the highest percentage of crimes that Georgia's new law targeted.

Cost-Benefit Analysis of Incarceration:

When determining the economic efficiency of a policy, a cost-benefit analysis provides a logical starting point. One problem with a cost-benefit analysis of incarceration is that the cost of incarceration and benefits from incarceration are not easily determined. Consider, the average cost of incarceration; there is at least more consensus there than among the economic benefits of incarceration. Cost of incarceration estimates range from \$25,000/year (DiIulio, 1991, 1) to \$47,102/year (California's Non-partisan Fiscal and Policy Advisory, 2009) and here are estimates that in between. (The Federal Register estimates the cost at \$28,893, Resnick, (2011), estimates the cost at \$44,000). A reasonable mid-point estimate of the average cost of incarceration of an inmate is \$35,000 a year, which is close to the median and mean of the available estimates. But, costs vary across states, California is estimated at \$44,000 a year,

Georgia, \$18,000/year. But, even these numbers are not as definitive because different studies include different variables in calculating cost of incarceration. (see footnote 5)

A more difficult issue that needs calculating is the marginal benefit of incarceration of an inmate. Zedlewski (1987) estimated the average incarceration has a benefit to cost ratio of 17 to 1. He estimated the cost of keeping a prisoner incarcerated at \$25,000 and the social cost to society of \$430,000 a year if the prisoner is not incarcerated. DiIulio (1991) takes each individual crime and assigns a dollar amount to it, instead of calculating all crimes together equally. (ie; He separates out larceny from robbery, as the social cost of robbery is much higher). he estimates the average benefit-cost (mean), of incarcerating offenders as 14.77, but the median benefit-cost level is only 1.87 (DiIulio, 1991, 29).

Donohue relies on other studies and calculates an expected drop of 2 to 9 index crimes per year per inmate (Donohue, 2009, 17). I use a median estimate of 4. Donohue estimates' are on the low end: \$22, 637 for robbery, \$2,287 for burglary, and \$335 for larceny. On the high end the estimates are \$290,491, \$31,980, and \$908, respectively. What we have to remember though is we have to weight these crimes by their incidence. Because larceny accounts for a higher percentage of crime than does robbery, it has to be included in a higher fraction of the index crimes. Donohue's estimates are presented below in table 5.

Table 5: Cost Estimate of Crimes Averted- California* see note 5

	Low	High
Robbery		
Cost Estimate (\$)	22,673	290,491
Number of Crimes Averted (Year 1)	7,549	7,549
Burglary		
Cost Estimate (\$)	2,287	31,980
Number of Crimes Averted (Year 1)	30,362	30,362
Larceny		
Cost Estimate (\$)	335	908
Number of Crimes (Year 1)	27,184	27,184
Total Cost of Crime Averted Estimate	\$249,106,640	\$3,294,683,072

*See Note 3 in Appendix for description

Based on the low cost and high cost estimates the average social cost of Index crimes averted is between \$249,106,640 and \$3,294,683,072 per year in California. The total number of prisoners in California increased from 1994 to 1995 by 10,594 inmates (U.S. Department of Justice). Taking the average cost per prisoner at \$35,000/year, we can multiply that number by the increase in inmates (10,954). The number that we come up with is the increase in the cost of incarceration, which is \$383,390,000.

There is one more factor to account for in this benefit/cost analysis and that is the lost productivity of the criminal due to lost work. Donohue estimates that criminals are working at average wages of \$616 dollars per week at the time they enter the prison

system (Donohue, 2009, 30). Taking these estimates, we can multiply \$616 by 50 weeks. Here we come up with lost productivity of \$30,800 per year.

To find the net social impact, we have to add the lost productivity (\$337,383,200) with the total added cost of incarceration (\$383,390,000) and compare that to the net social benefit of crimes averted. What we come up with is that based on the low cost estimate (\$249,106,640) the marginal cost of incarceration (\$720,773,200) greatly exceeds the marginal benefit. But based on the high cost estimate (\$3,294,683,072), the marginal benefit is significantly greater than the marginal cost of incarceration.

Policy Implications:

The cost benefit analysis tells an interesting story regarding whether incarceration is “worth it.” The total cost of incarceration (prisoner cost + lost productivity) is slightly higher than the low estimate of the net benefit of incarceration. Therefore, some readers might draw the conclusion that the equilibrium level of incarceration is too high. But, this does not necessarily suggest this. Remember, the estimate of index crimes comes from the marginal and not the “average” prisoner. Therefore, the effect of the benefit of incarceration is grossly understated when just looking at the marginal effect, which might lead one to the conclusion that Donohue’s high estimate is more accurate.

Because the “average” prisoner accounts for more crimes, by definition, then the marginal prisoner, the true benefit of incarceration would have to be estimated at a level closer to the marginal benefit of incarceration at the beginning of the enactment of the law and then find the average benefit at the margin, per prisoner across the time period studied. With the estimated average number of index crimes reduced, it is safe to say that

the law has produced a unknown social impact. However, there should be further research into whether reducing the number of crimes subject to the maximum penalty would be optimal.

I suggest this from my analysis of the data on Pennsylvania and New York. While we see the initial decrease in crime that we would expect after the first law was enacted (1982), what we see in the follow-up Act (1995) is that the impact on crime is negligible at best. While this serves as an example of the placebo effect, furthering suggesting evidence of deterrence, it also suggests there is something else at work. That is, these sentence enhancements might create an even more positive impact by focusing strictly on the “worst” criminals. By “worst” we mean the criminals that commit crimes that cause the most net harm to society. A follow up study could be conducted to look at resource allocation and if targeting specific types of repeat offenders(ie. robbery instead of larceny) would actually increase total social welfare.

Conclusion:

After looking at the reduction in crime across different states, and cities within those states, we can reasonably conclude that these sentence enhancements had a tangible deterrent effect. States with enhancements see crime rates fall relative to neighboring states without enhancements. This is conducted using state-level and city-level data. I also consider whether incarcerating more people enhances social welfare.

Based on the evidence presented, it is clear that these sentence impacts did have both a deterrence effect but the net social impact is unclear. Although, if we take the numbers presented as true estimators of the marginal benefit and marginal cost, we come

to the conclusion that the current level of incarceration is slightly above the equilibrium level.

Notes:

1. California “serious” felonies (eligible for three-strike law punishment). 1) Murder or voluntary manslaughter; (2) mayhem; (3) rape; (4) sodomy by force, violence, duress, menace, threat of great bodily injury, or fear of immediate and unlawful bodily injury on the victim or another person; (5) oral copulation by force, violence, duress, menace, threat of great bodily injury, or fear of immediate and unlawful bodily injury on the victim or another person; (6) lewd or lascivious act on a child under 14 years of age; (7) any felony punishable by death or imprisonment in the state prison for life; (8) any felony in which the defendant personally inflicts great bodily injury on any person, other than an accomplice, or any felony in which the defendant personally uses a firearm; (9) attempted murder; (10) assault with intent to commit rape or robbery; (11) assault with a deadly weapon or instrument on a peace officer; (12) assault by a life prisoner on a noninmate; (13) assault with a deadly weapon by an inmate; (14) arson; (15) exploding a destructive device or any explosive with intent to injure; (16) exploding a destructive device or any explosive causing bodily injury, great bodily injury, or mayhem; (17) exploding a destructive device or any explosive with intent to murder; (18) any burglary of the first degree; (19) robbery or bank robbery; (20) kidnapping; (21) holding of a hostage by a person confined in a state prison; (22) attempt to commit a felony punishable by death or imprisonment in the state prison for life; (23) any felony in which the defendant personally used a dangerous or deadly weapon; (24) selling, furnishing, administering, giving, or

offering to sell, furnish, administer, or give to a minor any heroin, cocaine, phencyclidine (PCP), or any methamphetamine-related drug, as described in paragraph (2) of subdivision (d) of Section 11055 of the Health and Safety Code, or any of the precursors of methamphetamines, as described in subparagraph (A) of paragraph (1) of subdivision (f) of Section 11055 or subdivision (a) of Section 11100 of the Health and Safety Code; (25) any violation of subdivision (a) of Section 289 where the act is accomplished against the victim's will by force, violence, duress, menace, or fear of immediate and unlawful bodily injury on the victim or another person; (26) grand theft involving a firearm; (27) carjacking; (28) any felony offense, which would also constitute a felony violation of Section 186.22; (29) assault with the intent to commit mayhem, rape, sodomy, or oral copulation, in violation of Section 220; (30) throwing acid or flammable substances, in violation of Section 244; (31) assault with a deadly weapon, firearm, machinegun, assault weapon, or semiautomatic firearm or assault on a peace officer or firefighter, in violation of Section 245; (32) assault with a deadly weapon against a public transit employee, custodial officer, or school employee, in violation of Sections 245.2, 245.3, or 245.5; (33) discharge of a firearm at an inhabited dwelling, vehicle, or aircraft, in violation of Section 246; (34) commission of rape or sexual penetration in concert with another person, in violation of Section 264.1; (35) continuous sexual abuse of a child, in violation of Section 288.5; (36) shooting from a vehicle, in violation of subdivision (c) or (d) of Section 12034; (37) intimidation of victims or witnesses, in violation of

Section 136.1; (38) criminal threats, in violation of Section 422; (39) any attempt to commit a crime listed in this subdivision other than an assault; (40) any violation of Section 12022.53; (41) a violation of subdivision (b) or (c) of Section 11418; and (42) any conspiracy to commit an offense described in this subdivision. (Suffolk University Law Review).

2. Table 3 Cities Within States:

Alabama- Mobile

Arizona- Mesa, Phoenix, Tucson

California- Anaheim, Bakersfield, Fresno, Long Beach, Los Angeles, Oakland, Riverside, Sacramento, San Diego, San Francisco, San Jose, Santa Ana, Stockton

Georgia- Atlanta

New York- Buffalo, New York City

Pennsylvania- Philadelphia, Pittsburgh

3. We have to take murder, rape, assault and Motor vehicle theft out of the equation here because we are not looking at those results. Specifically, motor vehicle theft was removed from our analysis because certain aspects of motor vehicle theft (carjacking and grand theft auto) become more appealing to the criminal based on the enactment of the three-strike law. For example, penalties for grand theft auto would subject a criminal to “harsher” penalties than the offender would be subjected to under the three-strike law anyways. We should not expect a deterrent effect because of this. Additionally, a substitution effect might be at work. Therefore, we only have 88.26% of

crimes represented here. So we have to multiply each of these numbers by 100/88.26 to generate the true weight percentage. That is shown in the table below:

4.

Level	Offense Gravity Score	Example Offenses	0	1	2	3	4	5	RFEL	REVOG	AGG/ MIT
Level 4 Incar	13	Murder 3	60-120	66-120	72-120	78-120	84-120	90-120	96-120	120	+12/ -12
	12	Drug delivery resulting in death; PWID cocaine, etc. (> 1000 gms)	54-72	57-75	60-78	66-84	72-90	78-96	84-102	120	+12/ -12
	11	Rape; ISB; robbery (SBI); agg.assault (SBI); PWID cocaine, etc.> 100-1000 gms)	42-60	45-63	48-66	54-72	60-78	66-84	72-96	120	+12/ -12
	10	Voluntary manslaughter; arson (person inside); PWID cocaine, etc.>50-100 gms.)	30-48	33-51	36-54	42-60	48-66	54-72	60-84	120	+12/ -12
Level 3 Incar Cnty Jail/ RIP trade	9	Burglary (home; person pres.); agg. assault (cause BI/w/ weapon); robbery (threat, SBI); robbery (infl. BI); agg.assault (att. SBI); agg. ind. asslt; PWID cocaine, etc. (>10-50 gms)	8-20	12-27	15-30	21-36	27-42	33-48	39-60	~	+6/ -6
	8	Invol. mansl., homicide by veh. (when DU); PWID cocaine, etc. (2.5-10 gms); PWID marijuana (> 10-50 lbs.); arson (pres. not inside); burglary (home; person not pres); theft (\$50,001-4100,000)	6-18	9-21	12-24	18-30	24-36	30-42	36-48	~	+6/ -6
	7	Invol. mansl., homicide by vehicle (no DU); statutory rape; theft (\$25,001-450,000)	4-12	7-15	10-18	16-24	22-30	28-36	34-42	~	+6/ -6
	6	Agg.assault (attempt BI w/weapon); burglary (not a home, person present); arson (property); escape (secure facility); PWID cocaine, etc. (<2.5 gms)	3-9	6-11 1/2	9-15	12-18	15-21	18-24	21-27	~	+3/ -3
Level 2 Incar RIP RS	5	Burglary (not a home, no one pres.); theft (> \$2000-\$25000); corruption of minors; firearms (loaded); robbery (removes property by force); PWID marijuana (1-10 lbs.)	RS-6	1-6	3-9	6-11 1/2	9-15	12-18	15-21	~	+3/ -3
	4	Indecent assault; forgery (will, etc.); firearms (unloaded); criminal trespass (breaks into buildings)	RS-3	RS-6	RS-9	3-9	6-11 1/2	9-15	12-18	~	+3/ -3
	3	Theft (\$200-\$2000); PWID marijuana (<1 lb); drug possession; forgery (money, etc.); REAP; simple assault; retail theft (3 rd , subsequent)	RS-RIP	RS-3	RS-6	RS-9	3-9	6-11 1/2	9-15	~	+3/ -3
Level 1 RS	2	Theft (\$50 - < \$200); bad checks; retail theft (1 st , 2 nd > \$150); retail theft (2 nd < \$150)	RS	RS	RS-RIP	RS-3	RS-6	1-6	3-9	~	+3/ -3
	1	Most misdemeanor 3's; drug paraphernalia; small amount of marijuana; theft (< \$50)	RS	RS	RS-RIP	RS-RIP	RS-3	RS-6	RS-6	~	+3/ -3

5. In Donohue's high cost estimate of crime, he includes the full social cost of any given crime, including the tangible and non-tangible cost. These cost include judicial cost, victim cost (PTSD, etc.), methods of prevention (alarm system, etc.), valuation of property missing, and opportunity cost of the offender. The low cost estimate includes the judicial cost and victim cost (Note that loss of property is not included in this calculation method, as it is considered a transfer of property from the victim to the offender in this calculation method).

6. The average number of estimated crimes averted goes down in every study that he referred between the years 1977 and 2005. His analysis takes estimates of 5 previous research efforts that look at crimes averted across different time periods. The number 4 is the median of those estimates from 2005. It also serves to reason that the marginal criminal commits fewer crimes than the average criminal because these are the "last" inmates incarcerated. They would be, theoretically, the least likely to be incarcerated as the severity of the law decreases.

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