The Effect of Legislated Reductions in the Prison Population on Crime Rates

Roisin McCord

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Abstract

As a major aim of incarceration is to reduce crime, it is important to understand the extent to which it does so. Isolating the effect of prison on crime can be difficult because of reverse causation: higher crime rates also tend to lead to larger prison populations. This paper utilizes state legislated reductions in the prison population to address this question. These policy changes were adopted because of budget or prison overcrowding concerns, and the legislation achieved its goals by shortening sentences and releasing from prison many nonviolent offenders. Using state level data from 1982 to 2009, I estimate that these actions lead to a 9.2 percent decline in state prison populations. In two stage least squares models that use the release legislation as an instrument for prison population, results indicate that a decline in the prison population leads to a statistically significant increase in nonviolent crime rates, with an elasticity of approximately 0.367. There is no statistically significant impact of release on violent crime, which is expected given the prison population impacted by the laws.

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understate the impact of incarceration if those released are less active criminals than those with longer sentences.

Incarceration is also believed to lower crime through deterrence. Levitt (1998) provides evidence that deterrence accounts for more than 75% of the reduction in property crime that results from arrests, and there is a fairly equal mix between deterrence and incapacitation effects in violent crime arrests. Incarceration has been found to both deter criminals from committing crimes after they are released from prison and deter those who have never been to prison from committing crimes. Despite these results, Levitt cautions that the evidence is far from conclusive because he does not deal with the issue of reverse causation. On page 365 of the paper, Levitt adds the notes that "the results in the paper must be interpreted with the caveat that endogeneity is present." It is believed that longer prison terms deter criminals more effectively than do shorter ones (Kuziemko, 2007).

Despite these few studies that attempt to distinguish between the effects of deterrence and incapacitation, making such a distinction can be difficult. Estimations of incapacitation such as those in Bhati (2007) can be inaccurate as they largely rely on surveys of inmates, which are not necessarily reliable. Also, while changes in rates of reported crimes can be observed in the Uniform Crime Reports, estimates do not guarantee what crimes would have been committed had prospective criminals and former inmates not been deterred by fear of incarceration. Trends in crime rates can also be affected by changing social conditions, such as family structures or urban populations that are independent of prison population, leading to inaccurate estimates of the incarceration effect.

A number of economists have attempted to identify the overall effect of incarceration on crime. Marvel and Moody (1994) regress crime rates on prison populations and conclude that

past 40 years, so that prison populations in 1997 were five times as large as those in 1973. By 1997, 645 of every 100,000 United States residents were incarcerated (Caplow & Simon, 1999; Sabol, 2002; King and Mauer, 2006). This growth in prison populations has led to overcrowded prisons and increased law enforcement spending. In 2008, the states spent $47 billion on corrections. While about two-thirds of offenders are on parole or probation as opposed to in prison, prison expenditures account for approximately 90% of corrections expenditures (Moore, 2009).

Generally, prisoners with a higher risk of recidivism are sentenced to longer terms. Findings are that parole boards can fairly accurately predict an inmate's chance of recidivism and design a sentence so that he is released when this risk falls to a predetermined level (Kuziemko, 2007). By this reasoning, shortening these predetermined sentences should lead to a higher recidivism and, therefore, higher crime rates, as higher risk criminals are subsequently left out on the street. An earlier study concluded that while early release proved to be cost-effective, it did have the negative effect of increasing crime (Austin, 1986). However, in recent years, much of the increase in prison population has been generated by longer minimum sentences and hence, it has been difficult to compare the marginal criminal released today to one released in previous periods. The large prison populations in many states and the strain that prison spending puts on state budgets have led states to reform prison sentence and parole laws, allowing shorter terms and early release for prisoners. By shortening the length of time served by prisoners, states can reduce their prison populations, cutting prison spending and relieving overcrowding.

With the implementation of such changes, the growth in the prison populations has slowed since the turn of the century, dropping from over 2% per year in 2000 to less than 0.3% in 2009. Detecting the impact of these reforms on crime is made more difficult because these

population decreases. Nonviolent crime has an elasticity of -0.367 with respect to prison population, which is very similar to the results of Levitt (1996). No change is observed in violent crime when legislative changes are enacted, which is not unexpected, as these laws were specifically intended for the release of nonviolent criminals.

State Prison Downsizing, 2003-2009

The states examined in this study all made some changes to prison, sentencing, or parole laws between the years of 2003 and 2009. In all cases, the goal of reducing prison populations was motivated by state budgets. While there have been similar reforms since then in other states, prison population data was only available through 2010. Table I gives the states and the years of the penal policy changes used in this study. The observed legislative changes were obtained by systematically "googling" each individual state name along with specific phrases such as "prison early release," "parole reform laws," and "prison reform laws." The resulting sources were then examined to determine if the given state enacted legislation aimed at reducing prison populations in the study time period. All states that were found by this systematic search to have enacted such legislation were put into the treatment group in this study. All control states were researched individually in this same way, through "Google" searches of several different phrases relating to prison reform along with the specific state's name. The control states were not found to have passed prison legislation in the studied years. A short explanation of the methods of and reasons for legislative changes is given below for each of the 13 states included in the treatment group.

In 2003, the Michigan Prisoner Reentry Initiative was enacted to help transition prisoners back into the community. It led to the closing of over 20 correctional facilities and an estimated

low-level offenders in response to high prison overcrowding and spending (Vermont, 2008). In 2008, Arizona passed Senate Bill 1476, "The Safe Communities Act," allowing for earned time credits and financially encouraging probation officers to keep parolees out of prison (Waters, 2008).

In 2009, Illinois Governor Pat Quinn released 1,700 prisoners in an effort to cut spending but changed back to a more rigorous sentencing policy months later, when faced with criticism because of high recidivism rates of those released (Garcia, 2009). California was ordered to release 30,000 prisoners by the Supreme Court in 2011. This paper does not cover the effect of this decision because there is no crime and prison population data available from after 2010. However, California's growth in prison population was first slowed in 2007, when the state formed a three-judge panel with the purpose of reducing overcrowding in California prisons (California Budget Project). The forming of the panel in 2007 is employed in this study.

Data Description

The key goal of this study is to analyze how trends in state prison population were altered as a result of mass prison release legislation. Because the enabling legislation was passed in specific states and in particular years, annual state-level observations on prison population and crime were required. Prison populations are defined as all prisoners under jurisdiction of Federal or State Correctional Authorities, and are taken from the Statistical Abstract of the United States (United States Census Bureau).[1] The data cover years from 1982 until 2009. Because prison population data are not available past the year 2009, the study does not include years after that.

[1] Data available from: http://www.census.gov/compendia/statab/cats/law_enforcement_courts_prisons/correctional_facilities_prisoners.html and http://www.census.gov/prod/www/statistical_abstract.html

observation of the impact of the original variable (prison population) on the outcome variable (crime rates).

The outcome variable of interest is ln(crime rate$_{st}$), which is the natural log of state s's crime rate in year t. Crime rates are defined as reported crimes per 100,000 residents. The equation of interest is similar to that used by Marvel and Moody (1994) and takes the form:

$$\begin{aligned} \ln(crime)_{st} = {} & \beta_1 \ln(prison)_{st} + \beta_2 \ln(income)_{st} + \beta_3 unemployment_{st} \\ & + \beta_4 percent1524_{st} + \beta_5 percent65_{st} + \beta_6 percentblack_{st} \\ & + \gamma_t + \xi_s + \varepsilon_{st} \end{aligned} \qquad (1)$$

in which *ln_prison* is the ln(prisoners per 100,000 state residents) in a given year, *ln_income* is the ln(per-capita income) in a given state and year, *unemployment* is the state unemployment rate, *percent1524* is the percentage of state residents between the ages of 15 and 24, *percent65* is the percentage of state residents who are at least 65 years old, and *percentblack* is the percentage of state residents who are black. The variable γ is a set of dummy variables used to control for permanent differences in crime across states. For example, the per capita motor theft rate is consistently higher in Arizona than in Alabama. The variable ξ represents year effects that are shocks common to all states in a year but are allowed to vary across time. For example, per capita motor theft rates were in lower in most states in 2008 than in 2007. These covariates were included in the model to control for unexplained external factors affecting crime rates that are common to a state or a year. For example, a national occurrence such as the start of an economic recession could affect the crime rates across all states in a given year. The key covariate of interest is β_1 which represents the elasticity of crime with respect to the prison population.

$$\ln(crime)_{st} = \theta_1 release_{st} + \theta_2 * \ln(income)_{st} + \theta_3 unemployment_{st} + \theta_4 percent1524_{st} + \theta_5 percent65_{st} + \theta_6 percentblack_{st} + \gamma_t + \xi_s + \varepsilon_{st} \quad (3)$$

Here, θ_1 represents the percent change in a crime category given the implementation of a law to reduce prison size, or ∂ln(crime)/∂(release). Since the model assumes that crime will only be impacted by a change in the prison population brought about by prisoner release, then θ_1 = ∂ln(crime)/∂release = [∂ln(crime)/∂ln(prison)][∂ln(prison)/∂release]. Since the parameter π_1 in equation (2) provides an estimate of [∂ln(prison)/∂release], in this exactly identified 2SLS model, $\beta_1 = \theta_1 / \pi_1$. Therefore, the ratio of the coefficient on *release* in the reduced form model equation (3) to the same parameter in the first stage model from equation (2) gives the elasticity of the effect of per-capita state prison populations on state crime rates, avoiding the effect of crime rates on prison populations.

Limitations

While the states in the treatment group took steps to reduce their prison populations because of overcrowding and high costs of incarceration, specific changes in legislation and methods of reducing prison population vary among states. Many states reinvested money in treatment programs for parolees, which cost less than incarceration and reduce overcrowding. These programs aimed, however, to reduce recidivism. If they were effective in doing so, then these programs would likely lower crime rates as well as prison population. This would then be an outside factor contributing to crime and correlated with prison populations and reform. If, however, the programs do reduce crime, they would actually cause an observed increase in crime

While the data analyze trends in prison population over time, numbers of releases resulting from changes in legislation as opposed to other factors are not available. Because of this, the study analyzes the effect that legislation had on the trend of incarceration rates. The data also do not account for what specific groups of prisoners were released. For example, ages and crime types of released prisoners are not specified. What types of criminals are released could have an effect on recidivism, but legislation changes aimed to release nonviolent criminals.

While the study aims to determine changes in crime, it can only account for reported crimes, as reflected in published crime rates. As the crime types given do not include drug offenses, changes in penal policy regarding drug offenders specifically, are also not included in the study. Because prison population data is only available through 2009, and the legislation changes examined happened in recent years, the study can only analyze the short-term effect of changes in penal policy but cannot draw conclusions about long-lasting results of such policies. It is likely, however, that in the long-term policies would continue to change.

Results

There are 1400 observations used in this study, corresponding to specific states and years. Table II provides summary statistics for each variable for each of the 50 states and for all years from 1982 to 2009. The summary statistics include observations from both treatment and control states, without distinction. Prison populations are given per 100,000 residents. Prison populations and crime rates are natural logs. The mean ln(prison population) is 5.65 with a minimum of 3.85, occurring in New Hampshire in1982 and a maximum of 7.84, occurring in Alaska in 1989. The ln(violent crime) has a mean of 5.98 and ranges from 3.85 to 7.13, while than ln(property crime) has a mean of 8.26 and ranges from 7.44 to 8.96. Property crime rates

statistically significant decrease of about 9.1 percent in prison population after legislation changes.

The model would present biased estimates if the prison release legislation were adopted because of secular changes in the prison population. For example, if states adopted these laws because of changing crime rates, then the results would be biased in a similar way to the basic results of Marvel and Moody. To ensure that this effect was the result of the legislative changes and not simply correlated (i.e. that the shock was indeed exogenous), the dummy variables *release1*, *release2*, and *release3* were created, indicating an observation to be one, two, or three years respectively before a prison legislation change. The coefficients on these variables should be statistically insignificant, indicating that the laws are not a reaction to pre-treatment trends in the prison population. Regressions that add these three covariates to the first-stage model are summarized in the second column of Table III. The coefficients on these pre-treatment dummy variables are all small and statistically insignificant, and the results from this model indicate that these legislation changes do indeed act as an external shock and so the *release* variable can serve as an effective instrument in the model.

Table IV gives estimates of outcomes obtained through regression analysis, according to the models presented above. The second and forth columns present ordinary least squares estimates of the effect of prison populations on rates of violent and property crimes. These models are similar in spirit to those estimated by Marvel and Moody. These values are obtained by OLS estimates of Model 1 and do not control for the simultaneity bias between prison and crime. All crime rates are given in log forms so that the estimates take the form of elasticities. The model produces an estimated elasticity of 0.205 for violent crime and 0.026 for property crime. The estimate obtained for violent crime can be seen to be significant, having a standard

they are not listed here. Prison population changes do not appear to have a statistically significant effect on larceny rates, but both motor theft and burglary are seen to increase upon a reduction in prison populations, with elasticities of -0.97 and -0.83 respectively. These estimates are between two and four times those of -0.26 and -0.40 obtained by Levitt, but this study sees the prison effect concentrated solely in these two crime categories, mostly likely because of the prisoners released by legislation changes, while the effect observed by Levitt is spread across categories.

The estimates obtained through the two-stage-least-squares model of elasticities for property crime and its subcategories differ dramatically from those obtained using ordinary least squares regression while treating prison population as exogenous. The ordinary least squares model produces estimates that, while not significant, are actually positive and, therefore, would suggest that if prison populations did affect property, crime it would be to increase it. This points to the existence of a simultaneity bias and highlights the importance of instrumenting for prison population. The R-squared values in all of the included regressions are above 0.765. These high values suggest that the variables included in the model effectively explain the trends in crime rates.

Additional covariates are also listed in the table, as they are included in the model to control for other characteristics that could affect crime in states over time. Regressing these other covariates on release shows income to be negatively correlated with the release variable. While this might in fact, lead to an underestimation of the impact of release on crime rates since release and income are both negatively correlated with crime, correlation between covariates can interfere with the model. Because of this, it was necessary to check that release of prisoners had an effect on non-violent crime that was independent of trends in time. To do so, regressions

legislative changes made by states, the prisoners being released by these laws were generally nonviolent offenders, which would explain why violent crime is unaffected. The estimates obtained for the response of property crime rates to prison reductions were higher than those found in previous studies. This suggests a concentration of the prison release effect within the categories of crimes for which more criminals are being released, reinforcing the conclusion that prison populations are directly affecting crime rates. While increased crime is not optimal, this knowledge can allow states that are facing overcrowding and budget problems to consider which criminals to release if necessary, based on the types of crimes viewed to have the lowest social cost.

The findings of this study indicate that incarceration reduces crime. However, it does not conclude that incarceration is the only effective crime-reduction strategy, nor does this study do a formal cost-benefit analysis of the prisoner release program. The results are a necessary first step in considering the costs of this fiscal cost-saving program. The results of regression analysis suggest that legislation enacted by states to reduce prison populations led to increased crime, but this does not mean that there are not effective alternative methods of controlling crime. It would be useful to examine the effects of individual policies to see if any successfully reduce crime. States could then weigh the costs and benefits of such policies, considering the money saved by investing in these policies as opposed to prison as well as how effectively they control crime. Also, as most of the data in this study analyzes short-term effects, it could be that over time these policies will develop and become more effective. Whether or not these policies can be refined and made more successful, it is evident from the results of this paper that decreasing prison sizes causes crime rates to rise, indicating that incarceration effectively reduces crime.

Table III
OLS Estimates of the First-Stage Relationship

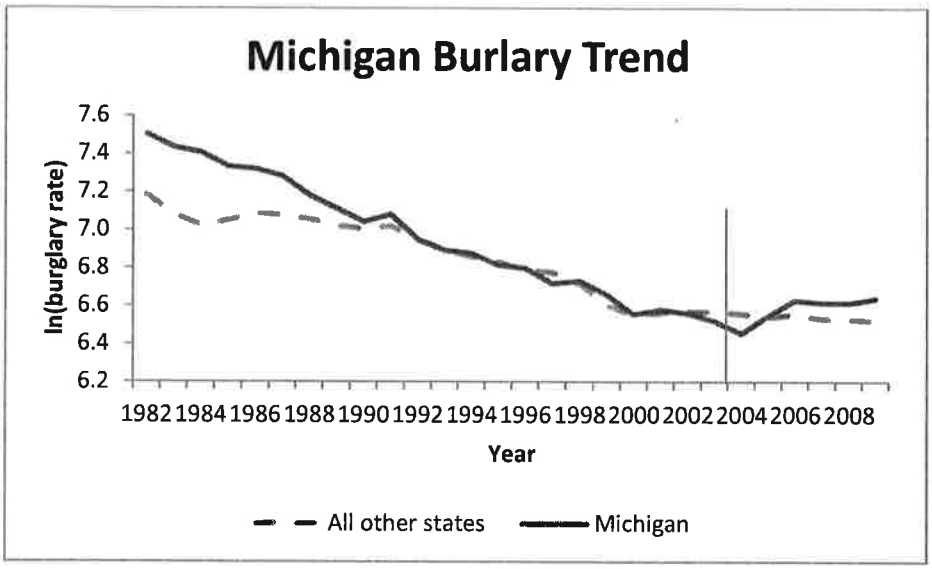
Covariate	Dependent Variable: ln(Prison Population) First-Stage	First-Stage with Lags
Release	-0.092	-0.083
	(0.031)	(0.032)
Release1	-	0.046
	-	(0.049)
Release2	-	0.039
	-	(0.049)
Release3	-	0.036
	-	(0.049)
ln(Income)	0.303	0.311
	(0.123)	(0.123)
Unemployment	-0.001	-0.001
	(0.123)	(0.005)
Percent black	0.262	0.290
	(0.598)	(0.599)
Percent 15-24	3.048	3.049
	(0.678)	(0.678)
Percent 65	-0.095	-0.026
	(0.687)	(0.689)
R^2	0.9224	0.9225
F-test	190.88	0.59
P-value	0.0000	0.6233

Numbers in parentheses are standard errors. All models include a complete set of state and year effects.

Table VI
Reduced-Form Estimates

	Dependent Variable: ln(Crime Rate)		
Variable	Property	Burglary	Motor Theft
Release	0.038	0.079	0.099
	(.020)	(0.026)	(0.043)
Release1	0.021	0.013	0.048
	(0.032)	(0.040)	(0.066)
Release2	0.023	0.011	0.056
	(0.032)	(0.040)	(0.066)
Release3	0.014	0.000	0.029
	(0.032)	(0.039)	(0.066)
ln(Income)	0.222	0.308	0.718
	(0.080)	(0.100)	(0.166)
Unemployment	-0.008	-0.003	-0.008
	(0.003)	(0.004)	(0.006)
Percent black	-1.353	-2.084	-2.370
	(0.388)	(0.484)	(0.806)
Percent 15-24	0.800	1.256	5.623
	(0.439)	(0.584)	(0.913)
Percent 65	1.476	3.180	2.596
	(0.446)	(0.557)	(0.929)
R^2	0.8693	0.8980	0.8476
F-test	0.35	0.06	0.24
P-value	0.7919	0.9820	0.8685

Table VI presents crime trends in the years before and after legislative changes. The F-test and p-values test release1=release2=release3=0.



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