

# Orange is the New Red: Estimating the Cost of Incarceration Using New York City Data

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May 2014

## Abstract

The use of alternatives to incarceration (ATI) has gained momentum in recent decades in response to a growing incarceration rate, high corrections costs, and an unyielding recidivism rate. Studies of the effects of ATI focus mostly on their impact on the recidivism rate, but few attempt to translate this impact to a net cost or benefit compared to the use of incarceration. This study uses a sample of recidivism data obtained from New York City's Data Analytic Recidivism Tool for comparable offenders sent to prison or diverted elsewhere, as well as data on the average annual costs of incarceration and ATI and the costs of recidivism to estimate the return on money spent on ATI compared to incarceration. Results indicate that ATI produce savings by costing less than incarceration and lowering recidivism, preventing expenditure on future arrest and corrections.

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## Introduction

From the late 1970s to 2010, the United States of America's incarceration rate increased from about .1% to .73% of the population, and the number of prisoners from less than 500,000 to more than 2 million. This is a result of a combination of factors, including mandatory sentencing laws introduced at the start of the War on Drugs and the rise of private prison corporations with political clout and a stake in keeping the incarceration rate high. But the drop in crime that most jurisdictions experienced in the 1990s is believed to be primarily due to factors other than incarceration. Studies that have focused on explaining the drop in crime have consistently concluded that incarceration has played a role in the drop but that other social factors are responsible for at least two-thirds and possibly more of the decline.<sup>1</sup> Additionally, incarceration is expensive, with the average annual cost per inmate estimated at \$31,000,<sup>2</sup> and, in many cases, ineffective, as offenders released from prison are rearrested at a rate 30-45 times that of the general population.<sup>3</sup> This raises the question of whether prison, and, more abstractly, punishment are the most effective methods of dealing with crime. In response to the United States' incarceration rate's rapid acceleration, its jurisdictions have developed alternatives to incarceration (ATI) programs intended to lower the cost of corrections and improve the likelihood of released offenders' smooth transition back to society. Following this has been a growing body of literature indicating that the potential of ATI programs is promising, on the basis that ATI graduates generally appear to recidivate less and have better chances of gaining employment than offenders sent to traditional prisons (explored below). However, there's been comparatively little analysis of the impact of these results on the net costs or benefits to society of ATI programs. This paper seeks to investigate whether the use of alternatives prevents crime more cheaply and effectively than traditional incarceration by comparing recidivism rates for comparable offenders sent to prison and sent elsewhere, the annual cost of institutionalization in a prison and

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<sup>1</sup> Przybylski, Roger. (2008). What Works: Effective Recidivism Reduction and Risk-Focused Prevention Programs. RKC Group, Lakewood, CO.

<sup>2</sup> Henrichson, Christian & Delaney, Ruth. (2012). 'The Price of Prisons: What Incarceration Costs Taxpayers.' Vera Institute of Justice, New York, NY.

<sup>3</sup> Rosenfeld, R., Wallman, J., and R. Fornango. (2005). The contribution of ex-prisoners to crime rates. In Prisoner Reentry and Crime in America, J. Travis and C. Visser (eds.). Cambridge University Press, New York, NY.

alternative programs, and the expected cost to society per instance of recidivism so as to compute the return of a dollar spent on ATI versus on incarceration. Data was drawn from New York City's Office of the Criminal Justice Coordinator's Data Analytic Recidivism Tool (DART), which enables anyone to acquire recidivism statistics for criminal offenders by specifying a set of characteristics, including age, gender, prior convictions, and whether the sentence involved incarceration, and statistical analysis of this data shows that incarceration is indeed associated with an increased recidivism rate when controlling for a host of other variables.

### **Review of literature**

Considerable research has analyzed the relationship between incarceration and crime, which is multifaceted and complex. Overall, these studies have yielded disparate and ambiguous results depending on the methods and measures used. A 2007 Vera Institute report identified fifteen studies examining the effects of incarceration on the crime rate, each with different results. The estimated effect of a 10% increase in the incarceration rate ranged from a 22% reduction in serious crime to virtually no impact at all. One cause of variation in these results is the type of data used. While most earlier studies used national data, more recent research is based on state and community-level data, which researchers generally agree provide more accurate and reliable results. Studies using national-level data have reported crime rate reductions ranging from 9% to 22% for a 10% increase in incarceration rates. More recent studies using state-level data have found more modest results (1-4% decrease in crime rate for every 10% increase in incarceration.<sup>4</sup>)

There also exists evidence that the incarceration of a substantial portion of a community's population, as often occurs in neighborhoods home to poor minorities, is associated with externalities like weakened family structures that wind up, on balance, harming that community rather than making it more safe. Numerous studies using neighborhood-level data suggest that increased incarceration rates

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<sup>4</sup> Stemen, Don. (2007). *Reconsidering Incarceration: New Directions for Reducing Crime*. Vera Institute of Justice, New York, NY.

compromise informal social control and produce higher rates of crime at the neighborhood level.<sup>5</sup> And, children of incarcerated parents are at an increased risk of abuse and neglect, and are far more (up to seven times) likely to engage in criminal behavior and be imprisoned themselves later in life than their peers.<sup>6</sup> Consistent with these observations, Liedka, Piehl and Useem (2006) found that there is a point beyond which increases in the incarceration rate are associated with higher crime rates.<sup>7</sup> Using state-level prison and crime data from 1972 through 2000, they found that higher crime rates begin to occur when a state's incarceration rate reaches between 3.25 and 4.92 inmates per thousand people in the general population.

The link between incarceration and recidivism has also been subject to scrutiny. Recidivism, the rate at which criminals released from jail are reincarcerated, is often used as a measure of success for corrections methods, given that the rehabilitation of the offender is one of the primary goals of the criminal justice system. Gendreau et al (1999) conducted a meta-analysis of 50 studies involving more than 300,000 prisoners and found no evidence that prison sentences reduced recidivism. The more rigorous studies, in fact, found a strong connection between longer prison stays and increased recidivism. In a separate study, Gendreau et al (2002) found that incarceration was associated with an increased recidivism compared with community-based sanctions, and that longer sentences in prison (compared with shorter ones) were also linked to higher recidivism.<sup>8</sup> Additionally, incarceration has been found to be least effective in terms of preventing recidivism for low-rate, non-violent offenders,<sup>9</sup> which made up about 60% of the country's total prison and jail population in 2010.<sup>10</sup> While conclusions about the

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<sup>5</sup> Lynch, J.P., and Sabol, W.J. (2001). *Prisoner Reentry in Perspective*. Urban Institute, Washington, DC.

<sup>6</sup> Gabel, S. and Shindeldecker, R. (July 1993). Characteristics of children whose parents have been incarcerated. *Hospital and Community Psychiatry* 44, pp 656-660

<sup>7</sup> Liedka, R., A. Piehl and B. Useem. 2006. The crime-control effect of incarceration: Does scale matter? *Criminology and Public Policy*, 5, 245-276

<sup>8</sup> Gendreau, P., Goggin, C. and Cullen, F. (1999). *The Effects of Prison Sentences on Recidivism. A Report to the Corrections Research and Development and Aboriginal Policy Branch, Solicitor General of Canada*. Ottawa, Canada. Also: Smith, P., Goggin, C., Gendreau, P. (2002). *The Effects of Prisons Sanctions on Recidivism: General Effects and Individual Differences*. Public Works and Government Services Canada.

<sup>9</sup> Piehl, A.M., Useem, B. and J. DiIulio, Jr. (1999). *Right-Sizing Justice: A Cost Benefit Analysis of Imprisonment in Three States*. Center for Civic Innovation at the Manhattan Institute, No. 8, New York, NY.

<sup>10</sup> Schmitt, J., Warner, K., and Gupta, S. (2010). *The High Budgetary Cost of Incarceration*. Center for Economic

relationship between incarceration and recidivism remain ambiguous, data show more consistently that employment, education, marriage, and especially aging have far more to do with cessation of criminal activity than the harshness and length of incarceration.<sup>11</sup> This suggests that there may exist better solutions, specifically tailored to the characteristics of the offense and the offender, for dealing with crime. Over the past few decades, different kinds of ATI programs have proliferated as interest in their potential effectiveness grew, including intensive/enhanced supervision programs (ISP/ESP), electronic monitoring, halfway houses, community service, job training, day reporting, drug courts, and mental health courts, with some kinds of programs targeting specific classes of offenders, such as substance abusers or the mentally ill.

A comprehensive 2007 study by Boise State University analyzed the effectiveness of different ATI programs at reducing recidivism for various types of offenders. It found that drug courts and diversion to community treatment based on a set of principles of effective intervention effectively reduced recidivism for substance abusers, with ISP combined with community treatment being possibly effective; it also found that ISP/ESP combined with treatment, community service, pretrial diversion, and job training were possibly effective for general offenders. Programs using only surveillance techniques were deemed ineffective at reducing recidivism for all classes of offenders, but combining surveillance with treatment was effective in several cases. The report found that drug courts were most consistently most effective.<sup>12</sup> Lipsey and Cullen's (2007) review of the research on correctional interventions determined that every meta-analysis comparing offenders who received rehabilitation treatment with those who did not found lower recidivism for those receiving treatment, with the average recidivism reduction effect in the 20% range.<sup>13</sup> A 2008 compendium of all available recidivism reduction programs found effective

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and Policy Research, Washington, DC.

<sup>11</sup> National Research Council. (2008). *Parole, Desistance from Crime, and Community Integration*. Committee on Community Supervision and Desistance from Crime. Committee on Law and Justice, Division of Behavioral and Social Sciences and Education. The National Academies Press, Washington, DC.

<sup>12</sup> Bostaph, L., Cooper, J., and Hatch, V. (2007). *Review of Research on Alternatives to Incarceration for Adults*. Boise State University, ID.

<sup>13</sup> Lipsey, M. and Cullen, F. (2007). *The Effectiveness of Correctional Rehabilitation: A Review of Systematic Reviews*. *Annual Review of Law and Social Science*, 3.

implementations of ATI targeting general offenders, juveniles, substance abusers, sex offenders, and the mentally ill, concluding that the effectiveness of ATI in reducing recidivism depends critically on proper targeting and implementation and on sensitivity to the needs and circumstances of the criminals in question.<sup>14</sup>

Importantly, the Boise study notes that even in cases where ATI doesn't reduce recidivism, it may still be more cost effective than traditional incarceration if the goal of the criminal justice system is to reduce recidivism by as much as possible as cheaply as possible. So the most important variable to consider is actually the cost of preventing criminals from committing future offenses.

### **Data and methodology**

The cost savings derived from diverting a criminal offender to ATI can be expressed as:

$$S = (C_i - C_a) + (C_{ri} - C_{ra}) + (O_r - O_i),$$

where  $S$  is the net economic benefit yielded by ATI,  $C_i$  the expected cost of incarceration,  $C_a$  the expected cost of ATI,  $C_{ri}$  the expected cost of recidivism post-incarceration, and  $C_{ra}$  the expected cost of recidivism post-ATI. (The idea is that ATI can save the criminal justice system money both by being less costly to implement and by preventing the incurrence of costs of future crimes by decreasing recidivism.) It's also been suggested that ATI improves the probability of future employment by providing vocational training, so the final pair of variables ( $O_r$  and  $O_i$ ) represent the difference in expected economic output between offenders leaving ATI programs and inmates leaving prison. The expected costs can be estimated from data about prisoners, with the relevant characteristics being age, years of education, employment and marital status, gender, frequency of criminal offense, and substance abuse.

The 'direct' cost of incarceration or recidivism is equal to the annual cost of holding the

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<sup>14</sup> Przybylski, Roger. (2008). What Works: Effective Recidivism Reduction and Risk-Focused Prevention Programs. RKC Group, Lakewood, CO.

offender in the corrections facility times the expected duration of the stay. The probability of recidivism can be estimated as a function of the type of offense (more severe crimes being associated with higher rates of recidivism), the number of offenses on the offender's record (with more offenses predicting higher recidivism), age (older predicts less recidivism), gender (with men more likely than women to recidivate), substance use (with drug crimes resulting in higher recidivism), and sentencing (with the prediction that incarceration is associated with higher recidivism).

New York City has extensive, long-running, and well-studied ATI programs, providing plenty of data and past results to interpret. In January, the city government launched the Data Analytic Recidivism Tool (DART), enabling anyone to analyze the one-year recidivism rate for prisoners released in 2009 from the city's penal system by filtering a wide range of variables, including whether the offender was incarcerated or sent to an alternative corrections program. Data was drawn from DART's website to acquire the average recidivism rate for samples of offenders with every possible combination of values for the available variables mentioned above using a Ruby script written by the author and published as open source.<sup>15</sup> DART will only compute recidivism rates for samples of defendants with the chosen characteristics of size greater than or equal to 250, so data for samples smaller than 250 were omitted (the small size of these samples relative to the others should prevent their omission from having any appreciable effect on the econometric results.) Definitions and summaries for the variables are found in table A in the appendix.

### **Econometric results and interpretation**

DART data was used to regress the recidivism rate (logged) against age, gender, drug

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<sup>15</sup> <https://github.com/strangerloops/recidevise>



charge, presence of prior convictions, severity of the offense, and diversion from incarceration with Stata. Each observation, being the average of a group of offenders, is weighted as the number of offenders in that sample, a statistic which DART reports, using the Stata parameter *fweight*, which duplicates each observation a number of times equal to its weight. Results are listed in table B in the appendix.

*Age* is the midpoint of the range for the age category provided by DART, or 50 for the 40+ category. *Female* is 1 if the offender is female, 0 otherwise. *Nondrug* is 1 if the offense is not drug offense, and 0 otherwise. *Violent\_felony* is 1 if the offense is a violent felony offense, 0 otherwise (misdemeanor or nonviolent felony). *Ati* is 1 if the offender was sentenced to probation, given a conditional discharge or fine, or sent to a rehabilitation program, and 0 if the offender was sentenced to a jail or prison term. Stata's default heteroskedasticity test indicated that heteroskedasticity was likely to be present in this sample, so the regression uses robust standard errors. The variables are all significant at the .1% level and the equation has an R-squared of .76, remarkably high for cross-section data. The dependent variable is logged, so the coefficients represent percent changes in the recidivism rate.

None of the econometric results are especially surprising. It is well-established in the literature that the likelihood of recidivism drops as offenders advance in age. Females have a lower crime rate than males and so are expected to recidivate less. Drug offenders are likely to be addicts and therefore are no less likely to continue using substances once released if not provided with treatment for their addiction. Recidivators are more likely than average to recidivate again, as are offenders committing the most severe crimes.

The result of greatest interest is the coefficient for *ati*, which indicates that offenders sentenced to ATI programs recidivate at a rate 32% lower than those sentenced to a term in

prison when controlling for the other variables, suggesting that the hypothesis of lower recidivism for ATI graduates holds in New York City. This can probably be attributed to ATI programs' focus on rehabilitation instead of punishment (substance abuse treatment for drug addicts, education and vocational training) and their positive, nurturing environment compared to prison, where small-time offenders are given the opportunity to network with career criminals.

The annual cost of incarceration in New York City was estimated as \$167,731 in 2012 by the city's Independent Budget Office.<sup>16</sup> This exorbitant cost, more than five times the national mean of \$28,893,<sup>17</sup> reflects numerous factors, including the city's uniquely high ratio of staff to inmates as well as its jail complex's location on Rikers Island, to and from which transportation is expensive. The annual cost of a typical New York City ATI program is estimated at about \$11,000.<sup>18</sup> This difference suggests savings of about \$150,000 annually for each criminal treated with ATI instead of incarcerated. (This is a rough estimate because an ATI program's duration may be longer or shorter than the length of the prison stay that would have occurred otherwise.) Moreover, the 32% lower recidivism rate for ATI graduates suggests that one in three criminals sent to ATI instead of prison would have recidivated otherwise, but will not, and DART data suggests that approximately 36% of recidivists are sentenced to a jail or prison term.<sup>19</sup> To include the costs of arrest as well, a 2011 study of the cost of marijuana arrests in New York City estimates the total cost of a misdemeanor arrest, which is the cheapest, as \$2,000.<sup>20</sup> This suggests ATI's recidivism-lowering effect produces additional savings of at least \$20,000 annually per inmate diverted to ATI (as  $\frac{1}{3} * (\$2000 + .36 * \$160,000)$ ). These savings amount to \$170,000

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<sup>16</sup> *New York City by the Numbers*. New York City Independent Budget Office, 2014.

<sup>17</sup> *Annual Determination of Average Cost of Incarceration*, Office of the Federal Register, 2013.

<sup>18</sup> *The New York City ATI/Reentry Coalition Services Report 2010*. The ATI/Reentry Coalition.

<sup>19</sup> Of 68,641 defendants with prior convictions, 25,460 were sentenced to a jail or prison term.

<sup>20</sup> Levine, Harry. *\$75 Million a Year: The Cost of New York City's Marijuana Possession Arrests*. Drug Policy Alliance, 2011

annually per inmate diverted to ATI.

For the sake of illustration, multiplying this number by the lower bound of the city's average prisoner population of 12,000<sup>21</sup> results in annual savings in excess of \$2 billion. Of course, ATI programs in their current form are not appropriate for every single criminal case (e.g. repeat violent offenders, organized crime leaders, corporate criminals). And scaling up ATI to comprise a greater share of corrections will incur expenditure beyond the current cost of treating individual offenders, as additional facilities will need to be constructed and additional staff employed. But ATI's potential for producing tremendous savings is compelling.

### **Conclusions & Suggestions for Future Study**

DART data indicate that the proliferation of ATI has the potential to reduce crime and save billions of dollars in New York City alone while providing a more humane manner of dealing with criminals. While ATI has momentum in New York, it is slow to catch on in many states most likely as the result of public perception of ATI as being 'soft on crime'. Therefore, policymakers ought to focus on framing ATI as a cost-cutting and crime-reducing measure in order for it to gain political support. Additionally, development of ATI methods targeting specific types of offenders and research and investigating their effectiveness are likely to be good investments.

This study could have benefited from access to more detailed defendant data, which is difficult to acquire as a result of privacy concerns. Ideally, it would have used data on individual offenders from the ATI facilities themselves rather than weighted averages from DART, and would also have included data on race and three-year re-arrest rates, which DART lacks.

Research investigating the duration of ATI programs compared to the length of prison stays for

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<sup>21</sup> *Facilities Overview*, City of New York Department of Correction, 2014.

comparable offenders as well as the employment rates and earnings of ATI graduates compared to those of comparable offenders released from prison would also improve the robustness of these results by enabling a more accurate estimate of S (savings) as specified above.

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## Appendix

Table A

### Data summary

Number of observations: 86522

Variable	Definition	[mean, standard deviation]
age	Midpoint of DART's age category; 50 for '40+'	35.0, 12.51
gender	1 if female, 0 if male	.093, .291
nondrug	1 if non-drug offense, 0 if drug offense	.723, .445
priors	1 if prior convictions on criminal record, 0 otherwise	.495, .500
violent_felony	1 if convicted for a violent felony, 0 for a nonviolent felony or misdemeanor	.057, .232
ati	1 if given a conditional discharge, fine, or sentenced to probation or rehabilitation program	.689, .463
recidivism	One-year rearrest rate as percentage	39.5, 15.8

Table B

Regression results for recidivism\_log,

with robust standard errors to correct for heteroskedasticity:

Linear regression		Number of obs = 86522			
		F(6, 86515) = 54987.99			
		Prob > F = 0.0000			
		R-squared = 0.7642			
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		Coef.	Robust Std. Err.	t	P> t
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	age	-.0176542	.0000668	-264.19	0.000
	gender	-.2178246	.0033294	-65.42	0.000
	nondrug	-.1668575	.0016977	-98.29	0.000
	priors	.5889073	.0014316	411.35	0.000
	violent_felony	.159546	.0020398	78.22	0.000
	ati	-.321221	.0015622	-205.63	0.000
	_cons	4.163447	.0040452	1029.22	0.000
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All variables are significant at the .1% level.