WASHINGTON STATE
Statistical Analysis Center
Informing a data-driven justice system

A Hard Cell

Examining the Personal Cost of Prison in Washington State

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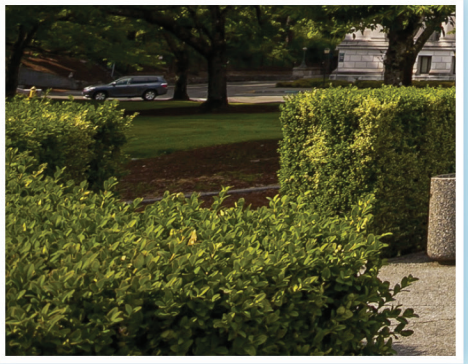

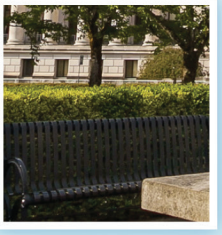

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Disclaimer
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Executive Summary

Study

For the last two years, the Washington Statistical Analysis Center has been conducting a series of studies in response to state and federal interest in reducing prison populations. Recommendations frequently reference the need to employ prison alternatives in an effort to reduce the number of inmates in facilities while aiming to decrease recidivism and increase employment post-release. This study aims to establish the effects of prison on post-release outcomes, measured as recidivism and employment. To take the results a step beyond simple correlation, this study utilizes propensity score matching in an effort to minimize confounding variables and compare offenders by their likelihood to spend their entire sentence in prison. This study utilizes the data linkage system developed by the Education Research and Data Center to connect Department of Corrections' (DOC) data with education and Unemployment Insurance records from the years 2000-2015.

Results and conclusions

Those offenders who are white, older, and have less serious offenses are more likely to spend at least some of their sentence in the community. Interestingly, females have an increased likelihood to spend their entire sentences behind bars. All types of prior education were also associated with increased likelihoods for spending full sentences in prison, with stronger effect sizes than any demographic variable.

Recidivism appears to be a somewhat mixed measure, with some lower propensity offenders showing increases against the comparison group. Those who are more likely to serve full sentences in prison, however, appear to have notably lower recidivism rates both in and out of the treatment group. The difference in means indicates that those in the highest propensity group are less than half as likely to recidivate if they have no field time with DOC. For those that do recidivate, however, the return to DOC is noticeably faster regardless of an offender's likelihood to be in the treatment or comparison group.

Where the mixed story for recidivism is unclear, the effects of prison on employment are stark in comparison. Those offenders who are the least likely to spend their entire sentence in prison see markedly higher employment rates post release if that is, in fact, their sentence. Offenders who are more likely to receive those sentences have worse employment rates, with their employment rate decreasing for those with higher odds of prison time. Wages are also lower for all offenders spending their entire time in prison, although these do not see the same variation that employment does. While there may be something said for the deterrent or criminogenic effects of prison, there is no doubt that the economic impact incurs a high personal cost for offenders.

Introduction

Background

For the last two years, the Washington Statistical Analysis Center has been conducting a series of studies in response to state and federal interest in reducing prison populations. Recommendations frequently reference the need to employ prison alternatives in an effort to reduce the number of inmates in facilities while aiming to decrease recidivism and increase employment post-release. To date, the Washington Statistical Analysis Center's (SAC) studies have supported this notion with findings that repeatedly demonstrate a clear association between the length of time spent in prison and worse outcomes post-release. It stands to reason that these associations might exist, as offenders who are better primed to succeed in conventional society also tend to be those who are less likely to incur severe prison terms. Elucidating the relationship between incarceration and post-release outcomes might require a closer look than correlations can provide.

Match methods provide social scientists a way to create experimental conditions where none may exist naturally. It would be extremely unethical to randomly select a group of people and send them to prison in order to observe their performance following release. One must also hope that the people entering prison are not randomly selected either, although nonrandom selection creates issues of biasing when attempting to perform statistical analysis. Match methods are particularly useful in these circumstances, as they allow researchers to account for observed characteristics such as a person's demographics, educational attainment or criminal activity. These very characteristics might even act as a proxy for unmeasurable traits such as motivation or academic aptitude. Once these characteristics are combined, researchers are more easily able to match "apples to apples," and thus report findings with less fear of confounding factors.

One such method is propensity score matching, which uses traits preceding a treatment event to calculate each individual's likelihood to be "assigned" to the treatment group. Once these propensity scores are generated, matching no longer relies on lining up specific similarities and instead focuses on aligning untreated and treated individuals based on their likelihood to be in the latter group. Ideally this helps to mitigate the biases inherent in unmatched methods, and while propensity score matching is not wholly immune to confounding variables it does allow a degree of confidence in establishing causality. Given the interest of both the federal and state governments, and the continued efforts of the SAC to establish a strong baseline of criminal justice statistics, applying propensity score matching to the study of post-release outcomes seems a natural step.

Present study

This study aims to establish the effects of prison on post-release outcomes, measured as recidivism and employment. To take the results a step beyond simple correlation, this study utilizes propensity score matching in an effort to minimize confounding variables and compare offenders by their likelihood to spend their entire sentence in prison. Limitations and

interpretations of the results will offer some insights as to the nature of the findings and their possible meaning for criminal justice systems in Washington.

Methodology

Design

This study utilizes the data linkage system developed by the Education Research and Data Center to connect the Department of Corrections data with education and Unemployment Insurance (UI) records. The combination of these data sources provides a core set of variables related to individual characteristics, time in custody, and post-release outcomes. Taken together these sources provide enough information for the creation of a treatment group, the generation of propensity scores and the assessment of post-release outcomes across groups. Data from these sources was gathered from calendar years 2000-2015 with the sampling frame ending in 2010. The five additional years of data collected allowed for an even look at post-release outcomes for all offenders. Because all offenders included in the study needed to have the potential to incur these outcomes, all offenders who were not released prior to 2010 were not included.

Variables

The demographic variables selected for this study follow the same pattern as those found significant in other SAC studies. Because propensity score matching requires a logistic regression for score assignment, all categorical variables needed to be placed in ranked form. For that reason, and in order to preserve statistical power for smaller groups, race was combined into the binary variable of white and non-white as shown in Table 1. The type of offense committed was organized into a ranked variable, placing violent offenses above nonviolent ones, and named offenses above “other” and “unknown” offenses. In that sense murder ranks above manslaughter, assault ranks above property crimes, and unknown offenses are located at the end of the order.

Table 1: Demographic Variables of Offenders

Variable	Frequency	Percent
Race		
White	237,396	77.88%
Non-white	67,417	22.12%
Gender		
Female	63,386	20.80%
Male	241,427	79.20%
Age at Release		
18-25	56,137	18.42%
25-35	99,214	32.56%
35-45	82,670	27.13%
45-55	49,966	16.40%
55+	16,724	5.49%
Offense Type		
Assault	49,367	16.20%
Drug	63,851	20.95%
Manslaughter	1,715	0.56%
Murder	2,736	0.90%
Other	44,897	14.73%
Property	74,602	24.47%
Robbery	12,081	3.96%
Sex	18,470	6.06%
Unknown	37,094	12.17%

Variables related to the time spent in DOC custody are shown in Table 2, and form the basis of the treatment group. Those who spent their entire sentence behind bars, with 0 percent of their time in the field, were selected as the treatment group. Others who had no or some prison time comprised the comparison group. While the length of time spent in prison is displayed in the sample, it was not viable for inclusion in propensity score generation due to its close integration with the treatment variable. Because the time and location of a sentence are often decided simultaneously, the length of time an offender spends with DOC cannot be considered as preceding their location placement and therefore the variable cannot be considered predictive.

Table 2: Aspects of Time in Custody

Variable	Frequency	Percent
Time in Custody		
Less than 1 Year	54,339	17.83%
1-2 Years	64,159	21.05%
2-5 Years	79,643	26.13%
5+ Years	106,672	35.00%
Percent of Time Behind Bars		
0%	191,372	62.78%
1-24%	51,726	16.97%
25-49%	23,974	7.87%
50-74%	14,092	4.62%
75-99%	9,987	3.28%
100%	13,661	4.48%

This study uses a familiar set of post-release measures derived from DOC and UI records and located in Table 3. Recidivism was measured as a return to DOC within five years of release, in keeping with other SAC studies on the topic. The time until return was measured in days for all offenders who did recidivate in order to provide a more precise measure of the observation. Employment was measured as any recorded wages or hours worked in the time following release, while total wages were averaged against the number of hours worked. The study also included some educational measures prior to entering DOC custody, including involvement in an apprenticeship, acquisition of a GED, or obtaining any degree of certificate level or higher from a post-secondary school. Each of these was coded for the presence of at least one such degree, but did not preclude offenders from recording at least one entry in each of the educational measures.

Table 3: Education and Outcome Variables

Variable	Frequency	Percent	Average	Standard Deviation
Pre-Entry				
Apprenticeship	322	0.11%	-	-
GED	8,172	2.68%	-	-
Higher Ed	1,424	0.47%	-	-
Post-Release				
Recidivism	60,920	19.99%	-	-
Time to Recidivism	-	-	1009.24	977
Employment	159,753	52.41%	-	-
Wage per Hour	-	-	$15.03	$9.59

Results

Table 4 shows the results of the logistic regression run against the treatment group of those spending their entire sentence in prison. Those who are white, older, and have less serious offenses are more likely to spend at least some time in the field. Interestingly, females have an increased likelihood to spend their entire time behind bars. All types of prior education were also associated with increased likelihoods for spending a full sentence in prison, with stronger effect sizes than any demographic variable. While the direction of some of these relationships is surprising, further testing of the propensity scores confirmed that they accurately represented those more likely to garner no field time in this study.

Table 4: Logistic Regression for 100 Percent Time behind Bars

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.2235	0.0377	1,054.1095	<.0001
Age at Release	1	-0.0764	0.0081	88.8805	<.0001
Female	1	0.1108	0.0227	23.8101	<.0001
Non-white	1	0.191	0.0202	89.7539	<.0001
Offense	1	-0.2943	0.00495	3,531.8559	<.0001
Prior Apprenticeship	1	0.7754	0.2043	14.4124	0.0001
Prior GED	1	0.9274	0.0377	606.0995	<.0001
Prior Higher Ed	1	0.949	0.0856	122.8946	<.0001

After the propensity scores were calculated, offenders were broken into clusters based on their likelihood to be located in the treatment group. Differences in mean were then calculated for each outcome measure using t-tests, and comparing offenders within clusters. While this does result in a reduction in overall statistical power and reduces some of the matching effect, analyzing outcomes by cluster allows for a greater emphasis on offenders who are particularly likely or unlikely to spend their entire sentence in prison. In Table 5, clusters are arranged from lowest to highest propensity, meaning that those offenders who are most likely to be located in the treatment group are in Cluster 6. For the purposes of this study, results with a Pr>|t| of 0.05 or below are considered statistically significant.

Recidivism appears to be a somewhat mixed measure, with some lower propensity clusters showing increases against the comparison group. Those who are more likely to serve full sentences in prison, however, appear to have notably lower recidivism rates both in and out of the treatment group. The difference in means indicates that those in the highest propensity group are less than half as likely to recidivate if they have no field time with DOC. For those that do recidivate, however, the return to DOC is noticeably faster across all clusters. While the relationship to overall recidivism appears to be somewhat mixed, the swifter return times for the treatment group may speak to a criminogenic effect or to a more obscure effect related to the lower number of recidivists in the treatment group overall.

Where the mixed story for recidivism is unclear, the effects of prison on employment are stark in comparison. Those offenders in Cluster 1, who are the least likely to be a part of the treatment group, see markedly higher employment rates post release if they do spend their entire sentence in prison. Every other group sees worse employment rates, with the effect sizes increasing for higher propensities. Wages are also lower for all clusters, although the effect size does not appear to change based on propensity. While Cluster 1 provides a slight anomaly in employment, the remaining clusters paint a clear picture that full prison time appears detrimental to economic outcomes.

Table 5: Comparison of Outcomes by Propensity and Time in Prison

Matched Cluster	Offenders in Cluster	Some Field	Total Prison	Difference in Means	Pr > |t|
Recidivism					
Cluster 1	1,317	20.90%	20.88%	-0.02%	0.9872
Cluster 2	997	18.48%	21.16%	2.68%	0.0313
Cluster 3	2,111	22.17%	16.58%	-5.59%	<.0001
Cluster 4	3,097	20.55%	22.76%	2.21%	<.0001
Cluster 5	2,649	19.77%	11.25%	-8.52%	0.0003
Cluster 6	3,490	15.72%	7.88%	-7.84%	0.0350
Time to Recidivism					
Cluster 1	265	756.20	650.70	-105.50	0.0875
Cluster 2	210	1,083.00	680.60	-402.40	<.0001
Cluster 3	350	1,086.90	868.90	-218.00	<.0001
Cluster 4	705	1,049.40	769.70	-279.70	<.0001
Cluster 5	297	970.50	729.90	-240.60	<.0001
Cluster 6	275	967.80	664.20	-303.60	<.0001
Employment					
Cluster 1	1,317	43.05%	56.87%	13.82%	<.0001
Cluster 2	997	56.76%	52.06%	-4.70%	0.0030
Cluster 3	2,111	50.52%	40.22%	-10.30%	0.2251
Cluster 4	3,097	56.25%	48.76%	-7.49%	<.0001
Cluster 5	2,649	55.67%	32.99%	-22.68%	<.0001
Cluster 6	3,490	53.76%	22.78%	-30.98%	<.0001
Wage Per Hour					
Cluster 1	749	$16.17	$16.05	-$0.12	0.7856
Cluster 2	519	$16.49	$14.38	-$2.11	<.0001
Cluster 3	849	$14.62	$13.71	-$0.91	0.0023
Cluster 4	1,510	$14.52	$13.21	-$1.31	<.0001
Cluster 5	874	$14.66	$13.52	-$1.14	<.0001
Cluster 6	795	$15.17	$13.79	-$1.38	<.0001

Discussion

Limitations

Propensity score matching allows for greater explanatory power, but the calculation of scores does necessitate removing or extrapolating some variable details. It is possible that more complex effects exist among race and offense that were not observed due to coding them as single binary and ranked variables. While this study attempted to maintain a simple approach, other researchers may consider creating multiple binary variables to keep the original ranges more intact. Similarly, with the surprising effect sizes associated with educational variables, it may be worthwhile to consider the degrees obtained and their number in greater detail.

As in other SAC studies, the outcome variables have some drawbacks to their measures. UI data is drawn from employers, and will miss hours and wages that are gained through self-employment or alternative means. This may result in an underestimation of total employment and wages, although the effect sizes in this study are such that it would be wildly improbable for self-employment to cover the gap. Recidivism is also measured at the most restrictive level, and future research may consider rearrests and reconviction as alternate or additional outcome measures.

Conclusions

The results from this study are unexpected in some measures and confirm conventional thought in others. While male offenders are more often predicted to spend time in prison rather than in the field, this study found that it was female offenders who had an increased propensity to spend the entirety of their sentence in prison. The link between prior education and inclusion in the treatment was also surprising, given that education is not generally associated with the criminal factors likely to preclude an offender from probation or parole. Even so, variables for age, race and offense followed more conventional relationships with the treatment group providing some assurance that the surprising findings have some validity.

Although findings on recidivism may appear mixed, the separation of clusters by propensity may lend itself to a theoretical interpretation of the results. While those most likely to be in the treatment group recidivate at lower rates when spending their sentence in prison, those who are less likely to be in the treatment group recidivate at higher rates. For those in the treatment group who do recidivate, all clusters are significantly more likely to return to DOC sooner. This may provide evidence of both prison's criminogenic and deterrent effects. For some offenders, prison may be suitably unpleasant or offer enough rehabilitation to prompt a change that wards off a return. For others, the effects may work in reverse with an even sooner return to the system. While the data cannot conclusively prove this theory, the matched data provide some support to these ideas and offer a reminder that prison does not always result in worse criminal outcomes.

Employment results reveal much more of the personal cost of prison, with one notable exception. Those with the lowest propensity to be in the treatment group have significantly improved employment outcomes when they are. One possible explanation is that this group is more likely to take advantage of prison programming, and improve their odds of employment post-release. Because Cluster 1 is relatively small it is also possible, though very unlikely, that the effect size

is artificially large due to random chance. Regardless, the rest of the economic variables clearly show that sentences spent entirely in prison appear to result in much lower odds of employment and lower wages across higher propensities. While there may be something said for the deterrent or criminogenic effects of prison, there is no doubt that the economic impact incurs a high personal cost for offenders.