Educate to Liberate? Effect of Prison Education Programs on Recidivism

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1 Introduction

As a measure to decrease the number of inmates that go back to prison after serving their sentence, many correctional facilities offer educational programs. More educated inmates can presumably enter the workforce more easily, which can keep them from committing further crimes. In 2000, 91% of state prisons, all federal prisons and 88% of private prisons have some educational program. More than half of inmates take advantage of educational programs at some point during their time in prison [1].

Given that the growth rate of prison spending is higher than that of sending a student to college and that there are 18 states that already spend more on prisons than schools, there is a real incentive to reducing the ballooning prison population [2]. In this paper, we aim to aim to answer the following question: *does completing a prison education program help prevent recidivism among inmates?*

2 Description of the Data

The data we examined comes from the Department of Corrections of the State of Wisconsin, for men who were in prison as of October 1988 and released from prison as of June 1990. When an inmate begins their sentence, an initial evaluation is done that ultimately provided the inmate with a recommendation of taking adult basic education, high school education, vocational training or no program. Inmates had a choice of participating in the program or getting a work assignment. However, these programs were usually oversubscribed, so an inmate might not have been able to take a program even if he wished to do so.

The data that we used broadly falls under each of the categories below. For a full description of each of the variable names, definitions and types, refer to Table 1 in the Appendices.

1. Whether an inmate went back to prison within 24 months. This will serve as our dependent variable.

2. Which educational programs the inmate completed, was eligible for, and was actually able to take.

3. Demographic information (age, race, etc.)

4. Severity of the crime

5. Type of crime (murder, theft, etc.)

3 Analysis

In the analyses that follow, *recid*24 will be our dependent variable, while completion of the appropriate program (*abecom*, *hsedcom* and *voccom*) will be our independent variable. The rest of the covariates will serve as controls. Regressions for each of the three programs were run separately to help us understand the effects of each individually. Only those inmates that were eligible for the program were included in the program's regressions, regardless of participation.

Controls were added into regressions based on their broad category. Demographic variables were added first, because we believed the individual's characteristics had the largest effect on their chances of committing a crime. Control variables related to the severity of the crime were added next, and finally we added the type of crime.

3.1 LPM and Probit Models

Our first approach was to use an LPM. This model gives us immediate interpretability, giving us a good idea of the magnitude of the effect that completing this program has on inmates. However, because we were concerned that a linear model was not the appropriate functional form (due to our use of a binary dependent variable), we also ran the same regressions using a probit model.

The results are summarized in Tables 2-4. All of these regressions show negative coefficients for the independent variable, which is consistent with our intuition. Furthermore, the behavior around control variables is similar across regressions. Specifically, there is a notable change in the independent variable coefficient when we add the demographic controls in Regressions 2 and 6, followed by a more modest change when adding the severity controls in Regressions 3 and 7. For the most part, adding the type of crime controls does not add much value to the model. Thus, throughout the three tables we will discuss Regressions 3 and 7.

Starting with Table 2, we can see a negative but statistically insignificant coefficient for *abecom*. This is not terribly surprising: it is unlikely that adult basic education will open up many career opportunities for those coming out of prison. Tables 3 and 4 show a lot more promise. With the exception of Regression 3 in Table 3, all coefficients are statistically significant at the 0.05 significance level. In addition, all coefficients in Table 4 are significant at the 0.01 level. They also show practically meaningful values. For example, looking at the coefficient in Regression 3 of Table 4, we can see a 13 point reduction in the probability that an inmate will return to prison, a huge reduction given the Unites States' skyrocketing prison population. The additional significance of these two programs agrees with our intuition that education that opens up doors for work opportunities is more likely to keep you in the workforce.

3.2 IV Regression

We do have reason to doubt these estimates though. Completion of the program is not randomly assigned, but rather self-selected. Inmates who are more motivated or talented are more likely to want to take the course and to actually finish it. Thus, we turned to IV regression to eliminate endogeneity. We defined the following instrument:

$$abeelig\_able = \begin{cases} 1, & \text{if } abeelig = 1, abena = 0 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

Similar instruments were created for *hsed* and *voc*. Clearly both the eligibility and availability conditions must be met for an inmate to complete a course, so the instrument is likely to be relevant. We cannot formally test for exogeneity, which we will discuss in the following section.

Two-stage least squares regression results are summarized in Tables 5-7. We see the same general trend across regressions: a relatively large adjustment of the independent variable coefficient when we add the individual characteristics, a more modest adjustment when we add the severity variables, and a negligible change when we add the type of crime dummies. Throughout these three tables, Regression 3 seems like the most attractive option. The first-stage F-statistic is reported for each regression; we see that the instruments are relevant in all regressions.

The first interesting result we obtained was that all coefficients in Table 5 are positive. This is counterintuitive but not terribly surprising. We already argued that adult basic education does not produce a statistically significant effect, and so there is functionally no difference in these estimates. The most surprising results come from Tables 6 and 7: we now observe that no independent variable coefficients are statistically significant. They are, for the most part, still negative, but they have lost all statistical and practical significance. These results support our previous concern that whatever apparent effect that completion of the educational programs produced was in large part due to selection bias.

3.3 Internal Validity

Of the threats to internal validity of the study, the most concerning one is the lack of knowledge of the enrollment protocol. For example, if a new session for a class starts, do interested inmates enroll on a first come, first served basis? By a lottery? While the latter ensures that our instrument is exogenous, the former might not. However, the only mechanism we deduced through which the instrument would produce a *reduction* in the statistical significance of the completion coefficients is by being as good as randomly assigned.

A secondary concern concerns an incorrect functional form. Although we used probit models in our initial analysis, we settled for LPM for our IV regression. This is a limitation we chose to accept, given that we believed that IV regression was the most effective way of eliminating selection bias. Given that the statistical significances were roughly equal for LPM and probit on Tables 2-4, we believe that for the purposes of determining causality LPM is sufficient.

4 Conclusions

In this paper, we have examined whether completion of three different educational programs for inmates helps prevent them from returning to prison. Although initial results with LPM and probit models were promising, an IV regression approach seems to indicate that the effect is not statistically significant, but rather the result of selection bias. However, there may be other reasons why prison education programs might be beneficial: they might help reduce homelessness or increase income after release. Future study should be devoted to the effect of these programs on other such externalities.

References

[1] C. W. Harlow. Education and Correctional Populations. page 12.

[2] Stephanie Stullich, Ivy Morgan, and Oliver Schak. State and Local Expenditures on Corrections and Education: A Brief from the U.S. Department of Education, Policy and Program Studies Service – July 7, 2016. page 31.

Appendices

DEPENDENT VARIABLE	
recid24	=1 if inmate returned to Wisconsin prison within 24 months of release =0 otherwise

INDEPENDENT VARIABLES	
abecom	=1 if inmate completed the adult basic education program =0 otherwise
hsedcom	=1 if inmate completed the high school education program =0 otherwise
voccom	=1 if inmate complated the vocational training program =0 otherwise

ELIGIBILITY AND AVAILABILITY	
abeelig	=1 if inmate is eligible for the adult basic education program =0 otherwise
abena	=1 if inmate is eligible for the adult basic education program but the program is not available =0 otherwise
abeelig_able	=1 if inmate is eligible for the adult basic education program and the program is available =0 otherwise
hsede	=1 if inmate is eligible for the high school education program =0 otherwise
hsedna	=1 if inmate is eligible for the high school education program but the program is not available =0 otherwise
hsedelig_able	=1 if inmate is eligible for the high school education program and the program is available =0 otherwise
vocelig	=1 if inmate is eligible for the vocational training program =0 otherwise
vocna	=1 if inmate is eligible for the vocational training program but the program is not available =0 otherwise
vocelig_able	=1 if inmate is eligible for the vocational training program and the program is available =0 otherwise

INDIVIDUAL CHARACTERISTICS	
ageadma	Age at the time of admission

Continued on next page

ageadma_2	Age at the time of admission squared. This was added because we believed older males were less likely to commit additional crimes than younger ones, though we do not prove this is the case
tstgrada	Tested grade level at the time of admission
nonwha	=1 if non-white =0 otherwise
SEVERITY OF CRIME	
med	=1 if inmate is in a medium security prison =0 otherwise
max	=1 if inmate is in a maximum security prison =0 otherwise
daysin	Number of days in prison from admission to release
TYPE OF CRIME	
oldsent	=1 if inmate violated parole and is serving a previous sentence =0 otherwise
asltoffa	=1 if assault offense =0 otherwise
sexoffa	=1 if sex offense =0 otherwise
drgoffa	=1 if drug offense =0 otherwise
econoffa	=1 if economic offense (e.g. burglary) =0 otherwise
miscoffa	=1 if miscellaneous offense (e.g. prostitution) =0 otherwise

Table 1: Full description of variables.

VARIABLES	(1) LPM	(2) LPM	(3) LPM	(4) LPM	(5) Probit	(6) Probit	(7) Probit	(8) Probit
abecom	-0.0760	-0.0963	-0.0982	-0.0900	-0.224	-0.282	-0.291	-0.266
	(0.0563)	(0.0589)	(0.0638)	(0.0631)	(0.172)	(0.183)	(0.198)	(0.199)
ageadma		-0.0386***	-0.0372**	-0.0354**		-0.111**	-0.110**	-0.106**
		(0.0149)	(0.0152)	(0.0156)		(0.0430)	(0.0434)	(0.0446)
ageadma_2		0.000440**	0.000426*	0.000422*		0.00123**	0.00124**	0.00126*
		(0.000214)	(0.000222)	(0.000228)		(0.000617)	(0.000631)	(0.000646)
tstgrada		0.00908	0.00388	0.00161		0.0270	0.0145	0.00679
		(0.0120)	(0.0122)	(0.0125)		(0.0346)	(0.0351)	(0.0362)
nonwha		-0.00934	-0.0201	-0.0179		-0.0236	-0.0605	-0.0316
		(0.0528)	(0.0529)	(0.0529)		(0.155)	(0.158)	(0.161)
med			0.114	0.130*			0.430	0.524*
			(0.0759)	(0.0772)			(0.317)	(0.318)
max			0.235***	0.230***			0.780**	0.813***
			(0.0760)	(0.0784)			(0.310)	(0.312)
daysin			4.17e-05	9.01e-05			0.000115	0.000264
			(6.19e-05)	(6.56e-05)			(0.000174)	(0.000189)
oldsent				0.102*				0.329**
				(0.0570)				(0.164)
asltoffa				-0.0127				-0.0391
				(0.0605)				(0.177)
sexoffa				-0.0182				-0.0640
				(0.0865)				(0.281)
drgoffa				0.0259				0.0212
				(0.0828)				(0.260)
econoffa				0.0608				0.192
				(0.0621)				(0.183)
miscoffa				0.120*				0.364*
				(0.0638)				(0.186)
Constant	0.326***	0.988***	0.802***	0.626**	-0.451***	1.445**	0.837	0.261
	(0.0285)	(0.258)	(0.272)	(0.282)	(0.0788)	(0.731)	(0.803)	(0.825)
Observations	353	353	353	353	353	353	353	353
R-squared	0.005	0.040	0.069	0.090				

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Results of regressions of prison recidivism in 24 months on completion of adult basic education and other covariates, for inmates eligible to take the adult basic education program. LPM and Probit models are indicated as such on the appropriate regression.

VARIABLES	(1) LPM	(2) LPM	(3) LPM	(4) LPM	(5) Probit	(6) Probit	(7) Probit	(8) Probit
hsedcom	-0.139**	-0.129**	-0.117*	-0.121**	-0.388**	-0.375**	-0.371**	-0.401**
	(0.0563)	(0.0577)	(0.0619)	(0.0609)	(0.159)	(0.164)	(0.178)	(0.182)
ageadma		-0.0184	-0.0169	-0.0335		-0.0165	-0.00610	-0.0518
		(0.0281)	(0.0284)	(0.0286)		(0.126)	(0.135)	(0.133)
ageadma_2		0.000115	0.000118	0.000420		-0.000415	-0.000572	0.000208
		(0.000475)	(0.000479)	(0.000476)		(0.00239)	(0.00258)	(0.00249)
tstgrada		-0.0258**	-0.0250*	-0.0228*		-0.0727**	-0.0722*	-0.0690*
		(0.0128)	(0.0132)	(0.0131)		(0.0370)	(0.0393)	(0.0399)
nonwha		-0.0116	-0.00364	-0.00342		-0.0338	-0.0234	0.0202
		(0.0583)	(0.0581)	(0.0592)		(0.165)	(0.168)	(0.176)
med			0.264***	0.217**			1.221**	1.161**
			(0.0806)	(0.0946)			(0.529)	(0.558)
max			0.263***	0.200**			1.205**	1.096**
			(0.0835)	(0.0950)			(0.532)	(0.558)
daysin			-3.28e-05	2.23e-05			-7.73e-05	6.59e-05
			(6.74e-05)	(7.14e-05)			(0.000197)	(0.000213)
oldsent				0.186**				0.507**
				(0.0777)				(0.212)
asltoffa				-0.0566				-0.199
				(0.0674)				(0.202)
sexoffa				0.0170				0.0609
				(0.113)				(0.379)
drgoffa				0.0160				0.0223
				(0.105)				(0.372)
econoffa				0.110				0.398*
				(0.0774)				(0.236)
miscoffa				0.0450				0.178
				(0.0746)				(0.218)
Constant	0.399***	0.979**	0.705	0.800*	-0.257**	0.967	-0.302	-0.143
	(0.0411)	(0.429)	(0.458)	(0.476)	(0.106)	(1.681)	(1.901)	(1.930)
Observations	274	274	274	274	274	274	274	274
R-squared	0.022	0.054	0.071	0.122				

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Results of regressions of prison recidivism in 24 months on completion of high school education and other covariates, for inmates eligible to take the high school education program. LPM and Probit models are indicated as such on the appropriate regression.

VARIABLES	(1) LPM	(2) LPM	(3) LPM	(4) LPM	(5) Probit	(6) Probit	(7) Probit	(8) Probit
voccom	-0.130***	-0.121***	-0.133***	-0.129***	-0.362***	-0.339***	-0.373***	-0.365***
	(0.0342)	(0.0351)	(0.0364)	(0.0367)	(0.0970)	(0.0994)	(0.104)	(0.105)
ageadma		-0.0187	-0.0188	-0.0185		-0.0479	-0.0487	-0.0501
		(0.0149)	(0.0150)	(0.0152)		(0.0456)	(0.0458)	(0.0462)
ageadma_2		0.000207	0.000218	0.000234		0.000497	0.000530	0.000614
		(0.000240)	(0.000241)	(0.000244)		(0.000761)	(0.000763)	(0.000769)
tstgrada		0.00396	0.00425	0.00459		0.0115	0.0131	0.0144
		(0.00599)	(0.00599)	(0.00601)		(0.0168)	(0.0169)	(0.0170)
nonwha		0.0255	0.0273	0.0292		0.0720	0.0779	0.0880
		(0.0373)	(0.0373)	(0.0375)		(0.104)	(0.104)	(0.105)
med			0.112*	0.104*			0.400*	0.379*
			(0.0582)	(0.0609)			(0.214)	(0.220)
max			0.114*	0.106*			0.406*	0.386*
			(0.0599)	(0.0623)			(0.216)	(0.221)
daysin			8.66e-05**	9.69e-05**			0.000240**	0.000269**
			(4.28e-05)	(4.53e-05)			(0.000117)	(0.000124)
oldsent				0.0130				0.0405
				(0.0429)				(0.119)
asltoffa				-0.0290				-0.0825
				(0.0433)				(0.119)
sexoffa				0.00763				0.0221
				(0.0624)				(0.184)
drgoffa				0.0180				0.0307
				(0.0639)				(0.187)
econoffa				0.0626				0.185
				(0.0465)				(0.130)
miscoffa				0.0425				0.126
				(0.0458)				(0.125)
Constant	0.396***	0.681***	0.507**	0.440*	-0.263***	0.472	-0.0945	-0.270
	(0.0239)	(0.228)	(0.237)	(0.241)	(0.0620)	(0.673)	(0.707)	(0.713)
Observations	746	746	746	746	746	746	746	746
R-squared	0.019	0.028	0.041	0.046				

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Results of regressions of prison recidivism in 24 months on completion of vocational training and other covariates, for inmates eligible to take the vocational training program. LPM and Probit models are indicated as such on the appropriate regression.

VARIABLES	(1) recid24	(2) recid24	(3) recid24	(4) recid24
abecom	0.0829	0.0722	0.0512	0.0190
	(0.171)	(0.165)	(0.188)	(0.182)
ageadma		-0.0392***	-0.0383**	-0.0358**
		(0.0150)	(0.0151)	(0.0154)
ageadma_2		0.000453**	0.000447**	0.000433*
		(0.000215)	(0.000222)	(0.000225)
tstgrada		0.000616	-0.00150	-0.00249
		(0.0147)	(0.0139)	(0.0142)
nonwha		0.00802	-0.00920	-0.00915
		(0.0545)	(0.0531)	(0.0530)
med			0.0988	0.118
			(0.0795)	(0.0794)
max			0.239***	0.230***
			(0.0757)	(0.0771)
daysin			1.90e-07	6.14e-05
			(7.91e-05)	(7.87e-05)
oldsent				0.105*
				(0.0559)
asltoffa				-0.0158
				(0.0595)
sexoffa				-0.0164
				(0.0846)
drgoffa				0.0171
				(0.0826)
econoffa				0.0581
				(0.0608)
miscoffa				0.123**
				(0.0624)
Constant	0.290***	0.984***	0.833***	0.645**
	(0.0454)	(0.262)	(0.275)	(0.280)
Observations	353	353	353	353
R-squared		0.019	0.055	0.083
First Stage F-stat	116.3	113	89.16	91.35

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Results of two-stage least squares regressions of prison recidivism in 24 months on completion of adult basic education and other covariates instrumented on a dummy variable for eligibility and availability of the program, for inmates eligible to take the adult basic education program. The first stage F-statistic is shown for the appropriate first stage.

VARIABLES	(1) recid24	(2) recid24	(3) recid24	(4) recid24
hsedcom	-0.0597	-0.0372	0.00411	-0.0381
	(0.113)	(0.114)	(0.139)	(0.135)
ageadma		-0.0161	-0.0161	-0.0330
		(0.0280)	(0.0282)	(0.0279)
ageadma_2		7.75e-05	0.000115	0.000419
		(0.000475)	(0.000478)	(0.000467)
tstgrada		-0.0277**	-0.0297**	-0.0261*
		(0.0128)	(0.0138)	(0.0137)
nonwha		-0.00281	0.00692	0.00499
		(0.0589)	(0.0591)	(0.0596)
med			0.280***	0.230**
			(0.0847)	(0.0970)
max			0.293***	0.222**
			(0.0916)	(0.100)
daysin			-8.60e-05	-1.34e-05
			(8.50e-05)	(8.46e-05)
oldsent				0.182**
				(0.0755)
asltoffa				-0.0644
				(0.0665)
sexoffa				0.0119
				(0.109)
drgoffa				0.00595
				(0.105)
econoffa				0.102
				(0.0768)
miscoffa				0.0393
				(0.0735)
Constant	0.361***	0.913**	0.683	0.795*
	(0.0615)	(0.427)	(0.452)	(0.462)
Observations	274	274	274	274
R-squared	0.015	0.044	0.058	0.115
First Stage F-stat	337.8	298.7	146.1	144.1

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Results of two-stage least squares regressions of prison recidivism in 24 months on completion of high school education and other covariates instrumented on a dummy variable for eligibility and availability of the program, for inmates eligible to take the high school education program. The first stage F-statistic is shown for the appropriate first stage.

VARIABLES	(1) recid24	(2) recid24	(3) recid24	(4) recid24
voccom	-0.0829	-0.0597	-0.0718	-0.0764
	(0.0560)	(0.0582)	(0.0642)	(0.0645)
ageadma		-0.0191	-0.0189	-0.0187
		(0.0149)	(0.0149)	(0.0151)
ageadma_2		0.000204	0.000215	0.000231
		(0.000240)	(0.000240)	(0.000242)
tstgrada		0.00295	0.00318	0.00373
		(0.00601)	(0.00602)	(0.00600)
nonwha		0.0324	0.0335	0.0353
		(0.0376)	(0.0374)	(0.0376)
med			0.126**	0.116*
			(0.0590)	(0.0613)
max			0.135**	0.124*
			(0.0620)	(0.0639)
daysin			6.83e-05	8.28e-05*
			(4.59e-05)	(4.74e-05)
oldsent				0.0148
				(0.0425)
asltoffa				-0.0352
				(0.0431)
sexoffa				0.00765
				(0.0619)
drgoffa				0.0117
				(0.0643)
econoffa				0.0593
				(0.0463)
miscoffa				0.0434
				(0.0452)
Constant	0.375***	0.669***	0.489**	0.427*
	(0.0306)	(0.229)	(0.236)	(0.240)
Observations	746	746	746	746
R-squared	0.016	0.024	0.037	0.044
First Stage F-stat	849.9	713.2	518.5	500.6

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Results of two-stage least squares regressions of prison recidivism in 24 months on completion of vocational training and other covariates instrumented on a dummy variable for eligibility and availability of the program, for inmates eligible to take the vocational training program. The first stage F-statistic is shown for the appropriate first stage.