The Effect of Job Training Programs at a Juvenile Correctional Facility in Japan

Kenji Wada, Akihito Toda and Kazuki Tomura

February, 2012

Facts and Motivation

- Most criminals are unemployed before committing a crime in Japan (68.3% in 2010).
- Few economic investigation of the effect of in-prison job training programs on recidivism
- Job training programs for criminals are important. Are they *effective*?

Questions Addressed

1. Who are likely to participate in job training program? (Probit Analysis)
2. Who are likely to have a smaller re-entry probability and a longer duration till re-entry? (Probit and Cox's Harazard Analysis)
3. Does the job training program lower re-entry probability and making duration till re-entry longer? (Matching Method)
4. Is there any difference in re-entry probability and duration till re-entry among participants in different job training programs? (Matching Method)

Literature Survey

- Heckman (1985): empirical evaluation of job training programs in general (not for criminals)
- Becker (1968): prevention of a crime
- Lochner (2004): negative relationship between education and crime

Literature Survey (Cont.)

- Witte (1977): one of the first quantitative studies on recidivism
- Tilley (2010): empirical evaluation of educational and vocational program on recidivism
- Tomura (2001) :comparison of the re-entry ratio between those with some job training and those without
- None of the above control for the difference in ability such as IQ and educational attainment

Characteristics of Criminals in Japan and the U.S.

74,232 or 57.9 per 100,000 in Japan (2010) and
1,613,714 or 502 per 100,000 in U.S. (2009)

Grades for Criminals in Japan

When criminals enter a prison, they get a single grade.

- A: not serious
- B: serious
- JA: minors and not serious
- JB: minors and serious
- YA: less than 26 years old and not serious
- YB: less than 26 years old and serious
- At Kawagoe, JA and YA only!

Data Description

- Two separate observations from Kawagoe Juvenile Correctional Facility
- Those released between 2002 and 2005 (participants:567 and non-participants: 1501)
- Those released between 1989 and 2000 (participants only: 1518)

Re-entry Ratio by Inmate Characteristics (Table 2)

- Table 2 compares the re-entry ratio within five years after release from a prison by the characteristics of each inmate

Table 2

Characteristics	Reentry ratio
Age at release	
-22	31%
23 - 24	28%
25 - 26	34%
27 -	26%
Educational Attainment	
Junior high school graduate	40%
Senior high school dropouts	30%
Senior high school graduate	25%
More than senior high school	16%
IQ	
< 80	43%
80 - 89	31%
90 - 99	24%
100 -	22%
TOTAL	31%

Number of Participants =567
Number of Non-participants = 1501

Characteristics	Reentry ratio
Initial, sentenced prison term	
Less than one years	36%
Less than two years	33%
Less than three years	32%
Three years and more	25%
Type of Offenses	
Drugs	35%
Violent	21%
Fraud	20%
Theft	44%
Other	31%
Parole	
Yes	29%
No	39%
Program Participation	
Yes	23%
No	34%

Probit Model on Program Participantion (Table 3)

Table 3 investigates who are likely to join the job training program by probit model.

Probit Model (cont.)

- $Y_i^* = \alpha + X_i'\beta + \varepsilon_i$:a latent variable
- X_i' : characteristics of each inmate (IQ, educational attainment, prison term, prison term squared, five types of crimes commited)
- (α, β) : parameters
- $\varepsilon_i \mid X_i \sim N(0,1)$: an error term
- $Y_i^* \geq 0$ if $Y_i = 1$, $Y_i^* < 0$ if $Y_i = 0$
- Y_i : a training dummy which takes one if the inmate has joined any job training program

Table 3

Estimation Results on the Participation in the Job Training Program

VARIABLES		VARIABLES	
IQ	0.0059***	Drugs	0.0091
	−0.00089		−0.032
Educational Attainment	0.012	Violent	−0.0069
	−0.0079		−0.03
Prison Term	0.031***	Theft	0.018
	−0.0023		−0.039
Prison Term Squared	−0.00021***	Fraud	−0.018
	(2.70e−05)		−0.026
		Other	−0.13***
			−0.049
Observations	2083		
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Probit Model on Re-entry Probability (Table 4A)

- Table 4A investigates the re-entry probability within five years after release by Probit Model

Table 4A: Probit Model on Reentry

	Coef.	Robust Std. Err.
Program Participation	−0.219*	0.112
IQ	−0.0181***	0.004
Educational attainment	−0.0770**	0.036
Age at release	0.050	0.026
Initial, sentenced prison terr	0.000	0.004
Parole	−0.255**	0.105
Drugs	0.420***	0.137
Violent	−0.222	0.167
Fraud	−0.129	0.191
Theft	0.813***	0.119
Other	0.259	0.245
Release Year =2002	0.369***	0.134
Release Year =2003	0.592***	0.107
Release Year =2004	0.304***	0.103
Log pseudolikelihood	−4618.6847	
Number of obs	2068	

Cox's Model on Duration (Table 4B)

- Table 4B investigates the duration till re-entry into prison by Cox's hazard model
- Y_i : re-entry dummy which takes one if each inmate has come back to prison within five years after release
- $X_i^{'}$: characteristics of each inmate
- T_i : time between release from and re-entry into prison
- $\lambda_i(t) = \lim_{h \to 0} \frac{P[t \leq T_i < t+h | t \leq T_i]}{h} = \lambda_0(t) \exp(x_i^{'} \beta)$ a hazard rate
- $\lambda_0(t)$: a baseline hazarda rate

Table 4B: Cox's Model on Duration

	Coef.	Robust Std. Err.
Program Participation	−0.051**	0.026
IQ	−0.004***	0.001
Educational attainment	−0.028***	0.009
Age at release	0.017**	0.007
Initial, sentenced prison terr	−0.001	0.001
Parole	−0.0065**	0.03
Drugs	0.122***	0.038
Violent	−0.033	0.036
Fraud	−0.021	0.042
Theft	0.217***	0.03
Other	0.066	0.067
Release Year =2002	0.094***	0.037
Release Year =2003	0.163***	0.031
Release Year =2004	0.090***	0.029
Psuedo R2		
Number of obs		

Matching Method (Participants vs. Non participants)

- Table 5A and 5B investigate the effectiveness of job training program in reducing the probability of re-entry and making the duration till re-entry longer by matching method.

Matching Method (cont.)

- $Y_i(D_i)$: the outcome of an inmate i defined by:

$$Y_i = Y_i(D_i) = \begin{cases} Y_i(0) & \text{if } D_i = 0 \\ Y_i(1) & \text{if } D_i = 1 \end{cases} \quad (1)$$

- D_i :a dummy which takes one if inmate i has taken any job training program
- Objective: Estimate the following:

$$ATT = \frac{1}{N_1} \sum_{i|D_i=1} (Y_i(1) - Y_i(0)|D_i = 1) \quad (2)$$

where $N_1 = \sum_i D_i$

Matching Method (cont.)

$J_M(i)$: the set of individuals without any job training whose covariates X_l are within distance of $d_M(i)$:

$$J_M(i) = \left\{ l = 1, ..., N_l \mid \begin{array}{c} D_l = 0, \\ ||X_l - X_i||_V \leqq d_M(i) \end{array} \right\} \tag{3}$$

Matching estimator ATT_m for ATT:

$$ATT_m = \frac{1}{N_1} \sum_{i|W_i^j=1} (Y_i(1) - \widehat{Y}_i(0)) \tag{4}$$

Matching Method (cont.)

where

$$\widehat{Y}_i(0) = \begin{cases} Y_i & \text{if } D_i = 0, \\ \dfrac{1}{\#J_M(i)} \displaystyle\sum_{l \in J_M(i)} Y_l & \text{if } D_i = 1, \end{cases} \tag{5}$$

and $\#J_M(i)$ is the number of individuals in $J_M(i)$ with $M = 5$.

Table 5

(A) The Difference in Probability of Reentry into Prison

	(1)	(2)	(3)	(4)	(5)	(6)
Coefficient	−0.063*	−0.066**	−0.066*	−0.040	−0.078**	−0.099**
Standard Error	0.030	0.028	0.030	0.028	0.030	0.030
Composition of X:						
IQ	Yes	No	Yes	Yes	Yes	Yes
Educational Attainment	Yes	Yes	No	Yes	Yes	Yes
Prison Term	Yes	Yes	Yes	No	Yes	Yes
Released on Parole	Yes	Yes	Yes	Yes	No	Yes
Name of Offenses	Yes	Yes	Yes	Yes	Yes	No
The Date of Release	Yes	Yes	Yes	Yes	Yes	Yes

Table 5

(B) The Difference in Duration till Reentry into Prison

	(1)	(2)	(3)	(4)	(5)	(6)
Coefficient	26.223	40.486	20.093	−41.285	100.929	−19.888
Standard Error	156.529	62.579	146.170	64.977	151.032	149.479
Composition of X:						
IQ	Yes	No	Yes	Yes	Yes	Yes
Educational Attainment	Yes	Yes	No	Yes	Yes	Yes
Prison Term	Yes	Yes	Yes	No	Yes	Yes
Released on Parole	Yes	Yes	Yes	Yes	No	Yes
Name of Offenses	Yes	Yes	Yes	Yes	Yes	No
The Date of Release	Yes	Yes	Yes	Yes	Yes	Yes

Matching Method (among participants)

- Table 6 investigates the difference in probability of re-entry and duration till re-entry among job training participants by matching method.
- Y_i^j : the outcome for an individual i who have joined the job training program j.

$$Y_i^j = Y_i^j(W_i^j) = \begin{cases} Y_i^j(0) & \text{if } W_i^j = 0 \\ Y_i^j(1) & \text{if } W_i^j = 1 \end{cases} \quad (6)$$

- $Y_i^j(1)$:outcome of the re-entry for those who have joined the program j
- $Y_i^j(0)$:outcome of the re-entry for those who have not joined the program j
- W_i^j :dummy variable which takes one if an

(Matching Method, cont.)

ATT^j of the job training program j relative to other job training programs are defined as:

$$ATT^j = \frac{1}{N^j} \sum_{i|W_i=1} (Y_i^j(1) - Y_i^j(0)|W_i^j = 1) \quad (7)$$

where $N^j = \sum_i W_i^j$

Table 6

Treatment Group	The Difference in Probability of Reentry into Jail		The Difference in Duration till Reentry into Jail		Number of	
					Treatment Group	Control Group
(1) Cleaners	.050		−77.66		180	1,238
	(.046)		(57.81)			
(2) Forklift Driving	−.608	**	−81.43		23	1,395
	(.225)		(220.69)			
(3) Prefabricated Construction	.049		−62.14		26	1,392
	(.110)		(148.16)			
(4) Boiler Maintenance	.016		−2.91		92	1,326
	(.061)		(77.66)			
(5) Gardening	.160		−249.51	*	33	1,385
	(.091)		(114.25)			
(6) Metal Molding	.046		−77.87		141	1,277
	(.049)		(59.16)			
(7) Architecture	−.003		27.01		41	1,377
	(.082)		(93.69)			
(8) Architectural Painting	−.039		32.77		62	1,356
	(.068)		(85.79)			
(9) Plasterer	.052		−23.35		132	1,286
	(.049)		(57.90)			
(10) Automobile Repair	−.074	*	135.15	*	127	1,291
	(.033)		(57.19)			
(11) Construction Machine	.173	*	−65.83		97	1,321
	(.079)		(96.22)			
(12) Information Processing	−.156	**	167.17	**	141	1,277
	(.048)		(58.53)			
(13) Tatami mat	.113	*	−153.60	*	106	1,312
	(.113)		(69.72)			
(14) Numerically-Controlled Machine	.012		48.22		44	1,374
	(.083)		(94.29)			
(15) Electric Construction	−.088		89.69		152	1,266
	(.046)		(53.91)			
(16) Sheet Metal Working	−.040		75.26		20	1,398
	(.150)		(179.65)			
(17) Woodwork	.055		−24.30		58	1,360
	(.071)		(84.20)			
(18) Hair Dressing	−.303	**	−69.79		63	1,355
	(.059)		(70.33)			

Conclusion

This paper considered

1. the job training program participation decision making
2. the effect of various characteristics of criminals on recidivism
3. the absolute and relative effectiveness of job training program on recidivism

Further Research

- We need individual observations on criminals after release so that we can investigate their behavior after relase in more detail.