The Effect of the Prison Industry Enhancement Certification Program on Labor Market Outcomes of Prison Releasees

Abstract: This article examines the effects of the federal Prison Industry Enhancement Certificate Program (PIE) on unemployment duration, length of employment, and earnings of inmates released between 1996 and 2001 across 5 states. This is the first nationally representative dataset of PIE and this is the first comprehensive study to analyze the effect of this program on labor market outcomes of the inmate. The results indicate that the PIE program may significantly decrease unemployment duration and increase the length of employment duration for both men and women. In addition, the PIE program may also significantly increase employment and earnings of the former male inmate.

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I. Introduction

The United States currently has more individuals incarcerated than any other country in the world, with 2,310,984 prisoners held in federal or state prisons, and/or in local jails as of midyear 2008 (Bureau of Justice Statistics). Moreover, there were over 7 million people under some form of correctional supervision in 2007. Having such a large population under custody has great social costs. These costs include direct pubic expenditures, the loss of productivity due to incarceration and the opportunity costs of resources spent on supporting inmates (Freeman, 1996). This mass incarceration has also increased racial and ethnic inequality (Western & Pettit, 2000, Western & Pettit, 2005). The lifetime likelihood of being incarcerated is 1 out of every 3 for black men, 1 out of every 6 for Hispanic men, and 1 out of every 17 for white men (BJS, 2009). Moreover, over half of those incarcerated are under the age of 35 (BJS, 2009). The reality that so many young, low-skilled, minority men are being incarcerated will have dire effects on this population's employment prospects, racial disparities, and the ability to become productive law abiding citizens (Western & Petit, 2005, Western & Petit, 2000, Western, 2007).

Many men are being incarcerated at ages important for human capital investment and gaining experience in the labor market. It is estimated that 600,000-700,000 inmates, roughly 30% of the yearly increase in the labor force, are being released each year (Freeman, 2003). This begs the question: how will society absorb these mostly low-skilled laborers once they are released from prison? Thus, prisoner rehabilitation and prisoner reentry is a significant topic to consider. Prison labor is one method of rehabilitation used by department of corrections in many states and is the topic of this paper.

This paper uses the first nationally representative data on the PIE program in order to investigate how this program affects prisoner reentry. In particular, a program evaluation will be conducted in order to investigate how PIE affects labor market outcomes of inmates released

from prison between 1996 and 2001. The PIE program essentially allows the private sector to employ inmate labor behind prison walls in a "free-world" work environment. This paper contributes to the literature by investigating how prison labor programs that approximate real world employment opportunities affect post-release employment outcomes of the offender. Smith, Bechtel, Patrick, Smith, and Wilson-Gentry (2006) wrote a report submitted to the U.S. Department of Justice using a different version of this dataset. Their report is the only other research to use these data to analyze the effects of this program on recidivism and labor market outcomes. However, their analysis does not utilize control variables that are needed to distinguish the effect of the PIE program on recidivism and employment outcomes from unobservables. Moreover, their analysis presents only a descriptive analysis of the wage outcomes of participants in the program instead of estimating the program's effect within a model that also controls for the decision to work and other factors that may affect earnings outcomes. The results of this study indicate that the PIE program may significantly decrease unemployment duration and increase the length of employment duration for both men and women. In addition, it is found to significantly increase employment and earnings of the former male inmate.

The paper is organized as follows: section II gives a brief literature review; section III provides a brief overview of the PIE program; section IV presents a brief description of the underlying theoretical model; section V introduces the data and methods; section VI presents the results; and section VII concludes.

II. Literature Review

Inherent in the belief that inmate labor programs help to lower recidivism is the notion that criminals commit crimes because their opportunity cost to do so are low (i.e., the wages they earn in the legal labor market are below those they would earn in the illegal sector). Thus, there is an intricate connection between work and crime.[1] Research has shown that the supply of youths to crime is very elastic and young men are actually very responsive to the monetary returns of crime and wages. In fact, the increase in crime among young men is largely due to declining real wages during the 1970s and 1980s (Freeman, 1996, Grogger, 1998). Actually, employment may be a greater deterrent to crime than incarceration. Employment and school attendance significantly lead to reduced amounts of criminal activity in the same way (Myers, 1983, Witte & Tauchen, 1994, Lochner & Moretti, 2004).

Moreover, "…the racial differential in crime rates is in part a labor market phenomenon. Blacks typically earn less than whites, and this wage gap explains about one-fourth of the racial difference in criminal participation rates" (p.787, Grogger, 1998). The penal system may mask unemployment inequality by removing low income men from the workforce (Western & Petit, 2005). For instance, Western and Petit (2005) estimate that two-thirds of the black-white wage convergence from 1985-1999 is accounted for by black joblessness.

Thus, it may be "…that poor education, job prospects, and wages can lead to imprisonment, which in turn becomes a life-changing event and, in itself, leads to lower wages, poor wage growth, and unemployment" (p. 594, Western, 2007). This in return can lead to a vicious cycle where former offenders become embedded in a life of crime. Thus, crime itself

[1] Bushway and Reuter (2002) note four theories that link work to crime: economic choice theory, control theory, anomie, and labeling theory. In addition it is also possible that the criminal is not rational at all. For the sake of space these theories are not explained in detail here. Please refer to Cox (2009) for an in depth analysis of these theories.

becomes criminogenic and incarceration and employment are endogenous. The "…historically unprecedented growth in the penal population is highly concentrated among young, low-skill, minority men" (p. 411, Western, Kling, & Weiman, 2001). Two issues affect the reentry of prisoners into the labor market: 1) racial and educational inequality among men will increase if incarceration damages employment prospects and 2) "[i]ncarceration may not be undermining the economic opportunities of ex-inmates; it may simply be officially earmarking severely disadvantaged men who would otherwise have poor job prospects, although without the dubious distinction of membership in a policy-relevant population" (p. 411, Western et al., 2001).

Incarceration affects labor market outcomes through three mechanisms: stigma, acquiring human capital, and obtaining social capital. Incarceration marks offenders as untrustworthy making it difficult for them to find employment. For example, offenders with felony records may be temporarily unable to find employment in licensed or professional positions, as well as public sector employment in some states. In addition, incarceration may weaken offenders' job skills, hinder their attainment of job skills compared to those who are free, and lower their productivity through attrition of human capital. Incarceration may also worsen physical and mental disabilities of inmates. In addition, behaviors that are consistent with survival in a prison environment are incompatible with work environments. Finally, offenders are unable to build social capital that would enhance legitimate employment prospects while imprisoned. In this view, they are unable to build relationships that help to connect workers to employers, but may strengthen criminal networks that aid in increasing criminal activity (Waldfogel, 1994, Western et al., 2001, Grubb, 2001, Bayer, Hjalmarsson, & Pozen, 2007, Pager, Western, & Suggie, 2009).

Empirical evidence suggests incarceration has little effect on employment, but has a significant negative effect on earnings (Grogger, 1995,Western et al., 2001, Kling, 2002). Over the life course, it appears that the impact on earnings tend to increase with age, especially for

those who held white-collar occupations prior to imprisonment. There is also evidence to suggest that program effects differ with age (Western et al., 2001).

In addition, research has found that traditional human capital variables (such as race, education, age, and criminal history) have no effect on employment of prison releasees (Needels, 1996, Schmidt, 1984). Nonetheless, they do seem to affect earnings in the traditional manner. Tyler & Kling (2007) study the effect of obtaining a GED while incarcerated on earnings of inmates once released and they find that there only seems to be a premium in the mainstream labor market for obtaining a GED for non-whites. Non-whites who obtain a GED have higher earnings than non-white dropouts (roughly a 20 percent increase in earnings); however, these benefits dissipate over time. In addition, there doesn't appear to be an extra benefit to obtaining the credential over simply participating in the program.

In conclusion, work programs should reduce crime and increase legitimate earnings. However, there is no trade off between work and crime (i.e., they are not necessarily substitutes). Offenders may not be in a position to consider the long-run if the short-term need for cash is immediate and if they have no access to credit markets. In theories of social control and anomie, positive work connections can lead to reduced criminal activity. However, "[t]o the extent that offenders are embedded in a full lifestyle of a variety of anti-social behaviors (Hagan, 1993), it is unlikely that making one aspect of life more pro-social (work) will be sufficient to overcome long-held behavioral patterns and pressures to persist" (p.6, Piehl, 2003). Thus, it will take a good job to attract criminals out of a lifestyle of crime; however, these jobs will be hard to find for individuals with low skill levels such as offenders. Moreover, many jobs that may be good in the long-run do not look as attractive in the short-term. Offenders released from prison typically need jobs with immediate start dates and frequent pay periods, characteristics not held by good

jobs. It is also possible that emphasizing work only can get in the way of human capital investment which may be more beneficial in the long-run (Piehl, 2003).[2]

Nonetheless, legitimate work does help offenders to restore trust and make up for the stigma of their unlawful actions. Moreover, work could play a key role in prisoner reentry but it is uncertain exactly what form it should take (e.g., should it take the role of job search, work experience, vocational education, etc.) (Piehl, 2003). Offenders are a fairly heterogeneous group in "…the degree to which they are 'embedded' in deviant lifestyle, and their relationships with people and institutions that would support rather than retard change," therefore, it may be more effective for programs to target those individuals most likely to be rehabilitated (p.10, Piehl, 2003). Due to many inmates having serious mental health, intelligence, and/or substance abuse issues, vocational programs may be most successful for the upper end of the inmate distribution (Piehl, 2003).

Previous research has found that Participants in education, vocational, and work programs are employed more than nonparticipants (Wilson, Gallagher, & MacKenzie, 2000). Smith et al. (2006) analyze the effect of the PIE program on recidivism and labor market outcomes. PIE is a unique program that offers offenders the opportunity to work for the private sector while incarcerated. This allows the offender to gain work experience while incarcerated and skills that may be of great benefit to the offender once released from prison. They find that the PIE program significantly decreases time from release to employment, significantly increases the duration of employment, and significantly increases earnings. However, in analyzing labor market outcomes they fail to use control variables. Thus, it cannot be concluded that it is the PIE program driving their results and not other observable characteristics such as education. Moreover, their wage analysis only looks at average earnings and therefore does not control for

[2] Many offenders have to secure work as conditions for parole.

selection bias. Using a subset of their data for which control variables are available, this paper seeks to better isolate the effect of the PIE program on the duration of unemployment, the length of employment, and the earnings of the former inmate by controlling for observables that were not controlled for in Smith et al.'s investigation. If the results in Smith et al.'s analysis are not due to selection bias, then the experience and skills learned by the inmate during imprisonment should help the PIE participant to gain employment faster, maintain employment longer, and earn higher wages than non-PIE participants.

III. Prison Industry Enhancement Certificate Program[3]

The PIE program "[e]xempts certified state and local department of corrections from normal restrictions on the sale of prisoner-made goods in interstate commerce. In addition the program lifts restrictions on these certified entities permitting them to sell prisoner-made goods to the Federal Government in amounts exceeding the $10,000 maximum normally imposed on such transactions" (p.1, BJA, 2004). This program encourages state and local governments to establish employment opportunities for prisoners that approximate private-sector work. Since the beginning of the program in 1979, 45 certificates[4] have been awarded across 39 states and 6 localities.[5] In the 4th quarter ending in 2007, 38 states and 4 localities were currently certified in PIE[6] employing 5,401 inmates in 204 active cost accounting centers.[7]

[3] Please see Cox (2009) for the legislative history and an in depth analysis of PIE.

[4] "Certificate Holder refers to a department of corrections, or an alternate umbrella authority, which is approved by BJA for PIECP Project Certification. Certificate Holders assume monitoring and designation responsibilities with respect to their designated Cost Accounting Centers [(CAC)]. All PIECP prisoner-made goods are produced within cost account [CAC] that a certificate holder designates within itself, private prisons located in the same state or jurisdiction or, in the case of an umbrella authority within its membership agencies…Umbrella Authority refers to a type of Certificate Holder which is authorized by law to administer a PIECP Project and which consists of state and/or local departments of correction located within the same state. A certified umbrella authority may designate CACs within its membership agencies, as well as within members' private prisons, and assumes responsibility for monitoring CAC compliance" (BJA, 1999)

[5] Please see Cox (2009) for a complete listing of certified states.

[6] Delaware, Missouri, and the Texas Red River County Department of Corrections no longer hold certificates. On May 13, 2004 the Washington State Supreme Court found inmates working in Class 1 free venture industries to be

There are three models of employment in which the private sector can operate within PIE: manpower, customer, and employer.[8] Inmates working in the manpower model are employed by the department of corrections but are managed by the private company (Smith et al., 2006). With the customer model, the private company purchases all or part of the output from a CAC enterprise. However, "[a] customer model private sector partner assumes no major role in industry operations, does not direct production, and has no control over inmate labor" (p. 17008, BJA, 1999). Finally, with the employer model "…the private sector owns and operates the CAC by controlling the hiring, firing, training, supervision, and payment of the inmate work force. The department of corrections assumes no major role in industry operations, does not direct production, and exercises minimum control over inmate labor performance" (p. 17008, BJA, 2004). Companies participating in the PIE program have to pay prisoners the prevailing local wage for similar labor but no less than the minimum wage. In 2001 PIE wages were typically set at the Federal minimum wage at the time, $5.15 per hour (Auerbach, 2001).

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unconstitutional. However, the legislature proposed to the people an amendment to the constitution that would allow the state to employ such labor. This amendment passed in the November 2007 elections. Using a logistic regression in a public choice model, Gallagher and Edwards (1997) attempted to explain the likelihood that a state would participate in the PIE program using data from 1985-1992. They find that "...states with stronger union membership, democratic governors, and high unemployment rates will be less likely to allow PIE projects" (p. 97, Gallagher and Edwards, 1997). However, states with a rehabilitative view of prisons would be more likely to participate in PIE.

[7] "Cost Accounting Center (CAC) refers to a distinct PIECP goods production unit of the industries system that is managed as a separate accounting entity under the authority of a Certificate Holder. All PIECP production activities are conducted within the context of a designated CAC which, generally is structured either as a customer or employer model for purposes of determining PIECP inmate benefits

[8] Note that the type of model the private sector uses will determine the benefit structure of the inmate. According to the BJA PIE Federal Guidelines (1999), "PIECP projects must provide inmate workers appropriate benefits comparable to those made available by the Federal or State Government to private sector employees, including workers' compensation and, under certain circumstances, Social Security." Nonetheless, some states prohibit inmates from receiving workers compensation. However, "[p]rovision of comparable workers compensation benefits is acceptable as long as the CAC can demonstrate comparability of such benefits with those secured by the Federal or State Government for private sector employees" (BJA, 1999). Moreover, if the employer model is used, then social security benefits must be provided to the inmate. However, if the customer model is used then "…the BJA recognizes the applicability of other provisions of Federal law which may operate to preclude the provision of PIECP inmates with certain benefits, including Social Security."

IV. Theoretical Background

The decision to commit a crime is formalized in a simple static model similar to a simple portfolio problem where the individual has to make a decision as to how much of his wealth to put at risk in criminal activity (Heineke,1978). The model follows from theories previously presented by Becker (1968), Ehrlich (1973), and Sjoquist (1973) and formalized by Heineke (1978) and Schmidt and Witte (1984). The behavior of offenders is consistent with the rules of optimizing behavior. Expectations can be formed about legitimate and illegitimate opportunities.[9] A criminal will commit an offense only if the expected utility of committing a crime is greater than the expected utility of using his time and other resources towards other activities.[10]

The criminal's maximization problem is modeled as follows:

$$(1)\ \underset{t_L, t_I}{Max} \quad \sum_{i=1}^{6} p_i U(I_i)$$

$$s.t.\, t_L, t_I \geq 0 \ and \ t_L + t_I \leq T,$$

where p_i is the subjective (or expected) probability of detection and conviction in state i, I_i is the total income or wealth in state i, t_L is the time spent in the labor market, t_I is the time spent in illegal activity, and T is the total time endowment. Assuming an interior solution, or that the constraints are not binding, then this becomes an unconstrained maximization problem. This

[9] Legitimate opportunities would be employment in the legal market, such as construction work, working at a fast-food restaurant, etc.; while illegitimate activities would be black market activities, such as selling drugs, supplying stolen goods for purchase at lower prices, etc.

[10] As Witte and Tauchen (1994) and DiIulio (1996) point out, this type of labor model of crime that uses time to commit an offense may not characterize criminal behavior because many offenses may not be planned and don't take much time to commit. Witte and Tauchen (1994) call these "crime as work" models (p.2). They also argue that these models do not include the psychic gains within the model. As a result, they use a model similar to the one suggested by Block and Lind (1975) and use the level of criminal activity in their theoretical model instead of time devoted to illegal behavior. However, these "crime work models" lead to the conclusion that improving legal work opportunities will help deter criminal activity. Since this thesis is a study of improving how legal work opportunities affect offender's criminal behavior, this model seems to be appropriate.

assumption means that the individual will choose to partake in legal, illegal, and leisure activities.[11]

The first order conditions for this maximization problem imply that this model is recursive: time spent in legal activities is determined independently of income and illegal gains and attributes (Schmidt & Witte, 1984). As a result, the "…system…is not a system of simultaneous equations, but rather a recursive system in which legal activity decisions are made and then, given [these decisions], the allocation to illegal activities is determined" (pp.18-19, Heineke, 1978).[12] Comparative statics reveal that the time allocated to legal labor market activity is dependent on legal gains earned while free and legal earnings made while incarcerated. The criminal's time allocation to the official labor market varies positively with both parameters. [13]

V. Data and Methods

Data

The data were collected, compiled, and matched by Smith and her coauthors using grants from the Bureau of Justice Assistance and analyzed under the National Institute of Justice in order to investigate the effects correctional industries have on inmate re-entry. The data were gathered from agency records across 5 states and includes inmates incarcerated in 46 prisons, at different security levels, released between January of 1996 and June of 2001. The follow up period ended in February of 2003 so inmates could be followed from 2 to 7.5 years. The states were selected using a cluster sampling strategy in order to guarantee an adequate sample size. Using this method, states, certified prior to 1996, were ranked according to the number of PIECP

[11] Inherent in this model is the rather unrealistic assumption that the value of leisure is zero. This is probably a very unrealistic assumption. However, this model is similar to that used in Schmidt and Witte (1984) and Heineke (1978). However, Schmidt and Witte (1984) show that when leisure is taken into consideration, one needs even stronger assumptions than that of the present model in order to obtain unambiguous results.

[12] If this analysis represents the decision to recommit a crime, then this may not be an invalid assumption. Freeman (1996) finds that crime and employment may be mutually exclusive for youths who end up incarcerated.

[13] Please see Cox (2009) for the full model with comparative static results

participants.[14] This method led to the selection of 5 states. From these states, all inmates who worked in PIE that were released between January 1996 and June of 2001 were selected. Data from the Social Security Administration were then merged with these individuals to obtain information on employment and earnings (Smith et al., 2006). .

Qualification for PIE differs by state correctional facility and industry. Although there are similarities in criteria between most of the institutions and industries, it is not uniform (Smith et al., 2006). In general, Department of Corrections prerequisites are: "[1)] disciplinary report free for 6 months[;] [2)] minimum and medium security levels[;] [3)] enrolled in a high school or GED program or completion[;] [4)] sentence of at least 6 months remaining[;] [5)] no major medical problems prohibiting work" (Smith et al., 2006).

Common industry requirements are: "[1)]submit an application[;] [2)] prior work experience, but some employers prefer to hire those who have never worked before[;] [3)] ['f']it with the current work force" (Smith et al., 2006). Inmates were then matched using a variable by variable approach to inmates who worked in traditional prison industries (TI) or participated in activities other than industrial work (OTW). Exact matches were made on race (white and minority), gender, and crime type (person and all other)**.** Category matches were made on age at intake (5 criteria), timed served (7 criteria), and the number of disciplinary reports (10 criteria). Information on control variables was not collected for all inmates in the master dataset. Therefore, this study analyzes a subset of these data containing 890 observations that have complete information on all of the control variables of interest.[15]

[14] The ranking resulted in states from "…all major U.S. geographic regions, rural and urban populations, gender representation to ensure results can be determined based on gender, and each of the models of PIECP…" (p.7, Smith et al., 2006).

[15] In doing so it is assumed that the data are Missing Completely at Random. In other words, it is assumed that this subsample is a random sample of all data that could possibly be examined. In other words, "…suppose x_i is an observation on a variable in the data set... Then the data on x_i is said to be MCAR if the probability of missing data on x_i depends neither on its own values nor on the values of other variables in the data set" (p. 927, Cameron &

One of the criteria for participation in the PIE program is that it must be voluntary. As a result, there may be considerable selection bias when analyzing this program for it could be that a significant effect of the program is due to unobservable inmate characteristics, such as motivation, and not the program itself. Therefore, matched samples were used to control for selection bias. However, because of the use of matched samples, the results should only be generalized to those inmates who participated in PIE or are similar to PIE workers. A related idea that affects the ability to generalize the results from this data is the notion of creaming. Creaming is when the program chooses the best inmates from the pool of incarcerated individuals who would have been more successful upon release regardless of whether they participated in PIE. In addition, the data does not allow determination of those individuals who are housed in a PIE facility but are included in the TI or OTW cohorts. Moreover, spillover effects of being placed in a cost accounting center cannot be isolated nor controlled. Furthermore, there is no variable to control for the particular task of the inmate while incarcerated. Because of overlap among the duties performed by TI and OTW and TI and PIE, there must be a large outcome between the groups before a significant difference will be detected.[16] Finally, the data does not have enough information to control for the effect of educational or vocational training that may be required for participation in the PIE program (Smith et al., 2006). Due to this research design, the results of the following analysis can only be generalized to the 5 states and the participants in the sample (Smith et al., 2006). The following sections present the methods used and the variables that will be included in the labor market equations.

Trivedi, 2005). Thus, no bias will result and the parameter estimates will be consistent. Nonetheless, standard errors will be larger due to loss of information (Cameron & Trivedi, 2005). As mentioned above, the data are collected from agency records that are recorded by employees of these agencies. Since all of the variables used in this analysis are not self-reported as in surveys, it seems reasonable there is no additional information in the data set that would aid in predicting these missing values.

[16]Please see Appendix B for descriptions of PIE, TI, and OTW

Methods

Although the decision to commit a crime and employment outcomes are intricately connected, the decision to commit a crime is recursive. That is, the criminal first decides how many hours of legal labor to supply then decides how many hours to dedicate to criminal activity. Therefore, the effects of the PIE program on work outcomes is analyzed separately from the decision to recommit a crime. This section presents the methods used and the variables that will be included in the labor market equations.

The analysis of employment outcomes will be executed with survival analysis using the commonly applied Cox Proportional Hazard (PH) model, Weibull model, and the lognormal model.[17] The Cox PH model is popular in duration data due to its semi-parametric approach. Unlike other models, such as the log-normal, log-logistic, gamma, Weibull, and Gompertz, the Cox proportional hazard model does not assume a functional form for the baseline hazard model. This gets around the issue of inconsistent estimators that plagues fully parametric models if the underlying model is misspecified (Cameron & Trivedi, 2005). Moreover, even though the estimator is inefficient, the loss in efficiency is small when compared to maximum likelihood estimators for fully parametric PH models (Cameron & Trivedi, 2005). This estimator also controls for censored and tied data.[18]

The proportional hazard rate for this model is of the form:

$$(2)\ \lambda(t \mid x, \beta) = \lambda_0(t)\phi(x, \beta),$$

If $\phi(x, \beta) = \exp(x'\beta)$ [19] is selected then:

$$(3)\ \lambda(t \mid x, \beta) = \lambda_0(t)\exp(x'\beta),$$

β is then estimated by minimizing the log partial-likelihood function:

[17] Please see Cox (2009) for the benefits of using survival analysis
[18] Tied data occurs when multiple failures happen at the same point in time (Cameron & Trivedi, 2005)
[19] This assumes $\varphi(x,\beta) > 0$

$$(4)\ \ln L_p(\beta) = \sum_{i=1}^{N} \delta_i \left[\ln \phi(x_i, \beta) - \ln(\sum_{l \in R(t_i)} \phi(x_l, \beta) \right],$$

where δ_i is an indicator variable equal to 1 for uncensored observations and zero for censored subjects, x_i are time-constant regressors that vary by individual, β is a vector of parameters, & $R(t_j)$ is the set of periods at risk at t_j (Cameron & Trivedi, 2005).

Nonetheless, reliability of the parameter estimates of the Cox model is based on the proportional hazard assumption. If this assumption does not hold then it may be best to estimate the model using a parametric model such as the Weibull or lognormal models. As such, they require the baseline hazard to follow the Weibull distribution or lognormal distribution respectively. The Weibull model is a popular model in the survival literature because it can have an increasing, decreasing, or constant hazard rate. However, because it has a monotonic hazard rate, it restricts the hazard function so that it can only increase, decrease, or remain constant (Chung et al., 1991). If the underlying hazard function is nonmonotonic then this model will not be appropriate. The lognormal distribution is nonmonotonic and has been shown to be appropriate in previous analysis of recidivism data, so it is also applied here (e.g., Chung et al., 1991). It has an inverted bathtub shaped hazard function that first increases and then decreases (Cameron and Trivedi, 2005).

The following likelihood function is maximized for the Weibull and lognormal models:

$$(5)\ \ln L(\theta) = \sum_{i=1}^{N} [\delta_i \ln \lambda(t_i|x_i, \theta) + \Lambda(t_i|x_i, \theta)],$$

where $\lambda(\cdot)$[20] is the hazard function, $\Lambda(\cdot)$[21] is the cumulative hazard function, δ_i is an indicator variable equal to 1 for uncensored observations and zero for censored subjects, x_i are time-

[20] The hazard for the Weibull distribution is $\gamma\alpha t^{\alpha-1}$, where $\gamma = \exp(x'\beta)$. The hazard for the lognormal distribution is $\exp(-(\ln t - \mu)^2/2\sigma^2)/t\sigma\sqrt{2\pi}\ [1 - \Phi((\ln t - \mu)/\sigma)]$

[21] The integrated hazard for the Weibull distribution is $\exp(-\gamma t^{\alpha})$. The integrated hazard for the lognormal distribution is $1 - \Phi((lnt - \mu)/\sigma)$.

constant regressors that vary by individual, t_i is the span of a possibly unfinished time period, and θ is a q x 1 parameter vector (p.587, Cameron & Trivedi, 2005).

The dependent variable used to measure the duration of unemployment is time from release to employment measured in quarters. The choice to supply labor will also depend on participation in TI or OTW relative to PIE and the vector of time constant regressors of personal characteristics believed to influence tastes (Pencavel, 1986). Personal characteristics include the type of crime committed, race, age at release, age at release squared, time served, education, number of disciplinary reports, marital status, substance abuse history, quarters worked prior to incarceration, previous occupation, number of children, mental health status, gender, health status, number of previous incarcerations, history of juvenile delinquency, facility dummies, and release year dummies.

Human capital theory suggests race should be used to control for discrimination and differences in taste (Schmidt & Witte, 1984). Moreover, it may be that race plays a more important role in labor market outcomes among the population of exoffenders (Saylor & Gaes 2001, Kling, 2002). Conventionally, age is a variable used in labor market analysis to denote experience. However, the negative impact of incarceration on labor market outcomes seems to increase with age (Western et al. 2001). Due to this nonlinearity, the square of age at release is incorporated into the analysis. Time served is an indication of depreciation of human capital because offenders may lose experience and skills while incarcerated (Schmidt & Witte 1984; Needels, 1994; Western et al., 2001). Greater education should indicate more skills and should signal to the employer worker productivity. However, segmented labor market theorists argue that employers see education as a signal of traits and characteristics attractive to employers (Cain, 1976). Nonetheless, there is evidence that this may not be the case for the inmate population (Needels, 1994; Western et al., 2001; Schmidt & Witte 1984). Quarters worked prior

to incarceration measure attachment to the labor market preceding imprisonment and job stability. Job stability may lead to decreases in adult crime (Sampson & Laub, 1992). Previous Occupation controls for the type of industry the inmate worked in prior to incarceration. Individuals who worked in white collar jobs or positions of trust may find it harder to obtain employment upon release (Waldfogel, 1994; Kling, 1999).

Criminal History variables represent a type of lifestyle employers may find offensive and antithetical to a good worker (Schmidt & Witte, 1984). Those with more extensive criminal histories will be more involved in criminal lifestyles (Piehl, 2003; Sampson & Laub, 1992). Also, those with more established criminal records may be more stigmatized, or suffer from greater discrimination on the labor market. The type of crime committed for the incarceration offense is included because employers may find activity in certain crimes more apprehensible (Grogger, 1995; Grubb, 2001; Waldfogel, 1994). Moreover, the skills needed for survival in prison are opposite of those needed to obtain and maintain employment. Thus, the number of disciplinary reports represents the extent of continued criminality behind bars (Western et al., 2001, Schmidt & Witte, 1984;Tyler & Kling, 2006).

Substance abuse history may signal to the employer lower worker productivity. Moreover, there may be a stigma attached to substance abuse and therefore, such individuals may suffer from discrimination (Schmidt & Witte, 1984; Borus, Hardin, & Terry, 1976). Former inmates with mental health disorders may have a hard time finding and maintaining employment due to disability or discrimination. It has also been found that inmates disproportionately suffer from mental health disabilities (Freeman, 2003; Piehl, 2003). Dummy variables for the year of release will pick up labor market and general economic conditions at the time the inmate is discharged from prison. Individuals who are sick or disabled will have a harder time finding

employment. This may be due to health reasons or discrimination thus health status is controlled for within the regressions.

Marital Status is a measure of taste and in theories of social control and anomie can represent social achievement and social attachment. Thus, it may lead to increased social stability and reductions in adult criminal behavior (Sampson & Laub, 1992). The number of dependents is also a common variable included in labor market analysis. Individuals with dependents have greater financial obligations and may be more compelled to seek employment. Gender and its interaction terms with the other covariates are incorporated into the analysis because it is well documented that labor market outcomes for men and women differ. Finally, the main variable of interest will be the variable indicating participation in PIE, TIE, or OTW. This framework will provide a difference in difference estimator for the effects of PIE participation on employment.[22]

The dependent variable used to measure the ex-offender's duration of employment will be employment to job loss. It is important to note that labor market volatility among prison releasees is selected by the former inmate since the majority of employment terminations are intentional (Schmidt & Witte 1984). Therefore, this variable could be thought of as a measure of job satisfaction or job stability.[23] In theories of segmented labor markets (or dual economies), it is believed that inferior wages and mediocre jobs bring about work instability (Schmidt & Witte 1984). These low wage, low quality, unstable jobs are a result of "…the workers' habits and attitudes ("tastes for work") that are inimical to steady employment, to the firm's output goals,

[22] Incarceration wage and wage upon release are indirectly controlled for through PIE participation. These variables are not directly included in the analysis due to not wanting to over-control for the effects of PIE; e.g., if PIE is beneficial because it increases post-incarceration wages then including this variable in the analysis will eliminate the effect of PIE.

[23] However, the data since the data is measured in quarters and we can't observe how many times an individual changes jobs in a quarter, this may not be measuring job stability.

and to upgrading onself" (Cain, 1976). To the extent that this is true, time from employment to job loss will also measure exoffenders' attitudes towards work. The control variables used in this analysis will be much the same as those in the recidivism and employment analysis discussed above. The only difference is that the inmate's previous occupation is not included in the analysis measuring duration of employment. This is because it is believed that previous occupation influences the ability to obtain a job but does not necessarily effect the capacity to maintain employment.

The wage analysis will be performed using a two-step Heckman selection model to control for selection bias. The following two-step procedure is employed:

(6) $w_i = x_{2i}^{'}\beta_2 + \sigma_{12}\lambda(x_{1i}^{'}\hat{\beta}_1 + \upsilon_i),$

where w_i is the log of the post release weekly earnings, x_2 are covariates included in the wage equation with at least one regressor different from that in x_1 for identification purposes, and υ_i is the error term. $\hat{\beta}_1$ is estimated by first regressing non-prison employment, defined as having worked at least one quarter post-incarceration, on x_1 with the following equation:

(7) $\Pr[Employment_i = 1 \mid x_{1i}] = \Phi(x_1^{'}\beta_1),$

where $\Phi(\cdot)$ is the standard normal cdf and x_1 is a vector of covariates that include an indicator variable for participation in OTW, an indicator variable for participation in TI, education, age at release, age at release squared, number of disciplinary reports, number of years served in prison, race, number of previous incarcerations, history of substance abuse, an indicator variable for having committed a property offense for the original offense, an indicator variable for having committed a drug offense for the original offense, an indicator variable for having committed an offense in the other category (all offenses not classified as property, drug, or an offense against a person), having a history of juvenile delinquency, having a history of a mental health issue, being

single, number of quarters worked pre-incarceration, number of children, having a medical special need, and release year dummies. X_2 consist of all the variables in x_1 except for the number of disciplinary reports. The inverse Mills ratio, $\lambda(\cdot)$, is then estimated by the following equation:

$$(8)\ \lambda(x_1' \hat{\beta}_1) = \frac{\phi(x_1' \hat{\beta}_1)}{\Phi(x_1' \hat{\beta}_1)},$$

where $\phi(\cdot)$ is the standard normal pdf (Cameron & Trivedi, 2005). It is assumed that the error in the wage equation is a multiple of the error term in the employment model plus some noise that is independent of the error in the employment equation.

VI. Results

Summary Statistics

The sample is a cross-section of 890 offenders. As can be seen in the summary stastistics presented in Table I, there is a fairly even distribution of OTW, TI, and PIE workers each comprising 34%, 32%, and 34% of the sample respectively. Naturally, because of the nature of this study, the concentration of TI and PIE workers is extremely high compared to the overall state inmate population. In 2000, 39.4% of state inmates worked in General Work, 3.0% did farm work, 5.3% worked in Traditional Industries, and 0.3% worked in PIE (Solomon, Johnson, Travis, & Mcbride, 2003).

Langan and Levin (2001) report that of the offenders released from prison in 1994, 50.4% of inmates were white and 48.5% were black, and 2.1% were other. In this sample 49% are white, 45% are black, and other minorities are 6% of the sample. Moreover, while women are only 8.7% of prisoners released, they are roughly 31% of these data. In addition, 44.1% of

prisoners released in 1994 were under age 30 compared to only 21.2% of this sample. Forty-seven percent of the sample is single and the average number of children for an inmate is 2.

There is a high percentage of inmates with a history of substance abuse with 85% having had a history of alcohol or drug use. Solomon et al. (2003) report 70% of state prison inmates having ever used drugs, 57% using drugs the month before arrest, 33% using drugs at the time of offense, and 37% using alcohol at the time of offense. Moreover, 25% of the sample has a mental health problem and 8% of the sample has a medical problem with a special need. Those with a mental health condition or physical medical problem comprise 28.5% of the sample. However, Solomon et al. (2003) states this number to be 31%.

The average education level for the inmates in this sample is 11 years. Moreover, only 5.2% of the sample had less than eight years of education; Freeman (2003) reports this number to be at 8%. Thus, this sample seems to be more educated. Average weekly earnings prior to incarceration are $41.34, average weekly earnings during incarceration are $39.31, and average weekly earnings post-incarceration are $192.60.[24] Ex-offenders worked an average of 11 hours per week prior to incarceration, 9 hours per week during while in prison, and 32 hours after release. Prior to incarceration 24% of the sample worked in food, retail, or an office; 33% worked as unskilled laborers, in assembly, in a warehouse, or trucking; 3% were self-employed; 28% worked in skill labor, in construction trades, or in welding; and 12% are unemployed, a student, or disabled (SSI).

Of the sample, property offenders, personal offenders, and drug offenders comprised 26%, 43%, and 29% respectively. Of offenders released in 1994, 22.5% were violent offenders (e.g., murder, sexual assault, and robbery), 33.5% were property offenders, and 32.6% were released from Drug offenses. It appears as though this sample has a fairly high percentage of

[24] Averages for weekly earnings are not adjusted for inflation.

individuals who committed crimes against a person compared to the 1994 sample of prison releases (Langan & Levin, 2001). The mean number of incarcerations for these data is 2, with 85.6% of the sample having had a prior incarceration. This is much higher than the 56% found by Langan and Levin (2001) in 1994. Moreover, the average time served in prison in this sample is 54 months (1,620 days) compared to 20.3 months in 1994 (Langan & Levin, 2001). The average monetary penalty is $90,803.57. Thirty-five percent of the sample had involvement in delinquent acts as a juvenile. In comparing these statistics with those of the sample used in Langan and Levin (2001) it seems as though this data does not suffer from a creaming effect (i.e., it does not appear that the data include only the "best" of the criminal offenders).

This sample has a much lower rate of recidivism than prisoners released in 1994. For the 3 years they were followed in 1994, 67.5% of inmates were rearrested, 46.9% were reconvicted, and 51.8% were reincarcerated. However, in this sample 43% were rearrested, 30% were reconvicted and 13% were reincarcerated. Moreover, 80% of the sample obtained employment after release; however, 91% lost their jobs during the follow up period.

How Does PIE Participation Affect Employment Outcomes?

In the theoretical model, the time allocated to legal endeavors and the time allocated to illegal activities is recursive; i.e., the decision to work or commit a crime can be analyzed separately. Therefore, it is assumed in this analysis that the inmate first decides how much time to allocate to the labor market, and then decides how much time to allocate to illegal activities thereby allowing labor market outcomes to be examined separately from the recidivism analysis. If focus was solely on recidivism, then the analysis would only investigate if the treatment, i.e. the PIE program, reduced criminality. However, if whether the treatment actually alleviates the targeted criminogenic needs of the criminal is important (e.g., increased job skills and an increased likelihood of employment upon release), then recidivism should be a secondary goal in

analyzing the rehabilitative effects of the PIE program on the inmate (Maltz, [1984]2001). Moreover, "focus[ing] on these more tangible aspects of rehabilitation would have fewer measurement problems" (p. 9, Maltz, [1984] 2001). Thus, how the PIE program affects these criminogenic needs will be evaluated by looking at how the program influences the duration of unemployment; how the program influences the length of employment; and how the program impacts wages upon release.

Analyzing the time from release to employment essentially investigates unemployment duration from the time an inmate is released from prison. Thus, this section examines how the PIE program affects the inmates' ability to obtain employment upon release from prison. We first analyze how PIE affects the duration of unemployment using Kaplan-Meier survival estimates. Kaplan-Meier survival estimates are equivalent to the Cox proportional hazard model estimated with no covariates. The Kaplan-Meier survival results presented in Figure 1 illustrate that PIE performs better than both TI and OTW in obtaining employment upon release from prison. Nonetheless, log-rank tests of equality of the survival curves fail to reject any differences among the graphs of the three cohorts.

Table II presents the Cox, Weibull, and lognormal models with the control variables. The difference in these models may be due to goodness of fit, i.e. the different assumptions made by each of the models about the baseline hazard function. Therefore, in order to test the appropriateness of the different models "…an empirical estimate of the cumulative hazard function based…on the Kaplan Meier survival estimates [is calculated] …taking the Cox-Snell residuals as the time variable and the censoring variable as before, and plotting it against [the Cox-Snell residuals]. If the model fits the data, then the plot should be a straight line with slope of 1" (p. 230, Stata, 2003). The tests reveal that none of the models provide a very good fit for measuring the time from release to employment. However, the Weibull and lognormal equations

are superior to the Cox model. The specification tests also show little difference in the goodness of fit of the lognormal and Weibull models (the Cox model seems to be the worst fit of the data). Nonetheless, the log-likelihood is larger in the lognormal model indicating that the lognormal model may provide a better fit than the Weibull specification. Although it is not significant, PIE participants have a higher hazard rate in the Cox model and a more accelerated failure time in the lognormal and Weibull models than the TI and OTW cohorts indicating that those who participate in PIE gain employment faster than TI and OTW participants.

An additional equation, Cox Model 2, presented in Table II is estimated by giving those observations that are recorded as having failed immediately, i.e. having a time of zero from release to employment, the smallest recognizable number that is close to zero but not equal to zero so that these observations may be included in the analysis. This can be done because it is the ranking of the numbers that is most important when estimating the Cox model. The results from this procedure indicate that both OTW and TI have significantly lower baseline hazards relative to PIE.[25] Moreover, women OTW participants have significantly lower baseline hazards than men who performed similar duties. TI workers have a baseline hazard that is 21.7% lower than PIE workers, male OTW participants have a baseline hazard that is 25.1% lower than PIE workers, and female OTW participants have a baseline hazard that is 61.4% lower than PIE workers. The fact that we get significant results by increasing the sample may indicate that the results in the previous analysis are inefficient due to the small sample size. However, it may also

[25] Nonetheless, we do not have data to control for the type of release and whether or not these individuals are released to a halfway house or work release. OTW are 26%, TI are 29%, and PIE are 45% of those recorded to have employment upon release. Nonetheless, this still speaks to the benefit of the program to the extent that PIE allows inmates to gain connections to employers that help them to gain employment on the outside.

be that individuals who work in PIE are able to make employment networks while incarcerated that help them to obtain employment immediately upon release from prison.[26]

We next examine employment duration. If job termination is the decision of the employer, then evaluating time from employment to job loss will be equivalent to assessing the soft-skills of the ex-offender, e.g., the ability to consistently show up at work on time. However, if job termination is the decision of the former inmate, as is believed to be the case in the literature (see Schmidt & Witte, 1984), then investigating PIE's effect on the time from employment to job loss will be a measure of job satisfaction and stability of the ex-offender. Thus, time from employment to job loss may be measuring how the PIE program affects the ex-offenders ability to attain satisfactory employment.[27] This is important because in theories of dual, or segmented, labor markets unsatisfactory employment is one reason individuals end up in the secondary, or low-paying, labor pool. Following the logic of segmented labor market theorists, helping offenders to attain better, more pleasing jobs will help to decrease their criminal activity.

The Kaplan-Meier survival estimates in Figure 2 show no difference between PIE, TI, and OTW. Moreover, log-rank test of equality fail to reject the null that all three survival curves are equal. Table III shows that the Cox, Weibull, and lognormal models. Specification tests, like those performed in the previous analyses, once again show that the lognormal and Weibull models are superior to the Cox model. They are decent fits of the data when measuring time from employment to job loss. Nonetheless, PIE participation does not significantly affect the

[26] It should be noted that we cannot control for the type of release (supervised release, work release, etc.). Nonetheless, to the extent that this does not systematically vary across PIE, TI, and OTW participants this should not affect the results. 33% of OTW, 38.3% of TI, and 56.7% of PIE have immediate employment upon release from prison.

[27] In this dataset there is no way to determine how many jobs an individual holds within each quarter. Thus, this is a very imperfect measure of job satisfaction because we can only determine that the individual maintained employment and not how many jobs an individual has throughout the observation period.

time from employment to job loss in any of the three methods used; although the effect of participation in OTW relative to TI is a shorter duration of employment.

The main difference between TI and PIE is the substantial difference in incarceration wages; both groups learn hard and soft skills while incarcerated (Smith et al., 2006). Thus, to the extent that the development of soft and hard skills is what is important for better post-release labor market outcomes, then PIE and TI should be analyzed together. That is, PIE and TI should be compared to OTW. Model 2 of each method presented in Table III makes these calculations. Using the same techniques presented above to determine the fit of the models illustrates that the Weibull and the lognormal equations are superior to the Cox model. However, while both the Weibull and the lognormal provide good fits to the data, the lognormal has a larger log-likelihood than the Weibull model so it may provide the best fit. Once TI and PIE are combined into one group we see that there is a significant difference from OTW participants in the Lognormal specification. Being a PIE or TI worker increases employment duration by 18% relative to the OTW group.[28]

In conclusion, those in the TI and OTW groups may have longer durations of unemployment relative to PIE workers, with women who work in OTW having the longest duration of unemployment. Moreover, an inmate that participated in activities characterized as other than work will have a shorter duration of employment when compared to PIE and TI workers. It appears as though PIE and TI may be teaching inmates hard and soft (e.g., showing up to work consistently and on time) skills that enable them to maintain employment longer upon release.

[28] This same analysis was performed for the duration of unemployment, however, the results were not significant.

How does PIE Participation Affect Wages?

Wages are the payoff to legal labor market activities. Therefore, according to the theoretical model[29], wages will directly affect the criminal's decision to (re)commit a crime. In the theoretical model an increase in legal wages has an ambiguous effect on crime, increasing the payoffs to legal labor market activity encourages criminal behavior (crime and legal employment are gross compliments) only given certain assumptions about attitudes towards risk and different states of the world. Nonetheless, rational choice theory and previous research suggest that legal earnings are important in reducing criminality as discussed in the literature review. The empirical results in the recidivism analysis of Cox (2009) show that once the payoffs to free labor and incarceration labor are accounted for in the model PIE participation no longer has an effect on recidivism. Moreover, time from release to arrest and time from release to conviction are significantly and positively influenced by the post-hourly wage (i.e., increasing post-hourly wages seems to reduce recidivism). Thus, for a complete analysis of labor market outcomes, it seems appropriate to analyze how PIE participation affects free labor market wages. In this section this will be investigated by first modeling labor market employment and then analyzing wages for men who had recorded earnings.

The probability of being employed is first analyzed in a probit model. Table IV shows the probit model for employment defined as having worked at least one quarter post-incarceration. It indicates that OTW and TI participants have statistically significant lower probabilities of employment than PIE individuals. Being in the OTW category lowers the probability of employment by .115, and working in TI lowers the probability of employment by .138.

To analyze how PIE participation affects weekly earnings, OLS is ran, without controlling for selection bias resulting from the decision to work, also presented in Table IV.

[29] See Cox(2009) for a detailed analysis.

The OLS results show that having participated in OTW while in prison lowers weekly earnings by 22.2% compared to those of PIE participants, however, there is no difference between PIE and TI.

A Heckman two-step selection model is used to control for selection bias. In order to obtain identification, at least one variable must be different between the selection equation and the wage equation. This variable is the number of disciplinary reports while in prison. It is believed that this covariate represents attitudes and characteristics that are counterproductive to the legal labor market, and will thus affect the decision to commit a crime, however, it should not affect the earnings of the ex-offender once the decision is made to work. The inverse mills ratio in the Heckman-selection model is essentially the hazard for obtaining employment. It is included in the model in order to control for the selection bias that is inherent in the decision to work. In this model it is not significant as can be seen in Table IV.[30] All of the signs are as expected except for the coefficients on TI. Compared to the OLS model, once selection is controlled for the marginal effects of OTW are no longer significant. Moreover, the sign on TI changes from negative to positive. It appears as though controlling for selection mitigates the effects of participation in PIE compared to OTW and TI. The coefficient on OTW in the wage equation excluding experience, also shown in Table IV, is negative and statistically significant indicating that those who were placed in other than work positions earned 25.3% less than PIE participants after release from prison. Nonetheless, there is still no significant difference between PIE and TI.

[30] This model is also estimated using the full maximum likelihood estimator (MLE) in order to test for selectivity bias. The full MLE tests for selection bias based on the correlation parameter rho. The rho coefficient is not significant when the model is estimated using full MLE. Thus, selection bias does not seem to be important in the model.

These findings suggest that there is no difference in post-release earnings between PIE participants and the TI cohort. However, PIE participants could earn up to 25.3% more than OTW participants upon release from prison. In addition, once experience is controlled for there is no significant difference between PIE and OTW. As in the duration of employment analysis, this indicates that what may be of most importance, once employment is controlled for, is having any work experience while incarcerated.

VII. Conclusion

The PIE program is a unique federal initiative that allows private industry to utilize prison labor for the manufacturing of goods and services. The program is thought to benefit the public (e.g., the state, tax payers, victims) and the inmate (e.g., enhanced skills, leading to higher better paying jobs upon release). This paper seeks to investigate how participation in the PIE program affects the labor market outcomes of inmates. The results suggest that the PIE program may help to decrease unemployment duration and increase the duration of employment for both men and women prison releasees. Moreover, PIE may significantly increase employment and the earning potential of male ex-offenders.

However, these results should be cautioned for several reasons. First, due to the nature of the data, the results cannot be generalized to the prison population as a whole. In an attempt to control for sample selection, the data is compiled of individuals who participated in PIE and those individuals who performed TI or OTW tasks while in prison that are most similar to PIE participants. Therefore, these results can only be generalized to inmates who are similar to PIE participants. Moreover, the program is voluntary and the data to control for this decision is not available. Consequently, although there is an attempt to control for selection bias through the inclusion of additional covariates and the sampling strategy, there may still be some bias in the

results. Finally, there are a number of things that could not be controlled for, due to confidentiality agreements, which may have also caused bias in the outcomes.

Nevertheless, given the above caveats, there are still some interesting policy implications for these results. If these results could be generalized to the broader prison population it would suggest that putting prisoners to work in a real world setting and expanding the scope of the PIE program may help inmates to attain more satisfying jobs that pay higher wages upon release from prison. Moreover, it may be that the PIE program is most beneficial as a signal to free-world employers of those inmates who have the skills necessary to be good workers.

Future research will seek to better identify what is driving the differences between PIE, TI, and OTW participants; as well as apply new developments in program evaluation, such as propensity score matching, in order to more adequately control for endogeneity and measure local average treatment effects. Moreover, this effect may show up for some groups but not all so it may be important to explore threshold effects. Finally, it may be more likely that the decision to recommit a crime and the decision to work are jointly determined and therefore, should be estimated simultaneously.

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Appendix A: Tables and Figures

Tables

Table I. Summary Statistics

Variable	Obs	Mean	Min	Max
Other Than Work Participants (OTW)	890	34		
Traditional Industries Participants (TI)	890	32		
Prison Industry Enhancemant Certification Program Participants (PIE)	890	34		
Age at Release (Years)	890	36	20	60
White	890	49		
Black	890	45		
Other	890	6		
Female	890	31		
Education (Highest Grade Completed Pre-incarceration)	890	11	0	20
Single (Binary Variable indicating if Inmate is Single)	890	47		
Number of Children	890	2	0	10
Number of Hours Worked Per Week Pre-Incarceration	890	11	0	40
Number of Hours Worked Per Week During Incarceration	890	9	0	40
Number of Hours Worked Per Week Post Incarceration	890	32	0	40
Previous Occupation: Food/Retail/Office	887	24		
Previous Occupation: Unskilled labor/Assembly/Warehouse /Trucking	887	33		
Previous Occupation: Self-Employed	887	3		
Previous Occupation: Skilled Labor/construction Trades/Welding	887	28		
Previous Occupation: Unemployed Disabled (SSI)/Student/Unemployed	887	12		
Mental Health Issue (Prison Records Indicated a Mental Health Problem)	890	25		
Medical Special Need (Prison Records Indicated Inmate Has a Physical Medical Special Need)	890	8		
History of Substance Abuse	890	85		
Number of Previous Incarcerations	890	2	0	24
History of Delinquency as a Juvenile	890	35		
Offense Type: Personal	890	43		

Table I. Summary Statistics Continued

Variable	Obs	Mean	Min	Max
Offense Type: Property	890	26		
Offense Type: Drug	890	29		
Offense Type: Other	890	2		
Time Served (years)	890	4.44	0.20	30
Number of Disciplinary Reports	890	3	0	64
Time from Release to First Arrest (Days)	885	1011	0	2630
Censored Arrest (Ex-Offenders who Were not Arrested During the Follow Up Period)	889	57		
Time from Release to Conviction (Days)	885	1164	10	2660
Censored Conviction (Ex-Offenders who Were not Convicted During the Follow Up Period)	889	70		
Time from Release to Incarceration (Days)	889	1317	30	2660
Censored Incarceration (Ex-Offenders who Were Not Incarcerated During the Follow Up Period)	889	87		
Release to Employment (Quarters)	890	4	0	30
Censored Employment (Ex-Offenders that did not Obtain Employment During Follow up Period)	890	20		
Employmet to Job Loss (Quarters)	890	5	0	30
Censored Job Loss (Ex-Offenders that Obtained Employment who did not Experience Job Loss During Follow up Period)	890	9		
Release Year 1[1]	890	21		
Release Year 2	890	17		
Release Year 3	890	15		
Release Year 4	890	9		
Release Year 5	890	27		
Release Year 6	890	11		

[1]Actual Release Years Are Unknown Due to Confidentiality

Table II. Dependent Variable: Time from Release to Employment

	Cox Model 1		Cox Model 2[††]		Weibull		Lognormal	
Variable	**Change in Baseline Hazard**	**Standard Error**	**Change in Baseline Hazard**	**Standard Error**	**Change in Time to Failure**	**Standard Error**	**Change in Time to Failure**	**Standard Error**
OTW	-0.071	0.195	-0.251**	0.090	0.166	0.352	0.168	0.298
TI	-0.140	0.226	-0.217**	0.093	0.312	0.405	0.163	0.343
Female*OTW	-0.359	0.245	-0.363**	0.135	0.696	0.769	0.644	0.512
Female*TI	0.058	0.396	-0.196	0.129	-0.308	0.699	0.051	0.524
Control Variables	x		x		x		x	
Interaction Variables (Female*Control Variables)	x		x		x		x	
Constant							0.631	2.259
Release Year Dummies	x		x		x		x	
Facility Dummies	x		x		x		x	
α					0.803			
Log-Likelihood					-760.974		-727.075	
N[†]	509		887		509		509	

*** Significant at the 1% Level

** Significant at the 5% Level

* Significant at the 10% Level

Standard Errors are Clustered Standard Areas (clustered at the facility level)

Control variables: the type of crime committed, race, age at release, age at release squared, time served, education, number of disciplinary reports, marital status, substance abuse history, quarters worked prior to incarceration, previous occupation, number of children, mental health status, gender, health status, number of previous incarcerations, history of juvenile delinquency, facility dummies, and release year dummies.

[†]Observations dropped from 890 to 509 because there are 381 observations recorded as having a time of zero from release to employment. This means that the time from release to employment was zero, thus these observations had employment immediately upon release from prison. Nonetheless, if the zeros are a result of measurement error, then it could be that these observations were recorded as having falsely obtained employment immediately upon release.

[††]Cox Model 2 assigns a number arbitrarily close to zero but not equal to zero to the observations that are recorded as having a time of zero from release to employment thus the number of observations. This can be done for the Cox model since it is most important to preserve the ranking of the numbers for estimation of the Cox model.

Table III. Dependent Variable: Employment to Job Loss

	Cox Model 1		Cox Model 2		Weibull Model 1		Weibull Model 2		Lognormal Model 1		Lognormal Model 2	
Variable	**Change in Baseline Hazard**	**Standard Error**	**Change in Baseline Hazard**	**Standard Error**	**Change in Time to Failure**	**Standard Error**	**Change in Time to Failure**	**Standard Error**	**Change in Time to Failure**	**Standard Error**	**Change in Time to Failure**	**Standard Error**
OTW	0.086	0.156			-0.073	0.130			-0.155	0.129		
TI	-0.086	0.137			0.071	0.143			0.015	0.128		
Work(Omitted Group OTW)			-0.135	0.084			0.123	0.091			0.166*	0.090
Control Variables	x		x		x		x		x		x	
Interaction Variables (Female*Control Variables)[†††]	x		x		x		x		x		x	
Constant									x		x	
Release Year Dummies	x		x		x		x		x		x	
Facility Dummies	x		x		x		x		x		x	
α					1.352		1.348					
Log-Likelihood					-880.889		-882.608		-858.096		-860.526	
N[†]	706		706		706		706		706		706	

*** Significant at the 1% Level

** Significant at the 5% Level

* Significant at the 10% Level

Standard Errors are Clustered Standard Areas (clustered at the facility level)

Control variables: the type of crime committed, race, age at release, age at release squared, time served, education, number of disciplinary reports, marital status, substance abuse history, quarters worked prior to incarceration, number of children, mental health status, gender, health status, number of previous incarcerations, history of juvenile delinquency, facility dummies, and release year dummies.

[†]The sample decreases from 890 to 706 observations because 181 observations never obtained employment and 3 observations were dropped due to collinearity.

[†††]PIE participation did not have a differential effect on men and women

Table IV. Earnings Equations

	Probit: Employment Equation			Wage Equation (Log Weekly Earnings)		Wage Equation(Log Weekly Earnings): No Experience		Wage Equation(Log Weekly Earnings):Heckman Selection	
Variable	Coefficient	Marginal Effects	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
OTW	-0.415***	-0.115	0.153	-0.222**	0.103	-0.253**	0.105	-0.088	0.177
TI	-0.490***	-0.138	0.160	-0.056	0.112	-0.075	0.113	0.103	0.206
Control Variables	x			x		x		x	
Release Year Dummies	X			X		X		X	
Inverse Mills Ratio								-0.899	0.854
Constant	x		x			x		x	
R-squared	0.099			0.166	0.155			0.168	
N[†]	613			485		485		485	

*** Significant at the 1% Level

** Significant at the 5% Level

* Significant at the 10% Level

Robust Standard Errors

Control variables (probit): education, age at release, age at release squared, number of disciplinary reports, number of years served in prison, race, number of previous incarcerations, history of substance abuse, an indicator variable for having committed a property offense for the original offense, an indicator variable for having committed a drug offense for the original offense, an indicator variable for having committed an offense in the other category (all offenses not classified as property, drug, or an offense against a person), having a history of juvenile delinquency, having a history of a mental health issue, being single, number of quarters worked pre-incarceration, number of children, having a medical special need, and release year dummies

Control variables (wage equations): include all of the control variables for the probit equation except for the number of disciplinary reports while incarcerated.

[†]The probit equation includes all male prison releasees. The earnings equations are all male prison releasees who obtained employment upon release

Figures

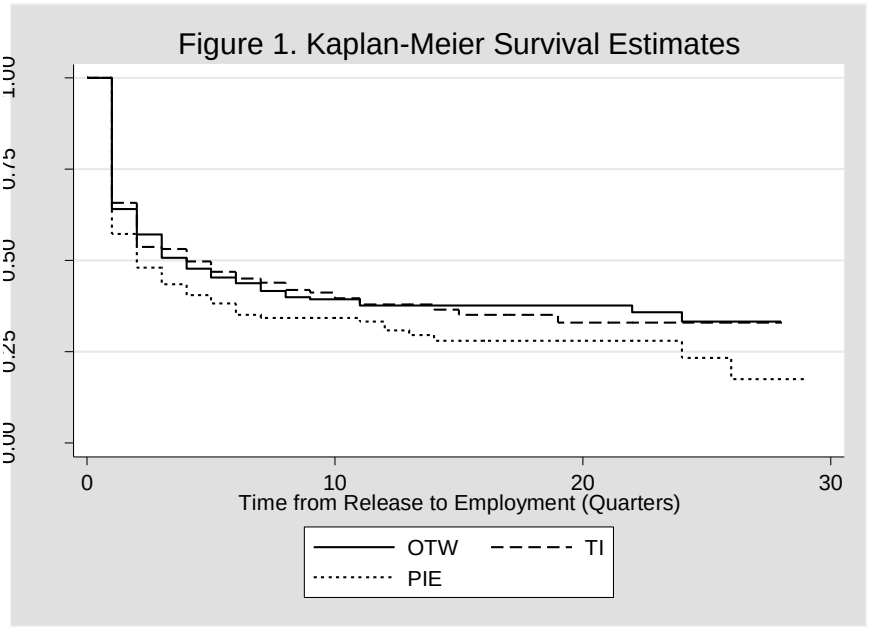
Figure 1. Kaplan-Meier Survival Estimates
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Time from Release to Employment (Quarters)
OTW
TI
PIE

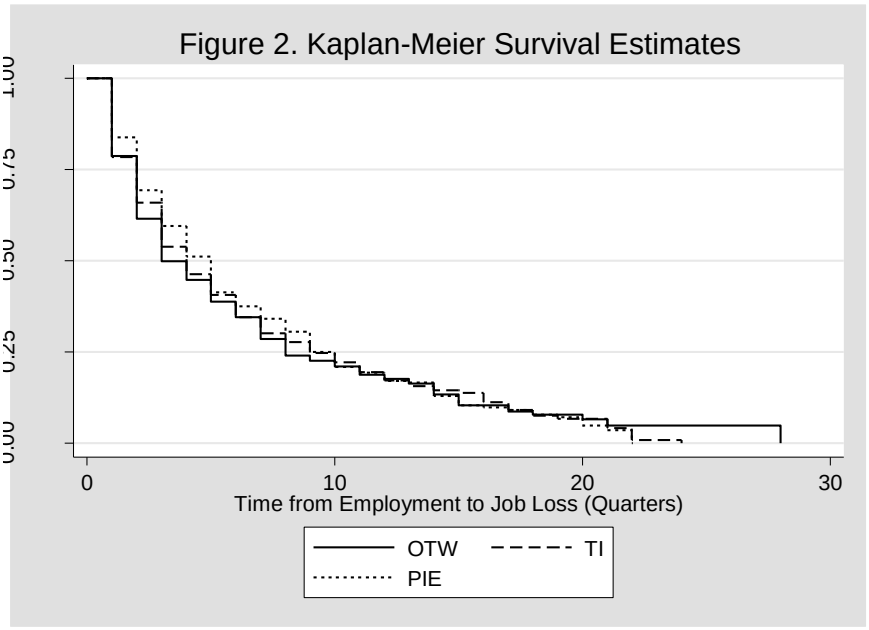
Figure 2. Kaplan-Meier Survival Estimates
0.00
0.25
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0
10
20
30
Time from Employment to Job Loss (Quarters)
OTW
TI
PIE

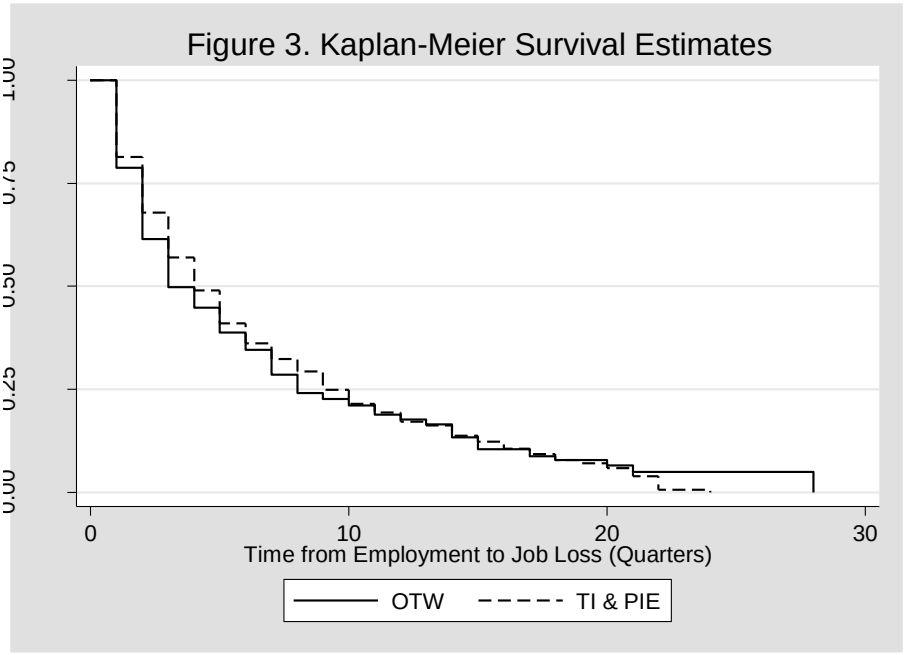
Figure 3. Kaplan-Meier Survival Estimates
1.00
0.75
0.50
0.25
0.00
0
10
20
30
Time from Employment to Job Loss (Quarters)
OTW
TI & PIE

Appendix B: Definitions of PIE, TI, and OTW (From Smith et al., 2006)

Other than work (OTW) – Those in the other than work group may be involved in other prison activities, just not industry work. For example, they may be enrolled in education programs or drug treatment. It is important to remember that people in the OTW group are not necessarily sitting idle in their cells, although that may be the case. Also, OTW tasks (i.e., laundry) may be the same task being performed by the TI people. The difference being that the task is classified by one state as TI and by the other state as OTW. OTW is further divided into two categories; 1) those who choose not to work while in prison, and 2) those who are in mandatory work states that choose the jobs with the least requirement of effort and time (i.e., two hours of mopping in the dorm area vs. an eight hour work day). Mandatory work states require an inmate to work or attend school. Some of the inmates do earn a minimal wage similar to TI (i.e., $.25/hour).

Prison Industry Enhancement Certification Program (PIE) – Includes a relationship of one or more private sector companies where inmates produce a product or provide a service for the company at the prevailing wage (i.e., minimum wage or above). The work ranges from labor intensive routine tasks (i.e., assembly line) to highly skilled craftsmanship (i.e., sheet metal welding). Under the employer and manpower models, the inmate has regular contact and is supervised by a free world worker which may change the environment from a correctional environment to an employment environment during the workday.

Traditional Industries (TI) – Traditional Industries is divided into two inmate worker categories. The first is similar to PIECP in terms of work, except the inmate is not paid a prevailing wage and the production is not sold in open markets. For example, he or she may be paid nothing or a minimal amount such as $.25/hour up to approximately $1.25/ hour. Traditional Industries include various types of work (i.e., sewing prison uniforms, making mattresses) and, in fact, the work may be exactly the same as PIECP, but is sold within the state to government entities or other limited markets. The second type of work is classified as institutional maintenance (i.e., semi-skilled maintenance, office support staff). TI includes whatever the host state considers a traditional industry within that state.