

## ABSTRACT

Title: FACTORIES WITH FENCES: THE EFFECT OF PRISON INDUSTRIES ON FEMALE INMATES

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Over the past thirty years, the number of women incarcerated has risen significantly and increased attention has been paid to the needs of female offenders. One area that has been frequently overlooked in this discussion is the issue of employment and skills training. While female offenders, similar to men, often lack the education and work experience to be competitive in the labor market, little attention is paid to whether the correctional work programs currently in place are effective for this population. Prison industries programs are a unique type of work program in that inmates are not simply offered vocational training, but also gain direct work experience in a specific industry. Initially developed to reduce inmate idleness and offset correctional costs, this program is also thought to have rehabilitative purposes by increasing inmates' likelihood of employment upon release and thus reducing recidivism. However, existing evaluations of prison industries programs are limited and often plagued with serious methodological concerns.

This study examines whether employment in the federal prison industries program, UNICOR, reduces institutional misconduct and recidivism among female

inmates. The study also seeks to establish whether there is an additional benefit based on length of employment. Data from a large sample of female inmates released from the federal prison system between January 1993 and December 2003 are used to create a matched sample of UNICOR participants and non-participants. Selection bias is addressed through the use of propensity score matching. Survival analysis is utilized to examine whether UNICOR employment affects institutional behavior and recidivism outcomes over a follow-up period of up to 13 years.

This study finds that the benefits received through this work assignment are limited to the prison environment. UNICOR participants are slightly less likely to engage in institutional misconduct, however no significant differences emerge in terms of rearrest or recommitment to federal prison. There is also only a slight effect based on length of employment. Implications for correctional programming and areas of future research, including whether prison industries can affect post-release employment outcomes and whether there may be a differential effect based on the type of industry employed, are discussed.

FACTORIES WITH FENCES:  
THE EFFECT OF PRISON INDUSTRIES ON FEMALE INMATES

by

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## CHAPTER 1 : INTRODUCTION

*When a society places a person behind walls and bars it has a obligation – a moral obligation – to do whatever can reasonably be done to change that person before he or she goes back into the stream of society... We can continue to have largely human “warehouses,” with little or no education and training, or we can have prisons that are factories with fences around them.*

- Former Chief Justice Warren E. Burger (1982)

The prison population in the United States has reached unprecedented levels, with over 2.3 million individuals incarcerated in prisons and jails across the country (West and Sabol, 2008). The female inmate population specifically has experienced a significant growth, rising at a rate faster than the male inmate population over the past thirty years (Kruttschnitt and Gartner, 2003). There are currently 114,420 women incarcerated in the United States (West and Sabol, 2008), an increase of almost 300% over the last 20 years (James and Harrison, 2005). While the increase and enormity of the prison population in the United States alone is of concern, attention has also been paid to the rising numbers of inmates who are being released back into the community. Faced with a lack of marketable skills, poor education and a criminal record, individuals released from prison often face worse prospects than they did prior to entering prison. Among female inmates specifically, within three years of their release from prison, over fifty percent will be rearrested and over a third will return to prison (Langan and Levin, 2002).

In many ways, female inmates are unique compared to their male counterparts and the rise in the number of women incarcerated in the United States has shifted attention to their gender-specific needs. For instance, women in prison are more likely than men to have been the primary caregivers of their children prior to incarceration. Women in prison are also more likely to have been the victim of physical or sexual abuse, with 70% of women reporting being victimized prior to the age of 18 (Greenfield

and Snell, 1999). In addition, female inmates have higher rates of drug and alcohol abuse and are also more likely than men to suffer from a mental health problem (James and Glaze, 2006). Thus, programs for women in prison often focus on addressing these issues as a way to prevent recidivism upon release from prison.

In contrast, assisting inmates in obtaining employment upon release is a greater priority in correctional facilities for men. This is due to the fact that research has found employment to be a turning point in the lives of male offenders, leading them to desist from crime (Sampson and Laub, 1993; Uggen and Staff, 2001; Laub and Sampson, 2003). Yet, like their male counterparts, women also have poor educational backgrounds and sporadic work histories, and also face significant barriers in obtaining employment. However, this aspect of female offenders' lives is often overlooked. The correctional work programs that do exist within women's prisons historically have been influenced more by stereotypes regarding gender roles (Schram, 1998). For example, programs which center on women's role as a mother are common and training programs are often geared towards "women's work," such as sewing and clerical occupations.

The purpose of this study, therefore, is to examine whether participation in a specific type of correctional work program, prison industries, reduces recidivism among the female inmate population. Prison industries have played an integral role in correctional philosophy since the inception of the modern prison system in the late 1800s and currently operate in 562 state and federal prisons across the country (Stephan, 2008).<sup>1</sup> Unlike other correctional work programs, such as vocational training programs, prison industries not only teach inmates a specific skill, but also provide them with the

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<sup>1</sup> The National Correctional Industries Association (2007) reports that 78,875 inmates are employed by prison industries, 5,651 of whom are women.

opportunity to gain real work experience producing goods and services to government agencies. In addition, employment in prison industries, unlike vocational training programs, offers “an offender meaningful work and an opportunity to earn money to help provide for his family or cushion his transition into the community,” as well as helps an inmate acquire soft skills, such as punctuality and dependability (Federal Bureau of Prisons, 1985:1).

The types of products and services generated by prison industries vary and include manufacturing office furniture, operating call centers and sewing uniforms for military personnel. This training, and the acclimation to the routine and expectations of the work environment that inmates experience, helps build their human capital. Thus, the program aims to not only reduce inmate idleness and contribute to the operating costs of the facility, but to also increase the likelihood of employment upon release (Garvey, 1998).

Despite its long history and intuitive appeal, little is known regarding whether prison industries are effective in reducing the in-prison and post-release behavior of inmates, in particular females. The research that has been conducted has been plagued with methodological problems. Ideally, to truly estimate the effects of prison industries, a study using an experimental design, where inmates are randomly selected into the program, is needed. However, this is not always feasible from a management perspective within a prison environment.<sup>2</sup> Studies instead use inmates who have self-selected into the

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<sup>2</sup> Saylor and Gaes (1997) argue that there are ethical problems with conducting a randomized experiment within a prison facility. For example, denying an inmate who expressed an interest in the program may undermine that desire to improve oneself in an “irreparable way” (35). In terms of prison industries specifically, which often have long waiting lists, selecting an inmate who did not have an interest in the program, instead of an inmate who had been on the waiting list for a long time, may incite a riot. However, some correctional experts, such as Doris MacKenzie, argue that one strategy for a randomized experiment would be to select treatment and control groups from the waiting list itself.



program and compare their outcomes to inmates who were not employed in the program. Due to pre-existing differences which may exist between the two groups, there is concern with selection bias in that these differences will influence the outcome of the study (Wilson, Gallagher and MacKenzie, 2000). Existing evaluations have produced mixed results and, given the limited research, MacKenzie (2006) has stated that, “at this point, it is too early to make any definitive conclusions about the effectiveness of correctional industries programs” (103).

The research on prison industries is not only limited in number and quality but also in scope. Few studies examine whether there are any differential effects by gender and there has been no study to date which examines the effect of prison industries on a sample of all female inmates. Studies on prison industries that have included women have found that prison industries are effective in reducing recidivism, however the effect is not as strong as it is for male inmates. In addition, the sample size used in these studies is often small<sup>3</sup> and detailed results are not differentiated by gender (see Anderson, 1995 and Saylor and Gaes, 1997). While more research is needed on prison industries in general, it is imperative that research be conducted which explores the effectiveness of this type of program for female inmates specifically. As Koons, Burrow, Morash and Bynum (1997) explain,

Women offenders have experienced a long history of indifference and neglect in the development and implementation of correctional programs. Programs have not been specifically targeted for this population; instead, they have been cloned from programs implemented for male offenders and provided to women offenders without consideration as to whether they were appropriate for women. Accordingly, it should not be presumed that all prior research findings in the treatment area are necessarily indicative of what might be effective with women offenders (517).

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<sup>3</sup> For example, in Anderson (1995), females only made up three percent ( $n = 267$ ) of the sample.

## CURRENT STUDY

This study addresses the limitations of other evaluations and contributes to the literature by exploring whether employment in the federal prison industries program, UNICOR, affects the institutional behavior and post-release criminal outcomes of female inmates using a large dataset of female inmates who were released from federal prison between 1993 and 2003.

### *UNICOR Program*

The federal prison system operates the largest prison industries system in the country. The Federal Prison Industries (FPI) system, also referred to as UNICOR, was established in 1934 as a way to address concerns over inmate idleness by creating meaningful work assignments. The program was also “designed to allow inmates the opportunity to acquire the knowledge, skills and work habits which will be useful when released from the institution” (Federal Bureau of Prisons, 1999:1). UNICOR currently employs 21,836 inmates in 109 factories operating in 76 federal prisons (Federal Prison Industries, Inc., 2008). UNICOR provides products and services to other federal departments, agencies and bureaus and currently manages business segments in a variety of areas, such as clothing and textiles, electronics, fleet management and vehicular components, industrial products, office furniture and recycling. UNICOR also operates a services segment, which specializes in document conversion, data services and call centers (Federal Prison Industries, Inc., 2008).

In 1983, the Post-Release Employment Project (PREP) was created to evaluate the effectiveness of the Federal Bureau of Prisons’ correctional work programs, including UNICOR. The PREP study by Saylor and Gaes (1997), which analyzed the institutional

behavior and post-release criminal and employment outcomes of over 7,000 federal inmates, has been the only evaluation of the UNICOR program to date. The study found that inmates who participated in correctional work programs were less likely to engage in institutional misconduct while incarcerated. In addition, one year after release from prison, inmates who participated in UNICOR, vocational training or apprenticeship programs were 14% more likely to be employed and 35% less likely to return to the custody of the Bureau of Prisons. The study also examined the long-term post-release criminal outcomes by type of correctional work program. Over the full follow-up period of up to 12 years, UNICOR participants were found to be 24% less likely to return to the custody of the Bureau of Prisons compared to inmates who were not enrolled in any correctional work program. While the sample included female inmates, there were no significant effects in the model due to the fact that only a small number recidivated.

### *Research Questions*

This study builds upon the work of Saylor and Gaes (1997) by evaluating the effect of the UNICOR program on institutional and post-release criminal behavior using a large sample of female inmates recently released from federal prison.

Specifically, this study addresses three primary research questions:

- 1) Does employment in the UNICOR program reduce the likelihood that female inmates will engage in institutional misconduct and/or engage in misconduct at a slower rate than non-participants?
- 2) Does employment in the UNICOR program reduce the likelihood that female inmates will recidivate upon release from prison and/or recidivate at a slower rate than non-participants?

- 3) Does employment in prison industries have a cumulative effect, i.e. does a longer period of employment in the UNICOR program increase the likelihood that an inmate will be successful upon release from prison?

Employment in prison industries is usually examined in the literature as a homogeneous experience. However, in reality, inmates are employed in a range of industries, some of which may have limited applicability to the outside labor market. Few studies have examined whether the type of industry or work assignment significantly impacts recidivism or employment (for exceptions, see Anderson, 1995, and Saylor and Gaes, 1997). In recent years, correctional agencies have begun to revamp their prison industries systems to develop work assignments which provide inmates with marketable skills. The federal prison system in particular has created industries in business services which teach inmates computer and other technical skills. One such assignment is in data services where inmates provide electronic imaging and document conversion services for federal agencies. While this study is unable to conduct a statistical analysis based on the type of industry in which an inmate is employed<sup>4</sup>, a descriptive analysis is provided of the data services industries within UNICOR and the types of inmates employed in this program, compared to inmates in other industries.

#### *Overview of Sample and Research Methodology*

The sample used for this study comes from a large dataset of 15,441 female inmates who were released from the custody of the Federal Bureau of Prisons between January 1993 and December 2003. Recidivism is defined by two separate measures: rearrest and recommitment to the Bureau's custody, with a follow up period of up to 13

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<sup>4</sup> This is due to the fact that there is little consistency in how facilities code work assignments.

years. The dataset includes demographic variables, criminal history and offense information, and information on institutional misconduct.

This study uses a quasi-experimental design where inmates are selected into a treatment group and a comparison group based on their employment in prison industries. Prison industries employment is defined as continuous employment in UNICOR for 12 months or more.<sup>5</sup> Inmates who have never been employed in UNICOR are selected for a comparison group. As with any quasi-experimental study, there is concern with selection bias, particularly given the fact that inmates self-select into UNICOR. For example, simply the fact that inmates have volunteered for employment in UNICOR and remain employed for at least a year suggests that they may have certain characteristics, such as a desire to work and self-discipline, which may also affect their likelihood of recidivating. Therefore, propensity score matching is utilized to control for individual differences between UNICOR participants and non-participants. The propensity score is the likelihood that an individual will be in the treatment group, based on observed characteristics, regardless of whether she was employed in the program (Rosenbaum and Rubin, 1983, 1985). The propensity score is then used to match UNICOR participants with non-UNICOR participants who are most similar to them. The result is that the treatment and control group should be similar on all observed characteristics, except for their employment in UNICOR. Once a matched sample is created, survival analysis is used to compare the institutional behavior and post-release criminal outcomes of UNICOR participants and non-participants. Survival analysis, unlike other statistical methods, is utilized because it can appropriately deal with the unique features of recidivism data, such as the fact that it is both non-negative and censored. Therefore, this

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<sup>5</sup> Justification for this definition is provided in Chapter 3.

study is able to test the effect of UNICOR employment on the institutional behavior and post-release criminal behavior of female inmates up to 13 years after release from prison.

#### SIGNIFICANCE OF STUDY

Over the past thirty years, the female prison population has increased significantly and women offenders have become a focus of criminological research. In particular, research on correctional programming is paying more attention to the needs of female inmates. Upon release from prison, women offenders face similar challenges as men, including a lack of marketable skills, sporadic work histories and a criminal record, which impact their ability to successfully reintegrate into society. While employment has been found to reduce recidivism, the barriers faced by former inmates in obtaining a job can be overwhelming. The goal of correctional work programs, therefore, is to enhance inmates' skills and work experience in order to increase the likelihood of employment upon release. However, little is known regarding the impact that correctional work programs have on reducing recidivism among female inmates. Therefore, this study contributes to the literature on correctional programming and female offenders by examining whether employment in federal prison industries has an effect on the institutional and post-release criminal behavior of inmates. This is one of only a few studies on prison industries which utilizes propensity score matching and the first study to explore these research questions using a sample of all female inmates with an extended follow-up period. The hope is that this study draws attention to the employment needs of female offenders and whether prison industries can play a role in facilitating desistance from crime after prison.

The remainder of this dissertation is organized as follows. Chapter 2 reviews the literature on the relationship between employment and crime and provides a historical overview of correctional work programs for female offenders, as well as prison industries. In addition, the empirical evidence on the effectiveness of prison industries is presented and discussed. Chapter 3 details the data that is used for this study and describes the demographic characteristics of the sample. The methods that are used for the analysis, specifically propensity score matching and survival analysis, are also discussed. Chapter 4 compares the institutional behavior and post-release criminal outcomes of UNICOR and non-UNICOR participants prior to propensity score matching and presents the propensity score analysis. Chapter 5 provides an analysis of the institutional behavior and post-release criminal outcomes of the matched sample, as well as an analysis based on an inmate's length of employment in UNICOR. Chapter 6 offers a description of two sub-samples of the dataset, inmates who are employed in UNICOR, but for less than 12 months, and inmates who are employed in the data services industry within UNICOR. While this chapter does not include a statistical analysis, it offers insight into the various types of inmate populations employed in UNICOR and the types of industries in which they may work. Finally, Chapter 7 concludes with an overview of the results and the limitations inherent in the study. The final chapter also discusses the significance of this study, its implications for correctional programming and directions for future research.

## CHAPTER 2 : LITERATURE REVIEW

### INTRODUCTION

Over the past thirty years, increased attention has been paid to the population of female offenders under correctional supervision. This is due to the fact that, since the 1980s, the number of women incarcerated in prisons and jails across the country has risen significantly (Kruttschnitt and Gartner, 2003). During this time, the gender-specific needs of female offenders have received significant attention in the literature, such as their histories of physical and sexual abuse, their role as mothers and their specific medical needs (Bloom and Covington, 1998; Bloom, Owen, Covington, 2005). One area that has been frequently overlooked in the discussion on female offenders is the issue of employment and skills training. Female offenders, like their male counterparts, have a weak connection to the legal workforce, often fluctuating between a reliance on legal and illegal sources of income. A sporadic work history and lack of marketable skills often limits the types of employment a woman can attain. In addition, similar to males, a criminal record may further restrict a woman's employment options (Western, 2006). As a result, women may come to depend on criminal activities as a way to support herself and her family.

While the relationship between employment and crime is highlighted in research on female offending, there is not a systematic discussion, as often is in research on males. Little attention is also paid to how to address the lack of training and experience among women in prison and to whether the correctional work programs currently in place are effective for this population (Gillis, 1999). Instead, when the issue of employment and skills training is discussed, the focus is often on how gender stereotypes influence the



quality and quantity of programs available to female offenders (Morash, Haarr and Rucker, 1994; Winifred, 1996; Gillis, 1999; Lahm, 2000). Specifically, studies that explore the relationship between participation in correctional work programs and recidivism among female offenders are lacking (see O'Brien and Bates, 2005, for an exception). This is problematic because, while research continually points to the employment needs of female offenders and suggests that work programs may be effective in enhancing female inmates' skills and increasing their likelihood of obtaining higher wage employment upon release (Lambert and Madden, 1976; Chapman, 1980; Jurik, 1983), there are few empirical studies which support this assumption.

The purpose of this literature review, therefore, is to summarize what is known regarding the relationship between employment and crime among women and the effectiveness of correctional work programs, specifically prison industries, for female inmates. This review of the literature is organized as follows. First, the characteristics of the female inmate population, specifically their employment needs, are described. Second, a review of the empirical studies on employment and crime among women is provided. Third, a brief history of correctional programming, specifically programs aimed to enhance the employability of female inmates, is presented. Fourth, the purpose and function of prison industries in corrections, as well as a review of the empirical evidence regarding the effectiveness of this program, is described. Finally, a discussion on why prison industries may be an advantageous correctional work program for female offenders, and the gaps that currently exist in our knowledge regarding these programs, are outlined.

## CHARACTERISTICS OF WOMEN IN PRISON

The Bureau of Justice Statistics currently estimates that there are 114,420 women in state and federal prisons in the United States (West and Sabol, 2008). This number is still relatively small in comparison to the number of men incarcerated.<sup>6</sup> However, the growing trend in the female inmate population is substantial, with incarceration rates of women rising at a faster rate than that of men (Kruttschnitt and Gartner, 2003).<sup>7</sup> In the last ten years, the number of women in prison has increased by 51% and, in the last thirty years, by almost 900% (Gilliard and Beck, 1997; Frost, Greene and Pranis, 2006).<sup>8</sup> The increase in the female inmate population has also resulted in greater numbers of women being released back into the community. Similar to newly released male inmates, these women are at an increased risk of recidivism, with the Bureau of Justice Statistics reporting that 57.6% of female offenders are rearrested, 39.9% are reconvicted and 39.4% return to prison (with or without a new prison sentence) within three years of their release (Langan and Levin, 2002). As a result of these trends over the past three decades, criminological researchers have begun to explore the predictors of recidivism specific to female offenders and to develop programming to address their needs (Kruttschnitt and Gartner, 2003).

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<sup>6</sup> The Bureau of Justice Statistics estimates that, as of December 31, 2007, there were almost 1.5 million men incarcerated in state and federal prisons in the United States (West and Sabol, 2008).

<sup>7</sup> Interestingly enough, this trend is not found in the federal system. Over the past ten years, the rate of incarceration for men has risen faster than that of women (Federal Bureau of Prisons, 2008; James and Harrison, 2005).

<sup>8</sup> Frost et al. (2006) report that, in 1977, 11,212 women were incarcerated in the United States. Over the next thirty years, overall incarceration rates in United States experienced a sharp increase. While incarceration rates rose by 400% between 1977 and 2004, incarceration rates for women rose by 757%, in comparison to 388% for men. Frost et al. (2006) note that while the growth in the female prison population is significant, the number of women incarcerated prior to the sharp rise in imprisonment during the 1980s was very small relative to men. As a result, the percentage growth in female incarceration “show[s] up as larger proportional growth against smaller base figures” (9).

The increased focus on female offenders has highlighted the ways in which they differ from their male counterparts, with many researchers characterizing women as “more needy, deficient and/or poorly adjusted than men in prison” (Kruttschnitt and Gartner, 2003: 21). In particular, the specific experiences women have as mothers and as victims are emphasized (Winifred, 1996). For instance, the majority of women in state and federal prison have children under the age of 18 and over half were living with these children prior to incarceration (Greenfeld and Snell, 1999; Mumola, 2000). Importantly, 31% of mothers in prison had been living alone with their children prior to incarceration, in comparison to 4% of fathers in prison (Mumola, 2000). In addition, while a history of alcohol and drug use is prominent among both male and female inmates, female inmates are more likely to have used drugs regularly in the past than male inmates (Greenfeld and Snell, 1999). Prior physical or sexual victimization is also more prevalent among the female inmate population. Over 40% of women in prison report having been the victim of physical or sexual assault, with 70% reporting that the assault(s) occurred prior to the age of 18 (Greenfeld and Snell, 1999). Female inmates also have higher rates of mental health problems than male inmates. It is estimated that almost three-fourths (73%) of women in State prison have a mental health problem, compared to 55% of men. In addition, of those women with a mental health problem, 74% met the criteria for substance dependence and abuse and 68% reported past physical or sexual abuse (James and Glaze, 2006; see also Kruttschnitt and Gartner, 2003). Kruttschnitt and Gartner (2003) conclude, in their review of the characteristics of incarcerated women, that:

The complex and overlapping nature of many of these problems almost certainly affects both women’s risks of coming into conflict with the law as well as their ability to cope with imprisonment, which typically does not provide adequate treatment for most physical and psychological

problems. This has encouraged some commentators on women in prison to depict them as more a ‘community of victims rather than a collection of victimizers’ (Bosworth, 1999: 56) (21).

Despite these differences, female offenders also share many of the same characteristics as their male counterparts in that they are “drawn from the most economically and socially disadvantaged segments of society” (Kruttschnitt and Gartner, 2003: 2). Black and Hispanic women are incarcerated at rates disproportionate to that of white women (Greenfeld and Snell, 1999; West and Sabol, 2008). The majority of female inmates also have poor educational backgrounds and few skills (Winifred, 1996). For example, only 42% of female inmates in State prisons have received their GED or completed high school (Harlow, 2003). It is not surprising then that the Bureau of Justice Statistics reports that female inmates experience difficult economic conditions prior to incarceration. Specifically, only 40% of women in State prison report that they had been employed full-time prior to their arrest, in contrast to 60% of male inmates. In addition, nearly 30% of female inmates report receiving welfare assistance at the time prior to incarceration, in contrast to less than 8% of male inmates (Greenfeld and Snell, 1999). As a result, the prison population in the United States is overwhelmingly made up of “un- and underemployed women, poorly educated women and women receiving public assistance” (Kruttschnitt and Gartner, 2003: 18).

#### *Differences Between State and Federal Female Inmates*

Given that this study focuses on the female inmate population in federal prisons, it is important to note the differences that exist among state and federal female inmates. For example, the majority of women in federal prison (73%) are high school graduates or have some college. In addition, prior to incarceration, sixty-three percent of women in federal prison report having been employed. In contrast to state inmates, who are

incarcerated for a broad variety of offenses, the majority of federal inmates (72%) are serving time on a drug conviction. Finally, while the percentage of women in both federal and state prisons who report both regular drug use and prior victimization is increasing, these experiences are more common among women in the state prison system. Only one-third of inmates in federal prison report having used drugs in the month prior to their incarceration. In addition, less than one-half (40%) have experienced past physical or sexual abuse (US General Accounting Office, 1999).

The differences that exist among female inmates in the federal and state prison system illustrate that incarcerated women are not necessarily a homogeneous population. However, in pointing out these differences, it is important to note that the majority of women incarcerated are serving time in state facilities. Despite the fact that female inmates in the federal prison system make up only a small percentage of the overall population of women incarcerated in the United States, they still warrant study.

#### EMPLOYMENT AND CRIME

While there is evidence to suggest that there is a connection between employment and crime among female offenders, other aspects of female offenders' lives garner more attention, such as substance use and victimization. Female offenders, similar to males, face barriers to employment as a result of their low skills and poor educational histories, which often significantly influence their decision to engage in crime. However, women also have unique barriers, such as parenting responsibilities, and face gender stereotypes, which make obtaining, and sustaining, any type of employment perhaps more difficult than males. Thus, women would benefit from programs and training that increase their employability and strengthen their bonds to the world of legitimate work. By increasing

human capital and their ability to maintain employment, female offenders are more likely to attain self-sufficiency and less likely to rely on criminal activities to support themselves and their family.

### *Economic Marginalization of Women Offenders*

Over the past thirty years, women in the United States have experienced increased economic marginalization. Heimer (2000) argues that this trend has been influenced by the combined effect of three specific factors which have developed in the United States since the 1960s (see also Chapman, 1980). First, the number of women living in poverty has increased significantly, due in part to changes in family structures and the rise in female-headed households. The US Census Bureau reports that, in 2007, women made up slightly more than half (56%) of the 37.3 million people living in poverty in the United States (US Bureau of the Census, 2007a). The economic circumstances of many women are compounded by the fact that they are also likely to be single mothers (Chapman, 1980; McCrate and Smith, 1998). In 2007, 62% of families living below the poverty line were headed by single women (US Bureau of the Census, 2007b). As Jurik (1983) notes, “child care responsibilities can have tremendous economic and emotional implications” as women struggle to make sure their children’s needs are met (605). Second, despite advances that women have made in the workforce, the gender gap in wages and “sexual segregation of occupations and the devaluation of women’s work” persists, particularly among low-income women (Heimer, 2000: 463). Women are disproportionately represented in service occupations, such as domestic, clerical and administrative positions and, due partially to the fact that stereotypical “female” occupations pay less than “male” occupations, women earn, on average, 78 cents for

every dollar earned by men (Heimer, 2000; DeNavas-Walt, Proctor and Smith, 2008). Finally, the welfare system in the United States has been significantly weakened and no longer provides the safety net for women and their children as it had in the past. Heimer (2000) argues that, while “any of these trends alone probably would not have resulted in the increases in the economic marginalization of women that has occurred in the United States; it is their *combined impact* that is crucial” (455). Therefore, while women may be obtaining income from legal sources, such as employment, welfare payments and husbands or boyfriends, they may also be supplementing this with illegal sources of income (Owen and Bloom, 1995; Baskin and Sommers, 1998; Harm and Phillips, 2001; O’Brien and Bates, 2005).

The extreme economic circumstances of many female offenders cannot be overlooked, with poverty considered by Holtfreter, Reisig and Morash (2004) as “a salient issue to consider in studies of crime” (188). Holtfreter et al. (2004) focused specifically on the relationship between poverty status and recidivism among female offenders. The authors interviewed 134 female offenders six months after their release from prison and found, based on self-reports, that poverty status significantly increased the likelihood of recidivism, defined as rearrest or supervision violation. The majority of women living in poverty did not recidivate. However, the authors found that receipt of state-sponsored support, in the form of housing or employment assistance, significantly reduced the likelihood of recidivism. Specifically, the likelihood of recidivism was 3.3 times greater for poor women who did not receive state-sponsored support. Even though the length of follow-up in Holtfreter et al.’s (2004) study was only six months, the period

immediately following release from prison is when women, and men, face the most pressure in their reintegration process.

### *Employment and Recidivism among Women*

Despite research on the economic marginalization of women, the employment needs of female offenders are often overlooked in the empirical literature (Gillis, 1999). While some studies have evaluated programs which assist offenders in obtaining employment upon release from prison, women only make up a small proportion of the samples (Berk, Lenihan and Rossi, 1980; Jurik, 1983; Uggen and Kruttschnitt, 1998). In contrast, studies on female offenders are more likely to be qualitative in nature, asking women about their employment experience prior to imprisonment or upon release from prison (Harm and Phillips, 2001; O'Brien, 2001b). While research has focused on the prominent role employment plays in the recidivism of male offenders, research on female offenders has found mixed results.

Several studies have found that employment reduces the likelihood of criminal activity among female offenders (Martin, Cloninger and Guze, 1978). Other studies, in addition to assessing criminal outcomes, also highlight the barriers that women face in obtaining sufficient employment. For example, Lambert and Madden (1976), in their longitudinal study of 338 former female inmates, found that women who recidivated in the year following their release from prison were more likely to have had poor employment experiences than those who did not recidivate. In addition, only 19% of the women in their sample had stable employment and, of those who were employed, half were not earning minimum wage.



Jurik (1983) explored the relationship between employment, economic incentives and recidivism among female offenders using data from the Transitional Aid Research Project (TARP). TARP was a randomized experiment designed to determine if newly released offenders who received transitional economic assistance and job placement were less likely to reoffend than a control group. While initial studies concluded that employment was an important factor in reducing recidivism among participants, the majority of the sample was male and results were not differentiated by gender (Berk et al., 1980). In contrast, Jurik's (1983) research focused solely on the experiences of the 125 women in the study. While economic incentives in the form of unemployment payments were found to reduce property crime among female ex-offenders, the effect of employment was smaller for the female sample than for males. Jurik concluded that this could be due to the fact that the earnings potential of female ex-offenders is less than that of males.

O'Brien and Bates (2005) also found that employment played an important role in a woman's reintegration process. The authors followed a sample of 166 women for a year following their release from prison and found that unemployment in the year prior to incarceration was significantly associated with recidivism. It is important to note that O'Brien and Bates only examined the relationship between employment in the year *prior to* incarceration and not the role of employment *upon release* from prison. Despite their findings, the authors state that while employment is effective in reducing recidivism, "employment alone is not sufficient to ensure success" (217). The characteristics of women who were not employed in the year prior to imprisonment highlight the multitude of issues faced by female offenders. O'Brien and Bates (2005) explain:

Women who had not held a job in the year prior to imprisonment were not only marginalized from the larger community through lack of employment, but they had more substance-abuse problems than employed women – especially with alcohol and crack/cocaine – tended to be younger and single, had more extensive criminal records and reported more emotional problems, such as depression, anxiety and stress (217).

Other studies have not found a relationship between employment and recidivism, arguing that this measure may not be fully tapping into the life circumstances of female offenders. For example, Bonta, Pang and Wallace-Capretta (1995), in their evaluation of the SIR scale, a risk assessment instrument, found that employment at the time of arrest was not a significant predictor of recidivism. The authors were not surprised by this finding, stating that “despite numerous advances women have made in the workplace over the past few decades, many are still dependent upon other sources of financial support” (290). Bonta and his colleagues did find that receiving nonemployment financial support, such as from welfare or illegal sources, was related to higher recidivism rates among female offenders. Similar to O’Brien and Bates’ (2005) study, however, Bonta et al. only examined the effect of employment *prior to* incarceration on women’s behavior upon release.

Uggen and Kruttschnitt (1998) conducted a study which explored the predictors of self-reported illegal earnings and arrest using data from the National Supported Work Demonstration Project. While the study specifically explored gender differences in predictors, the findings highlighted the unique experiences of female offenders. They found that women with greater educational attainment, but not work history, reported lower illegal earnings. In contrast, women who were employed or in school were less likely to be arrested, by 83% and 90%, respectively. The differences in predictors of self-reported illegal earnings versus arrest were explained, in part, by the fact that while

employment is perceived as an “indicator of normative status” by the legal system, it may not be effective in reducing women’s need for illegal sources of income (339). In fact, the women in the study reported they could earn more money through crime than in legitimate employment. Uggen and Kruttschnitt assumed that the “gender segmentation of the labor market and the differential availability of income from prostitution” played a role in this belief (352).

Other studies explore the relationship between employment and crime from the perspective of women offenders themselves. Harm and Phillips (2001) interviewed 38 women currently incarcerated, for at least the second time, to obtain a first-hand perspective on post-prison adjustment. Even though the majority (73%) of the women in their sample had been employed during their most recent release, almost half of the women were receiving some other form of financial assistance. Specifically, thirteen percent of the women were obtaining income from illegal activities. While many of the women who had been employed described positive experiences, others reported that employment put added stress on an already difficult reintegration process. The stigmatization faced as a result of having a prison record, low wages, and a lack of child care, were some of the problems faced by employed women.

In conclusion, the results from these studies suggest that many female offenders are, as Currie (1985) describes, “underemployed,” in that they have some connection to legal work, however, they are often employed in low-skilled jobs and make insufficient wages to make ends meet. As a result, women may turn to illegal sources of income. This finding is not unique to female offenders. However, due to the sexual segregation of employment and inequality in wages, women are less likely to obtain employment which

will enhance self-sufficiency. This is illustrated by the fact that women offenders believe they can make more money through criminal activities, such as prostitution, than they can in legal employment (Owen and Bloom, 1995; Uggen and Kruttschnitt, 1998). Female offenders are also likely to be facing a myriad of other issues, such as taking care of their children on their own or struggling with substance abuse issues. For example, Owen and Bloom (1995) report in their study of female offenders that substance abuse problems and child care responsibilities were the primary reasons why women were not working. This does not suggest that women do not want to work. In fact, studies have found that female offenders believe that adequate training and assistance in finding employment would be effective in reducing their criminal behavior in the future (Gillis, Robinson, Porporino, 1996; Delveaux and Blanchette, 2005). By offering women education and appropriate skills training, women will be more likely to obtain employment which will allow them to achieve self-sufficiency in the future.

It is evident that “programs for women that target stable employment and increased job skills are necessary inclusions in correctional treatment” (Krienert and Fleisher, 2004: 52). While female offenders, similar to their male counterparts, lack the education and experience to be competitive in the job market, they also face barriers due to economic marginalization and gender discrimination. For this reason, women in prison may benefit from the training and socialization gained from participating in correctional work programs. However, this type of programming is not a priority in correctional facilities for women. An overview of the history of correctional programming for women illustrates that the types of programs offered in women’s prisons are often influenced more by gender stereotypes than the actual needs of inmates.

## CORRECTIONAL WORK PROGRAMS FOR WOMEN

While the work of Gendreau, Little and Goggin (1996) and Andrews and Bonta (1994) have highlighted the importance of developing programming to address offenders' criminogenic needs, such as employment, this has not been the case historically for correctional programming for women (see Koons, Burrow, Morash, and Bynum, 1997). In contrast, programming has been influenced more by stereotypes regarding gender roles (Schram, 1998), than research on what is effective for this population. As Dobash, Dobash and Gutteridge explain:

From the very beginning, women in prison were treated differently from men, considered more morally depraved and corrupt and in need of special, closer forms of control and confinement ((1986:1) as quoted in Pollock-Byrne (1990: 36).

Women's reformatories were first developed in the mid-1800s, a time when the ideals of Victorian morality, and the notion of "separate spheres" for men and women, were prominent in American society, particularly in the Northeast. Men and women were viewed as having innate differences, with women seen as "obedient, domestic, chaste and somewhat childlike" (Rafter, 1990: 13). Women who were involved in crime were seen as having deviated from the ideal of true and pure womanhood (Freedman, 1981; Feinman, 1983). The belief was that women offenders needed to be trained on the "path of true womanhood" in order to be averted from a life of crime (Harris, 1998: 78). Thus, training in domestic skills, such as "cooking, laundry, sewing, cleaning and practical nursing," was offered in reformatories and little else (Feinman, 1983: 19; Pollock-Byrne, 1990; Britton, 2003). There were few academic programs and little to no training in vocational skills (Pollock-Byrne, 1990).

It was not until the early 1900s that vocational training programs were first implemented in female correctional facilities. As a result of the Progressive Movement, a new generation of reformers emerged who understood the influence of social conditions on female offenders' criminality (Freedman, 1981). These women were cognizant of the social and economic realities of female offenders' lives, including unemployment and lack of education, and sought to implement programs which would prepare female offenders for the "formerly male world of paid labor" (Freedman, 1981: 123). Providing women with tangible skills to increase their employment opportunities prepared them to be self-sufficient upon leaving prison.

While the reformatory movement did not last long, it left a legacy of sexual stereotypes that continued to influence women's prisons into the 1970s (Friedman, 1981; Rafter, 1990). For the most part, female prisons "supported the male-dominated prison system and adopted its values" and there was a lack of work and vocational training programming available to female inmates (Freedman, 1981: 155). This deficiency was justified on several grounds, including the small number of women incarcerated, the shorter average length of time served by female inmates, and the belief that women would not be interested in the types of programs that were offered to male inmates, nor would they be qualified to participate (US General Accounting Office, 1980; Pollock-Byrne, 1990; Winifred, 1996).

During the 1970s, the feminist movement, along with the prisoners' rights movement, drew attention to the fact that female inmates were not receiving the same quality or quantity of services while in prison as men (Pollock-Byrne, 1990; Morash et al., 1994). Several studies conducted during this time highlighted the disparity that

existed in the number and types of programming, specifically vocational and work programs, available for male and female inmates (Arditi, Goldberg, Hartle, Peters and Phelps, 1973; US General Accounting Office, 1980). These studies found that female inmates not only had access to fewer programs, but “of the programs that were offered, almost all of them prepared women inmates for ‘typical’ pink collar jobs, such as secretarial work, horticulture, sewing and service occupations (i.e. laundry and food service)” (Lahm, 2000: 39; see also Glick and Neto, 1977, Pollock-Byrne, 1990; Schulke, 1993).

As a result of several legal cases filed by female inmates who claimed that their rights had been violated under the 14<sup>th</sup> Amendment (US General Accounting Office, 1980; Kruttschnitt and Gartner, 2003), and consistent with a trend that was occurring around the country, many state prison systems began to increase the availability of programs for women offenders (Lahm, 2000).<sup>9</sup> Since the legal mandates were passed, several studies have been conducted to determine the prevalence of correctional work programs and female inmates’ involvement. These studies, such as the one conducted by Morash and colleagues (1994), found that, while a wider range of vocational educational programs were being offered by the late 1980s, programs that trained women in “women’s work,” such as cleaning and clerical work, in addition to programs which centered on women’s role as a mother, were still common (see also Rafter, 1990;

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<sup>9</sup> Several cases were influential in specifically increasing the number of vocational and work programs available to female inmates. The District of New Mexico, in *Barefield v. Leach* (1974), ruled that “the small numbers of women and the consequent economic difficulties of providing them with vocational programs cannot justify disparate treatment” (Pollock-Byrne, 1990: 169). In *Grosso v. Lally* (1977), the District Court of Maryland ruled that “programs, conditions and opportunities for women would be ‘no less favorable, either quantitatively or qualitatively’ than for men” (US General Accounting Office, 1980: 9). Finally, the Eastern District of Michigan ruled in *Glover v. Johnson* (1979) that “women prisoners have the right to a range and quality of programming substantially equivalent to that offered men but based on the needs and interests of female inmates” (US General Accounting Office, 1980: 8-9).

Duncan, 1992). While the hope was to create equity in programming in order to provide women with the skills necessary to be successful upon release from prison, instead, women continued to be trained for “occupations that pay poorly, have few if any medical or other benefits, and are subject to layoffs” (Morash et al., 1994: 198).

Some programs, commonly referred to as “nontraditional training programs”, train women for jobs in plumbing, carpentry, electrical and other fields (Koons et al., 1997; Schram, 1998). Programs such as these are offered with the hope of expanding the types of employment opportunities available to women upon release. However, to some extent these programs are problematic because they are training women for careers traditionally monopolized by men and for which male inmates are also trained. Thus, while women may be qualified for these positions, it is likely that they will face competition with male applicants and discriminatory hiring practices (Pollock, 2002). Non-traditional vocational programs are also problematic because many women do not want to enroll in these programs because they themselves accept traditional gender roles and see employment in areas, such as plumbing or electrical work, as being inconsistent with the type of work a female should be doing (Reid, 1985; Schram, 1998; Pollock, 2002).

The most recent survey of vocational programming in women’s prisons was conducted by Lahm (2000). Lahm assessed the educational and vocational programs available in over 450 state institutions (417 male and 47 female institutions) around the country and found that progress has been made over the past thirty years in terms of increasing the number of programs for women. However, Lahm notes that vocational programming for female inmates is still gender-stereotyped. Specifically, women are



more likely to be trained for jobs as medical assistants, clerical staff and telemarketers, whereas men are more likely to receive training in areas such as automotive repair, electronics and plumbing. While diversity in vocational programming for women in prison is increasing, female inmates are still more likely than men to be trained for low-wage occupations.

This brief history illustrates that correctional work programs have not been a priority in women's prisons as they have been for men, although this has been changing to some extent over the years. The perception of female inmates as "childlike" and in need of nurturance has influenced the types of programs that have historically been offered in women's prisons. Several explanations have been provided as to why vocational and prison industry programs are not as prevalent in women's prisons, such as the fact that it is not cost-effective due to the small number of incarcerated women, women's lack of prior work experience and a lack of interest (Duncan, 1992). As the numbers of women in prison rapidly increased during the 1980s, more attention was paid to the needs of female offenders. Despite increased programming for female inmates, particularly in "nontraditional" vocations, gender stereotypes still dominate. Women inmates are more likely to be offered programming in sewing, data entry and other low-paying occupations, which do little to enhance their skills or increase wages upon release (Morash et al., 1994; Lahm, 2000).

Although women do not have the same opportunities as men in prison to participate in correctional work programs, research indicates that women would similarly benefit from quality employment programs in prison. Regardless of gender, "employability and a decent working wage are critical to a newly released inmate's

ability to re-establish family and community ties” (Carp and Schade, 1992: 158) and the period of incarceration provides a unique opportunity to not only train inmates in a specific skill but to also acclimate them to the work environment in general. As Koons et al. (1997) argue, “women need skills that make them economically independent” (528). Training female inmates in low-wage occupations, such as cosmetology, sewing and secretarial work, will not enable them to attain economic self-sufficiency upon release from prison, thus reinforcing women’s limited options as a homemaker or low-skilled worker (Carp and Schade, 1992). Instead, it is recommended that female inmates, like their male counterparts, be trained in marketable skills which are in high demand in the workforce (Carp and Schade, 1992; Winifred, 1996; Koons et al., 1997). For women, this often requires training in “skills and occupations not traditionally taught...such as electronics, computer programming and carpentry” (Carp and Schade, 1992: 156). In addition, this may also call for “a change in a person’s belief system, especially about [herself] and what [she] is capable of being in society” (Winifred, 1996: 169). Participation in prison industries can meet these goals by teaching inmates a specific skill, while also providing a “normalizing effect” through engaging women in purposeful work (O’Brien, 2001a: 290).

## PRISON INDUSTRIES

### *Historical Overview*

The idea that work can be a transforming experience for inmates was first developed in the late 18<sup>th</sup> century, strongly influenced by the Quaker belief in moral reformation through silence and labor (Cullen and Travis, 1984; Dwyer and McNally, 1993; Garvey, 1998). Initially, inmates were sentenced to hard labor as punishment and

to deter future crime (Cullen and Travis, 1984; Garvey, 1998). Engaging inmates in hard labor served several functions in the early penitentiary system. First, hard labor provided punishment and retribution for one's crime. Second, work was central to an inmate's reformation or rehabilitation by providing structure and routine, which was perceived as lacking in inmates' lives and thought to contribute to their criminality. Prison labor also reduced idleness and "prevent[ed] the psychological as well as physical deterioration of the prisoner" (Vito, 1985: 23; Schaller, 1982). Inmates would also learn discipline and be skilled in a trade that would increase employment upon release (Garvey, 1998). However, prison labor was not solely about reforming the inmate. The goods that inmates made were sold on the open market and, therefore, inmate labor also benefited the institution by offsetting operating costs (Garvey, 1998). As America approached the 20<sup>th</sup> century, utilizing inmate labor for profit began to overshadow its more reformatory purposes and "the overriding criterion for evaluating prisons became their capacity to generate an economic surplus through the utilization of prison labor" (Vito, 1985: 23).

The appeal of prison industries did not last and prison labor for profit soon came under attack. Initially, inmate goods were sold on the open market, known as the state-account system, alongside the work of manufacturers and civilian workers. This system was quickly criticized, particularly by labor unions, as representing unfair competition and was dismantled (Vito, 1985; Garvey, 1998). In its place was the "state-use system" where inmate goods could only be bought by the state government, thereby reducing any competition (Garvey, 1998). While many states across the country switched over to the state-use system, this shift was essentially the first step in the decline of prison industries.

The decline of prison industries in the 1930s also coincided with a more general trend occurring within correctional philosophy. The “medical model” in corrections was gaining support whereby offenders, instead of being viewed as rational beings, were instead seen as “sick” and in need of treatment. During this time, treatment-oriented rehabilitation programs, such as counseling and education, became more prevalent (Hawkins, 1983; American Correctional Association, 1986). Prison industries, with the exception of the federal prison system’s UNICOR program, were virtually non-existent during the decades when the rehabilitation model was prevalent.

The 1970s and 1980s witnessed another shift in correctional philosophy and programming, influenced strongly by Martinson’s (1974) essay, “What Works: Questions and Answers about Prison Reform”. Research was unable to show conclusively that rehabilitation programs were effective in reducing recidivism. In addition, as a result of changes in correctional policies, such as punitive sanctions, especially the War on Drugs, and increased sentence lengths, the prison population in the United States began to rise rapidly. As had happened a century earlier, growing prison populations resulted in increased idleness and escalating violence among inmates within an overcrowded environment. Correctional administrators turned to work programs as a way to diffuse the tension among inmates and staff alike. In contrast to more expensive, treatment-oriented rehabilitation programs, prison industries, as they had in the late 1800s, were able to offset the costs associated with rising prison populations, while also providing vocational training to inmates (Schaller, 1982; American Correctional Association, 1986; Flanagan, 1989; Dwyer and McNally, 1993).

The significant increase in prison populations during the late 1970s and 1980s brought renewed attention to the debate over the role that vocational training and prison labor should have during an inmate's incarceration. Chief Justice Warren E. Burger most famously asked:

Are we going to build more "warehouses" or should we change our thinking and build factories with fences around them, where we will first train inmates and then have them engage in useful production (1982: 111)?

While reducing inmate idleness was important to protect the safety of both inmates and staff, reducing the likelihood of recidivism among inmates was also a central focus due to the fact that thousands of inmates were cycling through prisons, only to return back to their communities with few prospects. Thus, work programs were able to meet the various needs of corrections at this time. Work programs were not "treatment-oriented," yet still provided inmates with the skills needed to facilitate their return to society upon release. At the same time, work programs helped to reduce inmate idleness and contributed to facility operating costs, which was of increasing concern to correctional administrators.

### *Contemporary Prison Industries*

The Bureau of Justice Statistics reports that 31% of state and federal adult correctional facilities employ inmates in a prison industry (Stephan, 2008). The purpose of prison industries has been transformed over the years. While the goal is still to reduce institutional misconduct and train inmates in a skill, prison industries are also supposed to provide an inmate with "good work habits, a powerful work ethic and improve their human capital" (American Correctional Association, 1986: 8; Gaes, Flanagan, Motiuk

and Stewart, 1999). By providing employment training and experience, the post-release adjustment of inmates is also improved (Maguire, Flanagan and Thornberry, 1988).

Despite the perceived benefits of prison industries, this correctional program is not without criticism. There is great concern that the skills inmates learn while incarcerated have no applicability in the outside labor market. As Flanagan (1989) notes, “many prison jobs are in fields with no counterpart or labor surpluses in the free economy, utilize outmoded equipment and production techniques, or require licenses that are difficult for ex-offenders to obtain” (137-138; see also Gillis, 1999). Prison crowding has also had a negative impact on prison industries. There are not enough assignments for all of the inmates who want to work. As a result, industries are often in trades that lend themselves to “featherbedding” to employ as many inmates as possible, thus limiting an inmate’s ability to have a “meaningful” work experience (Flanagan, 1989; Saylor and Gaes, 1997). The daily routine of prison life also interferes with any attempts to simulate a normal work environment. Daily population counts, lockdowns, and court appearances are unique to the prison experience. The result is that the workday is shortened, usually at most six hours, with many inmates not working a full week or even a full day (Hawkins, 1983; Maguire et al., 1988). As a way to address some of these issues, the federal prison system and many state prison systems have overhauled their prison industries program to make them more technologically advanced and have also begun to partner with private industries. The goal is to be able to provide inmates with opportunities to work in industries that offer tangible skills and will better enable them to find employment upon release.

## *Research on the Effectiveness of Prison Industries*

Although prison industries are one of the oldest correctional programs, there has been surprisingly little research evaluating their effectiveness. In fact, in Lipton, Martinson and Wilks' (1975) comprehensive review of correctional programs, only one study, Daniel Glaser's (1964) study on federal prisoners, was mentioned (Maguire et al., 1988; Gaes et al., 1999). Thirty years later, reviews of the literature on correctional work programs have not resulted in a significantly larger pool of studies. While it is unclear why, it is obvious that correctional work programs have been overlooked in studies on the effectiveness of prison programming.<sup>10</sup> The studies that have been conducted are limited by methodological problems, particularly attrition and selection biases (Bouffard, MacKenzie and Hickman, 2000). As a result, there are mixed conclusions regarding the ability of work programs to positively affect the post-release behavior of inmates. However, research has conclusively shown that work programs are effective in reducing the institutional misconduct of inmates who participate (Maguire, 1996; Saylor and Gaes, 1997).

The first study that was conducted which explored correctional work programs and post-release outcomes was Daniel Glaser's study on federal prisoners in 1964. Glaser followed inmates for over five years after their release and found that individuals who did not violate their parole were twice as likely to be using the vocational skills learned in prison in their current employment. While it was important for inmates to obtain skills that would carry over into employment upon release, Glaser argued that it was "the habituation of inmates to regularity in constructive and rewarding employment,

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<sup>10</sup> MacKenzie (2006) argues that this may be due to the fact that the primary goals of prison industries are to the benefit of the institution and not the inmate.

and the anticriminal personal influences of work supervisors on inmates, that are the major contributions of work in prison to inmate rehabilitation” (1969: 172).

Another early study by Johnson (1984) examined the relationship between prison industries, post-release employment and recidivism using a sample of 1,210 inmates released from the Florida Department of Corrections. This study expanded upon previous studies by utilizing a proportional hazards model for the analysis which allowed for an examination of not only the likelihood of recidivism, but also the time between release and rearrest. There was no significant difference in post-release employment or recidivism between inmates who held prison industries jobs and those who did not. However, Johnson did not control for individual differences and, even though the results were insignificant, there is still a concern with selection bias. Johnson based her insignificant findings on the fact that:

Programs oriented at only habituating offenders to and maintaining them in low employment statuses, will have no seeming impact on recidivism because they make no attempt at significantly raising the offender’s employment status...programs oriented toward increasing skills may result in reduced likelihood of recidivism *only if full-time stable employment can be achieved* [emphasis added] (182).

Maguire, Flanagan and Thornberry (1988) addressed some of the limitations in Johnson’s (1984) study by attempting to control for differences between inmates who participated in prison industries and those who did not to make sure that any variation in outcome between the groups is the result of a “treatment effect” and not other factors. Maguire et al. (1988) conducted a quasi-experimental study on the relationship between prison labor and recidivism using a sample of inmates who had been released from the New York correctional system as of July 1986. The researchers selected a group of male inmates who had participated in prison industries continuously for a minimum of six



months between 1981 and 1982. Then, a control group was selected among inmates who were confined in the same correctional facilities, but who did not participate in prison industries at all during their confinement. In their initial examination of recidivism rates (measured as any felony arrest following release) among the 896 inmates, Maguire et al. found that industry participants were slightly less likely to recidivate than non-participants (29% vs. 34%) during the two years following release from prison. However, after controlling for characteristics that predict recidivism among the two groups, such as age, time served, drug use, prior employment record, etc., the between-group differences in recidivism rates were insignificant. In addition, Maguire et al. conducted a proportional hazards model to take into account the timing of recidivism and found that “there is no evidence of a separable and unique contribution of prison industry participation in determining recidivism” (1988: 15).

In contrast, other studies have found a significant negative relationship between inmates who participate in prison industries and recidivism. Anderson (1995) conducted an evaluation of Ohio Penal Industries (OPI) and found that inmates who had a “meaningful experience”<sup>11</sup> in an OPI job were almost 20% less likely to recidivate than inmates who did not participate in prison industries while incarcerated. Recidivism was defined as recommitment to the Ohio prison system, for either a technical violation or new conviction, within two years of release. Anderson also explored the differences in recidivism rates among inmates who worked jobs of varying skills levels and among inmates of different demographic groups. Inmates who held “high skill” jobs had a 50% reduction in recidivism and this effect was “substantial regardless of the offender’s

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<sup>11</sup> Anderson defines a “meaningful experience” as having participated in an OPI job for ninety days or more during incarceration.

demographic characteristics or the characteristics of the offender's conviction offense” (3). In addition, Anderson found that participating in an OPI job reduced the disparity in recidivism between blacks and whites. Specifically, employment in an OPI job had a more positive impact on inmates who are at a high risk of reoffending, such as “males, blacks, offenders aged 26-40 at release, those committed for crimes against person, drug offenders, and generally the more serious offender” (3). Anderson's study is also one of the few studies which explored the effect of OPI employment on gender. He found that males were more likely than females to benefit from working in an OPI job with a 5.4 percentage point rate of return compared to 1.1 for women. However, females only made up approximately 3% (n=267) of the sample. In general, Anderson's results should be interpreted with caution. The control group was only matched on one characteristic, a Test for Adult Basic Education (TABE) score of 6 or higher, which is the minimum requirement to participate in OPI. In addition, Anderson did not conduct any statistical tests for difference between the treatment and control groups.

The most methodologically sound study on prison industries to date is that of Saylor and Gaes (1997), who evaluated the Federal Bureau of Prisons' vocational training programs and prison industries. Using a large sample of over 7,000 inmates, a prospective longitudinal study was conducted which explored the effect of prison employment and training on institutional behavior and post-release employment and recidivism. Study group participants were selected among inmates who were released from federal custody between 1983 and 1987 and who had participated in either vocational training or correctional work for at least six months prior to their release. Comparison group members were then selected among inmates who were released during

the same quarter as study participants. In order to reduce selection bias, Saylor and Gaes not only matched study and comparison group members on a range of known predictors of recidivism, such as prior criminal history, but also on a propensity score, which indicated the “likelihood that an offender would be selected for participation in prison industry or vocational training, irrespective of whether he or she was in the study group or the comparison reservoir” (35-6). Thus, the propensity score was an attempt to control for individual differences between study and comparison group members, which may influence post-release outcomes.

Saylor and Gaes (1997) found that correctional work programs had a significant effect on the institutional misconduct, post-release employment and recidivism among inmates who participated. For example, a slightly negative relationship between participation in work programs and institutional misconduct was found. Study group participants were less likely to receive a disciplinary infraction during their last year of incarceration than comparison group participants (22.2% versus 26.2%). In the first year following release, study group participants were also more likely to be employed and less likely to recidivate than comparison group members. While there was no significant difference in the average wage earned between these two groups at the end of the first year, study group participants were 14% more likely to be employed (71.7% versus 63.1%), a difference which was statistically significant. In addition, 6.6% of study group participants and 10.1% of comparison group members returned to the Bureau of Prisons’ custody (as a result of a technical violation or new offense) within twelve months of their release from prison, a relative difference of 35%.

Saylor and Gaes (1997) only obtained employment and wage information for the first year after release. However, unlike other studies, which provide recidivism data for a maximum of two years, the follow-up period in their study ranged from 8 to 12 years. A proportional hazards model was used to estimate the average survival time for males and females separately. They found that, compared to men, women were less likely to recidivate, however, women, on average, recidivated much earlier than men. The mean survival time for women who recidivated was 647 days, compared to 811 days for men. There were no significant effects in the model for females and Saylor and Gaes conclude that “this finding was probably due to the fact that so few women recidivated in the time period” (41). Only 52 of the 904 women in the sample recidivated during the follow-up period. In the male sample, however, over the full time period, inmates who held prison industries jobs were 24% less likely to recidivate than comparison group members.

In a follow-up study, Saylor and Gaes (2001) examined if there were any differential effects of correctional work programs on racial and ethnic groups. Similar to Anderson (1995), the authors observed that participation in work programs have a greater impact on inmates who have a higher risk of recidivating, such as young black males. In other words, “the programs have a greater impact when a group is more likely to fail over time” (22).

Another study which explored the relationship between prison industries participation, post-release employment and recidivism is Gillis, Motiuk and Belcourt’s (1998) study on 300 former federal inmates in Canada. Unlike other studies, however, Gillis and colleagues only focused on a sample of offenders who were employed in prison industries (CORCAN) and did not include a control group. The authors found a

significant relationship between post-release employment and recidivism. Six months after release, individuals who were employed were convicted at half the rate of those who were not working (17% v. 41%). As in previous studies, Gillis et al. (1998) highlighted the problems offenders had in obtaining employment upon release, noting that over half of their sample reported employment needs upon release and two-thirds of the sample had trouble finding employment.

There is no study which has explored the effectiveness of correctional work programs for female offenders specifically. However, a study conducted by O'Brien and Bates (2005), which followed a sample of 166 women for one year following their release from prison, found that "participation in prison industries while in prison was significantly and inversely related to re-arrest" (213). In addition, the effect held regardless of whether a woman held a job in the year prior to incarceration, suggesting that there is something about the experience of prison industries employment that women carry with them into the community. It is important to note that only 16% of the sample participated in prison industries.

Despite the mixed results of previous studies, a systematic review conducted by Bouffard, MacKenzie and Hickman (2000) on the effectiveness of vocational and employment programs in prison found that there is enough evidence to suggest that prison industries are effective in reducing recidivism. The authors noted that not only is there a dearth of studies in this area in general, but the studies that have been conducted lack scientific rigor. Of particular concern is the issue of attrition and selection bias. Only five evaluations of prison industries programs were identified which met the criteria for inclusion in their review, based on the Maryland Scale for Scientific Rigor. However,

each of these studies reported a reduction in recidivism among inmates who participated in prison industries, leading the authors to conclude that these programs “work”.

Wilson, Gallagher and MacKenzie (2000) conducted a meta-analysis on a broad range of correctional programs, including education, vocation and work programs. Similar to Bouffard et al. (2000), the authors address the “generally weak methodological character of these studies” (347) and only four studies on prison industries met the criteria for their analysis. Wilson et al. found that program participants have lower recidivism rates than nonparticipants. In regards to prison industries programs specifically, if a 50% recidivism rate is assumed for nonparticipants, participants recidivate, on average, at a rate of 40%. However, the methodological concerns with the studies prevent Wilson and colleagues from attributing the lower recidivism rates to program participation and, instead, they caution that “the generally positive findings may result from differential characteristics of the offenders rather than a positive effect of program activities” (361).

The most recent meta-analysis on the effectiveness of correctional programming was conducted by the Washington State Institute for Public Policy (Aos, Miller and Drake, 2006). In order to determine whether there are evidence-based correctional programs which can: “(a) reduce the future need for prison beds, (b) save money for state and local taxpayers, and (c) contribute to lower crime rates,” the Institute conducted a systematic review of 571 evaluations of adult and juvenile correctional programs and prevention programs (1). Four studies on prison industries met the criteria for inclusion in their review. Overall, prison industries were found to reduce the recidivism rates of participants by 5.9%, on average.

Employment programs are a mainstay in correctional facilities and, as such, are increasingly becoming a focus of evaluation research. While quality research on the effectiveness of prison industries is limited, overall, studies have found that individuals who participate in prison industries have lower recidivism rates and are more likely to be employed upon release than non-participants. In addition, inmates who are employed in prison industry jobs while incarcerated have been shown to have lower rates of institutional misconduct. Studies have also found that individuals who have the greatest risk of recidivism, such as young black males, benefit the most from prison industries. Yet there is little research on the effect of prison industries on female inmates. Despite these positive findings, the weak methodological design used in evaluations limits the conclusions that can be made. As with other program evaluations, there are concerns with attrition and selection bias and, as such, it is unclear whether program participation or self-selection effects are responsible for inmates' post-release behavior. The next section will discuss these limitations in detail.

#### *Limitations of Prior Studies*

While, overall, there is some evidence to suggest that prison industries are effective in reducing recidivism among inmates, the findings from individual studies must be interpreted with caution. Ideally, a study using an experimental design, where participants are randomly selected into either a treatment or control group, would be used to estimate the effect of prison industries. However, this is often not feasible within a prison environment due to organizational and management constraints, as well as ethical considerations, and to date there have been no studies on prison industries which utilize this type of research design. Instead, most studies compare the institutional and post-

release behavior of inmates who self-selected into prison industries with a control group of non-participants. Although this type of design is used because it is the most practical, many studies do not adequately control for individual differences between the two groups, which results in selection bias (Johnson, 1984; Anderson, 1995).

Some studies attempt to address the issue of selection bias by controlling for variables that have been shown to predict recidivism (Maguire et al., 1988). Saylor and Gaes' (1997) study used propensity score matching to minimize selection bias, an even stronger methodological design. The propensity score was used to match individuals on their likelihood of participating in prison industries, regardless of whether or not they actually did. While controlling for individual observables is important, the problem is that studies are limited by the data used. As Maguire et al. (1988) note:

it is critical to recognize that although the groups have been compared on many attributes, there may be other relevant differences between the groups on variables that have not been measured...such as personal maturity, motivation to reform, family support, intelligence and others (9).

Therefore, even though the methodology used by Saylor and Gaes' reduces selection bias, it is impossible to truly control for every characteristic that might influence an individual's behavior.

Another issue which arises in evaluation studies is that of attrition, which occurs when there is a loss of cases in the treatment or control group, or both. While "the loss of cases due to purely random processes creates no validity threat, it is rare that attrition is of a random nature" (Wilson et al., 2000: 355). Attrition occurs most commonly when individuals drop out of the program being evaluated or otherwise do not complete it. These individuals may differ in significant ways from those who remain in the program and the results could be potentially biased by including them in the comparison group of



non-participants (Bouffard et al., 2000). Unlike other correctional programs, inmates do not “complete” a prison industries program and may instead be employed for as long as they like. Therefore, studies which evaluate prison industries create a treatment group based on a minimum length of employment in the program. There is still a concern with attrition, however, because individuals in the comparison group of non-participants may have worked in prison industries, but only for a short period of time. None of the studies on prison industries have adequately controlled for attrition. For example, Maguire et al. (1988) and Saylor and Gaes (1997) defined participation as employment in prison industries for at least six months prior to release and included a control group of individuals who have never worked in prison industries.<sup>12</sup> No steps were taken to address those individuals who had worked in prison industries for less than six months (Wilson et al., 2000).

Finally, given the small number of studies that have been conducted on prison industries, our knowledge is limited regarding not only whether, but also why, these programs may be effective in impacting the post-release behavior of inmates. Some studies have suggested that prison industries have a greater influence on those inmates most at risk for recidivating, such as minorities (Anderson, 1995; Saylor and Gaes, 2001), yet the effect of prison industries on other groups of offenders, particularly women, is limited. Little is also known regarding the long-term impact of prison industries on inmate behavior. Most studies use recidivism as the outcome measure and, with the exception of Saylor and Gaes (1997), use a follow-up period of only two years. While Saylor and Gaes (1997) examined the long-term recidivism rates of inmates, they only

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<sup>12</sup> The control group in Saylor and Gaes (1997) included inmates who were employed in prison industries for less than six months.

explored the employment outcomes for inmates for up to one year after release. Thus, additional studies that examine the effectiveness of prison industries over time are needed. However, “‘black-box’ empirical evaluations...fail to illuminate the mechanics of why and how programs work” (Wilson et al., 2000: 348). For example, studies do not differentiate the effect of prison industries by length of participation. In addition, there is little evidence on what types of industries are more applicable to the job market and therefore facilitate employment upon release. In order to increase our understanding regarding the effectiveness of prison industries, future studies must take these issues into account.

## CONCLUSION

As the female prison population has expanded over the past thirty years, more attention is being paid to the needs of women offenders. Increasingly, researchers are beginning to include females in their analyses to examine if, and how, this population of offenders differs from that of males. What has been noticeably lacking in the research on female offenders, however, are studies on the relationship between employment and crime. The notion that employment can be a “turning point” for male offenders is well-founded and assisting men in obtaining work upon release from prison is often a central focus of reentry programs (Solomon, Johnson, Travis and McBride, 2004). Yet, this aspect of female offenders’ lives is often over-looked.

This research, therefore, contributes to the literature on correctional work programs and women offenders by examining the effectiveness of participation in the federal prison industries program, UNICOR, using a large sample of federal female inmates. The purpose of this study is to determine whether employment in prison

industries reduces institutional misconduct and recidivism among women. Unlike previous studies, this research uses an extended follow-up period of up to 13 years, measuring recidivism as either rearrest or recommitment to federal prison. In addition, this study examines whether there is a differential effect based on length of employment. This study not only adds to the current knowledge on prison industries in general, but expands our understanding on what works for female offenders specifically.

## CHAPTER 3 : DATA AND METHODS

### INTRODUCTION

This study uses a quasi-experimental design, based on propensity scores, to examine the effect of UNICOR employment on institutional misconduct and post-release criminal outcomes. Ideally, in order to fully explore the effect of prison industries and control for selection bias, an experimental research design (“the gold standard”) would be used where inmates would be randomly selected to participate in the UNICOR program. In this way, observed and unobserved heterogeneity between participants and non-participants, which might influence the outcome of the study, would be controlled and selection bias eliminated. However, true experiments of this kind may not be feasible due to organizational and management constraints of the prison setting and ethical considerations regarding inmates.<sup>13</sup> Therefore, using data from a large sample of female inmates released from the federal prison system, this study instead retrospectively assigns inmates to a treatment or control group, based on whether the inmate was employed in the federal prison industries program, UNICOR, while incarcerated. This study addresses the methodological concerns of previous evaluations of prison industries programs by utilizing propensity scores to reduce the selection bias that is introduced due to the fact that inmates self-select into the UNICOR program. Survival analysis is conducted to examine whether employment in prison industries affects the length of time to first infraction for institutional misconduct and the length of time between release and recidivism. Thus, the use of propensity scores reduces the likelihood that the results from

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<sup>13</sup> For example, in a prison setting it may be problematic to randomly assign individuals to receive treatment as those who are most in need or most deserving may be denied. Inmates may perceive this as unjust, which may lessen the facility’s ability to control its population (Wolfe, 1970; Erez, 1985).

this study are influenced by individual characteristics which may not only affect an inmate's likelihood of being employed in UNICOR, but also may affect their behavior while in prison and after release.

## DATA

This study utilizes a large sample of female inmates ( $n = 15,441$ ) from the federal prison system, who were released between January 1, 1993 and December 31, 2003.<sup>14</sup> The Bureau of Prisons' (BOP) Office of Research and Evaluation initially compiled the data, which are obtained from three sources: the Bureau's inmate records, the United States Sentencing Commission (USSC) data files and the Federal Bureau of Investigation (FBI) arrest records.<sup>15</sup> The Bureau of Prisons' inmate records provide demographic information, such as age, race and ethnicity, as well as information on the current offense of conviction, institutional misconduct and recommitment. In addition, information is given on the length and type<sup>16</sup> of each UNICOR work assignment ever held by a woman while in the custody of the Bureau of Prisons. Supplemental demographic information, such as education level and number of children, is provided by USSC data files. Finally,

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<sup>14</sup> The requirements for inclusion in the sample, as determined by the Bureau of Prisons, are: 1) the woman must be a US citizen; 2) she must be incarcerated for her first federal conviction and for a minimum of six months; and 3) she must have no detainer at the time of her release. Due to the fact this is the first federal conviction for the women in the study, the results may be biased as recidivists within the federal system are not included in the sample. The initial data set includes 19,272 cases. However, for the purposes of this study, only those inmates who have sentences of 12 months or greater are included in the sample. This is due to the fact that treatment is defined in this study as employment in UNICOR for 12 months or more. There are 3,799 cases where inmates have sentences of less than 12 months. These cases are removed from the sample. In addition, 32 cases are removed due to missing data.

<sup>15</sup> The author submitted a research proposal to the BOP to request data for the purposes of this study. After receiving approval from the BOP's formal Institutional Review Board, the Office of Research and Evaluation created a dataset which included the information requested in the research proposal.

<sup>16</sup> Each prison facility codes its work assignments differently and specific coding definitions were unable to be obtained for all of the work assignments in this data. The author contacted each federal prison facility in the data to inquire about the UNICOR work assignment codes and was unsuccessful in obtaining complete information from all of the facilities. A work assignment in data services was the only assignment for which the Federal Bureau of Prisons provided coding information. For this reason, this is the industry examined in depth in Chapter 6.

the Bureau of Prisons derive age of first contact with the criminal justice system and rearrest data from FBI records.

## SAMPLE SELECTION

### *UNICOR Employment*

Treatment is defined as employment in the federal prison industries program, UNICOR. Inmates who are employed in UNICOR for a minimum of 12 continuous months or more during their incarceration are selected for the treatment group.<sup>17</sup>

Previous research has also shown that the definition of “continuous” work in prison is much different from that in the real work world. Inmates who work in prison jobs often do not work 40 hour weeks, due to lockdowns, court appearances, etc. (Maguire et al., 1988). The Bureau of Prisons’ policy states that an inmate may be terminated from UNICOR employment if they have missed 30 consecutive days of work (Federal Bureau of Prisons, 1999). Therefore, an inmate is defined as working “continuously” if there are less than 30 days between work assignments. If a woman has multiple, non-consecutive, work assignments in UNICOR during her incarceration, the assignment in which she is employed for the longest period of time is included for analysis.<sup>18</sup> Based on this

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<sup>17</sup> Prior research on prison industries has defined the treatment effect in varying ways, ranging from ninety days (Anderson, 1995) to six months (Maguire et al., 1988; Saylor and Gaes, 1997). This study chose to use employment for 12 months or more for several reasons. First, the minimum requirement of 12 months is used based on a determination by UNICOR staff that inmates need at least that amount of time to acclimate themselves to the work environment and to benefit from employment. Second, an inmate’s experience in UNICOR varies based on the length of time employed. Inmates with shorter sentence lengths receive less training and more on-the-job experience, in contrast to inmates with longer sentence lengths who have the opportunity to attain proficiency in a vocation, as well as on-the-job training. Defining the treatment effect as 12 months or more ensures that all inmates in UNICOR would have sufficient time to both engage in skills training and obtain on-the-job experience. Finally, the average length of employment among all UNICOR participants is 461.70 days, with a median of 325.00 days (approximately 45% of UNICOR participants had a length of employment of 365 days or longer). This suggests that defining treatment as 12 months is an adequate representation of the data.

<sup>18</sup> The work assignment in which an inmate is employed for the longest period of time is chosen for the analysis based on the assumption that the benefits of employment in prison industries accrue over time. Therefore, the effect of the UNICOR program is greater the longer a woman is employed.

definition, in the full sample, 1,946 women (12.6%) are employed in the UNICOR program.<sup>19</sup>

### Length of Employment

The average length of time an inmate is employed in the UNICOR program is 817.96 days (with a median of 679.00 days). In addition, female inmates spend approximately half their term of imprisonment (49.2%) employed in UNICOR. It is important to note that the majority of women who work in UNICOR (87.0%) are released to a halfway house to serve the remaining six months of their sentence. Although these women are still under the supervision of the Federal Bureau of Prisons, they are no longer housed in the prison facility and therefore are unable to continue to work in UNICOR. For this reason, most women do not work right up to their release date, but do work up to the date they are released to a halfway house.

A comparison group is selected among inmates who have never participated in the UNICOR program. In the full sample, 11,120 women (71.9%) have never held a UNICOR job. Only inmates who have no exposure to the UNICOR program are selected as controls so that there is no reason to be concerned that inmates who may have participated in UNICOR, but for less than 12 months, are included in the analysis and possibly bias the results (see Bouffard et al., 2000 for a discussion of this issue).<sup>20</sup> There are 2,375 women (15.4%) in the full sample who participated in UNICOR for less than

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<sup>19</sup> The full sample refers to the sample of 15,441 inmates, which includes inmates who were employed in UNICOR for less than 12 months. However, inmates who were employed in UNICOR for less than 12 months are not included in the descriptive statistics or primary analyses. This subsample of inmates is detailed in Chapter 6.

<sup>20</sup> Statistically significant differences exist between inmates who were employed in UNICOR for less than 12 months and inmates who were never employed in UNICOR on 24 of 32 covariates listed in Table 3.1.

12 months.<sup>21</sup> These cases are not included in the analysis. Thus, 13,066 inmates are included in the sample used in the analyses that follow.

## MEASURES

### *Outcome Variables*

The purpose of this study is to determine the effect of UNICOR employment on the institutional and post-release criminal behavior of inmates. Four specific outcomes are examined: the likelihood of institutional misconduct, the likelihood of serious institutional misconduct, the likelihood of rearrest and the likelihood of recommitment to the Federal Bureau of Prisons. In addition, this study also explores whether UNICOR employment increases the time to first institutional misconduct and first serious institutional misconduct and the time to rearrest and recommitment.

### Institutional Misconduct

Institutional misconduct is defined as any infraction received by an inmate while incarcerated. Behavior that is sanctioned by the Bureau of Prisons as misconduct ranges in severity. Inmates may be cited for behavior that is defined as criminal, such as assault, and for behavior that is a violation of institutional rules, such as having an untidy cell or failing to be present during a daily population count. The Bureau of Prisons classifies misconduct on a scale of 100 to 400, with 100 being the most serious and 400 being the least serious. Due to the low rates of misconduct among female inmates, infractions for misconduct are collapsed into two categories. Following the categorization used by Harer and Langan (2001), a serious misconduct infraction is defined as any 100- to 200-level offense and a less serious infraction as any 300- and 400-level offense.

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<sup>21</sup> A detailed description of this subsample is provided in Chapter 6.



This analysis examines whether inmates who are employed in the UNICOR program are less likely to engage in institutional misconduct, during their period of employment, than non-UNICOR participants. The data pose several challenges to this analysis. The first is that each inmate is incarcerated for varying lengths of time, which makes finding a comparable period of incarceration in which to measure institutional misconduct difficult. The second is that, due to waiting lists for a UNICOR job, inmates begin employment in UNICOR at different times during their incarceration.<sup>22</sup> Thus, inmates may have engaged in misconduct prior to being employed in UNICOR, which can bias the analysis. Finally, the length of time an inmate is employed in UNICOR also varies.<sup>23</sup>

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<sup>22</sup> On average, inmates begin employment in the UNICOR program within 541.27 days of their incarceration (median of 351.00 days).

<sup>23</sup> Prior research, which faced similar challenges in exploring the effect of prison industries on institutional misconduct, analyzed the data in various ways. For example, Maguire (1996), using data from the Prison Industry Research Project (see Maguire, Flanagan and Thornberry, 1988), calculated an annual misconduct rate for each inmate. This accounted for the varying sentence lengths among inmates in the sample. Then, the annual misconduct rate of inmates who were employed in prison industry and those who were not were compared for the entire period of incarceration. Next, in order to determine whether employment has a positive affect on inmate behavior, an inmate's rate of institutional misconduct was calculated both prior to and after employment. For inmates not employed in prison industry, two division points were identified within each inmate's period of incarceration ("time1" and "time2") and the annual rate of misconduct was calculated prior to "time1" and after "time2". A two-stage multivariate matching procedure was used to match treatment and control cases in order to determine this division point within a control case's period of incarceration. Then the annual rates of misconduct among inmates employed in prison industry and those who were not were compared at "time1" and "time2" to see if any significant differences emerge. It is important to note that while this study took into consideration varying sentence lengths of inmates, the varying lengths of time employed in prison industry were not considered.

While Maguire's (1996) methodology offers a precise analysis, the data used in that study was on male inmates. In this sample of female inmates, the annual rates of institutional misconduct are too small for any substantive analysis. In addition, the sampling method used in the Prison Industry Research Project allowed for inmates to be matched on sentence length more easily. Specifically, a pool of inmates who were employed in prison industry for 6 months or more during the year 1981-1982 were selected from Department of Corrections records. Then a comparison group of inmates was selected among inmates who were not employed in prison industry but incarcerated in the same prisons during the same time period. In contrast, the inmates in the present study were selected based on a release date between 1993 and 2003. As a result, it is more difficult to find a sufficient number of inmates with similar periods of incarceration with which to create a matched sample.

Saylor and Gaes (1997) also examined the effect of prison industries on institutional misconduct by comparing whether the treatment and control groups differed on the likelihood of institutional misconduct within the last year of incarceration. However, whether an inmate in the treatment group was employed in UNICOR when the infraction occurred was not taken into account. This is due to the fact that

This study attempts to address the challenges of analyzing the effect of prison industries on institutional misconduct by examining the likelihood of institutional misconduct (of any level of severity) and the likelihood of serious institutional misconduct within the first two years of incarceration. Calculating the likelihood of misconduct, rather than an annual rate, allows for a more substantive comparison given the low annual rates of misconduct in this sample. In addition, institutional misconduct is only examined during the first two years of incarceration for several reasons. First, using the first two years of incarceration ensures that the issue of whether inmates engaged in institutional misconduct prior to UNICOR employment is properly controlled. However, given the waiting period to become employed in UNICOR, it is rare for an inmate to become employed immediately upon entering prison. Therefore, this analysis uses a subsample of inmates who began employment in the UNICOR program within the first 30 days of their incarceration ( $n = 151$ ).<sup>24</sup> Second, measuring misconduct during the first two years of incarceration provides an appropriate pool of UNICOR participants in that the length of time employed in UNICOR is consistent. After a period of two years, attrition within the UNICOR program begins to occur and the treatment group becomes compromised. Lastly, this two year period also provides an appropriate comparison pool of non-UNICOR participants in that the period in which institutional misconduct is measured is consistent for all inmates.

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selection into the treatment group was based on whether an inmate was employed in UNICOR for six months or more prior to their release. In addition, their analysis did not control for misconduct that may have occurred prior to employment in UNICOR.

<sup>24</sup> For this analysis, unlike the analysis of post-release criminal outcomes, UNICOR participants are simply defined by the fact that they hold a UNICOR job. While the analysis of post-release criminal outcomes compares the outcomes of UNICOR and non-UNICOR participants *after* the treatment effect, the analysis of institutional misconduct is conducted *during* the treatment effect.

In addition to examining the likelihood of institutional misconduct and serious institutional misconduct within the first two years of incarceration, this analysis also explores the time to first institutional misconduct and the time to first serious institutional misconduct. This allows for an assessment of whether inmates who are employed in the UNICOR program are less likely to engage in misconduct over time.

### Post-Release Criminal Outcomes

Recidivism in this study is defined in two ways: rearrest and recommitment to federal prison.<sup>25</sup> The Bureau of Prisons' Office of Research and Evaluation derived the date of first rearrest, up to September 13, 2006, from FBI arrest records. In addition, the Office reviewed the Bureau of Prisons' automated records, up to July 31, 2007, to determine whether a woman in the sample was recommitted to the Bureau's custody, the date of return, and whether she was recommitted for a technical violation or a new crime.<sup>26</sup> Given varying release dates, the length of follow-up differs for each inmate. Therefore, in order to create a standard measure of recidivism, the likelihood of rearrest and recommitment is examined within three years after release.<sup>27</sup> Then, the time to first rearrest and recommitment is estimated over the full follow-up period of up to 13 years.<sup>28</sup>

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<sup>25</sup> The type of crime for which the rearrest resulted, such as whether it was for a felony or misdemeanor, and the reason for recommitment (beyond whether for a technical violation or new conviction) are not included in the dataset.

<sup>26</sup> It is important to note that only commitments to federal prison, and not state prison, are captured by the data.

<sup>27</sup> Previous studies, with the exception of Saylor and Gaes (1997, 2001) who utilize a follow-up period ranging from 8 to 12 years, measure recidivism using a two-year follow up period. One of the advantages of this study is the length of time in which inmates are followed after release from prison. Therefore, the likelihood of recidivism was measured at the minimum follow-up period for everyone in the sample, which is three years.

<sup>28</sup> The full follow-up period is used because survival analysis takes into account varying follow-up lengths. However, due to the fact that not everyone in the sample has a follow-up length of 13 years, the calculation for average time to first rearrest and average time to first recommitment uses a follow-up period of seven years. The period of seven years is chosen because it is the median length of follow-up for everyone in the sample.

### *Covariates*

This study considers a range of baseline measures, such as demographic, criminal history and offense variables, which may have a confounding effect on both institutional misconduct and post-release criminal outcomes. Specifically, the demographic variables include age at sentencing, race, ethnicity, education level and number of dependents. The criminal history and offense variables include age at first contact with the criminal justice system, prior commitments, history of violence, most serious offense of conviction, severity of current offense, the Bureau's custody classification score<sup>29</sup> and expected length of incarceration (in months). UNICOR participants and non-UNICOR participants may differ on these observed covariates, which may not only predict recidivism, but may also predict the likelihood of UNICOR employment and thus introduce bias into the analysis. Therefore, these variables are included in the propensity score model. In addition to the baseline measures, other variables, such as age at release, institutional misconduct (both less serious and serious), release to a halfway house, and length of post-release supervision (in months) are used as predictors in the recidivism analysis. The characteristics of UNICOR participants, non-UNICOR participants and the combined sample are provided in Table 3.1.<sup>30</sup>

The women in the combined sample range in age between 19 and 83, with an average age of 37.83 at the time of their release from prison. UNICOR participants are slightly older at release, presumably due to their longer sentence lengths. While majority

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<sup>29</sup> The custody classification score, determined by the Bureau of Prisons, is created to identify an inmate's security level within the federal prison system. The following factors are considered when calculating this score: severity of current offense, criminal history score, history of violence, history of escape or attempts, type of detainer, age, education level and substance abuse history. The score is categorized as follows: 0-13 is "minimum" risk; 14-17 is "low risk"; and 18-23 is "medium/high risk".

<sup>30</sup> Recall that the combined sample ( $n = 13,066$ ) does not include inmates who were employed in UNICOR for less than 12 months.

of the women in the combined sample are white (62%), 48% of UNICOR participants are black. In terms of education, 31% of the sample have graduated from high school and 19% have some college education. UNICOR participants are slightly less likely to have a high school diploma (29%) and some college education (16%) than non-participants (32% and 20%, respectively). It is important to note that this might be a function of the fact that UNICOR participants have a greater percentage (30%) of missing values on this measure. On average, the women in the combined sample have approximately 1.36 children under the age of 18.

The age at which women first came into contact with the criminal justice system ranges from age 11 to age 79, with an average age of 29.75 (median of 27.00). UNICOR participants have a slightly younger age at first contact, with an average age of 28.07 (median of 26.00), compared to non-participants, whose average age at first contact is 30.04 (median of 27.00). In addition, UNICOR participants are also more likely than non-participants to have previously been incarcerated (34% versus 27%). The majority of the women in the combined sample do not have a history of violence and, not surprisingly, drugs are the most common offense of conviction, followed by property crime. UNICOR participants are more likely than non-participants to be incarcerated for a violent offense (14% versus 6%) and for an offense of greater severity (16% versus 6%). The more serious nature of the UNICOR participants' offenses is illustrated in their greater average time served and longer term of post-release supervision. UNICOR participants served an average of 59.94 months (median of 52.00) in prison and were sentenced to an average of 52.04 months post-release supervision (median of 48.00). In contrast, non-participants served an average of 27.35 months (median of 22.00) in prison

and were sentenced to an average of 42.41 months (median of 36.00) post-release supervision. In addition, while most women in the Bureau of Prisons' custody classify at either a minimum or low level of security due to their level of risk, UNICOR participants have a slightly higher average custody classification score (4.86; median = 4.00) than non-participants (2.86; median = 2.00). Due to their higher risk level, it is not surprising that UNICOR participants are more likely to be cited for an infraction for both less serious (39% vs. 26%) and serious misconduct (20% vs. 11%).<sup>31</sup> Finally, the majority of women (87%) are released to a halfway house prior to their release from the Bureau of Prisons.

A brief comparison of the descriptive statistics of UNICOR and non-UNICOR participants highlights some of the significant differences between the two groups which could influence their likelihood of engaging in institutional misconduct and criminal activity. Specifically, given their individual characteristics, UNICOR participants make up a higher-risk sample, due to the fact that they are slightly younger, black, and have lower education levels than non-UNICOR participants. In addition, inmates who are employed in UNICOR also have higher custody classification scores and are more likely to be convicted of a violent crime than inmates who are not employed in UNICOR. These characteristics may not only impact their likelihood of being employed in UNICOR, but also their behavior both while in prison and after release, regardless of their employment in UNICOR. For this reason, propensity scores are utilized as a way to

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<sup>31</sup> It is important to note that these statistics represent whether that an inmate was cited for either a less serious or serious infraction over the course of her incarceration. In terms of UNICOR participants, there is no differentiation between whether this infraction occurred prior, during, or after her period of employment.

reduce the confounding effect that these individual differences may have on the outcomes of interest.

## METHODS

### *Propensity Score Analysis*

The significant differences between UNICOR and non-UNICOR participants are of concern when evaluating the effectiveness of the UNICOR program. This is because it is hard to discern whether the institutional behavior and post-release criminal outcomes of inmates who participate in the UNICOR program are a result of the program itself or due to the pre-existing characteristics of the inmates. In order to address this issue, propensity scores, developed by Rosenbaum and Rubin (1983), are utilized to balance the observed characteristics of UNICOR participants and non-participants so that they are independent of treatment assignment. In doing so, the likelihood that these characteristics will have a confounding effect on the outcome of interest is reduced. In this study, propensity scores are utilized in two ways. First, propensity score matching is used to match the treatment group of UNICOR participants with a comparison group of non-participants. Second, a recent extension of the traditional propensity score methodology by Lu, Zanutto, Hornik and Rosenbaum (2001) and Zanutto, Lu and Hornik (2005) is used which allows for the treatment effect to be measured in doses, or different levels. This method is used to compare inmates who are employed in UNICOR for varying lengths of time.

There are several advantages to using the propensity score methodology, as opposed to regression models, to control for selection bias. First, regression models presume that the relationship between the independent and dependent variables is linear,

an assumption that is not made with propensity score matching because the outcome of interest is not included in the matching procedure. Second, regression models ignore whether there is sufficient overlap in the distribution of the covariates among the treatment and control groups to allow for a meaningful comparison. If there is not, the model estimation involves extrapolating outside of the range of both the control and treatment groups, which increases the sensitivity of the model. In contrast, propensity score matching ensures that the covariate distributions between the two groups are similar. Doing so also assures that the observed covariates are no longer confounding variables, which can only be assumed in regression models. Finally, the propensity score captures all of the variation among covariates, allowing for the groups to be matched on one score, as opposed to many variables (Rosenbaum and Rubin, 1984; Ho, Imai, King and Stuart, 2007).

### Propensity Score Matching

Rosenbaum and Rubin (1983) first developed the use of propensity scores to reduce selection bias with the goal of “balanc[ing] two non-equivalent groups on observed covariates to get more accurate estimates of the effects of a treatment on which the two groups differ” (Luellen, Shadish and Clark, 2005: 530). In a randomized experiment, every individual has the same likelihood (0.50) of being selected into either the treatment or control group. However, when a quasi-experimental design is used, such as in this study, where participation is based on self-selection, individuals with certain characteristics may have a greater likelihood of being in the treatment group. Specifically, there is concern that these individual differences may also influence the outcome of interest. Therefore, a propensity score is calculated to predict the likelihood,



based on observed characteristics, that an individual will be in a treatment group, regardless of whether or not they actually participated in the program. Individuals in the treatment and control group are then matched on this propensity score, resulting in an assumption of conditional independence, where treatment status is independent of the observed characteristics.

The propensity score, which Rosenbaum and Rubin (1983) define as “the conditional probability of assignment to a particular treatment given a vector of observed covariates” (41), is represented by the following formula:

$$e(x) = \text{pr}(Z=1|x)$$

where  $Z$  is a binary variable that is one if an inmate was employed in UNICOR and zero if an inmate was not and  $x$  is a vector of individual observed characteristics. The propensity score,  $e(x)$ , ranges from 0 to 1, with a higher score representing a greater likelihood of being selected into the treatment group.

The propensity score is estimated using a logistic regression, where the likelihood of UNICOR employment is predicted using variables that have been theoretically and empirically shown to influence employment in prison industries and recidivism. Propensity scores are used to minimize differences between the two groups prior to treatment and therefore only those variables that are measured *prior* to UNICOR employment are used in the propensity score estimation. Outcome variables are also not included. The logistic regression model generates a propensity score for each individual. Individuals who have high propensity scores, but were not employed in UNICOR, are believed to be most similar to UNICOR participants and appropriate for selection into the comparison group. The utilization of propensity scores is particularly useful for this

study because of the high demand of UNICOR jobs in federal prisons. As Saylor and Gaes (2001) note:

Because of the excess demand for industries jobs, inmates who were not employed by UNICOR, but who had large propensity scores, may well have been interested in participating in the Bureau's industries program had a job been available to them. When these individuals can be identified, they make up an unbiased (or less biased) comparison group because they look like the study group members in terms of ...measures that are associated with program participation. The propensity score is a technique that allows for the identification and selection of these individuals (23-24).

After the propensity score estimation, it is important to assess whether there is sufficient overlap, or common support, in the propensity score distribution of the treatment and control group, prior to matching. This is to determine whether there are any similarities between the treatment and control group on observed characteristics. The purpose of propensity score matching is to match individuals who are similar on the distribution of observed covariates, yet differ only in their treatment assignment. Therefore, it is problematic if individuals with high propensity scores all participate in UNICOR and those with low propensity scores do not. This would suggest that there are no appropriate counterfactuals in the control group with which to match treatment cases. A more likely instance that arises is that there is some overlap in the distributions of the two groups, yet there are treatment cases which fall out of this range. This suggests that there are no control cases with a similar distribution of covariates with which to match these cases. These cases can be problematic because trying to find matches for them can increase model dependence, while discarding them can bias the treatment effect (Ho et al., 2007).

Once it is been determined that there is sufficient overlap between the two groups, a matching strategy is employed. Several matching strategies are available, including

one-to-one nearest neighbor matching, both without a defined caliper and with different caliper limits, two-to-one matching and matching with replacement. The one that results in the best matches, which in this study is nearest neighbor matching with calipers, should be chosen. In nearest neighbor matching, which is the most common propensity score matching strategy, a treatment group member is matched with a control group member who has the closest propensity score (Rosenbaum and Rubin, 1985). Once a comparison group member has been matched with a treatment group member, this case is removed from the pool of potential cases. While this reduces bias, it leads to problems later on when there are fewer appropriate matches for the remaining treatment group members. For this reason, a maximum distance, or caliper, between the propensity scores of the treatment and comparison group members is defined. The caliper range is the number of standard deviations of the propensity score within which to select control cases.<sup>32</sup> While this reduces the likelihood that poor matches are made, there is a greater potential for cases to be left unmatched (Smith and Todd, 2005).

There are several ways to assess whether propensity score matching has adequately balanced the treatment and control groups on observed covariates. First, chi-square and t-tests are used to assess whether the means of observed covariates differ significantly between the treatment and control groups. Rosenbaum and Rubin (1985) also recommend using a measure of standardized bias to assess whether the two groups are balanced. This measure is the standardized difference in means between the treatment and the control group on an observed covariate.<sup>33</sup> The covariate is considered

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<sup>32</sup> The default caliper range is 0.25 (Ho et al., 2007). The caliper range used in this study is 0.05.

balanced if the standardized bias has an absolute value of less than 0.25. Finally, graphical summaries, such as quantile-quantile plots, can be used to compare the empirical distributions of the treatment and control groups for each variable. If the treatment and control groups are still unbalanced, the procedure to estimate the propensity scores is repeated, including quadratics or interaction terms. This process is continued until balance is achieved and the conditional independence assumption, whereby treatment assignment is independent of observed covariates, is met.

After matching, the average treatment effect (ATE) is calculated, which is defined as:

$$ATE = \frac{1}{n} \sum_{i=1}^n \mu_1(X_i) - \mu_0(X_i)$$

where  $\mu_0(X_i)$  is the mean effect without treatment, with the individual characteristics,  $X_i$ , averaged over all units, and  $\mu_1(X_i)$  is the mean effect with treatment. Since it is impossible for an individual to be in both states (employed in UNICOR and not employed in UNICOR), the matched sample provides an opportunity to estimate the average effect of UNICOR employment by comparing the average outcome of treatment group members to those who are similar in all measured respects, yet who did not receive treatment (control group members). In doing so, the average effect of UNICOR across all cases, with all of the observed covariates at their means, is estimated.

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<sup>33</sup> The standardized bias statistic is calculated as follows:

$$\frac{\bar{x}_t - \bar{x}_c}{\sqrt{\frac{s_t^2 + s_c^2}{2}}}$$

where  $\bar{x}_t$  and  $\bar{x}_c$  represent the mean of the covariate for the treatment and control group and  $s_t^2$  and  $s_c^2$  represent the variance of the covariate for the treatment and control group.

## Dose Response Model

This study, in addition to evaluating whether employment in the UNICOR program has an effect on institutional misconduct and recidivism, also seeks to identify whether length of employment in UNICOR results in differential effects among inmates in the program. However, length of employment is not a binary variable and therefore recent extensions of the propensity score methodology are utilized. By definition, these methods allow for the estimation of the effect of different levels of treatment. These analyses are only employed on inmates who are employed in the UNICOR program ( $n = 4,321$ ).<sup>34</sup>

Propensity score matching is an effective approach when the treatment effect is binary. However, often the treatment effect is measured at varying degrees, or doses. Lu et al. (2001) expand upon the propensity score methodology developed by Rosenbaum and Rubin (1983) to accommodate a categorical treatment effect, or treatment with multiple doses, where the propensity score is calculated using an ordinal logit model (McCullagh, 1980). In this model, the distribution of doses for some individual,  $i$ ,  $D_i$ , given a vector of observed covariates,  $x_i$ , is modeled as:

$$\log \left[ \frac{P(D_i \geq d)}{P(D_i < d)} \right] = \alpha_d + \beta' x_i, \text{ for } d=2,3,4,\dots$$

Thus, the distribution of doses given covariates depends on the observed covariates only through  $b(x_i) = \beta x_i$ , such that the observed covariates,  $x$ , and the doses,  $D$ , are conditionally independent, given the propensity score,  $b(x_i)$ . The propensity score in this model, as it does when the treatment effect is binary, can then be used to balance the

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<sup>34</sup> The dose response model is estimated for inmates who are employed in UNICOR for less than 12 months, for inmates who are employed in UNICOR for 12 months or more, and then on all UNICOR participants.

distribution of a large number of covariates among individuals with various treatment doses simultaneously. While Lu et al. (2001) do this by matching individuals of different dose levels, Zanutto et al. (2005) suggest subclassification on the propensity score, which is the method employed in this study.

Subclassification on the propensity score, developed by Rosenbaum and Rubin (1984), is a way to balance the distribution of covariates such that 90% of the bias due to each covariate is removed. This is accomplished by stratifying the propensity score distribution into five equally sized subclasses, based on its quintiles. A covariate is considered balanced if it no longer predicts treatment dose level. In other words, as Lu et al. (2001) explain, “the observed covariates of people in the same subclass should look at least as balanced as if they had been randomly assigned to one of the exposure levels” (65). The balance of the covariate is assessed through a two-way ANOVA, where the dependent variable is the covariate, and the two factors are the propensity score subclass and the treatment dose level. If the main effect of treatment dose level, or the interaction of the propensity score subclass and treatment dose level, are statistically significant, the covariate is considered unbalanced. As with traditional propensity score methodology, if covariates remained unbalanced after subclassification, the procedure to estimate the propensity scores is repeated, including quadratic and interaction terms to improve the model.

### Dose Response Curve

The purpose of this analysis is to identify whether a longer period of employment is more effective in reducing recidivism upon release from prison among inmates employed in the UNICOR program. To do this, a stratum-weighted mean is estimated for

each of the four post-release criminal outcomes: likelihood of rearrest, likelihood of recommitment, average time to first rearrest and average time to first recommitment.<sup>35</sup>

The stratum-weighted mean for each of these outcomes, conditional on receiving dose,  $d$ , is written as:

$$\bar{Y}_d = \sum_{i=1}^5 \frac{1}{5} \bar{Y}_{d,i}$$

where  $\bar{Y}_{d,i}$  is the observed mean outcome among individuals receiving dosage level,  $d$ , in balancing score quintile,  $i$ . The standard error is calculated as:

$$SE(\bar{y}_{di}) = \frac{1}{5} \sqrt{\sum_{i=1}^5 \frac{s_{di}^2}{n_{di}}}$$

where  $s_{di}^2$  and  $n_{di}$  are the sample variance and frequency, respectively, among individuals in treatment dose level  $d$  in propensity score quintile  $i$ . While the standard error estimate has been found to be a reasonable approximation, as noted by Zanutto, Lu and Hornik (2005), it is not unbiased. This is due to the fact that the subclassification is based on propensity scores, which are estimated from the data, and the outcomes, both between and within each subclass, are not independent.

The means for each propensity score quintile are plotted to create a dose response curve to determine whether an increase in dosage (in this case, a longer period of employment) has an impact on the post-release criminal outcomes of inmates.

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<sup>35</sup> Recall that, due to varying exposure lengths among inmates, the likelihood of rearrest and the likelihood of recommitment are measured within three years of release from prison. This is the minimum follow-up period for everyone in the sample. Also, a seven year follow-up period is used to estimate the average time to first rearrest and the average time to first recommitment so that accurate comparisons can be made. Seven years is the median length of follow-up for everyone in the sample. Average time to first rearrest and average time to first recommitment are only estimated for those who were rearrested and recommitment, respectively.

### *Survival Analysis*

Once a matched sample is created, survival analysis is used to estimate the effect of UNICOR employment on institutional misconduct and recidivism over time. This type of analysis is well-suited to examine the outcomes of interest in this study because it identifies not only whether an individual experienced the outcome, but also the length of time before the outcome occurred. Specifically, while it is important to identify whether UNICOR employment affects the likelihood of misconduct and recidivism, it is also important to understand how the program affects the timing of these events. Survival analysis has several advantages over other types of statistical methods for modeling the unique aspects of events which occur over time, specifically recidivism.

Unlike a logistic regression, which uses a dichotomous outcome measure, survival analysis allows the researcher to not only examine whether an individual experienced an event during the follow-up period, but also the probability of not experiencing an event at different durations. In terms of recidivism specifically, this is important because there is evidence to suggest that individuals who recidivate shortly after release may differ on a range of factors from individuals who are able to remain in the community for an extended amount of time. Another advantage to survival analysis is that it is able to adequately estimate censored data. Censored data refers to data where not every individual in the sample will have experienced the event of interest during the follow up period. For example, if a follow up period of three years is used to examine recidivism outcomes and an individual does not recidivate during that time period, it does not necessarily mean that he or she *never* recidivated. Instead, it simply means that they did not recidivate during the three years following their release. If regression analyses are



used to estimate this type of data, the results can be severely biased and will underpredict the time until recidivism (Schmidt and Witte, 1988). Finally, another unique feature of recidivism data is that it is always non-negative and is positively skewed, due to the fact that many individuals recidivate shortly after release from prison.

First, a non-parametric analysis of the data is conducted, comparing the institutional misconduct and recidivism outcomes of UNICOR and non-UNICOR participants. This analysis makes no assumption about the functional form of the survival function and does not include covariates. Life tables provide information on how many individuals, during a specific interval, are at risk of experiencing an event (in this case, institutional misconduct or recidivism), the number and proportion of individuals who did experience an event, or “failed” during the interval, and the cumulative proportion of individuals who did not experience the event, or “survived” to the end of the interval. The hazard rate, or the probability that an individual will experience the event during the interval, given that she has not yet experienced the event, is also calculated. The overall survival and hazard rates can also be plotted to compare the curves of UNICOR and non-UNICOR participants. In addition, statistical tests of equality, such as the log-rank test, are used to determine if there is any difference in the survival curves of UNICOR participants and non-participants on the outcomes of interest, specifically institutional misconduct and recidivism.

Survival analysis also allows for the inclusion of covariates to determine which, if any, have an effect on the length of time until recidivism. This study uses a Cox proportional hazards model to estimate the effect of UNICOR employment on the time to first rearrest and recommitment. The advantage of this model over parametric models is

that it “allows one to estimate the effects of individual characteristics on survival times without having to assume a particular form for the distribution function (or the density or hazard)” (Schmidt and Witte, 1988: 83).

The hazard rate in the proportional hazards model is represented by the following equation:

$$h_i(t) = \lambda_0(t)\exp\{\beta_1x_{i1} + \dots + \beta_kx_{ik}\}$$

where the hazard rate for individual  $i$  at time  $t$  is the product of a baseline hazard function  $\lambda_0(t)$  and a linear function of a set of  $k$  fixed covariates, which is then exponentiated (Allison, 1995: 113). In order to create a linear model that can be estimated, taking the logarithm of both sides, the model is then written as:

$$\log h_i(t) = \alpha(t) + \beta_1x_{i1} + \dots + \beta_kx_{ik}$$

where  $\alpha(t)$  can be any function of time (Allison, 1984, 1995). For this reason, the model is referred to as semi-parametric. The model is called a proportional hazards model because “the hazard for any individual is a fixed proportion of the hazard for any other individual” (Allison, 1995: 114). In other words, the ratio of their hazards is constant (Allison, 1984).

The  $\beta$  coefficients in the proportional hazards model are estimated by maximizing the partial likelihood function (Allison, 1984). Allison (1984, 1995) explains that the likelihood function for the proportional hazards model can be factored into two parts: one part depends on information from the coefficients alone, while the other part depends on information from the coefficients and the baseline hazard function. Essentially, “partial likelihood simply discards the second factor and treats the first factor as though it were an ordinary likelihood function” (Allison, 1984: 34). The resulting estimates are unbiased

and normally distributed, however, there is a loss of efficiency, although small, due to the fact that some information about the timing of the events is lost. It is also important to note that these estimates also depend only on the order in which the events occur, not on the exact timing (Allison, 1984, 1995). One of the problems that may arise is the issue of “ties”, or the fact that two individuals may experience the event of interest at the same time. This is because the assumption of the partial likelihood function is that only one individual experiences the event at one time (Schmidt and Witte, 1988; Allison, 1995). Breslow’s approximation is used as a way to approach this issue. The resulting estimates in the model provide a measure of the statistical significance of the coefficient, as well as its relative importance. Specifically, the exponentiated coefficients in the model represent the percent change in the hazard rate for each unit change in the covariate.

## CONCLUSION

One of the main concerns with program evaluation is whether the outcome achieved is attributable to the program itself or a result of the characteristics of the individuals who participate in the program. This is a particular concern in evaluating the effect of the federal prison industries program, UNICOR, because inmates self-select into the program. In order to address this concern, this study, which utilizes a large sample of over 13,000 female inmates, uses propensity scores to control for the pre-existing differences between UNICOR participants and non-participants. In doing so, any selection bias that may be introduced into the analysis is reduced considerably. The institutional behavior and post-release criminal outcomes of UNICOR and non-UNICOR participants are then examined using non-parametrical survival analysis and Cox proportional hazards regression.

The next chapter details the propensity score analysis. Chapter 5 explores the institutional behavior and post-release criminal outcomes of UNICOR and non-UNICOR participants, as well as the specific outcomes based on length of employment. Finally, Chapter 6 provides a detailed description of both the inmates who were employed in a specific type of UNICOR industry, data services, and the inmates who participated in the UNICOR program, but for less than 12 months.

## CHAPTER 4 : PROPENSITY SCORE MATCHING & DOSE RESPONSE MODEL

### INTRODUCTION

The purpose of this dissertation is to determine whether employment in the UNICOR program reduces institutional misconduct and recidivism. The study also seeks to establish whether there is an additional benefit of employment, based on the length of time employed in the UNICOR program. Due to the fact that inmates self-select into the UNICOR program, isolating whether the UNICOR program has a direct impact on the institutional and post-release behavior of inmates is difficult. This is because inmates who seek employment through UNICOR may have specific characteristics which may make them more likely to be successful upon release. By not taking this selection effect into consideration, the results will be biased and associate, in all likelihood incorrectly, positive outcomes with UNICOR employment.

In order to reduce selection bias, propensity scores are utilized in two ways. First, UNICOR employment, the treatment effect, is measured as a binary variable and propensity score matching, as developed by Rosenbaum and Rubin (1983), is conducted to correct the selection problem. Propensity score matching simulates a randomized experiment by balancing the observable covariates of the treatment and control groups. As a result, selection bias is reduced because the covariates no longer predict, and are independent of, treatment assignment. Second, in order to evaluate the effect of length of employment in UNICOR, the treatment effect is measured as a categorical variable, or dosage. The propensity score is predicted using an ordinal logistic regression, based on Lu et al.'s (2001) extension of the traditional propensity score methodology. Selection bias is reduced through subclassification of the propensity score, which balances the

distribution of observable covariates by doses. These methods are an advantageous way to study whether there is a treatment effect because they reduce model dependence, without introducing inefficiency or bias (Ho, Imai, King and Stuart, 2007).

This chapter details the propensity score analysis and proceeds as follows. The first two sections provide baseline comparisons of institutional misconduct and post-release criminal outcomes for UNICOR participants and non-UNICOR participants, and for UNICOR participants, based on length of employment. The third section outlines the steps of the propensity score matching analysis and describes the matched treatment and control groups. The fourth section details the procedures of the dose response model used to evaluate the effect of length of employment and provides a description of the treatment dose categories. Finally, the last section concludes with an overview of the post-estimation analyses.

#### BASELINE COMPARISONS: UNICOR AND NON-UNICOR PARTICIPANTS

Prior to the utilization of propensity score matching, it is important to first determine whether there are any differences between UNICOR participants and non-UNICOR participants on the outcomes of interest, specifically institutional misconduct and recidivism.

##### *Institutional Misconduct*<sup>36</sup>

Within the first two years of incarceration, UNICOR participants are significantly more likely to have received an infraction for institutional misconduct. Approximately 12% of UNICOR participants, compared with 3% of non-UNICOR participants, received an infraction for institutional misconduct within the first year of incarceration ( $\chi^2 = 38.97$ ,

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<sup>36</sup> Recall that a subsample of UNICOR participants is used for the institutional misconduct analysis ( $n = 151$ ).

$p < .001$ ) and 18%, compared with 4.5%, received an infraction within the first two years of incarceration ( $\chi^2 = 58.77, p < .001$ ). The average treatment effect of the UNICOR program on the likelihood of institutional misconduct is 9.0% within the first year and 13.5% within the second year of incarceration. However, among inmates who experienced an infraction for misconduct, there are no significant differences between UNICOR participants and non-UNICOR participants in terms of average time to first misconduct. UNICOR participants, on average, receive their first infraction after 137.89 days within the first year of incarceration, compared to 170.52 days for non-UNICOR participants ( $t = 1.316; p = .189$ ). Within the first two years of incarceration, the average time to first misconduct for UNICOR participants is 264.44 days and 288.07 days for non-UNICOR participants ( $t = .613; p = .540$ ). The average treatment effect of the UNICOR program on time to first misconduct is approximately -32.63 days during the first year of incarceration and approximately -23.63 days during the first two years of incarceration. The non-parametric Kaplan-Meier survival curves for time to first misconduct within the first two years of incarceration are shown in Figure 4.1.<sup>37</sup> These survival curves illustrate that UNICOR participants not only engage in institutional misconduct earlier in their incarceration than non-participants, but also that UNICOR participants are more likely to experience an infraction for institutional misconduct over the first two years of incarceration. The difference between the two survival curves is statistically significant, based on the log-rank test ( $\chi^2 = 64.11, p < .001$ ).

Infractions for serious institutional misconduct are rare for both UNICOR participants and non-UNICOR participants within the first two years of incarceration.

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<sup>37</sup> Due to the small numbers of UNICOR participants in the institutional misconduct analysis, the hazard rates for time to first institutional misconduct and time to first serious institutional misconduct are not shown.

However, UNICOR participants are more likely than non-UNICOR participants to be cited for serious institutional misconduct within both the first year of incarceration (2.0% vs. 0.7%;  $\chi^2 = 3.64, p = .09$ ) and the second year of incarceration (4.0% vs. 1.2%;  $\chi^2 = 9.44, p = .01$ ). The average treatment effect of the UNICOR program on the likelihood of serious misconduct is 1.3% within the first year and 2.8% within the second year of incarceration. However, again, there are no significant differences in terms of the average time to first serious institutional misconduct. UNICOR participants have an average time to first serious institutional misconduct of 144.67 days within the first year of incarceration, compared to 173.07 days for non-UNICOR participants ( $t = .471; p = .639$ ). Within the first two years of incarceration, UNICOR participants have an average time to first serious institutional misconduct of 407.67 days, compared to 314.77 days for non-UNICOR participants ( $t = -.726; p = .500$ ). The non-parametric Kaplan-Meier survival curves for time to first serious misconduct within the first two years of incarceration are shown in Figure 4.2. Again, UNICOR participants are cited for serious misconduct earlier, and are more likely to experience an infraction for serious institutional misconduct over time, than non-participants. The difference between the two survival curves is statistically significant, based on the log-rank test ( $\chi^2 = 9.63, p = .002$ ).

These outcomes conflict with previous research which finds that inmates who participate in prison industries are less likely to engage in institutional misconduct (Maguire, 1996; Saylor and Gaes, 1997). However, it is important to consider that pre-existing differences between UNICOR and non-UNICOR participants may be driving



this finding, rather than that employment in the UNICOR program increases infractions for institutional misconduct.

### *Post-Release Criminal Outcomes*

#### Likelihood of Recidivism

Three years after their release, inmates who are employed in the UNICOR program for 12 months or more experienced more positive outcomes than non-participants. UNICOR participants are 13 percent less likely than non-participants to be arrested (14.9% vs. 17.2%;  $\chi^2 = 6.395, p = .012$ ). In addition, they are also 25 percent less likely to return to the custody of the Federal Bureau of Prisons for either a technical violation or a new conviction (8.0% vs. 10.7%;  $\chi^2 = 12.999, p < .001$ ).<sup>38</sup>

#### Time to First Rearrest

Not only are UNICOR participants less likely to recidivate after their release from prison, but their average time between release and recidivism is also longer.<sup>39</sup> Among those individuals who were rearrested, UNICOR participants remain in the community for a significantly greater number of days, receiving their first rearrest after 918.13 days within seven years of their release. In comparison, non-UNICOR participants have an average time to first rearrest of 835.42 days. This difference is statistically significant at the .01 level. Thus, prior to matching, the average treatment effect of UNICOR employment on average time to rearrest is 82.72 days.

Figure 4.3 illustrates the non-parametric Kaplan-Meier survival curves for rearrest for UNICOR and non-UNICOR participants over the full follow-up period of up to 13 years. The percentage of UNICOR participants who did not experience an arrest after

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<sup>38</sup> The majority of inmates (81.3% of UNICOR participants and 80.9% of non-UNICOR participants) returned to the custody of the Bureau of Prisons for a technical violation, not a new crime.

<sup>39</sup> Recall that the average time to rearrest is calculated within seven years after release from prison.

their release is slightly higher than non-participants over time. The difference between the two survival curves is marginally significant, based on the log-rank test ( $\chi^2 = 2.79$ ,  $p = .09$ ).<sup>40</sup>

The hazard rates for UNICOR and non-UNICOR participants also illustrate the differences in time to rearrest between the two groups over the full follow-up period. As shown in Figure 4.4, both UNICOR and non-UNICOR participants experience the greatest risk of rearrest within the first 1,000 days (approximately three years) after release from prison, however, the hazard rate for non-participants is slightly higher.

#### Time to First Recombitment

Before pre-existing differences between UNICOR participants and non-UNICOR participants are taken into consideration, employment in the UNICOR program also appears to increase the average time between release and recommitment to the Bureau of Prisons, among those who recidivated.<sup>41</sup> Specifically, among those individuals who were returned to the BOP's custody, UNICOR participants have an average time to recommitment of 903.35 days, compared to 779.40 days for non-UNICOR participants. This difference is statistically significant at the .001 level. Thus, prior to matching, the average treatment effect of UNICOR employment on average time to recommitment is 123.95 days.

As evidenced in the non-parametric Kaplan-Meier survival curves for recommitment (see Figure 4.5), the risk for recommitment is greatest within the first

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<sup>40</sup> The Wilcoxon test, which places greater weight on failure times earlier in the distribution, when individuals are more at risk (Cleves, Gould and Gutierrez, 2004), is statistically significant ( $\chi^2 = 4.85$ ,  $p = .028$ ).

<sup>41</sup> Similar to average time to rearrest, average time to recommitment is calculated within seven years of release from prison.

1,000 days after release and then levels off.<sup>42</sup> The percentage of UNICOR participants who experience a return to the Bureau of Prisons' custody over time is slightly less than that of non-participants, with a statistically significant difference based on the log-rank test ( $\chi^2 = 4.26$   $p = .04$ ).<sup>43</sup>

The hazard rates for UNICOR and non-UNICOR participants also illustrate the differences in time to recommitment between the two groups. Similar to rearrest, both UNICOR and non-UNICOR participants experience the greatest risk of recommitment within the first 1,000 days after release from prison (see Figure 4.6). However, while the hazard rate for non-participants is slightly higher and experiences a steeper decline after the first 1,000 days after release, the hazard rate for UNICOR participants has a more gradual decline.

#### BASELINE COMPARISONS: LENGTH OF UNICOR EMPLOYMENT

While it takes at least a year for inmates to acquire a set of skills and become acclimated to the UNICOR program, whether the benefits of employment accrue over time has not been explored. Therefore, the bivariate relationship between length of employment and post-release criminal outcomes are examined to determine whether there is an effect prior to the utilization of propensity scores in a dose response model.<sup>44</sup> These analyses are only conducted for those inmates who participated in UNICOR employment for 12 months or more ( $n = 1,946$ ).

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<sup>42</sup> The survival curves and hazard rates for recommitment are also calculated over the full follow-up period of up to 13 years.

<sup>43</sup> The Wilcoxon test is also statistically significant ( $\chi^2 = 5.73$ ,  $p = .017$ ).

<sup>44</sup> Since institutional misconduct is only examined during the first two years of incarceration, the relationship between length of UNICOR employment and institutional misconduct is not explored.

## *Post-Release Criminal Outcomes*

### Likelihood of Recidivism

There is a negative and significant relationship between length of employment in UNICOR and the likelihood of rearrest ( $r = -.074, p = .001$ ) and recommitment ( $r = -.060, p = .008$ ) within three years after release from prison.<sup>45</sup> Specifically, the longer an inmate is employed through the UNICOR program, the less likely she is to recidivate within three years of her release from prison.

### Time to First Rearrest

The relationship between time to first rearrest and length of UNICOR employment is examined using a Cox proportional hazards regression model. An increase in the number of days employed through the UNICOR program significantly decreases the hazard rate of rearrest ( $p < .001$ ). The effect is small given the fact that length of employment is measured in days. For this reason, length of employment is recoded to be measured in both months and in years. As shown in Table 4.1, each additional month of employment in the UNICOR program reduces the hazard of rearrest by 2% ( $p < .001$ ) and each additional year reduces the hazard by approximately 20% ( $p < .001$ ).

### Time to First Recombitment

The relationship between time to first recommitment and length of UNICOR employment is also examined using a Cox proportional hazards regression model. An increase in the number of days employed through the UNICOR program significantly decreases the hazard rate of recommitment ( $p < .001$ ). Similar to time to first rearrest, the effect is small. Again, length of employment is then examined as measured in both

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<sup>45</sup> These relationships are also confirmed in bivariate logistic regressions.

months and in years. Each additional month of employment in the UNICOR program reduces the hazard of recommitment by 2% ( $p < .01$ ) and each additional year reduces the hazard by approximately 18% ( $p < .01$ ) (see Table 4.1).

While these analyses suggest that the benefits of the UNICOR program accrue over time, it is important to note that the length of time employed in the UNICOR program is a function of an inmate's sentence length, which is based on a number of factors, such as offense type and criminal history. These factors may be correlated with recidivism, thus confounding the effect that length of employment has on recidivism. Therefore, these covariates must be balanced for inmates with varying lengths of employment in order to isolate the treatment effect.

These baseline comparisons illustrate that there are differences in both the institutional behavior and post-release criminal outcomes of UNICOR and non-UNICOR participants, as well as between inmates who are employed through the UNICOR program for varying lengths of time. However, given that inmates self-select into the UNICOR program, pre-existing differences between UNICOR participants and non-UNICOR participants, and among UNICOR participants, make isolating a treatment effect difficult. The utilization of propensity scores to control for the effect of selection bias is discussed in the following sections.

#### PROPENSITY SCORE MATCHING

While there are significant differences between UNICOR participants and non-UNICOR participants on institutional misconduct and post-release criminal outcomes, it is important to note that the two groups also differ on a range of observed characteristics (see Table 4.2). Due to the fact that inmates self-select into the UNICOR program, these

pre-existing differences between inmates may confound the effect that prison industries' participation has on institutional and post-release behavior. Specifically, these covariates may be correlated with UNICOR employment, institutional misconduct and recidivism. For this reason, propensity score matching is used as a way to balance the two groups on the observed covariates so that the treatment effect is isolated.

The propensity score is the likelihood, based on the distribution of covariates, that an individual will be in the treatment group, regardless of whether or not she actually participated in the program. The propensity score is estimated using a logistic regression model, which includes 20 covariates.<sup>46</sup> These covariates include demographic and criminal history variables which are related to either UNICOR employment or recidivism.<sup>47</sup> In order to avoid bias, only variables which are measured *prior* to treatment are included. The outcome variables are also not included in the matching procedure. Prior to matching, there are statistically significant differences between UNICOR participants and non-participants on all but three of the observed covariates (see Table 4.2). In addition, 10 of the 20 covariates are significantly related to UNICOR employment (see Table 4.3), suggesting that self-selection into the UNICOR program is not random.<sup>48</sup>

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<sup>46</sup> The MatchIt program (Ho, Imai, King and Stuart, 2006), a component of the R statistical package (R Development Core Team, 2005) is used to calculate the propensity score.

<sup>47</sup> There is some debate in the literature regarding whether all control variables should be included in the logistic regression model, or only those for which there are statistically significant differences between the treatment and control group. Most believe that including all of the control variables is more advantageous because it reduces bias more than it will increase variance (Ho et al., 2007). Rubin and Thomas (1996) caution that "unless a variable can be excluded because there is consensus that it is unrelated to outcome or is not a proper covariate, it is advisable to include it in the propensity score model even if it is not statistically significant" (253). Given the small number of covariates, in order to avoid omitted variable bias, this is the strategy employed. The only covariate that is not included in the propensity score model is "% non-white." The treatment and control group are balanced on this covariate prior to matching and matching actually reduces the balance of this covariate. For this reason, it is eliminated from the model.

<sup>48</sup> For example, due to the fact that UNICOR jobs are coveted within the federal prison system, there are long waiting lists to participate. For this reason, inmates who have longer sentences are more likely to

### *Common Support*

Before any matching strategy is attempted, the propensity score distributions for UNICOR participants and non-UNICOR participants are examined to determine if there exists any overlap, or region of common support (see Figure 4.7). This is done to establish whether there are a sufficient number of non-UNICOR participants who can be matched, based on the propensity score, with UNICOR participants. As expected, non-UNICOR participants are more likely to have lower propensity scores, while there are a greater number of UNICOR participants in the upper range of the propensity score distribution. There is a region of common support where the propensity score distribution of UNICOR participants overlaps with that of non-UNICOR participants, thus facilitating matching. However, there is a greater segment of UNICOR participants within the upper tail of the propensity score distribution, suggesting a high likelihood of being employed in prison industries. This is of concern because it suggests that there may not be an appropriate number of counterfactuals among non-UNICOR participants with which to match all of these cases.

### *Matching Procedure*

Ho and colleagues (2007) maintain that “balance provides a reasonably straightforward objective function to maximize and choose matching solutions” (216) and therefore the solution which provides the best balance should be chosen. Several matching solutions are attempted<sup>49</sup> and the one which ultimately provides the best

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obtain employment through the program, evidenced by the fact that the expected length of incarceration for UNICOR participants is double that of non-UNICOR participants (88.49 months versus 39.06 months).

<sup>49</sup> These include one-to-one nearest neighbor matching, both without a defined caliper and with different caliper limits, two-to-one matching and matching with replacement. Ideally, given a data set, such as the one used in this study, where there are many more controls than treatment cases, many-to-one matching can be used to increase the efficiency of the procedure by choosing more than one control for each treated case. However, due to the issue of common support, this strategy does not provide sufficient balance because

balance over all of the observable covariates is one-to-one nearest neighbor matching with a caliper of 0.05. In nearest neighbor matching, the treatment group cases are randomly sorted and then matched, one at a time, to a control with the closest propensity score. Each treatment observation is paired with exactly one control observation and, once matched, are both removed from the pool of cases. The problem with this approach is that after a while, the distance between “nearest neighbors” becomes greater. Therefore, the control chosen might not actually be a proper counterfactual, increasing model dependence (Ho et al., 2007). Due to the issue of common support, this is a particular problem in regards to matching treatment cases in the upper range of the propensity score distribution.

For this reason, a caliper range, or the number of standard deviations of the propensity score within which to select control cases, is chosen. Specifically, matching is limited to a caliper width of 0.05. Within that range, a control is randomly selected as the match for the treatment case. If there is not an appropriate control within the caliper, one is not selected and the treatment case is discarded. Control units which are not selected through this matching process are also discarded. Ultimately, through this matching procedure, 261 treatment cases and 9,435 controls are discarded.<sup>50</sup> The resulting matched data set consists of 1,685 treatment cases and 1,685 controls.

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there are not enough controls within the higher propensity score range to match with the treatment cases. A similar problem results with matching with replacement, whereby a few control cases are being continually matched with treatment cases in the upper range of the propensity score distribution, which can increase variance. This is usually a better matching strategy when there are more treatment cases than control cases, which is not the case here.

<sup>50</sup> Given the significant number of cases that are discarded through the matching procedure, there is a concern with the potential loss in statistical power that may result. However, in matching, discarding data can actually be beneficial because efficiency is increased when heterogeneity among the covariate distributions is reduced (Ho et al., 2007).



### *Checking Balance*

The goal of matching is to increase balance on all observed covariates. Therefore, after the matched sample is created, several steps are taken to ensure that sufficient balance has been obtained. First, chi-square and t-tests are conducted to determine whether there are any statistical differences between the means of the two groups on observed covariates. None of these tests are significant, as illustrated in Table 4.4, suggesting that the conditional independence assumption has been met. Ho et al. (2007) argue that hypothesis tests are not appropriate for assessing balance because they “are driven in part by factors other than balance” (221). For this reason, the standardized bias statistic (Rosenbaum and Rubin, 1985) for all covariates is also examined. This statistic is the standardized difference in means between the treatment and the control group on an observed covariate. The covariate is considered balanced if the standardized bias has an absolute value of 0.25 or less. As shown in Table 4.4, the standardized bias for each covariate is not greater than 0.10.<sup>51</sup> In addition, the percent improvement in standardized bias, before and after matching, of over 90% on 15 of the 20 covariates also highlights the adequacy of the matches.

After matching, the conditional independence assumption is also tested by predicting the likelihood of UNICOR employment using logistic regression. None of the covariates are significantly related to UNICOR employment (see Table 4.5). This demonstrates that pre-existing differences between the treatment and control groups are balanced and no longer predict the likelihood of being employed by the UNICOR program. As a result, selection bias is reduced and any differences in outcomes that are

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<sup>51</sup> The standardized bias is also examined for the squares of all of the covariates and every two-way interaction. None of the standardized biases are greater than 0.25.

found in the subsequent analyses are assumed to be result of employment through the UNICOR program.<sup>52</sup> In addition, the role of the propensity score as a balancing score is also met, with the propensity score found to be insignificant ( $p = .694$ ) in a bivariate logistic regression predicting the likelihood of UNICOR employment. It is important to point out that this is better balance than could be expected through randomization.

Finally, in addition to numerical summaries, graphical summaries are also used to assess balance, specifically quantile-quantile and jitter plots. The quantile-quantile plots, also known as QQ plots, are created, which compare the empirical distributions for the treated and control groups for each variable. Differences between the empirical distributions of the two groups are indicated by deviations from the 45 degree line.

While the empirical distributions for the treatment and control groups are not identical for all variables, there is significant improvement after matching. The jitter plot provides a graphical illustration of the propensity score distribution of the matched treatment and control cases versus the unmatched treatment and control cases (see Figure 4.8). While matches are found across the entire propensity score distribution, there are insufficient matches for treatment cases with a propensity score above 0.54 and, as a result, these treatment cases are discarded. The control cases which are discarded are those with a propensity score below 0.54, with a greater number clustering below a score of 0.30.

#### *Comparison of Matched versus Unmatched Cases*

The goal of matching is to create a sample of individuals who have an equal probability, or propensity, to receive treatment. Therefore, the matching analysis should retain only the most comparable units. As a result of the matching procedure utilized in this study, 9,696 cases are discarded, 13.41% ( $n = 261$ ) from the treatment group and

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<sup>52</sup> It is important to note that propensity scores only eliminate bias introduced by observed covariates.

84.85% ( $n = 9,435$ ) from the control group. There is some concern that discarding these individuals, particularly the treatment cases, will bias the causal effect (Ho et al, 2007).<sup>53</sup> Specifically, discarding treatment cases can cause the distribution of  $x$  to become distorted, resulting in a loss of efficiency. In addition, the differences between the resulting matched and unmatched treatment cases may be too severe, perhaps more so than the differences between the treatment and control groups prior to matching (Rosenbaum and Rubin, 1985). For this reason, a detailed comparison is provided between the matched and unmatched control cases, as well as the matched and unmatched treatment cases, to determine whether these concerns are valid.

As shown in the jitter plot, it appears that a large portion of the cases that are discarded are those individuals who either have a very high or a very low propensity to be employed through the UNICOR program. For example, 77.8% ( $n = 7,343$ ) of the discarded control cases have a propensity score of 0.10 or less. The effect of treatment on these individuals is irrelevant, as they have a very low probability of being employed through the UNICOR program. Given the characteristics of these individuals (see Table 4.6), including them in the analysis could potentially underestimate the likelihood of recidivism upon release. For example, the discarded control cases are more likely to be individuals who were convicted of a property offense and to not have a history of violence, resulting in a lower custody classification score. These individuals also initially came into contact with the criminal justice system at a later age and were slightly older at the time of their sentencing. As a result, their shorter sentence lengths also ensured that they were less likely to be employed through the UNICOR program.

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<sup>53</sup> There is less concern over the loss of the control cases due to the fact that the “variance of the casual effect is mostly a function of the number of treated units” (Ho et al., 2007: 214).

In contrast, and potentially of greater concern to the analysis, are the discarded treatment cases. These cases appear to be slightly higher-risk offenders, given that they are more likely to have prior commitments and a history of serious violence (see Table 4.6). In addition, these inmates were also more likely to be committed for a violent crime, resulting in a longer sentence length and thus, a higher custody score. The fact that these individuals had longer sentence lengths also increased the likelihood that they would be employed through the UNICOR program. By removing these cases from the analysis, the post-release outcomes of UNICOR participants may be over-estimated.

Discarding these cases is only a concern to the analysis if there are no inmates with these characteristics represented in the final matched treatment group. However, as shown in the jitter plot, matches are made for treatment cases across the entire propensity score distribution. This is significant because it means that the distribution of propensity scores within the treatment group is being represented in the final sample. In order to determine specifically if the characteristics of the unmatched treatment cases are represented, a comparison is made between the discarded treatment cases and only those matched treatment cases with a propensity score between 0.55 and 0.98 (the range of propensity scores of the unmatched treatment cases). As shown in Table 4.7, the cases in the matched treatment group are similar to the discarded treatment cases, alleviating concerns that the treatment effect may be biased by eliminating these cases. The matched treatment group effectively captures individuals who are higher risk, an aspect of the treatment group that may have been overlooked had it not been examined more closely. This comparison illustrates clearly that there are simply more treatment cases in the upper distribution of the propensity score than there are appropriate counterfactuals in the

control group. Therefore, the decision is made that it is better to discard treatment cases than to include all of them, albeit with poor matches.<sup>54</sup>

## DOSE RESPONSE MODEL WITH PROPENSITY SCORES

In order to estimate the effect of length of UNICOR employment, recent extensions of the propensity score methodology using multiple treatment doses, put forth by Lu et al. (2001) and Zanutto, Lu and Hornik (2005), are utilized to reduce selection bias. Similar to the traditional propensity score methodology, a single balancing score is generated. However, since there are more than two doses, the propensity score is modeled using an ordinal logistic regression (McCullagh, 1980). In doing so, the observed covariates and the treatment doses are conditionally independent on the propensity score. Lu et al. (2001) developed a propensity score matching procedure, which compares individuals with differing degrees of exposure to the treatment effect. Zanutto et al. (2005) built upon Lu et al.'s (2001) use of treatment doses but, instead of matching on the propensity score, incorporate subclassification on the propensity score. This allows for the estimation of a dose response curve. The subclassification method is used in this analysis. Again, these analyses are only conducted on the sample of UNICOR participants ( $n = 1,946$ ).

### *Defining Treatment Doses*

As length of employment is a continuous variable, the first step in this analysis is to create discrete dosage categories so that its effect can be examined using the dose

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<sup>54</sup> It is also important to note that some of the unmatched treatment cases have very high propensity scores, i.e. their likelihood of being employed through the UNICOR program is great. Of the 261 treatment cases that are discarded, 13.03% ( $n = 34$ ) had propensity scores greater than 0.90. Evaluating the treatment effect on these individuals may be irrelevant from a policy perspective. This is because it is impossible to evaluate whether it would be effective to treat this segment of the inmate population since they will almost always be treated. It is more interesting and more valuable to focus on those cases whose participation is less certain (Loughran and Mulvey, 2008).

response model. A histogram of length of employment in UNICOR, in days, is shown in Figure 4.9. The purpose of this analysis is to determine whether a longer period of employment through the UNICOR program results in more positive outcomes for inmates. Thus, the actual categorization of doses is arbitrary. For this reason, this analysis is conducted using various categorizations of length of employment. First, the distribution of length of UNICOR employment is divided into quintiles, which results in five equal categories: 1) 365-467 days, 2) 468-586 days, 3) 587-779 days, 4) 780-1112 days and 5) 1113 days and more. The distribution is also divided into four categories that coincides with the number of years employed, 1) less than 2 years (365-729 days), 2) 2 years (730-1094 days), 3) 3 years (1095-1459 days) and 4) 4 years and greater (1460+ days).<sup>55</sup> Finally, the distribution is also divided into five categories, based on number of months employed, 1) up to 17 months (365-545 days), 2) 18 – 23 months (546-725 days), 3) 24 – 29 months (726-905 days), 4) 30 – 35 months (906-1085 days) and 5) 36 months and more (1086+ days).<sup>56</sup> It is important to note that while the later categorizations are delineated in a more structured way, unlike the categorization of length of employment by quintiles, they are not divided equally. Lu et al. (2001) do not utilize dose categories of equal size and therefore it is not believed that this poses any problems for the analysis. The results of the analyses do not substantively differ and for this reason, only the results for the first categorization are provided.

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<sup>55</sup> The breakdown of each category by number of cases is as follows: 1) 1,078 cases, 2) 461 cases, 3) 230 cases, 4) 177 cases.

<sup>56</sup> The breakdown of each category by number of cases is as follows: 1) 649 cases, 2) 421 cases, 3) 274 cases, 4) 191 cases, 5) 411 cases.

### *Propensity Score Modeling and Subclassification*

Once the categories for treatment dosage are defined, the propensity score is calculated. This is done in a way similar to when the treatment effect is binary. The propensity score is the likelihood, based on the distribution of covariates, that an individual will be in one of the treatment dose categories. The propensity score is estimated using an ordinal logistic regression model, which includes 21 covariates (McCullagh, 1980, Lu et al., 2001, Zanutto et al., 2005). These covariates include demographic and criminal history variables which are related to either UNICOR employment or recidivism. Similar to when the treatment effect was binary, in order to avoid bias, only variables which are measured *prior* to UNICOR employment are included. The outcome variables are also not included in the matching procedure. Initial imbalance among covariates across the treatment dose categories is assessed by estimating one-way analysis of variance (ANOVA) models for each covariate. Prior to the propensity score estimation, 7 of the 21 covariates are out of balance in the length of employment model (Table 4.8).<sup>57</sup>

### Checking Balance

After a regression model is estimated for length of employment and the propensity scores generated, the data are subclassified into five strata based on the quintiles of the propensity score distribution. Rosenbaum and Rubin (1984), based on Cochran (1968), suggest that over 90% of bias, due to covariate imbalance, can be eliminated by stratifying the propensity score distribution into five equal subclasses. A

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<sup>57</sup> Initial imbalance is also assessed prior to the categorization of the distribution of length of employment using the correlation between each covariate and length of employment. There is a significant relationship between 12 of the 21 covariates and length of employment.

cross-tabulation is then created to make sure that there is a sufficient overlap across the five treatment categories by propensity score quintile.

After stratification, balance is assessed for each covariate within each dose category across the propensity score quintiles. This is evaluated using a two-way ANOVA, with the covariate as the dependent variable and the dose category and propensity score quintile as the two factors. A covariate is considered out of balance if there is a statistically significant main effect of the dose or a statistically significant interaction effect of dose and quintile (Lu et al, 2001, Zanutto et al., 2005). Balance is not initially achieved among the covariates. Therefore, interaction terms and quadratic terms of the imbalanced covariates are included to improve the propensity score model. The process to assess balance is repeated. The histograms of the propensity score distribution, estimated from the final model, for each of the five dosage categories for length of employment are shown in Figure 4.10.<sup>58</sup> Subclassification on the final propensity score model results in 19 of the 21 covariates being balanced (see Table 4.8).

## SUMMARY AND CONCLUSION

An initial comparison of UNICOR and non-UNICOR participants on institutional misconduct and post-release criminal outcomes suggests that employment in prison industries increases misconduct during incarceration, yet reduces recidivism upon release from prison. In addition, comparisons among UNICOR participants find that inmates who are employed for greater lengths of time in the program experience more positive post-release outcomes. Overall, these outcomes imply that employment in the UNICOR

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<sup>58</sup> The final model includes the main effects for all 21 covariates, three quadratic terms (age at first contact, age at sentencing, and log of expected sentence length) and 12 interaction terms (age at first contact, % some college, age at sentencing, log of expected sentence length, % high school graduate, % less than high school graduate).



program, while unable to positively influence the behavior of female inmates while incarcerated, is successful in reducing recidivism among this population. It is important to keep in mind that, due to the fact inmates self-select into the program, these outcomes may instead be a result of the individual characteristics of inmates who choose to participate in the UNICOR program, and not of the UNICOR program itself.

Propensity scores are utilized in two ways in this study to reduce selection bias so that the pre-existing differences between UNICOR participants and non-participants, and among UNICOR participants, are independent of treatment assignment. First, propensity score matching is used to create a matched sample ( $n = 3,370$ ) of UNICOR and non-UNICOR participants in which treatment status is independent of observed covariates. Second, propensity scores within a dose response model are used so that the effect of length of employment on post-release criminal outcomes can be explored such that dose category is independent of observed covariates. The following chapter provides an analysis of both institutional misconduct and post-release criminal outcomes, after controlling for selection bias, to determine whether the differences in institutional misconduct and post-release criminal outcomes remain or are in fact due to the pre-existing individual characteristics of inmates.

## CHAPTER 5 : ANALYSIS OF IN-PRISON BEHAVIOR & POST-RELEASE CRIMINAL OUTCOMES

### INTRODUCTION

The primary goal of correctional programming in general, and of prison industries specifically, is to provide inmates with the skills needed to reduce the likelihood of criminal activity upon release from prison. In terms of prison industries employment, this is done through the attainment of vocational skills and hands-on work experience, with the hope that this will instill in inmates “self-discipline, positive work habits and a positive self-image” (Maguire, 1996: 39). However, studies on prison industries often only examine the post-release outcomes of inmates to determine whether the program is effective (see Maguire, 1996 and Saylor and Gaes, 1997 for exceptions). The program’s impact on the behavior of inmates while incarcerated is often overlooked and yet examining the effect of prison industries employment on institutional misconduct may provide insight into how the program influences the behavior of inmates in the short-term (Maguire, 1996). In addition, one of the primary goals of prison industries has always been to reduce idleness among inmates by engaging them in purposeful work. Inmates who are employed in prison industries are also often motivated to abide by the institution’s rules for fear of losing a coveted work assignment. Therefore, from a management perspective, it is important to assess whether the program is successful in influencing the behavior of inmates while incarcerated.

Identifying whether prison industries employment is effective in reducing both institutional misconduct and recidivism, however, is difficult. This is because, while all able inmates must work during their incarceration, employment in a prison industries

program, such as the federal UNICOR program, is voluntary. Thus, individuals who seek employment in a prison industries work assignment might differ from individuals who do not on qualities such as initiative and self-discipline. These characteristics might also influence their ability to refrain both from institutional misconduct while incarcerated and criminal activity once released from prison. There is also an incentive to seek employment in a prison industries work assignment, due to higher wages and an opportunity to engage in meaningful work, and for this reason these particular work assignments are highly coveted and waiting lists are common. Therefore, there may be factors, such as sentence length, which influence an inmate's likelihood of being selected for a prison industries work assignment. These factors may also be correlated with one's likelihood of misconduct while incarcerated and recidivism upon release. As a result, the process leading to employment in prison industries is likely not random. For this reason, a comparison of the in-prison and post-release criminal outcomes of inmates who are employed in UNICOR with those who are not may be biased.

This chapter examines the effect of UNICOR employment on the likelihood of institutional misconduct and the likelihood of serious institutional misconduct within the first two years of incarceration. In addition, whether there is a difference between UNICOR participants and non-UNICOR participants in the time to first institutional misconduct, and first serious institutional misconduct, is also explored.<sup>59</sup> This chapter also explores the post-release criminal outcomes of UNICOR and non-UNICOR

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<sup>59</sup> For this analysis, a subsample of UNICOR participants, detailed in Chapter 3, and their matched control cases are used. As a result of the propensity score matching procedure, 12 treatment cases were unable to be matched. These cases were dropped (see Chapter 4). Therefore, the subsample for the institutional misconduct analysis consists of a matched sample of 139 UNICOR participants and 139 non-UNICOR participants.

participants, specifically rearrest and recommitment to federal prison, and whether length of employment in UNICOR influences these outcomes.

This chapter proceeds as follows. The first section provides the post-matching estimation of institutional misconduct. The second section compares the post-release criminal outcomes of UNICOR and non-UNICOR participants, specifically whether there is any difference in an inmate's likelihood of recidivating within three years after release from prison and whether there is any difference in the rate of recidivism over the full follow-up period, which extends to up to 13 years. The third section explores whether length of UNICOR employment, measured in doses, has an effect on recidivism. This is done by plotting the average outcomes by treatment dose category to create a dose response curve. The final section concludes with an overall discussion of the results and what can be inferred regarding the benefits of the UNICOR program.

## POST-MATCHING ESTIMATION OF INSTITUTIONAL MISCONDUCT

### *Likelihood of Institutional Misconduct*

As noted in the previous chapter, prior to the utilization of propensity scores, UNICOR participants have a greater likelihood of institutional misconduct during the first two years of incarceration. While this finding runs counter to the belief that employment in UNICOR can influence the behavior of inmates, it is not completely surprising given the fact that UNICOR participants are higher-risk inmates. It is likely that the individual differences between UNICOR and non-UNICOR participants have a confounding effect on these outcomes. After the observed characteristics of UNICOR and non-UNICOR participants are controlled through propensity score matching, UNICOR participants are no less likely than non-UNICOR participants to engage in

institutional misconduct within the first year of incarceration (12.9% vs. 18.7%;  $\chi^2 = 1.728, p = .250$ ). However, the difference between UNICOR and non-UNICOR participants within the second year of incarceration is marginally significant (19.4% vs. 29.5%;  $\chi^2 = 3.816, p = .069$ ). The average treatment effect of the UNICOR program on the likelihood of institutional misconduct is -5.8% within the first year and -10.1% within the second year of incarceration. This suggests that employment in the UNICOR program does have a slight impact on the institutional behavior of inmates such that they are less likely to engage in misconduct. Specifically, the longer an inmate is employed in UNICOR, the less likely she is to engage in institutional misconduct. This finding is particularly salient given the fact that propensity score matching controlled for pre-existing characteristics, which might increase the likelihood of an inmate engaging in misconduct, between UNICOR participants and non-participants.

#### *Time to First Institutional Misconduct*

While UNICOR participants are slightly less likely to engage in institutional misconduct within the first two years of incarceration, there is no significant difference in the average length of time to first misconduct between the two groups after the utilization of propensity score matching. Among inmates who are cited for an infraction, the average time to first misconduct during the first year of incarceration is 137.89 days for UNICOR participants, compared to 117.00 days for non-UNICOR participants ( $t = .663; p = .511$ ). Within the first two years of incarceration, the average time to first misconduct for UNICOR participants is 264.44 days and 254.27 days for non-UNICOR participants ( $t = .198; p = .844$ ). The average treatment effect of UNICOR employment on time to first misconduct is approximately 20.89 days during the first year of

incarceration and approximately 10.18 days during the first two years of incarceration. The Kaplan-Meier non-parametric survival curves for time to first institutional misconduct within the first two years of incarceration are shown in Figure 5.1.<sup>60</sup> Although the difference between the two survival curves barely reaches statistical significance, based on the log-rank test ( $\chi^2 = 3.77, p = .0522$ ), the graph illustrates that the effect of the UNICOR program appears to increase over time.<sup>61</sup> Specifically, while UNICOR participants are more likely than non-participants to be cited for an infraction within the first month of incarceration, their rate of institutional misconduct appears to decrease over time. This suggests that the longer inmates are employed in the UNICOR program, the less likely, and perhaps less willing, they are to jeopardize their job by misbehaving.

#### *Likelihood of Serious Institutional Misconduct*

Infractions for serious institutional misconduct are rare among both UNICOR and non-UNICOR participants in general, and specifically during the first and second years of incarceration. In the matched sample, there is no statistically significant difference between UNICOR participants and non-UNICOR participants in terms of serious institutional misconduct. UNICOR participants are no less likely to engage in serious institutional misconduct within the first (2.2% vs. 1.4%;  $\chi^2 = .204, p = .685$ ) or second year of incarceration (4.3% vs. 5.8%;  $\chi^2 = .301, p = .785$ ). The average treatment effect of the UNICOR program on institutional misconduct is 0.07% within the first year and -

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<sup>60</sup> Due to the small numbers of UNICOR participants in the institutional misconduct analysis, the hazard rates for time to first institutional misconduct and time to first serious institutional misconduct are not shown.

<sup>61</sup> Other tests of equality, including the Wilcoxon, Tarone-Ware and Peto-Peto test, are also conducted and all showed similar results. For this reason, the results from the log-rank test are reported throughout this chapter.

1.4% within the second year of incarceration. This suggests that, once individual characteristics are controlled for, employment in the UNICOR program has little effect on reducing serious institutional misconduct during the first two years of incarceration.

#### *Time to First Serious Institutional Misconduct*

Examination of time to first serious misconduct further illustrates the low frequency of serious institutional misconduct among this sample of female inmates. Within the first two years of incarceration, there is no statistically significant difference between UNICOR and non-UNICOR participants in the average time to first serious misconduct. The average time to first serious misconduct within the first year of incarceration is 144.67 days for UNICOR participants compared to 100.00 days for non-UNICOR participants ( $t = .343$ ;  $p = .754$ ). Within the first two years of incarceration, the average time to first serious misconduct for UNICOR participants is 407.67 days compared to 424.25 days for non-UNICOR participants ( $t = -.119$ ;  $p = .907$ ). The average treatment effect of the UNICOR program is 44.67 days during the first year of incarceration and -16.58 days during the second year. It is important to note that these differences may be more a function of the small numbers of female inmates who engage in serious institutional misconduct, than a function of the UNICOR program. The Kaplan-Meier non-parametric survival curves for time to first serious misconduct are shown in Figure 5.2. The difference between the two survival curves is not statistically significant, based on the log-rank test ( $\chi^2 = 0.30$ ,  $p = .5825$ ).

#### POST-MATCHING ESTIMATION OF POST-RELEASE CRIMINAL OUTCOMES

This section examines the post-release criminal outcomes of UNICOR and non-UNICOR participants, specifically rearrest and recommitment to federal prison. Rearrest

is measured as the first arrest an inmate experiences from the time of her release from prison up to September 13, 2006. Recombitment is measured as the first commitment to the custody of the Federal Bureau of Prisons an inmate experiences from the time of her release from prison up to July 31, 2007. The likelihood of rearrest and recommitment within the first three years of release from prison are examined.<sup>62</sup> Then, in order to determine whether the likelihood of recidivism changes over time, the rate of rearrest and recommitment over the full follow-up period, which extends up to 13 years, is also explored.

An initial examination of recidivism among UNICOR participants and non-UNICOR participants, prior to the utilization of propensity score matching, found that UNICOR participants are not only less likely to experience a rearrest or recommitment within the first three years after their release, but also that their rate of recidivating is slower than non-participants. In addition, length of employment in UNICOR is shown to be significantly and negatively related to recidivism. This suggests that the UNICOR program may have an effect on an inmate's post-release criminal behavior. Yet UNICOR participants and non-participants also differ significantly on a range of demographic and offense characteristics that might influence their likelihood of being employed in prison industries, as well as their likelihood of recidivism upon release. These characteristics may also influence how long an inmate is employed in the program.

In order to address the issue of selection bias, propensity scores are utilized so that observed covariates no longer predict, and are independent of, treatment assignment.

This chapter examines the post-release criminal outcomes of the matched sample of

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<sup>62</sup> Recall that the likelihood of rearrest and recommitment is examined within the first three years of release from prison due to the fact that inmates have varying follow-up lengths. Three years is the minimum follow-up period for everyone in the sample.



UNICOR participants and non-UNICOR participants ( $n = 3,370$ ). In addition, this chapter also explores, for the full sample of UNICOR participants ( $n = 1,946$ ), whether there is an effect by length of employment after the sample has been subclassified by propensity score. In doing so, a more accurate assessment of the ability of the UNICOR program to influence the behavior of inmates is attained because the analysis has sufficiently controlled for pre-existing differences.

#### *Comparison of UNICOR and Non-UNICOR Participants*

##### Likelihood of Recidivism After Release From Prison

A comparison of UNICOR participants' and non-UNICOR participants' likelihood of recidivism three years after release finds that there are no significant differences between the two groups. Specifically, three years after their release from prison, UNICOR participants are no less likely than non-participants to be rearrested (14.4% vs. 15.8%,  $\chi^2 = 1.224$ ,  $p = 0.269$ ) and no less likely to be recommitted to the custody of the Bureau of Prisons for either a technical violation or a new crime (7.8% vs. 8.5%,  $\chi^2 = 0.572$ ,  $p = 0.449$ ).<sup>63</sup> The average treatment effect of UNICOR employment on the likelihood of rearrest and recommitment three years after release is -1.4% and -0.7%, respectively. This illustrates that the significant differences which are found prior to propensity score matching are primarily the result of pre-existing differences between UNICOR and non-UNICOR participants and cannot be attributed to the program itself.

##### Time to First Rearrest

An examination of the average time between release and recidivism shows that there is also no significant difference in the average number of days to rearrest, with an

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<sup>63</sup> It is important to note that the majority of women (78.9% of non-UNICOR participants and 77.3% of UNICOR participants) who returned to Bureau of Prisons' custody did so for a technical violation and not for a new crime.

average of 943.63 days for UNICOR participants, compared to 902.33 days on average for non-UNICOR participants ( $t = .917; p = 0.359$ ).<sup>64</sup> The Kaplan-Meier non-parametric survival curves for rearrest are shown in Figure 5.3. This illustrates that, once the individual characteristics of inmates are controlled for, there is little difference between UNICOR and non-UNICOR participants in the time to first arrest after release from prison. The survival curves for UNICOR and non-UNICOR participants are essentially identical up to the first 1,000 days after release from prison. After that point, the survival rate for UNICOR participants is slightly greater. However, the two survival curves do not differ significantly, based on the log-rank test ( $\chi^2 = 0.11, p = 0.738$ ). A comparison of the hazard rates for UNICOR and non-UNICOR participants show that while non-UNICOR participants have higher rates of rearrest initially, after the first 1,000 days, the rates decrease significantly, while the rate of rearrest for UNICOR participants declines at a more gradual rate (see Figure 5.4).

A Cox proportional hazards model is conducted to examine the impact of UNICOR employment on the length of time to rearrest controlling for other covariates that have been shown to influence recidivism, including length of post-supervision (in months), age at release from prison, release to a community confinement center (CCC), or halfway house, and institutional misconduct, both less serious and serious, while incarcerated. While propensity scores are used to match UNICOR and non-UNICOR participants on individual characteristics, only covariates which are measured prior to treatment are included in the propensity score estimation. The propensity scores do not account for differences between UNICOR and non-UNICOR participants while in prison

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<sup>64</sup> Recall that the average time to rearrest and recommitment is calculated within seven years after release from prison due to the fact that inmates have varying follow-up lengths. Seven years is the median follow-up length for inmates in this study.

and after release. Therefore, UNICOR and non-UNICOR participants may still differ on their behavior while incarcerated and in their post-release experiences which may influence their likelihood of rearrest.

As shown in Table 5.1, the effect of UNICOR employment on the hazard rate of rearrest is small and insignificant. Not surprisingly, an inmate's age at release from prison is significant, with an increase of one year in age reducing the hazard rate of rearrest by 3.5%. In addition, being cited for institutional misconduct while incarcerated significantly increases the hazard rate of rearrest, by 43.67% for less serious misconduct and by 69.20% for serious misconduct. Length of post-supervision and whether an inmate is released to a halfway house do not significantly affect an inmate's length of time to rearrest.

#### Time to First Recombitment

There is also no difference between UNICOR participants and non-UNICOR participants in the average time between release and recommitment. UNICOR participants have an average of 901.05 days between release and recommitment, compared to 899.60 days for non-UNICOR participants ( $t = .028$ ;  $p = 0.978$ ). The Kaplan-Meier non-parametric survival curves for recommitment are shown in Figure 5.5. Similar to time to first rearrest, there is little difference between UNICOR and non-UNICOR participants, after propensity score matching. The survival curves for UNICOR and non-UNICOR participants are essentially the same up for the first 1,000 days after release from prison. After that point, the survival rate for UNICOR participants is slightly greater. However, the two survival curves do not differ significantly, based on the log-rank test ( $\chi^2 = 0.16$ ,  $p = 0.693$ ). The hazards rates for

recommitment are shown in Figure 5.6. While non-UNICOR participants have slightly higher rates of recommitment than UNICOR participants, overall, the rates are very similar.

The Cox proportional hazards model for recommitment is shown in Table 5.2. Employment in the UNICOR program has a small, and insignificant, effect on the length of time to recommitment. Similar to the model for rearrest, an inmate's age at release from prison is significant, with an increase of one year in age reducing the hazard rate of recommitment by 2.4%. In addition, being cited for institutional misconduct while incarcerated significantly increases the hazard rate of recommitment, by 41.05% for less serious misconduct and by 86.42% for serious misconduct. Again, as in the model for rearrest, length of post-supervision and whether an inmate was released to a halfway house do not significantly affect an inmate's length of time to recommitment.

These analyses show that the UNICOR program has little impact on post-release criminal outcomes. More importantly, however, these analyses illustrate that the differences in recidivism upon release from prison, which were found prior to the utilization of propensity scores, are the result of pre-existing characteristics between UNICOR and non-UNICOR participants and cannot be attributed to the program itself.

#### *Effect of Length of Employment in UNICOR*

#### Likelihood of Recidivism After Release From Prison

In order to assess the effect of length of employment on the likelihood of recidivism after release from prison, a dose response curve is created. First, the average likelihood of rearrest and recommitment within three years after release are estimated. The estimates are the average probability of rearrest and recommitment for each

treatment category, weighted by propensity score quintile. A dose response curve is then produced by plotting the estimates by length of employment category.<sup>65</sup> By definition, the analyses that follow are conducted only on the full sample of UNICOR participants ( $n = 1,946$ ).

The dose response curve for rearrest, shown in Figure 5.7, does not show that there is a significant downward trend in the average likelihood of rearrest as the dose of employment increases. A logistic regression predicting the likelihood of rearrest, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, confirms that there is no relationship between length of employment and likelihood of rearrest ( $p = .151$ ). In addition, a two-way ANOVA analysis is conducted and there is no statistically significant difference in the average likelihood of rearrest across treatment categories ( $F$ -statistic: 0.68;  $p = .6088$ ). This suggests that once the pre-existing differences among UNICOR participants with varying lengths of employment are balanced, there is no relationship between treatment category (i.e. length of employment) and the likelihood of rearrest within three years after release from prison.

Similar results are found for average likelihood of recommitment. While there is a more obvious downward trend in the likelihood of recommitment by treatment category (see Figure 5.8), this trend is not statistically significant. The results from a logistic regression predicting the likelihood of recommitment, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, find that there is no relationship between the treatment dose category and likelihood of recommitment ( $p =$

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<sup>65</sup> Length of employment in UNICOR is categorized in several ways. However, the results for each categorization (into five equal subclasses, by years employed and by months employed) do not substantively differ and therefore only the results for the categorization of length of employment into five equal subclasses are shown here.

.457). In addition, a two-way ANOVA analysis is conducted and there is no statistically significant difference in the average likelihood of recommitment across treatment categories ( $F$ -statistic: 0.51;  $p = .7283$ ). This suggests that any effect of length of employment on the likelihood of recommitment three years after release from prison, prior to the utilization of propensity scores, is confounded by pre-existing differences between inmates. Once controlled for, there is no relationship between length of employment and the likelihood of recommitment.

#### Time to First Rearrest

A dose response curve is also plotted for the average time to first rearrest for UNICOR participants who experienced an arrest within seven years after release from prison (see Figure 5.9).<sup>66</sup> Interestingly enough, the average time to first rearrest actually decreases as length of employment increases. This is in contrast to the expected direction of the effect of length of employment prior to the utilization of propensity scores. A regression model, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, finds that the relationship between length of employment and the average time to first rearrest is significant ( $p = .039$ ). However, a two-way ANOVA analysis is conducted and there is no statistically significant difference in the average time to first rearrest across treatment categories ( $F$ -statistic: 0.99;  $p = .4106$ ). This suggests that there is no convincing evidence that, once pre-existing differences between UNICOR participants with varying lengths of employment are balanced, there is an effect of length of employment on the average time to first rearrest.

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<sup>66</sup> Again, recall that the average time to first rearrest and recommitment is calculated within seven years after release from prison.

### Time to First Recommitment

Finally, the average time to first recommitment is estimated and a dose response curve plotted to determine whether there is any difference as length of employment increases. As shown in Figure 5.10, the average time to first recommitment by treatment category does not form a convincing trend. This is confirmed in a regression model, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, which finds that the relationship between length of employment and the average time to first recommitment is only marginally significant ( $p = .060$ ). A two-way ANOVA analysis is conducted and the difference in the average time to first recommitment across treatment categories is also found to be marginally significant ( $F$ -statistic: 2.20;  $p = .0697$ ). As with time to first rearrest, it does not appear that length of employment has a significant effect on the average time to first recommitment, once characteristics which predict how long an inmate is employed in UNICOR are balanced.

There are many factors which may influence an inmate's length of employment in UNICOR, most importantly an inmate's sentence length. Prior to propensity score subclassification, an inmate's length of employment was significantly and negatively related to recidivism, suggesting that the benefits of employment accrue over time. However, this analysis shows that the significant effect may have been driven more by the pre-existing differences between inmates who participate in UNICOR for varying lengths of time.

### SUMMARY AND CONCLUSION

This chapter examines the institutional behavior and the post-release criminal outcomes of UNICOR and non-UNICOR participants after the utilization of propensity

scores to determine whether employment in the UNICOR program has a positive impact on the behavior of inmates. In addition, this chapter also explores, among inmates who participate in UNICOR, whether a longer period of employment is significant in reducing the recidivism of inmates upon release from prison. The use of propensity scores ensures that pre-existing observed differences between UNICOR participants and non-participants, and among UNICOR participants, do not bias the outcome.

This analysis is only able to use a two-year time frame in which to examine the institutional behavior of inmates, yet there is an indication that the likelihood of institutional misconduct decreases the longer inmates are employed in the program. This may be due to the fact that inmates are less willing to put their job in jeopardy the longer they are employed in the program. Not only does an inmate's pay increase the longer she is employed, which is particularly significant due to the higher wages earned in UNICOR, but the work environment and positive relationships built may provide motivation to remain out of trouble. In addition, the routine of a regular work schedule also reduces the opportunities inmates have to engage in misconduct.

In terms of recidivism, the analyses in this chapter find that UNICOR participants are no less likely to be rearrested and recommitted to the Bureau of Prisons within three years after release from prison. In addition, there is no difference in the average time to first rearrest and first recommitment between UNICOR and non-UNICOR participants and little discernible difference in the survival curves over the full follow-up period. Thus, the differences which are shown in Chapter 4 between UNICOR and non-UNICOR participants in post-release criminal outcomes can be attributed primarily to the individual characteristics of inmates, and not solely due to the program itself.



Finally, this chapter also examines whether there is a differential impact of UNICOR employment, based on length of time employed. While length of employment is shown to have a significant effect on recidivism prior to the use of propensity scores, after the subclassification, the effect is diminished and no significant difference in recidivism is found among inmates who are employed for varying lengths of time in UNICOR.

One of the primary goals of the UNICOR program is to positively affect the behavior of inmates, resulting in a reduced likelihood of engaging in institutional misconduct while incarcerated and lower recidivism rates upon release from prison. The analyses in this chapter have shown that, while there does appear to be a selection effect in that employment in the UNICOR program is not random, once the pre-existing differences between inmates who are employed in UNICOR and those who are not are controlled for, the UNICOR program has only a minimal effect on institutional misconduct. The analyses do suggest that inmates who are employed in UNICOR are slightly less likely to engage in institutional misconduct over time. However, there is no significant effect of UNICOR employment on post-release criminal outcomes. Thus, it appears, based on this analysis, that the benefits received through this work assignment may be limited to the prison environment.

The next chapter provides detailed descriptions of two subsamples of inmates within the dataset, specifically inmates who are employed in the UNICOR program, but for less than 12 months during their incarceration, and inmates who are employed in a specific type of UNICOR industry, data services. The descriptive analyses are provided

as a way to further our understanding of the UNICOR program and the characteristics of inmates who are employed in the program.

## CHAPTER 6 : DESCRIPTION OF SUB-SAMPLES OF UNICOR PARTICIPANTS: THOSE EMPLOYED FOR LESS THAN 12 MONTHS AND THOSE EMPLOYED IN THE DATA SERVICES INDUSTRY

### INTRODUCTION

This chapter seeks to build upon the previous chapters by providing a detailed description of two specific sub-samples of inmates, those who are employed in the UNICOR program, but for less than twelve months, and those who are employed in one specific type of UNICOR industry during their incarceration, data services. The purpose of this chapter is to explore what factors led to an inmate being employed in the UNICOR program for less than twelve months and to examine whether there are any significant differences between this sub-sample of inmates and inmates who are employed for greater than twelve months, in terms of individual characteristics and post-release criminal outcomes. In addition, while the previous analyses focus on UNICOR employment in general, this chapter offers a more detailed description of the data services program within UNICOR and the characteristics of inmates who are employed in this specific industry.

One of the limitations of previous studies on prison industries is that the focus is only on examining the overall effect of employment in the program on inmate behavior. Evaluations of prison industries programs often use a specific length of employment to define treatment and overlook those inmates who were employed in the program for a shorter period of time. In doing so, an opportunity is missed to examine whether even a minimal amount of time in the program can be effective. In addition, examining this sub-sample of inmates also provides more insight into the issue of selection bias. For example, inmates who are employed in prison industries for a greater length of time

might differ from inmates who were unable to continue employment in ways that are also related to their ability to remain in the program and, in turn, their post-release criminal outcomes.

Prison systems, such as the federal system, offer a wide and diverse range of services in their prison industries program, such as sewing uniforms, making license plates, building furniture, etc. However, studies on prison industries overlook the various types of skills that inmates are learning. While the soft skills that inmates learn as a result of becoming acclimated to a professional work environment would most likely carry over into any type of employment, some industries may be more beneficial than others in helping inmates obtain work upon release from prison. Yet, this aspect of prison industries has not been examined in depth. In the federal system, the data services program within UNICOR is of particular interest as it trains inmates in a range of computer skills, which are in high demand in the work force.<sup>67</sup> This study does not examine the employment outcomes of inmates. However, providing specific information on the data services program is a way to draw attention to the various types of skills inmates learn while employed, illustrating that the applicability of these skills upon release from prison may vary.

The hope is that the detailed information provided in this chapter will offer further knowledge on the types of inmates who are employed in the UNICOR program and the specific kinds of skills they can obtain through their employment. This chapter proceeds as follows. The first section discusses the reasons why inmates may only be employed in the UNICOR program for a short period of time (less than twelve months). In addition, a

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<sup>67</sup> Coding definitions for work assignments other than data services were unable to be obtained by the BOP and for this reason, this study is unable to examine other industries within UNICOR in depth.

comparison is provided of the individual characteristics and post-release criminal outcomes of this sub-sample of inmates with inmates who are employed for over a year. The second section offers a description of the data services program within UNICOR and compares the characteristics and post-release criminal outcomes of inmates employed in this specific industry with those employed in other UNICOR industries.

#### UNICOR PARTICIPANTS FOR LESS THAN TWELVE MONTHS

In the full sample, 2,375 (15.4%) inmates were employed in the UNICOR program for less than twelve months.<sup>68</sup> Among these inmates, the average length of time employed was 169.79 days, or about five and a half months. This section provides a descriptive analysis of this sub-sample of inmates and explores what factors may explain why they were employed for only a short period of time.

#### *Reasons for Short-Term Employment in UNICOR*

There are many reasons why an inmate may only be employed in UNICOR for a short period of time, specifically less than a year. While it is possible that an inmate may voluntarily decide to leave their UNICOR job, this is a rare occurrence given the desirability of this type of work assignment.<sup>69</sup> Often inmates are only employed for a short period of time simply because they were selected for UNICOR employment too close to their date of release. For example, in this sub-sample of inmates, the average length of time served in prison is 36.81 months (median of 30.00 months). However, on average, inmates are incarcerated for about a year (367.30 days; median of 242.00 days) before they begin employment in UNICOR. Thus, the maximum amount of time an

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<sup>68</sup> “Full sample” refers to the entire dataset of 15,441 inmates.

<sup>69</sup> Reasons why an inmate may request to leave UNICOR are so that they can have a job with less stress or a job with greater flexibility so that they can have more time, for example, to access the law library or make phone calls (K. Ott, personal communication, February 12, 2008).

inmate could be employed for, on average, is two years, or a year and a half if they are transferred to a community corrections center to serve the remaining six months of their sentence.

It is also possible that an inmate may lose her job assignment in the UNICOR program for reasons outside of her control, such as an illness that leaves her incapable of working, or because she has been either released or transferred to another facility. An inmate may also have numerous court appearances which prevent her from maintaining a consistent period of employment in UNICOR. Finally, an inmate also may be terminated for an infraction for institutional misconduct or for not fulfilling her responsibilities as required.

It is hard to identify exactly why inmates in this sample ended their UNICOR employment since some possibilities, such as a transfer or illness, are not captured by the data. However, it appears that some of the inmates left their work assignment due to being released or transferred to a community corrections center (CCC). In most BOP facilities, inmates may request to leave UNICOR employment up to 2 weeks before their release or transfer to a CCC. This provides inmates with more time to prepare for their release. Approximately 27.8% of the inmates employed for less than twelve months ended their employment in UNICOR due to a transfer to a CCC or release.

It also appears that some were removed from their work assignment due to an infraction for institutional misconduct. Approximately 2.5% of inmates ended their employment in the UNICOR program on the same day that they were sanctioned for institutional misconduct. This is obviously a conservative estimate as inmates may have

been terminated from UNICOR due to institutional misconduct, yet not necessarily on the same exact day.<sup>70</sup>

Thus, there are a number of organizational reasons why an inmate may only be employed in the UNICOR program for a short period of time, many of which unfortunately cannot be explored with this data. However, it is also possible that an inmate may only be employed for a short period of time due to the fact that they lack certain characteristics, such as motivation and self-discipline, which are needed to be successful in the UNICOR program. The next section explores this in more detail by providing a comparison of the individual characteristics of inmates who are employed in the UNICOR program for less than 12 months and those who are employed for twelve months or more (see Table 6.1). This is done to see if there are any differences which may explain why some inmates are only employed for a short period of time in UNICOR.

#### *Characteristics of Short and Long-Term UNICOR Employees*

In addition to serving less time in prison, inmates who are employed in the UNICOR program for less than twelve months also differ from inmates who are employed in UNICOR for longer periods of time on a range of other characteristics. Specifically, inmates who are only employed in UNICOR for less than 12 months are significantly younger than inmates employed for 12 months or more. The age at sentencing ranges from 18 to 73, with an average age of 32.85 years, compared to 33.76 years for inmates employed in UNICOR for 12 months or more. As a result of their

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<sup>70</sup> The decision to end an inmate's employment in UNICOR due to an infraction for institutional misconduct is made by her supervisor. For this reason, an infraction for institutional misconduct does not necessarily mean that an inmate will be terminated from UNICOR. However, the fact that some inmates may be removed from their work assignment for this reason has implications for any recidivism analysis. Inmates who do not engage in misconduct or who do, but are not terminated for the infraction, are those who are employed in UNICOR for longer lengths of time. These inmates may also have better post-release outcomes, thus biasing the results.

shorter sentence lengths, inmates employed in UNICOR for less than 12 months are also significantly younger at the time of their release from prison, with an average age of 36.18 years, compared to 38.99 years for inmates employed for 12 months or more. It is also important to note that the age at which an inmate first came into contact with the criminal justice system is also younger for inmates employed in UNICOR for less than twelve months (27.24 vs. 28.07 years, respectively).

While the racial characteristics of UNICOR participants are evenly distributed among whites and blacks, inmates who are employed in the UNICOR program for less than 12 months are slightly more likely to be white (54%). Hispanic inmates make up approximately 12% of both samples. In terms of education, 33% of inmates who are employed in UNICOR for less than 12 months have a high school diploma. This is a significantly higher percentage than for inmates employed for 12 months or more, where 29% have a high school diploma. However, it is important to note that this may be more a function of the greater amount of missing data on educational level for inmates employed for 12 months or more, than a true significant difference between the two groups.

A description of the criminal history characteristics provides an interesting comparison of the two groups of inmates. Inmates who are employed in the UNICOR program for less than 12 months are classified, on average, at only a slightly lower custody classification score than inmates who are employed in the UNICOR program for a longer period of time (4.22 vs. 4.86, respectively). Inmates who are employed for a short period of time also have a similar likelihood of having a prior commitment and a history of violence. Yet, the length of time served is significantly shorter for inmates



who are employed in UNICOR for less than 12 months, with an average of 36.81 months compared to 59.94 months for inmates who are employed for 12 months or more. In addition, inmates employed in UNICOR for a short period of time were also convicted of an offense of lesser severity than inmates employed in UNICOR for 12 months or more. Specifically, inmates in this sub-sample were significantly more likely to be convicted of a property offense (24%) compared to UNICOR participants (13%). There are no significant differences between inmates in terms of likelihood of institutional misconduct.

This comparison suggests that inmates who are employed in the UNICOR program for less than 12 months are, like those employed for 12 months or more, higher-risk inmates. Yet they were convicted of offenses which have shorter sentence lengths. Due to their shorter period of incarceration, they did not remain employed in the UNICOR program for a significant length of time. The following section provides a comparison of the post-release criminal outcomes for the two groups of inmates.

#### *Post-Release Criminal Outcomes*

##### Likelihood of Recidivism

Inmates who are employed in the UNICOR program for less than 12 months are significantly more likely to be rearrested within three years of release from prison than inmates employed for longer than 12 months (24.3% vs. 14.9%;  $\chi^2 = 58.354$ ;  $p < .001$ ). In addition, the likelihood of recommitment to the Bureau of Prisons within three years of release from prison is also greater for inmates employed in the UNICOR program for less

than 12 months than those employed for longer periods of time (15.2% vs. 8.0%;  $\chi^2 = 51.875$ ;  $p < .001$ ).<sup>71</sup>

#### Time to First Rearrest

In addition to having a greater likelihood of recidivism, inmates who are employed in UNICOR for only a short period of time also recidivate at a faster rate than inmates employed for 12 months or more. Inmates employed in UNICOR for less than 12 months have a significantly shorter average time to first rearrest of 788.53 days, compared to 918.13 days for inmates employed for 12 months or more. This difference is significant at the .001 level. A comparison of the non-parametric Kaplan-Meier survival curves for time to first rearrest for short and long-term UNICOR participants is illustrated in Figure 6.1. Over the full follow-up period of up to 13 years, inmates who are employed in UNICOR for less than 12 months are not only more likely to fail, but also experience rearrest much sooner than inmates who are employed in UNICOR for 12 months or more. The two survival curves are significantly different, based on the log-rank test ( $\chi^2 = 45.95$ ,  $p < 0.001$ ). The hazard rates of short-term and long-term UNICOR participants also illustrate the differences in rearrest rates, with inmates who are employed for less than 12 months experiencing much higher rates of rearrest during the first 1,000 days after release from prison (see Figure 6.2).

#### Time to First Recombitment

The difference between short and long-term UNICOR participants in terms of the rate at which they recidivate is also seen in the average time to first recommitment.

Inmates who are employed in UNICOR for less than 12 months have an average time to

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<sup>71</sup> The majority of both short (84.4%) and long-term (84.6%) UNICOR participants returned to the custody of the Bureau of Prisons for a technical violation and not a new crime. There is no significant difference between the two groups of inmates in terms of returning to prison for a new crime ( $\chi^2 = 1.571$ ,  $p = .275$ ).

first recommitment of 817.67 days, compared to an average of 903.35 days for inmates employed for 12 months or more. This difference is significant at the .01 level. Figure 6.3 shows the non-parametric Kaplan-Meier survival curves for time to first recommitment for the two groups of inmates over the full follow-up period. Similar to the survival curves for rearrest, inmates who are employed for less than 12 months in UNICOR experience recommitment much earlier upon release from prison. In addition, over the full follow-up period, their rate of recommitment is much faster than inmates who are employed for 12 months or more. The difference between the two survival curves is statistically significant, based on the log-rank test ( $\chi^2 = 51.38; p < .001$ ). The hazard rates of short- and long-term UNICOR participants also highlight this trend, with inmates who are employed in UNICOR for less than 12 months experiencing a greater failure rate within the first 1,000 days upon release from prison (see Figure 6.4).

It is important to note that these are only baseline comparisons. However, this descriptive analysis provides an important first step in understanding what makes individuals successful in the UNICOR program by focusing on the full range of inmates who are employed in UNICOR, not simply those who are employed for the amount of time defined as the estimated treatment effect. As Bouffard, MacKenzie and Hickman (2000) point out:

Evaluation designs have frequently omitted controls for attrition from the program group, making it difficult to ascertain the effect of the program itself on recidivism. This is typical of the design in which researchers report only differences between those who complete and those who do not participate in a correctional program. This type of comparison creates several problems, including possible contamination of the comparison or control group. This occurs when a control group includes both subjects who never began a program and those who began but did not complete a program. Since those who begin and complete a program may be different than those who do not participate at all in or are not eligible for such

programming, it is difficult to reasonably attribute any differences in recidivism to program effectiveness (9).

This study attempts to address the concerns of Bouffard, MacKenzie and Hickman (2000) in two ways. First, for the primary analyses, inmates who are employed in UNICOR for less than 12 months are removed and propensity scores are utilized (see Chapters 4 and 5). Second, in order to determine whether inmates who are employed in the UNICOR program for less than 12 months differ from those who are employed for 12 months or more, a comparison of individual characteristics and post-release criminal outcomes is provided. Finally, using the full sample of UNICOR participants (inmates who are employed for any length of time), a dose response model is conducted to examine whether, once individual characteristics are controlled for, a greater period (or dose) of employment, improves post-release criminal outcomes. The dose response model is detailed in the next section.

#### Dose Response Model

A comparison of inmates who are employed in UNICOR for less than 12 months with those who are employed for 12 months or longer uncovered significant differences in terms of individual characteristics and post-release criminal outcomes. In order to assess whether the differences in recidivism are a result of the length of time employed, or rather pre-existing individual differences between the two groups of inmates, a dose response model is utilized to analyze the effect of length of UNICOR employment on post-release criminal outcomes. In contrast to the dose response model in Chapter 5 which only examined the effect of UNICOR employment for inmates employed for at least 12 months, the model in this chapter includes all inmates who are employed in the

UNICOR program ( $n = 4,321$ ).<sup>72</sup> A histogram of length of employment in UNICOR, in days, for all inmates employed in the program is shown in Figure 6.5.

In order to conduct this analysis, the distribution of length of UNICOR employment is divided into quintiles, which results in five equal categories: 1) 1-114 days, 2) 115-254 days, 3) 255-414 days, 4) 415-734 days and 735-3,298 days.<sup>73</sup> After subclassification on the propensity score, the average likelihood of rearrest and recommitment within three years after release are estimated. The estimates are the average probability of rearrest and recommitment for each treatment category, weighted by the propensity score quintile. A dose response curve is then produced by plotting the estimates by length of employment category.

The dose response curve for rearrest, as shown in Figure 6.7, shows that there is a significant downward trend in the average likelihood of rearrest as the dose of employment increases. A logistic regression predicting the likelihood of rearrest, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, finds that there is a significant relationship between length of employment and likelihood of rearrest ( $p < .001$ ). In addition, a two-way ANOVA analysis is conducted and there is a statistically significant difference in the average likelihood of rearrest across treatment categories ( $F$ -statistic: 4.52;  $p = .001$ ).

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<sup>72</sup> A dose response model is also used to initially analyze whether there is a differential effect by length of employment in UNICOR among inmates employed for less than 12 months. Length of employment (ranging from 1 to 364 days) is divided into five equally-sized doses: 1) 1-55 days, 2) 56-127 days, 3) 128-207 days, 4) 208-280 days, and 5) 281-365 days. The dose response model found that there are no significant differences between employment doses in terms of the four post-release criminal outcomes (likelihood of rearrest, likelihood of recommitment, average number of days to first rearrest, average number of days to first recommitment).

<sup>73</sup> The methodology behind the dose response model can be found in Chapter 4 and will not be repeated in detail here. It is important to note, however, that prior to the propensity score estimation 15 of the 21 covariates are out of balance in the length of employment model. Subclassification on the final propensity score model results in 18 of the 21 covariates being balanced (see Table 6.2). The histograms of the propensity score distribution, estimated from the final model, for each of the five dosage categories for length of employment are shown in Figure 6.6.

Similar results are found for average likelihood of recommitment. Again, an obvious downward trend is seen in the likelihood of recommitment by treatment category (see Figure 6.8) and this trend is statistically significant. The results from a logistic regression predicting the likelihood of recommitment, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, find that there is a significant relationship between the treatment dose category and the likelihood of recommitment ( $p < .001$ ). In addition, a two-way ANOVA analysis finds that there is a significant difference in the average likelihood of recommitment across treatment categories ( $F$ -statistic: 5.21;  $p < .001$ ).

A dose response curve is also plotted for the average time to first rearrest for UNICOR participants who experienced an arrest within seven years after release from prison (see Figure 6.9).<sup>74</sup> There is no difference in the average time to first rearrest across treatment dose categories. A regression model, with treatment dose category (treated as continuous) and the propensity score quintile as indicators, confirms that the relationship between length of employment and the average time to first rearrest is not significant ( $p = .235$ ). A two-way ANOVA analysis also finds that there is no statistically significant difference in the average time to first rearrest across treatment categories ( $F$ -statistic: 1.37,  $p = .242$ ).

Finally, the average time to first recommitment is estimated and a dose response curve plotted to determine whether there is any difference as length of employment increases. Similar to the average time to first rearrest, the average time to first recommitment by treatment category does not form a convincing trend (see Figure 6.10).

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<sup>74</sup> Recall that the average time to first rearrest and first recommitment is calculated within seven years after release from prison due to the fact that inmates have varying follow-up lengths. Seven years is the median follow-up length for inmates in this study.

This is confirmed in both a regression model ( $p = .509$ ) and a two-way ANOVA analysis ( $F$ -statistic: 0.44;  $p = .783$ ), which find that the relationship between length of employment and the average time to first recommitment is not significant.

A comparison of the descriptive statistics of short- and long-term UNICOR employees found significant differences on a range of individual characteristics. In addition, baseline comparisons between the two groups of inmates on post-release criminal outcomes showed that inmates who were employed in UNICOR for 12 months or more exhibited more positive outcomes. This suggests that either the individual characteristics of inmates are related to their ability to maintain employment in UNICOR, and thus be successful upon release, or that length of employment in UNICOR matters. In order to examine this question more closely, a dose-response model was utilized to balance the observed covariates of inmates with varying periods of employment in UNICOR. This analysis found that length of employment in UNICOR is significantly related to success within the first three years after release from prison, but that the impact of employment diminishes over time. Specifically, there is no difference in the average time to rearrest or recommitment among inmates who recidivated within seven years after release from prison.

What is interesting about this analysis is that length of employment has no effect on likelihood of rearrest or recommitment when examined separately for inmates employed for less than 12 months and those employed for 12 months or greater. In contrast, this analysis, which looks at the full range of employment length among inmates in the sample, finds that a greater period of employment is effective in reducing the likelihood of rearrest and recommitment three years after release from prison.

It is important to note that this analysis only compared post-release criminal outcomes among inmates employed in the UNICOR program and not with the control group. However, inmates who are employed in the UNICOR program for less than twelve months, as seen in the baseline comparisons, are at an increased risk of recidivism, much greater than that experienced by both inmates in the control group and those employed in UNICOR for greater than 12 months. This analysis suggests that, among the sample of inmates employed in UNICOR, a longer period of employment can improve their post-release criminal outcomes, at least within the first three years after release from prison. By working to ensure that inmates maintain employment for a specific period of time, there is potential for improved outcomes. While the dose response model is able to identify whether outcomes differ by treatment dose, it is unable to identify whether there is a “tipping point” in terms of length of employment. Future research is needed to identify specifically how long an inmate must be employed to receive a benefit.

While it is important to determine at what length employment in UNICOR is effective, it is also important to explore what challenges inmates face in maintaining employment in the UNICOR program. Addressing these challenges may be a way to deal with some of the barriers individuals face once employed after release from prison. In many instances, the reason behind why an inmate was only employed in UNICOR for a short period of time was beyond the inmate’s control, such as due to a transfer to a different facility. In other cases, the decision may have been made by the inmate herself or as a result of her behavior. Understanding and addressing these issues, when



appropriate, may be a way to ensure that inmates remain employed in the UNICOR program.

## DATA SERVICES INDUSTRY

### *Overview*

One of the programs that UNICOR operates is its data services industry, which provides document conversion services. Inmates who work in this industry convert a wide variety of documents, including images, charts and drawings, into a digital format. In this specific industry, inmates are involved in wide range of tasks, including data entry, redrawing technical manuals and scanning and electronically publishing documents. Currently, UNICOR reports that the industry is focusing on “technical manuals and technical drawings, patents for electronic publishing, conversions for document and records management systems and backfile conversion of legacy data” (Federal Prison Industries, Inc., n.d.).

During the time inmates in this study were incarcerated (1982-2003), this type of UNICOR program was operating in five federal women’s prisons: Federal Correctional Institution (FCI) Dublin, Federal Medical Center (FMC) Carswell, FCI Tallahassee, Federal Prison Camp (FPC) Bryan and FPC Marianna.<sup>75</sup> Federal correctional institutions are low security facilities, while federal prison camps are minimum security facilities.<sup>76</sup>

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<sup>75</sup> Since 2003, the UNICOR program has closed the data services programs at FCI Dublin and at FMC Carswell and has begun operating call centers in its place. The data services programs have been moved to male facilities.

<sup>76</sup> In the federal system, the level of security for female inmates ranges from minimum, low, high and administrative. Federal prison camps are federal facilities which house inmates classified at the lowest (or minimum) security level. Inmates live in dormitory housing and have few restrictions in terms of movement within the facility. In addition, there is limited or no fencing around the perimeter. Low security federal correctional institutions are slightly more restrictive, with double-fenced perimeters, dormitory or cubicle housing and a higher staff-to-inmate ratio. Finally, high security federal correctional institutions are penitentiaries where inmates live in cells and their movement is restricted. These facilities

As such, the population in each facility is slightly different, most specifically in terms of the average sentence length of inmates. On average, women in FCIs are incarcerated for approximately four to five years. For this reason, during their employment in data services, more focus is paid to training and skill development than actual on-the-job experience in the industry. The goal is to make the women as efficient and productive as possible. In contrast, in FPCs, women are incarcerated on average for about a year and a half and for this reason there is much higher turnover in the industry. Women employed in UNICOR at FPCs typically spend six months in skill training and then work in the industry for approximately one year (F. Hurst, personal communication, July 23, 2007).<sup>77</sup>

The UNICOR program does not follow up with inmates to learn whether they are able to obtain employment upon release from prison. However, the occupational outlook for data entry and information processing workers provided by the Bureau of Labor Statistics (2008) states that, while there is a projected overall decline in employment over the next year, job openings are expected due to the need to replace workers who leave this profession. The Bureau also notes that individuals who have “expertise in appropriate computer software applications and who meet company requirements for keyboarding speed” are at an advantage in terms of job prospects. This suggests that the training inmates receive as a result of employment in UNICOR’s data services industry may be beneficial upon release from prison. In addition, the training and experience inmates receive in the data services program also afford inmates the opportunity to gain higher-wage employment. For instance, in May 2006, the median annual earnings

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have highly secure perimeters. Administrative facilities, such as federal medical centers, house inmates of all security levels.

<sup>77</sup> Every inmate who works in data services must take and complete a four-week training class. After three months, an inmate should be proficient in the skill and after six months can be considered knowledgeable.

reported for data entry keyers, specifically, were \$24,690 (Bureau of Labor Statistics, 2008).

While data services is not a highly skilled occupation, in contrast to some of the other UNICOR industries, it does provide opportunities for employment upon release from prison which pay an adequate salary. While beyond the scope of this study, it would be interesting to examine whether the skills obtained by working in UNICOR's data services industry increase an inmate's post-release employment outcomes and whether inmates utilize the skills learned upon release. The next section offers a comparison of the characteristics of inmates in this sample who were employed in data services while incarcerated and those who were employed in other UNICOR industries.

#### *Characteristics of Inmates Employed in Data Services*

In order to provide a snapshot of the type of inmates employed in the data services industry in UNICOR, the characteristics of inmates in the sample who were employed only in data services during their incarceration are compared with those who were employed in other UNICOR industries (see Table 6.3).<sup>78</sup> The inmates employed in data services have a similar average age at sentencing, as other UNICOR participants, but are slightly younger at release from prison. This is due to the fact that inmates in the data services program have significantly shorter sentence lengths, serving only 29.30 months on average. The racial distribution of inmates in data services and those employed in other industries is essentially the same. However, inmates in the data services program

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<sup>78</sup> Inmates who are employed in UNICOR are often employed in more than one type of industry during their period of incarceration. For this reason, only a small number of inmates in the sample ( $n=112$ ) were employed solely in data services during their incarceration. In contrast to the previous analyses, due to the small sample size, inmates selected for this sample were employed for a minimum of 30 days, compared to 12 months. The comparison group of inmates therefore was pulled from inmates employed in other UNICOR industries for 30 days or more.

are significantly more educated, with 36% having some college education, compared to only 17% of inmates employed in other industries.

It also appears, based on their criminal history characteristics, that inmates in the data services program are lower-risk inmates than those who are employed in other UNICOR industries. For example, inmates in data services have a custody classification score, on average, of 3.36, compared to inmates in other industries who have an average score of 4.57. However, there is no significant difference in terms of prior commitments. While there are also no differences in terms of history of violence among inmates in this sub-sample and other UNICOR participants, inmates employed in data services are significantly more likely to be convicted of a property offense (37%) than inmates in other industries (18%) and less likely to be serving time for a drug offense (48% vs. 65%, respectively). In addition, the offense for which the majority of inmates in the data services industry were convicted of was either of lowest or moderate severity. Inmates in data services were significantly less likely to be convicted of an offense of high severity compared to inmates in other industries (14% vs. 25%, respectively). Finally, the inmates employed in the data services industry are also much less likely to engage in institutional misconduct, compared to inmates employed in other industries. Among inmates employed in data services, 24% were cited for less serious misconduct and 8% were cited for serious misconduct, compared to 40% and 20% of inmates in other industries, respectively. However, again, this difference may be due to the shorter sentence lengths of inmates employed in data services.

A description of the inmates employed in the data services industry suggests that these are lower-risk inmates who may be successful upon release from prison regardless

of their employment in the UNICOR program. However, it is important to note that the data in this study do not allow for an examination of whether these inmates were selected specifically for the data services program due to these characteristics, or whether these differences exist simply because of the way the sample was pulled and the type of inmates who are incarcerated in the facilities in which data services operates. The next section compares the post-release criminal outcomes of inmates in data services with those in other industries.

### *Post-Release Criminal Outcomes*

#### Likelihood of Recidivism

There is no significant difference between inmates employed in UNICOR's data services industry and those in other industries in terms of likelihood of rearrest three years after release from prison (15.2% vs. 19.9%;  $\chi^2 = 1.544, p = .231$ ). However, inmates employed in the data services industry have a significantly lower likelihood of recommitment three years after release from prison, compared to inmates employed in other industries (5.4% vs. 11.9%;  $\chi^2 = 4.476, p = .035$ ).

#### Time to First Rearrest<sup>79</sup>

Inmates who are employed in the data services industry do not differ significantly from inmates in other industries in terms of the rate at which they are rearrested. Inmates employed in the data services industry within UNICOR have an average time to first rearrest of 856.71 days, compared to an average of 834.94 days for inmates in other industries. This difference is not significant. The non-parametric Kaplan-Meier survival

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<sup>79</sup> Over the full follow-up period, only 11 inmates employed in data services were recommitted to the custody of the Bureau of Prisons. Due to such a small sample size, the results for time to first recommitment are not provided.

curves for rearrest for these two groups of inmates are shown in Figure 6.11.<sup>80</sup> While this is only a small sub-sample of inmates, upon release from prison, the outcomes of inmates in the data services industry appear to be slightly more positive than inmates in the UNICOR program overall. However, the difference between the two survival curves is only marginally significant, based on the log-rank test ( $\chi^2=3.31, p = .0689$ ).

One of the benefits of the UNICOR program is that inmates learn how to conduct themselves in a professional work environment and acquire good work habits. However, another important aspect of UNICOR employment is the actual training that inmates receive. The hope is that this skill training, in addition to the professional work experience, will allow inmates to be competitive in the labor market upon release from prison. For instance, inmates employed in the data services industry attain proficiency in data entry and become knowledgeable in the areas of document conversion and electronic publishing. This overview of the data services industry is a first step in understanding the types of skills inmates obtain while employed in UNICOR.

The sample of inmates employed in data services utilized in this study is small and should be viewed with caution. However, it is interesting to note that, except for a slight difference in likelihood of recommitment within three years after release from prison, there are no significant differences in post-release criminal outcomes between this group of inmates and those employed in other UNICOR industries. While these are only baseline comparisons and do not control for individual differences between the two groups of inmates, the similarity in outcomes is not surprising given the insignificant findings found in Chapter 5. This suggests that the type of skills in which inmates are

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<sup>80</sup> Due to the small number of inmates in data services who recidivated over the full follow-up period, the hazard rates for rearrest and recommitment are not shown.

trained in while working in UNICOR have little influence on their criminal behavior upon release from prison. However, this study does not examine the employment outcomes of inmates. Therefore, whether the type of industry an inmate works in while incarcerated affects her likelihood of employment upon release cannot be explored.

## SUMMARY AND CONCLUSION

Unlike other correctional programs, prison industries are unique in that inmates are not required to be employed for a specific period of time, nor do they have any control over the type of industry in which they are employed. Evaluations of prison industries assume that the experience of employment within this program is homogeneous. Yet there are many aspects of employment which may be influential in whether an inmate is successful upon release from prison. For example, for the primary analyses in this study, a determination was made that the treatment effect would be measured as employment in UNICOR for 12 months or more. This does not allow for an examination of whether inmates who are employed in the UNICOR program for less than that amount of time can receive some benefit. In addition, there are a broad range of industries in which inmates may be employed. The skills obtained in some industries, such as data services, may have more applicability for inmates upon release from prison, than others, such as computer refurbishing. This chapter briefly highlights these two aspects of the UNICOR program, length of employment and type of industry employed, with the hope that future research will examine these areas more in depth.

This chapter illustrated the differences that exist between inmates who are employed in the UNICOR program for less than twelve months and those employed for twelve months or more. Interestingly enough, this chapter found that length of

employment in the UNICOR program does affect an inmate's post-release criminal outcomes, once observed characteristics are controlled. This is in contrast with the previous chapter which did not find any significant effect of length of employment on recidivism, among inmates employed in UNICOR for twelve months or more. This suggests that there may be a benefit in ensuring that inmates are employed in the program for a specific period of time. This is particularly significant given the higher rates of recidivism among inmates employed in the program for less than twelve months.

This chapter also focused on one specific type of industry within the UNICOR program, data services. While only a descriptive analysis was provided, the comparison of inmates employed in data services and those employed in other industries suggests that the type of industry in which an inmate is employed may not impact one's recidivism outcomes after release from prison. However, whether the type of industry can influence employment outcomes has yet to be determined.

Understanding the different experiences inmates have while employed in UNICOR may provide insight into how the program can be used to increase the likelihood of employment and reduce recidivism upon release from prison. The analyses offered in this chapter suggest that two specific areas, length of employment and type of industry, are areas that future research should explore in more depth.



## CHAPTER 7: SUMMARY AND FUTURE DIRECTIONS

Prison industries have been at the cornerstone of correctional philosophy since the late 1800s. In contrast to traditional vocational training programs, which only train inmates in a specific skill, prison industries provide inmates with the opportunity to gain hands-on work experience utilizing the skills in which they have been trained. Inmates employed in prison industries also become acclimated to the work environment, where they gain soft skills, such as punctuality and dependability, vital in any job. Despite the prominent role that prison industries have played in correctional history, there is little research on the effectiveness of this specific type of correctional work program. While there is some evidence to suggest that prison industries can be effective in increasing the likelihood of employment and reducing recidivism upon release from prison (Saylor and Gaes, 1997), many studies do not adequately control for selection bias and therefore their results must be viewed with caution.

In addition, notably lacking in this literature is research on the effectiveness of prison industries among the female inmate population. The dramatic rise in the number of women incarcerated in the United States over the past thirty years has drawn increased attention to the gender-specific needs of female inmates. As a result, programs in women's prisons address topics such as parenting, victimization, and substance abuse, which significantly impact the lives of women offenders in ways that increase the likelihood of criminal behavior. Overlooked are women's poor educational backgrounds and sporadic work histories, which, along with a criminal history, hinder their ability to obtain employment upon release from prison, similar to men. In addition, vocational training and prison industries programs do not have prevalence in women's prisons as

they do in men's facilities. Many of the programs that do exist are, and have historically been, gender-stereotyped, preparing women for traditionally female-dominated positions, such as telemarketers or clerical staff. However, there is no research as to whether female inmates would similarly benefit from the training and work experience offered by correctional work programs, such that their ability to obtain employment upon release from prison is increased and their likelihood of recidivism reduced.

This research contributes to the literature by examining the effect of the federal prison industries program, UNICOR, on female inmates. Specifically, the study examines three questions: 1) Does employment in the UNICOR program reduce the likelihood that female inmates will engage in institutional misconduct and/or engage in misconduct at a slower rate than non-participants? 2) Does employment in the UNICOR program reduce the likelihood that female inmates will recidivate upon release from prison and/or recidivate at a slower rate than non-participants? and 3) Does employment in prison industries have a cumulative effect, i.e., does a longer period of employment in the UNICOR program increase the likelihood that an inmate will be successful upon release from prison? Inmates who are employed in UNICOR for 12 months or more during their incarceration are selected for the treatment group. Then, in order to reduce selection bias, propensity score matching is utilized to match treatment group members with inmates who were never employed in UNICOR. A follow up period of up to 13 years is used and recidivism is defined by two separate measures: rearrest and recommitment to the custody of the Federal Bureau of Prisons.

Prior to propensity score matching, it appears that inmates employed in UNICOR are more successful upon release from prison. However, the results from this dissertation

highlight that the pre-existing differences between the two groups of inmates were biasing the baseline comparisons. After the utilization of propensity scores, there are few discernible differences between the outcomes of UNICOR participants and non-participants. Consistent with past research (Maguire, 1996; Saylor and Gaes, 1997), inmates who are employed in the UNICOR program are slightly less likely to engage in institutional misconduct than non-UNICOR participants. In addition, inmates are found to be slightly less likely to engage in misconduct the longer they are employed in UNICOR. However, there are no significant differences between UNICOR and non-UNICOR participants in terms of post-release criminal outcomes. Specifically, UNICOR and non-UNICOR participants do not differ in terms of their likelihood of rearrest or recommitment within three years after release from prison or in their rate of recidivism over the full follow-up period. Finally, for inmates who have been employed in the UNICOR program for at least 12 months, any additional period of employment does not have a significant impact on recidivism outcomes. Yet, this study does find that, for all inmates employed in UNICOR, length of employment matters. However, determining exactly how long an inmate must be employed in UNICOR to receive a benefit is beyond the scope of this dissertation.

Previous research on prison industries, which has been conducted using samples of primarily male inmates, has found mixed results. However, overall there is evidence to suggest that the program can be effective in reducing recidivism (see Bouffard, MacKenzie and Hickman, 2000; Wilson, Gallagher and MacKenzie, 2000; Aos, Miller and Drake, 2006). For example, Saylor and Gaes (1997), also using a propensity score methodology, found that inmates employed in UNICOR were more likely to be employed

and less likely to recidivate during the first year after release from prison. In addition, inmates employed in UNICOR experienced lower rates of recidivism over the full follow up period, which ranged from 8 to 12 years. Although females were included in the Saylor and Gaes study, significant findings were only found for male inmates, due to the fact that too few female inmates recidivated during the follow-up period. In comparison to the insignificant findings of this study, it appears that the benefits of prison industries, specifically the UNICOR program, may be limited to male inmates.

While this dissertation does not examine why prison industries has a differential effect for male versus female inmates, the results speak in general to the limitations of prison industries in influencing the behavior of inmates. As Maguire et al. (1988) point out:

Prison industry participation occur[s] relatively late in the person's life, in an artificial and rather harsh environment, and occup[ies] a relatively brief amount of the participant's time and energy. When compared to the general social and psychological factors that are thought to lead to criminal behavior, exposure to a particular program while incarcerated pales in significance (15-6).

Specifically, employment in the UNICOR program while incarcerated may not be sufficient for women to overcome many of the gender-specific challenges they face upon release from prison.

As such, prison industries may instead simply provide a niche for women while they are incarcerated; a work assignment where they can be productive, be treated with a greater amount of respect, and earn a higher wage than is available in other prison jobs. However, after release from prison, the skills and work experience gained through employment in UNICOR are not enough to substantially change a woman's behavior.

For example, it may be that women choose not to be employed upon release from prison. As Harm and Phillips (2001) note, for women, the stress of maintaining employment after release from prison, including struggling with low wages and having to find and pay for child care, may prove to be too much. Upon release, both men and women may return to criminal activity as a way to make money. However, in contrast to men, a woman may have more options, other than employment, to receive financial support, such as through family, spouses or boyfriends, or government assistance. These are options that may not be as readily available for male inmates upon release from prison and thus employment may have more relevance for men.

These findings do not mean that prison industries are without merit. For example, there is evidence that UNICOR employment has a slight impact on the institutional behavior of female inmates, which as noted by Maguire et al. (1988) and Maguire (1996), suggests that prison industries programs have importance, particularly from a management perspective. These findings also do not mean that prison industries do not have the potential to influence the behavior of female inmates in the long-term. Determining whether there are ways to build upon the program, such as by specifying a minimum length of employment or creating linkages with businesses in the community, may be a way to improve the effectiveness of prison industries.

## LIMITATIONS

This research contributes to the literature in many ways. It is the first study which examines the effect of prison industries employment using a large sample of female inmates. In addition, the data used allow for an examination of inmates' behavior both while in prison and up to 13 years after release from prison, which is significant,

particularly for studies on women. Finally, the use of propensity score matching reduces selection bias that may be introduced, given the quasi-experimental research design.

However, there are limitations to this study that are important to address.

#### *Individual and Institutional-Level Variables*

As with any research that utilizes secondary data, this study is limited to the demographic, criminal history and offense data that were provided by the Federal Bureau of Prisons. For this reason, with the exception of data on educational attainment, number of dependents, prior commitments and history of violence, the analyses include limited information on the pre-prison characteristics of the female inmates in the sample, causing concern for omitted variable bias. This is particularly problematic as there are many aspects of an inmate's life prior to being incarcerated which can influence her behavior both while in prison and upon release. As Maguire et al. (1988) note, "by the time participants arrived in the industry program, they were adults who had completed the formative experiences of family, school, occupational experience and the like" (15).

For example, information is not available on whether an inmate has been a victim of physical or sexual abuse, whether she suffers from a mental health problem or if she has a history of substance abuse. Given the prevalence of these characteristics among the female inmate population, this study overlooks many of the challenges faced by women in prison and which play a significant role in their ability to successfully reintegrate back into society. Whether the UNICOR program can have an effect on women who face these issues is unable to be examined in this dissertation. These problems may be more pressing and employment not an immediate priority upon release from prison, thus further limiting the impact of UNICOR.

More importantly, given the focus of this research, there is no information regarding whether a woman was employed prior to or after release from prison. This aspect of a woman's life may also have implications for her ability to reintegrate back into society. Specifically, research has shown that women who are employed prior to incarceration have lower rates of recidivism upon release (O'Brien and Bates, 2005). In terms of prison industries, women who are employed prior to incarceration may be more likely to sign up for this specific type of correctional program, thus biasing the results. While this characteristic was unable to be controlled for in the propensity score analysis, given the findings, it is unclear whether it would have had a significant effect. However, it would be interesting to see whether employment in the UNICOR program affects occupational mobility among women who were employed prior to incarceration (see Saylor and Gaes, 1997). In addition, it would also be beneficial to explore whether employment in the UNICOR program can improve the outcomes of women who were not employed prior to incarceration. O'Brien and Bates (2005) noted that women who were unemployed prior to incarceration were more disadvantaged. Understanding whether prison industries can play a role in facilitating positive post-release outcomes for this population would be important.

#### *Recidivism Measures*

Recidivism in this study is defined by two separate measures: rearrest and recommitment to the custody of the Federal Bureau of Prisons. While these measures are commonly used to study recidivism outcomes, there are limitations to each. For example, the rearrest measure used in this study only captures whether a woman experienced an arrest upon release. No information is provided regarding the offense for which she was

arrested. There is no way to determine whether the offense was for a felony or misdemeanor, or whether the offense is similar to which the woman was previously convicted. In addition, as with any research that uses arrest records to measure recidivism, there is a concern that, for less serious offenses, the arrest may be more a reflection of the behavior of the police officer rather than the individual. This is due to the discretion that police officers have in making an arrest (Maxfield, Weiler and Widom, 2000).

The recommitment measure provides information regarding whether an inmate returns to federal prison for either a technical violation or a new crime. Commitments to a state facility are not captured by this data and therefore the measure is a conservative estimate of recidivism. Similar to arrest records, serious offenses are often likely to be reflected in the recommitment measure (Hindelang, Hirschi and Weis, 1979). However, the discretion of actors within the criminal justice system also plays a role in determining who is sentenced to prison. In this study, the majority of inmates are recommitted for a technical violation and not a new crime.<sup>81</sup> This means that the inmate broke one of the rules of her supervised release, such as not reporting to her probation officer every month or notifying them of a change in address. The probation officer often makes the determination as to whether the violation merits a return to prison. This suggests that that the discretion of one's probation officer is playing a significant role in this measure of recidivism.

Detailed information regarding these recidivism measures would allow for a more in-depth analysis of the effect of the UNICOR program on post-release criminal

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<sup>81</sup> If an inmate commits a new crime while under post-release supervision, the reason for recommitment is categorized as a new crime and not a violation of supervised release.



behavior. For example, this research found that there are no significant differences between UNICOR and non-UNICOR participants in terms of the reason for their recommitment to the Federal Bureau of Prisons; the majority of inmates are returned for a technical violation. However, it would be interesting to know whether there is any difference in the type of crime for which an inmate has been rearrested or recommitted, in terms of severity or if it differs from the offense for which a woman was initially arrested. Desisting from crime is a process (Laub and Sampson, 2001) and therefore a more detailed understanding of the recidivism outcomes of UNICOR and non-UNICOR participants may provide evidence as to whether employment in UNICOR is a way to facilitate that process.

In addition to concerns over validity, there are also external threats to the recidivism measures. Most important is the impact that one's community has on the likelihood of recidivism. Neighborhood-level factors are increasingly being explored in studies on prisoner reentry and recidivism. For example, Kubrin and Stewart (2006) found that, controlling for individual-level factors, individuals who returned to neighborhoods that experience high levels of disadvantage are more likely to recidivate than those who return to more affluent communities. While the present study is unable to examine neighborhood-level factors, this would be a particularly relevant factor to consider in future studies. This would be especially significant if considering post-release employment outcomes, as disadvantaged communities also experience higher rates of unemployment.

Much of the discussion on prison industries, similar to that on correctional programming in general, focuses on how much the program is able to bring about change

in an inmate's behavior. However, what is often overlooked is that facilitating change within the individual may not be enough to produce positive outcomes upon release from prison. Even the most skilled or highly motivated ex-offender faces serious challenges to re-entry, many of which are outside of an individual's control. For example, an inmate may obtain all of the benefits of employment in UNICOR, such as becoming proficient or licensed in a specific vocation and gaining professional work experience and the desire to seek employment upon release from prison. Yet, if an inmate leaves prison only to return to a community which does not have employment opportunities available, or which has a labor market where ex-offenders are not competitive, any benefits received from prison industries are inconsequential.

#### IMPLICATIONS FOR CORRECTIONAL PROGRAMMING

The findings from this research have important implications for correctional programming. First, consistent with prior research, employment in prison industries slightly reduces the likelihood of institutional misconduct among female inmates. In addition, this effect appears to increase to some extent over time. This suggests that, from a management perspective, there can be a benefit to prison industries. Studies have not examined this area in depth, but it is likely that the reason for this finding is the coveted nature of a prison industries work assignment and the higher wages inmates earn. In addition, while all inmates must work while incarcerated, inmates employed in prison industries are engaged in meaningful work for six to eight hours a day where, as much as can be expected within a prison environment, they are treated as an employee and not an inmate. Inmates may not want to put this employment in jeopardy by engaging in some form of misconduct. Thus, as Maguire (1996) states, there may be a "reward or incentive

mechanism...associated with prison industry participation” (42). Unfortunately, there are a limited number of inmates who may be employed in prison industries and there are long waiting lists to participate. Given that this type of work assignment has the potential to reduce institutional misconduct among female inmates, it would be beneficial to work towards increasing the number of inmates employed in prison industries.

Second, despite the insignificant findings of this research, the UNICOR program may still present an opportunity to provide female inmates with the skills and experience needed to become more competitive in the workforce upon release. Specifically, the results from this research should be used as an opportunity to learn more about how the program can become effective. For example, this dissertation provides evidence that there may be a minimum length of employment needed for any benefit of UNICOR to arise. This is an area that warrants further examination as it suggests that, in order for UNICOR to have any effect, inmates may need to commit to a required length of employment. In addition, all inmates face barriers in obtaining employment, particularly due to their criminal record. For this reason, it may be beneficial for prison industries programs to make connections with similar industries on the outside and provide inmates with assistance in obtaining employment in the field for which they have been trained. This would not only benefit the inmates, but would also provide industries with employees who would be entering employment fully trained and experienced. In addition, it may be helpful to provide inmates who are employed in prison industries with life skills training to prepare them for how to apply the experience they are gaining once they are released. This training may include how to put the experience gained through prison industries on a resume, how to interview, how to interact effectively with co-

workers, how to access benefits, such as health care, child care etc. This may help with the transition from prison into employment and increase the likelihood that an individual will remain employed over time.

#### AREAS OF FUTURE RESEARCH

A review of the literature on correctional programming found that there is little research on prison industries and the studies that have been conducted are plagued with serious methodological concerns. In addition, none of the prior studies on prison industries examine the effect on female inmates specifically. While this study contributes to the literature by examining whether prison industries can affect the institutional and post-release criminal behavior of female inmates, more attention must be given to this area of research. Specifically, research is needed which dissects what aspects of employment in prison industries are beneficial, if any, to inmates.

Most evaluations of prison industries overlook the fact that there are many different industries in which inmates may be employed. For this reason, research is needed to examine whether there is a differential effect of the program by type of industry. While this study briefly compared inmates who were employed in the data services industry in UNICOR with inmates employed in all other industries, the sample was too small to draw any substantive conclusions about the merits of this industry. Further research into this area would provide a deeper understanding as to whether the skills and experience obtained in some industries may have more relevance to inmates in terms of their ability to obtain employment, or improve their employment status, upon release. It is also important that future research examine the post-release employment outcomes of inmates. This dissertation utilized data on federal inmates, which made it

challenging to obtain information on employment as inmates are returning home to neighborhoods across the country. However, acquiring this information is not impossible (see Saylor and Gaes, 1997 and Gillis, Motiuk and Belcourt, 1998). Examining whether prison industries can increase the likelihood of employment upon release from prison would be influential in our understanding of the role that this program plays in facilitating desistance. This may also provide insight as to why there are differential effects of the program for male and female inmates. For example, despite participation in the UNICOR program, female inmates may either choose not to seek, or are unable to maintain, employment after release from prison.

As with all evaluation studies, there is a concern that pre-existing differences between individuals in the treatment and control group bias the outcome. Indeed, an initial comparison of UNICOR participants and non-participants found significant differences between these two groups of inmates, which affected their likelihood of institutional misconduct and recidivism. The increasing use of propensity score matching in evaluation studies has found it to be an advantageous way to isolate the treatment effect and reduce selection bias. For example, recent extensions of the traditional propensity score methodology, such as the dose-response model by Lu et al. (2001) and Zanutto, Lu and Hornick (2005) used in this study, have provided additional avenues through which to examine the effect of prison industries. Specifically, the work of Hirano and Imbens (2004), which applies the propensity score methodology to measure a continuous treatment effect, offers the opportunity to examine the issue of whether there is a specific length of time after which inmates receive a benefit from employment in prison industries. This methodology is only beginning to be utilized in evaluations of

correctional programming and offers exciting opportunities for research on prison industries.

Female inmates are a growing population within the U.S. prison system and, while increasing attention is being paid to many of their issues, their need for vocational training and employment is often overlooked. Research has shown that, similar to men, employment can play a role in facilitating a woman's desistance from crime, yet little is known regarding if and how correctional work programs can play a role in this process. This study draws our attention to the one specific type of correctional work program and its effect on the institutional and post-release criminal behavior of female inmates. While the program was not found to significantly influence the behavior of inmates, it does draw attention to the need for more research in this area.

TABLE 3.1  
Descriptive Statistics for Combined Sample, UNICOR Participants and Non-Participants

	Combined Sample (N=13,066)		UNICOR Participants (N=1,946)		Non-Participants (N=11,120)	
	Mean	SD	Mean	SD	Mean	SD
<b>DEMOGRAPHIC VARIABLES</b>						
Age at sentencing**	34.88	10.22	33.76	8.93	35.08	10.42
Age at release**	37.83	10.37	38.99	9.14	37.63	10.55
Number of dependents	1.36	1.62	1.33	1.32	1.36	1.66
Race						
<i>White**</i>	0.62	0.49	0.49	0.50	0.64	0.48
<i>Black**</i>	0.36	0.48	0.48	0.50	0.33	0.47
<i>Non-white</i>	0.03	0.16	0.03	0.16	0.03	0.16
Ethnicity						
<i>Hispanic**</i>	0.16	0.36	0.12	0.33	0.16	0.37
Education level						
<i>Less than HS graduate**</i>	0.32	0.47	0.22	0.42	0.33	0.47
<i>HS graduate*</i>	0.31	0.46	0.29	0.45	0.32	0.47
<i>Some college**</i>	0.19	0.39	0.16	0.37	0.20	0.40
<i>College graduate*</i>	0.04	0.20	0.03	0.16	0.04	0.21
<i>Missing**</i>	0.14	0.35	0.30	0.46	0.11	0.31
<b>CRIMINAL HISTORY &amp; OFFENSE VARIABLES</b>						
Age at first contact**	29.75	10.39	28.07	9.11	30.04	10.57
Any prior commitments**	0.28	0.45	0.34	0.47	0.27	0.44
History of violence						
<i>No history of violence**</i>	0.91	0.29	0.88	0.33	0.91	0.29
<i>History of minor violence</i>	0.05	0.22	0.06	0.23	0.05	0.22
<i>History of serious violence**</i>	0.05	0.21	0.07	0.25	0.04	0.20
Offense of conviction						
<i>Drugs**</i>	0.63	0.48	0.71	0.45	0.61	0.49
<i>Violent**</i>	0.07	0.26	0.14	0.35	0.06	0.24
<i>Property**</i>	0.26	0.44	0.13	0.34	0.28	0.45
<i>Other**</i>	0.04	0.20	0.02	0.14	0.04	0.21
Severity of current offense						
<i>Lowest/Low Moderate**</i>	0.24	0.43	0.13	0.33	0.26	0.44

	Combined Sample (N=13,066)		UNICOR Participants (N=1,946)		Non-Participants (N=11,120)	
	Mean	SD	Mean	SD	Mean	SD
<i>Moderate</i> **	0.50	0.50	0.42	0.49	0.52	0.50
<i>High</i> **	0.18	0.39	0.29	0.46	0.16	0.37
<i>Greatest</i> **	0.08	0.26	0.16	0.37	0.06	0.24
Custody classification score**	3.16	3.31	4.86	3.71	2.86	3.14
Expected length of incarceration (in months)**	46.42	42.35	88.49	65.31	39.06	31.59
Cited for less serious institutional misconduct**	0.28	0.45	0.39	0.49	0.26	0.44
Cited for serious institutional misconduct**	0.12	0.33	0.20	0.40	0.11	0.31
Time served (in months)**	32.20	22.72	59.94	30.14	27.35	17.00
Released to a halfway house	0.87	0.34	0.87	0.34	0.87	0.34
Post-supervision (in months)**	43.85	19.95	52.04	32.85	42.41	16.28
<b>OUTCOME VARIABLES</b>						
Rearrest three years after release*	0.17	0.38	0.15	0.36	0.17	0.38
Recommitment three years after release **	0.10	0.30	0.08	0.27	0.11	0.31
Average number of days to first rearrest*	847.08	617.49	918.13	641.81	835.42	612.73
Average number of days to first recommitment**	795.85	486.59	903.35	535.85	779.40	476.65

Note: Due to rounding, some categories may not equal 100%

\*  $p < .01$

\*\*  $p < .001$



TABLE 4.1  
Cox Proportional Hazards Regression of Time to Rearrest and Recombitment  
Based on Length of Employment

Length of Employment	Time to Rearrest			Time to Recombitment		
	I	II	III	I	II	III
<i>Days</i>	.999 (.000)**			.999 (.000)**		
<i>Months</i>		.982 (.004)**			.984 (.005)*	
<i>Years</i>			.804 (.037)**			.824 (.052)*

Hazard ratios are reported with standard errors in parentheses.

\*  $p < .01$

\*\*  $p < .001$

TABLE 4.2  
Comparison of UNICOR Participants and Non-Participants Before Propensity Score Matching

	UNICOR Participants (N=1,946)	Non-Participants (N=11,120)	$\chi^2$ or <i>t</i> -test
Propensity Score <sup>1</sup>	0.379	0.109	<i>t</i> = -46.9239**
Age at sentencing <sup>1</sup>	33.76	35.08	<i>t</i> = 5.849**
Age at release	38.99	37.63	<i>t</i> = -5.917**
Number of dependents <sup>1</sup>	1.33	1.36	<i>t</i> = 0.905
% white	49.4	63.8	$\chi^2 = 145.616^{**}$
% black <sup>1</sup>	47.8	33.4	$\chi^2 = 151.178^{**}$
% non-white	2.7	2.8	$\chi^2 = 0.013$
% Hispanic <sup>1</sup>	12.2	16.3	$\chi^2 = 21.390^{**}$
% less than high school graduate <sup>1</sup>	22.4	33.3	$\chi^2 = 92.267^{**}$
% high school graduate <sup>1</sup>	28.7	31.8	$\chi^2 = 7.310^*$
% some college <sup>1</sup>	15.8	19.5	$\chi^2 = 14.650^{**}$
% college graduate <sup>1</sup>	2.8	4.4	$\chi^2 = 11.461^*$
% missing (on education level)	30.3	10.9	$\chi^2 = 525.304^{**}$
Age at first contact <sup>1</sup>	28.07	30.04	<i>t</i> = 8.601**
% with prior commitments <sup>1</sup>	33.7	26.9	$\chi^2 = 38.525^{**}$
% with no history of violence	87.6	91.0	$\chi^2 = 22.959^{**}$
% with a history of minor violence <sup>1</sup>	5.6	4.9	$\chi^2 = 1.850$
% with a history of serious violence <sup>1</sup>	6.8	4.1	$\chi^2 = 28.519^{**}$
% convicted for drug offense <sup>1</sup>	70.8	61.2	$\chi^2 = 66.015^{**}$
% convicted for violent offense <sup>1</sup>	14.0	6.0	$\chi^2 = 158.597^{**}$
% convicted for property offense <sup>1</sup>	13.4	28.5	$\chi^2 = 195.079^{**}$
% convicted for other offense	1.8	4.4	$\chi^2 = 28.016^{**}$

	UNICOR Participants (N=1,946)	Non-Participants (N=11,120)	$\chi^2$ or $t$ -test
% convicted of lowest/low moderate severity offense	12.6	26.0	$\chi^2 = 162.865^{**}$
% convicted of moderate severity offense <sup>1</sup>	41.9	51.7	$\chi^2 = 64.222^{**}$
% convicted of high severity offense <sup>1</sup>	29.4	16.2	$\chi^2 = 195.860^{**}$
% convicted of greatest severity offense <sup>1</sup>	16.0	6.0	$\chi^2 = 237.336^{**}$
Custody classification score <sup>1</sup>	4.86	2.86	$t = -22.460^{**}$
Expected length of incarceration (in months)	88.49	39.06	$t = -32.724^{**}$
Log of expected sentence length <sup>1</sup>	4.30	3.47	$t = -56.874^{**}$
Cited for less serious institutional misconduct	39.5	26.4	$\chi^2 = 139.557^{**}$
Cited for serious institutional misconduct	19.6	11.1	$\chi^2 = 110.673^{**}$
Time served (in months)	59.94	27.35	$t = -46.421^{**}$
Released to a halfway house	86.5	87.0	$\chi^2 = 0.328$
Post-supervision (in months)	52.04	42.41	$t = -12.654^{**}$

<sup>1</sup> Included in propensity score analysis

\*  $p < .01$

\*\*  $p < .001$

TABLE 4.3  
 Logistic Regression for Likelihood of UNICOR Participation Before Propensity Score  
 Matching

	$\beta$	Std. Error	<i>p</i> -value
Age at Sentencing	-0.012	0.005	0.010
% with a history of minor violence	-0.083	0.139	0.549
% with a history of serious violence	-0.011	0.147	0.939
% black	0.323	0.065	0.000
% Hispanic	0.008	0.092	0.935
% convicted for drug offense	0.198	0.217	0.360
% convicted for property offense	0.402	0.225	0.074
% convicted for violent offense	0.941	0.232	0.000
Age at first contact	0.002	0.005	0.641
% convicted of moderate severity offense	-0.033	0.090	0.712
% convicted of high severity offense	-0.068	0.105	0.515
% convicted of greatest severity offense	-0.000	0.144	0.999
% less than high school graduate	-1.027	0.085	0.000
% high school graduate	-0.523	0.081	0.000
% some college	-0.510	0.094	0.000
% college graduate	-0.435	0.177	0.014
Log of expected sentence length	2.054	0.058	0.000
Number of dependents	-0.019	0.020	0.346
% with prior commitments	0.096	0.079	0.220
Custody classification score	0.060	0.013	0.000
Constant	-9.431	0.329	0.000

TABLE 4.4  
Comparison of UNICOR Participants and Non-Participants After Propensity Score Matching

	UNICOR Participants (N=1,685)	Non-Participants (N=1,685)	$\chi^2$ or <i>t</i> -test	Std. Bias	Percent Improvement
Propensity Score	.322	.320	<i>t</i> = -0.393	0.012	98.94
Age at sentencing	33.98	34.02	<i>t</i> = 0.145	-0.005	96.40
Age at release	38.78	38.23	<i>t</i> = -1.622	0.056	59.34
Number of dependents	1.32	1.30	<i>t</i> = -0.406	0.014	41.23
% white	52.0	51.7	$\chi^2$ = 0.043	0.006	102.04
% black	45.2	45.3	$\chi^2$ = 0.005	-0.002	99.18
% non-white	2.7	3.0	$\chi^2$ = 0.172	-0.018	-195.77
% Hispanic	12.9	12.4	$\chi^2$ = 0.217	0.016	87.08
% less than high school graduate	24.7	25.5	$\chi^2$ = 0.180	-0.019	92.97
% high school graduate	30.7	31.6	$\chi^2$ = 0.267	-0.018	73.04
% some college	16.9	16.8	$\chi^2$ = 0.002	0.002	98.39
% college graduate	3.0	3.7	$\chi^2$ = 1.330	-0.043	57.29
% missing (on education level)	24.7	22.5	$\chi^2$ = 2.375	0.071	85.64
Age at first contact	28.37	28.36	<i>t</i> = -0.038	0.001	99.37
% with prior commitments	32.8	32.4	$\chi^2$ = 0.066	0.009	93.93
% with no history of violence	88.4	87.7	$\chi^2$ = 0.476	0.022	119.99
% with a history of minor violence	5.5	5.7	$\chi^2$ = 0.050	-0.008	75.52
% with a history of serious violence	6.1	6.6	$\chi^2$ = 0.499	-0.024	78.22
% convicted for drug offense	70.6	70.7	$\chi^2$ = 0.006	-0.003	98.77
% convicted for violent offense	13.1	12.6	$\chi^2$ = 0.130	0.012	94.80
% convicted for property offense	14.5	15.3	$\chi^2$ = 0.396	-0.023	94.89
% convicted for other offense	1.9	1.4	$\chi^2$ = 1.162	0.039	125.98
% convicted of lowest/low moderate severity offense	13.2	12.0	$\chi^2$ = 1.075	0.036	110.46
% convicted of moderate severity offense	44.1	45.0	$\chi^2$ = 0.270	-0.018	90.96
% convicted of high severity offense	28.4	28.7	$\chi^2$ = 0.052	-0.008	97.31
% convicted of greatest severity offense	14.3	14.2	$\chi^2$ = 0.002	0.002	99.41
Custody classification score	4.539	4.635	<i>t</i> = 0.767	-0.026	95.20

	UNICOR Participants (N=1,685)	Non-Participants (N=1,685)	$\chi^2$ or <i>t</i> -test	Std. Bias	Percent Improvement
Expected length of incarceration (in months)	78.12	78.27	<i>t</i> = 0.076	-0.003	100.31
Log of expected sentence length	4.20	4.20	<i>t</i> = -0.082	0.003	99.81
Cited for less serious institutional misconduct	37.3	37.9	$\chi^2$ = 0.102	-0.012	104.26
Cited for serious institutional misconduct	18.2	14.0	$\chi^2$ = 10.773**	0.114	51.92
Time served (in months)	54.80	46.96	<i>t</i> = -8.668**	0.299	77.55
Released to a halfway house	86.6	84.4	$\chi^2$ = 3.275	0.062	520.50
Post-supervision (in months)	50.58	48.67	<i>t</i> = -2.139*	0.074	80.08

\* *p* < .05

\*\* *p* < .001

TABLE 4.5  
 Logistic Regression for Likelihood of UNICOR Participation After Propensity Score  
 Matching

	$\beta$	Std. Error	<i>p</i> -value
Age at Sentencing	-0.001	0.005	0.843
% with a history of minor violence	0.009	0.166	0.958
% with a history of serious violence	-0.055	0.166	0.742
% black	0.006	0.077	0.934
% Hispanic	0.062	0.113	0.581
% convicted for drug offense	-0.308	0.277	0.266
% convicted for property offense	-0.372	0.290	0.200
% convicted for violent offense	-0.224	0.290	0.441
Age at first contact	0.002	0.006	0.789
% convicted of moderate severity offense	-0.126	0.113	0.267
% convicted of high severity offense	-0.092	0.128	0.470
% convicted of greatest severity offense	-0.086	0.169	0.611
% less than high school graduate	-0.122	0.101	0.227
% high school graduate	-0.118	0.096	0.217
% some college	-0.084	0.112	0.450
% college graduate	-0.293	0.208	0.159
Log of expected sentence length	0.000	0.069	0.997
Number of dependents	0.007	0.027	0.801
% with prior commitments	0.072	0.094	0.441
Custody classification score	-0.013	0.015	0.399
Constant	0.501	0.431	0.245

TABLE 4.6  
Comparison of Matched vs. Unmatched Cases

	UNICOR (N=1,685)	Unmatched UNICOR (N=261)	Non-UNICOR (N=1,685)	Unmatched Non-UNICOR (N=9,435)
Propensity Score	.322	.743	.320	.071
Age at sentencing	33.98	32.36	34.02	35.27
Number of dependents	1.32	1.40	1.30	1.37
% white	52.0	32.6	51.7	66.0
% black	45.2	64.8	45.3	31.2
% non-white	2.7	2.7	3.0	2.7
% Hispanic	12.9	7.3	12.4	17.0
% less than high school graduate	24.7	7.3	25.5	34.7
% high school graduate	30.7	15.7	31.6	31.8
% some college	16.9	9.2	16.8	20.0
% college graduate	3.0	1.5	3.7	4.6
% missing (on education level)	24.7	66.3	22.5	8.8
Age at first contact	28.37	26.10	28.36	30.34
% with prior commitments	32.8	39.5	32.4	25.9
% with no history of violence	88.4	82.0	87.7	91.6
% with a history of minor violence	5.5	6.1	5.7	4.7
% with a history of serious violence	6.1	11.9	6.6	3.7
% convicted for drug offense	70.6	72.4	70.7	59.4
% convicted for violent offense	13.1	19.9	12.6	4.8
% convicted for property offense	13.1	6.1	12.6	30.8
% convicted for other offense	1.9	1.5	1.4	4.9
% convicted of lowest/low moderate severity offense	13.2	8.8	12.0	28.5
% convicted of moderate severity offense	44.1	27.6	45.0	52.9
% convicted of high severity offense	28.4	36.4	28.7	13.9
% convicted of greatest severity offense	14.3	27.2	14.2	4.6
Custody classification score	4.54	6.95	4.64	2.54
Expected length of incarceration (in months)	78.12	155.41	78.27	32.05
Log of expected sentence length	4.20	4.97	4.20	3.34



TABLE 4.7  
 Comparison of Matched vs. Unmatched UNICOR Cases  
 (with propensity score range of 0.55 – 0.98)

	UNICOR (N=262)	Unmatched UNICOR (N=261)
Propensity Score	.682	.743
Age at sentencing	32.59	32.36
Number of dependents	1.37	1.40
% white	37.8	32.6
% black	60.7	64.8
% non-white	1.5	2.7
% Hispanic	9.5	7.3
% less than high school graduate	11.8	7.3
% high school graduate	26.0	15.7
% some college	12.2	9.2
% college graduate	1.1	1.5
% missing (on education level)	48.9	66.3
Age at first contact	27.36	26.10
% with prior commitments	35.9	39.5
% with no history of violence	86.6	82.0
% with a history of minor violence	5.0	6.1
% with a history of serious violence	8.4	11.9
% convicted for drug offense	76.3	72.4
% convicted for violent offense	17.6	19.9
% convicted for property offense	4.6	6.1
% convicted for other offense	1.5	1.5
% convicted of lowest/low moderate severity offense	8.0	8.8
% convicted of moderate severity offense	29.8	27.6
% convicted of high severity offense	38.5	36.4
% convicted of greatest severity offense	23.7	27.2
Custody classification score	6.26	6.95
Expected length of incarceration (in months)	142.29	155.41
Log of expected sentence length	4.89	4.97

TABLE 4.8  
Covariate Balance Before and After Subclassification: Length of Employment

	BEFORE SUBCLASSIFICATION <i>F</i> -statistic	AFTER SUBCLASSIFICATION <i>F</i> -statistic	
		Main Effect	Interaction Effect
Age at sentencing <sup>1</sup>	2.55*	0.75	1.40
Number of dependents <sup>1</sup>	0.50	0.61	0.36
% white	0.69	0.42	0.38
% black <sup>1</sup>	0.51	0.20	0.39
% non-white <sup>1</sup>	2.10	1.02	0.70
% Hispanic <sup>1</sup>	0.83	0.54	0.41
% less than high school graduate <sup>1</sup>	1.76	1.22	0.95
% high school graduate <sup>1</sup>	3.82**	0.38	1.75*
% some college <sup>1</sup>	6.49***	2.01	1.86*
% college graduate <sup>1</sup>	0.46	0.59	0.95
% missing (on education level)	25.66***	1.16	1.18
Age at first contact <sup>1</sup>	1.74	1.28	1.42
% with prior commitments <sup>1</sup>	2.75*	1.35	0.55
% with no history of violence	1.66	1.37	0.39
% with a history of minor violence <sup>1</sup>	1.51	0.67	0.67
% with a history of serious violence <sup>1</sup>	1.26	1.42	0.57
% convicted for drug offense <sup>1</sup>	9.49***	0.51	0.80
% convicted for violent offense <sup>1</sup>	0.45	0.25	0.49
% convicted for property offense <sup>1</sup>	13.13***	1.19	1.04
% convicted for other offense	0.53	0.50	0.82
% convicted of lowest/low moderate severity offense	1.22	0.49	1.82*
% convicted of moderate severity offense <sup>1</sup>	1.63	0.44	0.31
% convicted of high severity offense <sup>1</sup>	1.28	1.63	0.94
% convicted of greatest severity offense <sup>1</sup>	1.04	0.99	0.76
Custody classification score <sup>1</sup>	1.54	0.83	0.48
Expected length of incarceration (in months)	64.10***	0.81	0.36
Log of expected sentence length <sup>1</sup>	109.95***	2.22	1.28

<sup>1</sup> Included in propensity score analysis

\*  $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

TABLE 5.1  
Cox Proportional Hazards Model for the Analysis of Duration to Rearrest

Variable	Coefficient	Standard Error	Coeff./SE	Exp. (Coeff.)
UNICOR Employment	-.0226684	.0693103	-0.33	0.9775866
Months Post-Supervision	-.0022837	.002058	-1.11	0.9977189
Age at Release	-.0353062	.004063	-8.69*	0.9653098
Release to CCC	-.033305	.0964076	-0.35	.9672435
Any Less Serious Misconduct	.3623912	.0724134	5.00*	1.436761
Any Serious Misconduct	.5259219	.0822937	6.39*	1.692018

Log likelihood = -6506.1714. Global  $\chi^2 = 210.02$ ,  $df = 6$ ,  $p = 0.0000$ .

\*  $p < .001$

TABLE 5.2  
Cox Proportional Hazards Model for the Analysis of Duration to Recommitment

Variable	Coefficient	Standard Error	Coeff./SE	Exp. (Coeff.)
UNICOR Employment	-.0559723	.0982775	-0.57	0.9455653
Months Post-Supervision	.0006120	.0018977	0.32	1.000612
Age at Release	-.0239411	.0056053	-4.27*	0.9763432
Release to CCC	-.0122496	.1380493	-0.09	0.9878251
Any Less Serious Misconduct	.3439984	.1031532	3.33*	1.410576
Any Serious Misconduct	.6228145	.1143416	5.45*	1.864167

Log likelihood = -3321.6204. Global  $\chi^2 = 86.57$ , df = 6,  $p = 0.0000$ .

\*  $p < .001$

TABLE 6.1  
Descriptive Statistics of Inmates Employed in UNICOR for Less than 12 Months  
and Inmates Employed in UNICOR for 12 Months or More

	Employed for Less than 12 mos. (N=2,375)		Employed for 12 mos. or More (N=1,946)	
	Mean	SD	Mean	SD
<b>DEMOGRAPHIC VARIABLES</b>				
Age at sentencing***	32.85	9.08	33.76	8.93
Age at release***	36.17	9.22	38.99	9.14
Number of dependents	1.41	1.50	1.33	1.32
Race				
<i>White**</i>	0.54	0.50	0.49	0.50
<i>Black**</i>	0.44	0.50	0.48	0.50
<i>Non-white</i>	0.03	0.16	0.03	0.16
Ethnicity				
<i>Hispanic</i>	0.12	0.33	0.12	0.33
Education level				
<i>Less than HS graduate***</i>	0.29	0.45	0.22	0.42
<i>HS graduate**</i>	0.33	0.47	0.29	0.45
<i>Some college ***</i>	0.20	0.40	0.16	0.37
<i>College graduate</i>	0.03	0.17	0.03	0.16
<i>Missing***</i>	0.15	0.36	0.30	0.46
<b>CRIMINAL HISTORY &amp; OFFENSE VARIABLES</b>				
Age at first contact**	27.24	9.06	28.07	9.11
Any prior commitments	0.36	0.48	0.34	0.47
History of violence				
<i>No history of violence</i>	0.87	0.33	0.88	0.33
<i>History of minor violence</i>	0.06	0.23	0.06	0.23
<i>History of serious violence</i>	0.07	0.26	0.07	0.25
Offense of conviction				
<i>Drugs***</i>	0.60	0.49	0.71	0.46
<i>Violent</i>	0.12	0.33	0.14	0.35
<i>Property***</i>	0.24	0.43	0.13	0.34
<i>Other***</i>	0.04	0.19	0.02	0.14

	Employed for Less than 12 mos. (N=2,375)		Employed for 12 mos. or More (N=1,946)	
	Mean	SD	Mean	SD
Severity of current offense				
<i>Lowest/Low Moderate</i> ***	0.22	0.42	0.13	0.33
<i>Moderate</i>	0.45	0.50	0.42	0.49
<i>High</i> ***	0.20	0.40	0.29	0.46
<i>Greatest</i> **	0.13	0.34	0.16	0.37
Custody classification score***	4.22	3.81	4.86	3.71
Expected length of incarceration (in months)***	54.78	44.44	88.49	65.31
Cited for less serious institutional misconduct	0.41	0.49	0.39	0.49
Cited for serious institutional misconduct	0.19	0.40	0.20	0.40
Time served (in months)***	36.81	23.49	59.94	30.14
Released to a halfway house	0.87	0.34	0.87	0.34
Post-supervision (in months)***	45.42	17.65	52.04	32.85
OUTCOME VARIABLES				
Rearrest three years after release***	0.24	0.43	0.15	0.36
Recommitment three years after release***	0.15	0.36	0.08	0.27
Average number of days to first arrest***	788.53	600.48	918.13	641.81
Average number of days to first recommitment*	817.67	495.40	903.35	535.85

Note: Due to rounding, some categories may not equal 100%

\*  $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

TABLE 6.2  
Covariate Balance Before and After Subclassification:  
Length of Employment for All UNICOR Participants

	BEFORE	AFTER	
	SUBCLASSIFICATION <i>F</i> -statistic	Main Effect	Interaction Effect
Age at sentencing <sup>1</sup>	6.01***	0.75	2.81***
Number of dependents <sup>1</sup>	2.41*	0.24	1.43
% white	1.85	1.01	0.51
% black <sup>1</sup>	1.81	0.45	0.55
% non-white <sup>1</sup>	1.76	1.37	1.09
% Hispanic <sup>1</sup>	0.82	1.63	1.40
% less than high school graduate <sup>1</sup>	8.35***	2.04	1.22
% high school graduate <sup>1</sup>	5.68***	0.20	0.75
% some college <sup>1</sup>	9.02***	2.08	0.90
% college graduate <sup>1</sup>	1.03	1.26	0.77
% missing (on education level)	58.25***	0.33	2.49***
Age at first contact <sup>1</sup>	5.28***	0.97	1.21
% with prior commitments <sup>1</sup>	2.38*	1.52	1.23
% with no history of violence	1.88	1.63	0.44
% with a history of minor violence <sup>1</sup>	1.69	1.41	1.24
% with a history of serious violence <sup>1</sup>	1.00	0.97	0.56
% convicted for drug offense <sup>1</sup>	21.10***	0.25	1.34
% convicted for violent offense <sup>1</sup>	0.62	0.42	0.81
% convicted for property offense <sup>1</sup>	28.18***	0.69	1.48
% convicted for other offense	3.19*	0.71	1.07
% convicted of lowest/low moderate severity offense	16.20***	4.98***	2.34**
% convicted of moderate severity offense <sup>1</sup>	3.13**	0.86	1.49
% convicted of high severity offense <sup>1</sup>	12.74***	1.36	2.02**
% convicted of greatest severity offense <sup>1</sup>	2.98*	0.15	1.25
Custody classification score <sup>1</sup>	9.00***	0.57	1.00
Expected length of incarceration (in months)	172.28***	1.53	1.27
Log of expected sentence length <sup>1</sup>	256.43***	7.84***	3.15***

<sup>1</sup> Included in propensity score analysis

\*  $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

TABLE 6.3  
Descriptive Statistics for Inmates Employed in UNICOR's Data Services Industry and  
Inmates Employed in All Other UNICOR Industries

	Data Entry Participants (N=112)		UNICOR Participants (N=3,900)	
	Mean	SD	Mean	SD
<b>DEMOGRAPHIC VARIABLES</b>				
Age at sentencing	33.30	9.19	33.26	8.98
Age at release	36.05	9.17	37.54	9.25
Number of dependents	1.30	1.42	1.38	1.44
Race				
<i>White</i>	0.52	0.50	0.52	0.50
<i>Black</i>	0.45	0.50	0.46	0.50
<i>Non-white</i>	0.04	0.19	0.03	0.16
Ethnicity				
<i>Hispanic</i>	0.13	0.34	0.12	0.33
Education level				
<i>Less than HS graduate***</i>	0.09	0.29	0.26	0.44
<i>HS graduate</i>	0.38	0.49	0.31	0.46
<i>Some college***</i>	0.36	0.48	0.17	0.38
<i>College graduate</i>	0.04	0.19	0.03	0.16
<i>Missing*</i>	0.14	0.35	0.23	0.42
<b>CRIMINAL HISTORY &amp; OFFENSE VARIABLES</b>				
Age at first contact	29.11	9.94	27.57	9.05
Any prior commitments	0.29	0.45	0.35	0.48
History of violence				
<i>No history of violence</i>	0.88	0.32	0.87	0.33
<i>History of minor violence</i>	0.04	0.21	0.06	0.23
<i>History of serious violence</i>	0.07	0.26	0.07	0.26
Offense of conviction				
<i>Drugs***</i>	0.48	0.50	0.65	0.48
<i>Violent</i>	0.09	0.29	0.14	0.34
<i>Property***</i>	0.37	0.48	0.18	0.39



	Data Entry Participants (N=112)		UNICOR Participants (N=3,900)	
	Mean	SD	Mean	SD
Severity of current offense				
<i>Lowest/Low Moderate</i>	0.23	0.42	0.17	0.38
<i>Moderate</i>	0.52	0.50	0.43	0.50
<i>High**</i>	0.14	0.35	0.25	0.43
<i>Greatest</i>	0.11	0.31	0.15	0.35
Custody classification score***	3.36	3.98	4.57	3.79
Expected length of incarceration (in months)***	43.89	33.90	71.37	57.78
Cited for less serious institutional misconduct***	0.24	0.43	0.40	0.49
Cited for serious institutional misconduct***	0.08	0.27	0.20	0.40
Time served (in months)***	29.35	18.45	48.39	29.32
Released to a halfway house	0.86	0.35	0.87	0.34
Post-supervision (in months)**	41.73	14.33	48.70	26.72
OUTCOME VARIABLES				
Rearrest three years after release	0.15	0.36	0.20	0.40
Recommitment three years after release*	0.05	0.23	0.12	0.32
Average number of days to first rearrest	856.71	669.35	839.94	624.76
Average number of days to first recommitment	993.18	728.46	837.32	502.31

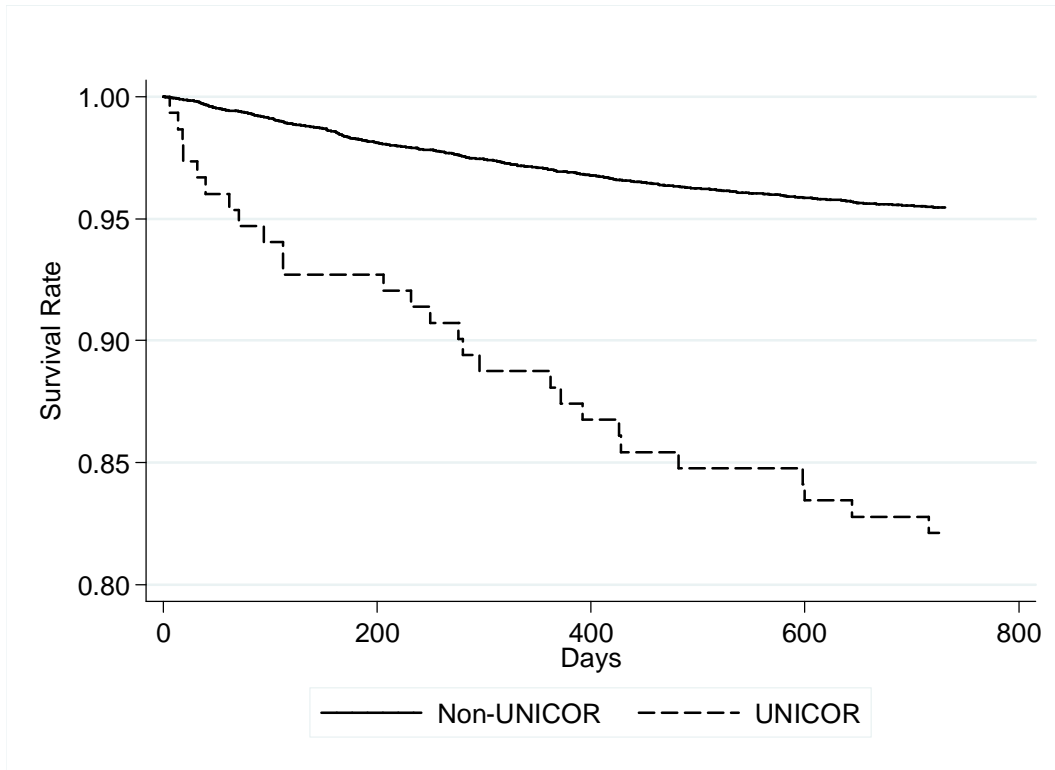
Note: Due to rounding, some categories may not equal 100%

\*  $p < .05$

\*\*  $p < .01$

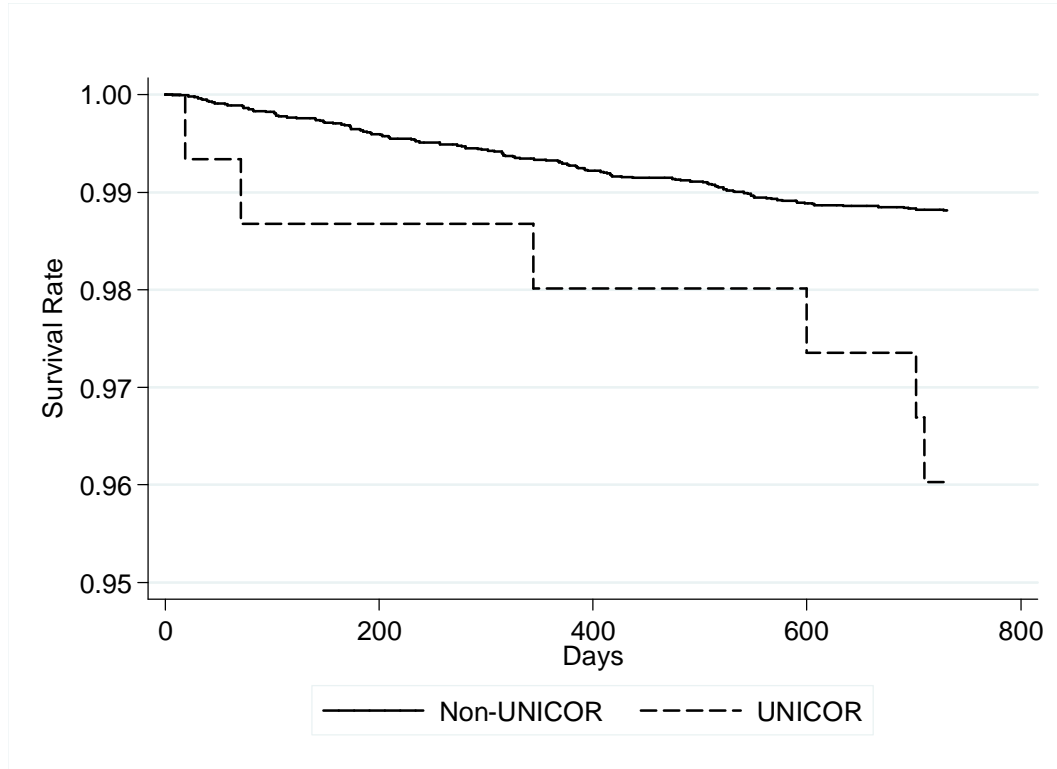
\*\*\*  $p < .001$

FIGURE 4.1  
Time to First Institutional Misconduct within First Two Years of Incarceration  
Prior to Propensity Score Matching



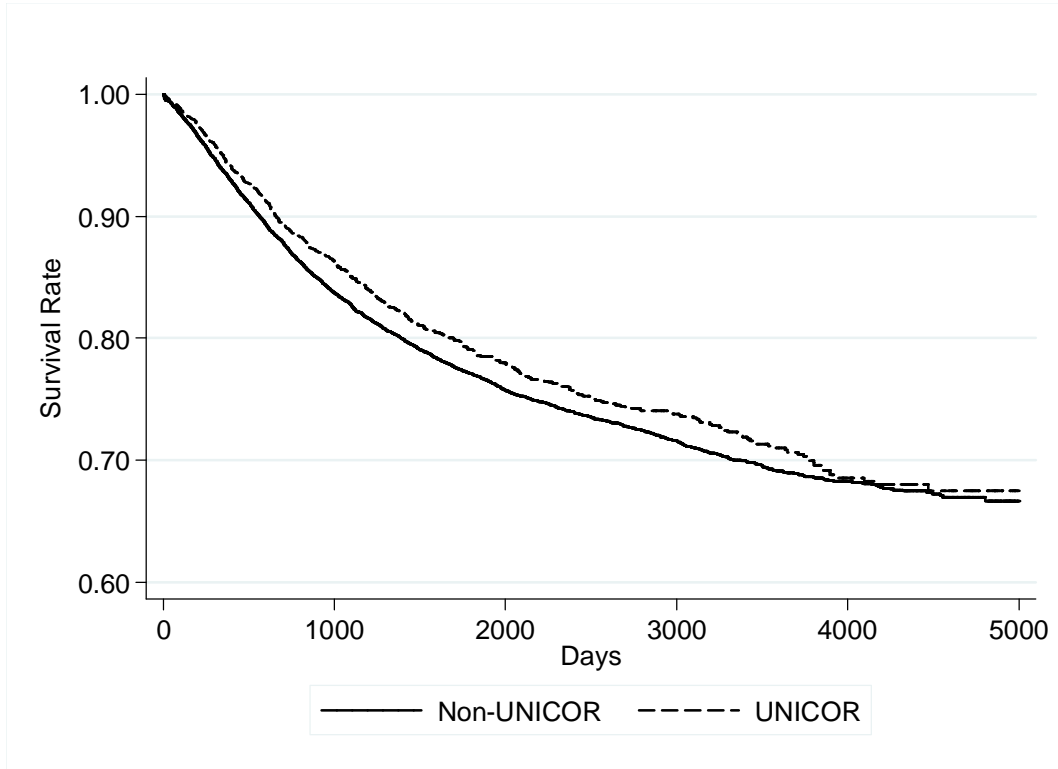
Log-rank test:  $\chi^2 = 64.11, p < .001$

FIGURE 4.2  
Time to First Serious Misconduct within First Two Years of Incarceration  
Prior to Propensity Score Matching



Log-rank test:  $\chi^2 = 9.63, p = 0.002$

FIGURE 4.3  
Time to First Rearrest Over Full Follow-Up Period  
Prior to Propensity Score Matching



Log-rank test:  $\chi^2 = 2.79, p = 0.09$

FIGURE 4.4  
Hazard Rates for Time to First Rearrest Over Full Follow-Up Period  
Prior to Propensity Score Matching

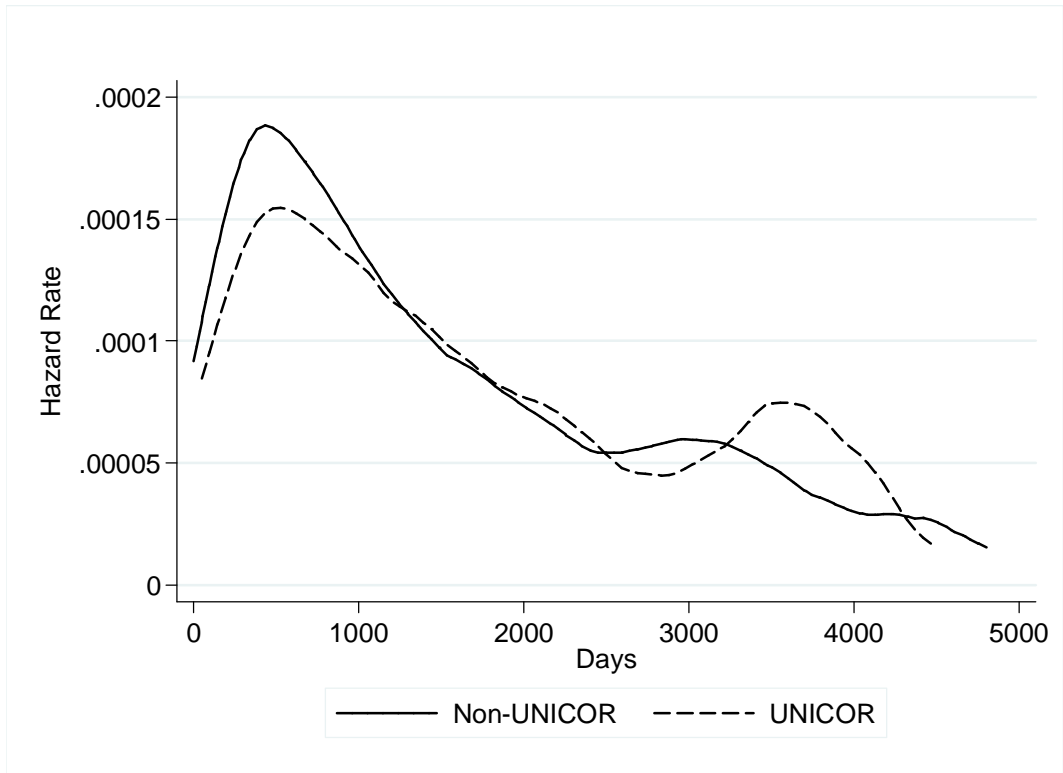
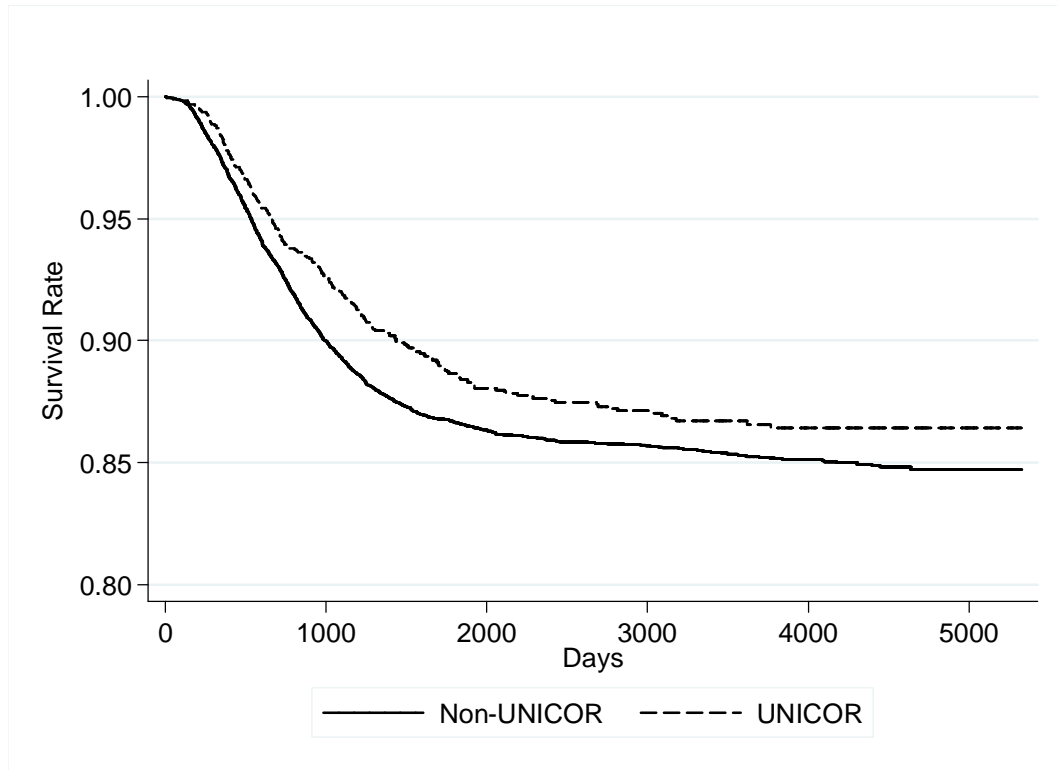


FIGURE 4.5  
Time to First Recommitment Over Full Follow-Up Period Prior to Propensity Score  
Matching



Log-rank test:  $\chi^2 = 4.26, p = 0.04$

FIGURE 4.6  
Hazard Rates for Time to First Recommitment Over Full Follow-Up Period  
Prior to Propensity Score Matching

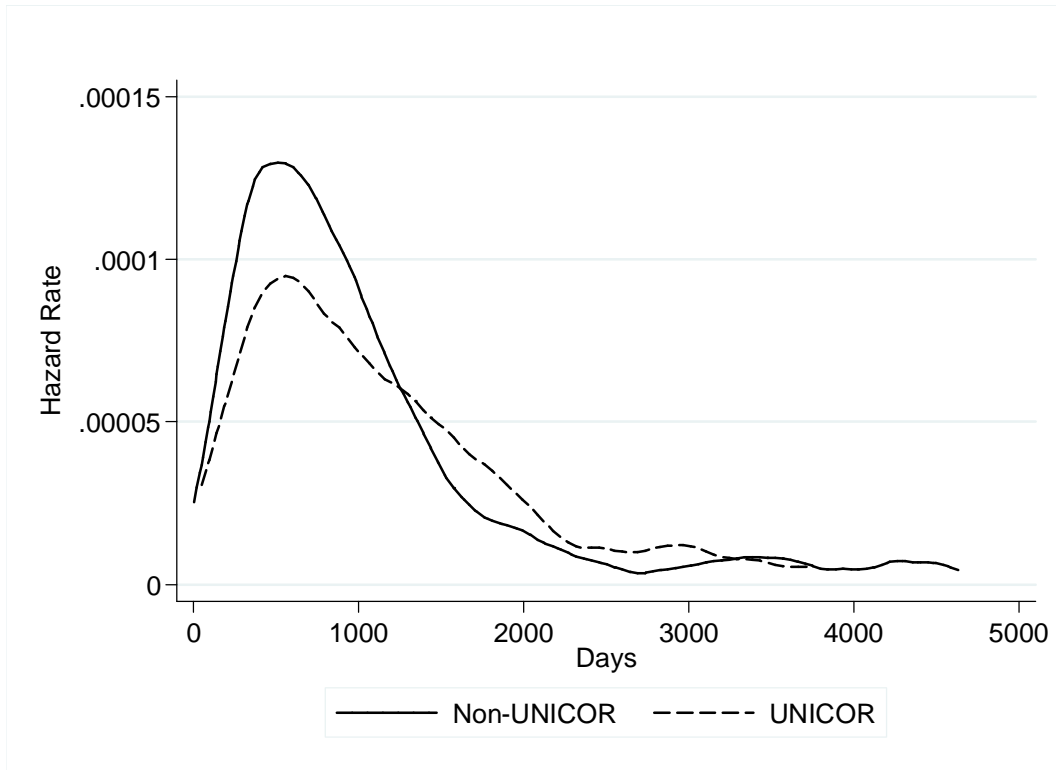


FIGURE 4.7  
Propensity Score Distribution of UNICOR and Non-UNICOR Participants

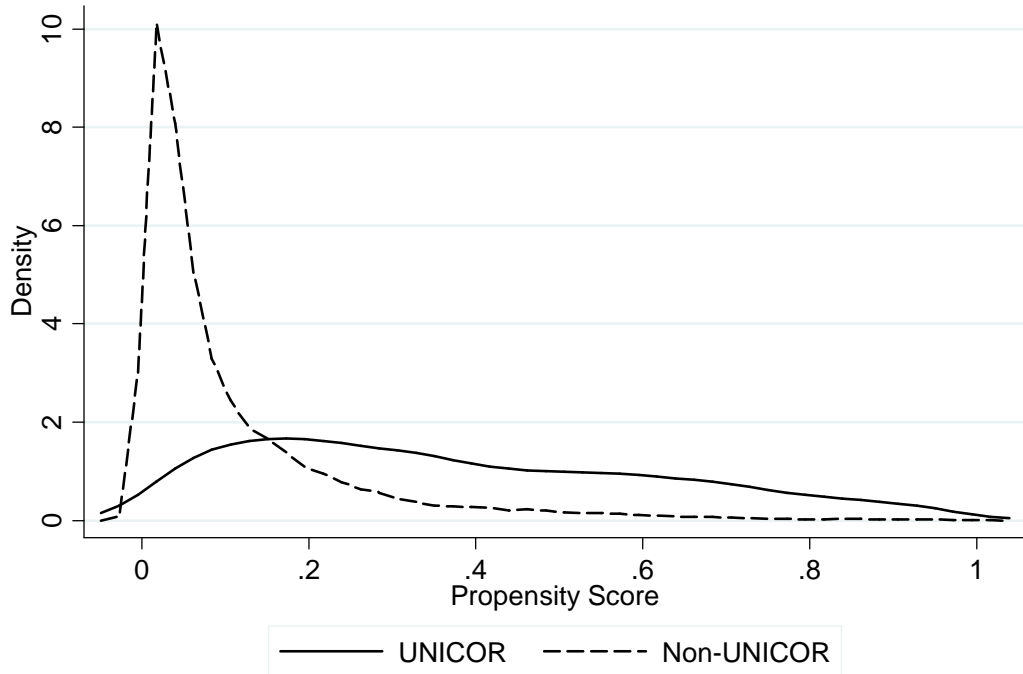




FIGURE 4.8  
Jitter Plots of the Propensity Score Distributions of Matched vs. Unmatched Cases

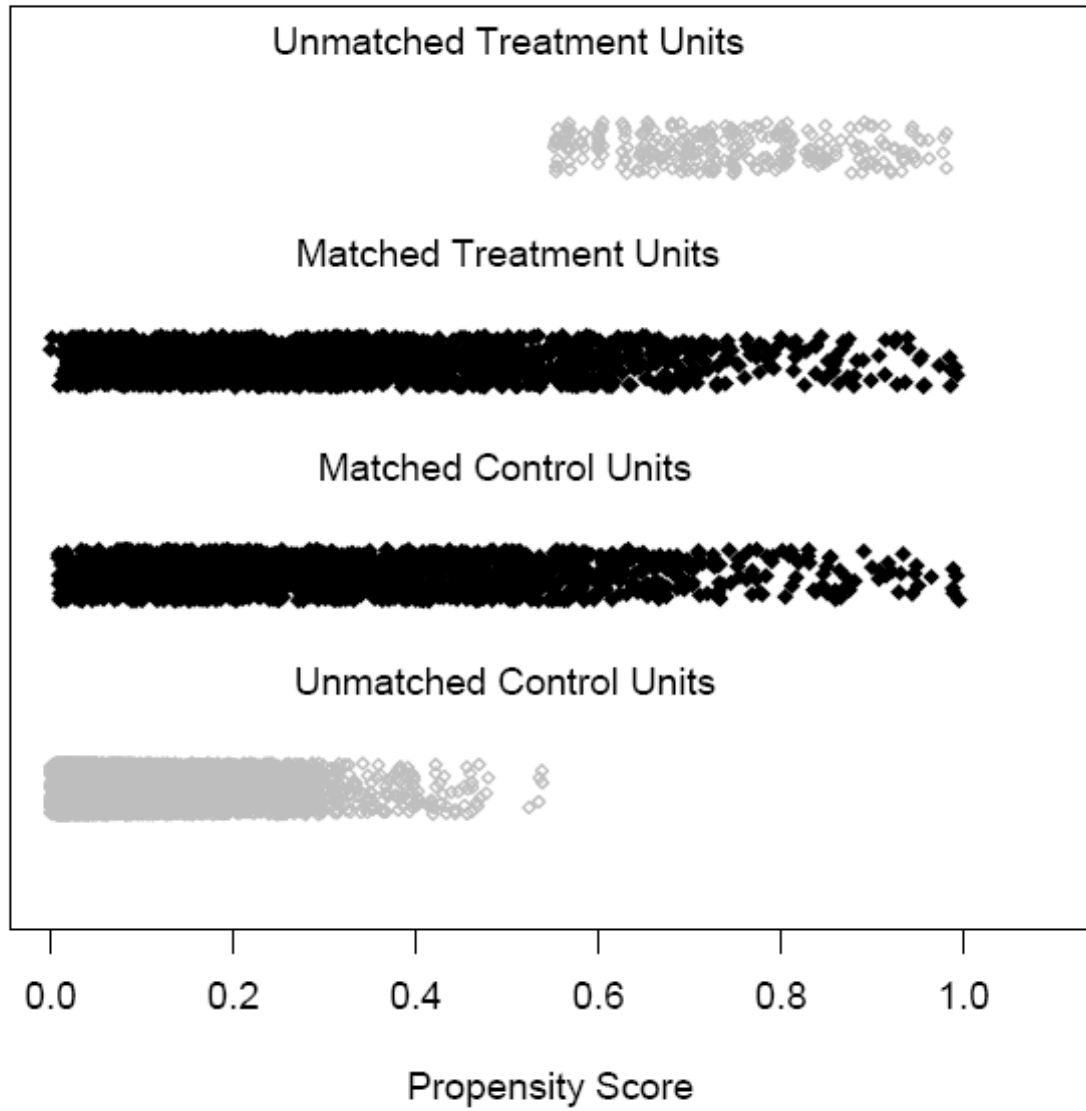


FIGURE 4.9  
Histogram of Length of Employment in UNICOR

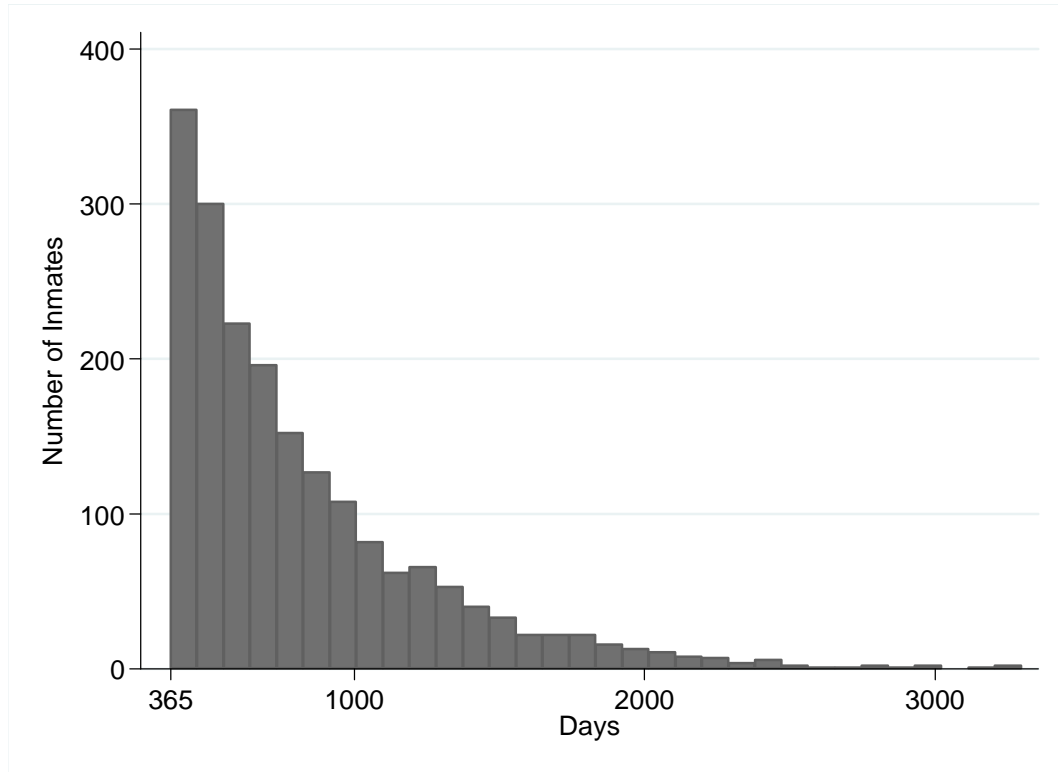


FIGURE 4.10  
Histograms of Propensity Score Distributions by Treatment Dose Category

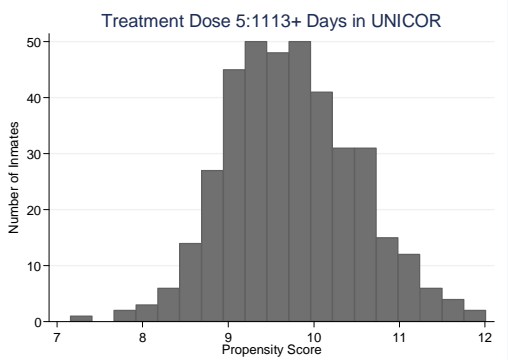
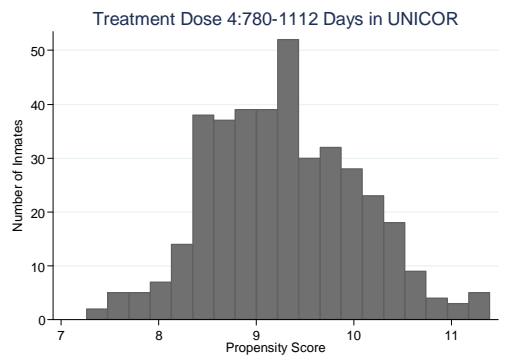
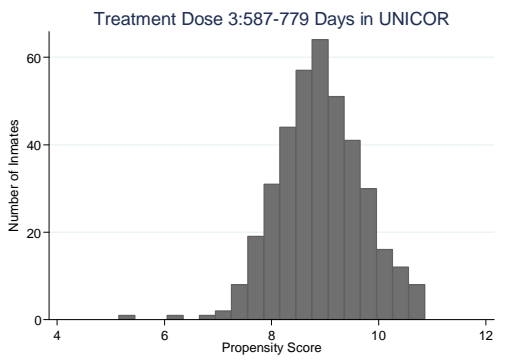
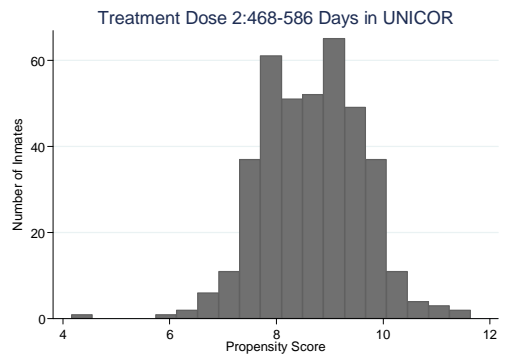
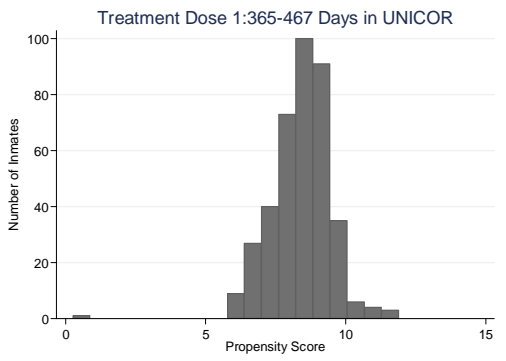
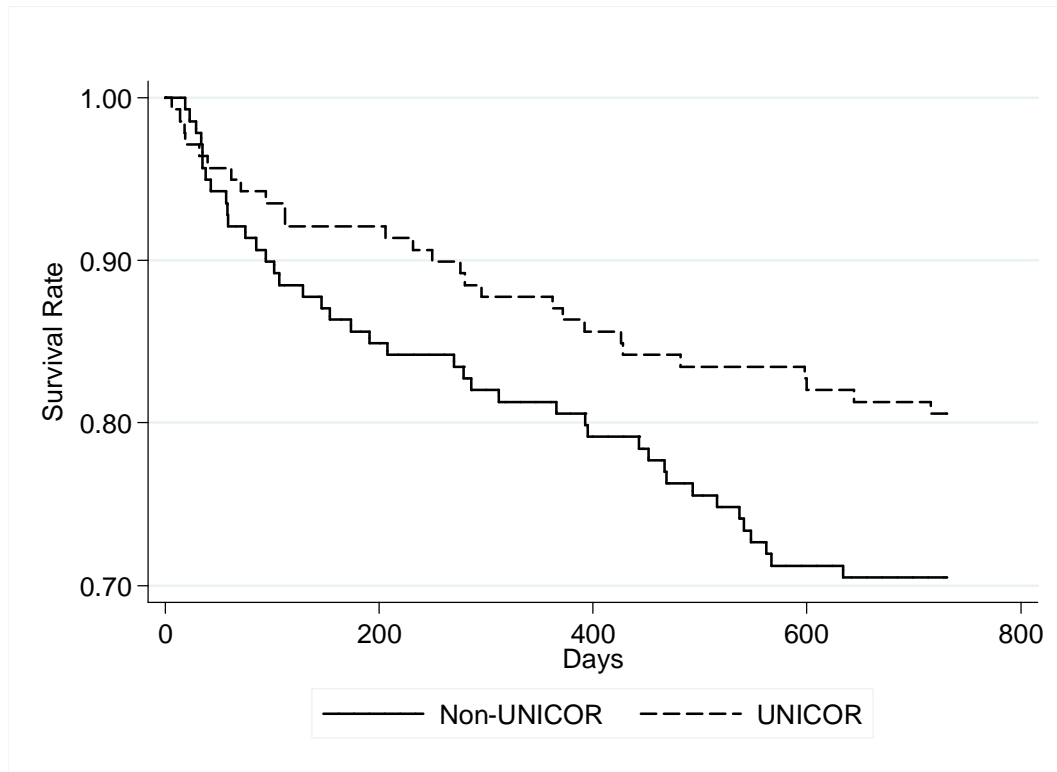
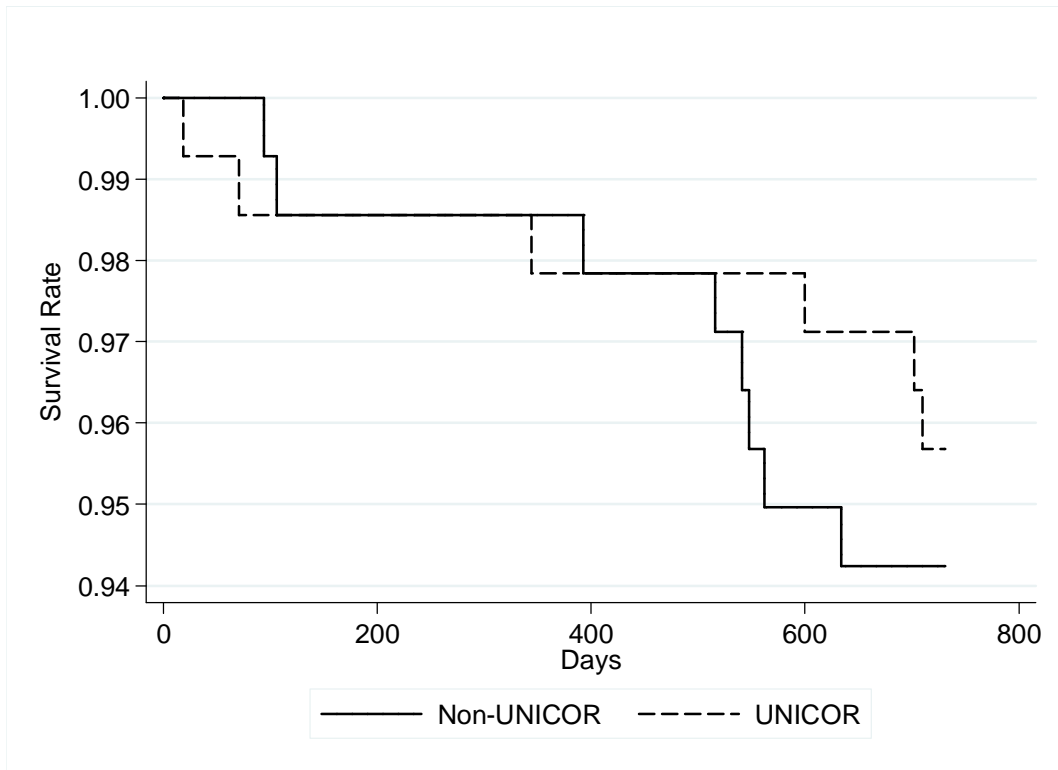


FIGURE 5.1  
Time to First Institutional Misconduct within First Two Years of Incarceration  
After Propensity Score Matching



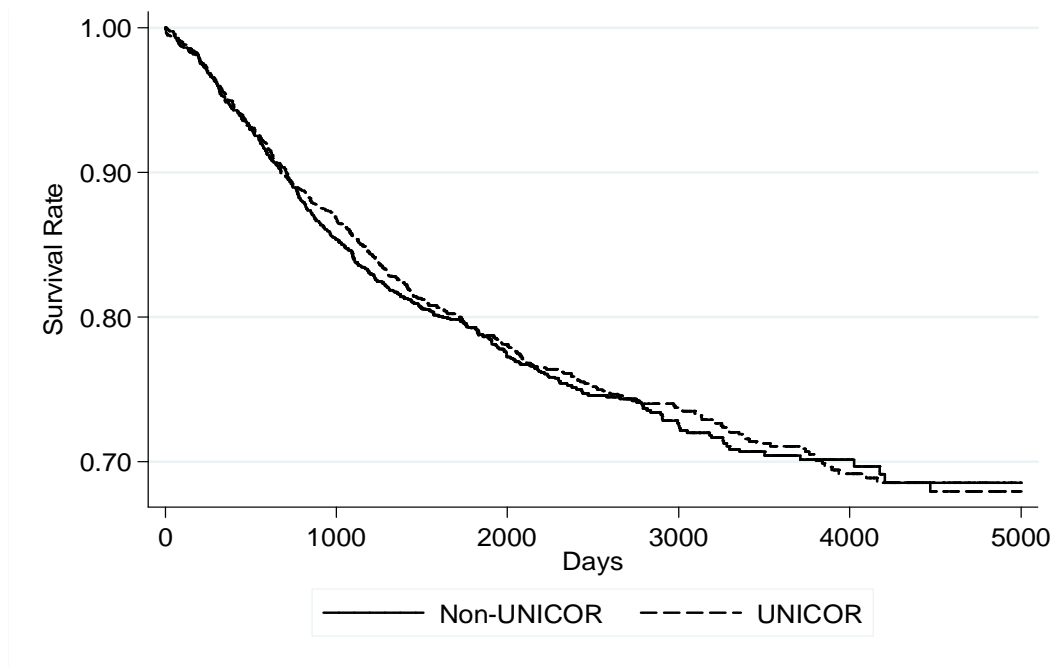
Log-rank test:  $\chi^2 = 3.77, p = .0522$

FIGURE 5.2  
Time to First Serious Misconduct within First Two Years of Incarceration  
After Propensity Score Matching



Log-rank test:  $\chi^2 = 0.30, p = .5825$

FIGURE 5.3  
Time to First Rearrest Over Full Follow-Up Period After Propensity Score Matching



Log-rank test:  $\chi^2 = 0.11, p = 0.7384$

FIGURE 5.4  
Hazard Rates for Time to First Rearrest Over Full Follow-Up Period  
After Propensity Score Matching

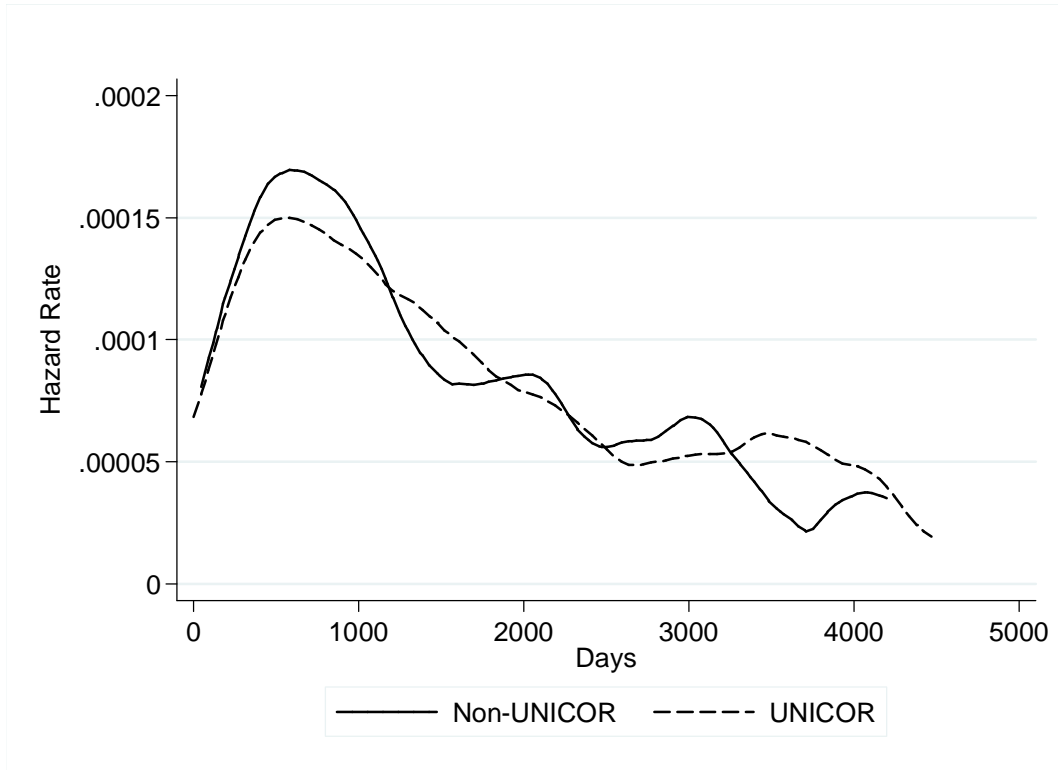
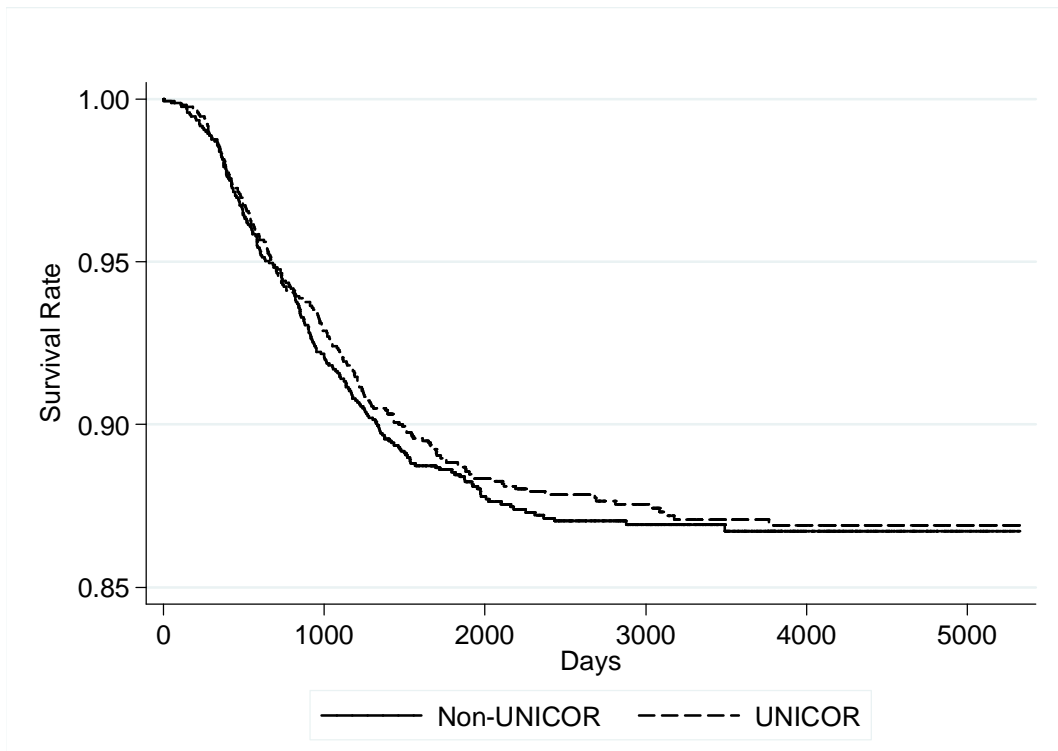


FIGURE 5.5  
Time to First Recommitment Over Full Follow-Up Period After Propensity Score Matching



Log rank test:  $\chi^2 = 0.16, p = 0.6930$



FIGURE 5.6  
Hazard Rates for Time to First Recommitment Over Full Follow-Up Period  
After Propensity Score Matching

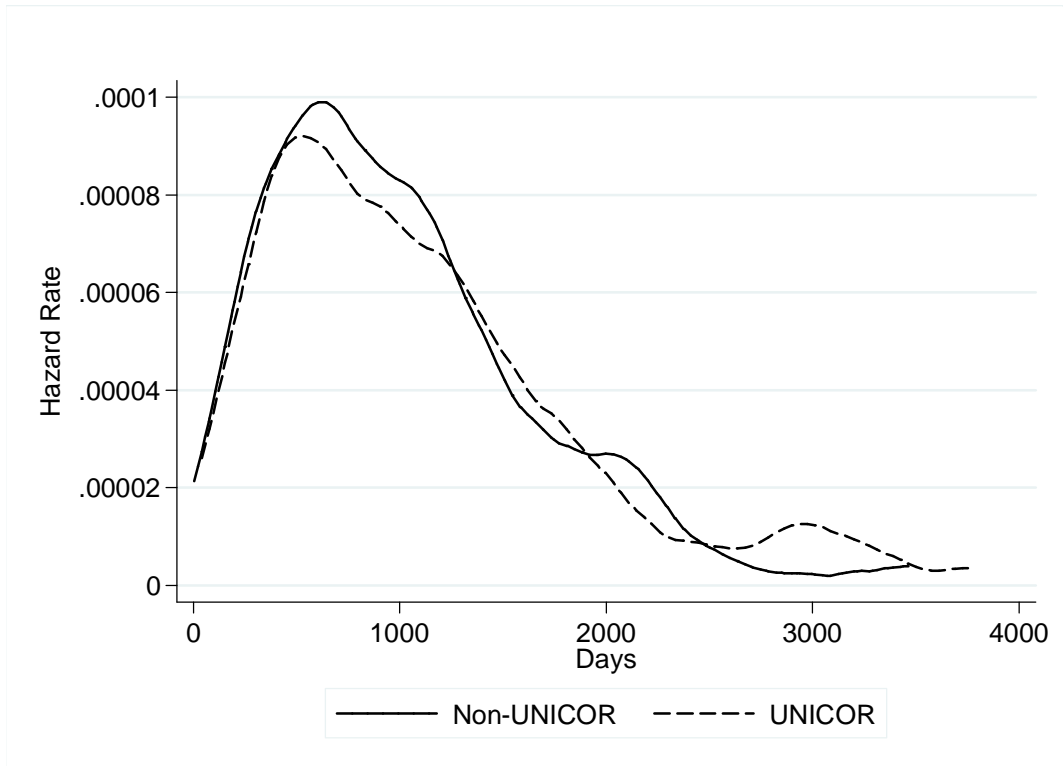
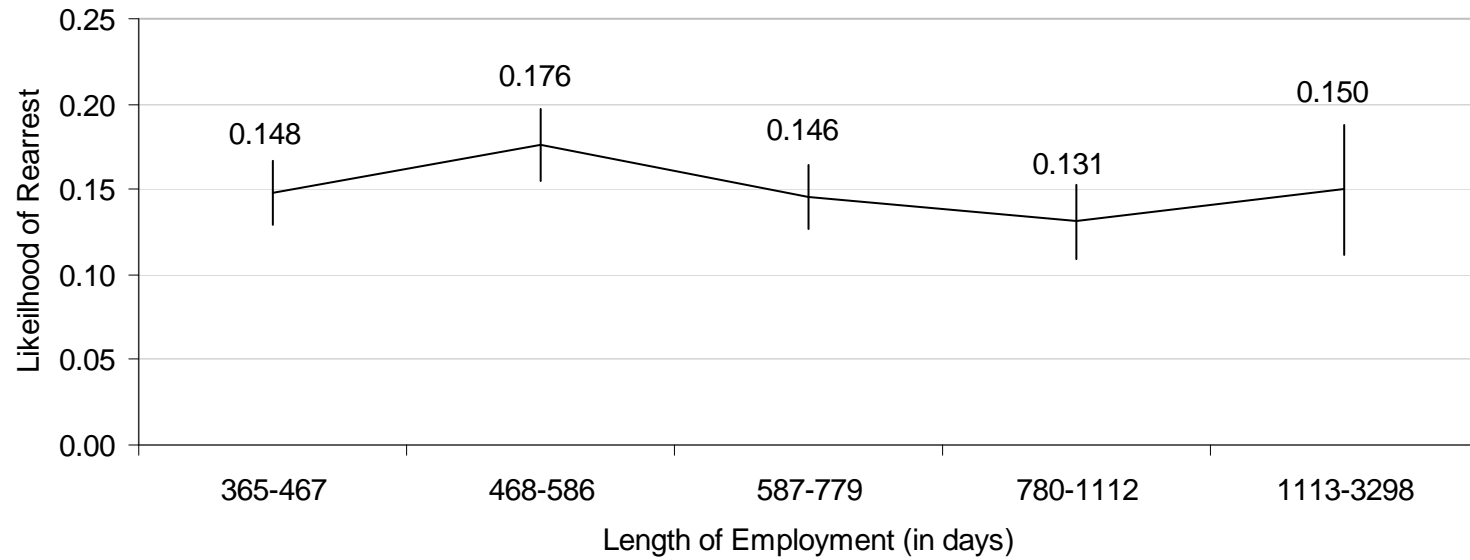
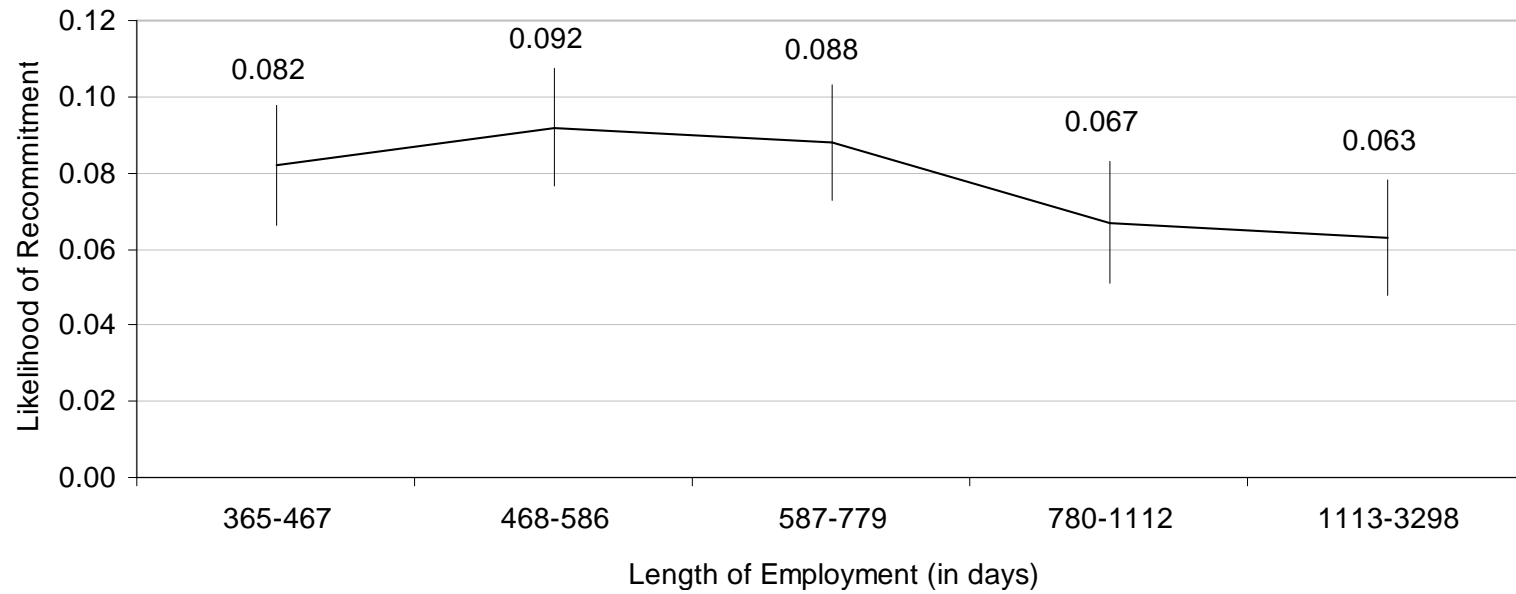


FIGURE 5.7  
Average Likelihood of Rearrest Within Three Years After Release by Treatment Dose Category



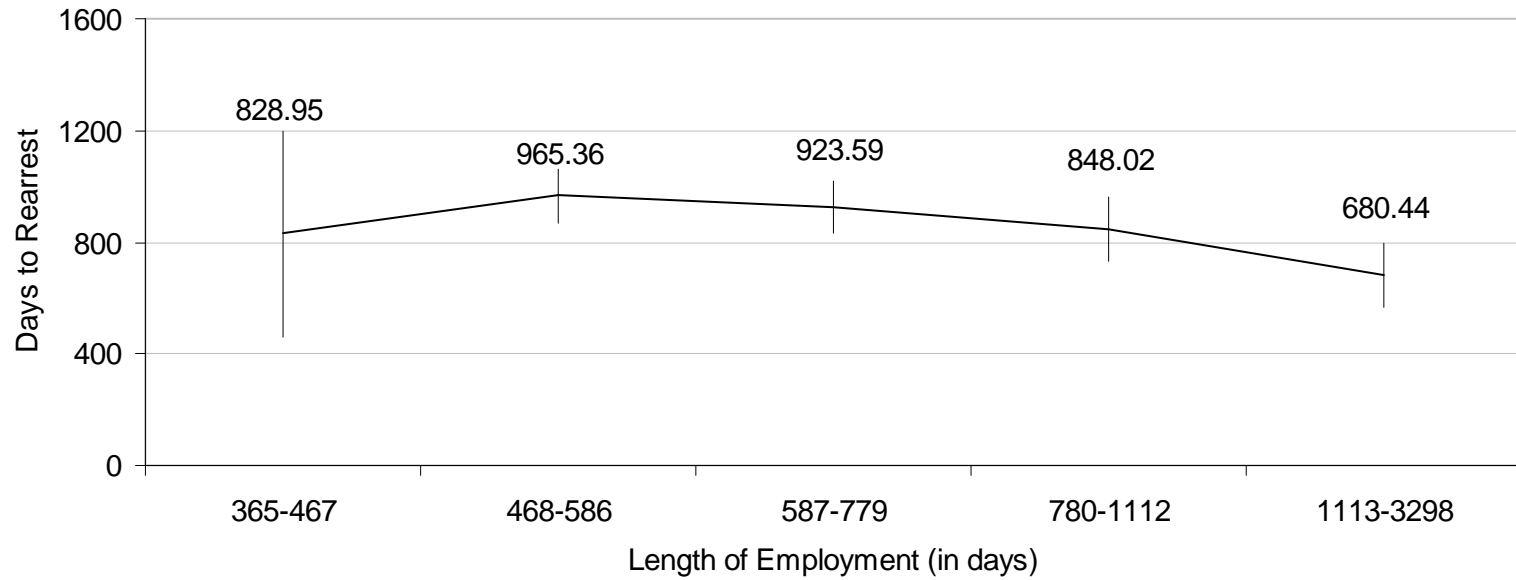
Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

FIGURE 5.8  
Average Likelihood of Recommitment Within Three Years After Release by Treatment Dose Category



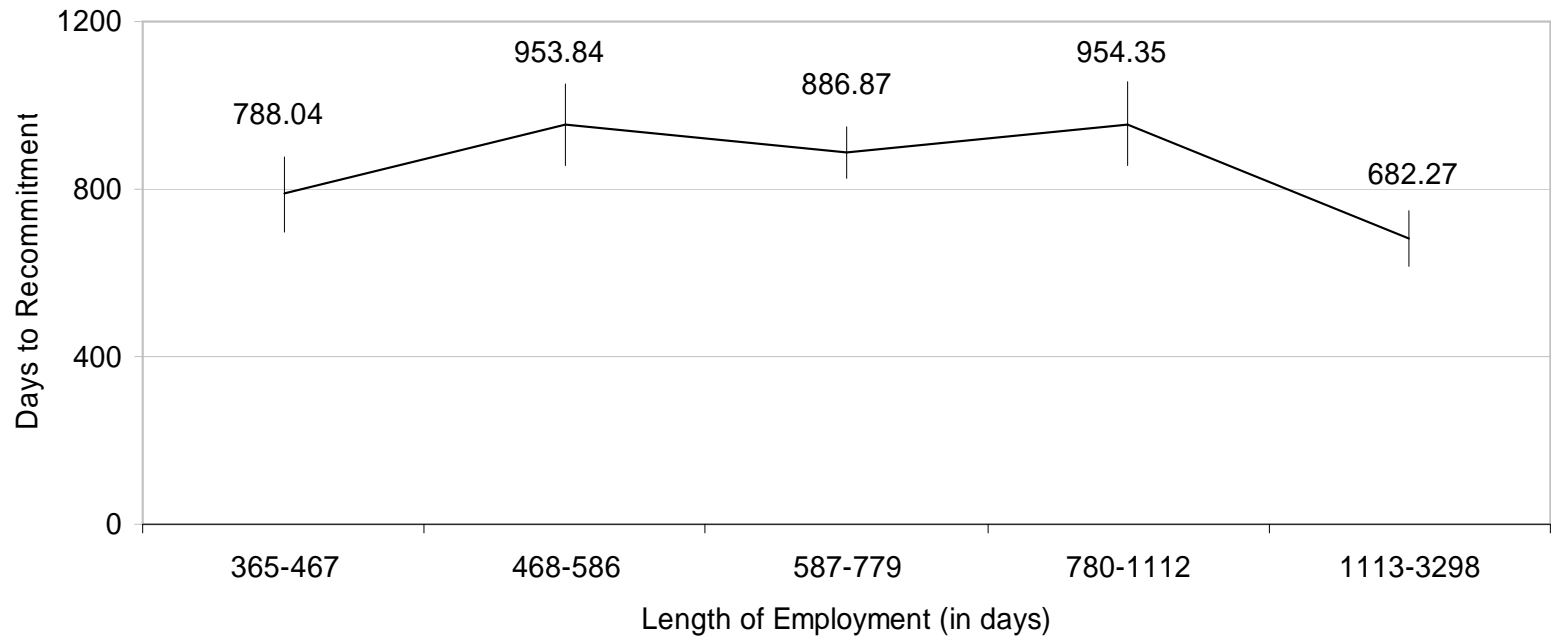
Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

FIGURE 5.9  
Average Time to First Rearrest After Release by Treatment Dose Category ( $n = 447$ )



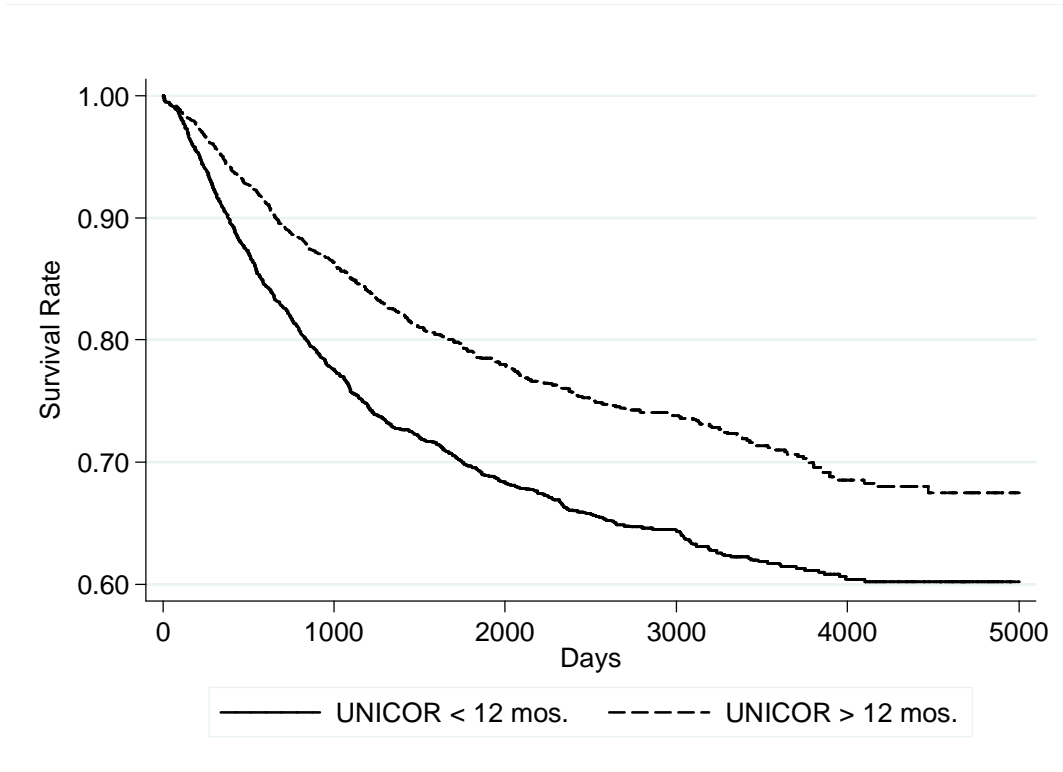
Note: Estimated averages at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

FIGURE 5.10  
Average Time to First Recommitment After Release by Treatment Dose Category ( $n = 236$ )



Note: Estimated averages at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ )

FIGURE 6.1  
Time to First Rearrest Over the Full Follow-Up Period for  
Inmates Employed in UNICOR for Less than 12 Months and  
Inmates Employed in UNICOR for 12 Months or More



Log-rank test:  $\chi^2 = 45.95, p < 0.001$

FIGURE 6.2  
Hazard Rates for First Rearrest Over the Full Follow-Up Period for  
Inmates Employed in UNICOR for Less than 12 months and  
Inmates Employed in UNICOR for 12 Months or More

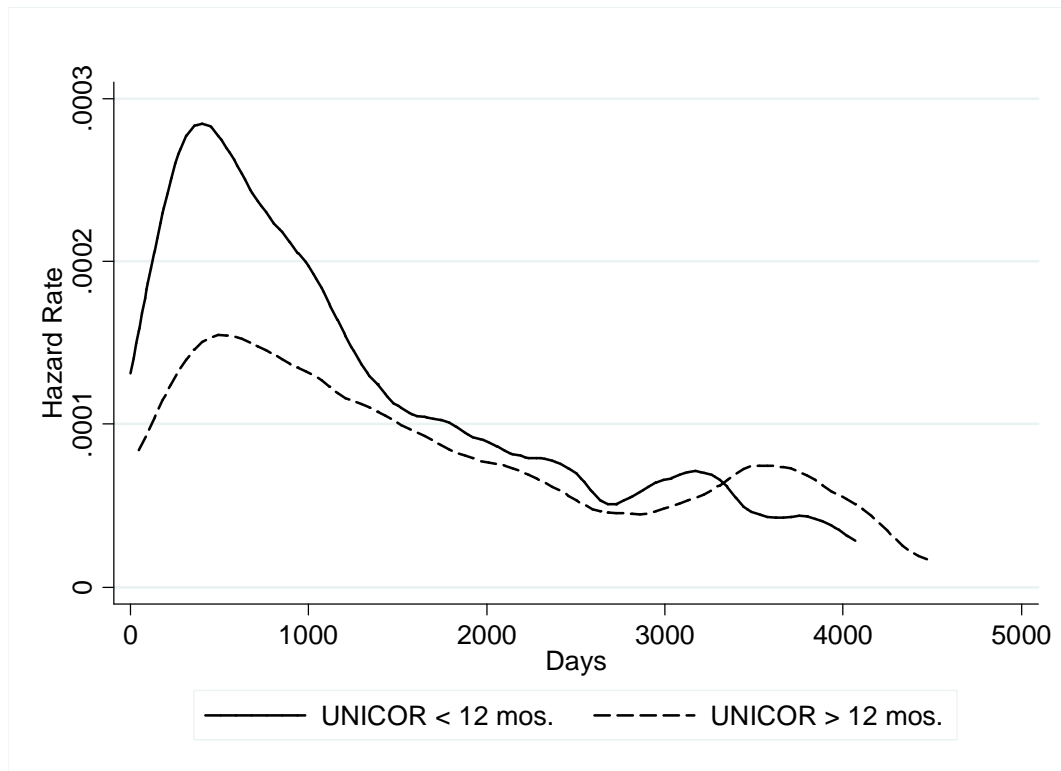
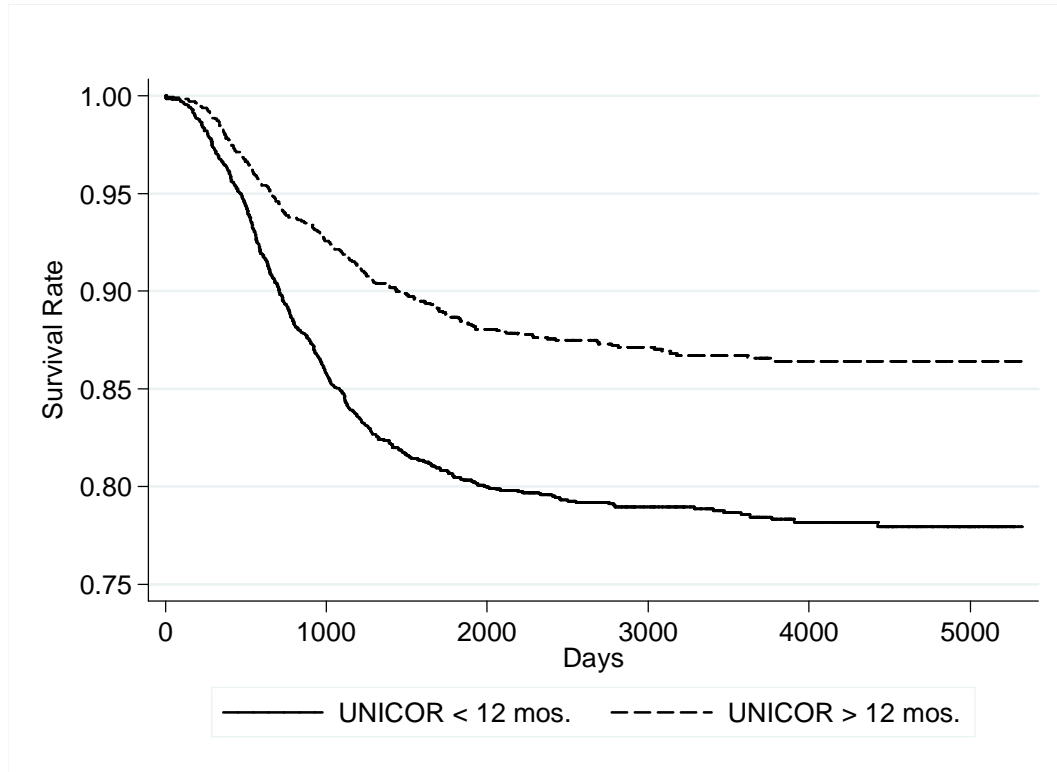


FIGURE 6.3  
Time to First Recommitment Over the Full Follow-Up Period for  
Inmates Employed in UNICOR for Less than 12 months and  
Inmates Employed in UNICOR for 12 Months or More



Log-rank test:  $\chi^2 = 51.38; p < .001$



FIGURE 6.4  
Hazard Rates for Recombinment Over the Full Follow-Up Period for  
Inmates Employed in UNICOR for Less than 12 Months and  
Inmates Employed in UNICOR for 12 Months or More

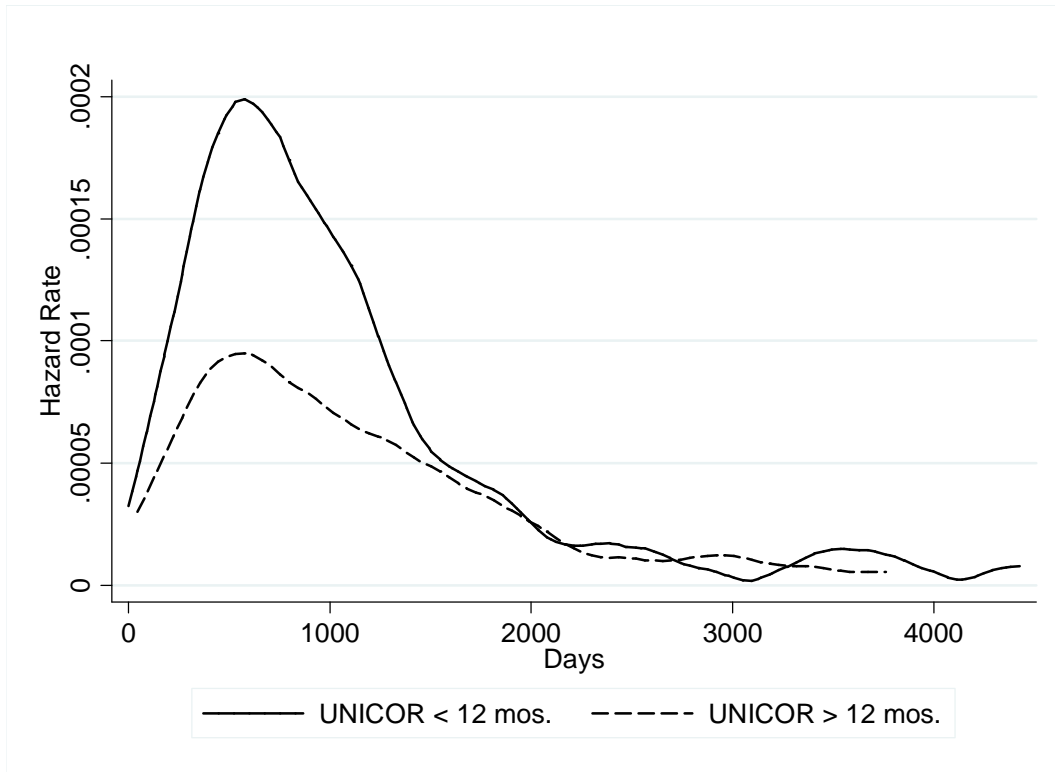
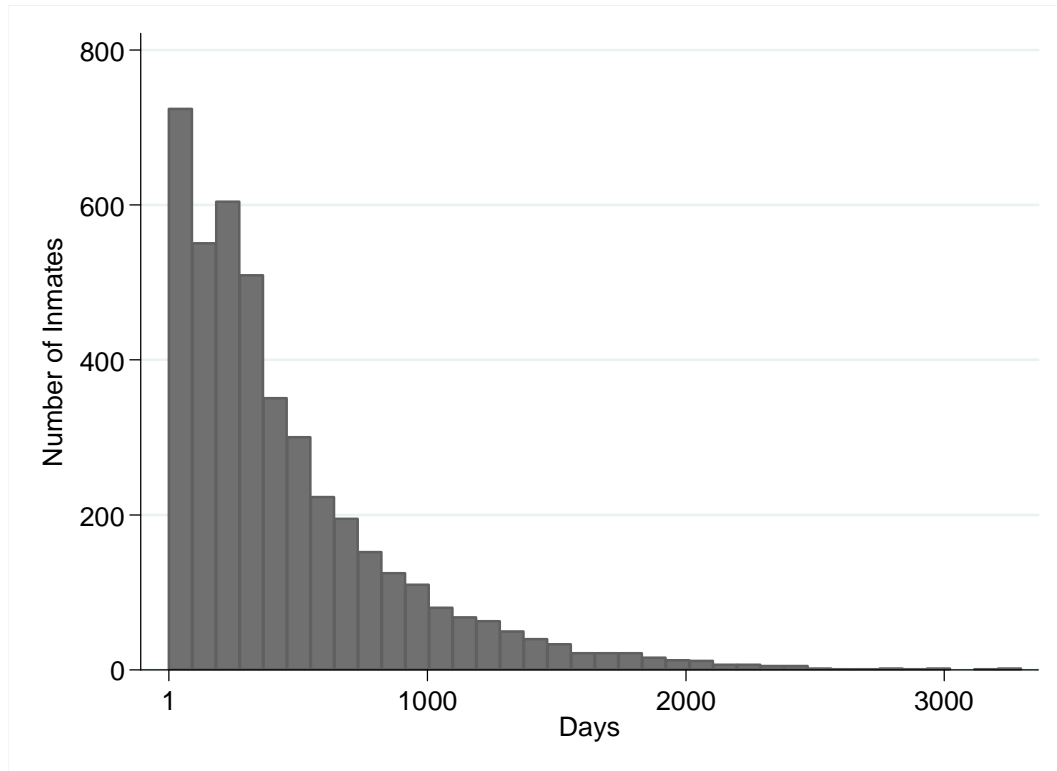


FIGURE 6.5  
Histogram of Length of Employment in UNICOR – All UNICOR Participants



**FIGURE 6.6**  
**Histograms of Propensity Score Distributions by Treatment Dose Category -**  
**All UNICOR Participants**

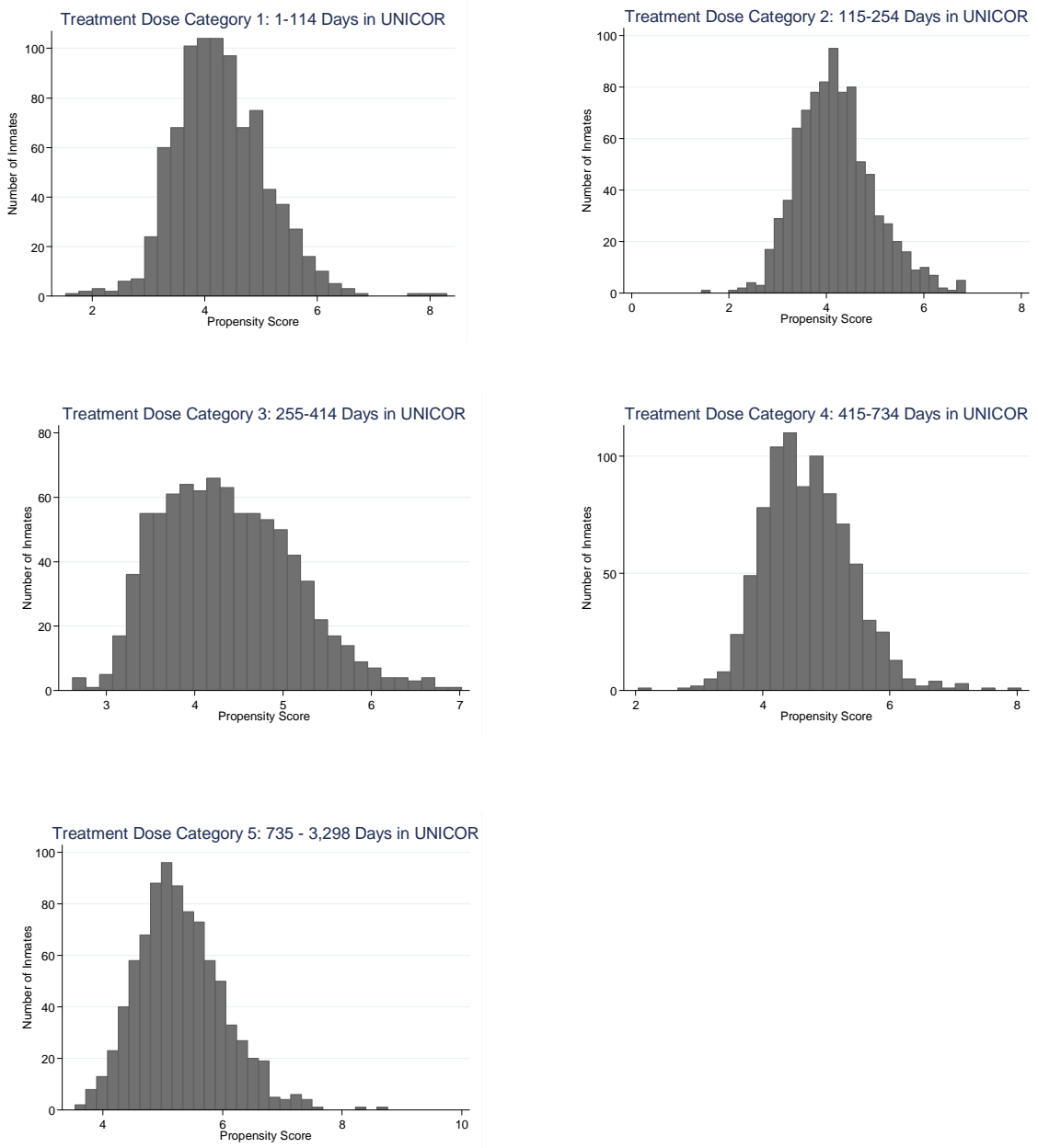
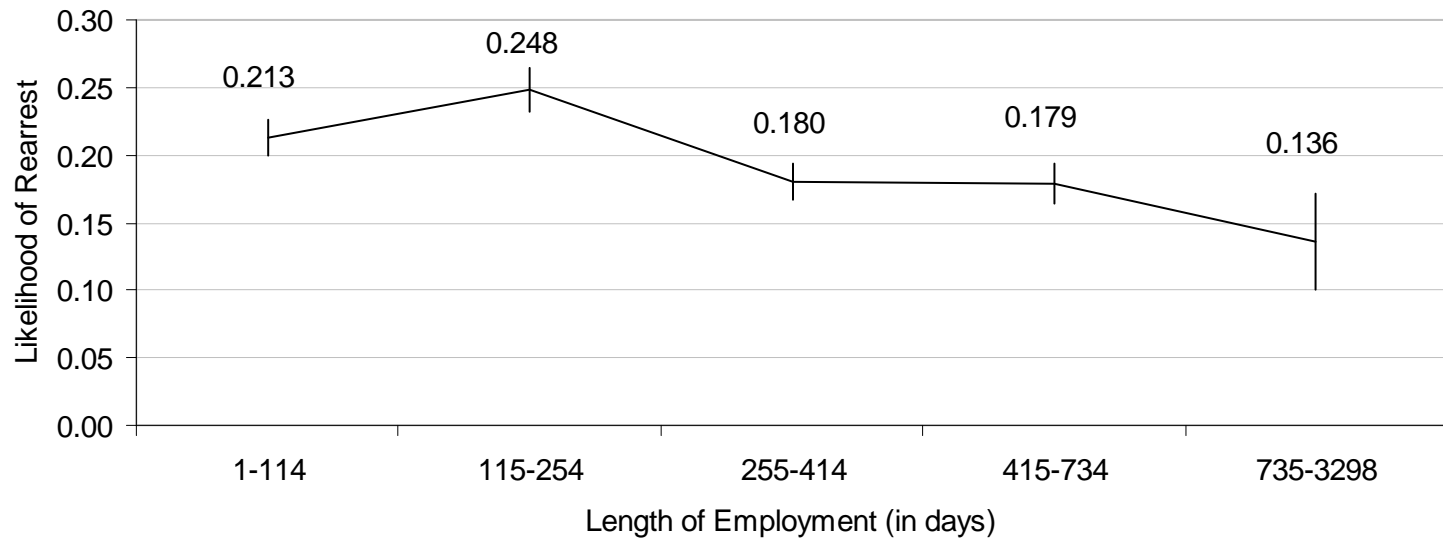
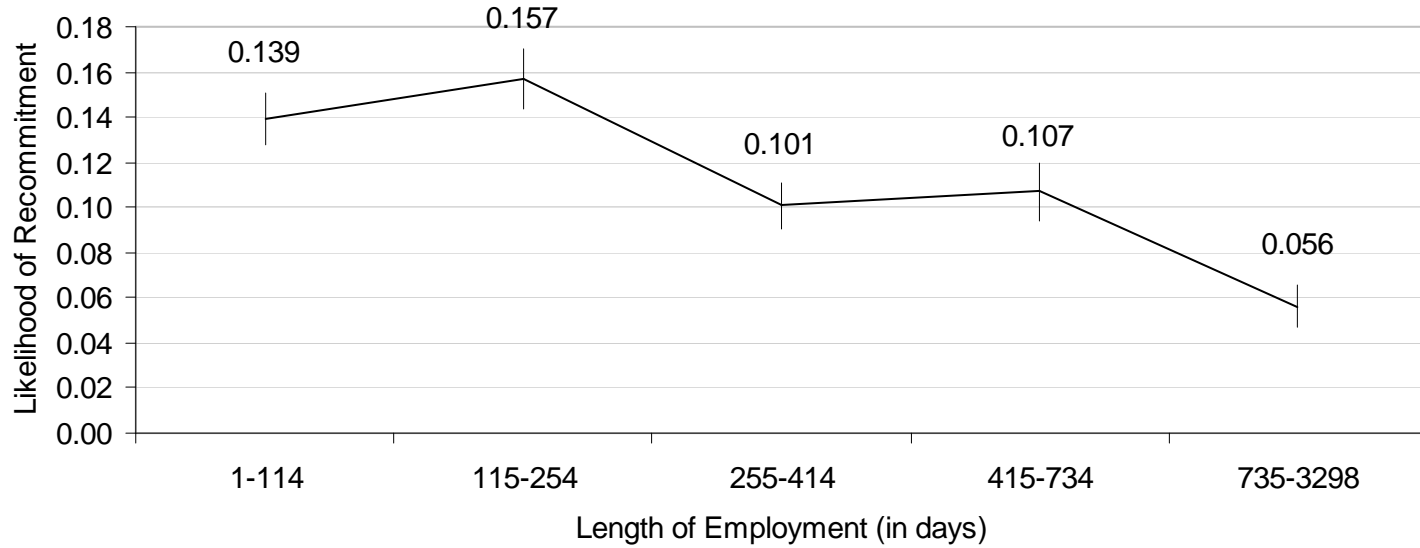


FIGURE 6.7  
Average Likelihood of Rearrest Within Three Years After Release by Treatment Dose Category -  
All UNICOR Participants



Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

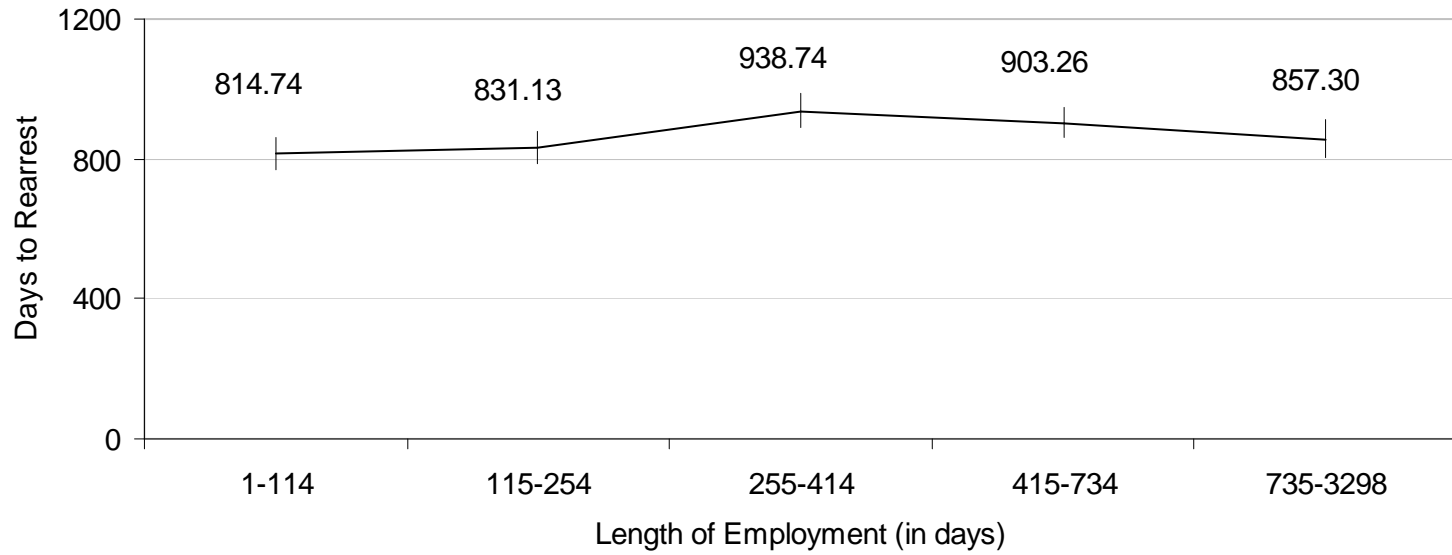
FIGURE 6.8  
Average Likelihood of Recommitment Within Three Years After Release by Treatment Dose Category -  
All UNICOR Participants



Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

FIGURE 6.9

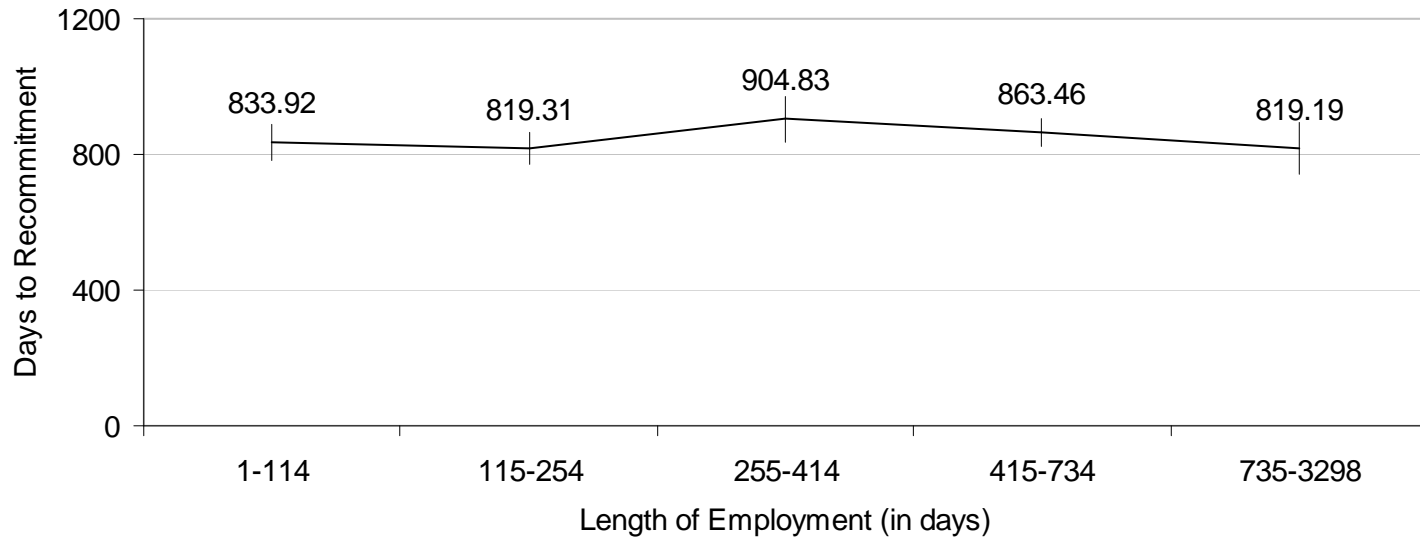
Average Time to First Rearrest After Release by Treatment Dose Category - All UNICOR Participants ( $n = 1,214$ )



Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

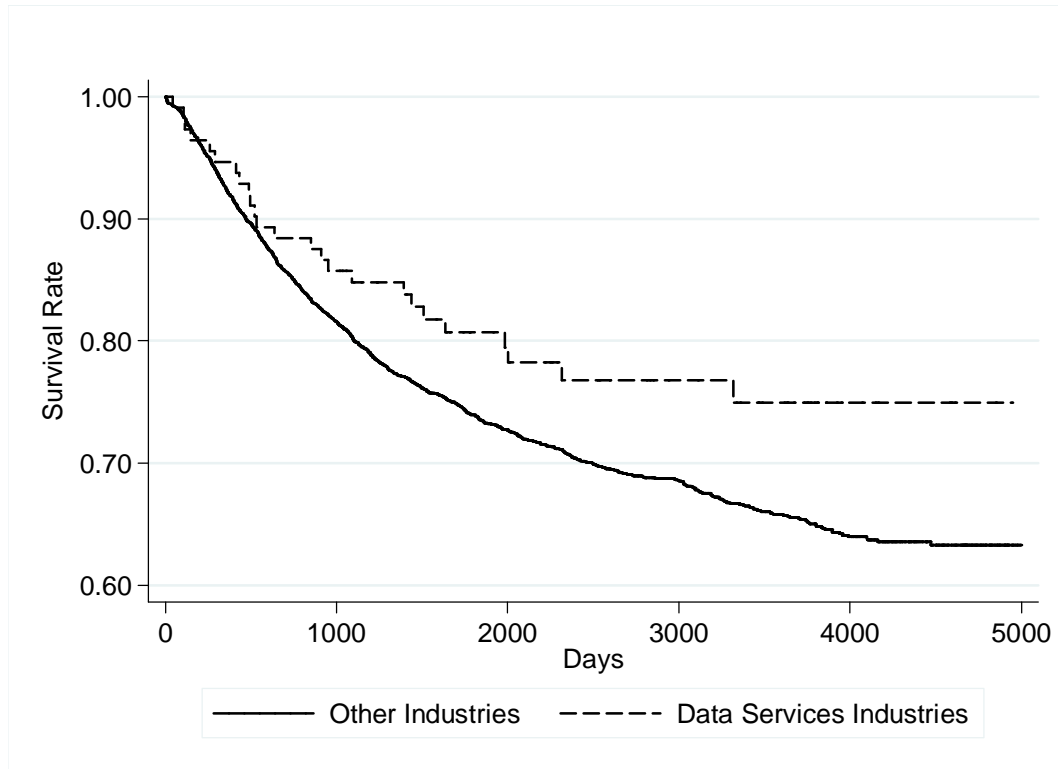
FIGURE 6.10

Average Time to First Recommitment After Release by Treatment Dose Category - All UNICOR Participants ( $n = 719$ )



Note: Estimated average likelihood at each treatment dosage after subclassifying on the estimated propensity score ( $\pm 1SE$ ).

FIGURE 6.11  
Time to First Rearrest Over the Full Follow-Up Period for Inmates Employed  
in UNICOR's Data Services Industries and Other Industries



Log-rank test:  $\chi^2 = 3.31$ ;  $p = .0689$



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