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# Does Industry Sector Matter? An examination of the relationship between industry and rearrest

by

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## ABSTRACT OF THE DISSERTATION

Does Industry Sector Matter? An examination of the relationship between industry and rearrest

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Gainful employment is a crucial and normative force that can help individuals desist from crime and avoid repeat justice system contact (recidivism). Despite the importance of employment, people with prior justice contact are often unemployed or marginally employed in low-wage jobs, typically clustered within one of seven industries. This study hypothesized that working in certain industries would be more conducive to desistance than working in others, holding important variables like occupation constant. Using data from the National Longitudinal Survey of Youth 1997 and discrete-time hazard analysis with individual-fixed effects, this study tested whether working in particular industries was associated with risk of rearrest for adults with at least one prior arrest. Using Quarterly Workforce Indicator data, this study also tested whether greater job availability in industries typically willing to hire people with prior justice contact was associated with risk of rearrest. After controlling for a number of important time-varying covariates such as educational attainment, occupation, and criminal history, being employed in the construction industry was associated with lower odds of rearrest relative to being employed in the food services industry or being unemployed. No other industries were significantly related to risk of rearrest across the full sample. Subgroup analyses revealed statistically significant differences in the correlation between industry of

employment, job availability, and rearrest by gender, age, race and ethnicity, as well as by offense history. Supplemental analyses showed a nuanced interplay between industry and occupation that differed according to the industry and the subgroup examined. Potential explanations for these findings, limitations of the current study, and areas of future research are discussed.

**ACKNOWLEDGEMENT**

This research uses data from the National Longitudinal Survey of Youth 1997 (NLSY97) and the Quarterly Workforce Indicators. The NLSY97 is a study primarily funded by the Bureau of Labor Statistics (BLS), with contributory funding from the Department of Justice, Office of Juvenile Justice and Delinquency Prevention, the U.S. Department of Education, and the National Institute of Child Health and Human Development. The NLSY97 data is collected by the National Opinion Research Center (NORC) at the University of Chicago with assistance from the Center for Human Resource Research (CHRR) at The Ohio State University. The Quarterly Workforce Indicators (QWI) data are compiled by the United Sates Census based on linked data from employers and employees through the Longitudinal Employer-Household Dynamics (LEHD), a database with information from all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

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# I. INTRODUCTION

## 1.1 BACKGROUND AND PROBLEM STATEMENT

### *1.1.1 Prevalence of criminal justice contact and recidivism*

The United States (U.S.) arrests, convicts, and incarcerates more individuals than any other nation in the world. Between 70 and 100 million U.S. residents have some form of criminal record (Vallas and Dietrich, 2014). Young adults make up a growing share of this population (Brame, Turner, Paternoster, & Bushway, 2012). According to the most current estimate, nearly one in three U.S. residents is arrested by the time they turn 23 years old—an 8 percent increase in the prevalence of arrest among young adults since the last estimate conducted in the 1960s (Brame et al., 2012; Freeman, 1996). Consequently, arrest has become a common life event for millions of young people in the U.S. People of color, people from poor communities, and people struggling with addiction and mental illness are all overrepresented among the justice-involved population (Brame, Bushway, Paternoster, & Turner, 2014; Constantine et al., 2010; Mooradian, 2012; Murakawa & Beckett, 2010; Reisig, Bales, Hay, & Wang, 2007).

Justice system contact, in the broadest sense, can include interaction with one or many parts of the justice system including: contact with law enforcement and potential arrest, contact with the court system and potential conviction, contact with a correctional facility such as jail or prison (incarceration), or contact with a community-based correctional institution such as probation or parole. Even criminal justice contact at the early end of the justice–process—the arrest stage—can have large and long-lasting effects

on young adults' education and employment. Research shows that, compared with similar individuals without criminal justice contact, those who experience arrest are more likely to drop out of school, experience longer spells of unemployment and under-employment, and have reduced life-time earnings (Brame et al., 2012; Lopes et al., 2012). These impacts are magnified when an individual is convicted or incarcerated.

While some people never experience another arrest, many become entrenched in the justice system and cycle in and out of incarceration facilities, sometimes for new crimes but often due to technical violations of supervision or other public order offenses (Durose, Cooper, & Snyder, 2014). In the latest national study of repeat justice contact (recidivism), 76 percent of those released from prison in 2005 were rearrested (for any reason) within five years (Durose et al., 2014). Approximately 25 percent were returned to prison due to a technical violation of probation or parole and another 39 percent were rearrested for some other public order offense like failure to appear in court, public drunkenness, or disorderly conduct.

Using this broad definition of recidivism, which includes returns to incarceration due to technical violations and for new crimes, recidivists account for a substantial share of new arrests each year. According to an estimate by Rosenfeld, Fornango, and Wallman (2005), adult recidivists make up about 5 percent of the U.S. population, but they accounted for approximately 15 to 25 percent of the total arrests between 1994 and 1997 (Schnepel, 2014). Similarly, the Bureau of Justice Statistics reported that 16 percent of released prisoners were responsible for almost half of arrests between 2005 and 2010 (Durose et al., 2014).

This repeat justice system contact has tremendous financial and collateral costs for individuals, their families, their communities, and society as a whole in terms of decreased public safety and increased tax expenditures. For individuals and their families, prior justice contact has persistent negative effects on lifetime earnings, civic participation, voting behavior, and access to public benefits (Apel & Sweeten, 2010; Holzer, 2007; The Pew Charitable Trusts, 2011). Recidivism can also have more amorphous intergenerational costs such as the impact of parental absence on the socio-emotional development of children (Wakefield & Wildeman, 2013). For society, persistent recidivism equates to decreased public safety, increased public spending, and decreased national productivity. In 2012, federal, state, and local governments spent a combined $260 billion on corrections. In addition, the unemployment of individuals with criminal records costs the U.S. economy between $57 and $65 billion annually (Kyckelhahn, 2013; Mueller-Smith, 2014; Schmitt, Warner, & Gupta, 2010). As explained by (D'Alessio, Stolzenberg, & Eitle, 2014), "even a small reduction in repeat offending would generate considerable monetary savings" (p. 347).

### *1.1.2 Importance of employment in breaking cycles of recidivism*

Access to stable housing, connections with positive family and peers, and ties to education and the labor market are all important aspects of helping individuals desist from crime. Of these, employment is one of the most widely researched (Lutze , Rosky, & Hamilton, 2014; Madoo, 2015; Sampson, Laub, & Wimer, 2006; Uggen, 2001; Visher & O'Connell, 2012; Wright, Caspi, Moffitt, & Silva, 2001). Theory and research suggest that employment is a crucial and normative force that can help individuals desist from crime.

Despite the importance of employment, research shows that individuals with prior system involvement fare poorly in the labor market, often worse than other marginalized groups such as welfare recipients and people with mental and physical disabilities (Holzer, Raphael, & Stoll, 2003). Individuals with former justice involvement experience chronic unemployment, under-employment, and marginalized employment (Holzer , Raphael, & Stoll 2003; Varghese et al., 2010; Western and Pettit, 2010).

### *1.1.3 Clustered employment of the justice-involved*

When people with former justice involvement *are* employed, it is often within one of a select number of industry sectors (henceforth referred to as industries).[1] According to an analysis using the National Longitudinal Survey of Youth 1997 (NLSY97), Schnepel (2014) estimated that 90 percent of individuals' first jobs after release from prison were within the following seven industries: (1) construction, (2) administrative and support and waste management and remediation services (administrative and waste management), (3) manufacturing, (4) accommodation and food services (food services), (5) retail trade, (6) transportation and warehousing, and (7) other services. A number of additional studies confirm employment of the justice-involved clusters within these seven industries. These are sometimes referred to as "typically willing" industries because they are willing to hire people with prior criminal justice contact (Bellair & Kowalski, 2011; Lichtenberger, 2006; Lyons & Pettit, 2011; Schnepel, 2014).

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[1] In this study, industry sectors are defined according to the 2002 North American Industry Classification System (NAICS). For a description of the NAICS industry sectors, a summary of the NAICS hierarchy, and a list of the twenty NAICS industry sectors, subsectors and industries, see Appendices A1, B1, and C1 respectively.

Many factors contribute to the clustered employment of individuals with criminal justice contact within these seven industries including: (a) human capital deficits such as low levels of education or inconsistent work experience (Lochner, 2004); (b) institutional level barriers such as employer discrimination by race and criminal record (Harris & Keller, 2005; Pager, 2003; Varghese, 2013); and (c) structural barriers such as local labor market conditions, access to public transportation, and travel restrictions related to community supervision (Kethineni & Falcone, 2007; Pratt & Cullen, 2005; Solinas-Saunders & Stacer, 2015; Western & Pettit, 2010; Wheelock, Uggen, & Hlavka, 2011). Because of these and other barriers, people with prior criminal justice contact generally find employment in one of the nine industries where a post-secondary education and extensive work experience are not required. Beyond the seven "typically willing" industries, health care and social assistance and educational services are the two other industries that also hire many low-skilled workers. These two industries make up more than 17 percent of the jobs available to individuals with a high school diploma or less, and are projected to grow over the next decade (Carnevale et al., 2011). Unfortunately, individuals with prior justice contact are typically excluded from these industries. Employers in these industries are less likely to hire individuals with criminal backgrounds out of fear of putting their clients—often vulnerable populations such as children and the elderly—in harm's way. Occupational restrictions in these industries also limit the ability of people with prior justice contact to access employment in these education and healthcare services. Since the 1980s and 1990s, legislation has restricted access to jobs in the education, health care, and private security sectors while state licensing bans have prohibited individuals with criminal backgrounds from obtaining licenses in professions

such as home healthcare, nursing, education, plumbing, and barbering (D'Alessio et al., 2014).

To illustrate the extent to which individuals with prior justice contact are excluded from these two high growth industries, Figure 1 presents data from the NLSY97 that shows the distribution of employment by industry for individuals with no more than a high school degree, stratified by arrest history. Compared to individuals who are never arrested (orange bar), those with one or more arrests (blue and purple bars) are far less likely to be employed in the healthcare services and educational services industries.

*** Figure 1 here ***

Unfortunately, jobs in the "typically willing" industries tend to be of lower quality and are more likely to be part of the shadow economy (also known as "off-the-books" or "under-the-table" work) (OECD, 2017) [2]. Table 1 contains data compiled by the United States Bureau of Labor Statistics, which shows characteristics for typically willing industries (top panel) and less willing industries (bottom panel).[3] An examination of average wages, quantity of work, job benefits, and the percent of the industry represented by a union illustrates two important points. First, jobs in willing industries (top panel) are generally of lower quality (meaning lower wages, less hours worked per week, and fewer benefits) than jobs in less willing industries (bottom panel). Second, jobs in typically

[2] It is hard to estimate the size and characteristics of the shadow economy but according to an OECD (2017) report, the services, retail, and food services industries have the largest under-ground economies as determined by non-compliance reports from tax administrators. Under-the-table jobs are often low-quality and temporary. Additionally, under-the-table jobs can put employees at greater risk of exploitation from employers and leaves them without access to formal recourse when they are treated unfairly (OECD, 2017).
[3] Industry sectors shown in the bottom panel are organized by supersector, which are overarching groups of multiple industry sectors.

willing industries—generally considered to be of lower quality—still show considerable variation across all quality indicators. Specifically, among willing industries, construction, transportation and warehousing, and manufacturing have higher wages ($21 to $25), number of hours per week (39 to 42), value of benefits ($11 to $14), and union representation (11 percent to 21 percent). In contrast, food services and retail have lower wages ($12 to $15), number of hours per week (26 to 30), value of benefits ($3 to $7), and union representation (3 percent to 5 percent). Thus, jobs in willing industries are generally of lower quality, but even among the willing industries, there is variation in wages, access to benefits, and other important aspects of job-quality.

*** Table 1 here ***

*1.1.4 U.S. policy to improve employment and reduce recidivism*

Federal and state lawmakers have established a number of employment-focused policies to help people with prior justice involvement (re)enter the labor market. A small portion of these policies target employers with incentives to increase their likelihood of hiring people with prior justice contact. These include tax incentives for hiring individuals with criminal records, federal bonding programs that protect employers who hire people with records from financial losses, and "ban-the-box" legislation, which is designed to discourage employers from discriminating based on criminal record during the hiring process.

A more extensive set of federal and state policies target potential employees to improve employability through job training and placement. These workforce development programs are authorized by seminal legislation such as the 1998 Workforce

Investment Act (WIA) and the 2014 Workforce Investment Opportunity Act (WIOA). Over the past decade, the federal government allocated billions of dollars through WIA and WIOA to help low-skilled and low-income workers obtain job-readiness and skills training, industry-recognized credentials and experience in career pathways (Kozumplik, Nyborg, Garcia, Cantu, & Larsen, 2011; U.S. Department of Labor, 2016). Some of these workforce development programs focus on education and training within particular industries. For example, the primarily federally-funded YouthBuild USA program trains participants between the ages of 16 and 24 for jobs primarily in the construction industry.

In addition to resources allocated through general WIOA funding, a subset of funds have been allocated to programs exclusively serving justice involved individuals including the U.S. Department of Labor's Reentry Employment Opportunities (REO) grants.[4] The Second Chance Act, originally enacted in 2008, is another key source of funding for services for individuals with prior justice contact.[5] Nearly 40 percent of the $125 million appropriated for the Second Chance Act Prisoner Reentry Initiative in 2009 and 2010, a subset of the funds authorized under the larger legislation, was spent on programs to help released prisoners obtain employment (Schnepel, 2014).

This study's focus on the identification of promising industries for people with prior justice involvement can inform all of the above mentioned policy efforts. For example, government agencies can use information on promising industries to target tax

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[4] See the U.S. Department of Labor's Employment and Training Administration website (https://www.doleta.gov/) for additional information about federal workforce development initiatives such as the REO program (https://www.doleta.gov/REO/eta_default.cfm).

[5] The primary purpose of the Second Chance Act is to break the cycle of criminal recidivism and increase public safety by providing offenders and ex-offenders with educational, literacy, vocational, and job placement services, along with social services such as substance abuse counseling, family reunification, and housing assistance (Catalog of U.S. Government Publications [CGP] United States Congress, 2008).

incentives to employers, more diligently enforce regulations on hiring practices, and tailor workforce development programs to train individuals in promising industries.

## 1.2 Focus of the Current Study

Identifying factors that bolster individual's desistance and avoidance of rearrest is critically important because reductions in recidivism can increase public safety, reduce ballooning criminal justice costs, and improve public well-being. Employment—particularly high quality, full-time employment—has been identified as an important element in reducing the likelihood of individuals with prior criminal justice contact from reoffending (Uggen & Wakefield, 2008). Acknowledging that individuals' selection into jobs is nonrandom (Pager & Pedulla, 2015; Uggen, 1999), this study hypothesized that recidivism rates vary by industry because the quality of jobs (i.e. wages, job stability, benefits, etc.) also varies by industry. While past studies on crime and desistance included industry of employment as a control variable—often as a binary indicator of skill level (e.g. low-skill job) or an indicator of the availability of "good jobs" (Bellair & Kowalski, 2011; Schnepel, 2014)—the current study focuses explicitly on industry of employment with the goal of identifying promising industries for people with prior criminal justice contact.

Using data from the National Longitudinal Survey of Youth 1997 (NLSY97) and the Quarterly Workforce Indicators (QWI), this study answers the following three research questions:

1. Is employment in specific industries associated with a reduced likelihood of rearrest for individuals previously arrested?
2. Is the availability of viable employment in industries typically willing to hire people with prior justice contact associated with rearrest?

3. Do the effects of industry and viable job availability vary by subgroups based on gender, age, race and ethnicity, and offense type?

The next section describes the theoretical perspectives underpinning this study's examination of the relationship between industry and desistance.

## II. THEORETICAL DRIVERS OF RECIDIVISM AND DESISTANCE

The drivers of recidivism and desistance are numerous and individual pathways into and out of crime vary considerably by age, gender, socioeconomic status, and contextual and environmental factors (Siennick & Osgood, 2008). Within the field of criminology, there is considerable debate about whether the causes of crime are the same as the causes of recidivism and, similarly, there is debate about whether the things that prevent criminal activity are the same things that encourage desistance from crime. In line with most prior research, this study assumed that the causes of crime and recidivism are similar and the drivers of prevention and desistance are similar (Loeber & Farrington, 2008). The section that follows applies theoretical frameworks on the causes of crime to explain potential causes of recidivism; likewise, it applies theories on crime prevention to explain how such factors can help people desist from crime.

### *Key Concepts*

Two concepts are central to many of the theories described below: (1) the *rational choice model*, which postulates that individuals are rational actors who weigh the costs and benefits of their actions before acting; and (2) the concept of *opportunity cost*, which can be understood as the explicit or implicit value of a forgone alternative. In the current context, the rational choice model suggests that an individual understands and fully integrates relative gains and losses before deciding whether to commit a crime (Lochner, 2004). To illustrate the concept of opportunity costs, imagine two individuals: one has a good job with a livable wage, benefits, and potential for advancement, and the other has a low-wage job with a demanding and variable schedule and little opportunity for career

advancement. With all else being equal, the individual with the better job has a higher opportunity cost of getting in trouble with the law, because they have more to lose. As is discussed below, the rational choice and opportunity costs concepts have strong theoretical ties to economic, human capital, and social control theories, and operate differently by race, gender, and offense type.

## 2.1 Economic Theories

Economic theories emphasize financial drivers of crime and the use of illegal channels to obtain resources otherwise inaccessible (Becker, 1968). Within this framework, individuals resort to crime in the absence of acceptable means of survival or because the payoff of criminal activity far exceeds the payoff of available, legitimate avenues for economic self-sufficiency. In this way, economic theories of crime hinge on the concept of rational choice. Economic theories predict that desistance arises when actors have legitimate means to support themselves, reducing their need to resort to crime and their subsequent risk of recidivism. Within this model, it is expected that employment—which enables individuals to provide for themselves and their dependents both financially and through benefits such as health care, paid sick leave, or vacation—positively relates to criminal desistance and avoidance of rearrest. Applying this framework to the current study's focus on industry-based employment, this research predicts that the extent to which jobs within an industry offer higher wages, wage growth over time, and good benefits, the greater the opportunity costs of crime and the likelihood of desistance from crime and avoidance of recidivism.

## 2.2 HUMAN CAPITAL THEORIES

Human capital theories stem from an understanding of crime as the result of an incongruence between an individual's skills and assets and the skills and assets needed to access legitimate avenues of success (Lochner, 2004). Indicators of human capital often include education or vocational credentials and work-history (such as job-tenure). Based on the tenets of human capital theory, employment is an asset that helps individuals in various life pursuits and subsequently increases the opportunity costs of crime (Hirschi, 1986).[6] Conversely, individuals without human capital have restricted opportunity, relegating them to low-wage jobs that further limit the accrual of human capital. Applying these concepts to the current study's focus on industry-based employment, one might predict that jobs in industries that allow for the accumulation of human capital (on-the-job training, credentials, seniority) would be positively related to desistance and avoidance of rearrest. Meanwhile, industries that do not foster human capital accumulation, have high turnover, or have a greater proportion of temporary, day labor, or "under-the-table" jobs are theorized to relate to greater risk of rearrest.

## 2.3 SOCIAL STRAIN AND DIFFERENTIAL OPPORTUNITY THEORIES

More than in the above mentioned theories, strain theories emphasize differential access to opportunity, inequality relative to peers, and restricted access to legitimate avenues of success as the primary drivers of crime (Agnew, 1985, 2012). From this

[6] Considering the evidence that individuals with criminal records often have low levels of education and spotty work experience, much of the U.S. policy designed to address underemployment and recidivism has focused on workforce development programs to bolster human capital through job readiness, soft-skills training, and programs designed to set individuals on "career pathways."

perspective, an individual's assessments of strains can lead to a range of negative emotions, such as frustration, anger, disappointment, and depression, which may be externalized in criminal acts. While early strain theories focused primarily on financial strains and crime (Merton, 1938), Agnew's later (1992, 1996, 2012) conceptualization of strain theory accounts for a broader range of strains and offers an explanation for the ways in which strains can manifest into violent crimes, particularly among those who perceive unfair treatment. Indicators of strain might include poor pay, lack of benefits, or stressful schedules, all of which are likely characteristics of jobs in the secondary labor market.[7] As Wang (2010) describes,

> …characteristics of strain are amplified in secondary labor markets, in which employees have a tendency to view themselves as victims of a vague and unfair social hierarchy. Agnew (2006) specifically pointed out that some working experiences, such as working in the secondary labor markets and chronic unemployment, would increase the likelihood of engaging in delinquency... Although it is legal/conventional employment, working in the secondary labor market is often perceived as unpleasant because it is associated with low pay (often minimum wage), poor benefits, less autonomy, unpleasant tasks (e.g. repetitive, simple, or physically demanding work), coercive control (e.g. threats of being fired) and limited opportunity for advancement. General strain theory predicts that participating in secondary labor markets would receive relatively more strains from the jobs, which consequently lead to a higher likelihood of criminal behaviors (pp. 14–15).

Applying these concepts to the current study's focus on industry-based employment, one might predict that jobs in the industries that typically hire individuals with former justice contact might not correlate to desistance in the same way that more financially rewarding and stable jobs would. Conversely, if jobs in certain industries,

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[7] The concept of the secondary labor market grows out of dual labor market theory in which jobs are either part of the primary or secondary sectors. Jobs in the secondary sector typically employ individuals without specialized skills or advanced degrees; such jobs typically offer lower wages, are less stable, and offer less room for advancement. Conversely, jobs in the primary sector have higher wages, offer greater stability, and provide opportunities for career (Wachter, Gordon, Piore, & Hall, 1974).

even those within the secondary labor market, offer individuals opportunities to accrue monetary or human capital, such jobs may increase one's desistance and decrease the likelihood of rearrest.

## 2.4 SOCIAL CONTROL, SOCIAL BONDING, AND ROUTINE ACTIVITIES THEORIES

A social control framework focuses on social disorganization, social disconnectedness, and criminal embeddedness as the primary drivers of crime (Merton, 1938). In this theory, crime is thought to result from, and thrive in, communities with accumulated disadvantage. In their 1997 chapter in *Advances in Criminological Theory*, Sampson and Laub put forth a framework of 'age-graded informal social control' which posits that the stability or continuity of criminal behavior can be largely attributed to a developmental process they term "cumulative disadvantage" (Sampson & Laub, 1997). From this perspective, the reactions and or sanctions of social institutions, such as family, school, and peers, reinforce initial antisocial behavior (Hirschi, 1969, 2002; Matza, 1990). Broadly, these theoretical perspectives view connections with social institutions such as school, family, and employment as factors that reinforce an individual's social contract with society. For example, ties to employment are theorized to reinforce mainstream values through mechanisms of self-fulfillment, routine, peer influence, and the desire to be judged positively by others.[8] From a social control perspective, rewarding job attributes create "opportunity costs" which individuals risk losing if they engage in

[8] In a study by Grasmick and Bursik (1990), deterrent effects of self-imposed shame (conscience) were stronger than those of embarrassment from a significant other (the authors caution that this may be due to measurement error and highlight that their analyses do not account for individual differences in deterrent effects of significant others, conscience or legal sanctions; they only looked at the logged effects across study participants). See also Sampson & Laub (1993); Sampson, Laub, and Wimer (2006); and Liberman (2008).

criminal activity. Such normalizing effects of employment in a given industry should be evident in the extent to which jobs 1) generate a sense of fulfillment or satisfaction; 2) produce a stable schedule or routine; and 3) expose individuals to positive environments or peers. Conversely, employment in industries where work lacks meaning, where many jobs are "under-the-table," where work schedules are unpredictable, or where work exposes individuals to risky environments and/or peers, should increase the risk of rearrest for new crimes or technical violations.

A second potential mechanism through which employment is thought to influence desistance is through changes in daily routine and reductions in "leisure time," or the amount of free time one typically has to partake in deviant activities or socialize with deviant peers (Cohen & Felson, 1979).[9] Barring the instances where crime occurs in the workplace (i.e., white-collar crime), one might expect the number of hours an individual works to be negatively related to a person's availability to commit crime or to be arrested.[10] Consequently, industries with greater full-time work may be associated with less time a person is at risk of committing crime or experiencing criminal justice contact.[11]

## 2.5 Spatial Mismatch Theories

The theories summarized above primarily focus on the ways in which the quality and characteristics of employment influence an individual's ability to desist from crime

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[9] Research exploring criminality and criminal justice contact has documented that intensive employment can increase the likelihood of crime among youth and young adults, particularly when work detracts from their participation in other age-appropriate institutions such as school (Paternoster, Bushway, & Brame, 2003).

[10] In instances of white-collar crime, this relationship might not be expected to hold, as increased time at work does not equate with time away from criminal environments.

[11] Conversely, full-time work may actually increase an individual's risk of rearrest for a technical violation because it may make it hard for them to adhere to the conditions of their probation or parole supervision such as attending regular meetings with their probation officer or attending mandatory treatment.

and avoid justice system contact. Another key aspect of employment investigated in the current research is access to employment or "job availability." Spatial mismatch theory is useful in understanding how job availability by industry may influence employment and desistance from crime. Spatial mismatch theory asserts that crime and recidivism can result from an incongruence between the skills of individuals and the opportunities in the communities where they reside. As noted by Holzer (1994), spatial mismatch theory offers a useful lens to interpret the problems of high unemployment and underemployment among individuals with criminal records because it acknowledges the two sides of the problem: (1) the supply side, which includes individuals' lack of soft skills, technical skills, and credentials; and (2) the demand side, which includes employers' discriminatory attitudes and hiring practices. Both sides are problematic for the employment of persons with former justice contact.

First proposed by Kain (1968), spatial mismatch theory has been used extensively in sociological and demographic research on the effects of large labor market shifts, such as deindustrialization or the relocation of low-skilled manufacturing jobs outside of metropolitan centers (Gobillon, Selod, & Zenou, 2007). In large part due to racially segmented housing markets and other forms of institutionalized discrimination, accessibility to job opportunities, particularly "good jobs" for people without a college degree or specialized credential, became increasingly limited during and after the period of deindustrialization. Looking forward, the number of jobs requiring a high school degree or less is projected to shrink, suggesting that employment prospects for the majority of individuals with prior justice contact who do not have a post-secondary education will continue to decline in the decades to come (Carnevale et al., 2011; Schmitt

et al., 2010). The current study applies the tenets of spatial mismatch theory to assess whether the availability of jobs in typically willing industries is related to reduced recidivism for individuals with prior justice contact.

## 2.6 Additional Drivers of Criminal Justice Contact

In addition to the above-mentioned drivers of crime and recidivism, it is important to acknowledge other structural and situational factors that influence the likelihood of criminal justice contact. For example, an individual's race and ethnicity likely influences whether they are arrested. National arrest rates for blacks are 2.3 times higher than those for whites (Mears, Cochran, & Lindsey, 2016); 49 percent of black males likely to experience an arrest, compared with 38 percent of white males (Brame et al., 2014). Similarly, differential policing of low-income neighborhoods is another factor likely to influence the probability of arrest. Individuals living in communities with high crime rates or a large per capita police force have greater exposure to law enforcement and an increased risk of arrest and rearrest. Lastly, individuals on probation or parole supervision have an increased risk of being returned to jail or prison for violating the conditions of their supervision, even for non-criminal actions such as missing mandated treatment sessions, failing to appear at a court date, or not checking in with their probation or parole officer. Although this study does not include measures of supervision and therefore cannot account for such interactions, it is probable that employment in some industries, specifically those with unpredictable schedules, might put individuals at greater risk of violating the conditions of their supervision.

## 2.7 ADDITIONAL THEORETICAL DRIVERS OF DESISTANCE

A number of other important mechanisms influence an individual's desistance from crime including peer networks and the negative, stigmatizing effects of having a criminal record.[12] Theories that describe these mechanisms include those focused on social capital and social learning, as well as on labeling and social interaction. As is described in detail in the methods section, this study controls for time stable relationships and peer influences, but is not able to assess the extent to which peer influences change and how those influences affect employment or desistance. Despite the limitations of the current study to measure these phenomenon, the following provides a brief description of each of the theories including a discussion of how industry-based employment may be influential in the context of such theories.

Social capital theory examines the ways in which peer networks and other influential actors like family can influence desistance. Based on Bourdieun's 1984 principles of cultural capital, social capital is accrued through the social networks that help individuals meet their needs. As described by Kubrin and Stewart (2006), social capital "provides residents with access to others in the community with economic and cultural capital, others who can serve as an indispensable resource when seeking a job, finding housing, or searching for social services such as child care" (p. 172). From this perspective, the extent to which jobs in an industry provide employees access to positive networks of people and resources, such jobs may increase the likelihood of desistance or

[12] Scholars have historically emphasized personality traits such as self-control as primary drivers of crime and criminality (Gottfredson and Hirschi, 1990). While the author agrees that self-control and other personality traits are important predictors of desistance, such factors are not conceptualized as deterministic and will be controlled for in the current research through the use of within-person analyses.

the ability to mitigate criminal justice contact if it occurs. For example, imagine a female with prior criminal justice contact who is picked up by police because she matches the description of a suspect in a recent crime. Consider how non-criminal connections established through employment might help her—maybe a co-worker knows a good lawyer who can give her a discount, or a manager knows the arresting officer and can vouch for the young woman. While very difficult to measure, one can see how social capital can influence rates of success, particularly because it operates as a source of opportunity for positive life chances (potentially opening doors to better employment or housing opportunities) and may help counteract criminal justice contact when it occurs. Extant literature supports these notions to some degree, but, in general, it is observed that people with criminal justice system contact have substantially fewer opportunities to accrue social capital (Madoo, 2015).

Conversely, one can imagine ways in which employment can actually cause the accrual of negative social capital, sometimes termed "criminal capital." In these contexts, employment can increase access to illegitimate resources through deviant peer networks (Clemmer, 1958; Reynolds, 2013; Rose & Clear, 1998) or expose individuals to more deviant environments. Therefore, to the extent that employment modifies access to resources and social networks, it may also increase social or criminal capital and, consequently, influence opportunities for desistance.

The collateral costs associated with having a criminal "label" are also theorized to influence one's ability to desist from crime. Research confirms that, after controlling for known correlates, justice system contact and especially incarceration, in and of itself, is associated with: poorer educational attainment (Kirk & Sampson, 2013); a reduced

likelihood of being admitted to a secondary education institution (Boettke, Coyne, & Hall, 2012); restricted access to housing (Thacher, 2008; Western & Pettit, 2012); reduced civic participation (Manza, 2004); poorer employment prospects (Apel & Sweeten, 2010; Mueller-Smith, 2014; Pager, 2003; Pager, Western, & Sugie, 2009; Varghese, Hardin, Bauer, & Morgan, 2010); reduced future earnings (Lyons & Pettit, 2011; Pettit & Lyons, 2009; Western, 2002); and negative impacts on personal health (Schnittker & John, 2007) and familial well-being, including a reduced likelihood of marriage and family formation (Western, Lopoo, & McLanahan, 2004). Theory predicts that employment may counteract the negative "criminal" label in at least two ways, including how it shapes others' perceptions of an individual as a criminal versus a non-criminal, and how the label is internalized and counteracts one's internal criminal identity. Therefore, the extent to which industry-based employment influences others' perceptions of an individual or an individual's perceptions of their self-worth may also influence rates of desistance.

To summarize, a number of theoretical perspectives predict that high-quality employment increases the likelihood of desistance and, conversely, that low-wage, dead-end jobs may increase social strains and potentially increase the likelihood of recidivism. As described in the introduction, employment of people with former justice contact clusters in a select number of industries. The characteristics of jobs by industry vary in important ways, such as in wages, average hours worked, and access to employer benefits. This section reviewed several theories that posit differences in such job characteristics can lead to differences in an individual's likelihood of desistance from crime.

# III. LITERATURE REVIEW

## 3.1 RELATIONSHIP BETWEEN INDUSTRY-BASED EMPLOYMENT AND RECIDIVISM

To the author's knowledge, no prior research has explicitly examined the relationship between industry of employment and rearrest, and little research examines industry and recidivism more generally. Because the extant literature on industry and rearrest is limited, this section reviews studies in related areas, namely research focused on the relationship between industry and/or occupation and recidivism (where the measures of recidivism vary from self-reported criminal behavior to return to prison). The review will contextualize the extant literature and show the reader how evidence in these different but related areas sheds light on the potential relationship between industry and risk of rearrest.

First, based on the tenets of dual labor market theory, Crutchfield and Pitchford (1997) examined whether marginal employment in the secondary sector (low-skill) jobs was related to self-reported criminal behavior. While the authors do not explicitly define how they operationalized secondary sector employment, they describe these jobs as low-wage and unstable and their examples include a number of the low-skill industries examined in the current study including construction, manufacturing, administrative, and waste management.

Crutchfield and Pitchford (1997) used data from the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79) to investigate the relationship between employment in the primary and secondary sectors and criminal activity (defined as overall summary index of eleven self-reported crimes and separate summary measures for violent and property crimes). Using a sample of 8,127 males and females between the ages of

14–21 at baseline, the authors employed stepwise ordinary least squares (OLS) regression to build successive models, adding in controls for individual characteristics (age, gender, race, marital status, highest grade completed, and high school suspension status), aggregate labor market characteristics (unemployment rate, poverty rate, percentage black, population size, employment rate), and interaction terms between the individual and macro-level variables.

Crutchfield and Pitchford (1997) found a bivariate relationship between secondary sector employment and overall criminal behavior, but once they included characteristics like job stability and anticipated duration of employment in their regression model, secondary sector employment was no longer related to self-reported crime. Nevertheless, their results showed that people with greater job instability (greater time out of the labor force or in jobs that respondents thought to be short-term) were more likely to engage in violent crime. This relationship was especially true for individuals who lived in counties with high unemployment rates. Conversely, those who thought they would stay at their current job longer were less likely to commit crime regardless of whether their employment was in the secondary sector. The findings of this study highlight that not all secondary sector jobs are alike and that job stability, which varies considerably by industry, may be an important mechanism by which industry might be related to risk of rearrest.

Next, research by Uggen (1999) provides the most detailed description of how industry and occupation relate to recidivism. Uggen's (1999) Heckman two-stage OLS analysis used a subset of data from the National Supported Work Demonstration project and the 1977 Quality of Employment Survey to examine the effects of job quality on self-

reported crime.[13] Uggen's (1999) analysis included a subset of individuals who were offenders (n=2,268), were employed in a job other than the one supplied by the demonstration, and had complete information on the relevant variables for all three waves of data collection (baseline, nine months, and eighteen months after random assignment; n=442). To measure recidivism, Uggen created a binary measure of crime that equaled 1 if any economic or non-economic crimes were self-reported.[14] To measure job quality, Uggen transformed Quality of Employment Survey (QES) job satisfaction scores so they represented standardized measures of quality[15] by the following eight occupational classifications: professional and technical, managerial and administrative, sales, clerical, craft, operative, laborer, and service occupational groups. Within each of these categories, Uggen further categorized workers by skill level and industry and applied the mean QES score to participants based on their industry and occupation classification. Uggen (1999) found that employment in high quality industries and occupations reduced the likelihood of economic and non-economic criminal behavior, even after controlling for selection into

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[13] The National Supported Work Demonstration study was comprised of 4,927 former offenders, addicts, or highs school dropouts from six U.S. cities: Chicago, Hartford, Jersey City, Newark, Oakland, and Philadelphia. Sample members were randomly assigned between 1975 and 1979; treatment group members received minimum wage employment in crews with 6–8 other participants for up to 18 months.

[14] Uggen constructed a binary measure of self-reported crime equal to 1 if any of the following economic or non-economic crimes were reported by the respondent: Economic Crimes—numbers, other gambling; burglary or breaking and entering; boosting, shoplifting, stealing from cars or trucks; selling marijuana or other drugs; robbery, holdups or stick-ups; selling or fencing stolen goods; mugging or snatching purses; cashing or forging stolen checks or credit cards; con games, fraud, swindles or jostling; pimping or prostitution; illegal sales of alcohol, selling booze; Non-Economic Crimes—burning a car or truck; fighting with a gun or knife; fist fighting; destroying or damaging property; concealing a crime; homicide; assault, attacking a person; carrying a concealed weapon; rape; burning a building; arson.

[15] As part of the transformation, Uggen added a constant "to each score and the result divided by 100 to obtain a positive metric for data transformations and to scale job quality to a magnitude similar to other variables in the analysis. The resulting job quality scores range from 0 (for operatives in nondurable goods manufacturing industries) to 1.08 (for skilled craft workers outside the manufacturing or construction industries), with a mean score of .57 (approximately equal to the .56 score for food service workers)" (p. 134).

employment, propensity to commit crime, and other important job attributes such as wages and stability.[16] Perhaps most important for this study, Uggen also found evidence that individuals in similar occupations but different industries had differential rates of recidivism, suggesting that industry may have an independent effect on recidivism even after controlling for occupation.

To summarize, there is little definitive evidence about the effect of industry-based employment on recidivism. Existing research highlights the importance of controlling for occupation and suggests that industry may have an independent effect on recidivism after controlling for occupation and other important covariates.

### 3.2 Relationship between job availability by industry and recidivism

Evidence suggests that greater job availability in industries likely to hire people with prior justice contact relates to greater desistance from crime and avoidance of recidivism among people released from prison (Bellair, Roscigno, & McNulty, 2003; Schnepel, 2014). Research by Bellair and Kowalski (2011), Schnepel (2013, 2014), and Yang (2017) demonstrated that greater county-level job availability in the construction and manufacturing industries at the time of release correlated with lower recidivism rates

[16] Uggen's analysis included controls for the following variables thought to influence selection into employment and criminal behavior: respondent's health and perceived pressure to find work, their age, race, sex, number of dependents, prior earnings, and welfare receipt are included in the job entry equation. He also included human capital measures of education and work history (both measured in years). To capture the external labor market conditions, Uggen used the unemployment rate at each program site. In the crime prediction model, Uggen included employment measures like job tenure and wages. Also, to control for propensity to commit crime, Uggen included number of times arrested and a self-reported indicator of prior economic crime. He also added measures of prior alcohol and heroin use. All independent variables were measured at the initial baseline interview except for the employment measures, which were drawn from the nine-month interview.

for individuals recently released from prison. This section provides a review of these three key studies including a description of their data, sample, findings, and limitations.

Bellair and Kowalski (2011) used Ohio state corrections data from 1999 to test whether differential access to employment explained disproportionate recidivism rates among African Americans and whites.[17] Bellair et al. used Cox proportional hazard models to measure time to reincarceration for prisoners released on community supervision ($N$ = 1,568).[18] They found that job availability in the manufacturing industry explained racial differences in two-year recidivism rates. Job availability in other industries was not significantly related to recidivism.[19] While Bellair and Kowalski's (2011) study presented important evidence about the correlation between county-level employment by industry and recidivism by race, their research had a number of limitations. First, Bellair et al. (2011) used employment rates by industry to measure job availability, but employment rates may not accurately measure job opportunity in an industry because the presence of a large industry in a county does not necessarily equate to high turnover and hiring in that industry. Instead, measures of job openings or new hires by industry more accurately estimate job availability by industry. A second limitation of their study was the lack of information on the employment experiences of ex-prisoners in their sample. Bellair and Kowalski's study did not measure individual-level employment; instead, they assumed that greater job opportunity resulted in greater

[17] In addition to looking at differential access to employment, Bellair and Kowalski (2011) tested whether other macro-level factors such as poverty and family composition explained disproportionate recidivism rates among African American and whites. In addition to looking at differential access to employment, Bellair and Kowalski (2011) tested whether other macro-level factors such as poverty and family composition explained disproportionate recidivism rates among African American and whites.
[18] Recidivism was measured as a reincarceration due to a new felony conviction.
[19] The researchers note that the lack of findings for job availability in other industries may have been the result of small sample sizes within those industries.

employment which, in turn, resulted in reduced recidivism. Lastly, Bellair and Kowalski's (2011) sample consisted of serious felony offenders released from a single state more than a decade ago. Given the vast majority of individuals with prior justice contact are nonviolent offenders, and given the fact that the availability of low-skill, high-quality jobs has declined since the time of their study, additional research with a more contemporary and nationally representative sample is needed.

Schnepel (2014) conducted a seminal study investigating the relationship between job availability and desistance using California National Corrections Reporting Program data and Quarterly Workforce Indicator (QWI) data. His research examined whether the density of *viable* employment opportunity related to the probability that a cohort of released offenders returned to prison.[20] Schnepel's sample included 1.7 million working-aged males released from California prisons to mandatory parole supervision between 1993–2009. Schnepel's research demonstrated that counties with a greater number of construction and manufacturing new hires had the lowest rates of recidivism. A key feature of Schnepel's work was his operationalization of *viable* work opportunity, in which he restricted the estimate of opportunity to jobs that people with criminal records would be able to obtain. Because the majority of people with criminal records do not have more than a high-school diploma, Schnepel's estimate of viable job opportunity only included new hires in typically willing industries where the position did not require more than a high school diploma. Using this definition, Schnepel estimated job density by

[20] Schnepel's analysis is not able to differentiate between return to prison for new crimes versus return to prison for parole violation, though he references a study by Grattet, Petersilia and Lin (2008) which found that the majority of California parolees who returned to prison committed at least one new criminal violation.

industry relative to the population of working-age residents in that county (within a standard commuting zone). His research used linear regression with fixed effects for time of release (quarter-year) and county of sentencing, as well as controls for linear and quadratic county-level trends. Schnepel found that one additional construction hire per 1,000 working-age individuals (in a commuting zone) during the quarter of prison release was associated with a 1.8 percent decrease in recidivism. A similar increase in low-skill manufacturing hires was associated with a 1.0 percent decrease in recidivism. In his discussion of his findings, Schnepel (2014) points to the fact that construction and manufacturing industries offer the highest wages and benefits relative to other willing industries. The prevalence of job opportunity in other typically willing industries (food services, retail, admin/waste, or other services) did not have similar effects on recidivism.[21] In addition to finding industry-specific effects across the full sample of males, Schnepel's subgroup analyses showed that the effect of employment opportunity by industry varied according to offense history (first-time versus repeat offender), offense type (property, drug, violent), and age. More specifically, Schnepel found that (1) increases in construction and manufacturing jobs were associated with greater decreases in recidivism among first-time offenders compared with repeat offenders; (2) increases in construction and manufacturing jobs were associated with greater decreases in recidivism among those incarcerated for drug crimes compared with those incarcerated for property or violent crimes; (3) increases in construction and manufacturing jobs were associated

[21] Schnepel (2014) also found that increases in job opportunity in high-skill jobs positively related to recidivism. This presents evidence of indirect effects of job opportunity where increased high skilled jobs equate to increased access to wealthy targets for criminals. The current study controlled for this phenomenon by including a county-level measures of median household earnings.

with the greatest declines in recidivism among those between ages 35–45, while those under 25-years-old showed no response to labor market fluctuations; and (4) increases in construction opportunities had similar effects on recidivism across blacks, whites and Hispanics, but increases in manufacturing opportunities had a larger effect on recidivism rates for Hispanics.

While Schnepel's results held across multiple specification and falsification tests, his study was hampered by the lack of individual-level, post-release employment information. Like Bellair et al. (2011), Schnepel's data did not contain information on individual employment; hence, his analysis could not ascertain whether reductions in recidivism were the result of increased employment in the promising industries. The final limitation of Schnepel's study is the limited generalizability of the findings to labor markets outside of California.

Most recently, research by Yang (2016) used administrative prison data from 2000–2013 across 43 states and more than 2,800 counties to estimate whether offenders who return to counties with greater labor market opportunities have a reduced risk of returning to prison for a new crime or technical violation. Yang found that local labor markets and, more specifically, average wages in the construction, manufacturing, and transportation industries were significant factors in predicting recidivism. Evidence from her research suggests that people released from prison returning to counties with greater employment and average higher wages have significantly decreased risk of recidivism, particularly impactful for black offenders and first-time offenders. Additionally, her research shows that the impact of local labor market conditions is especially important in states where legal restrictions ban individuals with criminal records from receiving food

stamps and welfare benefits and in states that prohibit private employers from discriminating based on criminal history. These effects point to the importance of the availability of good jobs (jobs with higher average wages) in willing industries.

Building on the work of Bellair et al., Schnepel, and Yang, this study includes measures of viable employment opportunity to explore the effects of job availability on desistance from crime and assess whether their findings are replicated using more detailed individual-level survey data from a younger sample of individuals with more diverse criminal backgrounds.

## 3.3 Heterogeneity of Employment and Recidivism Experiences

Existing research highlights the ways in which the effects of employment on desistance can vary by important subgroups. The following sections present evidence of how employment and desistance patterns vary by gender, age, race and ethnicity, and offense history.

### *Gender*

The offending and employment patterns for males and females are demonstrably different. Although the vast majority of individuals in the criminal justice system are male, females comprised approximately 18 percent of the justice-involved population in 2014 (Kaeble, Glaze, Tsoutis, & Minton, 2015). While overall rates of arrest in the U.S. have fallen over the past decade, arrest rates for females have declined slower than arrest rates for men. Female offending patterns also differ in terms of the types of crimes. Compared with males, females are less likely to engage in violent criminal acts and more

likely to engage in property and drug offenses. Females are also less likely to recidivate than their male counterparts (Ney, Ramirez, & Van Dieten, 2012).

Female employment patterns are also different from men, in that they tend to work in different industries, work fewer hours on average, and earn less than men (United States Bureau of Labor Statistics, 2014). Of particular interest in this study, the best paying industries among the typically willing industries are in jobs predominantly held by males, such as in the construction and manufacturing industries. Meanwhile, among the typically willing industries, those that most often employ women such as the accommodation and food services industry offer lower wages and more part-time work and are less likely to provide benefits.

Little rigorous evidence exists on the employment and desistance patterns of women and no rigorous studies explicitly examine promising industries for women with prior justice contact. However, qualitative research suggests that, like for men, finding high quality employment can be a significant predictor of desistance. Maruna (2001), for example, identified that gratifying, rewarding, or high quality work was important in women's narratives of desistance. Evidence from Opsal's (2012) qualitative interviews with 43 women released from prison in Denver, Colorado, confirmed that women saw employment as a hook for change. Opsal observed that women were seemingly more able to find work than men after release from prison, though often in low wage, underwhelming, and unfulfilling jobs. Opsal notes that women in her study were most often employed within the information, accommodation and food services, and other services industries. In these industries, "their wages rarely exceeded $7.50 an hour, they never reported having benefits, and they almost never worked full time" (p. 387). While

study participants reported hopeful and positive attitudes about employment in the first interview (despite the low quality of their jobs), by the second and third interviews, many were sufficiently exhausted from the difficulty of maintaining low-wage, poor quality, and instable employment. Given the growing prevalence of justice involvement among women and the lack of evidence about their employment and desistance patterns, this study analyzes industry-based employment for this important subgroup in the hopes of identifying promising industries for women with justice involvement.

### *Age*

Employment and desistance trajectories are most in flux during late adolescence and early adulthood, the time of interest in this study. Following seminal research by Uggen (2001) and others which highlight the importance of examining employment and desistance patterns by age (Krivo & Peterson, 2004; Sampson & Laub, 2003; Wright, Cullen, Agnew & Brezina, 2001), this study examines age-graded effects of job availability and industry-based employment on desistance. Generally, prior evidence suggests that job availability (Schnepel, 2014) and employment have a greater deterrent effect against crime among individuals 25-years-old or older. This finding has been demonstrated in rigorous evaluations of workforce development programs (Siennick & Osgood, 2008; Uggen, 2001) and in observational studies (Laub & Sampson, 2001; Sampson & Laub, 2003). Nevertheless, the specific mechanisms of work that are most important for older workers remain ambiguous, with some studies indicating that job quality is most important (Uggen, 1999) while others indicate that the quantity of jobs is most important (Krivo & Peterson, 2004). Additional research that explores the industry-based employment patterns on desistance among young adults and older adults is needed.

***Race and ethnicity***

As with gender and age, patterns in employment and recidivism vary by race and ethnicity. Many racial and ethnic minorities are overrepresented among justice involved populations and these individuals face multiple layers of discrimination in the labor market (Pager, 2003). Historically, race has also interacted with large labor market shifts, such as during and after deindustrialization when blacks were disproportionately disadvantaged by the closure and relocation of manufacturing jobs to suburban areas (Wang, Mears, & Bales, 2010). To test whether employment opportunities in manufacturing had differential impacts on recidivism by race, Wang et al. used a combination of individual-level data obtained from the Florida Department of Corrections' Offender-Based Information System and county-level data to identify the recidivism patterns (defined as reconviction within two years after release). They used data from 13,272 black male ex-prisoners and 8,648 white male ex-prisoners released from prison between January 2000 and June 2001. Particularly relevant to the current research, Wang et al. (2010) examined whether higher manufacturing employment rates at the county-level were associated with differential recidivism for black and white releasees. The authors predicted manufacturing employment rates to be more important in predicting recidivism among blacks compared to whites and more important for predicting property and drug recidivism compared with violent recidivism. Contrary to their hypotheses, they found that the presence of manufacturing jobs was protective for whites but was not related to recidivism among blacks; further, they found that higher county-level manufacturing job availability had no effect on property or drug offenses for blacks or whites but was associated with reduced recidivism for white violent crime.

Similar to in Wang's research, a study by Bellair et al. (2011) examined how the availability of low-skill employment opportunity in typically willing industries (retail and manufacturing) influenced black and white recidivism rates. The authors concluded that

> African American ex-prisoners residing in neighborhoods with unemployment rates one standard deviation above the mean (roughly 13 percent) and beyond have dramatically larger hazards of returning to prison for committing a new felony relative to whites, whereas African Americans residing in contexts of low (i.e., 1 percent) to mean (6.99 percent) unemployment are not significantly more likely than white ex-prisoners to commit new felonies and be returned to prison (pp. 195–197).

Studies examining the risk of arrest and recidivism for individuals of Hispanic ethnicity are more mixed with older studies primarily showing no difference in risk of arrest, but more recent studies showing Hispanics having an increased risk of arrest compared to non-Hispanic whites (Tapia, 2010). Additionally, Hispanic employment rates are historically lower than whites, in part because Hispanics educational attainment has lagged behind that of non-Hispanics, limiting availability to certain types of employment (Blank, 2001).

In sum, prior research identifies differential patterns in employment and recidivism by race and ethnicity, underscoring the current study's plan to examine effects by race and ethnicity.

### *Offense type*

As highlighted in some of the earlier work cited, offense type may impact both the type of employment individuals are able to get and their likelihood of recidivating (Cerda, Stenstrom, & Curtis, 2015). Evidence suggests that employers are less likely to hire individuals with a history of violent or sexual offenses (Cerda et al., 2015) and are more willing to hire individuals with non-violent offense histories over those with drug histories

(Graffam, Shinkfield, & Hardcastle, 2008; Holzer, Raphael, & Stoll, 2003). Additionally, the extant research on viable job availability and recidivism indicates differential effects by offense history and offense type: first time offenders (Schnepel, 2014; Yang, 2017) and drug offenders (Schnepel, 2014) show greater responsiveness to increases in viable employment opportunity compared to property and violent offenders. Research by Horney, Osgood, and Marshall (1995), Piquero et al. (2002), and Uggen and Shannon (2014) demonstrate that individual employment effects can vary by the type of offense. For example, in Horney et al.'s study, offenders who worked full-time showed lower odds of assault but higher odds of property crime. Piquero et al. (2002) found that white parolees who were employed full-time were less likely to have subsequent violent arrests than were their nonworking counterparts, but they found no effects of work for nonwhite parolees or for nonviolent arrests. In Uggen and Shannon's (2014) study of individuals with histories of substance abuse, employment (and, more specifically, wages) had a differential effect by the types of crimes committed, where higher wages were associated with fewer property crimes but not fewer drug crimes. Collectively, this evidence suggests that job availability and employment may have differential effects depending upon the drivers of individual criminal behavior. To explore whether the effects of industry vary by prior offense histories, this study contains analyses for subgroups based on whether the respondent has committed violent crimes, property crimes, or drug crimes.

## IV GAPS IN KNOWLEDGE & THE CURRENT STUDY'S CONTRIBUTIONS

Identifying industries associated with desistance from crime can inform policymakers and practitioners interested in reducing recidivism and improving public well-being. Existing research evaluating industry-based employment and recidivism is hampered by one or more of the following limitations: (1) use of older data that may not adequately translate to contemporary labor markets; (2) the use of cross-sectional data or longitudinal data with short follow-up periods; or (3) the use of limited measures of industry-based employment or job availability. The current study addresses these limitations and builds on the existing literature in the following ways.

First, this research utilizes a contemporary panel data set to identify modern-day industries that appear promising for people with former justice involvement. Given the relative decline in so-called good jobs available to individuals with prior justice contact over the last few decades, the use of contemporary data is important to identify modern-day lines of work accessible to people with prior justice involvement.

Second, unlike many studies of employment and desistance that use cross-sectional data or data with relatively short follow-up periods (typically ranging from 1–3 years)[22], the current study uses longitudinal data spanning fourteen years. Detailed histories of employment and arrests are used to ensure temporal precedence and assess the effects of industry on desistance over multiple arrest spells. Because the data also include weekly or monthly measures of other important indicators related to employment and desistance, such as educational attainment, occupation, marriage, and the birth of children,

[22] There are exceptions to this such as Sampson and Laub's work and studies using the Glueck and Glueck data; however, there are many differences between the current day labor market and criminal justice experiences of individuals compared to when those data were collected.

the current study is better able to control for important time-varying covariates than previous studies.

Third, this study builds upon prior research on job availability by including both measures of county-level job availability *and* measures of individual employment by industry in an attempt to assess whether greater job availability by industry is related to reductions in recidivism because of increased employment by industry.

Fourth, unlike most studies of recidivism, which focus on individuals released from prison, this study does not restrict the sample to individuals with histories of incarceration. Because arrest is becoming such a common life event (Brame et al., 2012), particularly for African Americans and other marginalized groups, and in light of evidence that the mark of a criminal record matters regardless of whether one is incarcerated or even convicted (Varghese et al., 2010), the current study includes all individuals with at least one prior arrest. By focusing on rearrest among individuals with any previous arrest histories, this study broadens the research base on the most frequently experienced type of justice contact and adds to the study of the growing population of individuals with arrest histories.

Finally, this research defines industries according to the North American Industry Classification System (NAICS)[23], the same system that the government uses in tax policies and in workforce development (education and training) programs. By using the NAICS, this research provides parsimonious and policy-applicable information that government agencies can use to generate jobs in promising industries, encourage employment through targeted tax incentives to employers, or tailor workforce-training

[23] See NAICS frequently asked questions (https://www.naics.com/frequently-asked-questions/).

programs in promising industries. While the current study is not able to make causal claims and acknowledges limitations in the ability to fully estimate selection bias, it describes employment and desistance patterns by industry, and employs within-person analyses to control for unmeasured, time-stable correlates of employment and recidivism, and time-varying covariates to control for other important factors status.

# V. METHODOLOGICAL APPROACH

## 5.1 DATA

This study used the National Longitudinal Survey of Youth 1997 (NLSY97) to measure employment and rearrest, and the Quarterly Workforce Indicators to measure county-level job availability. Each of these data sources is described below.

### *5.1.1 National Longitudinal Survey of Youth 1997*

The NLSY97 is a nationally representative survey of non-institutionalized American youth born between 1980–1984 (United States Bureau of Labor Statistics, 2013). The NLSY97 was designed to examine the transition from school to work. Youth were first surveyed when they were between the ages of 12- and 18-years-old. The survey collects rich information on respondents' work experiences and criminal justice contacts over fifteen waves (1997–2011), making it ideal for an observational study of the relationship between employment and desistance.[24]

The NLSY97 is comprised of two samples: the primary, cross-sectional sample designed to represent non-institutionalized American youth aged 12–16 as of December 31, 1996; and a supplemental sample that oversamples Hispanic and non-Hispanic black youths. In total, there are 8,984 sample members. Among the sampled households, all residents aged 12–16 (as of December 31, 1996) were considered eligible to be a part of the study (including those who were temporarily away at school or college, or in a

[24] A sixteenth wave was released after this study was underway. The sixteenth wave is not included in these analyses.

hospital, correctional facility, or other type of institution).[25] This resulted in the selection of 8,984 respondents from 6,819 unique households (United States Bureau of Labor Statistics, 2003). The initial survey was collected in 1997/1998 and subsequent surveys were collected annually 1997–2011, comprising the first fifteen waves of the study.[26] Response rates remain consistently and impressively high, ranging between a high of 93.3 percent for the first follow-up (1998/1999) and a low of 81.2 percent in round nine (2008/2009) with an average response rate of 86 percent across the first 15 waves (Moore, Pedlow, Krishnamurty, & Wolter, 2000; National Longitudinal Surveys, n.d.). Appendix D1 presents sample sizes and response rates by sample type and gender taken from the NLSY97 online documentation.

Compared to other data sets, the NLSY97 has a number of important advantages for this study. First, very few contemporary longitudinal data sets have such detailed information about employment and criminal justice contact. Other contemporary data sets, such as the Fragile Families data set or the Add Health Study data set, do not contain the information necessary to construct detailed work and arrest histories or ensure temporal precedence. Additionally, few nationally representative panel data sets provide users with event history data (weekly or monthly data constructed based on dates the respondent provides at each round of data). While older panel data sets such as the NLSY79 have rich employment data it only collects information on criminal behaviors in the first wave making it impossible to measure change over time. The NLSY97 also

[25] To select the sample of 8,984 respondents, 75,291 households were screened across 147 non-overlapping metropolitan areas and counties (in non-metropolitan areas).
[26] In 2011, the study moved to a bi-annual survey; the most recently released round of publicly available data (round 16) is from 2013/2014, skipping one year (2012).

contains detailed information about the types of jobs and, more specifically, the industry and occupation of each job. A second benefit of the NLSY97 is that it is a nationally representative sample. While a number of the studies cited use data from a single state or a set of states, the NLSY97 includes representation from 50 states and the District of Columbia.

***Description of data collection***

NLSY97 includes a number of different data collection components; the data used in this study are drawn from the Youth Questionnaire, which was collected from all youth aged 12–17 within the sampled households in 1997/1998. The NLSY97 data collection is designed to capture the transition of youth into adulthood; thus, the Youth Questionnaire focuses on schooling and employment activities, as well as other socioeconomic, familial, and behavioral characteristics. The NLSY97 interviews were conducted in English and Spanish, primarily by field interviewers using laptops with computer-assisted personal interviewing (CAPI) system technology.[27] Questions on sensitive topics such as criminal activity, drug use, and sexual behavior were administered through audio computer-assisted self-interview (ACASI) technology. In the ACASI format, the interviewer provides the respondent with the laptop on which they can read the questions themselves or listen to a recording of someone reading the questions before entering their own

[27]CAPI systems automatically route interviewers and respondents through the survey depending on their responses to previous questions and allow for programming of automated checks within and across rounds of data collection to ensure data consistency. While most data were collected in person using CAPI, a small percent of data were collected by telephone because of the respondent's location or reluctance to be interviewed in-person (BLS, n.d., accessed on February 12, 2016 https://www.nlsinfo.org/content/cohorts/nlsy97/intro-to-the-sample/interview-methods/page/0/4)

responses. The use of ACASI helps increase the quality of the data by reducing social desirability bias associated with an interviewer administered format. The survey generally took 50–60 minutes to administer.[28] Respondents received a small incentive for their participation in each round of the survey.

### *5.1.2 Quarterly Workforce Indicators*

Quarterly Workforce Indicators (QWI) data are compiled by the United Sates Census and made publicly available via a web-based portal called the QWI Explorer (United States Census Bureau Center for Economic Studies LEHD Program, 2012).[29] The QWI provides local labor market statistics by industry, worker demographics, employer age, and size. QWI data are compiled based on linked data from employers and employees through the Longitudinal Employer-Household Dynamics (LEHD), a database with information from all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. While not exhaustive, the LEHD data cover over 95 percent of U.S. private sector employment collected through the voluntary submission of quarterly data by state partners. These state micro data sets are combined with Social Security, federal tax records, and other census and survey data to generate the QWI. Importantly for this study, the QWI data provide county-level labor market statistics by industry and include important worker demographics such as education level. Building on the work of Schnepel (2014) and Yang (2017), this study uses data from 1998 to 2011 to generate

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[28] Based on the survey timings available for rounds 8–15 (https://www.nlsinfo.org/content/cohorts/nlsy97/using-and-understanding-the-data/item-nonresponse-interview-timings)

[29] For more information about the QWI data, see: http://lehd.ces.census.gov/doc/QWI_101.pdf. The QWI explorer (http://qwiexplorer.ces.census.gov/#x=0&g=0) also provides additional documentation and resources.

estimates of "viable" employment opportunity. Capitalizing on the QWI's ability to narrow the estimate of available jobs in a given county to only those requiring a high school diploma or less for entry, this study calculates quarterly county-level measure of viable job availability and applies the county-level values of viable job availability for the previous quarter ($t - 1$) to all weeks in a given quarter.

### *5.1.3 Other Data Sources*

In addition to the NLSY97 and the QWI data, the current study draws upon the following four data sources for county-level information about local labor market conditions, rates of crime, the relative size of law enforcement, and other general socioeconomic indicators such as the percent of the population living in poverty.

1. The Local Area Unemployment Statistics compiled and maintained by the Bureau of Labor Statistics (BLS) (2001), provides indicators of local economic conditions including county unemployment rates. Data from 1996–2011 are used in these analyses.
2. The Uniform Crime Report (UCR) 1996 is maintained by the United States Federal Bureau of Investigation within the Department of Justice and provides data on local crime and arrest rates. This study uses data from 1996 to control for county level crime relative to the county population.
3. The Directory of Law Enforcement Agencies 1996 is compiled by the United States Department of Justice, Office of Justice Programs, Bureau of Justice Statistics (BJS). This study uses these data to control for the size of the police force in a given county relative to size of the county population.

4. The Current Population Survey (intercensal estimates for 1996) produced by the United States Census Bureau, provided the 1996 county-level population used to create the above mentioned ratios of crime and law enforcement presence relative to the county population.

### *5.1.4 Missing data*

Each of the above mentioned data sources had different levels of missing data but across all sources there was less than 10 percent missingness, hence listwise deletion was used for all analyses. This section describes attrition due to missing data according to each data source.

In the NLSY, the key variables of interest (including employment by industry and rearrest status) are available in event history format with nearly full information (less than 7 percent missing data from the analytic sample across all variables of interest). Similarly, a number of the other the key time varying covariates such as marital status, childbirth, and educational credential attainment are provided in monthly arrays, further limiting the missing data issues. In instances where the individual failed to complete their interview in a given year and this data wasn't available from the NLSY constructed arrays, data from the previous completed interview and the next completed interview were used to fill in the gaps, a method Allison (2010) refers to as the "last value carried forward/backward" method. For example, if a respondent was interviewed in rounds 5 and 7 but had missed their interview in round 6, the employment arrays would show the employer identifiers during that time but would be missing characteristics about the job such as the industry and occupation. In these instances, the researcher used the job identifiers to ascertain if the individual still had the same job from prior completed rounds and, if so, whether the

industry and occupation data was consistent in the prior and latter waves. If the industry and occupation stayed consistent in rounds 5 and 7, this information was used to fill in the missing industry and occupation data in round six. If the individual had conflicting data in rounds 5 and 7, the carry forward method was not used to fill in missing data.[30] In the less than 1 percent of instances that that industry or occupation data was "uncodable," the data were left as missing.

For the QWI, there was systematic missing data because some states didn't start contributing data until later in the study period; however, this only affected approximately 3 percent of cases and resulted in the loss of roughly 5 percent of rearrests (n = 128 arrests from 99 individuals). For a summary of the availability of data and the subsequent missingness of QWI data by state, see Appendix E1. Given the relative completeness of the data, no adjustments were made to QWI data.

Finally, the county-level data sources used to estimate the relative size of the police force, the crime rate, and the arrest rate all had such small amounts of missing data (<1%) that no adjustments were needed.

## 5.2 Analytic Sample

Because the current study investigates the employment and desistance patterns of individuals with previous justice contact, the study sample is restricted to working age individuals (age 18 and older) who have at least one prior arrest. In addition to restricting the sample by age and arrest status, the analytic sample excludes 92 individuals who were

[30] To test whether the "carry forward" method biased the results, supplementary analyses were performed in which cases with missing data were excluded from the analyses. The results remained the same suggesting that the carry forward method did not bias the findings.

out of the labor force for the entire observation period and 14 individuals who were missing data on one or more variables for all weeks they were in the sample. Individuals not working in any given week remained in the analytic sample. Lastly, the analytic sample excludes person-weeks where the industry or occupation was "uncodable" (n= 52,057 person-weeks). Of the 8,984 individuals in the NLSY97 sample, 3,018 experienced one or more arrest. Of those, 2,914 individuals had at least one job and complete information across the NLSY, QWI, and other county-level data sources used.

While the NLSY data are typically structured by survey round or year, the current study transformed the data longwise by week so that each observation (row) represents a person-week, totaling 1,441,566 person-weeks (*NT* = 1,441,566) spanning across 14 years (1998–2011). There were 782 weeks in the study period and individuals contributed an average of 284 weeks each (with a range of 1 week to 728 weeks). Capitalizing on the fact that many individuals experienced more than one arrest, this study includes all non-custody spells—or time between arrests where in individual is not incarcerated. Of the 2,914 individuals in the sample, 1,977 were rearrested at some point over the study period and they experienced 2,588 total arrests.

## 5.3 MEASURES

This section describes the key measures included in the analysis; this information is also summarized in Appendix F1.

### *5.3.1 Dependent Variable*

The primary outcome in this study is rearrest; more specifically, this analysis models the probability of rearrest for individuals with at least one prior arrest. In each

interview sample members were asked "*[Since [date of last interview] have you /Have you ever]] been arrested by the police or taken into custody for an illegal or delinquent offense (do not include arrests for minor traffic violations)?*" This question and the accompanying arrest dates were used to create a binary indicator for whether in individual was rearrested in any given week.

### *5.3.2 Independent Variables*

There are two sets of independent variables in this study: (1) industry-based employment; and (2) viable job availability by industry. For the purposes of this study, industries are defined according to the 2002 NAICS.[31] Each of these independent variables is described below.

*Industry-based employment.* Measures of industry-based employment were constructed according to prior literature demonstrating that, when employed, individuals with previous justice contact are most often employed in one of the following industries: (1) construction; (2) administrative and support and waste management and remediation services (administrative and waste management); (3) manufacturing; (4) retail trade (retail); (5) accommodation and food services (food services); (6) other services except public administration; and (7) transportation and warehousing.[32] Employment in each of

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[31] There are a number of ways to classify industries and multiple taxonomies exist; some examples include the International Standard Industrial Classification of All Economic Activities (ISIC) which was developed by the United Nations in 1994 and the Standard Industrial Classification (SIC) which was developed by the U.S. Government and was later revised to become the North American Industry Classification System (NAICS) in 1997. The NAICS was created and is maintained by the Bureau of Labor Statistics in order to track, monitor, and report on the labor market.

[32] The food services industry was the reference category in the regression models unless otherwise specified.

these industries in a given week ("industry at *t*") is measured using a set of seven binary variables. This analysis also included binary variables for (8) unemployed and (9) "other industries" which included anyone employed in one of the thirteen other industries not typically willing to hire people with prior justice contact.[33]

Industry of employment was collected from respondents age 14-years or older based on questions about the "kind of business or industry" (or, if the respondent was confused by the question, the interviewer asked, "what did you make or do where you worked?"). Using the answers to these questions, survey staff then coded each employer's industry based on the NAICS. Industry measures include formal employment and informal or "off-the-books"/ "under-the-table" employment. This is important because many individuals with prior justice contact find work in the informal labor market and not capturing this work would paint an incomplete picture of their employment experiences.

*Viable job availability **across** willing industries.* Borrowing from Schnepel's (2014) conceptualization of "viable" job availability, this study utilized the Quarterly Workforce Indicators (QWI) to calculate two types of quarterly measures of new hires in a given county, relative to the working age population in that county. The first measure, *viable job availability across typically willing industries,* is a ratio of viable new hires in willing industries in the previous quarter (job availability *across* willing industries at "*t* - 1") relative to the working age population in that county. This was calculated by summing counts of new hires in jobs requiring no more than a high school degree across the seven

[33] The "other industries" category captures employment in any of the 13 industries beyond the seven typically willing industries; these include Agriculture, Forestry, Fishing and Hunting; Mining; Utilities; Wholesale trade; Information; Finances and Insurance; Real Estate and Rental Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; and Public Administration.

industries most likely to hire people with prior justice contact (pooled by county and quarter), dividing this sum by the number of working age residents in the county, and multiplying that figure by 1,000 to get an estimate of viable new hires per 1,000 working age individuals in a county.

The second measure, *viable job availability **by** willing industry*, includes county-level measures of new hires for each of the seven industries most likely to hire people with prior justice contact and a seventh measure of viable jobs in the other thirteen less willing industries. Similar to the other measure of viable job availability, these measures are restricted to jobs requiring no more than a high school degree, they are measured at "*t* - 1" (meaning the previous quarter), and they are proportionate to the working age population in that county.[34]

### *5.3.3 Moderators*

Because work and criminal justice involvement vary for different subgroups, this study includes the following variables as moderators: gender (male is the reference group), a binary variable indicating if respondent is over or under 25-years-old (under 25 is the reference group); race and ethnicity (non-Hispanic black, non-Hispanic white, Hispanic, and other race or ethnicity; non-Hispanic black is the reference group); and offense type (three binary variables equal to 1 if the respondent ever reported committing a property crime, a drug crime, or a violent crime).

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[34] The author ran supplementary analyses with concurrent measures of job availability (meaning job availability at time "*t*" rather than "*t* - 1"); the results remained the same.

### *5.3.4 Control Variables*

This study includes individual-, county-, and state-level controls related to employment and desistance as well as a time trend. Importantly, individual fixed effects models control for all time stable characteristics such as race, ethnicity, gender, pre-arrest characteristics such as prior education and work history, and indicators of prior offense history including age of first arrest. Additionally, the following time-varying controls are included in all models (unless otherwise specified).

***Individual-level controls.*** This study includes controls for age (continuous-measured weekly), education level (categorical-measured monthly), marital status (categorical-measured monthly), whether the individual has children (binary-measured monthly), number of previous arrests (continuous-measured monthly), cumulative count of self-reported crimes (continuous–measured by round), whether they have ever been incarcerated (binary-measured monthly), whether they are currently employed in more than one job (binary–measured weekly), their work history (continuous-cumulative weeks worked measured weekly), and their current occupation (binary–measured weekly) which was coded according to methods used by Uggen (1999) and includes the following occupational categories: (1) professional and technical; (2) managerial and administrative; (3) sales; (4) clerical; (5) craft; (6) operative; (7) laborer; and (8) service.

***County-level controls.*** In order to control for county-level factors that may affect employment and the likelihood of rearrest, this study includes time-varying covariates for median household income, the percent of the population in poverty, and the unemployment rate. This study also included three per capita criminal justice indicators measured in 1996: the crime rate, the arrest rate, and the relative size of the police force.

This study did not include time-varying rates of the criminal justice variables to avoid the problems of endogeneity and over controlling for factors related to the dependent variable.

***State-level controls.*** Because state-level laws, regulations, and general economic conditions can influence employment and desistance, state dummy variables are included in all models.

***Control for time.*** All models include a series of dummy variables to control for year and a cubed measure of "street time," or time when an individual is not incarcerated and is at risk of rearrest.[35] A central aspect of modeling time is establishing an "origin" time or the point of entry into the sample. In the current study, the origin time is based on the date of the most recent arrest or, if incarcerated, the date of release from incarceration. The origin time is determined based on the following survey question, asked in each wave of data collection of anyone who reports an arrest: *"What [month/year] was your most recent arrest?"*[36] Based on the date of their most recent arrest, their time variable starts and counts the weeks an individual remains arrest-free. Time references the weeks since an individual's most recent arrest; hence $t=0$ references the week of the most recent arrest, $t<0$ references all weeks before the most recent arrest and $t>0$ refers to all weeks after the most current arrest (before the next arrest).

In accordance with prior research, this study subtracts out time spent incarcerated because respondents are not at risk of rearrest during that time. Not adjusting the origin

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[35] Log and multiple polynomial transformations were evaluated using Stata Corps' *two-way lpoly* and *marginsplot* commands. As displayed in Appendix G1, the cubic transformation (c) of time was the smoothest while fitting the most data points compared with the log (a) and squared (b) transformations of time.

[36] Because the day is not collected, this study used the 15th as the date of release. This should not significantly bias the results.

time in this way would overestimate an individual's desistance (Eggleston, Laub, & Sampson, 2004). If a respondent is incarcerated following their arrest, the start of their next "non-custody spell" (or street-time at risk of rearrest) begins upon their release from jail or prison. The NLSY97 contains monthly incarceration status arrays which indicate spells in jail or prison for respondents 12-years-old or older. The monthly arrays are based on the following questions: "*Since [date of last interview], /Have you ever been sentenced to spend time in a corrections institution, like a jail, prison or a youth institution like a juvenile hall or reform school or training school or to perform community service?*" and, if so, "*what month/year did you first serve time in a jail or a corrections institution?*" and "w*hat [month/year] were you released from that sentence to jail or a corrections institution?*"

## 5.4 Analytic Approach

There are many factors beyond industry of employment that influence whether one recidivates. Without an experimental design, it is nearly impossible to ensure that differences between recidivists and non-recidivists are attributable to predictor variables rather than underlying differences between the two groups. In attempt to minimize the influence of unobserved, time-stable characteristics that correlate with employment and criminal propensity such as self-control, this study uses individual-level fixed effects models where individuals act as their own controls.[37] To help ensure temporal precedence, this study employs discrete-time hazard models and includes a number of

[37] Siennick and Osgood (2008) note, "analyses of within-individual change provide a much stronger control for selection processes than the standard regression or covariance adjustment for prior measures of an outcome (Allison, 1990)… analyses of within-individual change provide a valuable means of strengthening analyses on the effects of role transitions on crime" (p. 169).

time-varying covariates to control for known correlates of employment and desistance. Additionally, this study uses restricted use data with county identifiers, which enable the inclusion of county-level controls for differential policing, access to resources, and exposure to crime.

As summarized in Appendix F1, Model A1 will include indicators for employment by industry and time-varying controls to examine whether employment in specific industries is associated with a reduced likelihood of rearrest for individuals with at least one prior arrest. To compare across industries, the analysis will include pairwise comparisons adjusted for multiple comparisons using a Bonferroni adjustment. Model B1 will include time-varying covariates and a single independent variable that measures the job availability across typically willing industries to assess whether greater availability of viable employment across typically willing industries is associated with a reduced risk of rearrest. To assess whether greater job availability in particular industries is associated with a reduced risk of rearrest, Model B2 will include time-varying controls and seven independent variables measuring the proportion of viable new hires relative to the working age population in the county for each of the seven industries most likely to hire people with prior justice contact.

Models C1 and C2 combine industry-based employment with viable job availability across willing industries (C1) and viable job availability by willing industry (C2). Similar to in Model A1, the analysis will use Bonferroni-adjusted pairwise comparisons to assess differences by industry of employment. Models D1 through G2 examine how industry-based employment and job availability relate to risk of rearrest for important subgroups. More specifically, Models D1 and D2 examine results for males

and females; Models E1 and E2 break out the results for those under age 25 and those 25-years-old or older; Models F1 and F2 examine the relationship by race and ethnicity; and Models G1 and G2 examine the results by primary offense type (property, drug, violent crimes). Across these subgroup analyses, models D1, E1, F1, and G1 include indicators for industry-based employment and viable job availability *across* willing industries while models D2, E2, F2, and G2 include indicators for industry-based employment and viable job availability by industry.

# VI. RESULTS

## 6.1 DESCRIPTIVE STATISTICS

The descriptive statistics presented in Table 2 include 2,914 individuals and 1,441,566 person-weeks. Across all person-weeks, the average age is 24-years-old, with a range in age between 18- and 32-years-old. The majority of the sample is comprised of males (69 percent). A little less than half of the sample are white, non-Hispanic (46 percent), about a third are black, non-Hispanic (30 percent) and less than a quarter are Hispanic (21 percent). Most are never married (79 percent) and a little more than half have children (54 percent). The majority of person-weeks were contributed by individuals who had a high school diploma or GED (64 percent), or some post-secondary education (9 percent); a little more than a quarter of the person-weeks were contributed by individuals who lacked a high school degree or GED (27 percent). The analytic sample includes observations from all 50 states and the District of Columbia but the sample clustered in a subset of 20 states (not shown in table).

*** Table 2 here ***

Because analyses of within-person change require sufficient variation or change over time, Table 2 shows the percentage of individuals and the percentage of person-spells who experienced change on each variable across the reference period (each new arrest marks a new spell so a single individual can contribute multiple spells to the analytic sample). The rightmost columns in Table 2 indicate that about a third of individuals experience a change in marital status (from never married to married), a little more than

half have their first child, and slightly less than half of individuals experience a change in their education status over the reference period.

### *6.1.1 Arrests and criminal behavior*

As one would expect when looking at a sample comprised of individuals with at least one arrest, there is a fair amount of crime reported across person-weeks. More than half of the analytic sample had an arrest prior to their eighteenth birthday (55 percent) with the average age of first arrest hovering around 17-years-old. Across all person-weeks, the sample had an average of 1.94 arrests, but some individuals were arrested as many as nine times. Sixty-six percent of weeks were contributed by individuals who were rearrested at least once. Approximately 59 percent of person-weeks were contributed by individuals who experienced one or more convictions, and approximately 19 percent of person-weeks were contributed by individuals who were previously incarcerated. In terms of self-reported criminal behavior, half of the sample reported the commission of property crime (52 percent of person-weeks), and drug crime (21 percent of person-weeks), while a smaller proportion reported committing violent crimes (14 percent of person-weeks). Finally, non-custody spells—or time between arrests—lasted an average of 231 weeks and ranged between 1 and 728 weeks.

### *6.1.2 Employment*

The second page of Table 2 presents descriptive statistics on employment experiences and work characteristics for the analytic sample. Across the analytic sample, there is a clear pattern of high unemployment and under-employment. Only 61 percent

of person-weeks were contributed by individuals who were employed.[38] When employed, individuals only worked an average of 18 hours per week, compared to the national average of around 38 hours per week during the study period (OECD, 1997-2011). The analytic sample's average earnings (slightly less than $8/hour) and median earnings ($7.00) were low compared with national averages which ranged between $12.29 and $19.58 over the study period (United States Bureau of Labor Statistics). When employed, the sample was employed in more than one job in approximately 10 percent of person-weeks. Women, individuals younger than 25-years-old, and whites were more likely to be employed in more than one job in any given week. This aligns with what is known about the part-time labor force in general.

***Industry***

Figure 2 displays the distribution of employment across industries for the analytic sample. Roughly 60 percent of all employment within the analytic sample was in the seven industries typically willing to hire individuals with prior justice contact. Within the seven typically willing industries, the majority of employment was clustered in the food services industry (19 percent), the retail industry (14 percent), and the construction industry (13 percent). A notable portion of employment clustered in industries other than those typically willing to hire people with prior justice contact (40 percent), primarily concentrated within the health care and social assistance and the management of companies and enterprises industries.

[38] As a point of reference, this is 8 percent less than working-age individuals without arrest records.

*** Figure 2 here ***

As mentioned earlier, individuals' selection into industries is not random. Table 3 displays the average characteristics of the people employed in each of the seven typically willing industries and the "other industries" category (see Appendix H1 for graphical representation of the information presented in Table 3). Not surprisingly, industries vary considerably in terms of their composition by gender, age, race, and ethnicity. Construction, transportation and warehousing, manufacturing, and administrative and waste management are all male dominated industries with a slightly older workforce compared with the food services and the retail industries which tend to employ more females and have a slightly younger workforce. The people that comprise the "other industries" category are, on average, older, better educated, and less likely to be black or Hispanic. People employed in manufacturing and construction were less likely to hold multiple jobs compared to the other typically willing industries. This variation in demographic characteristics by industry illustrates differential selection into industries and the importance of controlling for this in the regression models as much as possible.

*** Table 3 here ***

Figure 3 illustrates the bivariate relationship between employment in willing industries and risk of rearrest, pooling across all time points. The graph shows the odds ratio (*OR*) of rearrest for each of the seven typically willing industries as well as the risk of rearrest for the "other industries" category. Overall, employment in the retail and food services industries was associated with higher odds of rearrest while employment in construction and the "other industries" category was associated with lower odds of

rearrest. More specifically, relative to not being employed, employment in retail (*OR* = 1.26; $p < .05$) or food services (*OR* = 1.21; $p < .05$) was associated with an increased risk of rearrest while employment in the "other industries" category (*OR* = .82; $p < .05$) was associated with a reduced risk of rearrest. Pairwise comparisons and contrasts adjusted for multiple comparisons (using a Bonferroni adjustment) revealed that employment in construction and the "other industries" category was associated with reduced odds of rearrest relative to employment in the retail industry and the food services industries. These bivariate results align with theoretical and empirical evidence that low-wage, part-time work may increase risk of rearrest and that higher paying, more stable work may be related to increased chances of desistance.

*** Figure 3 here ***

***Occupation***

As highlighted earlier, occupation is an important correlate of industry. Figure 4 displays the distribution of employment by occupation for the analytic sample. The vast majority of employment is clustered within service occupations (27 percent). The following describes the distribution of work across occupation categories and provides examples of common occupations in that category. Occupation categories are listed from the most common to least common across the sample:

- *Service workers* made up 24 percent of the sample. Common occupations included "food service workers," such as chefs and wait staff; "cleaning attendants," such as janitors and grounds maintenance workers; and "personal care and service workers," such as childcare workers and personal home care aides.

The rest of employment was distributed evenly across the remaining seven occupational categories:

- *Professional and technical* (12 percent), for example "nursing" or "psychiatric/home health aide";
- *Operative* (12 percent), for example "industrial truck and tractor operator";
- *Sales workers* (11 percent), for example "cashier";
- *Clerical workers* (11 percent), for example "stock clerks";
- *Managerial and administrative workers* (10 percent), for example "food service managers";
- *Craft workers* (9 percent), for example "automotive service technicians";
- *Laborers* (9 percent), for example "construction helpers."

*** Figure 4 here ***

Figure 5 illustrates the bivariate relationship between occupation and rearrest controlling only for time. Relative to not being employed, employment in professional/technical occupations ($OR$ = .67; $p$ < .01) and managerial/administrative occupations ($OR$ = .74; $p$ < .05) was associated with a decreased risk of rearrest. Similarly, pairwise comparisons using a Bonferroni adjustment for multiple comparisons showed that employment in professional/technical and managerial occupations was associated with lower odds of rearrest compared to employment in sales, laborer, or service occupations. Again, these results align with theory because the professional/technical and managerial/administrative occupational categories have higher occupational prestige, benefits, and pay relative to operative, laborer, and service occupational categories.

*** Figure 5 here ***

***Overlap of industry and occupation***

To get a better sense of how industry and occupation overlap, Figure 6 displays the distribution of occupation for each of the seven typically willing industries as well as for the "other industries." The distribution of occupation varies considerably by industry. In administrative and waste management for example, 71 percent of employment clusters within the service occupation. Similarly, 79 percent of employment in construction is clustered within two occupation categories (craft (53 percent) and laborer (26 percent)).

*** Figure 6 here ***

In other industries, occupation is more dispersed, such as in the transportation and warehousing industry and the manufacturing industry where no single occupation makes up more than 34 percent of the employment within that industry. See Table 4 for a summary of the distribution of occupations in each industry.

*** Table 4 here ***

Across all of the employment indicators described above, there is a moderate amount of change over time (shown in the rightmost columns of Table 2). Retail, food services, and the "other industries" categories experience the most change over time (all above 50 percent) while the administrative and waste management and transportation and warehousing experience the least amount of change over time (under 20 percent). For graphical depictions of changes across industries among the employed and among all person-weeks including weeks individuals were unemployed, see Appendix I1. The

length of each bar represents the overall amount of change by industry and the color-coded stacked bars illustrate the patterns in change. For example, in Appendix I2 the "others industries" category (bottom bar) experiences the most change; when individuals move into or out of this industry, they are most likely to move to or from food services (dark blue portion of bar) or retail (orange portion of bar).

### *6.1.3 Viable job availability*

Table 5 presents descriptive statistics of viable job availability across typically willing industries, for each willing industry, and across the less willing industries. On average, summing across typically willing industries in a county-quarter, counties gained approximately 27 new viable jobs per 1,000 working age individuals, although this number ranges from less than 1 to 104 viable new hires per county-quarter. When looking at the job availability by typically willing industry, the industries with the greatest average numbers of new hires were administrative and waste management (mean ($M$) = 6.5; standard deviation ($SD$) = 4.70) and food services ($M$ = 5.8; $SD$ = 3.68). The fewest new hires per county-quarter were in the other services ($M$ = 1.5; $SD$ = .78) and transportation and warehousing ($M$ = 1.5; $SD$ = 1.14) industries. Meanwhile, across the 13 industries less likely to hire individuals with prior criminal justice contact, there were an average of 12 new hires per 1,000 working age individuals in a county-quarter.

*** Table 5 here ***

Across all the industries, the number of viable new hires changed frequently over time as indicated by the rightmost columns; however, the size of this change was small

and is illustrated by the box plot graph displayed in Figure 7 which shows the relative restricted distribution of job availability in the typically willing industries compared to the "other industries" category.

*** Figure 7 here ***

Figure 8 shows the relationship between living in a county with high viable job availability and rearrest. High viable job availability was defined as equal to one if the number of viable new hires in a given county-quarter was higher than the median number of new hires in that industry. As shown in Figure 8, the odds of rearrest are significantly higher for individuals living in counties with high job availability in the construction, manufacturing, and retail industries. Meanwhile, high job availability in the food services and transportation and warehousing industries appears to be negatively associated with rearrest.

*** Figure 8 here ***

## 6.2 Regression results

This section presents the significant results of the main analyses, organized by research question. All analyses use discrete-time hazard models with individual-level fixed-effects and clustered standard errors. Results can be interpreted as changes in the probability of rearrest associated with changes in industry of employment or job availability holding covariates at their means. Individual fixed-effects models inherently control for time-stable, within-person characteristics and all models also include the following time-varying controls (unless otherwise specified): (1) individual-level

characteristics including respondent's age, marital status, whether they had a child, their education level, occupation, whether they worked in multiple jobs in a given week, number of prior arrests, whether they have ever been incarcerated or used hard drugs and a cumulative measure of self-reported crime; (2) county-level characteristics including 1996 crime rate, arrest rate, and ratio of sworn officers per county population, unemployment rate, median household income, and percent of households in poverty; (3) a control for state of residence; and (4) controls for year and length of the current non-custody spell.

### *6.2.1 Industry-based employment and rearrest*

This study aims to understand if employment in specific industries is associated with a reduced likelihood of rearrest for adults previously arrested. Across the full sample, holding controls at their means, employment in construction was associated with lower odds of rearrest relative to employment in food services (Figure 9). More specifically, a switch from working in food services to working in construction was associated with 37 percent lower odds of rearrest (Table 6). Pairwise comparisons using a Bonferroni adjustment for multiple comparisons found no other statistically significant differences in the likelihood of rearrest by industry of employment; however, working in construction, food services, and the "other industries" category were all significantly better than being unemployed. For example, a shift from working in the construction industry to being unemployed was associated with 51 percent higher odds of rearrest. Conversely, the odd of rearrest when employed in the administrative and waste management, manufacturing, retail, services, or transportation and warehousing industries were not significantly different from the odds of rearrest when unemployed.

*** Figure 9 here ***

As shown in Table 6, a number of other individual-level factors were significantly related to recidivism risk, including changes in education status, marital status, incarceration history, and the number of prior arrests. More specifically, acquiring post-secondary education was associated with lower odds of rearrest. Likewise, getting married was associated with 47 percent lower odds of rearrest. These findings are congruent with human capital and social control theories, which posit that education and marriage can aid in desistance. Similarly, and in keeping with theory and prior research on desistance, each subsequent non-custody spell after an arrest was negatively related to the odds of rearrest.

*** Table 6 here ***

Change in incarceration status was the single strongest predictor of rearrest, where individuals who were incarcerated for the first time had 13 times greater odds of rearrest upon release compared to those who had never been incarcerated. This aligns with research showing the negative and criminogenic effects of incarceration, particularly for young adults. Meanwhile, each additional self-reported criminal behavior was associated with a 1 percent increase in the odds of rearrest. Age was positively associated with rearrest in this and subsequent models, a result that runs counter to expectations. Upon further investigation, this trend was the result of a strong correlation between age and the number of prior arrests. If the number of prior arrests was excluded from the model, the age coefficient behaved as expected based on prior research. Because theory suggests that

age and criminal history are important correlates of future crime, both variables were retained in the analysis.

### *6.2.2 Viable job availability and rearrest*

The second research question of this study concerned whether the availability of viable employment in typically willing industries was related to rearrest. This study took two approaches to answer this question and the results of each are displayed in Models B1 and B2 of Table 7. The first approach was to measure *viable job availability across typically willing industries*—defined as the proportion of new hires in jobs requiring no more than a high school degree, relative to the working age population in that county (pooling across typically willing industries). In the second approach, the model included measures of *viable job availability by willing industry* for each of the seven industries most likely to hire people with prior justice contact. Both models included all individual, county, and state controls as well as controls for time, but excluded industry and occupation variables in order to mirror prior research and assess the independent relationship of viable job availability and rearrest for the full sample.

*** Table 7 here ***

As shown in Model B1, the pooled measure of viable job availability across willing industries was not related to risk of rearrest. This result aligns with prior research by Schnepel (2014) and Crutchfield and Pitchford (1997) which found a null relationship between binary measures of low-skilled employment opportunity and recidivism.

In the second approach, measures of *viable job availability by willing industry* were also not significantly related to rearrest (displayed in Model B2 of Table 7). This

result clashes with the strong and positive effect of job availability in construction, manufacturing, and transportation and warehousing identified within Schnepel and Yang's research. As is described in the section on sensitivity analyses, the difference in results is likely because the current study includes individuals with less serious criminal backgrounds while the extant literature is based on people with more serious backgrounds (prison releasees).

### *6.2.3 Industry-based employment and viable job availability*

Models C1 and C2 of Table 8 bridge the first and second set of analyses to assess the extent to which these results hold when job availability and individual employment are included in the same model. In the combined models, the story remained the same—working in the construction industry was associated with lower odds of rearrest compared with working in food services or being unemployed, while neither measure of job availability was related to rearrest for the full sample. As in the models without the job availability measures, working in construction, food services, and the "other industries" category were all associated with significantly lower odds of rearrest relative to being unemployed.

*** Table 8 here ***

### *6.2.4 Variation by subgroups*

Tables 9 through 12 present results from subgroup analyses by gender, age, race and ethnicity, and offense history. Unless otherwise noted, all models use individual fixed-effects and include individual-level and county-level controls along with controls

for year and length of the current non-custody spell. State was excluded from the subgroup analyses as the sample sizes were too small for the models to converge. Results can be interpreted as changes in the probability of rearrest associated with changes in industry of employment or job availability holding covariates at their means.

***Gender***

Table 9 presents the regression results by gender. Across all models for males, employment in the food services industry was associated with significantly higher odds of rearrest compared to working in construction, other services, or in a job within the "other industries" category. For example, among males, a shift from working in food services to construction was associated with 42 percent lower odds of rearrest (Model D2). Meanwhile, males employed in service occupations had 37 percent lower odds of rearrest, compared to males who were unemployed. Interestingly, in models that only included occupation without industry (not shown), the coefficient of service occupation decreased substantially and was no longer significant suggesting that, for males, the relationship between occupation and rearrest varies by industry. Lastly, neither measure of viable job availability was significantly related to rearrest for males.

*** Table 9 here ***

For females, odds of rearrest did not significantly differ by industry of employment or availability of viable jobs. While working in food services was associated with higher odds of rearrest for males, this pattern did not hold for females (Figure 10). In fact, Bonferroni adjusted pairwise comparisons demonstrate that, among females, the administrative and waste management and food services industries were the only two

industries that were significantly different from being unemployed. For example, a shift from working in food services to unemployment was associated with 99 percent higher odds of rearrest for females. Meanwhile, a shift from administrative and waste management to unemployment for females (not shown) was associated with 139 percent higher odds of rearrest.

*** Figure 10 here ***

Additionally, two other employment related variables are of note for females. First, females employed in more than one job in a week have 87 percent higher odds of rearrest compared with females who are unemployed or employed in one job in a given week. As mentioned in the descriptive statistics, women make up the majority of individuals in the analytic sample who work multiple jobs and the positive relationship to rearrest aligns with what is known about the stresses of working part-time in multiple low-wage jobs. Second, although only marginally significant in the models that include industry, being employed in a clerical occupation was associated with reduced risk of rearrest for females. In models that only include occupation and exclude industry (not shown), clerical occupations were significantly associated with 46 percent lower odds of rearrest, relative to being unemployed.

***Age***

Table 10 presents the regression results for those under 25-years-old and those 25-years-old or older.[39]

*** Table 10 here ***

Similar to the full sample and males, young adults employed in food services had higher odds of rearrest than those working in construction and lower odds of rearrest than the unemployed (Figure 11). More specifically, a shift from working in food services to working in construction was associated with 40 percent lower odds of rearrest while a shift to unemployment was associated with 43 percent higher odds of rearrest for those under 25 (Table 10). Bonferroni adjusted comparisons show that working in construction for those under 25-years-old is also associated with lower odds of rearrest relative to working in manufacturing.

*** Figure 11 here ***

Meanwhile, higher job availability in the construction industry was associated with a small but significant increase in the probability of rearrest for those under 25, where each additional construction job per 1,000 working age individuals in a county-quarter was associated with a 4 percent increase in the odds of rearrest. This finding is hard to interpret given the positive effect of working in construction for this age group. It is likely

[39] These two subgroups by age are not mutually exclusive over time. For example, an individual who enters the sample at age 24 and experiences their last rearrest at age 26, will contribute some weeks to the "under 25" groups and some weeks to the "25 and older group." The analytic sample includes 786,254 person–weeks contributed by individuals under 25 and 655,312 person-weeks contributed by individuals over 25-years-old.

that counties with high numbers of construction jobs have other characteristics that lead to higher rates of rearrest; however, this study is not able to make inferences about such unmeasured factors. No other job availability measures were significantly related to rearrest for those under age 25, which aligns with prior literature that shows those under 25 are not affected by fluctuations in job availability by industry (Schnepel, 2014).

Supplementary analyses of occupation for young adults revealed that although occupation was not predictive of rearrest in any of the models that included industry, if industry was excluded, being employed in a managerial occupation was associated with an increased probability of rearrest for individuals under age 25. After adding industry to the model, managerial occupations were no longer significantly related to rearrest, suggesting a differential relationship by industry. Descriptive analysis revealed that most of the person-weeks where young adults were employed in managerial occupations were within the food services and retail industries. While employment in these industries was not significantly related to rearrest, both were directionally indicative of an increased risk of rearrest. Given the clustered nature of managerial occupation holders in these higher risk industries, perhaps this is one reason why managerial occupations appear significantly related to rearrest when industry is not included in the model.

For those 25-years-old or older, no industries were significantly associated with rearrest but greater job availability in the other services industry and the administrative and waste management industry were associated with a reduced probability of rearrest. Each additional new hire in the other services industry (per 1,000 working age individuals in the county-quarter) was associated with a 25 percent decrease in the odds of rearrest. Furthermore, each additional new hire in the administrative and waste management

industry (per 1,000 working age individuals in the county-quarter) was associated with a 6 percent decrease in rearrest. Overall, these results suggest that older workers may be more impacted by fluctuations in job availability than younger workers. This aligns with prior literature which found greater effects for older workers and null effects for those under 25-years-old (Schnepel, 2014).

***Race and ethnicity***

Table 11a and Table 11b present regression results by race and ethnicity. Disaggregation of the results by race shows that the relationship between industry, job availability, and rearrest differs for blacks and whites.

*** Tables 11a and 11b here ***

For blacks, employment in the retail industry was associated with significantly higher odds of rearrest relative to being employed in the food services industry (Figure 12).

*** Figure 12 here ***

As shown in Table 11a, a shift from a job in food services to a job in retail was associated with 97 percent higher odds of rearrest. These effect persisted when job availability by industry was added to the model (Table 11b). Furthermore, Bonferroni-adjusted comparisons demonstrate that the odds of rearrest were higher when blacks worked in retail than when they were unemployed (not shown) where a shift from being unemployed to working in retail was associated with 145 percent higher odds of rearrest. Descriptive analysis of these unexpected results revealed that the inclusion of occupation in the model was an important part of the larger story. Supplementary analyses presented in Appendix

J1 show two models: the first contains industry without occupation, and the second contains both industry and occupation. In the industry only model (left column), employment in the "other industries" category was significantly associated with a reduced likelihood of rearrest, and the retail industry was positively related to rearrest but only marginally significant. After adding occupation (right column), the "other industries" category was no longer significant and the coefficient for employment in the retail industry increased dramatically and became significant. This suggests a differential relationship between industry and rearrest that is dependent upon occupation. Research on the employment experiences of blacks in the retail industry may help to explain this finding. According to a 2015 report on the topic, 17 percent of black retail workers lived below the poverty line, compared to 9 percent for the retail workforce overall. Blacks are also underrepresented in management and supervisory occupations within retail and they are paid less on average, than their white peers in similar occupations (Ruetschlin & Asante-Muhammad, 2015). When only occupation is included in the model, employment in service occupations was the only significant association with rearrest. Because employment generally clusters within service occupations (across all racial and ethnic groups), this significant relationship may be more indicative of the positive impact of employment for blacks generally, rather than a particular significance of service occupations for blacks. Overall, these descriptive analyses do not explain how or why the retail industry is associated with an increased risk of rearrest for blacks, but they did reveal a more nuanced interplay between industry and occupation for this population.

A second unexpected finding was that blacks who lived in counties with high job availability in the retail industry had a reduced probability of rearrest, even after

controlling for individual employment by industry and occupation (Table 11b). More specifically, each additional new hire in the retail industry (per 1,000 working age individuals in the county-quarter) was associated with a 9 percent decrease in the odds of rearrest for blacks. It is unclear how to interpret the finding that increased job availability in the retail industry was associated with a reduced risk of rearrest for blacks, while actually working in retail was related to increased odds of rearrest for the same group. It is likely that living in a county with a greater number of retail jobs has other correlates beyond increased employment in retail jobs, and perhaps those unobserved variables underlie the correlation between increased retail jobs and decreased recidivism.

For Hispanics, relative to working in food services, working in other services was associated with 143 percent higher odds of rearrest while greater job availability in the other services industry was related to reduced odds of rearrest; each additional new hire in the other services industry (per 1,000 working age individuals in the county-quarter) was associated with a 31 percent decrease in the odds of rearrest for a Hispanic individual. Conversely, each new hire in the administrative and waste management industry (per 1,000 working age individuals in the county-quarter) was associated with a 5 percent increase in the odds of rearrest for a Hispanic individual.

Lastly, for white non-Hispanics, similar to for males, working in construction was associated with lower likelihood of rearrest while working in food services was associated with higher likelihood of rearrest (Figure 12). For example, among whites, a shift from employment in the food services industry to the construction industry was associated with 44 percent lower odds of rearrest. Whites working in food services also had significantly greater odds of rearrest compared to working in the other services industries. Whites also

had an increased risk of rearrest when living in counties with higher job availability in the construction industry. More specifically, for each additional construction new hire per 1,000 working age individuals in a county-quarter, the odds of rearrest increased by 6 percent for whites.

***Offense history***

Tables 12a and 12b present the regression results by offense history defined according to three binary variables indicating whether the individual has a history of committing property, drug, or violent offenses. These subgroups are not mutually exclusive. Among individuals who reported committing property offenses, industry of employment was not a significant predictor of rearrest but greater job availability in construction was associated with an increased risk of rearrest. For each additional new hire in the construction industry (per 1,000 working age individuals in the county-quarter), the odds of rearrest for property offenders increased by approximately 4 percent.

*** Tables 12a and 12b here ***

For individuals with drug offenses, working in the food services industry was associated with greater odds of rearrest relative to working in the other industries category. A shift from food services to a job in an industry other than the typically willing industries was associated with 29 percent lower odds of rearrest. People with drug offenses also had 15 percent lower odds of rearrest for each additional new hire within the other services industry (per 1,000 working age individuals in the county-quarter).

For those with violent arrest histories, working in the food services industry was associated with greater odds of rearrest relative to working in construction. A shift from

food services to construction was associated with 53 percent lower odds of rearrest. Meanwhile, for each additional new hire in the administrative and waste management industry (per 1,000 working age individuals in the county-quarter), the odds of rearrest increased by 5 percent.

Collectively, the differences in the relationship between industry and job availability by subgroup align with the variation noted in the existing literature; however, differences in study samples make it is difficult to assess the comparability or validity of the current study's findings.

## 6.3 Robustness Checks and Sensitivity Analyses

This study included sensitivity checks and alternate model specifications to test whether the stated effects remained robust to changes in the regression models and operationalization of the independent and control variables.

First, because industry and occupation are so highly correlated, this study performed a number of supplementary analyses to better understand the independent effects of each variable. These analyses included running models with only industry and not occupation and vice versa. Beyond the subgroup specific nuances presented in the subgroup results, when occupation was excluded from the model for the full sample, the "other industries" category was significant and negatively related to rearrest (a result that was also replicated in many of the subgroup analyses when occupation was excluded). More specifically, when occupation was excluded from the model, a change from being unemployed to being employed in an industry other than those typically willing to hire individuals with prior justice contact was associated with 19 percent lower odds of rearrest, holding other variables at their means. Employment in the "other industries"

category was also associated with a lower risk of rearrest relative to employment in the retail and food services industries. After adding occupation into the model for the full sample, the "other industries" category coefficient remained negative (associated with reduced odds of rearrest), but it was no longer significant. Excluding occupation from the model had similar effects for females, those 25-years-old or older, blacks, Hispanics, and those with a history of drug offenses. While a more detailed analysis of industries within the other category is beyond the scope of this research and may not be possible due to limited sample sizes, descriptively the data show that the majority of employment with the "other industries" category clusters within the health care and social assistance industry (24 percent). Given that healthcare is one of the fastest growing industries in the U.S. economy, future research might further explore whether employment in this industry or other prominent industries in the "other category" are associated with a reduced risk of rearrest. While this industry will likely remain inaccessible to people with serious criminal offense histories, this is a potentially promising area for the growing number of individuals with less serious criminal backgrounds.

Second, because the current study's findings differed from the extant literature on job availability and desistance which shows strong and positive effects of job availability in the construction, manufacturing, and transportation and warehousing industries, two sensitivity tests were conducted. To mirror prior research, the author excluded from the model education level, employment status, marital status, and whether the respondent had a child. These exclusions did not explain differences between the current study's results and prior research. Next, to examine whether the differences in the sample were driving the disparate findings, the second model restricted the sample to only those who had a

history of incarceration in jail or prison (n = 693). When excluding the individual-level variables mentioned above and limiting the sample to those with a history of incarceration, the results changed dramatically and aligned more closely with the results of Schnepel (2014) and Yang (2017). In these restricted models, increased viable job availability in the construction and transportation and warehousing industries were directionally associated with reduced odds of rearrest. Although these results were not statistically significant, this supplemental analysis confirmed parity with prior literature and highlighted the differences between the current study's analytic sample and the samples of most extant literature on this topic.

Third, this study tested alternate specifications of the independent variables. The presented analyses examine the effect of job availability in the previous quarter (*t* -1 quarter) on the odds of rearrest at time *t*. This study tested whether the results changed if job availability was measured concurrently (at time *t* rather than *t*-1). This alternate specification did not alter the results. This study also tested a set of independent variables intended to capture cumulative employment in a given industry by measuring the proportion of weeks worked in each industry as of week *t* ("cumulative weeks as of *t*"). Unfortunately, these measures did not perform in interpretable ways; therefore, the measures were excluded from subsequent analyses.

Finally, to assess the extent to which the results were sensitive to limitations of the fixed effects model, the analyses were run using logit regression with controls for pre-

arrest characteristics such as prior level of education and prior work experience.[40] The logit models included robust standard errors clustered at the person level. Because these models are generally more flexible and do not account for many of the unmeasured factors inherently controlled in a fixed-effects model, the logit regressions produced a greater number of significant results than what was presented in the current study. Nevertheless, all of the current results held in these alternate models.

[40] While fixed effects models have benefits in terms of their ability to help control for omitted variable bias, they are not efficient models in that they necessitate multiple changes in the independent and dependent variables in order to estimate effects and any observations that do not have sufficient variation are dropped from the analysis. Additionally, fixed effects models do not allow for the inclusion of time stable characteristics such as gender or race.

# VII. DISCUSSION AND CONCLUSION

This study set out to examine whether working in any of the seven industries most willing to hire individuals with prior justice involvement was associated with risk of rearrest and whether greater availability of viable jobs in these typically willing industries was associated with risk of rearrest. The following provides an overview of findings in each of these areas.

## *7.1. Findings*

### Industry-based employment and rearrest

The results of this study suggest that industry of employment and recidivism are correlated but that these relationships differ substantially by gender, age, race and ethnicity, as well as by offense history. First, employment in the construction industry was correlated with lower odds of rearrest relative to employment in food services or being unemployed. This pattern was observed for the full analytic sample, males, those under 25-years-old, whites, and those with a history of violent offenses. Second, working in food services was associated with higher odds of rearrest relative to working in construction. Similar to the previous finding, this result was observed for the full analytic sample, males, those under 25-years-old, whites, and those with a history of violent offenses, and those with a history of drug offenses. These findings held after multiple falsification tests and persisted regardless of whether occupation was included in the model. Third, working in the retail industry correlated with increased odds of rearrest for blacks, but only when controlling for occupation. Working retail was not significantly related to rearrest for any other subgroup. This finding aligns with evidence that blacks

employed in the retail industry are often overrepresented in low-paying occupations and underrepresented in managerial and supervisory positions. While it may seem obvious that occupation is important and highly related to risk of rearrest, this study uncovered that the impact of occupation likely varies by subgroup and industry. For example, the positive association between working in the food services industry and rearrest for males, whites, those under 25, and those with a history of violent and drug offenses was consistent regardless of whether occupation was included in the model, underscoring the point that occupation appears more influential within some industries and for some subgroups relative to others.

Overall, these findings are not surprising given the evidence that jobs in the construction industry are, on average, of higher quality with higher average wages, greater average hours worked per week, and better benefits compared to other typically willing industries. Similarly, given the low-quality of employment in the food services and retail industries, it is not surprising that jobs in these industries did not reduce risk of rearrest. As described in the introduction, food services and retail have the lowest wages, highest underemployment, and fewest benefits from among the typically willing industries (OECD, 2012). The retail and food services industries also have other characteristics that make them "riskier" than other industries. Of the seven industries examined in this study, food services and retail have the largest proportion of individuals under 25-years-old. It is well established that criminal offending peaks in late adolescence and young adulthood and, a time when peer networks are especially influential in shaping behavior. It is possible that the concentration of young adults within these industries may expose individuals to deviant peers and other risks that are less prevalent in other low-skill

industries. Additionally, these industries are among those with the highest proportion of under-the-table jobs, meaning that employees working in these industries may be at increased risk of exploitation from employers and exposure to illegal activities (OECD, 2012). Finally, job schedules in these industries are precarious in terms of the regularity of work (regular schedule versus variable schedule), the time of work (day versus night), and the predictability of work (schedule notice), all of which can have important implications for individuals (Lambert, Fugiel, & Henly, 2014). Unpredictable schedules can hinder planning child care or the likelihood of finding and holding down other employment to make ends meet (Lambert et al., 2014).

It is important to note that these patterns were not uniform across subgroups. For example, employment in food services was associated with lower odds of rearrest relative to employment in other industries for women, blacks, and Hispanics. For example, relative to working in the other services industry, Hispanics working in food services had lower odds of rearrest, while for blacks, working in food services was associated with lower odds of rearrest than working in retail.

**Viable job availability and rearrest**

Measures of viable job availability were not associated with rearrest across the full sample; however, increased job availability by industry was correlated with risk of rearrest for particular subgroups based on age, race, and offense history.

Looking across subgroups with significant results, greater job availability in the retail and other services industries was correlated with a reduced risk of rearrest for specific subgroups, while greater job availability in the construction industry correlated with an increased risk of rearrest for specific subgroups. Finally, greater job availability

in the administrative and waste management industry had mixed results depending on the subgroup examined.

More specifically, higher job availability in retail was associated with reduced odds of rearrest for blacks, and higher job availability in the other services industry correlated with reduced odds of rearrest for individuals over age 25, Hispanics, and individuals with a history of drug offenses. Meanwhile, greater job availability in construction correlated with increased odds of rearrest for those under 25, for whites and for those with a history of committing property offenses. Finally, higher job availability in the administrative and waste management industry correlated with increased odds of rearrest for Hispanics and people who have a history of violent crime, but was associated with decreased odds of rearrest for those over 25-years-old.

As previously discussed, these findings differ from the extant literature on job availability and recidivism, primarily because the current study's sample is very different from the samples used in prior research. The samples in prior research were of released prisoners and they were also notably older than the current analytic sample. It was the goal of this research to assess whether the patterns identified in prior literature would hold with a more diverse and younger sample and to assess whether including individual-level employment, a variable that was not included in previous studies, influenced the results. Like prior literature, this study found that the relationship between job availability and rearrest varied by subgroups based on age, race, and offense type; however, the specific industries that were related to rearrest were very different from those identified in extant literature. While job availability in the construction, manufacturing, and transportation and warehousing industries were significantly related to reduced recidivism in prior

research, in the current study these were not associated with reduced recidivism for the full sample and were correlated with increased recidivism for certain subgroups. Supplemental analyses with only individuals with a history of incarceration confirmed that job availability in construction and transportation and warehousing were negatively, although not significantly, related to recidivism for this group of more serious offenders. Nevertheless, it is unclear why or how greater job availability in construction would be associated with greater odds of rearrest for the broader sample of whites, those under 25 and those with a history of property offenses. Furthermore, there is little relevant research to contextualize the finding that greater job availability in the retail and other services industries was associated with reduced odds of rearrest for specific subgroups. Employment for these groups does not overwhelmingly cluster in these industries and being employed in these industries was not associated with reduced odds of rearrest suggesting that other, unobserved variables explain this correlation. This conclusion stands in contrast to the larger body of literature on job availability which assumes that greater job availability in "good jobs" is related to a reduced risk of rearrest due to greater employment in those industries. The current study's results do not support this notion. None of the job availability results by subgroup aligned with the results on the effects of individual employment for those subgroups and in some instances, such as for blacks in retail, they were in direct opposition to one another.

Taken together the results of this study suggest that the employment and recidivism patterns for individuals with at least one prior arrest are diverse and complex and vary by important demographic characteristics such as gender, race, ethnicity, and offense history. Additional research is necessary to better understand and interpret the

mixed job availability findings. However, the evidence from this study does not support the notion that correlations between greater job availability in particular industries and reduced risk of rearrest are explained directly or solely by greater employment in those industries.

*7.2. Limitations and areas for future research*

As previously mentioned, one of the largest challenges in understanding the effects of transitions in employment status on subsequent desistance is the difficulty controlling for unobserved variables that underlie observed relationships. While this research employs fixed effects methods to help control for omitted variable bias and discrete time hazard models to ensure temporal precedence, these methods do not control for the exclusion of important variables that change over time. These limitations make it impossible to tease out whether industry-based employment or greater job availability in an industry leads to, or protects one, from rearrest, thus severely limiting the ability to draw definitive conclusions from this research. Future research might try to exploit exogenous shocks within the labor market to better estimate the causal relationships that were descriptively explored in this study. Additionally future research should incorporate important variables that are missing in this study such as housing status, employer characteristics, measures of human capital attainment, and a measure of whether individuals are under community supervision.

Another limitation of the existing research is the use of rearrest as the sole outcome measure without distinguishing between arrests for new crimes and arrests due to technical violations. Because prior research has demonstrated that work may decrease recidivism for new crimes but increase the risk of technical violations this study may be

obscuring patterns related to employment by industry and rearrest by not separating out arrests due to technical violations (Duwe, 2015).

As highlighted earlier, there are many factors beyond the quantity and severity of criminal behavior that increase the likelihood of criminal justice contact. Although this study hoped to perform analyses by conviction status and incarceration status, limitations in the current data set made it impossible to model these as dynamic outcome measures. More specifically, while the NLSY97 contains conviction data and it is possible to link convictions to the arrest data, the current analytic dataset does not contain sufficient information to link the two outcomes. Similarly, although the NLSY97 contains incarceration data in event history format, the relatively low prevalence of incarceration would not support detailed analyses by industry. Future research might expand on this work by linking the event history records of arrests to the conviction data by round in order to conduct subgroup analyses for those with a criminal conviction. As was confirmed in this study, employment and recidivism patterns vary by the severity and type of criminal background. Additionally, future research should build on this work by distinguishing between arrests and convictions for new crimes versus violations and should account for whether the respondent is on probation or parole. By not using these more nuanced measures of recidivism, the current study may overstate the prevalence of repeat criminal offending.

Another limitation is this study's inability to describe or control for peer effects—particularly how employment influences peer groups (positively and negatively). Given the positive association between risk of rearrest and employment in the food services and retail industries for specific subgroups, it would be helpful to learn more about what it

means to work in these industries and uncover the mechanisms that underlie this relationship (or identify that this relationship is spurious). Getting richer, more detailed information about the employment patterns of individuals with prior justice contact would be an important contribution to the literature.

Future research could also improve upon this work by investigating whether and how the results vary according to employment in the formal versus informal labor market. This study captured informal employment but was not able to control for whether this work was in the potentially more risky "under-the-table" category. Future research might also employ innovative data collection methods such as those used by Sugie (2014) to capture real time information about the job search and employment patterns of individuals with prior justice contact through the use of daily text messages. These methods might get a more accurate and nuanced picture of the job search and employment experiences than research using data collected annually.

### *7.3 Conclusion*

Roughly 71 million people in the U.S. (over 30 percent of the adult population) have an arrest record in a criminal justice database (Mills, 2007). The proliferation of public criminal records databases and employers' increasing use of background checks as part of the hiring process has meant that finding employment is increasingly difficult for a growing share of the population. Indeed, people with prior justice involvement typically fare poorly in the labor market and are often unemployed or underemployed in low-wage jobs. A number of previous studies documented that, when employed, people with prior justice contact often work within one of seven industries—construction, accommodation and food services, retail trade, manufacturing, administrative and waste management,

other services, and transportation and warehousing. Despite the concentration of employment within these seven industries and the variation in job-quality by industry, little extant research investigated whether individuals employed in certain industries fared better than those employed in other industries. The current study used data from the NLSY97 to describe whether working in particular industries was associated with a reduced risk of rearrest for individuals with at least one prior arrest. The study also used QWI data to assess whether viable job availability in willing industries was related to risk of rearrest. Unfortunately, the current study's patchwork of findings on job availability were hard to interpret and did not align with the results for individual's employment by industry. Future research should further investigate whether job availability influences individual desistance patterns and whether that operates directly through employment or indirectly through other mechanisms.

Unlike the measures of job availability which were not significant across the full sample, two industries were significantly related to rearrest across the full sample and a number of subgroups. First, after controlling for a number of important time-varying covariates such as educational attainment, occupation, and criminal history, employment in the construction industry was correlated with lower odds of rearrest for the full sample, males, those under 25-years-old, whites, and those with a history of violent offenses. Because, jobs in the construction industry are generally of higher quality, these results highlight the importance of job-quality. Additionally, they lend credence to the programs that primarily train individuals for careers in the construction industry, such as YouthBuild USA.

Second, working in food services was associated with higher odds of rearrest for the full analytic sample and for males, those under 25, whites, and individuals with a history of drug or violent offenses. Although this study cannot claim that working in food services uniformly increases the likelihood of rearrest, it demonstrates a correlation for many subgroups that should give workforce development programs pause before credentialing or placing individuals in employment within the food services industry. Overall, the industry-based employment analyses confirmed that individuals with prior justice contact are often marginally employed in low-quality jobs where the risk of rearrest is not significantly different than if they were unemployed. This finding highlights the plight of the working poor and the need for investment in workforce development programs that can help low-skilled workers break out of industries with dead-end jobs and obtain employment in industries with higher quality jobs and greater opportunity for advancement. Practitioners and reform advocates interested in improving the employment prospects of individuals with prior justice contact should push for a critical assessment of legislation imposing blanket bans against individuals with justice involvement obtaining licenses in certain occupations. Given evidence that the risk of recidivism precipitously declines with time and is practically zero after 10 to 13 years (Blumstein & Nakamura, 2009), future policy should take into account an individual's record of rehabilitation and their criminogenic risk before prohibiting them from obtaining credentials that would allow them to access gainful employment.

Finally, much of the extant literature on work and crime focuses on individuals exiting prisons. This descriptive study confirmed that the employment and desistance patterns of less serious offenders are very different from those described in the extant

literature and additional research is needed on the broader population of justice-involved individuals. Because arrest is becoming such a common life event, particularly for blacks and other marginalized groups, and in light of evidence that the mark of an arrest record matters, regardless of whether one is incarcerated or even convicted, future research should continue to focus on employment and desistance patterns of all individuals with prior justice contact, not just those who have been incarcerated.

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# IX. TABLES AND FIGURES

**Table 1 Average job characteristics by industry**

| | Avg. hourly earnings (all workers)[a] | Non-Supervisor Avg. hourly earnings[b] | Avg. hours worked per week[c] | $ Value of benefits[d] | Percent union representation[e] | Projected Growth (2014-2024)[f] |
|---|---|---|---|---|---|---|
| **Typically willing industries:** | | | | | | |
| Construction | $25 | $20 | 39 | $11 | 15 | 13% |
| Administrative and Support and Waste Management and Remediation | $18 | $13 | 34 | $5 | 4 | 10% |
| Manufacturing | $23 | $16 | 42 | $13 | 11 | -7% |
| Retail Trade | $15 | $13 | 30 | $4 | 5 | 5% |
| Accommodation and Food Services | $12 | $9 | 26 | $3 | 3 | 6% |
| Other Services | $21 | $15 | 32 | $7 | 4 | 4% |
| Transportation and Warehousing | $21 | $17 | 39 | $14 | 21 | 3% |
| **Less willing industries[g]** | | | | | | |
| Natural Resources and Mining | $31 | $27 | 43 | NA | NA | 2% |
| Professional and Business Services | $30 | $25 | 35 | NA | 3 | 10% |
| Financial Activities | $37 | $28 | 36 | $12 | 2 | 6% |
| Education and Health Services | $23 | $17 | 32 | $9 | 9.5 | 16% |

Primary source: U.S. Bureau of Labor Statistics. *Industries at a Glance*: http://www.bls.gov/iag/home.htm
Notes:
[a] Average hourly earnings is based on average wages from 2007-2015.
[b] Average hourly earnings is based on average wages for non-supervisors from 1997-2013.
[c] Average hours of production and nonsupervisory employees 2005-2015.
[d] Hourly dollar value of benefits derived from a rounded average across Compensation Cost Trends estimates for the second quarter of 2015.
[e] Percent union representation is based on 2014 estimates from the Current Population Survey.
[f] Source: http://www.bls.gov/careeroutlook/2015/article/projections-industry.htm#growth-by-detailed-industry
[g] Industries shown in the bottom panel are organized by supersectors, which are overarching categories for similar industries.

**Table 2 Descriptive statistics pooled across person-weeks**

| Variable | Min, Max | Proportion or Mean (SD) | 10th / 50th / 90th | % Persons with Change | % Person - Spells with Change |
|---|---|---|---|---|---|
| Age | 18, 32 | 24 (3.36) | 20 / 25 / 29 | 100 | 100 |
| Male | 0, 1 | 0.69 | -- | -- | -- |
| Race/ethnicity | 1, 4 | | | | |
| Non-Hispanic, black | | 0.30 | -- | -- | -- |
| Non-Hispanic, white | | 0.46 | -- | -- | -- |
| Non-Hispanic, other race | | 0.03 | -- | -- | -- |
| Hispanic | | 0.21 | -- | -- | -- |
| Marital status | 0, 2 | | | | |
| Never married | | 0.79 | -- | 28 | 15 |
| Married | | 0.16 | -- | 31 | 17 |
| Separated, Divorced or Widowe | | 0.05 | -- | 11 | 6 |
| Any children | 0, 1 | 0.54 | | 55 | 30 |
| Educational attainment | 0, 2 | | | | |
| No high school diploma or GED | | 0.27 | -- | 34 | 18 |
| High school diploma or GED | | 0.64 | -- | 44 | 23 |
| Some post-secondary | | 0.09 | -- | 13 | 7 |
| **Criminal history** | | | | | |
| Arrest before age 18 | 0, 1 | 0.55 | -- | -- | -- |
| Age at first arrest | 9, 31 | 17.16 (3.52) | 13 / 17 / 22 | -- | -- |
| Number of arrests | 1, 9 | 1.94 (0.83) | 1 / 2 / 3 | 71 | -- |
| Ever rearrested | 0, 1 | 0.66 | -- | 71 | 48 |
| Ever convicted | 0, 1 | 0.59 | -- | -- | -- |
| Previously incarcerated | 0, 1 | 0.19 | -- | 21 | 11 |
| Cumulative criminal behavior | 0, 1167 | 69 (173) | 0 / 9 / 180 | 46 | 28 |
| Property crime | 0, 1 | 0.52 | -- | 7 | 4 |
| Violent crime | 0, 1 | 0.14 | -- | 4 | 2 |
| Drug crime | 0, 1 | 0.21 | -- | 6 | 3 |
| Use hard drugs | 0, 1 | 0.30 | -- | 11 | 7 |
| Weeks in non-custody spell | 1, 728 | 231 (165) | 32 / 206 / 473 | 100 | 100 |

Source NLSY97. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. Figures in table are shown as proportions for binary and categorical variables, or as means and (standard deviations) for continuous variables. With the exception of the number of weeks in a non-custody spell, the means are based on $NT$ observations. The "% Persons with Change" column is based on $N$ observations, and reflects the percentage of the sample that underwent at least one change in the value of that measure during the 14-year study window. The "% Person-Spells with Change" column reflects the percentage of the sample that underwent at least one change in the value of that measure per non-custody spell.

**Table 2 Descriptive statistics pooled across person-weeks (continued)**

| Variable | Min, Max | Proportion or Mean (SD) | 10th / 50th / 90th | % Persons with Change | % Person - Spells with Change |
|---|---|---|---|---|---|
| **Work Characteristics** | | | | | |
| Employed | 0, 1 | 0.61 | -- | 99 | 71 |
| Hours per week ‡ | 0, 71 | 18.4 (19.44) | 0 / 12 / 40 | 96 | 69 |
| Hourly rate of pay ‡ | 0, 133 | 7.95 (12.98) | 0 / 7 / 17 | 99 | 73 |
| More than one job ‡ | 0, 1 | .10 | -- | 66 | 41 |
| **Industry of employment** | | | | | |
| Unemployed | 0, 1 | .61 | -- | 100 | 71 |
| Construction | 0, 1 | .13 | -- | 33 | 21 |
| Administrative and Waste Management | 0, 1 | .04 | -- | 19 | 11 |
| Manufacturing | 0, 1 | .09 | -- | 30 | 18 |
| Retail | 0, 1 | .14 | -- | 51 | 31 |
| Accommodation and Food Services | 0, 1 | .19 | -- | 56 | 35 |
| Other Services | 0, 1 | .06 | -- | 26 | 15 |
| Transportation and Warehousing | 0, 1 | .04 | -- | 16 | 9 |
| Other Industry[a] | 0, 1 | .40 | -- | 71 | 50 |
| **Occupation** | | | | | |
| Unemployed | 0, 1 | .61 | -- | 100 | 71 |
| Professional/technical | 0, 1 | .10 | -- | 26 | 15 |
| Managerial/administrative | 0, 1 | .11 | -- | 29 | 17 |
| Sales | 0, 1 | .12 | -- | 48 | 28 |
| Clerical | 0, 1 | .11 | -- | 40 | 24 |
| Craft | 0, 1 | .08 | -- | 27 | 16 |
| Operative | 0, 1 | .12 | -- | 40 | 25 |
| Labor | 0, 1 | .09 | -- | 39 | 24 |
| Service | 0, 1 | .27 | -- | 70 | 45 |

Source NLSY97. *N* = 2,914, *NT* = 1,441,566 person-weeks. Figures in table are shown as proportions for binary and categorical variables, or as means and (standard deviations) for continuous variables. With the exception of the number of weeks in a non-custody spell, the means are based on *NT* observations. The percentages provided under the "% Persons with Change" column are based on *N* observations, and reflect the percentage of the sample that underwent at least one change in the value of that measure during the 14-year study window. The percentages provided under the "% Person - Spells with Change" column reflect the percentage of the sample that underwent at least one change in the value of that measure during their current non-custody spell.

‡ Descriptive statistics are shown only for person-months in which respondents are employed (*NT* = 882,540). Hours and hourly rate of pay represent averages across jobs if an individual was in more than one job in a given week. If an individual worked in more than one industry or occupation they are counted in each industry and occupation they reported; consequently, totals may sum to more than 100 percent.

[a] The "other industries" category pools employment across the remaining 13 industries: agriculture, forestry, fishing and hunting; mining; utilities; wholesale trade; information; finances and insurance; real estate and rental leasing; professional, scientific, and technical services; management of companies and enterprises; educational services; health care and social assistance; arts, entertainment, and recreation; and public administration.

**Table 3 Demographic composition of industries within analytic sample**

| | % Male | % Under 25 years old | % High school diploma or higher | % Black, Non-Hispanic | % White, Non-Hispanic | % Hispanic | % Employed in multiple jobs |
|---|---|---|---|---|---|---|---|
| **Typically willing industries:** | | | | | | | |
| Unemployed | 67 | 53 | 64 | 39 | 39 | 19 | 0 |
| Construction | 96 | 56 | 69 | 15 | 58 | 26 | 12 |
| Administrative and Support and Waste Management and Remediation | 85 | 58 | 70 | 30 | 45 | 24 | 21 |
| Manufacturing | 86 | 54 | 79 | 23 | 51 | 24 | 9 |
| Retail Trade | 65 | 62 | 82 | 24 | 49 | 24 | 17 |
| Accommodation and Food Services | 60 | 61 | 76 | 27 | 54 | 16 | 18 |
| Other Services | 63 | 56 | 74 | 28 | 50 | 20 | 24 |
| Transportation and Warehousing | 87 | 53 | 79 | 31 | 45 | 23 | 17 |
| **Less–willing industries:** | | | | | | | |
| Other industries category[a] | 63 | 49 | 85 | 26 | 49 | 22 | 16 |

Source: NLSY97. *N* = 2,914; *NT* = 1,441,566 person-weeks.

[a] The "other industries" category includes agriculture, forestry, fishing and hunting; mining; utilities; wholesale trade; information; finances and insurance; real estate and rental leasing; professional, scientific, and technical services; management of companies and enterprises; educational services; health care and social assistance; arts, entertainment, and recreation; and public administration.

**Table 4 Distribution of occupation by industry**

| | Industry | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Occupation | Construction | Administrative and waste management | Manufacturing | Retail | Food services | Other services | Transportation and warehousing | Other industries[a] |
| % Professional/technical | 1 | 2 | 9 | 4 | 2 | 2 | 2 | 18 |
| % Managerial/administrative | 6 | 7 | 11 | 14 | 13 | 6 | 7 | 11 |
| % Sales | 1 | 1 | 3 | 39 | 11 | 4 | 19 | 8 |
| % Clerical | 2 | 6 | 6 | 21 | 4 | 8 | 17 | 17 |
| % Craft | 53 | 1 | 17 | 1 | 0 | 5 | 1 | 1 |
| % Operative | 10 | 11 | 34 | 9 | 1 | 33 | 23 | 10 |
| % Laborer | 26 | 2 | 16 | 5 | 0 | 1 | 27 | 9 |
| % Service | 1 | 71 | 4 | 7 | 68 | 41 | 5 | 25 |
| Total Percentage | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: NLSY97. Descriptive statistics are shown only for person-months in which respondents are employed (*NT* = 882,540). The highlighted cells indicate the most prevalent two occupations in any industry category.

[a] The "other industries" category includes 13 industries: agriculture, forestry, fishing and hunting; mining; utilities; wholesale trade; information; finances and insurance; real estate and rental leasing; professional, scientific, and technical services; management of companies and enterprises; educational services; health care and social assistance; arts, entertainment, and recreation; and public administration.

**Table 5 Descriptive statistics of job availablility by industry per 1,000 working age individuals in a county**

| Variable | Min, Max | Proportion or Mean (SD) | % Persons with Change | % Person - Spells with Change |
|---|---|---|---|---|
| **New hires across willing industries** [a] | | | | |
| Viable new hires in willing industries | 1, 104 | 26.5 (12.42) | 100 | 86 |
| **New hires by willing industry** | | | | |
| Construction | 0, 15 | 4.2 (2.57) | 100 | 85 |
| Administrative and Waste Management | 0, 25 | 6.5 (4.70) | 100 | 85 |
| Manufacturing | 0, 16 | 2.7 (2.38) | 100 | 85 |
| Retail | 0, 13 | 4.3 (2.17) | 98 | 83 |
| Accommodation and Food Services | 0, 24 | 5.8 (3.68) | 100 | 86 |
| Other Services | 0, 6 | 1.5 (0.78) | 100 | 85 |
| Transportation and Warehousing | 0, 7 | 1.5 (1.14) | 100 | 85 |
| **New hires across less willing industries** | | | | |
| Other industries[b] | 0, 58 | 11.9 (7.51) | 100 | 86 |

Sources: QWI 1998 – 2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. The job availability measures are estimates of viable new hires per every 1,000 working age individuals in a county in a quarter at $t$-1 (the previous quarter). "Viable" is defined as a job that requires no more than a high school diploma. The percentages provided under the "% Persons with Change" column are based on $N$ observations, and reflect the percentage of the sample that underwent at least one change in the value of that measure during the 14-year study window. The percentages provided under the "% Person- Spells with Change" column reflect the percentage of the sample that underwent at least one change in the value of that measure per non-custody spell.

[a] New hires across viable industries pools viable new hires across the seven industries most willing to hire individuals with prior justice contact: construction, administrative and waste management, manufacturing, retail, food services, and other services.

[b] The "other industries" category pools viable new hires per county quarter across the remaining 13 industries: agriculture, forestry, fishing and hunting; mining; utilities; wholesale trade; information; finances and insurance; real estate and rental leasing; professional, scientific, and technical services; management of companies and enterprises; educational services; health care and social assistance; arts, entertainment, and recreation; and public administration.

**Table 6 Relationship between industry-based employment and rearrest**

| | Model A1 | | |
|---|---|---|---|
| | Coeff. | (S.E.) | OR |
| **Industry of employment** | | | |
| Not employed | 0.316 | (0.145) | 1.37** |
| Construction | -0.308 | (0.188) | 0.74* |
| Administrative and Waste Management | -0.115 | (0.204) | 0.89 |
| Manufacturing | -0.130 | (0.181) | 0.88 |
| Retail | -0.078 | (0.148) | 0.92 |
| Food Services (ref) | -- | -- | -- |
| Other Services | -0.187 | (0.181) | 0.83 |
| Transportation and Warehousing | -0.032 | (0.219) | 0.97 |
| Other Industries | -0.158 | (0.125) | 0.85 |
| **Individual characteristics** | | | |
| Age | 0.47 | (0.087) | 1.59*** |
| Marital status | | | |
| Never married (ref) | -- | -- | -- |
| Married | -0.63 | (0.151) | 0.523** |
| Separated, Divorced, or Widowed | 0.18 | (0.215) | 1.224 |
| Any children | 0.10 | (0.094) | 1.158 |
| **Education and Employment** | | | |
| Educational attainment | | | |
| No high school diploma or GED | 0.85 | (0.277) | 2.34** |
| High school diploma or GED | 0.46 | (0.128) | 3.68*** |
| Some post-secondary (ref) | -- | -- | -- |
| Occupation | | | |
| Not employed (ref) | -- | -- | -- |
| Professional/technical | -0.37 | (0.226) | 0.69 |
| Managerial/administrative | -0.03 | (0.196) | 0.97 |
| Sales | -0.20 | (0.183) | 0.82 |
| Clerical | -0.34 | (0.192) | 0.71 |
| Craft | 0.05 | (0.223) | 1.06 |
| Operative | 0.01 | (0.187) | 1.01 |
| Labor | -0.07 | (0.190) | 0.93 |
| Service | -0.26 | (0.164) | 0.77 |
| Prior work history (cumulative weeks worked) | 0.07 | (0.018) | 1.10 |
| Working in multiple jobs | 0.16 | (0.127) | 1.17 |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors and odds ratios. The logit coefficients represent the probability of rearrest relative to employment in the food services industry where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend and state and year dummy variables. ^$p$ <.1 * $p$ < .05, ** $p$ < .01, *** $p$ < .001 (two-tailed tests). *Table continued on next page*

**Table 6 Relationship between industry-based employment and rearrest (continued)**

| | Model A1 | | |
|---|---|---|---|
| | Coeff. (S.E.) | | OR |
| **Criminal history** | | | |
| Number of prior arrests | -4.32 | (0.079) | 0.01*** |
| Previously incarcerated | 2.59 | (0.137) | 13.37*** |
| Cumulative criminal behavior | 0.004 | (0.001) | 1.004*** |
| **Controls for county-level characteristics** | | | |
| 1996 County crime rate | 0.000 | (0.000) | 1 |
| 1996 County arrest rate | 0.000 | (0.000) | 1 |
| 1996 Ratio of sworn officers per county population | 0.000 | (0.000) | 1 |
| County unemployment rate | -0.002 | (0.001) | 1* |
| County median household income | 0.000 | (0.000) | 1* |
| Percent of county households in poverty | 0.000 | (0.000) | 1 |
| *Log likelihood* | *-10545.01* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors, and odds ratios. The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend and state and year dummy variables. ^$p < .1$ * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 7 Relationship between viable job availability and rearrest**

| | Model B1 Across willing industries | | | Model B2 By willing industry | | |
|---|---|---|---|---|---|---|
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| New hires across willing industries [a] | -0.005 | (0.004) | 0.99 | -- | -- | -- |
| **New hires by willing industry** | | | | | | |
| Construction | -- | -- | -- | 0.011 | (0.010) | 1.01 |
| Administrative and Waste Management | -- | -- | -- | -0.007 | (0.009) | 0.99 |
| Manufacturing | -- | -- | -- | 0.013 | (0.011) | 1.01 |
| Retail | -- | -- | -- | -0.018 | (0.020) | 0.98 |
| Food Services | -- | -- | -- | -0.011 | (0.012) | 0.99 |
| Other Services | -- | -- | -- | -0.087 | (0.056) | 0.92 |
| Transportation and Warehousing | -- | -- | -- | -0.022 | (0.027) | 0.98 |
| New hires across less willing industries [b] | -- | -- | -- | -0.002 | (0.004) | 1.00 |
| **Individual characteristics** | | | | | | |
| Age | 0.55 | (0.08) | 1.62** | 0.55 | (0.08) | 1.73** |
| Marital status | | | | | | |
| Never married (ref) | -- | -- | -- | -- | -- | -- |
| Married | -0.58 | (0.15) | 0.53** | -0.58 | (0.15) | 0.56** |
| Separated, divorced, or widowed | 0.23 | (0.21) | 1.18 | 0.24 | (0.21) | 1.18 |
| Any children | 0.11 | (0.09) | 1.10 | 0.10 | (0.09) | 1.10 |
| Educational attainment | | | | | | |
| No high school diploma or GED (ref) | -- | -- | -- | | | |
| High school diploma or GED | 0.45 | (0.13) | 1.58** | 0.45 | (0.13) | 1.56** |
| Some post-secondary | -0.88 | (0.27) | 0.42** | -0.86 | (0.27) | 0.42** |
| Criminal history | | | | | | |
| Number of prior arrests | -4.30 | (0.08) | 0.01*** | -4.30 | (0.08) | 0.01*** |
| Previously incarcerated | 2.58 | (0.14) | 13.34*** | 2.58 | (0.14) | 13.2*** |
| Cumulative criminal behavior | 0.0 | (0.0) | 1*** | 0.0 | (0.0) | 1*** |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors and odds ratios. The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend and state dummy variables. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests). *Table continued on next page*

**Table 7 Relationship between viable job-availability and rearrest (continued)**

| | Model B1 Across willing industries | | | Model B2 By willing industry | | |
|---|---|---|---|---|---|---|
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Controls for county-level characteristics** | | | | | | |
| 1996 County crime rate | 0.0 | (0.0) | 1 | 0.0 | (0.0) | 1 |
| 1996 County arrest rate | 0.0 | (0.0) | 1 | 0.0 | (0.0) | 1 |
| 1996 Ratio of sworn officers per county population | 0.0 | (0.0) | 1 | 0.0 | (0.0) | 1 |
| County unemployment rate | 0.0 | (0.0) | 1* | 0.0 | (0.0) | 1* |
| County median household income | 0.0 | (0.0) | 1* | 0.0 | (0.0) | 1^ |
| Percent of county households in poverty | 0.0 | (0.0) | 1 | 0.0 | (0.0) | 1 |
| Non-custody spell-time | -0.03 | (0.0) | 0.97*** | -0.03 | (0.0) | 0.97*** |
| *Log likelihood* | *-10563.91* | | | *-10558.45* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors and odds ratios. The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend and state dummy variables. ^ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 8 Likelihood of rearrest by industry of employment**

| | **Model A1** Industry-based employment | | | **Model B1** Job availability across willing industries | | | **Model B2** Job availability by industry | | | **Model C1** Industry-based employment and job availability across willing industries | | | **Model C2** Industry-based employment and job availability by willing industry | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coeff | (S.E) | OR | Coeff | (S.E) | OR | Coeff | (S.E) | OR | Coeff | (S.E) | OR | Coeff | (S.E) | OR |
| **Industry of employment** | | | | | | | | | | | | | | | |
| Not employed | **0.316** | **(0.145)** | **1.37**** | | | | | | | **0.316** | **(0.145)** | **1.37**** | **0.317** | **(0.146)** | **1.37**** |
| Construction | **-0.308** | **(0.188)** | **0.74*** | | | | | | | **-0.308** | **(0.188)** | **0.74*** | **-0.314** | **(0.188)** | **0.73*** |
| Administrative and Waste Management | -0.115 | (0.204) | 0.89 | | | | | | | -0.115 | (0.204) | 0.88 | -0.115 | (0.204) | 0.89 |
| Manufacturing | -0.130 | (0.181) | 0.88 | | | | | | | -0.126 | (0.181) | .93 | -0.130 | (0.181) | 0.88 |
| Retail | -0.078 | (0.148) | 0.92 | | | | | | | -0.074 | (0.148) | 0.83 | -0.078 | (0.148) | 0.92 |
| Food Services (ref) | -- | -- | -- | | | | | | | -- | -- | -- | -- | -- | -- |
| Other Services | -0.187 | (0.181) | 0.83 | | | | | | | -0.181 | (0.181) | 0.97 | -0.187 | (0.181) | 0.83 |
| Transportation and Warehousing | -0.032 | (0.219) | 0.97 | | | | | | | -0.030 | (0.219) | 0.86 | -0.032 | (0.219) | 0.97 |
| Other Industries | -0.158 | (0.125) | 0.85 | | | | | | | -0.157 | (0.125) | 1.37** | -0.158 | (0.125) | 0.85 |
| **Viable job availability across willing industries** | | | | | | | | | | | | | | | |
| New hires across viable jobs in willing industries | | | | -0.005 | (0.004). | 0.996 | | | | -0.005 | (0.004) | 0.995 | | | |
| **Viable job availability by willing industry** | | | | | | | | | | | | | | | |
| Construction | | | | | | | 0.011 | (0.010) | 1.01 | | | | 0.012 | (0.010) | 1.01 |
| Administrative and Waste Management | | | | | | | -0.007 | (0.009) | 0.99 | | | | -0.006 | (0.009) | 0.99 |
| Manufacturing | | | | | | | 0.013 | (0.011) | 1.01 | | | | 0.012 | (0.011) | 1.01 |
| Retail | | | | | | | -0.018 | (0.020) | 0.98 | | | | -0.020 | (0.020) | 0.98 |
| Food Services and Entertainment | | | | | | | -0.011 | (0.012) | 0.99 | | | | -0.011 | (0.012) | 0.99 |
| Transportation and Warehousing | | | | | | | -0.087 | (0.056) | 0.92 | | | | -0.087 | (0.056) | 0.92 |
| Other Services | | | | | | | -0.022 | (0.027) | 0.98 | | | | -0.022 | (0.027) | 0.98 |
| *Log likelihood* | *-10545.01* | | | *-10563.91* | | | *-10558.45* | | | *-10544.33* | | | *-10538.91* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. Models show logit coefficients, standard errors, and odds ratios (OR). The logit coefficients represent the probability of rearrest relative to working in construction where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates, state dummy variables, and a control for year. ^ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 9 Likelihood of rearrest by industry of employment and gender**

| | **Model D1** Industry-based employment and job availability across willing industries | | | | | | **Model D2** Industry-based employment and job availability by willing industry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Males | | | Females | | | Males | | | Females | | |
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Industry of employment** | | | | | | | | | | | | |
| Not employed | 0.221 | (0.166) | 1.25 | **0.665** | **(0.311)** | **1.94*** | 0.217 | (0.166) | 1.24 | **0.679** | **(0.313)** | **1.99*** |
| Construction | **-0.532** | **(0.208)** | **0.59*** | -0.267 | (0.864) | 0.77 | **-0.540** | **(0.208)** | **0.58**** | -0.245 | (0.866) | 0.78 |
| Administrative and Waste Management | -0.036 | (0.219) | 0.96 | -0.832 | (0.693) | 0.44 | -0.043 | (0.219) | 0.96 | -0.819 | (0.695) | 0.44 |
| Manufacturing | -0.305 | (0.203) | 0.74 | 0.150 | (0.470) | 1.16 | -0.312 | (0.203) | 0.73 | 0.155 | (0.468) | 1.17 |
| Retail | -0.324 | (0.182) | 0.72 | 0.318 | (0.264) | 1.37 | -0.328 | (0.182) | 0.72 | 0.322 | (0.266) | 1.38 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | **-0.528** | **(0.234)** | **0.59*** | 0.209 | (0.290) | 1.23 | **-0.530** | **(0.234)** | **0.59*** | 0.210 | (0.291) | 1.23 |
| Transportation and Warehousing | -0.088 | (0.235) | 0.92 | -0.137 | (0.673) | 0.87 | -0.093 | (0.235) | 0.91 | -0.136 | (0.676) | 0.87 |
| Other Industries | **-0.308** | **(0.153)** | **0.74*** | -0.040 | (0.218) | 0.96 | **-0.311** | **(0.153)** | **0.73*** | -0.026 | (0.219) | 0.97 |
| **Viable job availability across willing industries** | | | | | | | | | | | | |
| New hires in viable jobs in willing industries | -0.004 | (0.004) | 0.996 | -0.004 | (0.007) | 0.996 | | | | | | |
| **Viable job availability by willing industry** | | | | | | | | | | | | |
| Construction | | | | | | | 0.0100 | (0.011) | 1.0096 | 0.054 | (0.030) | 1.055 |
| Administrative and Waste Management | | | | | | | -0.003 | (0.011) | 0.9972 | 0.004 | (0.013) | 1.004 |
| Manufacturing | | | | | | | 0.019 | (0.012) | 1.0190 | 0.005 | (0.024) | 1.005 |
| Retail | | | | | | | -0.015 | (0.021) | 0.9848 | -0.018 | (0.042) | 0.982 |
| Food Services | | | | | | | -0.004 | (0.013) | 0.9965 | -0.040 | (0.028) | 0.961 |
| Other Services | | | | | | | -0.104 | (0.067) | 0.9011 | -0.057 | (0.088) | 0.944 |
| Transportation and Warehousing | | | | | | | -0.001 | (0.029) | 0.9989 | -0.019 | (0.056) | 0.982 |
| *Log likelihood* | *-7869.52* | | | *-2666.72* | | | *-7866.18* | | | *-2662.73* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks including weeks including 2,015 males and 899 females. All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates, and a control for year.
* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 10 Likelihood of rearrest by industry of employment and age group**

| | **Model E1** Industry-based employment and job availability across willing industries | | | | | | **Model E2** Industry-based employment and job availability by willing industry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under 25 | | | 25 and Over | | | Under 25 | | | 25 and Over | | |
| | Coeff. | (S.E.) | OR | Coeff. | (S.E.) | OR | Coeff. | (S.E.) | OR | Coeff. | (S.E.) | OR |
| **Industry of employment** | | | | | | | | | | | | |
| Not employed | **0.36** | **(0.18)** | **1.43*** | 0.44 | (0.37) | 1.55 | **0.36** | **(0.18)** | **1.43*** | 0.40 | (0.38) | 1.49 |
| Construction | **-0.52** | **(0.24)** | **0.60*** | -0.13 | (0.42) | 0.88 | **-0.54** | **(0.24)** | **0.58*** | -0.15 | (0.42) | 0.86 |
| Administrative and Waste Management | -0.06 | (0.28) | 0.94 | 0.03 | (0.41) | 1.03 | -0.08 | (0.28) | 0.93 | 0.05 | (0.41) | 1.05 |
| Manufacturing | 0.16 | (0.23) | 1.17 | -0.67 | (0.45) | 0.51 | 0.15 | (0.23) | 1.16 | -0.70 | (0.45) | 0.50 |
| Retail | -0.03 | (0.18) | 0.97 | 0.25 | (0.36) | 1.28 | -0.03 | (0.18) | 0.97 | 0.25 | (0.36) | 1.29 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | -0.22 | (0.24) | 0.80 | 0.18 | (0.44) | 1.20 | -0.23 | (0.24) | 0.80 | 0.17 | (0.44) | 1.19 |
| Transportation and Warehousing | -0.02 | (0.30) | 0.98 | 0.34 | (0.46) | 1.40 | -0.02 | (0.30) | 0.98 | 0.40 | (0.46) | 1.49 |
| Other Industries | -0.03 | (0.16) | 0.97 | -0.20 | (0.29) | 0.82 | -0.03 | (0.16) | 0.97 | -0.19 | (0.29) | 0.83 |
| **Viable job availability across willing industries** | | | | | | | | | | | | |
| New hires in viable jobs in willing industries | -0.004 | (0.005) | 0.996 | -0.005 | (0.008) | 0.995 | | | | | | |
| **Viable job availability by willing industry** | | | | | | | | | | | | |
| Construction | | | | | | | **0.041** | **(0.020)** | **1.042*** | 0.008 | (0.016) | 1.01 |
| Administrative and Waste Management | | | | | | | 0.000 | (0.010) | 1.000 | **-0.066** | **(0.021)** | **0.94**** |
| Manufacturing | | | | | | | 0.002 | (0.014) | 1.002 | 0.024 | (0.026) | 1.02 |
| Retail | | | | | | | -0.012 | (0.026) | 0.988 | -0.048 | (0.040) | 0.95 |
| Food Services | | | | | | | -0.024 | (0.170) | 0.976 | 0.030 | (0.021) | 1.03 |
| Other Services | | | | | | | -0.066 | (0.070) | 0.936 | **-0.285** | **(0.127)** | **0.75*** |
| Transportation and Warehousing | | | | | | | -0.016 | (0.330) | 0.984 | 0.149 | (0.075) | 1.16 |
| *Log likelihood* | *-6159.68* | | | *-3061.49* | | | *-6156.28* | | | *-3049.02* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. These two categories are not mutually exclusive over time (includes 786,254 person–weeks contributed by individuals under 25 and 655,312 person-weeks contributed by individuals over 25-years-old). All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates and a control for year. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 11a Likelihood of rearrest by industry of employment and race and ethnicity**

| | **Model F1** Industry-based employment and job availability across willing industries | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Black | | | Hispanic | | | White | | |
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Industry of employment** | | | | | | | | | |
| Not employed | 0.29 | (0.29) | 1.34 | 0.51 | (0.34) | 1.66 | 0.23 | (0.20) | 1.25 |
| Construction | 0.47 | (0.42) | 1.60 | -0.09 | (0.42) | 0.91 | **-0.59** | **(0.26)** | **0.56*** |
| Administrative and Waste Management | 0.11 | (0.39) | 1.11 | 0.17 | (0.41) | 1.19 | -0.21 | (0.30) | 0.81 |
| Manufacturing | 0.66 | (0.38) | 1.94 | -0.19 | (0.41) | 0.83 | -0.40 | (0.25) | 0.67 |
| Retail | **0.68** | **(0.31)** | **1.97*** | -0.08 | (0.34) | 0.92 | -0.31 | (0.21) | 0.73 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | -0.30 | (0.39) | 0.74 | **0.88** | **(0.41)** | **2.42*** | **-0.57** | **(0.26)** | **0.57*** |
| Transportation and Warehousing | 0.14 | (0.40) | 1.15 | 0.10 | (0.51) | 1.11 | -0.05 | (0.32) | 0.96 |
| Other Industries | -0.05 | (0.25) | 0.95 | -0.18 | (0.29) | 0.84 | -0.15 | (0.17) | 0.86 |
| **Viable job availability** | | | | | | | | | |
| New hires in viable jobs in willing industries | -0.010 | (0.007) | 0.990 | 0.001 | (0.010) | 1.001 | 0.000 | (0.005) | 1.00 |
| *Log likelihood* | *-3368.45* | | | *-2213.43* | | | *-4650.27* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,823, $NT$ = 1,396,843 person-weeks contributed by 873 black, Non-Hispanics; 1,325 white, Non-Hispanics; and 625 Hispanics ("Other race" Non-Hispanic (n = 91) are excluded from these subgroup analyses due to small sample sizes). All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates and a control for year. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 11b Likelihood of rearrest by industry of employment and race and ethnicity**

| | **Model F2** Industry-based employment and job availability by willing industry | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Black | | | Hispanic | | | White | | |
| | Coeff. | (S.E.) | OR | Coeff. | (S.E.) | OR | Coeff. | (S.E.) | OR |
| **Industry of employment** | | | | | | | | | |
| Not employed | 0.29 | (0.29) | 1.33 | 0.55 | (0.34) | 1.73 | 0.23 | (0.20) | 1.25 |
| Construction | 0.46 | (0.42) | 1.59 | -0.09 | (0.42) | 0.91 | **-0.60** | **(0.26)** | **0.55*** |
| Administrative and Waste Management | 0.09 | (0.39) | 1.09 | 0.17 | (0.42) | 1.19 | -0.20 | (0.31) | 0.82 |
| Manufacturing | 0.65 | (0.38) | 1.92 | -0.18 | (0.41) | 0.83 | -0.41 | (0.25) | 0.66 |
| Retail | **0.68** | **(0.31)** | **1.97*** | -0.12 | (0.34) | 0.89 | -0.32 | (0.21) | 0.73 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | -0.31 | (0.39) | 0.74 | **0.89** | **(0.41)** | **2.43*** | **-0.58** | **(0.26)** | **0.56*** |
| Transportation and Warehousing | 0.15 | (0.40) | 1.16 | 0.13 | (0.51) | 1.14 | -0.04 | (0.32) | 0.96 |
| Other Industries | -0.06 | (0.25) | .94 | -0.19 | (0.30) | 0.83 | -0.16 | (0.17) | 0.86 |
| **Viable job availability by willing industry** | | | | | | | | | |
| Construction | -0.004 | (0.018) | 0.996 | -0.021 | (0.044) | 0.98 | **0.060** | **(0.020)** | **1.06**** |
| Administrative and Waste Management | 0.022 | (0.019) | 1.02 | **0.053** | **(0.019)** | **1.05*** | -0.014 | (0.015) | 0.99 |
| Manufacturing | 0.020 | (0.014) | 1.02 | -0.048 | (0.046) | 0.95 | 0.011 | (0.016) | 1.01 |
| Retail | **-0.091** | **(0.038)** | **0.91**** | 0.001 | (0.046) | 1.00 | 0.015 | (0.023) | 1.02 |
| Food Services | -0.020 | (0.024) | 0.98 | 0.022 | (0.030) | 1.02 | -0.020 | (0.017) | 0.98 |
| Other Services | -0.048 | (0.086) | 0.95 | **-0.377** | **(0.162)** | **0.69*** | -0.115 | (0.077) | 0.89 |
| Transportation and Warehousing | 0.017 | (0.036) | 1.02 | -0.111 | (0.101) | 0.90 | 0.000 | (0.034) | 1.00 |
| *Log likelihood* | *-3363.97* | | | *-2206.72* | | | *-4643.92* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $N$ = 2,823, $NT$ = 1,396,843 person-weeks contributed by 873 black, Non-Hispanics; 1,325 white, Non-Hispanics; and 625 Hispanics ("Other race" Non-Hispanic (n = 91) are excluded from these subgroup analyses due to small sample sizes). All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates, and a control for year. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests)

**Table 12a Likelihood of rearrest by industry of employment and offense type**

| | **Model G1** Industry-based employment and job availability across willing industries | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Property | | | Drug | | | Violent | | |
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Industry of employment** | | | | | | | | | |
| Not employed | 0.22 | (0.19) | 1.24 | 0.19 | (0.20) | 1.20 | -0.10 | (0.24) | 0.90 |
| Construction | -0.27 | (0.26) | 0.76 | -0.30 | (0.25) | 0.74 | **-0.74** | **(0.37)** | **0.48*** |
| Administrative and Waste Management | -0.15 | (0.31) | .86 | -0.02 | (0.27) | 0.98 | -0.12 | (0.38) | 0.89 |
| Manufacturing | 0.09 | (0.24) | 1.10 | -0.09 | (0.24) | 0.92 | -0.26 | (0.33) | 0.77 |
| Retail | 0.13 | (0.19) | 1.14 | -0.15 | (0.20) | 0.86 | -0.03 | (0.26) | 0.97 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | -0.37 | (0.23) | 0.69 | -0.22 | (0.26) | 0.80 | -0.42 | (0.32) | 0.66 |
| Transportation and Warehousing | 0.05 | (0.28) | 1.05 | 0.03 | (0.30) | 1.03 | -0.38 | (0.41) | 0.69 |
| Other Industries | -0.17 | (0.17) | 0.85 | **-0.34** | **(0.17)** | **0.71*** | -0.25 | (0.22) | 0.78 |
| **Viable job availability** | | | | | | | | | |
| New hires in viable jobs in willing industries | 0.001 | (0.005) | 1.001 | -0.001 | (0.005) | .999 | 0.008 | (0.007) | 1.008 |
| *Log likelihood* | *-5909.92* | | | *-5730.05* | | | *-3358.65* | | |

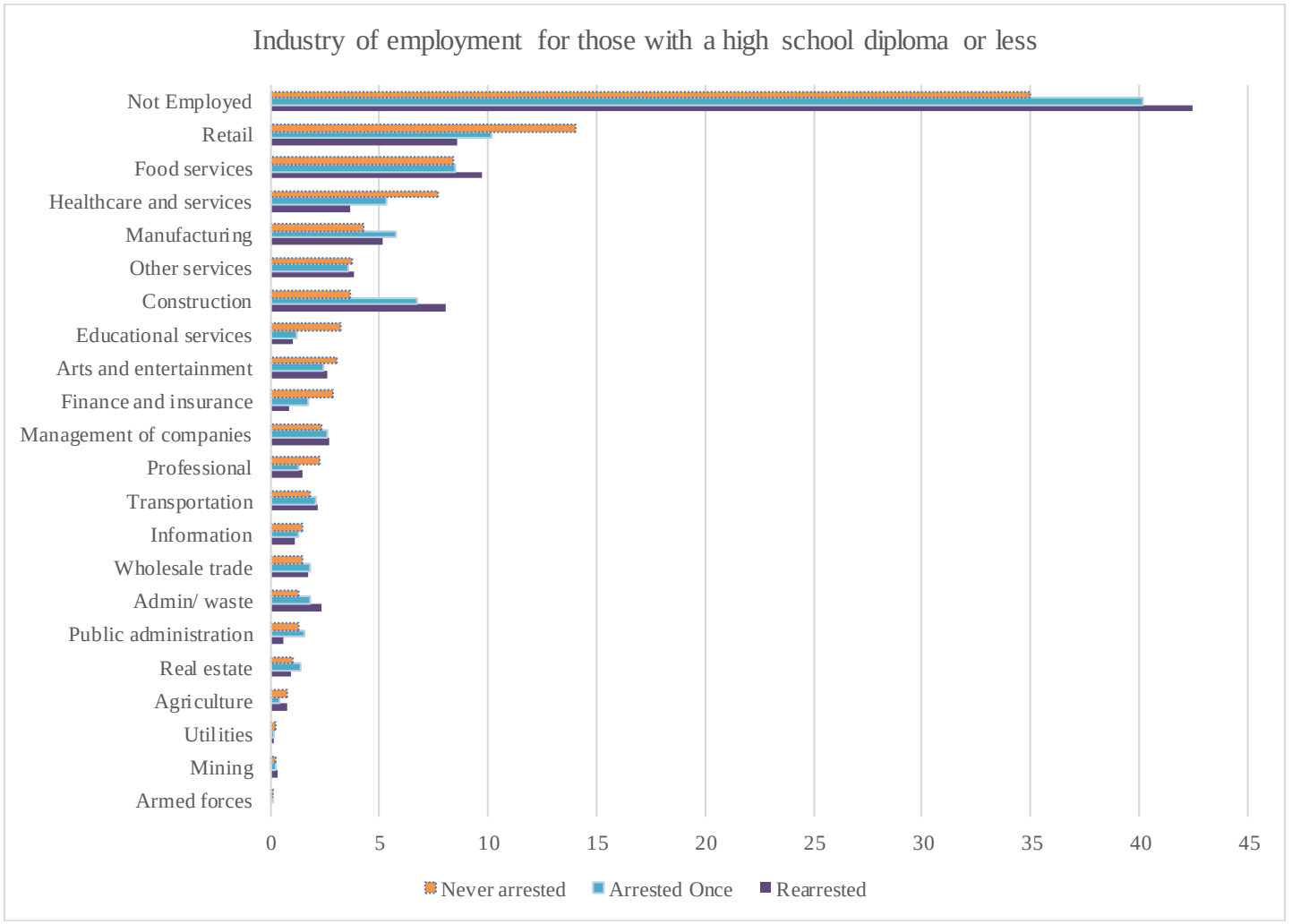
Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates, and a control for year. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Table 12b Likelihood of rearrest by industry of employment and offense type**

| | **Model G2** Industry-based employment and job availability by willing industry | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Property | | | Drug | | | Violent | | |
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Industry of employment** | | | | | | | | | |
| Not employed | 0.22 | (0.19) | 1.24 | 0.18 | (0.20) | 1.20 | -0.10 | (0.24) | 0.90 |
| Construction | -0.27 | (0.26) | 0.76 | -0.31 | (0.25) | 0.74 | **-0.75** | **(0.37)** | **0.47*** |
| Administrative and Waste Management | -0.14 | (0.31) | .87 | -0.03 | (0.27) | 0.97 | -0.11 | (0.38) | 0.90 |
| Manufacturing | 0.10 | (0.24) | 1.10 | -0.09 | (0.24) | 0.92 | -0.29 | (0.33) | 0.75 |
| Retail | 0.13 | (0.19) | 1.14 | -0.16 | (0.20) | 0.85 | -0.05 | (0.26) | 0.95 |
| Food Services (ref) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other Services | -0.37 | (0.23) | 0.69 | -0.21 | (0.26) | 0.81 | -0.40 | (0.32) | 0.67 |
| Transportation and Warehousing | 0.06 | (0.28) | 1.06 | 0.04 | (0.30) | 1.04 | -0.38 | (0.42) | 0.69 |
| Other Industries | -0.16 | (0.17) | 0.85 | **-0.34** | **(0.17)** | **0.71*** | -0.26 | (0.22) | 0.77 |
| **Viable job availability by willing industry** | | | | | | | | | |
| Construction | **0.04** | **(0.02)** | **1.04*** | 0.01 | (0.01) | 1.01 | 0.01 | (0.01) | 1.01 |
| Administrative and Waste Management | 0.0072 | (0.01) | 1.01 | 0.00 | (0.01) | 1.00 | **0.05** | **(0.02)** | **1.05*** |
| Manufacturing | 0.0128 | (0.02) | 1.01 | 0.01 | (0.01) | 1.01 | 0.02 | (0.02) | 1.02 |
| Retail | -0.01 | (0.03) | 0.99 | 0.02 | (0.02) | 1.02 | -0.06 | (0.04) | 0.94 |
| Food Services | -0.006 | (0.02) | 0.99 | -0.01 | (0.02) | 0.99 | 0.01 | (0.02) | 1.01 |
| Other Services | -0.085 | (0.07) | 0.92 | **-0.16** | **(0.08)** | **0.85*** | -0.06 | (0.01) | 0.94 |
| Transportation and Warehousing | -0.015 | (0.04) | 0.98 | -0.02 | (0.04) | 0.98 | -0.07 | (0.06) | 0.93 |
| *Log Likelihood* | *-5906.57* | | | *-5726.34* | | | *-3352.98* | | |

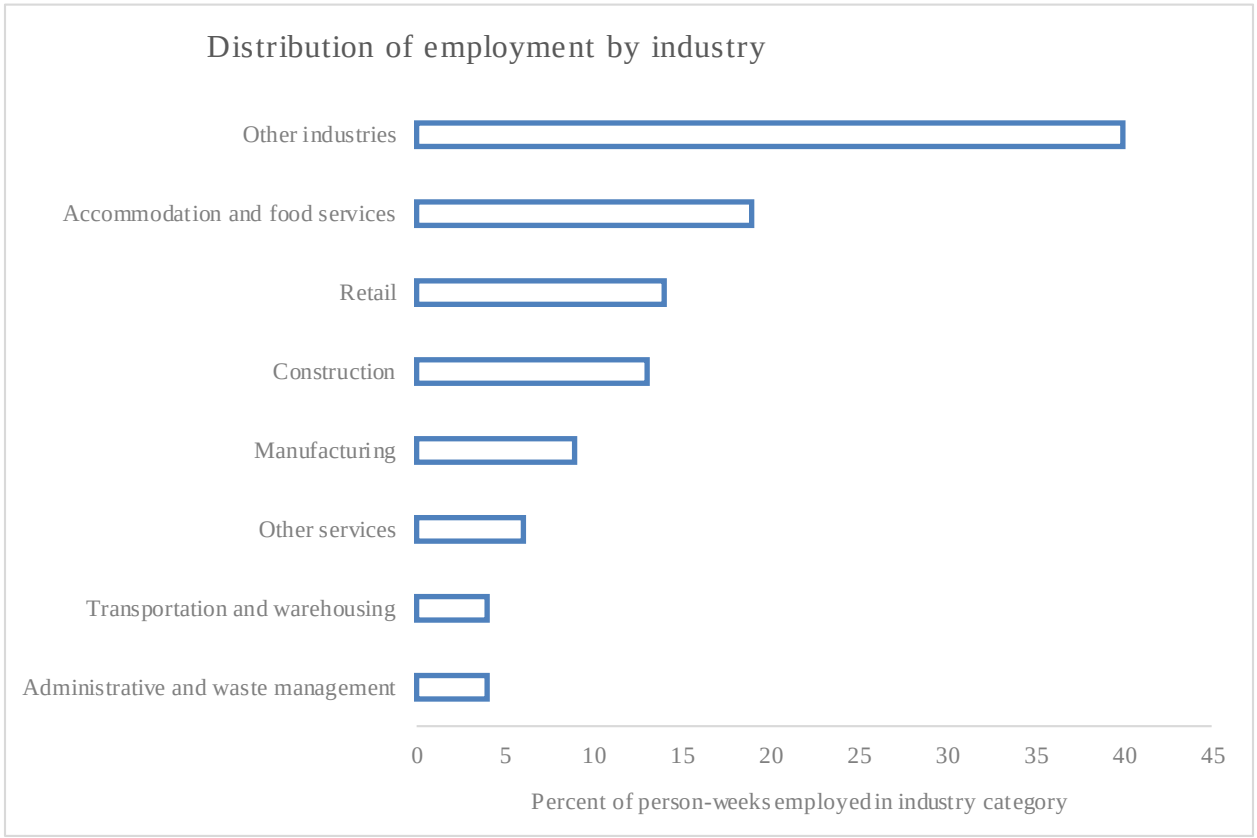
Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. All models show logit coefficients, standard errors and odds ratios (OR). The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend, individual-level covariates, county level-covariates, and a control for year. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Figure 1 Industry of employment for those with a high school diploma or less, by arrest group**




Source: NLSY97 rounds 1 through 15; *N* = 8,680; *NT* = 4,303,185 person-weeks. The sample is limited to individuals with no more than a high school diploma and individuals with any work experience over the 15 years in the study.

**Figure 2 Distribution of employment by industry**

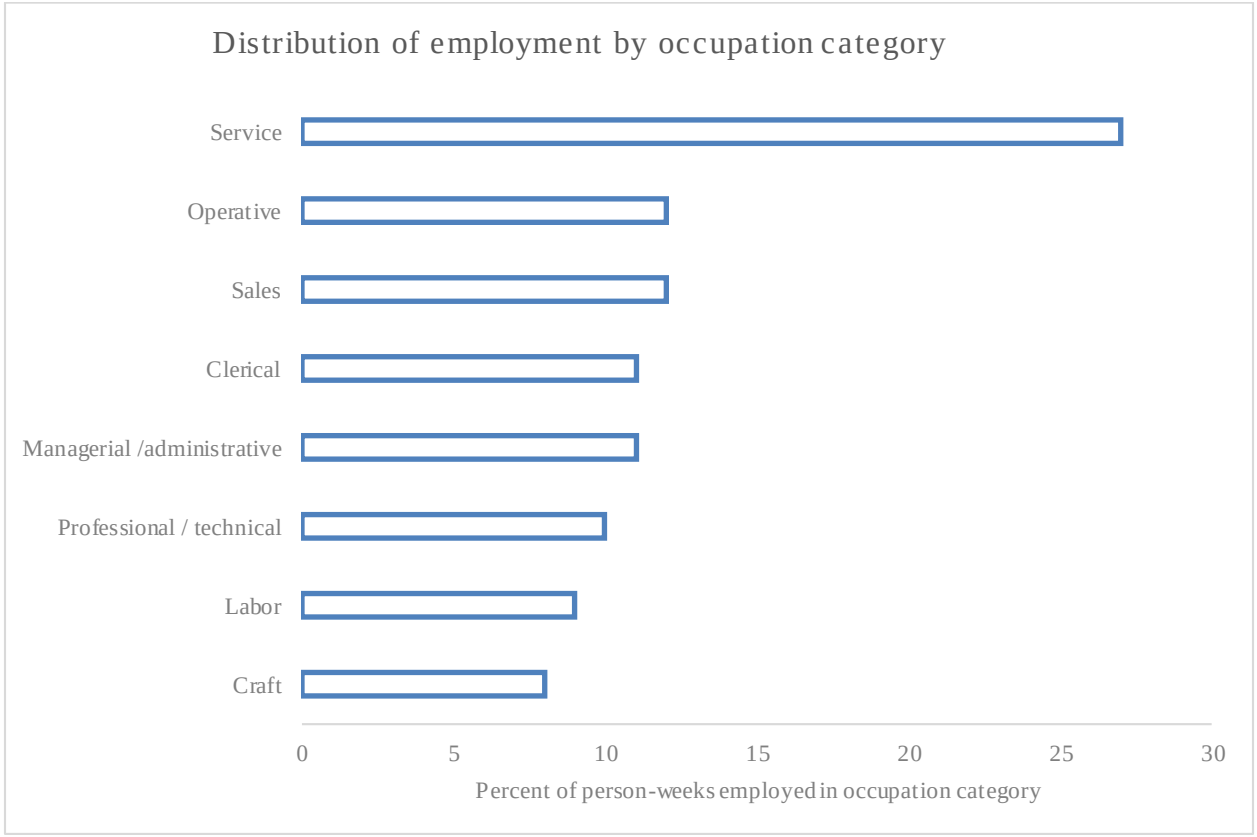



Source: NLSY97. Descriptive statistics are shown only for person-months in which respondents are employed (*NT* = 882,540).

**Figure 3 Bivariate relationship between industry and rearrest**

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. Graph shows odds ratios from bivariate models and can be interpreted as increased or decreased odds of being rearrested, relative to the odds of being rearrested when unemployed. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Figure 4 Distribution of employment by occupational category**

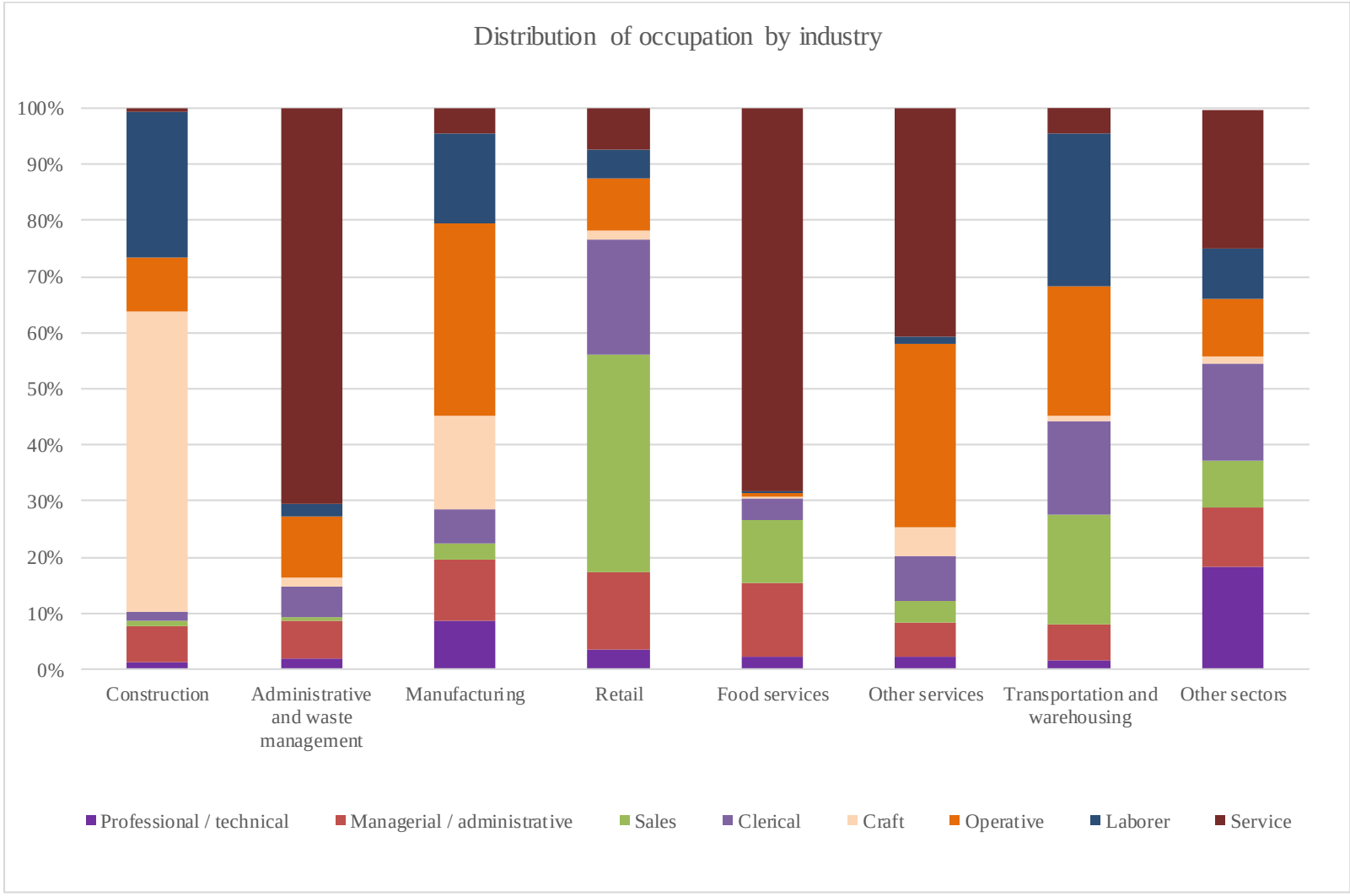



Source: NLSY97. Descriptive statistics are shown only for person-months in which respondents are employed (*NT*=882,540).

**Figure 5 Bivariate relationship between occupation and rearrest**

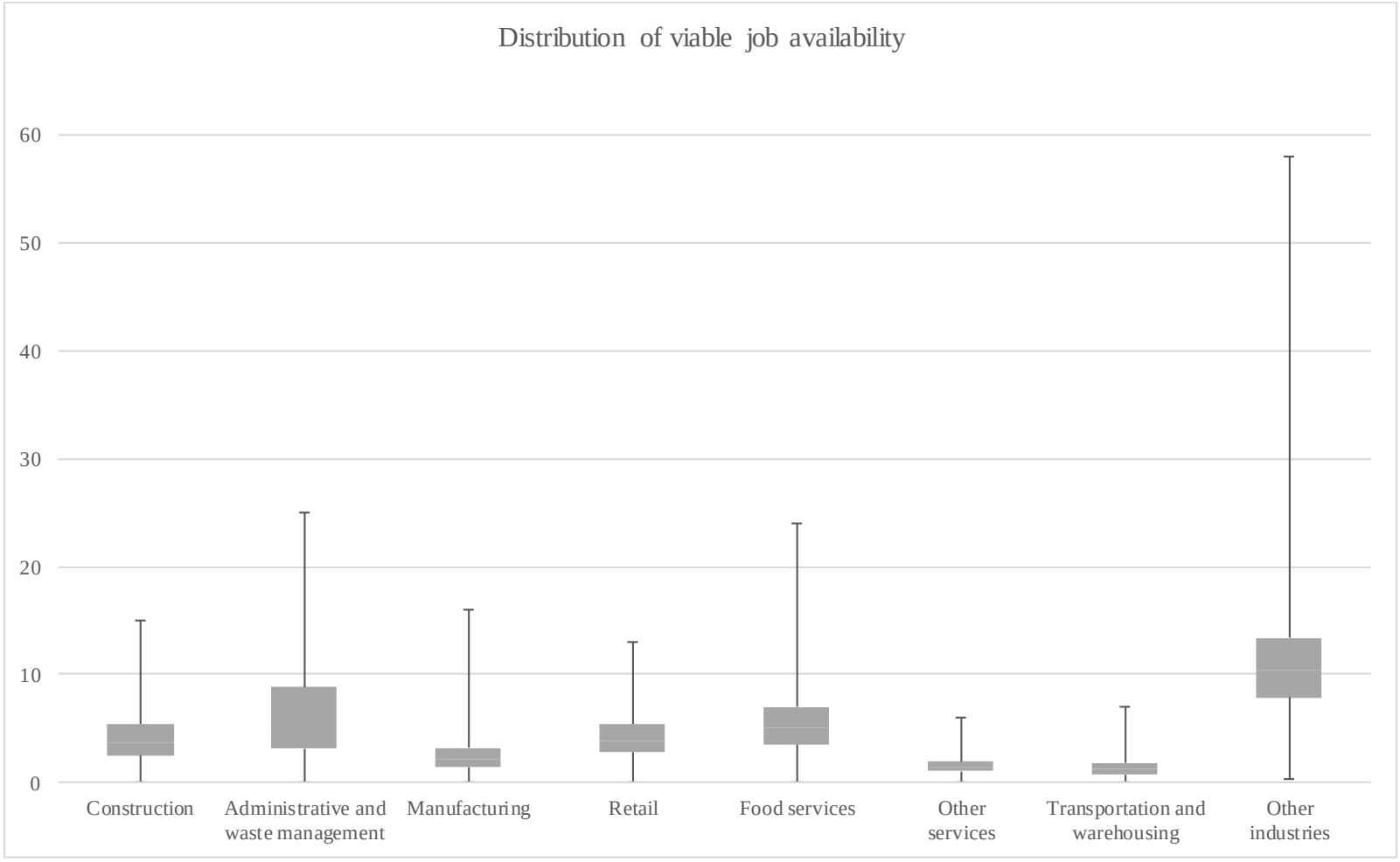
Source: NLSY97. $N$ = 2,914, $NT$ = 1,441,566 person-weeks. Graph shows odds ratios from bivariate models and can be interpreted as increased or decreased odds of being rearrested, relative to the odds of being rearrested when unemployed. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Figure 6 Distribution of occupation by industry**



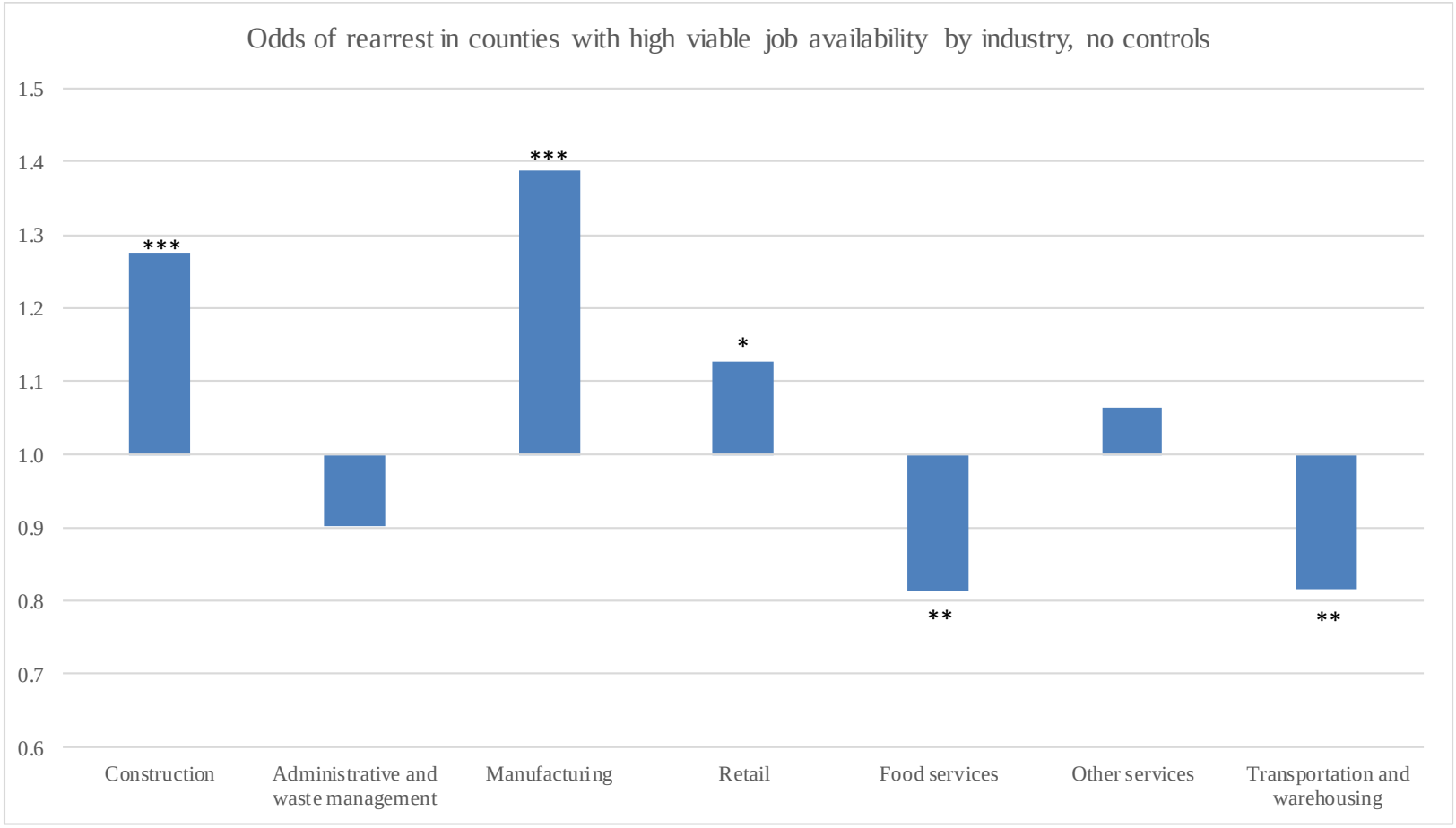

Source: NLSY97. Descriptive statistics are shown only for person-months in which respondents are employed (*NT*=882,540).

**Figure 7 Distribution of viable new hires by industry**



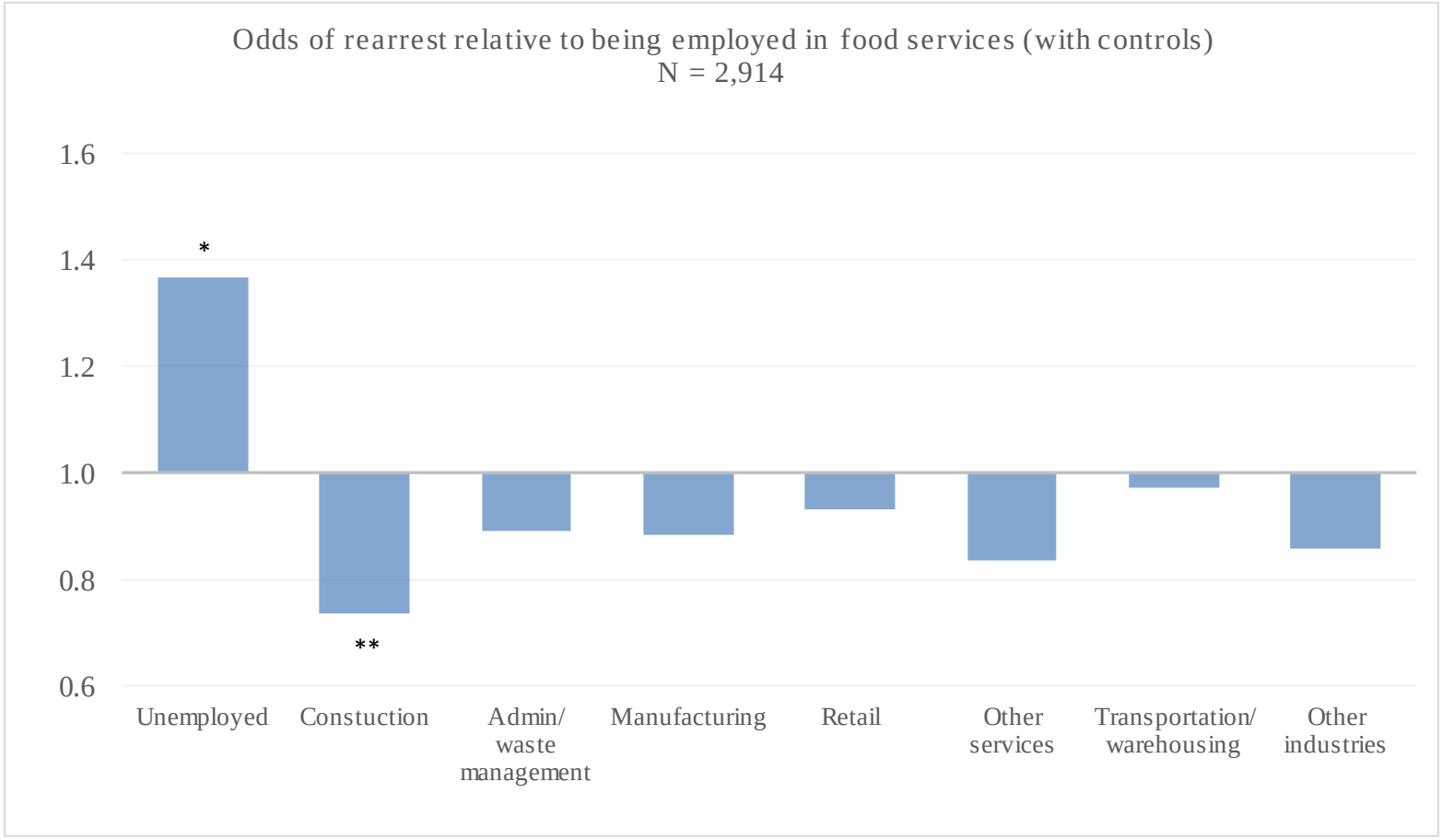

Source: QWI 1998-2011. $N$ = 2,914, $NT$ = 1,441,566 person-weeks.

**Figure 8 Relationship between viable job availability by industry and rearrest**



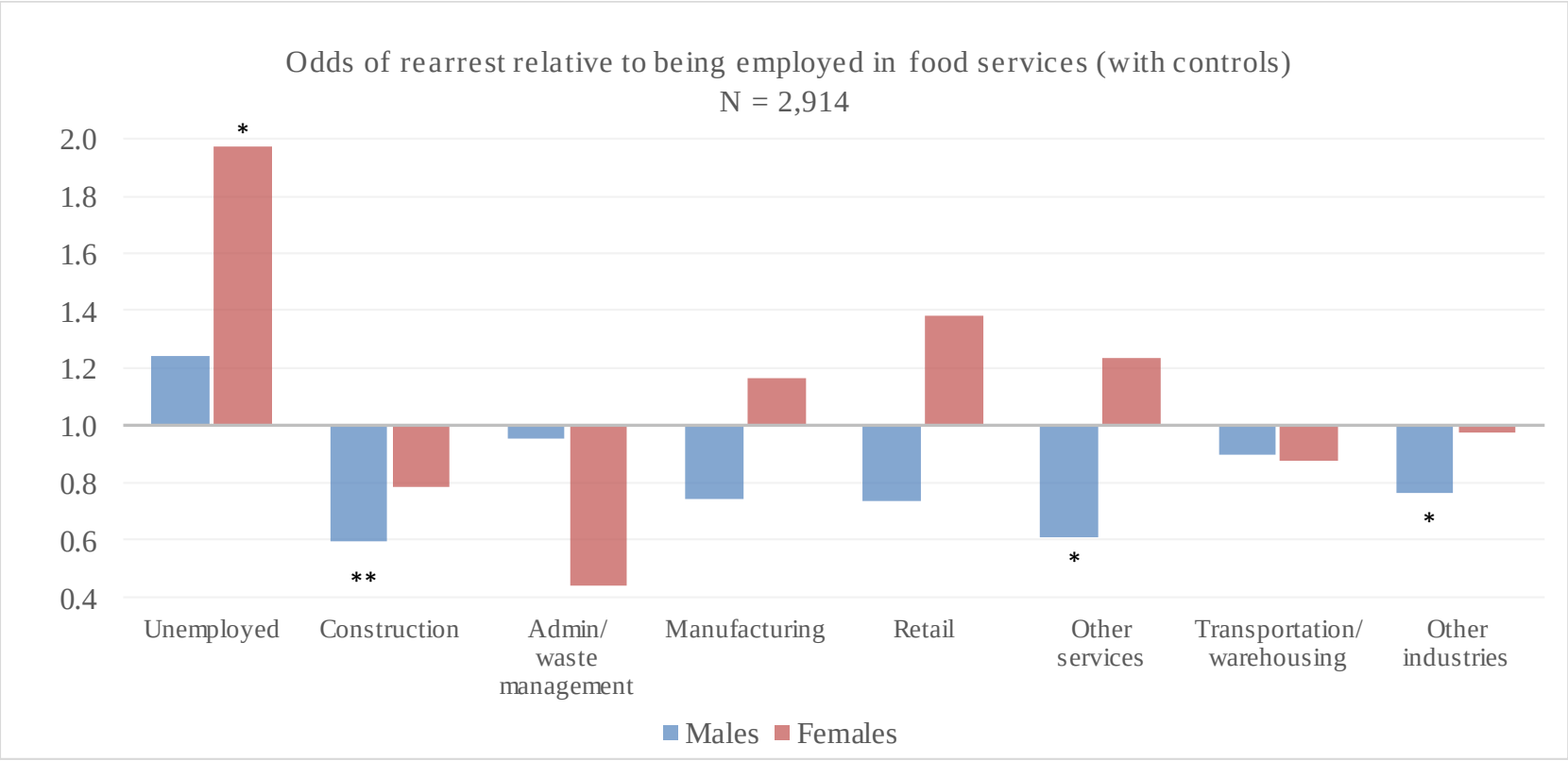

Source: QWI 1998–2011. Note: $N$ = 2,914, $NT$ = 1,441,566 person-weeks. High job availability was defined as counties with a greater number of new hires in viable jobs in a given county-quarter relative to median number of new hires in that industry. Graph can be interpreted as odds of being rearrested for counties with high viable job availability in each of the seven typically willing industries. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Figure 9 Relationship between industry of employment and rearrest**



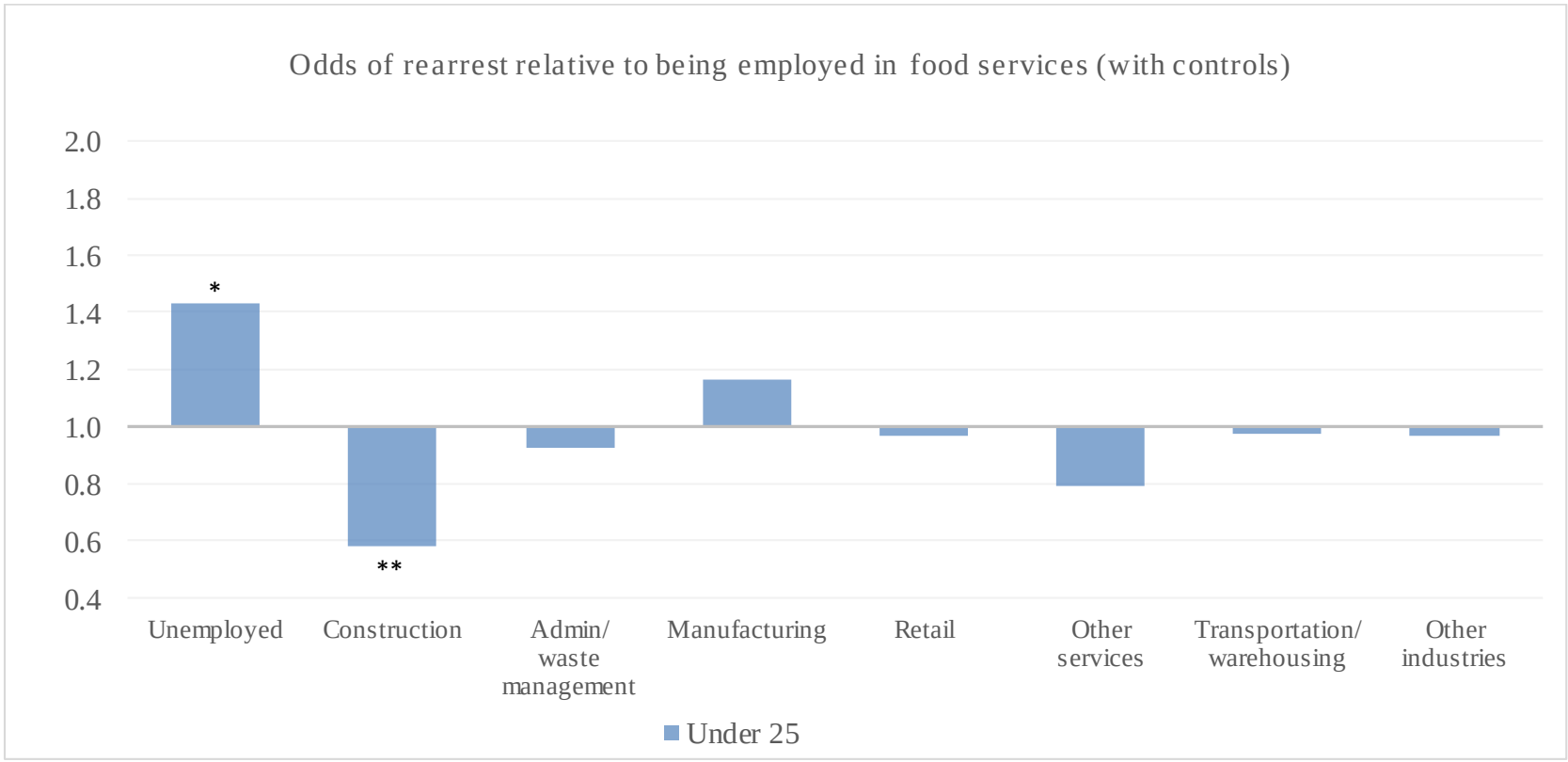

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. *N* = 2,914, *NT* = 1,441,566 person-weeks. Graph shows odds ratios and can be interpreted as increased or decreased odds of being rearrested relative to a shift from working in the food services industry. For example, a shift from working in food services to construction was associated with 42 percent lower odds of rearrest. * p < .05, ** p < .01, *** p < .001 (two-tailed tests).

**Figure 10 Relationship between industry of employment and rearrest, by gender**



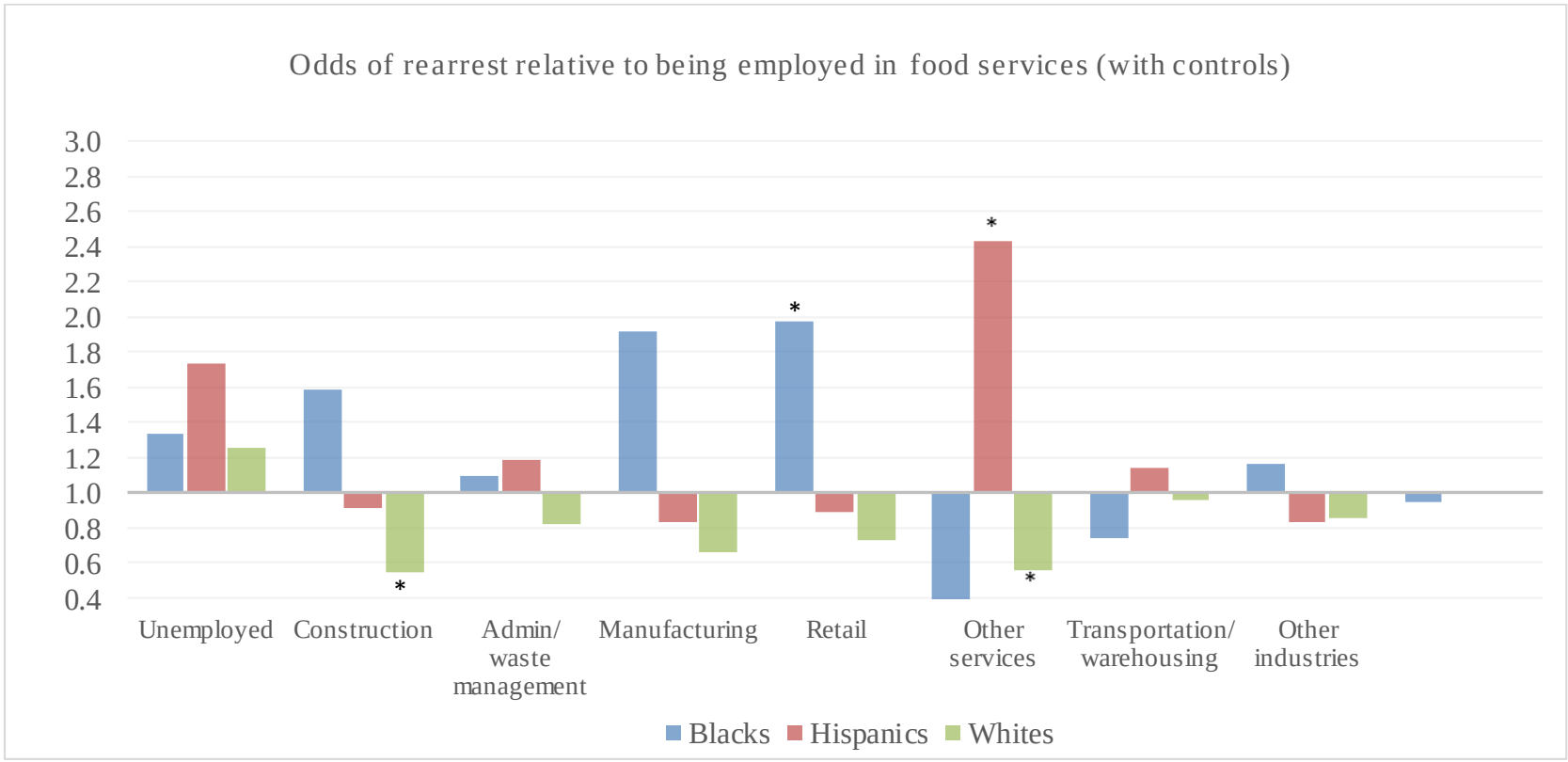

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. *N* = 2,914, *NT* = 1,441,566 person-weeks including 2,015 males and 899 females. Graph shows odds ratios and can be interpreted as increased or decreased odds of being rearrested, relative to a shift from working in the food services industry. For example, among males a shift from working in food services to construction was associated with 42 percent lower odds of rearrest. Meanwhile, among females, a shift from working in food services to being unemployed was associated with 97 percent higher odds of rearrest. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests)

**Figure 11 Relationship between industry of employment and rearrest for those under 25-years-old**




Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. *NT* = 786,254 person–weeks contributed by individuals under age 25. Graph shows odds ratios and can be interpreted as increased or decreased odds of being rearrested, relative to a shift from working in the food services industry. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).

**Figure 12 Relationship between industry of employment and rearrest, by race and ethnicity**




Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N$ = 2,914, $NT$ = 1,441,566 person-weeks contributed by 873 black, Non-Hispanics; 1,325 white, Non-Hispanics; and 625 Hispanics ("Other race" Non-Hispanic (n = 91) are excluded from these subgroup analyses due to small sample sizes). Graph shows odds ratios and can be interpreted as increased or decreased odds of being rearrested, relative to a shift from working in the food services industry. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests)

# X. APPENDICES

## Appendix A1 Bureau of Labor Descriptions of Industries

| Industry | Description |
|---|---|
| Construction | The construction industry comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this industry.<br><br>Construction work done may include new work, additions, alterations, or maintenance and repairs. Activities of these establishments generally are managed at a fixed place of business, but they usually perform construction activities at multiple project sites. Production responsibilities for establishments in this industry are usually specified in (1) contracts with the owners of construction projects (prime contracts) or (2) contracts with other construction establishments (subcontracts). |
| Administrative and Support and Waste Management and Remediation | The Administrative and Support and Waste Management and Remediation Services industry comprises establishments performing routine support activities for the day-to-day operations of other organizations. These essential activities are often undertaken in-house by establishments in many sectors of the economy. The establishments in this industry specialize in one or more of these support activities and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include: office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services. |
| Manufacturing | The Manufacturing industry comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products.<br><br>Establishments in the Manufacturing industry are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the worker's home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this industry. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing. |

**Appendix A1: Bureau of Labor Descriptions of Industries (continued)**

| Industry | Description |
|---|---|
| Retail Trade | The Retail Trade industry comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.<br><br>The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This industry comprises two main types of retailers: store and nonstore retailers.<br><br>1. Store retailers operate fixed point-of-sale locations, located and designed to attract a high volume of walk-in customers. In general, retail stores have extensive displays of merchandise and use mass-media advertising to attract customers. They typically sell merchandise to the general public for personal or household consumption, but some also serve business and institutional clients. In addition to retailing merchandise, some types of store retailers are also engaged in the provision of after-sales services, such as repair and installation.<br><br>2. Nonstore retailers, like store retailers, are organized to serve the general public, but their retailing methods differ. The establishments of this subsector reach customers and market merchandise with methods, such as the broadcasting of "infomercials," the broadcasting and publishing of direct-response advertising, the publishing of paper and electronic catalogs, door-to-door solicitation, in-home demonstration, selling from portable stalls (street vendors, except food), and distribution through vending machines. |
| Accommodation and Food Services | The Accommodation and Food Services industry comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. The industry includes both accommodation and food services establishments because the two activities are often combined at the same establishment. |
| Transportation and Warehousing | The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline. |
| Services (other than public administration) | The Other Services (except Public Administration) industry comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system. Establishments in this industry are primarily engaged in activities, such as equipment and machinery repairing, promoting or administering religious activities, grantmaking, advocacy, and providing dry-cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services. |

Source: North American Industry Classification System; accessed on Bureau of Justice Statistics website on August 28, 2015: http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2002

## Appendix B1 The North American Industry Classification System (NAICS) Structure

| The Hierarchical Structure | | Example | |
|---|---|---|---|
| XX | Economic industry sector (20 broad categories) | 44-45 | Retail Trade |
| XXX | Subsector | 441 | Motor Vehicle and Parts Dealer |
| XXXX | Industry group | 4412 | Other Motor Vehicle Dealers |
| XXXXX | Industry | 44122 | Motorcycle, Boat, and Other Motor Vehicle Dealers |
| XXXXXX | U.S., Canadian or Mexican National specific | 441221 | Motorcycle, ATV, and Personal Watercraft Dealers |

Source: https://www.census.gov/eos/www/naics/faqs/faqs.html#q1. NAICS industries are identified by a 6-digit code where the first two digits indicate the industry sector, the third digit indicates the subsector, the fourth digit indicates the industry group and the fifth digit indicates the NAICS industry. The sixth digit, where used, identifies subdivisions of NAICS industries that accommodate user needs in individual countries across North America. Thus, 6-digit U.S. codes may differ from counterparts in Canada or Mexico, but at the 5-digit level, they are standardized.

**Appendix C1 The North American Industry Classification System (NAICS) Supersectors, Industry sectors, and Subsectors**

| **Goods-Producing Domain** | |
|---|---|
| **Supersector** | Natural Resources and Mining (11, 21) |
| **Industry Sector** | Agriculture, Forestry, Fishing and Hunting (NAICS 11) |
| **Subsectors** | Crop Production (NAICS 111)<br>Animal Production (NAICS 112)<br>Forestry and Logging (NAICS 113)<br>Fishing, Hunting and Trapping (NAICS 114)<br>Support Activities for Agriculture and Forestry (NAICS 115) |
| **Industry Sector** | Mining, Quarrying, and Oil and Gas Extraction (NAICS 21) |
| **Subsectors** | Oil and Gas Extraction (NAICS 211)<br>Mining (except Oil and Gas) (NAICS 212)<br>Support Activities for Mining (NAICS 213) |
| **Supersector** | Construction (23) |
| **Industry Sector** | Construction (NAICS 23) |
| **Subsectors** | Construction of Buildings (NAICS 236)<br>Heavy and Civil Engineering construction (NAICS 237)<br>Specialty Trade Contractors (NAICS 238) |
| **Supersector** | Manufacturing (31-33) |
| **Industry Sector** | Manufacturing (NAICS 31-33) |
| **Subsectors** | Food Manufacturing (NAICS 311)<br>Beverage and Tobacco Product Manufacturing (NAICS 312)<br>Textile Mills (NAICS 313)<br>Textile Product Mills (NAICS 314)<br>Apparel Manufacturing (NAICS 315)<br>Leather and Allied Product Manufacturing (NAICS 316)<br>Wood Product Manufacturing (NAICS 321)<br>Paper Manufacturing (NAICS 322)<br>Printing and Related Support Activities (NAICS 323)<br>Petroleum and Coal Products Manufacturing (NAICS 324)<br>Chemical Manufacturing (NAICS 325)<br>Plastics and Rubber Products Manufacturing (NAICS 326)<br>Nonmetallic Mineral Product Manufacturing (NAICS 327)<br>Primary Metal Manufacturing (NAICS 331)<br>Fabricated Metal Product Manufacturing (NAICS 332)<br>Machinery Manufacturing (NAICS 333)<br>Computer and Electronic Product Manufacturing (NAICS 334)<br>Electrical Equipment, Appliance, and Component Manufacturing (NAICS 335)<br>Transportation Equipment Manufacturing (NAICS 336)<br>Furniture and Related Product Manufacturing (NAICS 337)<br>Miscellaneous Manufacturing (NAICS 339) |

## Appendix C1 The North American Sector Classification System (NAICS) Supersectors, Sectors, and Subsectors (continued)

| | |
|---|---|
| **Service-Providing Domain** | |
| **Supersector** | Trade, Transportation, and Utilities (42, 44-45, 48-49, 22) |
| **Industry Sector** | Wholesale Trade (NAICS 42) |
| **Subsectors** | Merchant Wholesalers, Durable Goods (NAICS 423) |
| | Merchant Wholesalers, Nondurable Goods (NAICS 424) |
| | Wholesale Electronic Markets and Agents and Brokers (NAICS 425) |
| **Industry Sector** | Retail Trade (NAICS 44-45) |
| **Subsectors** | Motor Vehicle and Parts Dealers (NAICS 441) |
| | Furniture and Home Furnishings Stores (NAICS 442) |
| | Electronics and Appliance Stores (NAICS 443) |
| | Building Material and Garden Equipment and Supplies Dealers (NAICS 444) |
| | Food and Beverage Stores (NAICS 445) |
| | Health and Personal Care Stores (NAICS 446) |
| | Gasoline Stations (NAICS 447) |
| | Clothing and Clothing Accessories Stores (NAICS 448) |
| | Sporting Goods, Hobby, Book, and Music Stores (NAICS 451) |
| | General Merchandise Stores (NAICS 452) |
| | Miscellaneous Store Retailers (NAICS 453) |
| | Nonstore Retailers (NAICS 454) |
| **Industry Sector** | Transportation and Warehousing (NAICS 48-49) |
| **Subsectors** | Air Transportation (NAICS 481) |
| | Rail Transportation (NAICS 482) |
| | Water Transportation (NAICS 483) |
| | Truck Transportation (NAICS 484) |
| | Transit and Ground Passenger Transportation (NAICS 485) |
| | Pipeline Transportation (NAICS 486) |
| | Scenic and Sightseeing Transportation (NAICS 487) |
| | Support Activities for Transportation (NAICS 488) |
| | Postal Service (NAICS 491) |
| | Couriers and Messengers (NAICS 492) |
| | Warehousing and Storage (NAICS 493) |
| | Utilities (NAICS 22) |

## Appendix C1 The North American Sector Classification System (NAICS) Supersectors, Sectors, and Subsectors (continued)

| | |
|---|---|
| **Supersector** | Information (51) |
| **Industry Sector** | Information (NAICS 51) |
| **Subsectors** | Publishing Industries (except Internet) (NAICS 511)<br>Motion Picture and Sound Recording Industries (NAICS 512)<br>Broadcasting (except Internet) (NAICS 515)<br>Internet Publishing and Broadcasting (NAICS 516)<br>Telecommunications (NAICS 517)<br>Data Processing, Hosting, and Related Services (NAICS 518)<br>Other Information Services (NAICS 519) |
| **Supersector** | Financial Activities (52-53) |
| **Industry Sector** | Finance and Insurance (NAICS 52) |
| | Monetary Authorities - Central Bank (NAICS 521)<br>Credit Intermediation and Related Activities (NAICS 522)<br>Securities, Commodity Contracts, and Other Financial Investments and Related Activities (NAICS 523)<br>Insurance Carriers and Related Activities (NAICS 524)<br>Funds, Trusts, and Other Financial Vehicles (NAICS 525) |
| | Real Estate and Rental and Leasing (NAICS 53) |
| | Real Estate (NAICS 531)<br>Rental and Leasing Services (NAICS 532)<br>Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) (NAICS 533) |
| **Supersector** | Professional and Business Services (54-56) |
| **Industry Sector** | Professional, Scientific, and Technical Services (NAICS 54) |
| | Management of Companies and Enterprises (NAICS 55) |
| **Subsectors** | Administrative and Support and Waste Management and Remediation Services (NAICS 56) |
| | Administrative and Support Services (NAICS 561)<br>Waste Management and Remediation Services (NAICS 562) |
| **Supersector** | Education and Health Services (61, 62) |
| **Industry Sector** | Educational Services (NAICS 61) |
| | Health Care and Social Assistance (NAICS 62) |
| **Subsectors** | Ambulatory Health Care Services (NAICS 621)<br>Hospitals (NAICS 622)<br>Nursing and Residential Care Facilities (NAICS 623)<br>Social Assistance (NAICS 624) |

## Appendix C1 The North American Sector Classification System (NAICS) Supersectors, Sectors, and Subsectors (continued)

| | |
|---|---|
| **Supersector** | Leisure and Hospitality (71, 72) |
| **Industry Sector** | Arts, Entertainment, and Recreation (NAICS 71) |
| **Subsectors** | Performing Arts, Spectator Sports, and Related Industries (NAICS 711)<br>Museums, Historical Sites, and Similar Institutions (NAICS 712)<br>Amusement, Gambling, and Recreation Industries (NAICS 713) |
| **Industry Sector** | Accommodation and Food Services (NAICS 72) |
| **Subsectors** | Accommodation (NAICS 721)<br>Food Services and Drinking Places (NAICS 722) |
| **Supersector** | Other Services (except Public Administration) (81) |
| **Industry Sector** | Other Services (except Public Administration) (NAICS 81) |
| **Subsectors** | Repair and Maintenance (NAICS 811)<br>Personal and Laundry Services (NAICS 812)<br>Religious, Grantmaking, Civic, Professional, and Similar Organizations (NAICS 813)<br>Private Households (NAICS 814) |
| **Supersector** | Government (91-93) |
| **Industry Sector** | Federal Government (NAICS 91) |
| **Industry Sector** | State Government (NAICS 92) |
| **Industry Sector** | Local Government (NAICS 93) |

Source: U.S. Bureau of Labor Statistics. *Industries at a Glance (n.d.)*
http://www.bls.gov/iag/tgs/iag_index_naics.htm

**Appendix D1 NLSY Retention Rates by Sample Type and Gender**

| | Cross-sectional | | Supplemental | | Sample Total | |
|---|---|---|---|---|---|---|
| | **Interviewed** | **Retention rate** | **Interviewed** | **Retention rate** | **Interviewed** | **Retention rate** |
| **Round 2** | | | | | | |
| Male | 3213 | 92.90% | 1070 | 93.90% | 4283 | 93.10% |
| Female | 3066 | 93.20% | 1037 | 94.60% | 4103 | 93.60% |
| **Total** | **6279** | **93.00%** | **2107** | **94.20%** | **8386** | **93.30%** |
| **Round 3** | | | | | | |
| Male | 3144 | 90.90% | 1026 | 90.00% | 4170 | 90.70% |
| Female | 3029 | 92.10% | 1010 | 92.20% | 4039 | 92.10% |
| **Total** | **6173** | **91.50%** | **2036** | **91.10%** | **8209** | **91.40%** |
| **Round 4** | | | | | | |
| Male | 3097 | 89.60% | 1019 | 89.40% | 4116 | 89.50% |
| Female | 2957 | 89.90% | 1007 | 91.90% | 3964 | 90.40% |
| **Total** | **6054** | **89.70%** | **2026** | **90.60%** | **8080** | **89.90%** |
| **Round 5** | | | | | | |
| Male | 3011 | 87.10% | 977 | 85.70% | 3988 | 86.70% |
| Female | 2907 | 88.40% | 987 | 90.10% | 3894 | 88.80% |
| **Total** | **5918** | **87.70%** | **1964** | **87.80%** | **7882** | **87.70%** |
| **Round 6** | | | | | | |
| Male | 2995 | 86.60% | 1002 | 87.90% | 3997 | 86.90% |
| Female | 2903 | 88.30% | 996 | 91.00% | 3899 | 88.90% |
| **Total** | **5898** | **87.40%** | **1998** | **89.40%** | **7896** | **87.90%** |
| **Round 7** | | | | | | |
| Male | 2951 | 85.30% | 977 | 85.70% | 3928 | 85.40% |
| Female | 2831 | 86.10% | 996 | 90.10% | 3826 | 87.30% |
| **Total** | **5782** | **85.70%** | **1972** | **88.20%** | **7754** | **86.30%** |
| **Round 8** | | | | | | |
| Male | 2816 | 81.40% | 916 | 80.40% | 3732 | 81.20% |
| Female | 2784 | 84.70% | 986 | 90.10% | 3771 | 86.00% |
| **Total** | **5600** | **83.00%** | **1902** | **85.10%** | **7502** | **83.50%** |
| **Round 9** | | | | | | |
| Male | 2734 | 79.00% | 932 | 81.70% | 3666 | 79.60% |
| Female | 2703 | 82.20% | 969 | 88.40% | 3672 | 83.80% |
| **Total** | **5437** | **80.10%** | **1901** | **85.00%** | **7338** | **81.70%** |
| **Round 10** | | | | | | |
| Male | 2850 | 82.40% | 953 | 83.40% | 3803 | 82.70% |
| Female | 2774 | 84.30% | 982 | 89.60% | 3756 | 85.70% |
| **Total** | **5624** | **83.30%** | **1935** | **86.50%** | **7559** | **84.10%** |

**Appendix D1 NLSY Retention Rates by Sample Type and Gender (continued)**

| | Cross-sectional | | Supplemental | | Sample Total | |
|---|---|---|---|---|---|---|
| | Interviewed | Retention rate | Interviewed | Retention rate | Interviewed | Retention rate |
| **Round 11** | | | | | | |
| Male | 2803 | 81.00% | 932 | 81.70% | 3735 | 81.20% |
| Female | 2718 | 82.60% | 965 | 88.00% | 3683 | 84.00% |
| **Total** | **5521** | **81.80%** | **1897** | **84.80%** | **7418** | **82.60%** |
| **Round 12** | | | | | | |
| Male | 2819 | 81.40% | 948 | 83.10% | 3767 | 81.90% |
| Female | 2741 | 83.30% | 982 | 89.50% | 3723 | 84.90% |
| **Total** | **5560** | **82.30%** | **1930** | **86.30%** | **7490** | **83.30%** |
| **Round 13** | | | | | | |
| Male | 2835 | 81.90% | 950 | 83.30% | 3785 | 82.30% |
| Female | 2781 | 84.50% | 995 | 90.80% | 3776 | 86.10% |
| **Total** | **5616** | **83.20%** | **1943** | **86.90%** | **7559** | **84.10%** |
| **Round 14** | | | | | | |
| Male | 2816 | 81.4% | 949 | 83.20% | 3765 | 81.80% |
| Female | 2728 | 82.9% | 986 | 89.90% | 3714 | 84.70% |
| **Total** | **5544** | **82.10%** | **1935** | **86.50%** | **7479** | **83.20%** |
| **Round 15** | | | | | | |
| Male | 2792 | 80.7% | 951 | 83.40% | 3743 | 81.40% |
| Female | 2709 | 82.4% | 971 | 88.60% | 3680 | 83.90% |
| **Total** | **5501** | **81.50%** | **1922** | **86.00%** | **7423** | **82.60%** |
| **Round 16 (wave not included in this study)** | | | | | | |
| Male | 2647 | 76.5% | 898 | 78.80% | 3545 | 77.10% |
| Female | 2638 | 80.20% | 958 | 87.40% | 3596 | 82.00% |
| **Total** | **5285** | **78.30%** | **1856** | **83.00%** | **7141** | **79.50%** |

Source: adapted from https://www.nlsinfo.org/content/cohorts/nlsy97/intro-to-the-sample/retention-reasons-non-interview. Retention rate is defined as the percentage of all base-year respondents participating in a given survey. Deceased respondents are included in the calculations.

**Appendix E1 Quarterly Workforce Indicators (QWI): Data Availability by State, 1996-2013**

| 2-digit FIPS code | State | Years available | Quarters with Data | Quarters Missing Data | NLSY97 cases affected | NLSY97 rearrests affected |
|---|---|---|---|---|---|---|
| 01 | Alabama | 2001-2013 | 13 | 5 | 15 | 8 |
| 02 | Alaska | 2000-2013 | 14 | 4 | 3 | 0 |
| 04 | Arizona | 2004-2013 | 10 | 8 | 89 | 31 |
| 05 | Arkansas | 2002-2013 | 12 | 6 | 18 | 4 |
| 06 | California | 1996-2013 | 18 | 0 | 0 | 0 |
| 08 | Colorado | 1996-2013 | 18 | 0 | 0 | 0 |
| 09 | Connecticut | 1996-2013 | 18 | 0 | 0 | 0 |
| 10 | Delaware | 1998-2013 | 16 | 2 | 0 | 0 |
| 11 | District of Columbia | 2005-2013 | 9 | 9 | 0 | 0 |
| 12 | Florida | 1998-2013 | 16 | 2 | 16 | 8 |
| 13 | Georgia | 1998-2013 | 16 | 2 | 0 | 0 |
| 15 | Hawaii | 1996-2013 | 18 | 0 | 0 | 0 |
| 16 | Idaho | 1996-2013 | 18 | 0 | 0 | 0 |
| 17 | Illinois | 1996-2013 | 18 | 0 | 0 | 0 |
| 18 | Indiana | 1998-2013 | 16 | 2 | 0 | 0 |
| 19 | Iowa | 1998-2103 | 16 | 2 | 0 | 0 |
| 20 | Kansas | 1996-2013 | 18 | 0 | 0 | 0 |
| 21 | Kentucky | 2001-2013 | 13 | 5 | 5 | 0 |
| 22 | Louisiana | 1996-2013 | 18 | 0 | 0 | 0 |
| 23 | Maine | 1996-2013 | 18 | 0 | 0 | 0 |
| 24 | Maryland | 1996-2013 | 18 | 0 | 0 | 0 |
| 25 | Massachusetts | 2010-2013 | 4 | 14 | 50 | 35 |
| 26 | Michigan | 2000-2013 | 14 | 4 | 28 | 10 |
| 27 | Minnesota | 1996-2013 | 18 | 0 | 0 | 0 |
| 28 | Mississippi | 2003-2013 | 11 | 7 | 41 | 26 |
| 29 | Missouri | 1996-2013 | 18 | 0 | 0 | 0 |
| 30 | Montana | 1996-2013 | 18 | 0 | 0 | 0 |
| 31 | Nebraska | 1999-2013 | 15 | 3 | 0 | 0 |
| 32 | Nevada | 1998-2013 | 16 | 2 | 0 | 0 |
| 33 | New Hampshire | 2003-2013 | 11 | 7 | 2 | 1 |
| 34 | New Jersey | 1996-2013 | 18 | 0 | 0 | 0 |
| 35 | New Mexico | 1996-2013 | 18 | 0 | 0 | 0 |
| 36 | New York | 2000-2013 | 14 | 4 | 25 | 2 |
| 37 | North Carolina | 1996-2013 | 18 | 0 | 0 | 0 |
| 38 | North Dakota | 1998-2013 | 16 | 2 | 0 | 0 |
| 39 | Ohio | 2000-2013 | 14 | 4 | 17 | 1 |

**Appendix E1 Quarterly Workforce Indicators (QWI): Data Availability by State, 1996-2013 (continued)**

| 2-digit FIPS code | State | Years available | Quarters with Data | Quarters Missing Data | NLSY97 cases affected | NLSY97 rearrest affected |
|---|---|---|---|---|---|---|
| 40 | Oklahoma | 2000-2013 | 14 | 4 | 17 | 1 |
| 41 | Oregon | 1996-2013 | 18 | 0 | 1 | 0 |
| 42 | Pennsylvania | 1997-2013 | 17 | 1 | 0 | 0 |
| 44 | Rhode Island | 1996-2013 | 18 | 0 | 0 | 0 |
| 45 | South Carolina | 1998-2013 | 16 | 2 | 0 | 0 |
| 46 | South Dakota | 1998-2013 | 16 | 2 | 0 | 0 |
| 47 | Tennessee | 1998-2013 | 16 | 2 | 0 | 0 |
| 48 | Texas | 1996-2013 | 18 | 0 | 0 | 0 |
| 49 | Utah | 1999-2013 | 15 | 3 | 1 | 0 |
| 50 | Vermont | 2000-2013 | 14 | 4 | 10 | 0 |
| 51 | Virginia | 1998-2013 | 16 | 2 | 2 | 0 |
| 53 | Washington | 1996-2013 | 18 | 0 | 0 | 0 |
| 54 | West Virginia | 1999-2013 | 15 | 3 | 0 | 0 |
| 55 | Wisconsin | 1996-2013 | 18 | 0 | 0 | 0 |
| 56 | Wyoming | 2001-2013 | 13 | 5 | 0 | 0 |
| | | | **Total cases affected** | | 340 | 128 |

Source: QWI 1998-2011

## Appendix F1 Variable Definitions and Models

| | | | A1 | B1 | B2 | C1 | C2 | D1/D2 E1/E2 F1/F2 G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| **Dependent Measures** | | | | | | | | |
| Rearrest | Dichotomous - coded 1 if individual was rearrested for any crime and 0 if not rearrested measured weekly | NLSY97 | X | X | X | X | X | X |
| **Time Varying Predictors** | | | | | | | | |
| **Industry of employment**[41] | | | | | | | | |
| Construction | Dichotomous - coded 1 if employed in construction (23) | NLSY97 | X | X | | X | X | X |
| Administrative and Support and Waste Management and Remediation Services | Dichotomous - coded 1 if employed in Administrative and Support and Waste Management and Remediation Services (56) | NLSY97 | X | X | | X | X | X |
| Manufacturing | Dichotomous- coded 1 if employed in Manufacturing (31-33) | NLSY97 | X | X | | X | X | X |
| Retail Trade | Dichotomous - coded 1 if employed in Retail (44-45) | NLSY97 | X | X | | X | X | X |
| Accommodation and Food Services | Dichotomous - coded 1 if employed in Accommodation and Food Services (72) | NLSY97 | X | X | | X | X | X |

[41] Industry of employment is measured weekly. Industry is defined according the 2002 NAICS; the two-digit industry sector code is listed in parentheses in the "Variable description" column.

| | | | A1 | B1 | B2 | C1 | C2 | D1/D2<br>E1/E2<br>F1/F2<br>G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| Other Services except Public Administration | Dichotomous - coded 1 if employed in Other Services (except Public Administration) (81) | NLSY97 | X | X | | X | X | X |
| Transportation and Warehousing | Dichotomous - coded 1 if employed in Transportation and Warehousing (48-49) | NLSY97 | X | X | | X | X | X |
| Other Industries | Dichotomous - coded 1 if employed in any of these 13 industries: Agriculture, Forestry, Fishing and Hunting (11); Mining (21); Utilities (22); Wholesale trade (42); Information (51); Finances and Insurance (52); Real Estate and Rental Leasing (53); Professional, Scientific, and Technical Services (54); Management of Companies and Enterprises (55); Educational Services (61); Health Care and Social Assistance (62); Arts, Entertainment, and Recreation (71); Public Administration (92) | NLSY97 | X | X | | X | X | X |

| | | | A1 | B1 | B2 | C1 | C2 | D1/D2<br>E1/E2<br>F1/F2<br>G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| **Viable job availability** | | | | | | | | |
| Viable job opportunity *across* typically willing industries (at $t-1$) | Number of viable new hires across typically willing industries[42] in a county at quarter $t$-1 per 1,000 working age individuals in the county; viable jobs are defined as those that require no more than a high school diploma | QWI | | X | | X | | D1, E1, F1, G1 |
| Viable job opportunity *by* typically willing industry (at $t-1$) | Series of seven continuous variables indicating the number of viable new hires in each typically willing industry[51] per 1,000 working age individuals in the county at quarter $t$-1; viable jobs are defined as those that require no more than a high school diploma | QWI | | | X | | X | D2, E2, F2, G2 |
| **Individual level controls** | | | | | | | | |
| Age | Age since date of birth (measured weekly) | NLSY97 | X | X | X | X | X | X |
| Marital Status | A dichotomous variable coded 1 if married (measured monthly) | NLSY97 | X | X | X | X | X | X |
| Any Children | A dichotomous variable coded 1 if individual has any children (measured monthly) | NLSY97 | X | X | X | X | X | X |

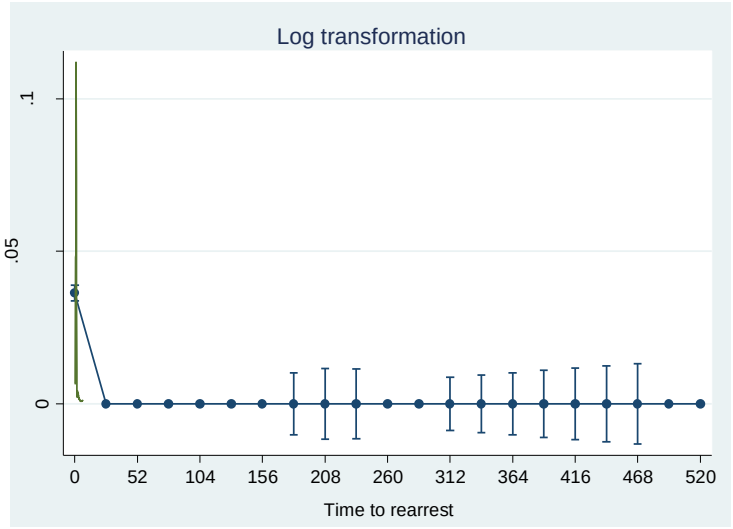
[42] "Typically willing" industries are those that are typically willing to hire people with prior justice contact including construction, administrative support and waste management and remediation services, manufacturing, retail, accommodation and food services, other services, and transportation and warehousing.

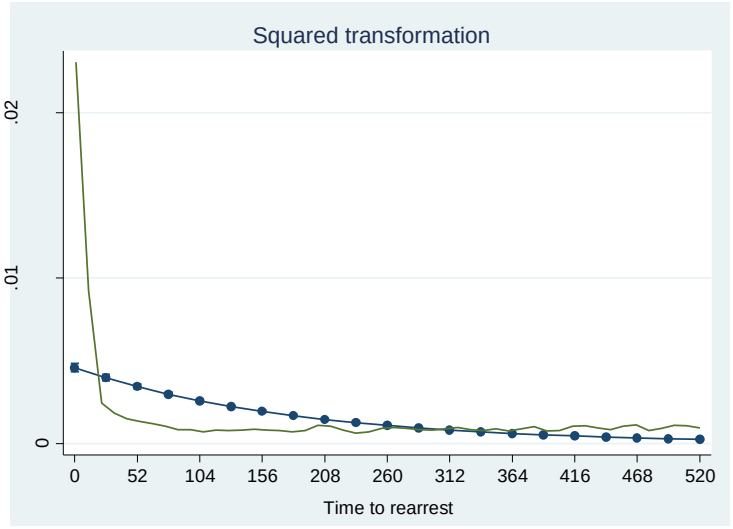
| | | | A1 | B1 | B2 | C1 | C2 | D1/D2<br>E1/E2<br>F1/F2<br>G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| Employed in multiple jobs | A dichotomous variable coded 1 if currently employed in multiple jobs in a given week | NLSY97 | X | X | X | X | X | X |
| Occupation | A series of eight dichotomous variables indicating major occupational classifications per Uggen (1999): (1) professional and technical; (2) managerial and administrative; (3) sales; (4) clerical; (5) craft; (6) operative; (7) laborer; and (8) service (measured weekly). | NLSY97 | X | X | X | X | X | X |
| Education Credentials | A categorical variable coded 0 if no high school diploma or GED; 1 if have high school diploma or GED; and 2 if have any post-secondary education (measured monthly) | NLSY97 | X | X | X | X | X | X |
| Work history | Cumulative number of weeks employed (square root) (measured weekly) | NLSY97 | X | X | X | X | X | X |
| Hard Drug Use | Number of times hard drugs (i.e., not marijuana) was used in past year, measured by round and attributed to months in year | NLSY97 | X | X | X | X | X | X |
| Incarcerated | A dichotomous variable coded 1 if currently incarcerated, measured monthly and attributed to all weeks in a month | NLSY97 | X | X | X | X | X | X |

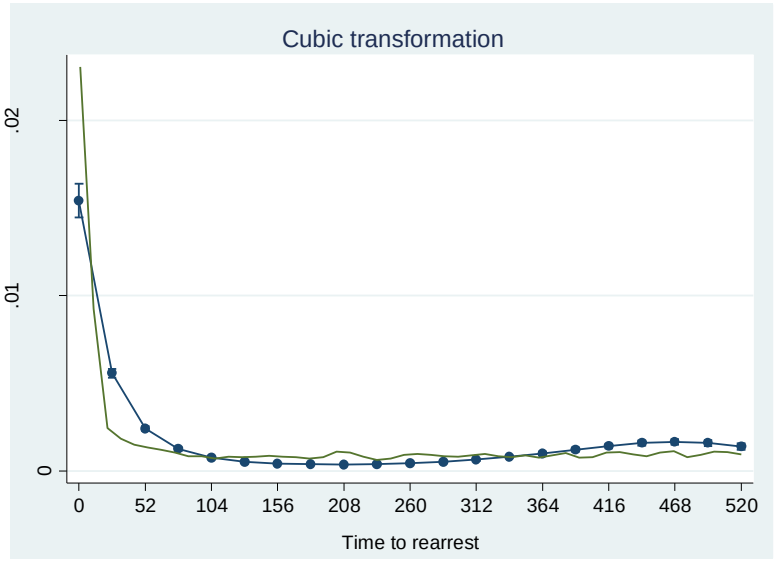
| | | | A1 | B1 | B2 | C1 | C2 | D1/D2<br>E1/E2<br>F1/F2<br>G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| **Geographic and Time controls** | | | | | | | | |
| Crime rate per county population | Total number of index crimes reported (including arson) per 100,000 county residents in 1996 | UCR / Census | X | X | X | X | X | X |
| Arrests rate per county population | Total number of arrests in a county in 1996 per 100,000 county residents in 1996 (includes arrests for non-index crimes such as fraud, gambling, forgery, prostitution). | UCR / Census | X | X | X | X | X | X |
| Police officers per county population | Number of sworn police officers per 100,000 county residents in 1996 | BJS / Census | X | X | X | X | X | X |
| County unemployment rates | Proportion of working age individuals looking for work per 100,000 county residents | BLS | X | X | X | X | X | X |
| County poverty | Percent of households in poverty | BLS | X | X | X | X | X | X |
| County wealth | Median household income | Census | X | X | X | X | X | X |
| State | Series of dichotomous variables coded 1 for each state | NLSY97 | X | X | X | X | X | |
| Non-custody spell time | A cubic measure of time since most recent arrest (non-incarcerated time) | NLSY97 | X | X | X | X | X | X |

| | | | A1 | B1 | B2 | C1 | C2 | D1/D2<br>E1/E2<br>F1/F2<br>G1/G2 |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Variable description** | **Data source** | Industry – based employment | Job availability *across* willing industries | Job availability *by* willing industry | Industry-based employment and job availability *across* willing industries | Industry-based employment and job availability *by* willing industry | Subgroup analyses by gender, age, race/ethnicity, and offense type |
| **Subgroups** | | | | | | | | |
| Male | A dichotomous variable coded 1 if male | NLSY97 | | | | | | D1/D2 |
| Race and ethnicity | A categorical variable coded 1 if black, non-Hispanic; 2 if white, non-Hispanic, 3 if a race other than black white or Hispanic, and 4 if Hispanic | NLSY97 | | | | | | E1/E2 |
| Under 25 years old | A dichotomous variable coded 1 if under 25 years old and 0 if 25 years old or older | NLSY97 | | | | | | F1/F2 |
| Crime Types (historical) | Set of three dichotomous variables =1 if arrest was for violent crime, property crime, drug crime or other crime | NLSY97 | | | | | | G1/G2 |

**Appendix G1 Logarithmic and Polynomial Transformations of Time to Rearrest**

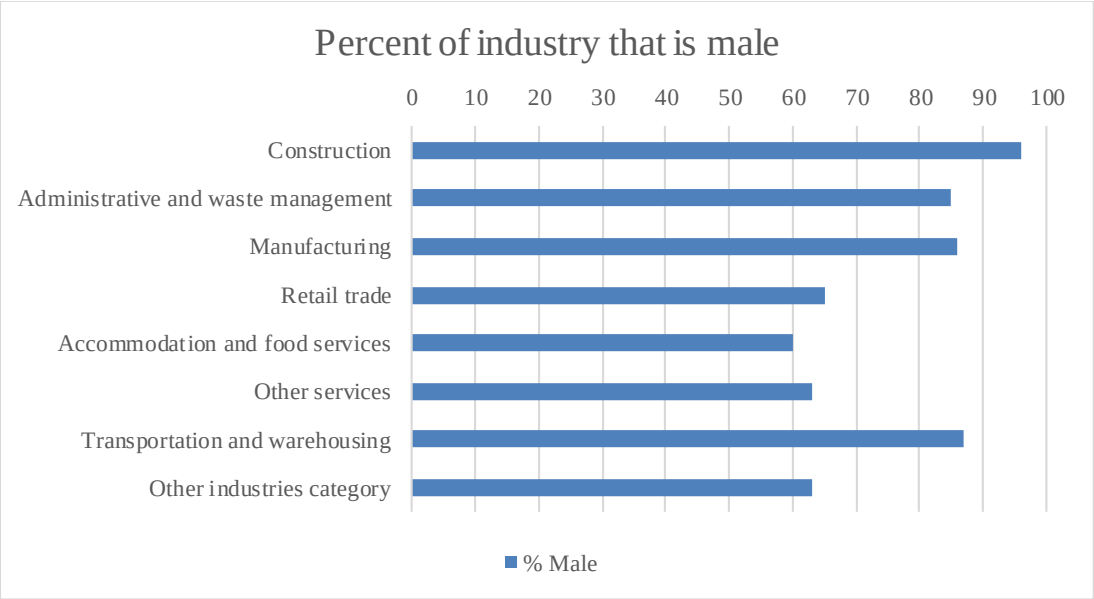


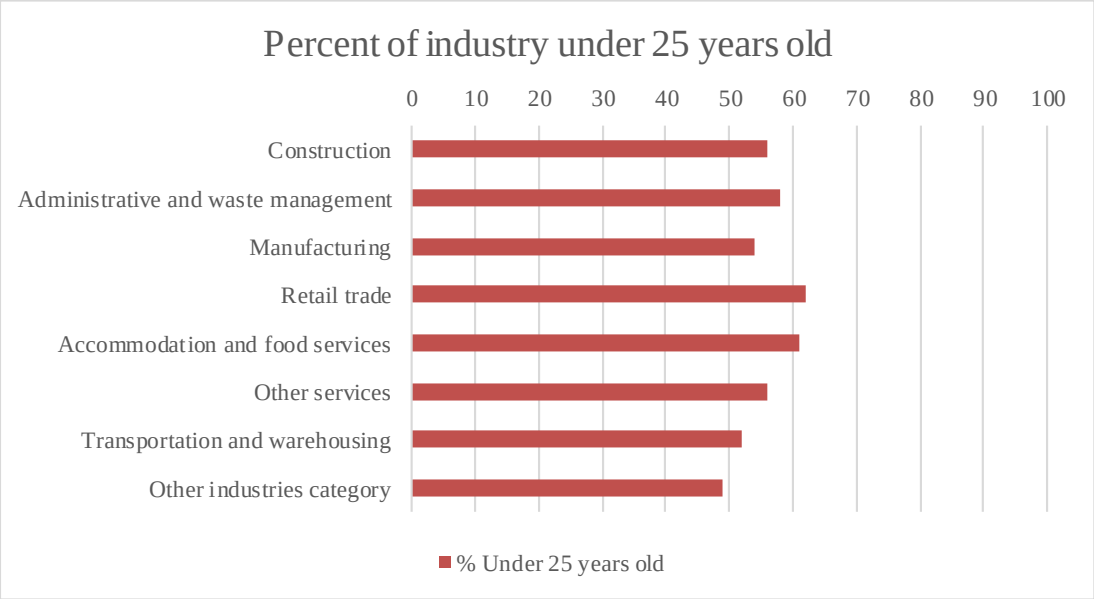




Source: NLSY97

**Appendix H1 Demographic composition of industries within analytic sample**

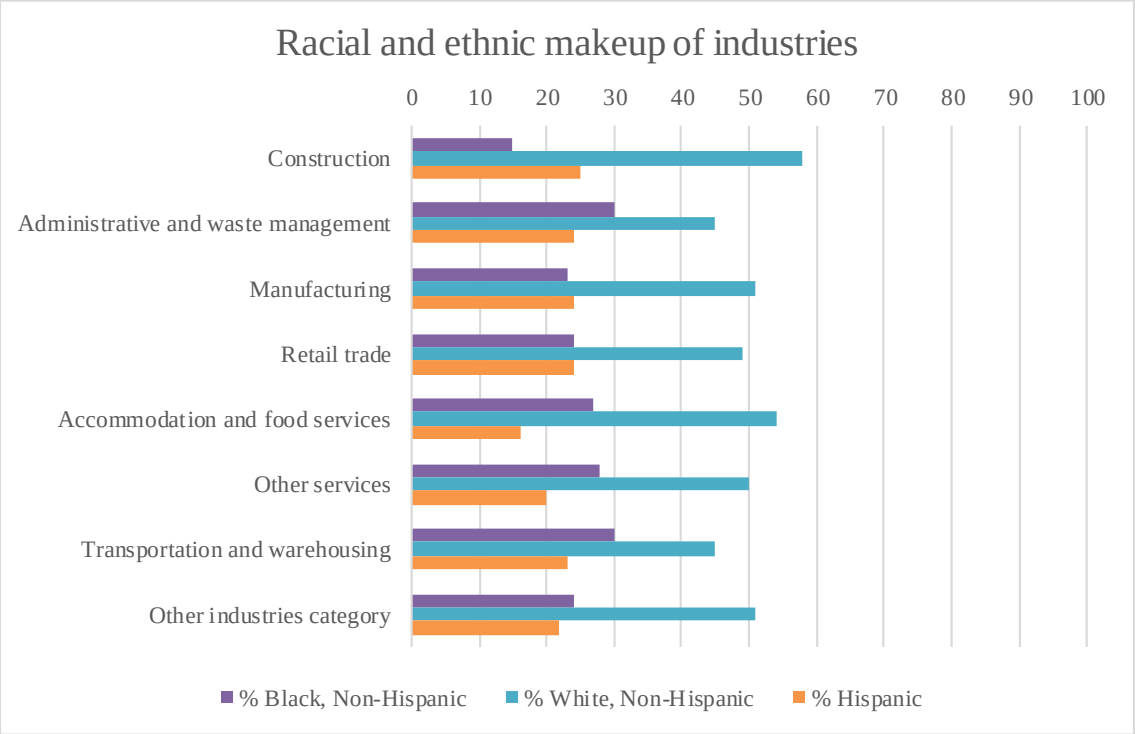



Source: NLSY97

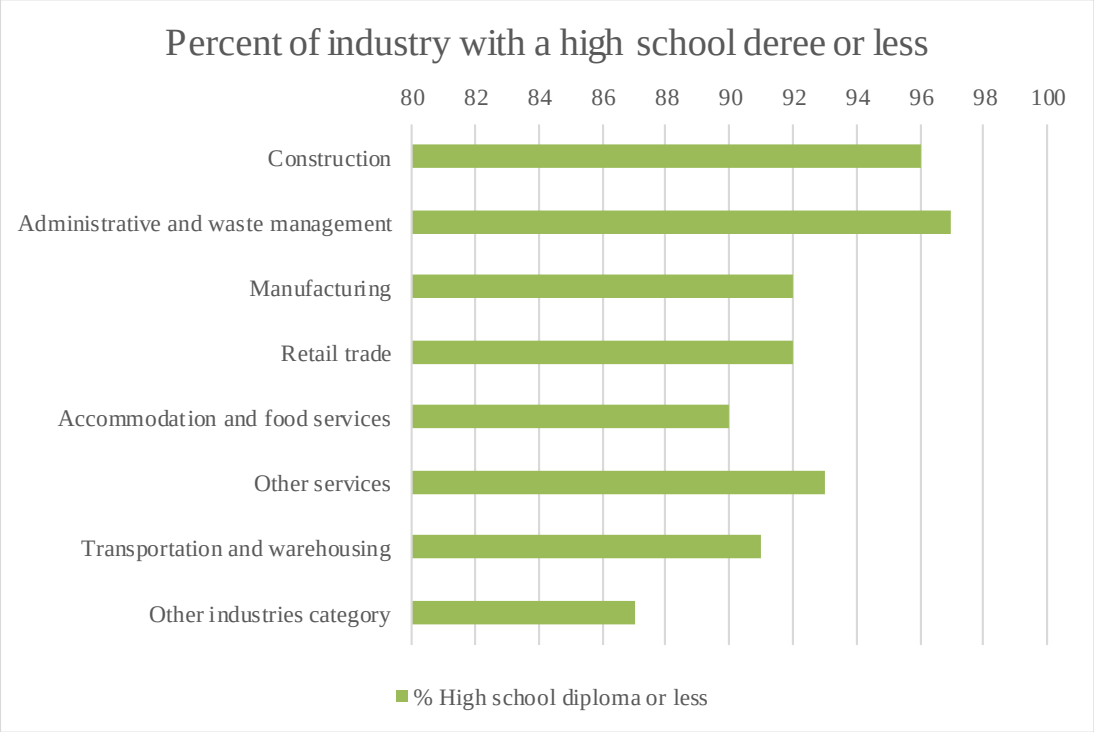



Source: NLSY97

**Appendix H1 Demographic composition of industries within analytic sample (continued)**

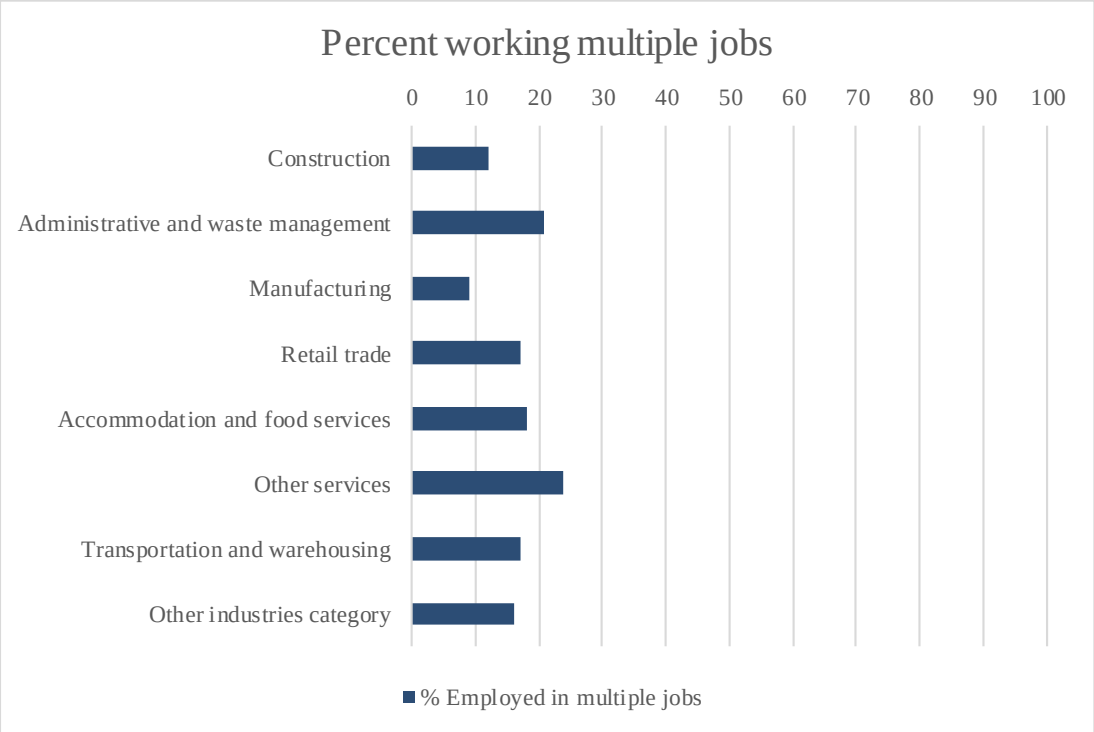



Source: NLSY97



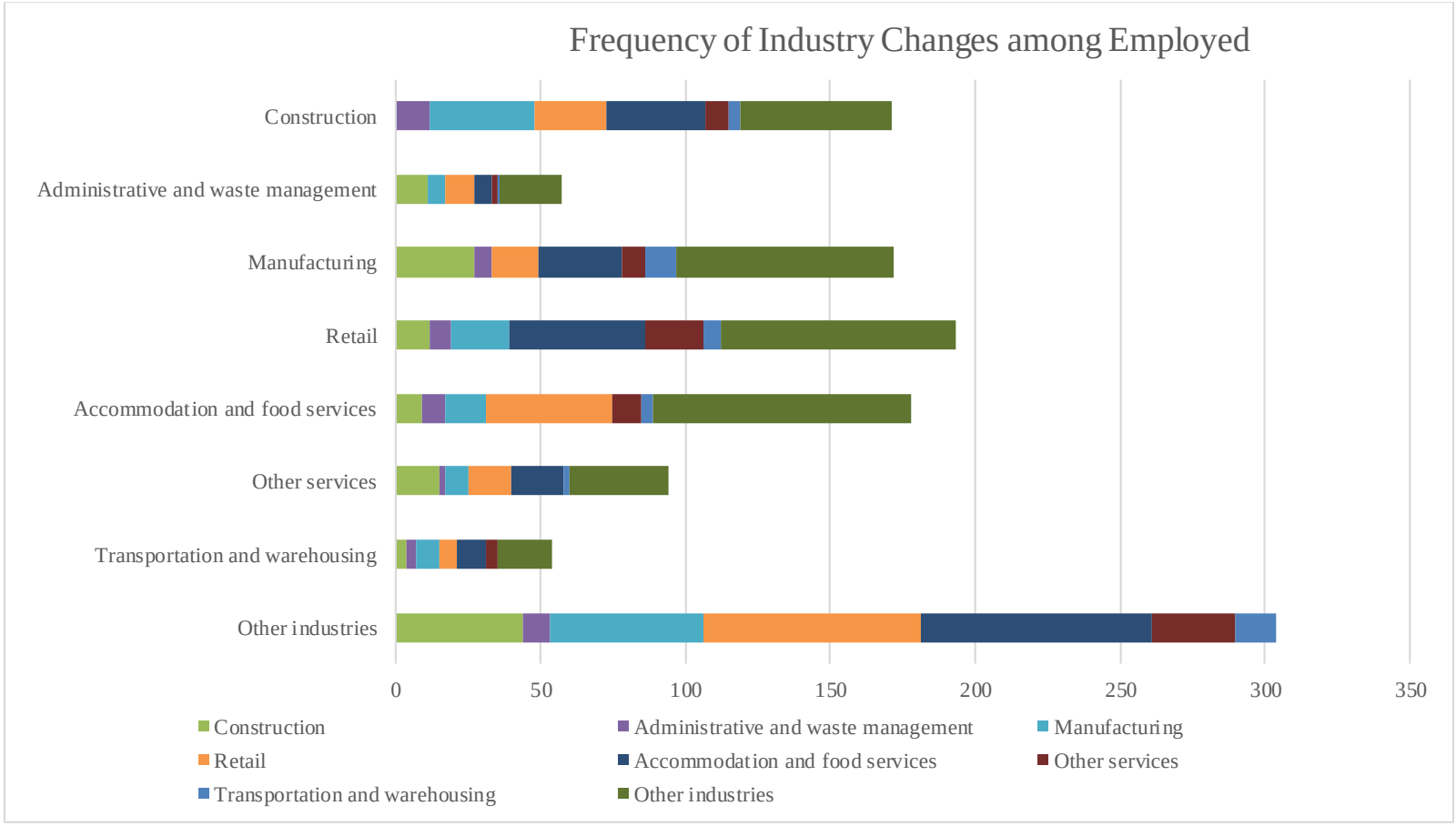

Source: NLSY97

**Appendix H1 Demographic composition of industries within analytic sample (continued)**



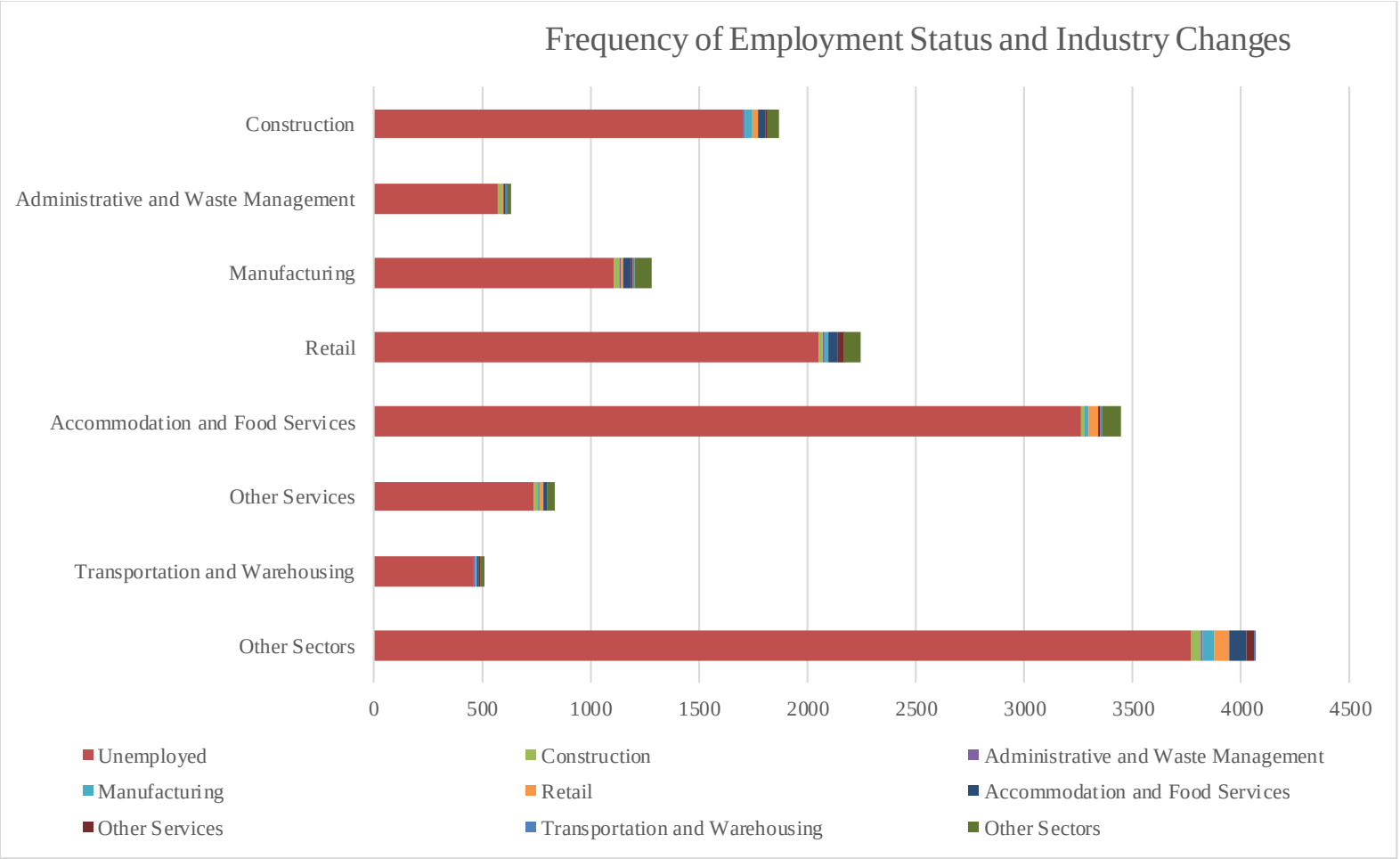

Source: NLSY97

**Appendix I1 Frequency of changes by industry of employment**




Source: NLSY97. Descriptive statistics are shown only for person-months in which respondents are employed (*NT* =882,540).

**Appendix I2 Frequency of changes in employment status and industry over time**




Source: NLSY97. $N$ = 2,914, $NT$ = 1,441,566 person-weeks.

**Appendix J1 Supplemental analyses of the relationship between industry and occupation and job availability for blacks**

| | Industry only | | | Industry and occupation | | |
|---|---|---|---|---|---|---|
| | Coeff. (S.E.) | | OR | Coeff. (S.E.) | | OR |
| **Industry of employment ‡** | | | | | | |
| Unemployed (ref) | | | | | | |
| Construction | 0.06 | (0.27) | 1.06 | 0.65 | (0.47) | 1.92 |
| Administrative and Waste Management | -0.24 | (0.35) | 0.79 | 0.33 | (0.47) | 1.39 |
| Manufacturing | 0.22 | (0.27) | 1.25 | 0.85 | (0.44) | 2.34 |
| Retail | **0.39** | **(0.21)** | **1.48 ^** | **0.90** | **(0.38)** | **2.45*** |
| Accommodation and Food Services | -0.12 | (0.17) | 0.89 | 0.32 | (0.31) | 1.38 |
| Other Services | -0.66 | (0.35) | 0.52 | -0.06 | (0.47) | 0.94 |
| Transportation and Warehousing | 0.08 | (0.38) | 1.08 | 0.20 | (0.40) | 1.22 |
| Other Industry[a] | **-0.41** | **(0.17)** | **0.66*** | 0.10 | (0.31) | 1.11 |
| **Occupation ‡** | | | | | | |
| Professional/technical | | | | -0.34 | (0.49) | .71 |
| Managerial/administrative | | | | -0.01 | (0.42) | 0.99 |
| Sales | | | | -0.51 | (0.38) | 0.60 |
| Clerical | | | | **-0.76** | **(0.41)** | **0.47 ^** |
| Craft | | | | -0.56 | (0.49) | 0.57 |
| Operative | | | | -0.65 | (0.41) | 0.52 |
| Labor | | | | **-0.71** | **(0.40)** | **0.49 ^** |
| Service | | | | **-0.67** | **(0.35)** | **0.51 ^** |
| *Log likelihood* | *-10553.49* | | | *-3363.98* | | |

Sources: NLSY97; QWI 1998-2011; LAUS 1996-2011; UCR 1996; DLEA 1996; and CPS 1996. $N = 837$ blacks. All models show logit coefficients, standard errors and odds ratios. The logit coefficients represent the probability of rearrest where positive coefficients indicate an increased probability of rearrest and negative coefficients indicate a reduced probability of rearrest. Included in all models but not shown are a time trend and state dummy variables. ^$p < .1$ * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests).