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Abstract

This paper estimates the impact of local labor market conditions on criminal recidivism using rich administrative prison records on over four million offenders released from 43 states between 2000 and 2013. Exploiting each offender's exact date of release, I find that being released to a county with higher low-skilled employment and higher average low-skilled wages significantly decreases the risk of recidivism. The impact of higher wages on recidivism is larger for both black offenders and first-time offenders, and in sectors that report being more willing to hire ex-offenders. These results are robust to individual and county-level controls, policing and corrections activity, and do not appear to be driven by changes in the composition of released offenders during good or bad economic times.
JEL Codes: J23, K14, K40

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1. Introduction

Every week, over 10,000 prisoners are released from federal and state prisons, with over 650,000 offenders returning to their communities each year (Carson and Golinelli 2013). Within three years of release, over two-thirds of released offenders are rearrested, over half are reconvicted, and over 40 percent are returned to custody (Beck and Shipley 1989, Langan and Levin 2002, Durose et al. 2014). As a result, ex-offenders are contributing a growing share to overall crime rates (Rosenfeld et al. 2005). One potential explanation for high recidivism rates is limited labor market opportunities for ex-offenders. Indeed, one year after release, as many as 60 to 75 percent of former offenders are not employed in the legitimate labor market (Petersilia 2003, Visher et al. 2008).

An important question is therefore whether labor market opportunities and economic incentives more broadly affect the recidivism of recently released offenders. The answer to this question is of growing importance given the resources spent on rehabilitation and reentry efforts. Since Congress passed the Second Chance Act in 2007, the federal government alone has spent more than $400 million on reentry programs aimed at reducing recidivism. In recent years, federal and state governments have also considered reforms to reduce the ability of employers to consider criminal history in making hiring decisions. For instance, in April of 2012, the Equal Employment Opportunity Commission issued guidance stating that an employer cannot categorically ban the hiring of a convicted felon unless the disqualification is "job-related" or "consistent with business necessity." In addition, cities and states have begun a movement to limit the ability of employers to ask individuals about their criminal history, or "ban the box," in an effort to aid offender reentry into society.

However, the link between economic conditions and recidivism is theoretically ambiguous. Many cite employment among ex-offenders as a key component of successful reintegration into society (Uggen 2000, Kling 2006), but the vast majority of ex-offenders have low human capital, limited job experience, and suffer from mental and substance abuse issues (Petersilia 2003, Visher et al. 2008), potentially impeding their ability to obtain employment regardless of criminal history. To the extent that individual characteristics such as ability or individual preferences for criminal behavior are the primary determinants of recidivism, stronger labor markets may have little impact on reoffending. In addition, the stigma associated with incarceration (Pager 2003, Holzer et al. 2003) and legal bans in certain occupations suggest that employers may be unwilling to hire ex-offenders compared to other low-skilled workers. On the other hand, ex-offenders may be responsive to opportunities to engage in legitimate work, decreasing the returns to new criminal activity.

Empirically estimating the impact of employment opportunities on recidivism has been ham-

pered by three main problems. First, there are limited panel datasets that link prison spells for the same individual over time due to confidentiality concerns. Second, existing panel datasets contain very small samples, or are restricted to a small number of states that give access to administrative correctional data, making estimates prone to external validity concerns. Third, state-level data often do not identify the local communities that offenders are likely to return to, making it impossible to identify the impact of local labor markets versus aggregate state economic conditions.

To overcome these obstacles, this paper uses new offender-level administrative data on prisoner admissions and releases collected by the Bureau of Justice Statistics (BJS) as part of the National Corrections Reporting Program (NCRP). The NCRP contains data from state Departments of Corrections and Parole and cover persons admitted to state prison, or released from state prison from 2000-2013. In recent years, the NCRP linked prison terms using defendant and offense identifiers, allowing for a large-scale and geographically representative analysis of criminal recidivism. Importantly, the data contain information on the county in which each offender was sentenced, representative of where the offender resides and returns to after release, which is used to assign local labor markets. With over four million offenders released to over 2,800 counties, I am able to exploit variation in labor market conditions both across counties and time.

Controlling for demographic and offense characteristics of each offender, and county and time fixed effects, I measure the effect of local labor market conditions, as measured by low-skilled total employment and average wages, on the likelihood of recidivism. Using proportional hazard models, these estimates are identified from differences in the timing and severity of local economic conditions experienced by offenders upon release from prison.

I find that low-skilled employment growth in an offender's local labor market significantly reduces the risk of returning to prison. Similarly, increases in average low-skilled wages are negatively associated with the risk of returning to prison and generally have a larger impact on recidivism than employment, suggesting that earnings opportunities are critical for reducing recidivism. My estimates suggest that the typical employment growth during a business cycle decreases the risk of recidivism by 2.2 percent, and that the typical wage growth during a business cycle decreases the risk of recidivism by an additional 1.8 to 4.0 percent. The effects of local labor demand shocks on recidivism are largest in the sectors that report a willingness to hire ex-offenders such as construction, particularly in counties with a higher baseline share of low-skilled men employed in these sectors. Black offenders, older offenders, and first-time offenders are most responsive to changes to wages. Results are robust to additional controls that proxy for police and corrections behavior, state-by-year fixed effects, accounting for differential release during good or bad economic times, and correlation between economic conditions at prison entry and prison exit.

These results indicate that the cohorts of offenders released during the Great Recession may

have been exposed to an increased risk of recidivism.[1] States like California have also released some inmates in order to reduce overcrowding and save money in a depressed economy, but the tough job market may impede the ability of ex-offenders to find employment, potentially increasing future recidivism and endangering public safety.

This paper is most closely related to a few prior studies. First, Myers (1983) finds that among a sample of 432 male offenders released from Maryland state prisons, higher average weekly wages reduces the probability of rearrest. More recently, Sabol (2007) studies the relationship between local unemployment rates and employment prospects among a sample of released prisoners in Ohio. Using a duration model, he finds that a one percent increase in county unemployment rates decreases the probability of a released prisoner exiting the initial spell of unemployment by about five percent. Raphael and Weiman (2007) explore the relationship between county unemployment rates at the time of release (static rather than time-varying) on the probability of returning to prison among a sample of released prisoners in California. Using ordinary least squares regression, they find a small, but positive relationship between local unemployment rates and the probability of returning to custody. In another sample of released prisoners from California, Schnepel (2015) finds that increases in construction and manufacturing employment opportunities at the time of release are associated with significantly lower recidivism.

This paper is also directly related to two strands of research. The first strand explores the impact of economic conditions on aggregate crime rates (e.g., Gould et al. 2002, Raphael and Winter-Ember 2001, Machin and Meghir 2004, Corman and Mocan 2005). This paper differs from these studies in measuring individual ex-offender responses to local economic conditions, which is of independent interest given the recent focus on rehabilitation and reentry programs for ex-offenders. Additionally, this paper focuses on wages and employment of low-skilled men, a demographic group most similar to ex-offenders, rather than aggregate economic conditions.

The second related strand of research is an experimental literature testing the impact of various reentry interventions on employment and recidivism. This experimental literature includes, among others, the Baltimore Living Insurance for Ex-Prisoners (LIFE) experiment (Mallar and Thornton 1978), which found that providing financial assistance and job search assistance to ex-offenders had no detectable effects on recidivism. More recently, the Manpower Demonstration Research Corporation evaluated the Center for Employment Opportunities program which provided transitional jobs to parolees in New York City, finding that while employment increased during the first year when transitional jobs were offered, there was no significant change in recidivism during periods of increased employment (Redcross et al. 2012). In combination, the prior experimental literature finds limited evidence that temporary programs which improve employment opportuni-

[1]For instance, data from Indiana suggest that the employment rate for released offenders decreased from 40.1 percent in 2006 to 25 percent in 2009. See http://eric.ed.gov/?id=EJ1011632.

ties affect recidivism (Cook et al. 2014). In contrast to these experiments, this paper cannot identify the precise employment effect on recidivism. Instead, this paper explores the reduced form effects of improved labor market opportunities. However, the estimates in this paper may more accurately reflect the lasting effects of job opportunities faced by released offenders rather than the effect of providing a temporary job or job search assistance to a small group of ex-offenders. For example, giving an ex-offender a temporary subsidized job may not lead to an unsubsidized job in the regular labor force. In addition, subsidized jobs offered in prior experiments were often minimum-wage jobs, whereas improvements in labor market opportunities might lead not only to employment, but also higher paying jobs.[2]

The remainder of the paper is structured as follows. Section 2 provides a conceptual framework for the relationship between local labor market conditions and criminal recidivism. Section 3 describes the data and provides summary statistics. Section 4 describes the empirical strategy. Section 5 estimates the impact of local labor market conditions on the risk of returning to prison. Section 6 concludes.

2. Conceptual Framework

Following the framework of Becker (1968) and Ehrlich (1973), local economic conditions may affect recidivism through two main channels. First, increases in both local employment and average earnings may reduce the likelihood of recidivating directly by increasing the probability of obtaining work and increasing the potential return to work. This substitution effect may shift ex-offenders away from the illegal sector towards the legitimate labor market. Higher wages may also lead to an income effect that reduces the incentive to seek supplemental income from any source. Employment can also be a form of "incapacitation" by keeping ex-offenders occupied and less likely to engage in criminal activity during work hours. Additionally, conditional on employment, ex-offenders may also develop their human capital, potentially changing their preferences for criminal behavior.

Of course, ex-offenders may be unresponsive to labor market opportunities if the traits that are correlated with criminal behavior are immutable and essential to getting a job. In general, offenders have low ability, low levels of work experience, and a high prevalence of mental and substance abuse issues. Furthermore, human capital may erode during prison, furthering reducing ex-offenders' employability. Employer demand for ex-offender labor may also depend directly on local labor market conditions. The stigma of incarceration may make hiring ex-offenders undesir-

[2]This paper is also related to a literature that explores the impact of arrest and incarceration on employment and earnings (Grogger 1995, Kling 2006, Western 2006, Mueller-Smith 2014), the impact of incarceration on future recidivism (Di Tella and Schargrodsky 2013, Aizer and Doyle 2015), and the stigma associated with incarceration and its impact on labor market outcomes (Pager 2003, Pettit and Lyons 2007).

able to employers, even compared to other low-skilled labor.

Second, criminal opportunities may also change depending on local employment opportunities. For instance, an improved local labor market may increase the number of criminal opportunities if there are more goods to steal, leading to potentially more recidivism.[3] The estimates in this paper capture the combined effect of all potential mechanisms.

3. Data

3.1. National Corrections Reporting Program

Data on prison spells are obtained from the NCRP. The data are constructed using administrative data voluntarily provided by states on prison admissions and releases from 2000-2013, with almost all offenders entering prison between 1990 and 2013. 38 states have provided some data since 2000 and 48 states provided data in 2013.

Prior to 2014, the NCRP data comprised separate and non-linkable files for prison admissions, prison custody, and prison releases. In recent years, the BJS retroactively linked prison spells from 2000 onwards using inmate ID numbers, dates of birth, admission, release, offense and sentencing information in the NCRP data. Years and states in which data were incomplete or in which counts where substantially different from National Prisoner Survey (NPS) statistics were excluded.[4] Approximately 14 percent of all prison releases reported to the NCRP were excluded for these reasons. However, the majority of states (44 total) were able to have records linked for some period of time they submitted data between 2000 and 2013.[5] See Appendix Table 1 for a list of the states in the sample and the years for which they provided data used to construct reliable prison spells.

The data contain information on the exact prison admission date and release date for each prison spell. Demographic characteristics for each offender include age, race, Hispanic ethnicity, education (highest grade completed), gender, and whether the individual has previously been

[3]There are additional channels through which improved economic conditions might affect recidivism, such as greater spending on police and corrections and changes in drug and alcohol consumption.

[4]Several other studies using the older versions of the NCRP prison admissions and release data have used a subset of states to ensure reliability. First, Pfaff (2011) compared counts of individuals entering and exiting into state prisons from NCRP (1983-2002) to other official counts such as the National Prisoner Statistics (NPS) Series from the BJS. According to Pfaff, eleven states consistently reported data: California, Colorado, Illinois, Kentucky, Michigan, Minnesota, Nebraska, New Jersey, South Dakota, Virginia, and Washington. Neal and Rick (2014) conduct several checks both internally within the NCRP data and with other data sources such as the NPS using data from 1983 to 2009. After several tests, the authors exclude their analysis to seven states: California, Colorado, Michigan, New Jersey, South Carolina, Washington, and Wisconsin. Comparing parole data from the NCRP against other sources, Mechoulan and Sahuguet (2015) retain ten states for their analysis: Michigan, North Dakota, Utah, Colorado, Wisconsin, Texas, Missouri, Arkansas, New York, and California. While this study uses the newly constructed NCRP dataset, my findings are robust to these subsamples of states.

[5]For a description on how prison terms were created, see http://www.icpsr.umich.edu/files/NACJD/ncrp/white-paper-computing-code.pdf.

convicted and incarcerated of a felony. From these variables, I construct age and prior felony incarceration status as of the first observed prison release so that all demographic characteristics are time-invariant throughout the sample period.

For each individual and prison spell, I observe the most serious offense of conviction. From offense types provided by each of the participating states, the BJS created a uniform classification of 171 offense types, distinguishing between completed crimes, attempts, and conspiracies to commit the substantive offense.[6] I also observe the number of conviction counts for each offense, the sentence imposed for each offense, as well as the total sentence imposed. Because I observe the exact prison admission date and prison release date for each period of incarceration, I can calculate the actual total time served for each period of incarceration. This actual time served can differ from the total sentence imposed because of early release through parole or good time credited.

The NCRP data also provide additional details on each period of incarceration. For each prison spell, I observe the type of facility the prisoner entered into. In addition, I observe the reason why the offender entered into the custody of the correctional facility,[7] as well as why the prisoner was released.[8] Finally, I observe the agency that assumed custody at the time of the release. Like demographic characteristics, offense information is defined at the time of release from the first observed prison spell, and time-invariant throughout the sample period for each offender.

I make five sample restrictions. First, I keep only the first observed prison spell for each offender to specifically explore the impact of local labor market conditions on the first return to prison.[9] Second, I drop observations in which county of sentencing is missing, about 2.7 percent of the observations, leaving me with a sample from 43 states. Third, I drop left-censored spells (offenders with missing prison release dates) because it is not possible to determine when an offender was released from prison, another 13.8 percent of the sample. Fourth, I drop individuals who were released from prison prior to 2000. Finally, I drop individuals who were "released" from prison because of death, 0.7 percent of the sample. After these restrictions, there are a total of 4,058,755 offenders released from prison between 2000-2013 and therefore 4,058,755 non-custody spells ("offender sample").

[6]For instance, separate offense types are recorded for completed, attempt, and conspiracy to commit petty larceny/theft involving goods under $200.

[7]The overwhelming majority of offenders are committed by the court under a new offense, or recommitted due to a parole or probation revocation.

[8]Prisoners can be conditionally released by parole boards through discretionary release, or by statute through mandatory release when their time served plus any good time earned equals the original sentence. Another form of conditional release comes through shock probation, where a judge can impose a brief period of incarceration designed to shock a first-time offender, followed by release under supervision. In other states, prisoners may be released unconditionally following the expiration of their sentence, in which case they have served the maximum court sentence and there is no supervision upon release.

[9]Because I do not observe complete histories of every offender, it is likely that some of the observed "first" spells are in fact higher spells. In unreported results, I find similar results using all spells for each offender.

These data are uniquely suited for a study of the impact of local labor markets on recidivism, defined as reentry into state custody, for several reasons. First, the sample size is unprecedentedly large, comprising over four million individuals released from prison between 2000 and 2013, much larger than prior studies. Second, the data contain information on the the county where each sentence was imposed, which is where the overwhelming majority of prisoners are returned to from prison. Offenders who are turned over to state parole are generally required under state statute to remain in the original county of conviction or last county of residence, with over 90 percent of offenders residing in the county of conviction post-release (Raphael and Weiman 2007, Sabol 2007, Schnepel 2015). Following the prior literature, I use sentencing county as a proxy for each offenders' local labor market. Third, the period covered by the data contain substantial variation in economic conditions, with a period of economic expansion (2000-2007) followed by the Great Recession (2008-2013).

There are two main limitations to the data. First, the NCRP data only link prison spells within a state, so any reoffending in a different state is not captured and is indistinguishable from an individual who is not recommitted in the same state.[10] Second, the data only capture return to custody, not rearrest or prosecution. As a result, the estimates in this paper may underestimate the impact of local labor market conditions on broader definitions of recidivism.

Table 1 presents the unconditional probabilities of returning to prison for the 4,058,755 released offenders after their first observed prison release, in the aggregate and by prisoner characteristics. Because I limit the sample to one prison release per offender, these recidivism rates do not include the contribution of offenders who recidivate two or more times during the sample period, who are likely higher risk. I define recidivism as return to prison within the same state whether due to a "new commitment" or technical parole violation given evidence that law enforcement officials often classify a new offense as a technical violation because it is easier to ensure a period of incarceration (Kuziemko 2013, Austin and Lawson 1998). In later sections, I specifically explore whether labor market conditions affect returning to prison for a new offense.

For the full sample of over four million prisoners released between 2000-2013 in 43 states, 15 percent return to prison within one year of release and 30 percent return to prison within five years of release.[11] Black offenders have higher rates of recidivism than white and Hispanic offenders. Males and younger offenders are also more likely to return to prison than females and older offenders, respectively. The higher the educational attainment of an offender, the lower the rate of

[10]The BJS estimates that within five years of release, approximately ten percent of released offenders are arrested in a state other than the one that released them. See http://www.bjs.gov/content/pub/pdf/rprts05p0510.pdf. Incarceration in another state is therefore some fraction of this ten percent of released offenders. However, if offenders move out of states with poor economic conditions, this mobility leads to a downward bias in the main estimates.

[11]These recidivism rates are comparable to other statistics on recidivism using the new NCRP Data. See Rhodes et al. (2014).

recidivism. Offenders who have a prior felony incarceration have roughly similar recidivism rates compared to those without, although 30 percent of individuals are missing this information in the data.[12] By type of primary offense, prisoners convicted of property offenses are more likely to recidivate than those convicted of violent or drug offenses. By type of prison admittance, prisoners who enter into custody due to a parole or probation violation have higher rates of recidivism than those with a new court commitment. Finally, prisoners released through mandatory parole are more likely to recidivate than those released through the discretion of a parole board, or those released through shock probation. Prisoners who serve the full maximum court sentence have the lowest rates of recidivism, likely because they are not under supervision following release and therefore cannot be recommitted for technical parole violations.

Figure 1 presents unconditional empirical hazard rates by month since release, calculated as the number of failures (offenders returning to prison) in a month divided by the size of the risk set at the beginning of the same month. This figure shows that the hazard rate peaks within the first year since release and then declines exponentially, indicating that offenders are at the highest risk of recidivism in the first few years post-release.

Given that the hazard rate is approximately flat three years post-release, I censor all spells at 36 months (or 12 quarters) after release in order to focus on the risk of returning to prison in the three years post-release. Results are robust to alternative censoring lengths. I transform the data to allow for multiple observations per offender, such that each observation represents a quarter in each offender's non-custody spell. For instance, an offender released in June 2000 and who returned to custody in June 2001 would have four observations for each quarter between release and readmission. I allow for multiple observations per offender to allow local economic conditions to vary during the course of each offender's non-custody spell. After this transformation of the data, the offender sample of 4,058,755 released offenders results in 35,737,706 observations ("offender-quarter sample").

3.2. Local Labor Market Variables

Ideally, one would like to observe local labor market demand for ex-offenders. Prior studies (Raphael and Weiman 2007, Sabol 2007) have utilized local unemployment rates as the sole proxy for ex-offender labor demand. In contrast, I proxy for labor demand using both total employment and average wages following Hoynes (2000). Unlike the unemployment rate, total employment varies solely due to the number of employees at any point in time, rather than also varying due to changes in labor force participation. Wages may also be a better proxy for the labor market

[12] States completely missing information on prior felony incarceration in all years include Alabama, Alaska, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Pennsylvania, and Rhode Island.

prospects of ex-offenders given that wages reflect longer-term changes to labor market conditions than unemployment, which is often short-lived and highly cyclical (Gould et al. 2002).

I obtain employment and earnings measures from the Quarterly Workforce Indicators collected from the Longitudinal Employer-Household Dynamics dataset, which allow for disaggregation by sector and worker demographics.[13] From the Quarterly Workforce Indicators data, I obtain county-level quarterly data on employment and average monthly earnings in the aggregate, by sector, and by sex-education bin.[14] In the main results, I focus in particular on total employment and average wages of non-college educated men given that over 90 percent of ex-offenders in the sample have a high school degree or less.[15] These metrics capture both employment and earnings opportunities in each offender's local labor market, proxying for the same underlying unobserved demand for ex-offender labor. In my offender-quarter sample, the conditional correlation between total low-skilled employment and average low-skilled wages is 0.40. In contrast to the demographic and offense characteristics in the NCRP data, these local labor market variables vary over the course of each offender's non-custody spell.

Because I observe the county in which each prisoner is sentenced at the beginning of the first observable spell, labor market variables are assigned to each prisoner in each quarter out of custody based on this county. Any classical measurement error of the county that an offender returns to will attenuate my estimates towards zero. My estimates will also be biased downwards due to selective migration across counties if offenders leave their county of conviction (either by permission or by absconding from supervision) for counties with better economic conditions. In the full sample of approximately four million released offenders, I observe that among those who recidivate during the sample period, the county of conviction for the new offense differs from the county of the first observed offense 10.1 percent of the time, consistent with national statistics that indicate a nine percent rate of absconding from parole (Bonczar 1999). However, mobility does not necessarily indicate an offender taking up residency in another county, as the first and second counties of conviction are often neighboring counties. To the extent that an offender crossed a county border to commit an offense but still resides in the county of conviction, the original county of conviction is still likely representative of the offender's local labor market.

Table 2 presents summary statistics for the offender-quarter sample (35,737,706 observations) during the time period. Each observation represents an offender-quarter. Between 2000-2013, 50.3 percent of released offenders are white and 39.2 percent are black. 20.1 percent of released offenders are Hispanic and over 86 percent are male. The average age at release is 34.9 years and

[13]Public data from the Quarterly Workforce Indicators are available for all states other than Massachusetts, and for most years between 2000-2013.

[14]Nominal wages are converted to real wages using the CPI.

[15]Results are similar controlling for alternative proxies of labor market demand, such as average wages for men with strictly less than a high school degree and average wages of new hires at the beginning of each quarter.

over half of offenders have less than a high school degree. Only 1.1 percent of released offenders have a college degree. 23.0 percent of offenders in the sample were previously incarcerated for a felony.

The three most common crimes are violent, property, and drug offenses, representing 22.4 percent, 26.8 percent, and 30.0 percent of offenders, respectively. The average number of convicted counts per offender is 1.2, and offenders serve approximately 2.2 years in prison. The most common reason for entrance into prison is a new court commitment, representing 83.9 percent of all offenders. Another 4.8 percent enter prison due to a parole revocation and 7.9 percent enter prison due to a probation revocation. Approximately 28.2 percent of offenders are released under discretionary parole, 19.1 percent released under mandatory parole, and 31.0 percent serve their full sentence in prison. Another 10.6 percent are released via shock probation.

Summary statistics on log employment and average monthly wages for low-skilled men, defined as non-college educated, are presented in the bottom panel of Table 2. There is substantial variation in labor market conditions for low-skilled men across counties and time. In the offender-quarter sample, log employment ranged from 2.3 to 13.5, and log average monthly wages ranged from 5.9 to 10.1. County labor market conditions also vary within state. In California, the state with the largest number of released prisoners, log employment for low-skilled men ranged from 3.1 to 13.5, and log average monthly wages ranged from 6.8 to 10.1.

4. Empirical Methodology

To estimate the effect of local labor market conditions on criminal recidivism, I estimate proportional hazard models that allow for an unrestricted baseline hazard in the duration of non-custody spells and time-varying covariates.[16] In this model, the hazard rate represents the probability of leaving a state in the t^{th} period given continuous participation in that state for the last $t-1$ periods. From this hazard rate, one can construct a duration density distribution and a survivor function, which can be conditioned on various covariates and on initial entry into a state. The parameters of the continuous time duration model are estimated using maximum-likelihood.

I right-censor non-custody spells if an individual has still not been recommitted by the end of the sample period for each state. For instance, Arizona provided data from 2000-2012, so all spells are censored as of December 2012. Given that the hazard rate declines rapidly after approximately three years post-release (Figure 1), I censor all spells at 36 months after release in order to focus on the risk of returning to prison in the three years after release.

[16]This specification has been used widely in the literature on unemployment duration (Meyer 1990, Card et al. 2007) and welfare exits and reentry (see Hoynes 2000).

In particular, I estimate a model with the following specification:

$$h_{itc} = \alpha_t \text{exp}(\beta_1 X_i + \beta_2 L_{tc} + \gamma_t + \delta_c + \epsilon_{itc}) \tag{1}$$

The dependent variable, h_{itc}, is the hazard rate for returning to prison in quarter t for offender i in county c, with each spell beginning in the quarter-year that the offender is first released from prison. α_t denotes the baseline hazard, estimated using a piece-wise exponential function with dummy variables for each quarter post-release to flexibly approximate the baseline hazard. Under this semi-parametric specification, α_t is assumed constant in each quarter.

X_i includes time-invariant characteristics of each offender at the time of first release: race, ethnicity, age, age squared, highest graded completed, prior felony incarceration indicator, main offense type, number of convicted counts, type of prison admission (new commitment, parole violation, etc), type of facility, reason for release, time served, and time served squared. I also include indicators for missing data on each of these time-invariant characteristics.

The independent variables of interest, L_{tc}, include time-varying labor market conditions in quarter t in county c: log total employment or log average monthly wages of low-skilled workers. I allow for local labor market conditions to vary each quarter to capture the fact that released offenders face different conditions at each point in time after release, which may affect the risk of recidivism. In additional specifications, I separately estimate the effect of low-skilled wages by sector, demographic characteristics of offenders, and by offense characteristics.

The coefficient of interest is β_2, which captures the effect of local labor market conditions on the hazard of return to custody. Given the functional form, β_2 can be interpreted as the elasticity of the hazard rate with respect to employment/wages, such that a one percent increase in employment/wages leads to a β_2 percent change in the hazard. Because each offender is observed every quarter out of custody to allow for economic conditions to vary over time, standard errors are clustered at the offender level. Results are robust to clustering standard errors at the county or state level.

One potential threat to identification is that offenders with higher rates of recidivism are located in areas with poor economic conditions. To account for these time-invariant unobservable characteristics, I control for county fixed effects, δ_c. I also control for time fixed effects, γ_t, to account for factors such as changes in criminal justice policy or welfare changes that may be correlated with both local economic conditions and recidivism. These controls eliminate any omitted county effects or year effects that may bias the estimates. In robustness checks, I also control for additional county variables, and add county-specific time trends to account for trends in recidivism that are unrelated to local labor market conditions.

My identification strategy exploits the exact timing of each offender's release from prison.

Intuitively, I compare recidivism outcomes of observably similar offenders who have served the same amount of time for the same crime, but who return to counties when labor market conditions are more or less favorable. If the exact timing and county of release are uncorrelated with unobservable characteristics of prisoners, my estimates capture the causal effect of local labor markets conditions on recidivism.

To partially test the identifying assumption that local labor market conditions at the time of release are orthogonal to unobservable characteristics of ex-offenders, I collapse the offender-level data (4,058,755 observations) by county-quarter and regress characteristics of released offenders on labor market conditions in the quarter of release, controlling for year of release fixed effects, and county fixed effects. Standard errors are clustered at the county level. Table 3 presents these balance tests. I find no significant effect of low-skilled wages on the total number of released offenders per quarter, or characteristics of the offenders, suggesting that the composition of released offenders is not substantially different during good or bad economic times. In Section 5.4, I further explore potential selection due to strategic timing of release.

In addition, I consider the impact of low-skilled wages in particular sectors known for a willingness to hire ex-offenders. In the spirit of Bartik (1991), Blanchard and Katz (1992), and Aizer (2010), among others, I interact the average wage for low-skilled men in industry j in state s, excluding own county c, with the proportion of low-skilled men employed in that sector in the initial year 2000, θ_{cj}:

$$h_{itc} = \alpha_t \text{exp}(\beta_1 X_i + \beta_2 L_{tjs,-c} + \beta_3 (L_{tjs,-c} * \theta_{cj}) + \gamma_t + \delta_c + \epsilon_{itc}) \tag{2}$$

Intuitively, this variation captures the fact that state-level increases in wages for workers in a particular industry will lead to larger predicted increases in wages in counties with a higher share of low-skilled men (a proxy for ex-offenders) in those industries.[17] For instance, the construction industry hires a large number of ex-offenders, and construction wages increased during the housing boom, differentially affecting some counties with very low baseline employment in construction (two percent) compared to some counties with over 25 percent of low-skilled men employed in construction.

[17] According to Raphael (2010), establishments willing to hire ex-offenders (particularly construction) are also more likely to hire less educated individuals (high school degree or less) compared to sectors less willing to hire ex-felons.

5. Results

5.1. Main Hazard Estimates

Table 4 presents main results where the dependent variable is the hazard rate for returning to prison within three years. In all results, I report coefficients rather than hazard ratios such that a positive coefficient indicates that a variable increases the recidivism risk and vice versa. The full set of offender demographic characteristics includes age at release and its square, race, Hispanic ethnicity, highest grade completed, gender, prior felony incarceration status, offense and charge characteristics (most serious convicted offense, number of convicted counts, time served and its square), type of admittance and exit from prison, and the type of facility released from. Specifications with these offender-level controls also include indicators for missing variables. All control variables are time-invariant for each offender. I present results with and without the full set of offender-level controls to assess the sensitivity of the estimates to observable heterogeneity following Card and Levine (2000). Standard errors are clustered at the individual offender level.

In column 1 of Table 4, I control for county log employment of non-college educated men, low-skilled workers most similar to ex-offenders. Recall that given the functional form on log employment, β_2, the coefficient of interest, can be interpreted as the elasticity of the hazard rate with respect to labor market conditions. With the addition of county fixed effects, β_2 is identified from fluctuations in labor market conditions over time within each county. Column 2 adds the full set of offender controls. In column 3, I control for county average wages of low-skilled workers to estimate the effect of earnings opportunities on recidivism and in column 4, I add offender controls. Finally, in column 5, I control for both county log employment and average wages of low-skilled men, as well as offender controls.

Turning to the local labor market variables, low-skilled employment is negatively associated with the hazard rate. According to column 1, a one percent increase in employment reduces the hazard rate by 0.33 percent. With the addition of offender controls, a one percent increase in employment reduces the hazard rate by 0.32 percent (column 2). Higher average wages also reduce the hazard of returning to prison within three years, with a one percent increase in average wages reducing the hazard by 0.43 percent (column 3). With the addition of offender controls, a one percent increase in average wages reduces the hazard by 0.45 percent (column 4). The similarity of the estimates with and without offender controls suggests that my results are not very sensitive to controlling for observed heterogeneity and, therefore, may not be biased by unobservable heterogeneity either.[18]

[18] As another partial check on unobservable heterogeneity, I compare the characteristics of offenders who have not yet returned to prison at different points in time. For example, at one quarter since release, 86.9 percent are male, 50.0 percent are white, 23.5 percent have been previously incarcerated for a felony, and the average age is 34.4.

Parameter estimates presented for some key offender and offense characteristics in Table 4 indicate that black offenders are significantly more likely to recidivate than similar white offenders (the omitted group) after controlling for observables. Non-Hispanic defendants are more likely to recidivate than similar Hispanic defendants. In contrast, female defendants are significantly less likely to recidivate than male defendants. Recidivism is also decreasing in educational attainment. Compared to the omitted group of offenders with less than an eighth grade degree, offenders with a high school degree, some college, or a college degree, are increasingly less likely to recidivate. Finally, older offenders, those with no prior felony incarceration, and those who have served more time for the current offense, are less likely to recidivate than their counterparts.

Finally, in column 5, I control for both employment and earnings of low-skilled men. According to column 5, a one percent increase in employment reduces the hazard rate by 0.22 percent and a one percent increase in average wages reduces the recidivism risk by 0.37 percent. These results suggest that ex-offenders are responsive to labor market conditions as measured by both employment and earnings. Between 2003-2008, within-county low-skilled employment increased on average by ten percent, and real low-skilled wages increased by four percent. Similarly, on average, county employment increased by ten percent and real wages increased by six percent between 2008-2013, variation that is typical during a standard business cycle (Hoynes 2000). Placing the estimates in the context of this variation, a ten percent increase in low-skilled employment reduces the recidivism risk by 2.2 percent. In comparison, a five percent increase in real wages reduces the recidivism risk by approximately 1.8 percent. However, because employment and earnings are collinear and the interpretation of the coefficients is difficult when controlling for both variables,[19] I present all the following results controlling only for low-skilled wages as a proxy for local labor market conditions following Machin and Meghir (2004) and Grogger (1998).

In Table 5, I consider the impact of low-skilled wages in specific sectors known for a willingness to hire ex-offenders: construction, manufacturing, and transportation (Holzer et al. 2004, Raphael 2010).[20] To the extent that local labor market conditions affect criminal recidivism through potential labor market employment and earnings opportunities, the results should be present in the sectors most willing to hire released prisoners. In Panel A, I present results for county-level low-skilled wages. I find that a one percent increase in low-skilled wages in the construction sector reduces the recidivism risk by 0.24 percent, compared to 0.32 percent for low-skilled wages in

At four quarters since release, 86.9 percent of at risk offenders are male, 50.0 percent are white, 23.4 percent have previously been incarcerated for a felony, and the average age is 34.5. At eight quarters since release, 86.7 percent of at risk offenders are male, 50.1 percent are white, 23.2 percent have previously been incarcerated for a felony, and the average age is 34.6. Given the similarity in observable characteristics at various points in time, it is unlikely that unobservable heterogeneity leads to substantial bias in the estimates.

[19] A regression of low-skilled employment on average low-skilled monthly wages, controlling for county and year fixed effects, yields a coefficient of 0.396.

[20] See also http://articles.latimes.com/2010/nov/30/business/la-fi-felon-jobs-20101130.

the manufacturing sector, and 0.12 percent in the transportation sector. These results indicate that wage increases in some of the sectors most likely to hire ex-offenders substantially reduce the risk of recidivism.

Next, I consider the differential effects of state-level increases in low-skilled wages in each industry by the proportion of low-skilled men employed in those industries as of 2000, the beginning of the sample period. While there are no statistics on the share of ex-offenders employed in each industry, low-skilled men are a potentially valid proxy for this group. In Panel B, I interact industry state-level wages (excluding own county) with the baseline share of low-skilled men in that county-industry, intuitively capturing the fact that state-level increases in wages for workers in a particular industry will lead to larger predicted increases in wages in counties with a higher share of low-skilled men in those industries. Consistent with this prediction, I find that plausibly exogenous increases in construction wages reduce recidivism disproportionately more in counties with a higher share of low-skilled men employed in the construction sector. Offenders released to counties with a ten percent higher baseline construction share experience an additional 0.16 percent reduction in recidivism risk for a one percent increase in wages. There is also some evidence that increases in manufacturing wages have a larger impact in counties with higher baseline employment shares in manufacturing, although the interaction is not statistically significant (p-value = 0.19). Finally, for the transportation sector, an increase in wages has a larger effect on recidivism in those counties with a higher baseline share of low-skilled men employed in transportation, with a one percent increase in wages reducing the recidivism risk by an additional 0.13 percent for counties with a ten percent higher baseline share.

5.2. Treatment Heterogeneity

In Table 6, I estimate hazard models controlling for low-skilled employment and average wages separately by several offender characteristics to assess whether certain types of offenders are more sensitive to local labor market fluctuations. The specifications also control for the full set of demographic and offense characteristics, as well as county and year fixed effects. In column 1 of Table 6, I replicate the main findings from column 4 of Table 4 for the full sample of released offenders.

In columns 2 and 3, I separately estimate the main specification for male offenders and female offenders, respectively. I find that the impact of low-skilled wages on recidivism is not significantly different by gender, despite the generally lower recidivism risk of female offenders. In columns 4 and 5, I separately estimate the main specification for white offenders and black offenders. I find that increases in low-skilled wages reduce recidivism risk significantly more for black offenders than for white offenders. A one percent increase in low-skilled wages reduces the hazard rate by 0.36 percent for white offenders, compared to 0.54 percent for black offenders, suggesting

that black offenders are substantially more responsive to increases in wages than similar white offenders. In columns 6 through 8, I estimate the main specification separately for offenders in different age groups. I find evidence that older ex-offenders are more responsive to increases in earnings prospects than younger ex-offenders. A one percent increase in low-skilled wages reduces the recidivism risk by 0.41 percent for offenders aged 25 or under, 0.41 percent for offenders aged 25 to 40, and by 0.52 percent for offenders released at age 40 or older. Larger effects of wages on older ex-offenders are consistent with both employer preference for older offenders, and/or older offenders being more responsive to earnings opportunities (Uggen 2000).

Differences in the effect of local labor market conditions also appear by prior criminal history and crime type. In columns 1 and 2 of Table 7, I find evidence that first-time offenders are much more responsive to changes in low-skilled wages than those with a prior felony incarceration. Among those without a prior felony incarceration, a one percent increase in wages reduces the recidivism risk by 0.68 percent compared to 0.24 percent for those with a prior felony. In columns 3 through 5, I present additional subsample results by crime type. I group the detailed offense categories into three main crime categories. Violent crimes range from murders and rapes to armed robberies and aggravated assaults. Property offenses include burglary, arson, theft, and other economic crimes. Finally, drug offenses include drug trafficking and possession. I find evidence that offenders convicted of violent, property, and drug crimes are roughly equally responsive to changes in low-skilled wages.

Finally, I combine all these characteristics into a single risk index to test for heterogeneous results. First, I estimate a hazard model controlling for the full set of offender, crime, and prison admission/release characteristics. I use a split-sample estimator to predict recidivism risk in a five percent random sample to avoid the bias that arises from endogenous stratification (Abadie et al. 2014). I then use these estimates to construct a predicted ex ante risk of recidivating in the other 95 percent of my offender-quarter sample. I divide offenders into above and below median risk of recidivating during the sample period, with those in the below median group having a 14.2 percent probability of recidivating in the three years post-release compared to 36.8 percent for the above median group. In Appendix Table 2, I present the main hazard model results separately for these two groups of offenders. I find that low-skilled wage increases have a larger effect on the recidivism risk of lower-risk offenders compared to higher-risk offenders, although both groups are responsive to local labor market conditions.

5.3. Committing New Offenses

The previous results indicate that release from prison during favorable local labor market conditions significantly reduces the hazard of returning to prison within three years. Recall that I

define recidivism as any return to prison, whether due to parole violations or the commission of a new offense, because new offenses may be classified as technical violations by law enforcement officials (Kuziemko 2013). Nevertheless, it is important from a public safety perspective to assess whether improved labor market conditions can reduce the risk of committing a new crime. To do so, I explicitly analyze the hazard of returning to prison for a new offense, as classified by each state's corrections system. In this specification, non-custody spells for ex-offenders who do not recidivate and those who return to prison for a parole violation are censored at 36 months after release. Within three years post-release, 9.3 percent of ex-offenders return to prison for a new offense, explaining roughly one-third of the overall three-year recidivism rates.

Column 1 of Table 8 presents these results. I find that a one percent increase in low-skilled wages reduces the hazard rate for returning to prison for a new crime by 0.52 percent, suggesting that improved local labor markets also affect the commission of new offenses. Columns 2 through 4 explore the impact of labor market conditions on returning to prison for a new violent, property, and drug offense, respectively. While higher wages reduce the recidivism risk of all types of new offenses, the magnitude of the wage effect is largest for new violent and drug offenses, where the violent crime results are driven largely by new assaults and robberies.

5.4. Alternative Specifications

In Table 9, I test the robustness of the main results. In column 1, I replicate the main results from the preferred specification controlling for low-skilled wages (column 4 from Table 4). In column 2, I add county-specific linear trends to the preferred specification, such that my estimates are identified off deviations from county trends and find that a one percent increase in wages is associated with a 0.39 percent reduction in the hazard rate.

In column 3, I add additional county-year controls for county population, per capita personal income, and personal current transfer receipts, obtained from the Bureau of Economic Analysis (BEA). Personal current transfer receipts are benefits received by persons for which no current services are performed.[21] Results are similar with the addition of these county-level controls. In column 4, I control for county-year arrests collected from the Uniform Crime Reports to address the concern that changes in police enforcement may be correlated with local economic conditions. I also control for the total number of prison admittances per county-quarter based on the NCRP data to address the concern that courts are more likely to incarcerate ex-offenders, conditional on arrest, during poor economic times. I find that even accounting for local changes in arrests and prison admittances, increases in wages are associated with lower recidivism risk. In column 5, I control for state-by-year fixed effects, relying solely on variation across counties within the same

[21] According to the BEA, transfer receipts accounted for almost 15 percent of total personal income at the national level in 2005.

state. I find that within the same state-year, a one percent increase in low-skilled wages reduces the recidivism risk by 0.44 percent.

Another concern is that parole officers may be differentially willing to report violations (both technical and new crimes) during good or bad economic times. For instance, if parole officers are more willing to file a parole violation against an ex-offender when the local economy is bad, my estimated effects may not capture a real change in criminal recidivism. However, this concern is unlikely to explain my results. First, parole departments hit with budget cuts during the Recession generally led to increased workloads for parole officers, leading them to have less time to supervise their parolees, suggesting that parole officers may be less likely to detect or report violations during poor economic conditions. Second, to partially test this concern, I replicate the main specification looking only at ex-offenders who served the full expiration of their sentence. Because these ex-offenders have fully served their sentence, they do not undergo parole when they are released from prison and therefore are not affected by any potential changes in parole officer behavior. In column 6, I find similar results among this subsample of ex-offenders with a one percent increase in low-skilled wages reducing recidivism risk by 0.49 percent.

In columns 1 and 2 of Table 10, I explore whether I find similar results splitting the sample before and after the Great Recession. Given the housing and related construction boom pre-2007, and subsequent bust post-2007, the availability of low-skilled jobs differed greatly across these two time periods. The effects of higher low-skilled wages on recidivism persist across both time periods although I find larger wage effects during the housing boom.

Next, I analyze two main sources of bias. One potential concern is if the timing of release from prison is correlated with local economic conditions, as mentioned previously in Section 4. For instance, state parole boards may let out certain lower-risk prisoners earlier during worse economic times. If these early release prisoners also have a lower propensity to recidivate, I may underestimate the effects of local economic conditions on recidivism. The only state with an official early release policy in the last decade is California, whose Realignment program did not begin until the end of my sample. Absent an official policy, parole boards are not authorized to consider economic conditions in making parole decisions. In addition, many states eliminated parole, and thus discretionary release, prior to 2000. To further test the magnitude of this bias, I replicate my main results on a subsample of states in which there is no discretion in prison release date. As of the beginning of my sample period, 16 states had abolished discretionary parole for almost all offenders: Arizona, California, Delaware, Florida, Illinois, Indiana, Kansas, Maine, Minnesota, Mississippi, North Carolina, Ohio, Oregon, Virginia, Washington, and Wisconsin.[22] NCRP prison spell data are available for all these states except for Virginia. In column 3 of Table 10, I replicate the preferred specification in these 15 states with no discretionary parole. I find similar and larger

[22] See http://www.bjs.gov/content/reentry/releases.cfm.

results in this sample of states, with a one percent increase in wages reducing the recidivism risk by 0.80 percent, suggesting that correlation between the timing of release and economic conditions may in fact underestimate the true impacts. The estimate in this subsample of states with no discretionary parole suggests that the typical business cycle growth in real wages reduces the risk of recidivism by 4.0 percent.

A second potential source of bias comes from the unobservable propensity to commit crime during different economic conditions. An offender who commits an offense during good economic times is likely unobservably different from one who commits an offense during bad economic times. If local conditions affect the initial entry into prison of individuals with particular unobserved characteristics, this selection could affect my estimates in two ways. First, offenders who commit a crime may be forward-looking and anticipate the local economic conditions in the year of prison release, but this is unlikely among a population of offenders. Second, even if offenders are not forward-looking, there may be correlation between economic conditions when an offender commits a crime and when he is released from prison.[23]

To partially test for this source of bias, I explore whether correlation in local labor market conditions at the time of the offense and the time of release can explain my results. In column 4 of Table 10, I replicate the main specification but add additional controls for county average wages both in the quarter-year of admission to prison, and lagged one year to account for the delay from offense commission to prison admission.[24] If correlation is driving my estimates, then current labor market conditions upon release should have no impact on the risk of recidivism after controlling for conditions during and before admission to prison. I find that current wages are still highly predictive of recidivism risk even after controlling for historical conditions, suggesting that correlation between past and current labor market conditions cannot fully account for my findings.

Finally, in column 5, I replicate the main specification on the sample of 18 states that provided data for the full sample period from 2000-2013 to explore whether selective reporting biases the findings. I find very similar results in this subsample, with a one percent increase in low-skilled wages associated with a 0.37 percent decline in the recidivism risk.

In Appendix Table 3, I present results under different models that give equal weighting to each ex-offender using the offender sample. In columns 1 and 2, I estimate an ordinary least squares specification for the probability of returning to custody within three years of release and one year of release, respectively. When analyzing the probability of return to custody within three years,

[23]Generally, correlation of unemployment rates fades after three years (Oreopoulos et al. 2012). In my offender-quarter sample, the average time served in the data is 2.3 years once a defendant enters prison. Correlation is further mitigated because the most relevant date is not when the offender enters prison but when the crime is committed.

[24]Unfortunately, the NCRP data do not contain information on when the offense was committed, or when the prisoner was arrested. However, the BJS estimates that the median time from arrest to sentencing for felony convictions in state court was 265 days in 2006. See http://www.bjs.gov/content/pub/pdf/fssc06st.pdf.

I limit the full sample to offenders who are observed for at least three years post-release. When analyzing the probability of return to custody within one year, I limit the full sample to offenders who are observed for at least one year post-release. Because ordinary least squares models do not allow for time-varying covariates, I control for local average wages in the first quarter post-release. I also control for year of release and county fixed effects and cluster standard errors at the county level. I find a similar negative and statistically significant relationship between average wages in the quarter of release and the probability of recidivism within either three years or one year of release. In column 3, I estimate a censored regression model for the time until return to prison (censored at 36 months post-release) controlling for average wages in the quarter of release. I also control for year of release and county fixed effects and cluster standard errors at the county level. I find that higher average wages in the quarter of release are associated with a longer time until return to prison, consistent with a lower risk of recidivism. These results indicate that my findings are robust across different specifications.

6. Conclusion

This paper estimates the impact of local labor market conditions on criminal recidivism using administrative prison data on over four million released offenders from 43 states. As measures of local labor market opportunities, I obtain information on quarterly county-level low-skilled employment and average low-skilled wages. Estimating the transition back into prison using hazard models, I find that ex-offenders are responsive to both local employment growth and increases in wages experienced upon release from prison. The typical employment growth during a business cycle decrease the risk of recidivism by approximately 2.2 percent and the typical wage growth during a business cycle decreases the risk of recidivism by 1.8 to 4.0 percent. The combined effects of increases in low-skilled employment and earnings suggest a reduction in the recidivism risk of up to 6.2 percent. These results are robust to unobserved county differences and the selection of high-risk individuals into bad neighborhoods, as well as the inclusion of additional time-varying county controls such as arrests and prison admissions. In addition, I find that the results are unlikely to be driven by selective release of certain types of prisoners during good or bad economic times.

These findings are largely consistent with a literature establishing a negative relationship between economic conditions and aggregate crime rates, but suggest that ex-offenders in particular are responsive to improvements in local labor market opportunities. In contrast, these findings differ slightly from the experimental literature finding mixed evidence of job assistance or transitional jobs on recidivism. While this paper is not able to identify the magnitude of a direct employment effect on recidivism, there is evidence that labor market improvements lead to increased employ-

ment among ex-offenders and low-skilled men (Sabol 2007, Holzer and Offner 2002). The difference in results may be driven by this paper's ability to measure the effects of regular labor market opportunities for released ex-offenders rather than job search assistance or a temporary subsidized job, which rarely leads to a regular unsubsidized job and therefore highlights the importance of employer demand.

Overall, the findings suggest that the release of a large number of ex-offenders during the Great Recession likely had substantial consequences for recidivism, particularly because of contractions in industries traditionally open to hiring ex-offenders, such as manufacturing and construction.[25] Between the fourth quarter of 2007, and the first quarter of 2009, real average monthly earnings for low-skilled men fell by 12 percent, with real wages in the construction and manufacturing sectors falling by 19 percent and 12 percent, respectively. Even by the first quarter of 2013, real wages for low-skilled men remained depressed, still 4.5 percent less than in the fourth quarter of 2007. The estimates in this paper suggest that compared to a counterfactual in which real wages remained constant during the time period, the recidivism risk of offenders released during the Great Recession increased by 5.0 to 7.8 percent. With approximately one million offenders released during the Recession, the heightened recidivism rate during depressed economic times may account for an additional 50,000 offenders returning to prison within the coming years. Among those offenders who recidivate, the average time served upon return to prison is over one year. With an average cost of $30,000 to house an inmate in state prison, these offenders may entail over $1.5 billion in costs, in addition to decreases to public safety.

One limitation of this paper is that it only measures the impact of local labor markets on criminal recidivism. Improved employment and earnings prospects likely also impact non-criminal outcomes. In addition, this paper is unable to identify the precise mechanisms through which labor market opportunities affect recidivism. Future work analyzing the impact of the direct employment channel, as well as the effect of other components of successful offender reintegration, such as access to housing and public assistance, is critical.

[25] "We have a record high number of people coming out of prison each year into the highest rate of unemployment since the Great Depression," said Marc Mauer of the nonprofit Sentencing Project. "As difficult as the recession has been on people, it's twice as difficult for people with a felony to make it in this economy." See http://articles.latimes.com/2010/nov/30/business/la-fi-felon-jobs-20101130.

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Table 1. Distribution of Time Until Return to Prison

		Probability of Return to Prison in			
	No. of Obs	$\leq$ 1 Year	$\leq$ 2 Years	$\leq$ 3 Years	$\leq$ 5 Years
All Prisoners	4,058,755	0.146	0.226	0.267	0.303
Demographics					
White	1,910,818	0.139	0.216	0.254	0.289
Black	1,495,200	0.148	0.240	0.287	0.330
Hispanic	703,790	0.139	0.201	0.230	0.252
Male	3,526,792	0.151	0.235	0.277	0.314
Female	530,945	0.113	0.172	0.202	0.229
Age Under 25	831,541	0.204	0.310	0.361	0.404
Age 25-40	1,987,822	0.143	0.224	0.266	0.304
Age Over 40	1,238,978	0.112	0.174	0.206	0.235
Less HS Degree	1,335,533	0.136	0.227	0.275	0.321
HS Degree	1,075,356	0.126	0.200	0.238	0.273
College Degree	27,399	0.077	0.124	0.150	0.179
Prior Felony Incarceration	665,587	0.154	0.231	0.271	0.307
No Prior Felony	2,159,097	0.141	0.220	0.261	0.296
Type of Offense					
Violent Offense	987,097	0.139	0.219	0.260	0.295
Property Offense	1,129,453	0.178	0.268	0.311	0.348
Drug Offense	1,175,618	0.131	0.209	0.249	0.285
Reason for First Prison Spell Admittance					
Court Commitment	3,300,652	0.136	0.213	0.253	0.288
Parole Revocation	201,305	0.211	0.328	0.383	0.426
Probation Revocation	327,434	0.193	0.291	0.340	0.383
Reason for First Prison Spell Release					
Discretionary Parole	1,188,865	0.166	0.260	0.302	0.334
Mandatory Parole	770,370	0.236	0.336	0.382	0.414
Shock Probation	418,513	0.125	0.217	0.265	0.307
Expiration of Sentence	1,074,312	0.049	0.101	0.138	0.180

Notes: This table presents descriptive statistics for the unconditional probabilities of returning to prison by demographic characteristics for the full sample of prisoners released between 2000-2013 in 43 states.

Table 2. Summary Statistics of Prisoners Released 2000-2013

Variable	Mean	SD
NCRP Data		
White	0.503	0.500
Black	0.392	0.488
Hispanic	0.201	0.401
Male	0.865	0.342
Female	0.135	0.342
Age at Release	34.946	10.815
Less HS Degree	0.516	0.500
HS Degree	0.405	0.491
Some College	0.064	0.244
College Degree	0.011	0.103
Prior Felony Incarceration	0.230	0.421
Violent Offense	0.224	0.417
Property Offense	0.268	0.443
Drug Offense	0.300	0.458
Number of Counts	1.226	1.309
Time Served (Years)	2.231	3.458
Court Commitment	0.839	0.368
Parole Revocation	0.048	0.214
Probation Revocation	0.079	0.269
Discretionary Parole	0.282	0.450
Mandatory Parole	0.191	0.393
Shock Probation	0.106	0.307
Expiration of Sentence	0.310	0.462
Labor Market Variables (in Logs)		
Low-Skilled Employment	10.138	1.790
Low-Skilled Wages	7.368	0.152
Low-Skilled Construction Employment	7.833	1.808
Low-Skilled Construction Wages	7.450	0.205
Low-Skilled Manufacturing Employment	8.279	1.739
Low-Skilled Manufacturing Wages	7.514	0.202
Low-Skilled Transportation Employment	7.258	2.004
Low-Skilled Transportation Wages	7.379	0.181

Notes: This table presents summary statistics on the full sample of released prisoners from 2000-2013 from 43 states. The dataset contains one observation for each quarter transition in the non-custody spell.

Table 3. Balance of Released Offender Characteristics

	# Released	# Black	# Male	# < HS	# Prior
	(1)	(2)	(3)	(4)	(5)
Log Low-Skill Wage	-0.697	0.509	-0.753	-1.588	-0.745
	(1.603)	(0.737)	(1.383)	(1.237)	(1.275)
Observations	108,164	107,487	108,164	93,041	73,001

Notes: This table presents results from OLS regressions of released offender characteristics on labor market conditions. Each column represents a separate regression. The unit of observation is a county-quarter. Specifications include year of release fixed effects and county fixed effects. Standard errors are clustered at the county level.

Table 4. Main Results

	(1)	(2)	(3)	(4)	(5)
Black		0.159^{***}		0.159^{***}	0.159^{***}
		(0.003)		(0.003)	(0.003)
Not Hispanic		0.221^{***}		0.221^{***}	0.221^{***}
		(0.006)		(0.006)	(0.006)
Female		-0.310^{***}		-0.309^{***}	-0.309^{***}
		(0.003)		(0.003)	(0.003)
HS Degree		-0.077^{***}		-0.077^{***}	-0.077^{***}
		(0.005)		(0.005)	(0.005)
Some College		-0.151^{***}		-0.151^{***}	-0.151^{***}
		(0.007)		(0.007)	(0.007)
College Degree		-0.302^{***}		-0.302^{***}	-0.302^{***}
		(0.017)		(0.017)	(0.017)
Age at Release		-0.044^{***}		-0.044^{***}	-0.044^{***}
		(0.001)		(0.001)	(0.001)
No Prior Felony		-0.469^{***}		-0.469^{***}	-0.469^{***}
		(0.003)		(0.003)	(0.003)
Time Served (Years)		-0.008^{***}		-0.008^{***}	-0.008^{***}
		(0.001)		(0.001)	(0.001)
Labor Market Variables					
Log Low-Skill Emp.	-0.329^{***}	-0.320^{***}			-0.225^{***}
	(0.016)	(0.016)			(0.017)
Log Low-Skill Wage			-0.427^{***}	-0.454^{***}	-0.374^{***}
			(0.019)	(0.019)	(0.020)
Observations	35,092,191	35,092,191	35,092,191	35,092,191	35,092,191
Individual Controls	No	Yes	No	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate regression. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 5. Results by Sector

	Construction	Manufacturing	Transportation
	(1)	(2)	(3)
Panel A: County Wages			
Log Low-Skill Wage	-0.244^{***}	-0.323^{***}	-0.123^{***}
	(0.011)	(0.015)	(0.012)
*Panel B: State Wages*Share*			
Log State Low-Skill Wage	-0.231^{***}	-1.049^{***}	-0.451^{***}
	(0.043)	(0.061)	(0.044)
Log State Low-Skill Wage*Share	-1.646^{***}	-0.307	-1.268^{**}
	(0.363)	(0.238)	(0.577)
Observations	35,014,155	34,877,664	34,715,385
Year Fixed Effects	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Panel A controls for county-level log wages. Panel B controls for industry specific state-level log wages excluding own county and its interaction with the share of low-skilled men employed in each industry (as of first quarter 2000). Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 6. Results by Offender Demographics

	All	Male	Female	White	Black	< 25	25 to 40	> 40
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Low-Skill Wage	-0.454^{***}	-0.455^{***}	-0.477^{***}	-0.356^{***}	-0.537^{***}	-0.409^{***}	-0.414^{***}	-0.517^{***}
	(0.019)	(0.020)	(0.062)	(0.027)	(0.032)	(0.036)	(0.028)	(0.040)
3 Yr Recidivism	0.266	0.275	0.201	0.252	0.286	0.361	0.266	0.203
Observations	35,092,191	30,334,438	4,745,906	16,639,690	13,005,389	6,656,189	17,232,429	11,200,955
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for subsamples of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 7. Results by Criminal History and Crime Type

	Prior Felony	No Prior	Violent	Property	Drug
	(1)	(2)	(3)	(4)	(5)
Log Low-Skill Wage	-0.236^{***}	-0.680^{***}	-0.473^{***}	-0.456^{***}	-0.451^{***}
	(0.051)	(0.028)	(0.040)	(0.034)	(0.037)
3 Yr Recidivism	0.269	0.260	0.252	0.310	0.249
Observations	5,555,402	18,850,927	8,507,909	9,415,881	10,552,286
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for subsamples of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 8. Committing New Offenses

	Any New	Violent	Property	Drug
	(1)	(2)	(3)	(4)
Log Low-Skill Wage	-0.519^{***}	-0.583^{***}	-0.382^{***}	-0.541^{***}
	(0.034)	(0.071)	(0.059)	(0.065)
3 Yr Recidivism	0.093	0.018	0.029	0.026
Observations	39,943,756	41,894,182	41,680,592	41,781,593
Year Fixed Effects	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 9. Alternative Specifications

	Baseline Results	County Trends	County Controls	County Arrests	State*Year FE	Full Sentence
	(1)	(2)	(3)	(4)	(5)	(6)
Log Low-Skill Wage	-0.454^{***}	-0.388^{***}	-0.359^{***}	-0.418^{***}	-0.437^{***}	-0.491^{***}
	(0.019)	(0.021)	(0.020)	(0.020)	(0.020)	(0.053)
Observations	35,092,191	35,092,191	35,092,191	32,032,664	35,092,191	10,552,881
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Column 1 replicates the main estimates from column 4 in Table 4. Column 2 adds county-specific linear trends. Column 3 adds county-year controls for population, per capita personal income, and personal current transfer receipts. Column 4 adds county-year arrests and county-quarter prison admissions. Column 5 adds state-by-year fixed effects. Column 6 estimates the main specification for offenders who served the full expiration of their sentence. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

Table 10. Alternative Specifications

	Released < 2007	Released $\geq$ 2007	No Parole	Economic Lags	Balanced Panel
	(1)	(2)	(3)	(4)	(5)
Log Low-Skill Wage	-0.536^{***}	-0.438^{***}	-0.803^{***}	-0.409^{***}	-0.373^{***}
	(0.028)	(0.031)	(0.033)	(0.020)	(0.024)
Observations	16,770,682	18,101,886	14,419,088	34,390,496	18,267,266
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Column 1 estimates the main specification on offenders released between 2000-2006. Column 2 estimates the main specification on offenders released between 2007-2013. Column 3 estimates the main specification on offenders released in 15 states with no discretionary parole. Column 4 estimates the main specification adding controls for labor market conditions in the quarter-year of prison admission and lagged one year before admission. Column 5 estimates the main specification on offenders released in 18 states that provided data every year from 2000-2013. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the offender level.

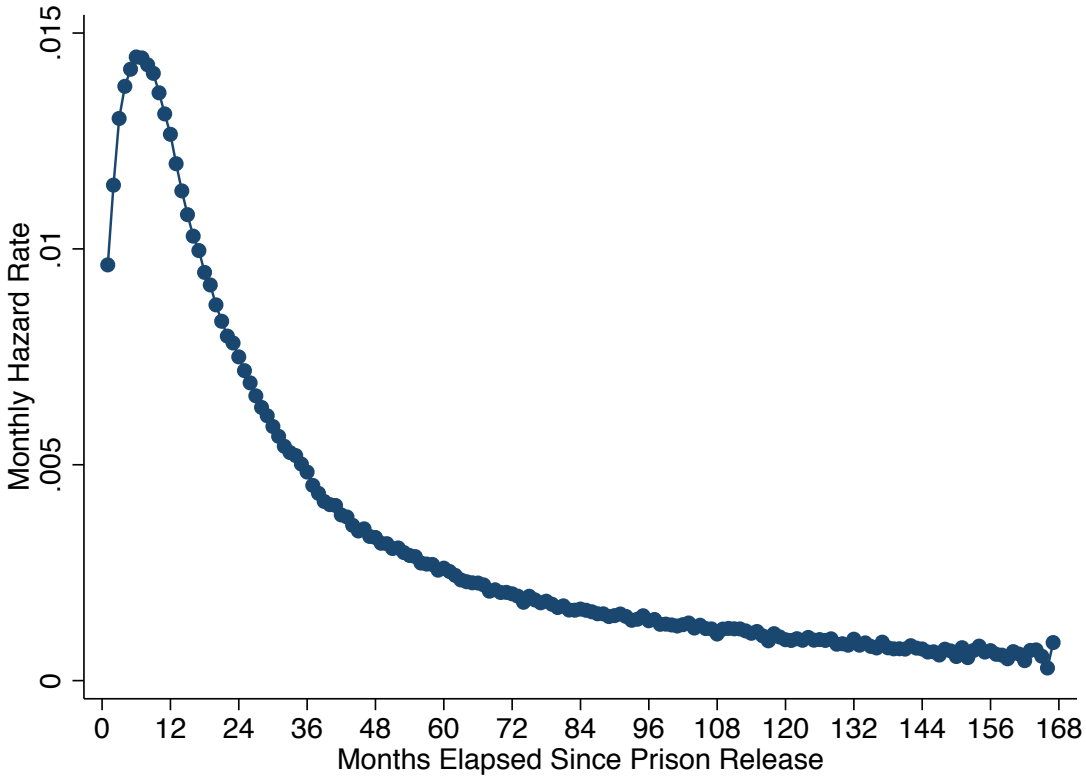

Figure 1. Hazard for Probability of Returning to Prison

Notes: Data are from the NCRP for prisoners released from 2000-2013. This figure calculates the unconditional probability of returning to prison in each month post-release conditional on having not yet returned to prison.

Appendix Table 1. States in NCRP Data on Prison Spells

State	Years Data Provided
Alabama	2007-2013
Alaska	2005-2012
Arizona	2000-2012
California	2000-2013
Colorado	2000-2013
Delaware	2009-2013
Florida	2000-2013
Georgia	2000-2013
Idaho	2008-2012
Illinois	2000-2003
Indiana	2002-2013
Iowa	2002-2013
Kansas	2011-2013
Kentucky	2000-2013
Maine	2012-2013
Maryland	2000-2012
Massachusetts	2010-2013
Michigan	2000-2013
Minnesota	2000-2013
Mississippi	2004-2013
Missouri	2000-2013
Montana	2010-2013
Nebraska	2007-2013
Nevada	2009-2013
New Hampshire	2011-2013
New Jersey	2003-2013
New Mexico	2010-2013
New York	2000-2013
North Carolina	2000-2013
North Dakota	2002-2013
Ohio	2009-2013
Oklahoma	2000-2013
Oregon	2001-2013
Pennsylvania	2001-2013
Rhode Island	2004-2013
South Carolina	2000-2013
South Dakota	2000-2012
Tennessee	2000-2013
Texas	2005-2013
Utah	2000-2013
Washington	2000-2013
West Virginia	2000-2013
Wisconsin	2000-2013
Wyoming	2006-2013

Notes: This table lists the states and years available in the NCRP data.

Appendix Table 2. Results by Risk Index

	Below Median	Above Median
	(1)	(2)
Log Low-Skill Wage	-0.526^{***}	-0.448^{***}
	(0.040)	(0.023)
3 Yr Recidivism	0.14	0.37
Observations	16,570,939	16,546,451
Year Fixed Effects	Yes	Yes
County Fixed Effects	Yes	Yes

Notes: This table presents proportional hazard estimates for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Predicted risk is estimated in a five percent split sample, as described in the text. Standard errors are clustered at the offender level.

Appendix Table 3. Alternative Models

	OLS 3 Yrs	OLS 1 Yr	Censored Duration
	(1)	(2)	(3)
Log Wage	-0.050^{***}	-0.025^{**}	2.021^{**}
	(0.013)	(0.011)	(0.969)
Observations	2,954,439	3,617,565	3,931,394
Year Fixed Effects	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes

Notes: This table presents alternative models for the full sample of prisoners released between 2000-2013 in 43 states. Each column represents a separate specification. Column 1 presents results from an OLS specification for the probability of return to custody within three years of release. Column 2 presents results from an OLS specification for the probability of return to custody within one year of release. Column 3 presents results from a censored normal regression for the duration of time out of prison. Specifications include demographic, offense, and prison admittance and entry characteristics. Standard errors are clustered at the county level.