The Minimum Wage, EITC, and Criminal Recidivism*

Amanda Y. Agan† Michael D. Makowsky‡

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Abstract

For recently released prisoners, the minimum wage and the availability of state Earned Income Tax Credits (EITCs) can influence both their ability to find employment and their potential legal wages relative to illegal sources of income, in turn affecting the probability they return to prison. Using administrative prison release records from nearly six million offenders released between 2000 and 2014, we use a difference-in-differences strategy to identify the effect of over two hundred state and federal minimum wage increases, as well as 21 state EITC programs, on recidivism. We find that the average minimum wage increase of 8% reduces the probability that men and women return to prison within 1 year by 2%. This implies that on average the wage effect, drawing at least some ex-offenders into the legal labor market, dominates any reduced employment in this population due to the minimum wage. These reductions in re-convictions are observed for the potentially revenue generating crime categories of property and drug crimes; prison reentry for violent crimes are unchanged, supporting our framing that minimum wages affect crime that serves as a source of income. The availability of state EITCs also reduces recidivism, but only for women. Given that state EITCs are predominantly available to custodial parents of minor children, this asymmetry is not surprising. Framed within a simple model where earnings from criminal endeavors serve as a reservation wage for ex-offenders, our results suggest that the wages of crime are on average higher than comparable opportunities for low-skilled labor in the legal labor market.

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†Department of Economics, Rutgers University. Email: aagan@economics.rutgers.edu

‡John E. Walker Department of Economics, Clemson University. Email: mdmakow@clemson.edu

1 Introduction

Every year, more than 600,000 men and women are released from U.S. prisons; nearly one-third will return to prison within three years. The probability these individuals return to prison is in part determined by the labor market opportunities they face upon release (Visher et al. 2008, Schnepel 2017, Yang 2017). Recently released prisoners tend to have lower human capital and interrupted work histories (Waldfogel 1994; Pager 2008); they also carry the stigma of a criminal conviction and the associated risks to potential employers (Pager 2003; Agan and Starr 2017). In the market for low and unskilled labor, released prisoners are likely to be on the margin of employment and may be particularly sensitive to changes in low-wage labor market policies. In addition, for some their outside option may include criminal activity implying that the question becomes not just whether an released prisoner can find a job, but whether they can find a job that pays better than crime.

In this paper, we estimate how two major low-wage labor market policies, the minimum wage and earned income tax credits (EITCs), impact the probability a recently released prisoner returns to prison. We exploit variations in the levels and existence of these policies across states combined with microdata from nearly six million individual prison release records from 2000 to 2014 across 42 states to understand how these policies impact recidivism. The detail and number of the prisoner release records allow us to identify the impact of these wage policies across gender and educational attainment, while also separately identifying differentials in the offenses and violations for which individuals were returned to prison. Understanding how these policies impact released prisoners can help us explain the mechanisms underlying recidivism and aid in breaking the revolving door of prison. This paper also adds to the literature on how minimum wages and EITCs impact the decisions that individuals facing low-wage labor market opportunities make.

A change in the minimum wage could impact the labor market prospects of released prisoners, and thus recidivism, through a change in their likelihood of finding employment and/or through a change in the wage they can expect to earn if they succeed. The first of these, the *employment effect*, is at the heart of most economic studies of minimum wages (e.g. Card and Krueger 1994; Allegretto et al. 2011; Dube 2013; Meer and West 2015; Allegretto et al. 2017; see Neumark 2017 for recent reviews). A reduction in labor demand and increase in the likelihood of unemployment stands to reduce the opportunity cost of returning to jail, increasing the probability of recidivism (Beauchamp and Chan 2014; Yang 2017). This simple model also predicts a second *wage effect* that pushes in the opposite direction. Broadly speaking, if an individual is able to secure a job at the now higher minimum wage, then their opportunity cost of returning to jail has increased, reducing the

probability of recidivism (Myers 1983; Myers 1984). This simple analysis, however, abstracts from the core decision being made by ex-offenders: whether or not to engage in profitable illegal activity. In studying the effect of minimum wages on most populations, the underlying theory would predict a reservation wage of labor market participation set by the opportunity costs of foregone leisure, schooling, or household production. For released prisoners, however, the foregone earnings from criminal endeavor must also be considered a key component of their reservation wage.[1]

The realization of this wage effect is conditional on a minimum wage that exceeds the black and gray market wages of criminal behavior. While not unexplored (Uggen and Thompson 2003; Levitt and Venkatesh 2000), the wages of crime are certainly difficult to observe. If wage effects were to dominate employment effects, it would offer a welfare benefit of minimum wage laws not previously discussed. If the employment effect dominates, however, it would present both an example of a vulnerable segment of the U.S. population unintentionally harmed and a significant, second-order, negative externality in the form of increased criminal behavior. Given the observed patterns of correlation between employment, wages, and recidivism (Visher et al. 2008; Schnepel 2017), the predicted net effect of the minimum wage on recidivism is necessarily ambiguous.

Exploiting the various state and year variation in minimum wages over our time period, we find that an 8% increase in the minimum wage (the average increase over our time period) corresponds to a 2% *decrease* in the probability an individual returns to prison within one year over the average, with no discernible difference in effect for men or women. That is, the increased incentive to substitute legal employment for criminal market activity, on net, appears to be greater than any employment effects of reduced labor demand resultant of minimum wage market distortions. While our results are agnostic regarding the debates over the magnitudes of the employment effects of minimum wages, they do serve as evidence that wage effects, on balance, dominate employment effects in the decisions made by would-be recidivists. This suggests that the wages of criminal market activity are greater than those that can be expected by ex-offenders in the legal market for low-skilled labor (Uggen and Thompson 2003; Levitt and Venkatesh 2000).

The predicted effects of EITCs are far less ambiguous, at least for those who are eligible (Nichols and Rothstein 2016; Leigh 2010; Rothstein 2010). An EITC is a (usually) refundable tax credit available to individuals with a job and low to moderate income (potentially between \$1 and \$53,505 depending on the number of children you have and whether you are married

[1]This earnings from criminal activity are, of course, potentially salient to the reservation wages of any would-be participants in the low skill labor market. Criminal earnings, however, are likely to be of greater salience to ex-offenders given the additional barriers they face in the legal labor market and their greater likelihood of human and network capital in the illegal market.

filing jointly or single). The federal EITC is particularly generous for people with minor children who live with them at least half the year - in 2016 the maximum federal EITC benefit for a household with no qualifying children was $506, whereas it was $3,373 for those with 1 qualifying child and $6,269 for households with at least three children.[2] In addition to the federal EITC, some states also have their own additional EITCs - an additional percentage of the federal EITC offered to filers in those states. As an explicit wage subsidy, standard theory predicts that the wage and employment effects of the EITC should move in the same direction, with both working towards the reduction of crime and recidivism. EITC programs, however, are not uniform in the financial support they offer to low wage earners. Subsidy magnitudes are strongly contingent on the number of children for which an individual holds custodial responsibility. Given the challenges that released prisoners face when trying to maintain custodial rights, EITC programs are likely to have differential effects across individuals, particularly with regards to gender. The Bureau of Justice Statistics reports that 53% of men and women in prison are parents of minor children before they entered prison, 41.7% of women reported being the single parent of their household, compare to 19.2% of men (Glaze 2008). As such, the vast majority of males returning from prison are unlikely to be eligible, or significantly impacted by, state EITC benefits in the short run following their release.

Using state and year variation in the availability of state EITCs, we find that the availability of state top-ups to the federal EITC corresponds to a 1.6 percentage point (7.1%) lower rate of recidivism *amongst women*, while having no significant effect on men. Focusing on the differing sizes of the state top-up as a percent of the federal EITC, we find that a one standard deviation increase in the state EITC corresponds to a 6% (0.09pp) reduction in the expected recidivism rate for women. The state EITCs have no discernible effect on men, and, if anything, point to these policies leading to an increase in recidivism for males.

Few, if any, labor policies draw more enduring scientific, political, or popular attention than the minimum wage. It's effect on criminal recidivism rates, however, has not previously been considered (Card and Krueger 2015; Neumark and Wascher 2010). Minimum wage studies have placed emphasis on groups likely to be looking for low-skilled occupations, including (but not limited to) teenagers (Neumark and Wascher 1995; Dube et al. 2010; Allegretto et al. 2011; Gorry 2013; Dube and Zipperer 2015; Liu et al. 2016; Slichter et al. 2016; Powell 2016), immigrants (Orrenius and Zavodny 2003), and high school drop-outs (Deere et al. 1995). Released prisoners share attributes with all of these groups, including the likelihood of limited skill sets, education, and/or reference networks. Given the addi-

[2]https://www.irs.gov/credits-deductions/individuals/earned-income-tax-credit/eitc-income-limits-maximum-credit-amounts

tional stigma of a criminal record, few released prisoners are likely to enjoy the luxury of being inframarginal with regard to any nontrivial wage policy. For other participants in the low-skill labor market, the next best alternative to legal employment is often leisure or school—the prospect of a higher minimum wage making employment more attractive is a private outcome with little consequence for others. For released prisoners, on the other hand, their next best alternative to legal employment may instead be criminal endeavor.

Several studies have examined the relationship of employment to crime in both longitudinal studies of individuals and macro models of the broader labor market. Beauchamp and Chan 2014 analyzed the impact of changes in the minimum wage on teenagers using the 1997 National Longitudinal Survey of Youth (NLSY). They find that teenagers affected by a change in the minimum were more likely to commit a crime, become idle, and lose their job, with especially large effects identified for teenagers with prior gang membership. Again focusing on youth crime, Hashimoto 1987 identified shifts attributable to changes in the minimum wage changes using a time-series model of youth arrests in the FBI's Uniform Crime Reports. While not explicitly criminal, Muravyev and Oshchepkov 2016 found that a doubling of the Russian minimum wage in 2007 resulted in increased participation in the "informal" labor market. Braun 2017 is the closest in spirit to our study, estimating the impact of a national minimum wage on aggregate crime rates. Calibrated using data from the NLSY97, her model predicts crime rates initially decreasing with the federal minimum wage, but eventually generating a net increase via disemployment effects.

The research on the EITC constitutes a deep literature, if a less voluminous one than that on the minimum wage, but its connection to recidivism has similarly not been considered. Prior work has shown that, in terms of labor market participation, single mothers are more responsive to the EITC than other comparable groups (Eissa and Liebman 1996; Ellwood 2000; Meyer and Rosenbaum 2001), while the observed net effects on married and childless men are insignificant (Eissa and Hoynes 2004; Hoffman and Seidman 2003). Meyer and Rosenbaum (2001) found that, subsequent to the enaction of the federal EITC, annual employment for single mothers increased by 8.5%, and that the majority of this increase can be attributed to the EITC and other contemporaneous tax changes. Further, prior research has offered evidence that the EITC may have a sufficiently strong effect of pushing single mothers into the workforce that the additional competition for low-skilled jobs may actually increase male unemployment (Eissa and Liebman 1996; Ellwood 2000; Meyer and Rosenbaum 2001). Blank and Gelbach (2002) tests this "crowd out" hypothesis. They find no significant evidence of crowd-out, however, and any potential effect appears to be minor, though any crowd-out effect would be predicted to be stronger for males with a criminal record. These previous findings support bolster our conclusion that EITC benefits reduce

recidivism for women, but have null if not criminogenic effects for men.

Our findings have important implications for both labor and crime policy. Nearly half of the $125 million budget for the Second Chance Act Prisoner Reentry Initiative was earmarked for released prisoner employment programs (GAO 2011). Summarizing the "flurry of community-based employment interventions, generally involving some combination of job readiness, job training, and job placement services" implemented between 1971 and 1994. Visher et al. 2005 identify eight programs that were designed with an eye towards testable outcomes. While these ex-offender jobs programs likely have a range of genuine benefit to their participants, none produced statistically identifiable reductions in recidivism rates. Further, the intent of these and similar policies not withstanding, the balance of U.S. labor policy is very much against those with criminal records.[3] Given the limited efficacy of past policies, and the political obstacles to passing legislation targeted to support individuals with criminal records, understanding the impact of broader labor policies is critical to efforts towards reintegrating released prisoners back into the workforce and breaking the cycle of crime and imprisonment. We find evidence that minimum wages and wage subsidies have socially beneficial second order effects on criminal recidivism, while also demonstrating an additional benefit to expanding the EITC to individuals who do not have custodial custody of young children. These observed outcomes suggest that broader labor policies targeted towards helping low skilled workers may serve as an alternative to policies specifically targeting released prisoners.

2 A Theoretical Framework

When an individual is released from prison, finding employment is a challenge. Rather than assume that legal employment is the dominant option, however, we model the decision as a choice between legal and illegal activities (Becker 1968). As such, what matters is not only the probability of the individual finding legal employment, but also the wage they can expect to earn from legal employment relative to the "wages" of criminal activity. Even if the likelihood of finding employment is decreasing with the minimum wage, there will be (within reasonable parameters) some fraction of ex-offenders who do manage to become employed and whose wage is greater than what they would otherwise earn in the labor market because of minimum wage laws.

If an individual is able to secure a job at the now higher minimum wage, then the

[3] As of 2016, there were 6,392 separate state restrictions on employment eligibility for those with felony records (Fredericksen and Omli 2016). Criminal records as a major barrier to employment would appear, in many ways, to be not just an outcome, but an explicit policy *goal* (Pager 2003; Agan and Starr 2017).

opportunity cost of returning to jail has increased, reducing the probability of recidivism (Myers 1983; Myers 1984). Yang 2017 finds that a 1 percent increase in local low-skilled wages correspond to a 2.5 percentage point decrease in an individual's probability of re-entering prison in the first year subsequent to release, and a 5.0 percentage point decrease in the first three years. In a longitudinal study of pre- and post-release prisoners, Visher et al. 2008 found a simple correlation between hourly wages and the probability of reincarceration during the first post-release year: 8 percent of those earning more than $10; 12 percent for those earning $7 to $10; and 16 percent for those earning less than $7, all compared to the 23 percent reincarceration rate for the persistently unemployed. The net effect of minimum wage laws on recidivism—the balance of employment and wage effects—depends on the relative magnitudes of changes in employment rates and earned wages relative to wages of crime.

Consider a simple model where a released prisoner can earn w_i^* in the legal market absent a minimum wage and w_i^{crime} in the criminal market. The effect of a minimum wage, w^{min}, will depend on its size relative to w_i^* and w_i^{crime}. If we assume that the minimum wage is both salient in the market i.e. that $w_i^* < w^{min}$ and that, as such, the probability of finding a job is decreasing with the minimum wage, then the net effect of the minimum wage on criminal activity (and recidivism) depends on the relative levels of w^{min}, w^*, and w^{crime}.[4]

If $w^{crime} < w^* < w^{min}$, then the probability of recidivism will *increase* with the minimum wage w^{min}. Under these conditions recidivism will be entirely tied to the probability of unemployment. Increases in the minimum wage will serve to increase unemployment rates for released prisoners, while the increase in wages will not induce any substitution of legal labor for crime at the margin given that the uncontrolled market wage was already sufficient to dominate the criminal wage.

If $w^* < w^{crime} < w^{min}$, then the probability of recidivism will *decrease* with w^{min} Inverting the relationship between market and criminal wages serves to invert the relationship between the minimum wage and criminal recidivism as well. Recidivism is now entirely tied to the minimum wage and the premium it offers relative to the wages of crime. Increases in unemployment due to the minimum wage are irrelevant because uncontrolled market wages are insufficient to dominate criminal endeavor.[5] Within the context of this simple model, the net effect of the minimum wage is an empirical question whose answer depends as much on the prospective earnings from criminal activity as it does on the market and minimum wages.

[4] Braun 2017 builds a search-theoretic model of crime and employment under a minimum wage that is broadly compatible with our framework.

[5] If $w^* < w^{min} < w^{crime}$, then the individual will opt for criminal activity, regardless of the market and minimum wages.

For individuals whose market wage are below the wages of crime(w_L^*), the wage effect will dominate. For individuals whose market wage are above the wages of crime (w_U^*), the employment effect will dominate (Figure 1). The net effect of increasing minimum wages on recidivism is ambiguous and will depend on the underlying distributions of market and criminal wages. Increasing minimum wages could lead employers to reduce hiring and ex-offenders may be particularly susceptible to this loss, leading to increased recidivism. Higher minimum wages, however, could bring legal wages above potential "criminal" wages for some offenders, enticing them into the legal labor market. Given some probability of finding and securing this higher paid job, this wage effect should lead to reductions in recidivism. In estimating the impact of minimum wages on recidivism, we are in effect estimating the net of these two forces.

Considered in this simple framework, the predicted impact of the EITC appears straightforward. The first order wage and employment effects of a pure wage subsidy push in the same direction—with larger subsidies leading to higher wages *and* higher probability of employment. The EITC, however, is not a universal subsidy program, with benefits almost entirely accruing to custodial parents of dependent children. This differential benefit to released prisoners stands to correspond to differential impact, particularly with regards to gender. Disproportionate accrual to single mothers is likely to be relevant to the 41.7% of women that entered prison as the only parent living with their child. Further to this point, in exit interviews with released prisoners, women were found to consistently place a higher priority on maintaining and regaining custody of children than men (Spjeldnes and Goodkind 2009). On net, our simple model unambiguously predicts that the EITC will reduce criminal recidivism *for women*. With regards to male recidivism, however, the predicted effect of the EITC is far weaker.

3 Data and Empirical Analysis

3.1 National Corrections Reporting Program

Data on prison spells were obtained from the National Corrections Reporting Program (NCRP). The data were constructed using administrative data voluntarily provided by states to the Bureau of Justice Statistics (BJS) on prison admissions and releases from 2000-2014. By 2000, 38 states had provided at least some data, growing to 48 states in 2014. The BJS data are linked using inmate ID numbers, allowing the matching of individuals across prison spells within a state. We excluded states and years in which data were incomplete or in which counts where substantially different from National Prisoner Survey (NPS) statistics,

resulting in the exclusion of roughly 14 percent of all prison releases reported to the NCRP (Yang 2017). However, the majority of states (44 total) were able to have records linked for some period of time they submitted data between 2000 and 2014.[6] We dropped records for individuals who were "released" from prison because of death, which constituted 0.7% of the sample.

The broadest exclusion of data from our analysis comes from the state of California. In 2011, California enacted the Public Safety Realignment Act (PSRA), an attempt to reduce overcrowding in CA prisons and as a result many convicts served their time in county jail rather than state prison post-PSRA. Given our data's reliance on state prison records (county jail admissions are unobserved), for the purposes of our analysis this completely changes the definition of recidivism in CA in 2011 and after. This can be seen clearly in Figure 3 where CA recidivism rates drops precipitously around 2011, a far outlier from other large states or the state with the largest drop in recidivism around that time, Utah. Taking what we believe to be the most conservative approach, we opt to entirely exclude California from our analysis.[7] After all restrictions are imposed, including the exclusion of California, our sample includes nearly 5.8 million prison releases from 4 million unique offenders in 43 states.

The data include the admission and release month for each prison spell. Observed demographics for each offender include age, race, Hispanic ethnicity, education (highest grade completed), gender, and whether the individual has previously been convicted of and incarcerated for a felony. For each prison spell, we observe the type of facility the prisoner entered into, the reason why the offender entered into the custody of the correctional facility, as well as why the prisoner was released. For each prison spell we also observe up to 3 conviction offenses, the sentence imposed for each offense, and the total sentence imposed. Because we observe the prison admission and release date for each period of incarceration, we can calculate the total time served for each period of incarceration. Actual time served can differ from the sentence imposed because of early release via parole or time credited.

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. Second, the data only capture a return to custody in state prison, not rearrest or prosecution.

Our sample of prisoner data is summarized in Tables 1 and 2. Table 1 gives demographic

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

[7]The data from California prior to 2011 is compromised as well. In 2006, California declared a "Prison Overcrowding State of Emergency", authorizing the involuntary transfer of thousands of prisoners to out of state prisons. This state of emergency was not repealed until 2013, at which point 8,900 prisoners sentenced in California were still serving their sentences in out of state prisons. https://www.gov.ca.gov/news.php?id=4278

characteristics of the sample and Table 2 shows recidivism rates. As expected, a vast majority of our sample, 88.1% are male. Minorities make up a larger share of our sample of prisoners than in the U.S. population (54.4% of our sample are black or hispanic). The average prisoners is in their mid-thirties on release, which makes sense as our data is about prisons and not local or county jails, and thus most people are incarcerated for a relatively serious crime, in addition almost 30% have a previous incarceration for a felony. Just over 17% of offenders in our dataset are returned to prison within 1 year, and 35% are returned within 3 years. Men recidivate at a higher rate than women (17.8% versus 14% in the first year). Property and drug crimes constitute the most common returning offenses, while 6 percent of released prisoners are returned to prison in the first year for parole violations without conviction of any new criminal offense.

3.2 Minimum Wage and EITC Data

We combine the NCRP data with data on minimum wages and the availability of state EITC top-ups. The minimum wage data is from Vaghul and Zipperer 2016 which includes state and sub-state minimum wages for the entire period of our study. Table 3 and Figure 2 summarize state minimum wage and minimum wage changes during these years. The average state had 4 changes in their minimum wage during our time period, with no state changing less than twice. Many of these changes stemmed from the 2007 amendments to the Fair Labor Standard Act which implemented federal minimum wage increases in 2007, 2008, and 2009 ($5.85 effective July 24, 2007; $6.55 effective July 24, 2008; and $7.25 effective July 24, 2009).[8] On average, states increased their minimum wage $0.50 (about 8% of the previous minimum wage), ranging from $0.05 to $1.70. At any given point in our window of study, as many as 31 states had minimum wages above the Federal minimum. Many substate changes take place at the city level, and our data is at the county level. In our main analyses we focus only on state minimum wages due to this limitation and the idea that these will be the most salient. In robustness checks, we look further at substate changes.

The state EITC comes from come from the Tax Policy Center.[9] As of 2016, 25 states and D.C. offer EITCs on top of the federal EITC worth an additional 3.5-40% of the federal benefit. These EITC state top-ups were introduced in different states at different times, and many have expanded or contracted their EITC benefits over time, giving us both within-state and across-state variation in state EITC generosity and availability.

In Figure 4, we map the overlapping presence of state minimum wages and EITC pro-

[8] If a state already had a minimum wage at or above these federal increases then it would not register as having a minimum wage change, hence the number changed in those years is not 51.

[9] Downloaded from: http://www.taxpolicycenter.org/statistics/state-eitc-based-federal-eitc

grams at the beginning (2000) and end (2014) of the window within which we are able to observe prison release. The variation across states and over time in both the minimum wage and the EITC will allows us to employ a difference-in-differences identification strategy in our analysis of the effect of low-wage labor market policies on individual recidivism. All minimum wage changes, state EITC provision, and state EITC top-up amounts for each state in our sample period (2000 - 2014) can be found in Appendix Table A.1.

4 Empirical Model and Estimation

To estimate the effect low-wage labor market policies on whether a released prisoner recidivates within a certain time period we employ a difference-in-differences design. This design exploits the panel nature of our data and the fact that minimum wage changes, EITC top-ups, and EITC top-up amounts were enacted and changed in different years and months across many states between 2000 and 2014. Specifically, our baseline specification is:

$$Recidivate_{istp} = \alpha + \beta_1 LMP_{st} + \beta_{\mathbf{2}}\mathbf{X_{ip}} + \beta_{\mathbf{3}}\mathbf{K_{ts}} + \beta_{\mathbf{4}}\mathbf{Z_c} + \gamma_y + \delta_s + \epsilon_{ist} \quad (1)$$

Where *Recidivate* is an indicator variable for whether an offender i released into state s in year-month t after prison spell p returned to prison in the same state within a certain time period (1 or 3 years depending on the specification). Our main variable of interest is LMP_{st} - the particular labor market policy of interest. In our main specifications, LMP_{st} is defined as either the minimum wage in the state and year-month into which the offender was released or whether an EITC existed in the state and year-month into which the offender was released. Additionally, we also consider the amount of the state EITC top-up in the state and year-month into which the offender was released. Given that the EITC is mainly claimed by single mothers, we also interact our labor market policies with gender to see whether policy impact differs for men and women.

X_i is a vector of characteristics about the individual offender, both time invariant and specific to that particular prison spell, e.g. gender, race, age at release, time served for this spell, and offense committed for this spell. K_{ts} are time-varying state characteristics: the housing price index and the number of sworn police officers per 1000 in the population.[10] Z_c is a vector of county economic and demographic characteristics, that could impact low-wage

[10]Housing price index is the All-transactions quarterly index from the Federal Housing Finance Agency. This is the same control used in Clemens and Wither (2016) to control for time-varying macroeconomics conditions across states without controlling for unemployment which could be a direct result of minimum wage and EITC policies. Sworn police officers per 1000 are from the FBI's La 666w Enforcement Officers Killed or Assaulted (LEOKA) data.

employment availability and recidivism of recently released offenders.[11] Specifically, this vector includes age and racial demographics, and median household income in the county of release. γ_y are year fixed effects and δ_s are state fixed effects. Standard errors are clustered at the state level.[12]

Within the context of our model, the impact of the minimum wage is dependent on its value relative to market and criminal wages that an ex-offender can command. To better identify the salience of the minimum wage in the context of a state's current labor market, we also borrow from Lee 1999 and Autor and Smith 2016, and also test specifications with the "effective" minimum wage, where $MW_{st}^{eff} = log(MW_{st}) - log(W_{st}^{p50})$ as the independent variable of interest. Here W_{st}^{p50} is the median wage in that particular state and year. Thus the effective minimum wage is measuring how far the minimum wage is from the median wages in the state and is, in a sense, a measure of proportion of the labor pool for which the minimum wage "binds". [13]

In Equation 2, we identify the effect of the low-wage labor market policy *at the time the offender was released*. For that reason we mostly focus on recidivism within 1 year, although we also show results for a 3 year window. Our identification of the impact of the minimum wage or the EITC compares observably similar offenders, released into the same state, but who happen to be released under different minimum wages or EITC policy regimes. The coefficients of principal interest are identified off of the random variation in the month of release, whether that release occurred before or after a raise in the minimum wage or EITC, and how an individual's probability of recidivism compares to other prisoners with similar characteristics. These policies can obviously change after the offender is released, and this is may affect their employment, wages, and potential recidivism. To account for this we also consider the average minimum wage in 6 months and 12 months following release. In the Robustness and Alternative Specifications section we also consider several alternative specifications, including variations on the dependent and key explanatory variables. We will

[11] County data is from the US Census https://www.census.gov/support/USACdataDownloads.html. County c identified here as the county of the court in which the individual offender i was committed to prison. Allegretto et al. 2017 make the case the local covariates are important when trying assess the employment effects of minimum wages. Given our interest in the *net* of employment and wage effects on recidivism, local covariates serve as controls for labor markets where minimum wages are more or less likely to be salient (i.e. whether there are many young people).

[12] We cluster at the state level because this is the level of variation for our primary explanatory variables (i.e. state minimum wages and EITC top-ups), but also in part because it constitutes the most conservative level of clustering, and accommodates Bertrand et al.'s 2004 important observations and critiques. This strategy leaves us with 42 clusters. Though there is some debate on the minimum number of clusters necessary to use standard clustering techniques, but this appears to surpass most of stated thresholds. Nonetheless, standard errors are similar if we do the adjustments suggested by Cameron et al. 2008. Other clusters, i.e. state-month (one may consider as that is the level of variation of our policy changes) report smaller standard errors.

[13] Data for median wages by state and year are estimated from the CPS.

test specifications addressing potential dynamic effects, state-sepcific macroeconomic time trends, and identification via cross-state counties with shared borders.

5 Results

We start by presenting the basic relationship between minimum wages or EITC top-up percentages and the probability of recidivism as binned scatterplots, controlling only for state and year fixed effects with a bivariate regression line fit to the plotted bins. Figure 5 is for the state minimum wages. We see a distinct downward trend: high minimum wages appear to be associated with a reduced risk of returning to prison within one year, and while there are clear level differences, the slopes are almost identical for men and women. The relationship between recidivism and state EITC top-up percentages is similarly plotted in Figure 6. Here we see a slightly different story, there is a downward trend for women but for men the slope of the relationship between the EITC top-up and recidivism is, if anything, slightly positive. While these relationships will be explored with more rigor and controls in later regression analysis, we see the initial story start to emerge: higher minimum wages are associated with reduced recidivism for both men and women, and EITC top-ups are associated with reduced recidivism for women but not for men.

Table 4 presents our main results from Equation 2 for the minimum wage and existence of a state EITC, as well as their interactions with gender. All specifications include state and year fixed effects, as well as controls for observable offense and offender characteristics and county of release characteristics. We focus here on whether the individual returns to prison in 1 year.[14] When the minimum wage is included as a standalone variable of interest, the results from Column 1 imply that a $1.00 increase in the minimum wage is associated with a 0.9 percentage point *decrease* in the probability an individual returns to prison within one year. The mean probability of returning to prison in 1 year is 22.7% implying that a $1.00 increase in the minimum wage is associated with an 4% decrease in recidivism. Recall that the average minimum wage increase is $0.50, so while a $1.00 increase is on the high end it is well within plausible increases. In Column 2 we include an interaction with the female indicator variable. Confirming the results from the binned scatter plots, we find that the effect of the minimum wage does not differ significantly for women versus men.

In Column 3 we consider the availability of a state top-up to the federal EITC. The coefficient is positive but insignificant. However, when we interact the state EITC with the offender being female in Column 4, we see that for *women* the existence of a state EITC decreases recidivism by 1.6pp, an 11.4% decrease over the average recidivism rate for women

[14] 3 year results are qualitatively similar and presented in the robustness checks.

- though the coefficient is only marginally significant ($p < 0.10$), recall also that only 10% of our sample is female. Finally, Column 5 includes both policies and their interactions with gender and finds similar results. In short - an increase in the minimum wage decreases average recidivism for both men and women, while a state EITC top-up decreases recidivism only for women, with a potential increase (though not statistically significant) in recidivism for men.

In Table 5 we consider different definitions of the minimum wage: it's natural log, the average minimum wage 6 months after release, average minimum wage 12 months after release, and the effective minimum wage of Lee 1999. The first column recreates Table 4 Column 2. In Columns 2-5, we see that for all definitions of the minimum wage, an increase in the minimum wage decreases recidivism and that this effect is similar for men and women. The logged results imply that a 1% increase in the minimum wage is associated with a 0.05 pp decrease in the probability an individual returns to prison in 1 year. Recall that the average minimum wage change resulted in an 8% increase over the previous minimum wage, thus the average minimum wage increase results in a 0.4 pp decrease (2% over the average). In Column 3 we model the effect of the"effective" minimum wage—the difference between the logged minimum wage and the logged state median wage. A one standard deviation increase in the effective minimum wage corresponds to a 0.5pp decrease in the rate of recidivism, and is more precisely identifed ($p < 0.01$). This suggests that, when the minimum wage is specified according to its salience within the state's labor pool, its observed impact on recidivism remains the same, save a small increase in precision in the estimated coefficient. The coefficient on the interaction of the effective minimum wage with the female indicator is marginally significant, and positive, suggesting that when the salience of the minimum wage in the local labor market is taken in to account, it may have a smaller effect on female recidivism. In Columns 4-5 we consider the average minimum wage 6- and 12- months after release to account for the fact that the minimum wage could change after an offender release, though results remain similar.

Table 6 substitutes the magnitude of the state EITC top-up into Equation 2 instead of simply whether a state top-up exists. This table is thus similar to Table 4 Columns 3 and 4, with top-up percent replacing the EITC dummy. The results indicate that a 1 pp increase in the EITC top-up reduces recidivism by 0.1pp for women. Within the context of our sample (mean state top-up = 5.2%, Std. Dev. = 9.3), a one standard deviation increase in the state EITC corresponds to a 6% (0.09pp) reduction in the expected recidivism rate for women. These results corroborate the previous findings using the EITC indicator in Table 5.

Our estimates in Tables 4 and 6 allow us to make some back of the envelope policy comparisons, at least for predicted reductions in female recidivism rates. Our models esti-

mate that a $0.50 increase in the minimum wage corresponds to the same reduction in the rate of female recidivism as a 5 percentage point increase in the state EITC top-up. While the typical minimum wage employee is both young and engaged in part-time employment, for the sake of comparison, a full-time employee working 2,000 hours per year would earn an additional $1,000 after a $0.50 wage increase. In 2015, a married couple with chidren and yearly household income between $14,000 and $23,750 could receive the maximum the maximum EITC benefit of $5,572, with the mean EITC recipient household received $3,186 on Budget and Priorities 2016. Given that it is awarded as a percent of the federal credit, a state-up of 5 percentage points would provide a the average household with an additional $159 a year, the maximum $279. In other words, between $159 and $279 per year in additional income via the EITC corresponds to same expected reduction in female recidivism as a $1,000 worth of additional (full-time) income via an increase in the minimum wage. A state, currently operating without an EITC top up and bound by the federal minimum wage of $7.25, contemplating an $8.25 state minimum wage to help working families with a single minimum wage full-time earner could expect to similarly raise those household incomes with a 36pp state EITC top-up. In this scenario, our estimates would predict that this minimum wage increase would reduce expected female recidivism rates by 4.5%, while the enaction of the comparable state EITC would reduce it by roughly 25.3%. [15] We can do little more than speculate on the differing wage policy effects on male recidivism, save that these results further speak to the potential gains to be had from expanding access to the EITC for individuals who are not custodial parents.

5.1 Subcategories: Offender education, returning offense, and parole violations

Given that minimum wages and EITCs effect mainly low-skill labor, we may expect these results to be stronger for ex-offenders with less education. Table 8 reports results from different subsamples based on the highest level of education completed by the ex-offender, again using specification from Column 5 of Table 4 which includes both the minimum wage, state EITC, and their interactions with sex. We find that the prior observed reduction in recidivism under higher minimum wages remains robust for those without a high school diploma or college degree. Further, when focusing on individuals without a high school diploma, the coefficient is larger than for the whole population or for those with a high

[15] This, of course, does not imply that the EITC is necessarily the more efficient policy. The deadweight losses of the two policies is beyond the scope of this analysis. Rather, it implies that the given a fixed household income policy target, the comparable EITC increase corresponds to a larger expected decrease in female recidivism.

school diploma—a one dollar increase in then minimum wage leads to a 7% lower rate of recidivism for released prisoners without a high school diploma. The observed coefficients on the interaction of the state EITC and female indicators are nearly twice as large for high school drop-outs as those observed for entire population, though the coefficient is not statistically significant. In general, our indicator for state EITC top-ups appears to have insufficient variation to estimate precise effects when looking at narrower slices of the (already much smaller) female offender population.

One potential mechanism for the reduction in recidivism is that increased wages lead ex-offenders to commit fewer crimes associated with income generation - such as drug dealing or property crimes. Table 7 reports results by the type of crime an offender was returned to prison for: violent, property, or drug using the specification from Column 5 of Table 4 which includes both the MW, state EITC, and their interactions with gender. We find that the probability of returning to prison for a violent crime is uncorrelated with the minimum wage. Property crime (column 2) and and drug offense (column 3) recidivism are both decreasing with the minimum wage, though the coefficient on drug crime recidivism is only marginally significant. These results continue to support the conclusion that the wage effects of the minimum wage dominate any employment effects - high minimum wages do not reduce "crimes of passion" but do reduce potentially income generating crimes.

The EITC results are more mixed. We do observe a small, but nonetheless unexpected increase in male violent crime recidivism (0.6pp) and a small decrease in female violent crime recidivism (1pp). These findings are difficult to explain within the context of our theoretical framework, but research in domestic violence and female violent crime arrest rates suggest they may be connected. Van Wormer and Bartollas 2000 suggest that the growing rate of female incarceration for violent crimes (Spjeldnes and Goodkind 2009 is a result of domestic violence mandatory arrest laws. Combined with prior evidence that married couples are less likely to remain married under large increases in the EITC (Dickert-Conlin and Houser 2002, these small violent crime effects may be an unexpected byproduct of domestic violence arrests that, within our data, cannot be distinguished from assault and other violent offenses.

Recidivism in our case is defined as a return to prison. An ex-offender could return to prison due to a parole/probation violation or for a new crime. Both are potentially of interest. In Table 9 we separate returns to prison for violations of the conditions of early-release absent a new criminal charge from those returned with a conviction for a new crime. We focus on those granted early release and placed under regular state supervision, including both those granted discretionary parole release and those released on state-mandated parole. Terms of parole typically include requirements to adequately pursue employment.[16] A minimum-

[16]Most state parole programs require parolees to demonstrate an approved combination of regular em-

wage distorted labor market could stand to impede and discourage ex-offenders' efforts to procure employment and, in turn, increase parole violations. In Table 9 reports results of the separate estimates of the effects of the minimum wage on ex-offenders returned under a parole revocation absent a new conviction (Column 1), those whose parole was revoked with a new criminal conviction (Column 2), and those returned to prison under entirely new charges (Column 3). We observe a trivial, nearly zero, effect of the minimum wage on parole revocations with or without a new charge, while the effect on new offenses is effectively unchanged from the estimates on all returning violations. This implies that the minimum wage is reducing returns to prison for *new crimes*. We do, however, observed a 1.8pp reduction in the parole revocations absent any new criminal conviction for women in states with an EITC top up. This further supports prior conclusions that the EITC is increasing women's labor market participation and, in turn, lowering their rate of return to prison. In this case, however, it is through the specific mechanism of reducing violation of the terms of parole.

5.2 Robustness and Alternative Specifications

In this section we first test the robustness of our results to some simple alternative variations of the depedendent variable and the geography of the minimum wage. We then test the robustness of our results to a variety of alternative empirical model specifications. In this, we take our cues explicityly from the most recent research, and at time explicit disagreements, in the research on the effects of minimum wages on youth and low skill employment. Given the different, "event", nature of our outcome of interest, our replications of the different authors' preferred specifiations are not always identical, but they still serve to test the sensitivity of our results to the variety alternative model designs characterizing the most recent literature.

5.2.1 Simple robustness checks

Table 10 recreates our baseline specifications for reference in column 1. When we extend the post-release window and examine rates of return to prison in within 3 (rather than 1 year), the negative relationship within the minimum wage remains and the coefficient grows roughly 50% larger (column 2).

Between 2000 and 2014 there are 18 municipalities that have a minimum wage that is above the state's minimum wage.[17] This represents 0.2% of our data, about 14,000 obser-

ployment and regular enrollment in school. Failure to do so is a violation of the terms of Parole. In the Pennsylvania Parole Officer low, medium, and high violation rubric, failure to maintain adequate employment is a "medium" violation. For comparison, being convicted of a misdemeanor is also a "medium" violation.

[17] Data on substate minimum wages also from Vaghul and Zipperer 2016: data only available from 2004-

vations. Recall that we have data at the county level, while some of these are sub-county municipalities and thus not everyone in the county is subject to them. In the main analysis we considered only the state minimum wage. In Columns 3 and 4 we try two different strategies for dealing with this. Column 3 just drops any jurisdiction with a substate minimum wage. Column 4 assigns the substate minimum wage to everyone in the county, even if only one city within the county had this. The resulting coefficients are unchanged from our primary specification, perhaps unsurprisingly given how few observations these localities represent.

The coefficients on the $EITCXFemale$ interaction is qualitatively unchanged (and are nearly quantitatively identical) in all of our alternative specifications in Table 10. Similar to coefficient on the minimum wage, extending the post-release window of analysis increases the magnitude of the effect of the EITC on women. The effect of the EITC on men remains statistically significant in all of our alternative specifications.

5.2.2 Dynamic labor market effects

While focusing on recidivism relieves our model of some of the difficulties of precisely measuring the elasticities of labor demand, there are considerations in the minimum wage literature that merit attention. In addressing the dynamics of low skill labor markets, Meer and West 2015 note that the disemployment effects of minimum wage policies are less likely to show up immediately, in the form of job separations, and more likely to show up as foregone growth, and that narrow post-policy change treatment windows can obfuscate underlying disemployment effects. To address this, we include a set of one-, two-, and three-year lags of the state minimum wages to the model specification in Table 11. When included as singular right-hand side variables, the coefficients on the 1-, 2-, and 3-year lags remain negative, if not statistically significant. When all three lags are include with the concurrent minimum wage, the results are broadly consistent with our primary analysis. The coefficient on the concurrent minimum wage remains negative ($p < 0.01$). The coefficient is slightly smaller, but that would appear to be due to the portion of the negative effect accounted within the negative coefficient on the 2-year lag ($p < 0.05$). While simple-inclusion of lagged minimum wage covariates does not replicate the nuance of the Meer-West model, it does suggest that our observed dominance of wage effects over unemployment effects is unlikely to be an artifact of unaccounted for future growth stagnation.

2015 as 2004 is the earliest substate minimum wage above a state that the authors documents. These localities are: Albuquerque, NM; Bangor, ME; Berkeley, CA; Fayette County, KY; Jefferson county, KY; Johnson County, IA; Las Cruces, NM; Montgomery County, MD; Portland, ME; Prince George's County, MD; San Francisco County, CA; San Jose, CA; Santa Fe, NM; Seatac, WA; Seattle, WA; Tacoma, WA

5.2.3 State specific macroeconomic heterogeneity: state-specific time trends

One concern for our identification strategy is the potential endogeneity of minimum wage changes to state-specific trends that could also affect recidivism - i.e. if states tend to change their minimum wages when economic conditions are are on an up or a downswing, this could bias our results. The potential for time varying state or local geography-specific differential trends in economic conditions and how to control for them is the thrust of much of the recent debate in the minimum wage and employment literature (see, for example, Dube et al. 2010; Neumark et al. 2014; Allegretto et al. 2017; Neumark and Wascher 2017). We tested several additional specification that attempt to account for time-varying heterogeneity in economic conditions within local areas that could impact recidivism and thus be biasing our results. As the literature is not yet settled on the best way to control for this, we opt for a conservative approach, and test several specifications based on strategies recently employed in minimum wage literature.

In Table 12, as in much of the applied microeconomic literature concerned about differential trends in unobservables across states, we add in state-specific time trends. We consider linear trends, as well as trends with higher-order polynomials. The higher-order polynomials follow the suggestion of Neumark et al. (2014), who note that recessionary periods can lead to cross-state deviations in employment and labor market conditions that could cause linear time trends to be biased, and that higher-order polynomials may pick up this variation better. Columns (1)-(4) of Table 12 follows the specification of Column 1 of Table 4 and then adds in through fourth order state-specific polynomial time trends.[18] The coefficient on the minimum wage is smaller with the addition of the state-specific time trends, as is to be expected from the addition of a third vector of fixed effects. The coefficients are slightly larger, and are statistically significant, when the trend is included as a 2nd, 3rd, or 4th order polynomial.

The state-specific time trend analysis obviously requires parametric assumptions about the trajectory of unobservable conditions across states. A less parametrically reliant approach to control for time-varying area-specific shocks is to use geographically close controls. For example, the approach used in Dube et al. (2010) takes advantage of discontinuities offered by state borders to compare outcomes of minimum wage increases in one county to another county just across a state border that does not experience such an increase. This approach relies on the assumption that geographically close counties experience very similar shocks and only experience different minimum wages due to the state border between

[18] Adding in the interactions with female does not change the conclusion is not presented in the interest of space

them.[19] In columns (5) and (6) of Table 12 we restrict our analysis to either pairs (Column (5)) or pairs and triads (Column (6)) of counties that straddle state borders and include county-cluster by year interactions to control for shocks common to both or all 3 counties in a cluster straddling a state border.[20] The coefficient on the minimum wage drops out of significance when only the counties who share a cross-state border with a single county. When the set of included counties is extended to three county clusters, the number of observations doubles, and the coefficient returns to significance ($p < 0.05$).

Finally, we take a nod from Clemens and Wither (2016), and focus on the major federal minimum wage increases that took place in 2007, 2008, and 2009. Some states were bound by these minimum wage increases by virtue of having minimum wages below the new federal levels and others were not (by having minimum wages already at or above the new federal minimums).[21] While our variable of interest (individual recidivism rates) does not permit an identical triple difference design, we can similarly treat the the binding status of federal minimum wage laws as a source of variation in state minimum wages that are are exogenous to the macroeconomic conditions in any particular state. We identify state-years that experienced minimum wage increased *caused* by the federal increases, and compare those to other changes via the following specification:

$$\begin{aligned} Recidivate_{istp} = \alpha + \beta_1 MinWage_{st} + \beta_2 Bound_{st} + \beta_3 MinWage_{st} X Bound_{st} \\ + \beta_4 \mathbf{X_{ip}} + \beta_5 \mathbf{K_{ts}} + \beta_6 \mathbf{Z_c} + \gamma_y + \delta_s + \epsilon_{ist} \end{aligned} \tag{2}$$

Appendix C describes how we define *Bound* and identifies the states and years that we consider bound by the federal increases. In Column (7) of Table 12 we show that states that experienced bound and unbound minimum wage changes experienced similar decreases in recidivism. The coefficient on the interaction term is 0.002 (se=0.005, so not statistically significant), indicating that bound states may have slightly smaller decreases in recidivism, but we cannot rule out similar decreases to unbound states and regardless both types of increases resulted in overall recidivism decreases.

The variety of alternative specifications characterizing the current literature are a product

[19] We note that Neumark and Wascher (2017) critique this approach, arguing that the data does not always support that contiguous counties across state borders are the best controls and that other policies that affect outcomes may also vary across the border.

[20] See Appendix B for details about the construction of these county clusters.

[21] These changes happened during the great recession, which also differentially affected states. While state minimum wage increases tend to be correlated with weak economic conditions, the federally bound states in this window, on average, were less negatively impacted by the great recession (Clemens and Wither (2016)). They control for these differences using an index of housing market prices, a control variable which we employ as well.

of researchers arguing over how best to identify disemployment effects of minimum wages—a literature focused on the demand side of the market. Our observation of reductions in criminal recidivism is consistent across a broad swath of these alternative models. This observed reduction, within our theoretical framework, supports a model where labor market decisions by would-be criminals are dominated by the wage increasing effects of minimum wages. The consistency of our results across the variety of specifications, however, is indicative of a phenomenon determined by the supply side of the labor market. Future research, including criticisms of our approach here, would appear to best served focusing on how we study and model decisions made by the suppliers of labor, particularly those for whom illegal labor markets are a viable and considered endeavor.

6 Conclusion

In this paper, we exploit changes in minimum wage laws and state EITCs to estimate the impact of these wage policies on the recidivism of released prisoners. Using records on nearly six million offenders released between 2000 to 2013, and admissions through the end of 2014, we find that on net, higher minimum wages decrease recidivism. These results suggest that while increases in the minimum wage may potentially reduce labor demand among the population of individuals with criminal records, negative employment effects are dominated by the labor-crime substitution effects of increased wages relative to criminal alternatives.

We find that EITC wage subsidies reduce recidivism, as well, but only for women. In light of the uniform effects of minimum wages across gender, we believe this gender-specificity of the EITC is a byproduct of its emphasis on subsidizing the wages of custodial parents, an outcome reciprocal to the marked salience of the EITC to single mothers (Eissa and Liebman 1996; Ellwood 2000; Meyer and Rosenbaum 2001). The exclusion of men without children, and fathers without custody, serves as a mechanism to exclude the bulk of men released from prison from the predicted positive (recidivism reducing) wage and employment effects. Disaggregating the underlying employment and wage effects of the EITC for men and women, as well as parents and non-parents, leaving prison will require future research and, likely, more detailed data on the familial standing of released prisoners.

The balance of U.S. labor policy is very much against those with criminal records, with little reason to believe reducing their labor market opportunities will lead to anything other than greater criminal activity (Pager 2003; Agan and Starr 2017). As of 2016, there were 6,392 separate state restrictions on employment eligibility for those with felony cords, led by Louisiana's 389 and no state carrying fewer than 41 (Fredericksen and Omli 2016). Our results raise the possibility of significant, and previously undiscussed, second-order welfare

benefits of broad wage policies. The minimum wage may serve as something of an efficiency wage that, while paying more than the market estimate of ex-offenders' marginal products, provides a public good in the form of reduced criminal activity. Similarly, the EITC can serve to push wages above those available from criminal activity, increasing the opportunity cost of crime without the potential disemployment effects associated with minimum wages. Our results may serve as further rationale for expanding these subsidies to include those without children.

Our results also raise the possibility that the wages of criminal activity in the black market may be higher than some previous estimates or, at least, in excess of what unskilled labor, and those carrying the stigma of a criminal record, can hope to earn in the legal market. Empirical evidence of illegal market wages are sparse, as is to be expected. Prohibitions and embargoes of products can be expected to reduce the supply and, in turn, increase the prices of the targeted goods. When such prohibitions lead to returns to illegal production or smuggling in excess of market wages for low- and un-skilled labor, minimum wages and wage subsidies may provide the previously unidentified benefit of reducing criminal recidivism by pushing wages in legal markets above their more nefarious alternatives.

References

Agan, A. Y. and S. B. Starr (2017). Ban the box, criminal records, and racial discrimination: A field experiment. *Quarterly Journal of Economics* (Forthcoming).

Allegretto, S., A. Dube, M. Reich, and B. Zipperer (2017). Credible research designs for minimum wage studies. *ILR Review 70*, 559–592.

Allegretto, S. A., A. Dube, and M. Reich (2011). Do minimum wages really reduce teen employment? accounting for heterogeneity and selectivity in state panel data. *ILR Review 50*(2), 205–240.

Autor, David H.and Manning, A. and C. L. Smith (2016). The contribution of the minimum wage to us wage inequality over three decades: A reassessment. *American Economic Journal: Applied Economics 8*(1), 58–99.

Beauchamp, A. and S. Chan (2014). The minimum wage and crime. *The BE Journal of Economic Analysis & Policy 14*(3), 1213–1235.

Becker, G. S. (1968). Crime and punishment: An economic approach. *The Journal of Political Economy 76*(2), 169–217.

Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates. *The Quarterly Journal of Economics 119*(1), 249–275.

Blank, R., J. Gelbach, and G. R Ford (2002, 04). Are less skilled women crowding out labor market participation among less skilled men?

Braun, C. (2017). Crime and the minimum wage. *Working Paper, University of California-Santa Barbara*.

Cameron, A. C., J. B. Gelbach, and D. L. Miller (2008). Bootstrap-based improvements for inference with clustered errors. *The Review of Economics and Statistics 90*(3), 414–427.

Card, D. and A. B. Krueger (1994). Minimum wages and employment: A case study of the fast-food industry in new jersey and pennsylvania. *American Economic Review 84*(4), 772–793.

Card, D. and A. B. Krueger (2015). *Myth and measurement: The new economics of the minimum wage*. Princeton University Press.

Clemens, J. and M. Wither (2016). The minimum wage and the great recession: Evidence of effects on the employment and income trajectories of low-skilled workers. Technical Report 20724, National Bureau of Economic Research.

Deere, D., K. M. Murphy, and F. Welch (1995). Employment and the 1990-1991 minimum-wage hike. *The American Economic Review 85*(2), 232–237.

Dickert-Conlin, S. and S. Houser (2002). Eitc and marriage. *National Tax Journal*, 25–40.

Dube, A. (2013). Minimum wages and aggregate job growth: Causal effect or statistical artifact?

Dube, A., T. W. Lester, and M. Reich (2010). Minimum wage effects across state borders: Estimates using contiguous counties. *The review of economics and statistics 92*(4), 945–964.

Dube, A. and B. Zipperer (2015). Pooling multiple case studies using synthetic controls: An application to minimum wage policies.

Eissa, N. and H. W. Hoynes (2004). Taxes and the labor market participation of married couples: the earned income tax credit. *Journal of public Economics 88*(9), 1931–1958.

Eissa, N. and J. B. Liebman (1996). Labor supply response to the earned income tax credit. *The quarterly journal of economics 111*(2), 605–637.

Ellwood, D. T. (2000). The impact of the earned income tax credit and social policy reforms on work, marriage, and living arrangements. *National tax journal*, 1063–1105.

Fredericksen, A. and D. Omli (2016). Jobs after jail: Ending the prison to poverty pipeline. Report, Alliance for a Just Society.

Glaze, L. E. (2008). Parents in prison and their minor children.

Gorry, A. (2013). Minimum wages and youth unemployment. *European Economic Review 64*, 57–75.

Hashimoto, M. (1987). Minimum wage law and youth crimes: Time-series evidence, the. *JL & Econ. 30*, 443.

Hoffman, S. D. and L. S. Seidman (2003). *Helping working families: The earned income tax credit*. WE Upjohn Institute.

Lee, D. S. (1999). Wage inequality in the united states during the 1980s: Rising dispersion or falling minimum wage? *The Quarterly Journal of Economics 114*(3), 977–1023.

Leigh, A. (2010). Who benefits from the earned income tax credit? incidence among recipients, coworkers and firms. *The BE Journal of Economic Analysis & Policy 10*(1).

Levitt, S. D. and S. A. Venkatesh (2000). An economic analysis of a drug-selling gang's finances. *The Quarterly Journal of Economics 115*(3), 755–789.

Liu, S., T. J. Hyclak, and K. Regmi (2016). Impact of the minimum wage on youth labor markets. *Labour 30*(1), 18–37.

Meer, J. and J. West (2015). Effects of the minimum wage on employment dynamics. *Journal of Human Resources*.

Meyer, B. D. and D. T. Rosenbaum (2001). Welfare, the earned income tax credit, and the labor supply of single mothers. *The quarterly journal of economics 116*(3), 1063–1114.

Muravyev, A. and A. Oshchepkov (2016). The effect of doubling the minimum wage on employment: evidence from russia. *IZA Journal of Labor & Development 5*(1), 6.

Myers, S. L. (1983). Estimating the economic model of crime: Employment versus punishment effects. *The Quarterly Journal of Economics 98*(1), 157–166.

Myers, S. L. (1984). Do better wages reduce crime? a research note. *American Journal of Economics and Sociology 43*(2), 191–195.

Neumark, D. (2017). The employment effects of minimum wages: Some questions we need to answer. Technical report, National Bureau of Economic Research.

Neumark, D., J. I. Salas, and W. Wascher (2014). Revisiting the minimum wage-employment debate: Throwing out the baby with the bathwater? *ILR Review 67*(3).

Neumark, D. and W. Wascher (1995). Minimum wage effects on employment and school enrollment. *Journal of Business & Economic Statistics 13*(2), 199–206.

Neumark, D. and W. Wascher (2017). Reply to "credible research designs for minimum wage studies". *ILR Review 70*(3), 593–609.

Neumark, D. and W. L. Wascher (2010). *Minimum Wages*. MIT Press.

Nichols, A. and J. Rothstein (2016). The earned income tax credit. *Economics of Means-Tested Transfer Programs in the United States 1*, 137.

on Budget, C. and P. Priorities (2016). *The Earned Income Tax Credit*.

Orrenius, P. M. and M. Zavodny (2003). The effect of minimum wages on immigrants' employment and earnings. *American Journal of Sociology 108*(5), 937–975.

Pager, D. (2003). The mark of a criminal record. *American journal of sociology 108*(5), 937–975.

Pager, D. (2008). *Marked: Race, crime, and finding work in an era of mass incarceration*. University of Chicago Press.

Powell, D. (2016). Synthetic control estimation beyond case studies: Does the minimum wage reduce employment?

Rothstein, J. (2010). Is the eitc as good as an nit? conditional cash transfers and tax incidence. *American Economic Journal: Economic Policy 2*(1), 177–208.

Schnepel, K. T. (2017). Good jobs and recidivism. *The Economic Journal* (Forthcoming).

Slichter, D. et al. (2016). The employment effects of the minimum wage: A selection ratio approach to measuring treatment effects. *Unpublished paper. Accessed at http://bit.ly/1kLgpGT*.

Spjeldnes, S. and S. Goodkind (2009). Gender differences and offender reentry: A review of the literature. *Journal of Offender Rehabilitation 48*(4), 314–335.

Uggen, C. and M. Thompson (2003). The socioeconomic determinants of ill-gotten gains: Within-person changes in drug use and illegal earnings 1. *American Journal of Sociology 109*(1), 146–185.

Vaghul, K. and B. Zipperer (2016). Historical state and sub-state minimum wage data. Technical Report 2016-09, Washington Center for Equitable Growth.

Van Wormer, K. S. and C. Bartollas (2000). *Women and the criminal justice system*. Allyn and Bacon Boston.

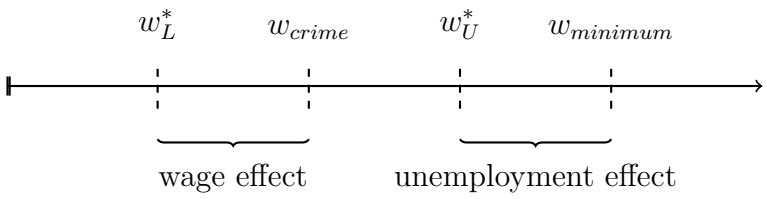
Visher, C. A., S. Debus, and J. Yahner (2008). *Employment after prison: A longitudinal study of releases in three states*. Urban Institute, Justice Policy Center.

Visher, C. A., L. Winterfield, and M. B. Coggeshall (2005). Ex-offender employment programs and recidivism: A meta-analysis. *Journal of Experimental Criminology 1*(3), 295–316.

Waldfogel, J. (1994). Does conviction have a persistent effect on income and employment? *International Review of Law and Economics 14*(1), 103–119.

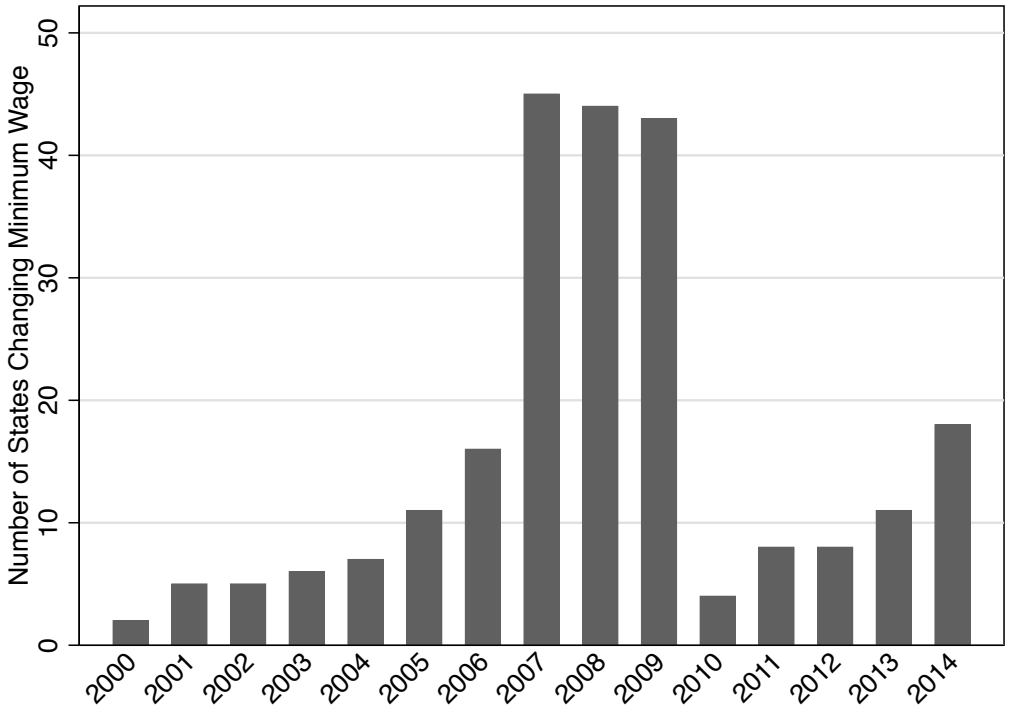
Yang, C. S. (2017). Local labor markets and criminal recidivism. *Journal of Public Economics 147*, 16–29.

Figure 1



Note: In this illustration, w_L^* and w_U^* are the hypothetical wages for individuals whose market wages are below and above the wages of crime, w_{crime}, all of which are assumed to be less than the minimum wage, $w_{minimum}$. For individuals earning w_L^* in the legal market, the wage effect will dominate, while the unemployment effect will dominate for those earning w_U^*.

Figure 2: Number of States Changing Minimum Wage by Year



Note: A 2007 amendment enacted federal minimum changes in 2007, 2008, and 2009 ($5.85 effective July 24, 2007; $6.55 effective July 24, 2008; and $7.25 effective July 24, 2009). If a state already had a minimum wage at or above these federal increases then it would not register as having a minimum wage change, hence the number changed in those years is not 51.

Figure 3: 1 Year Recidivism Rates for CA versus Other States

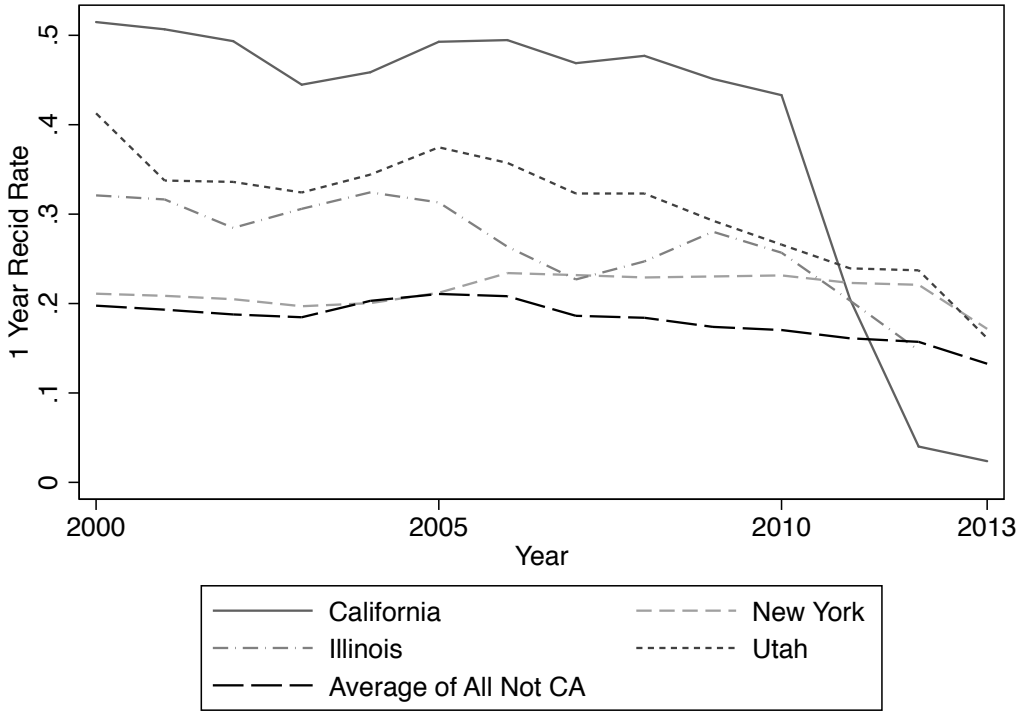
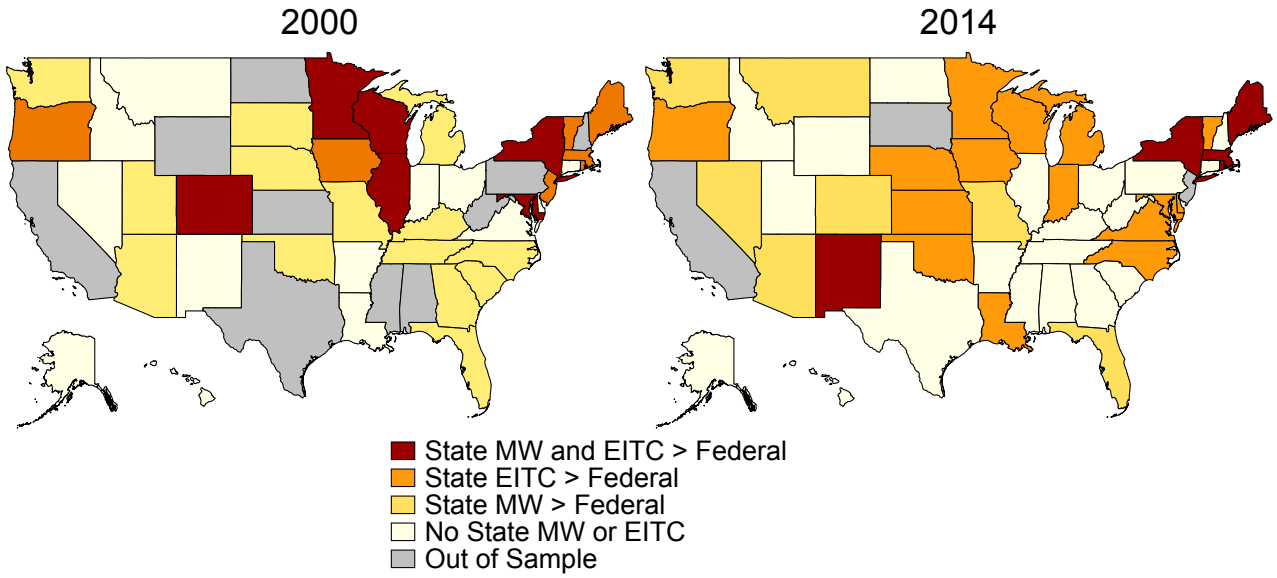
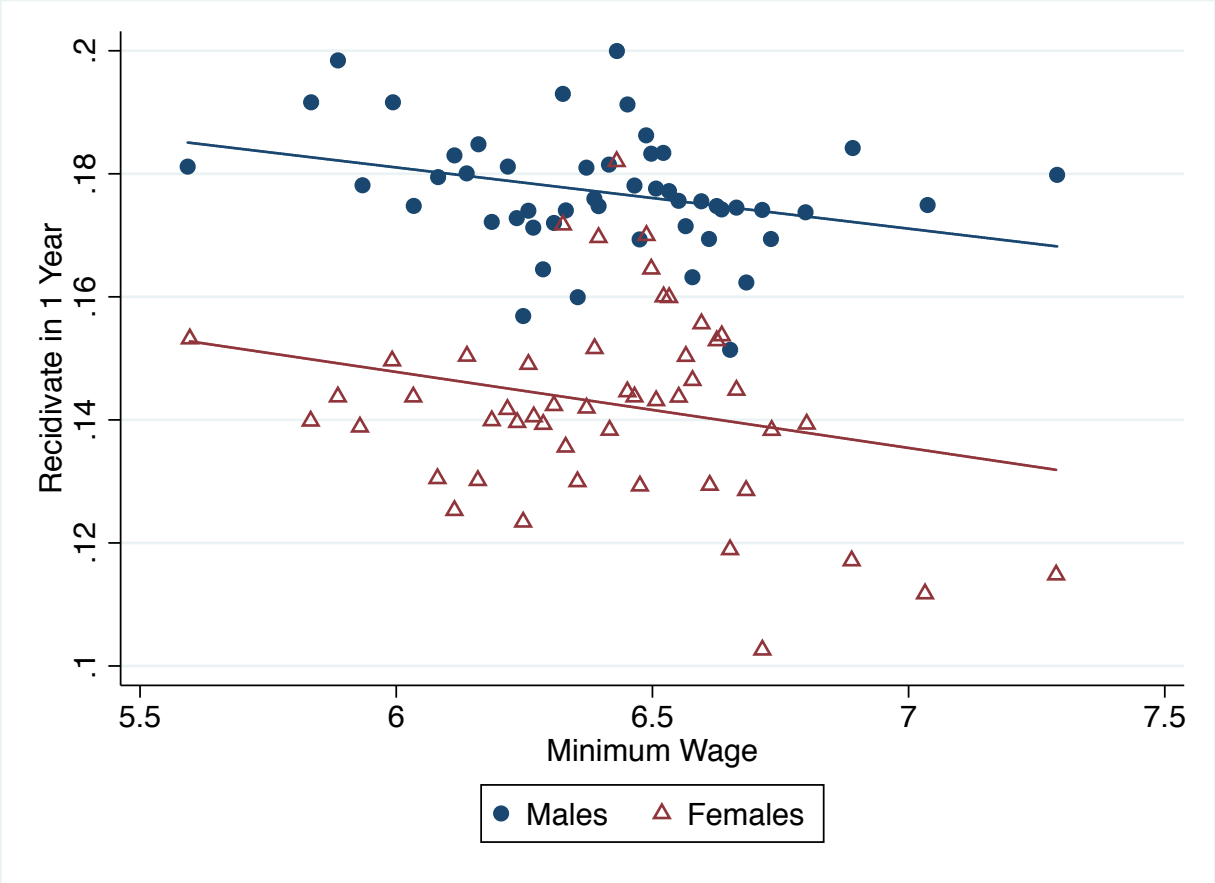


Figure 4: States with Minimum Wages Above Federal and EITC top-ups in January 2000 and January 2014



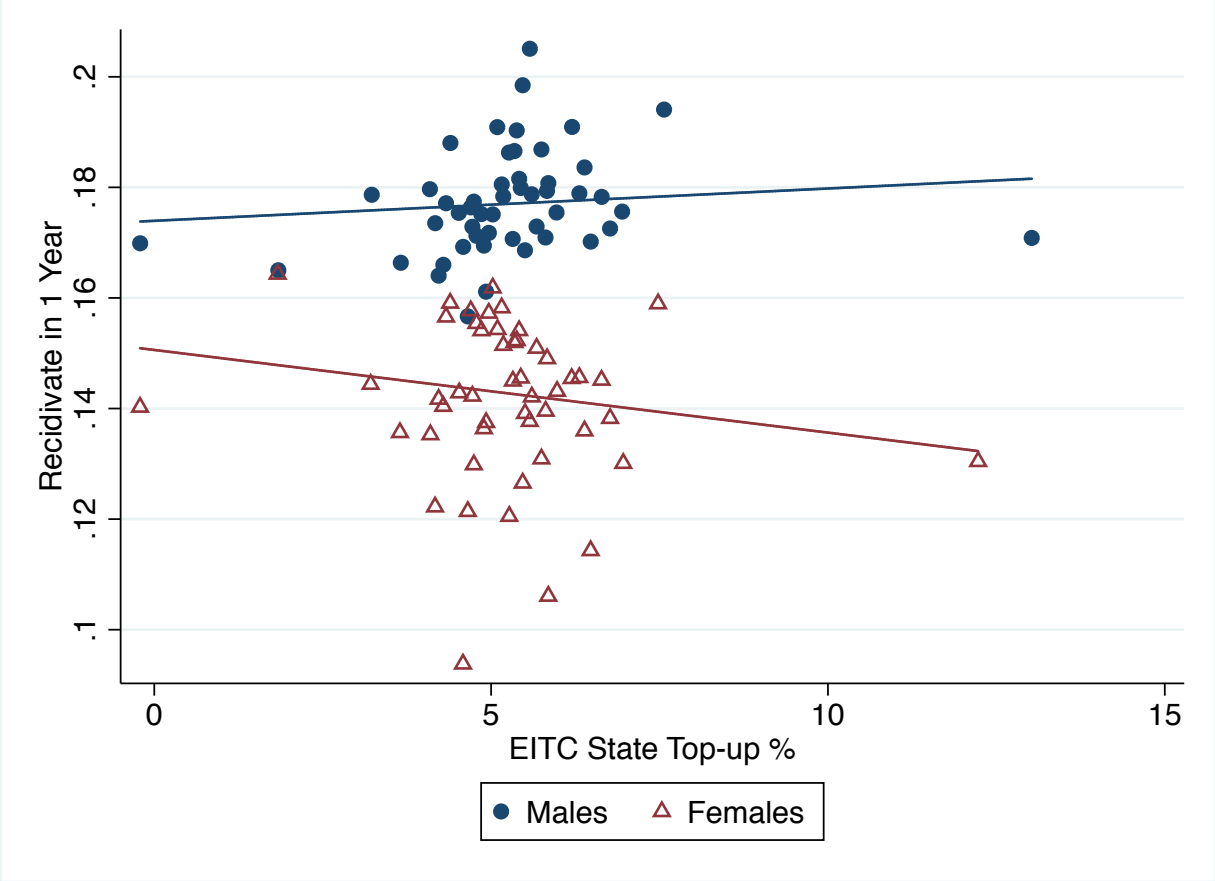
Note: This map reports state Minimum Wage and EITC programs at the beginning and end of our sample. States not included in our sample are reported as "out of sample".

Figure 5: Correlation between Minimum Wage and Recidivism



Note: To construct the binned scatter plots we plot the the offender's probability of recidivism (y-axis) over the minimum wage (x-axis), demeaning for state and year fixed effects. The residual rates of recidivism are divided into fifty equal-sized bins and plotted over the mean EITC top-up for each bin. Fifty bins were chosen for symmetry with the subsequent plot of EITC state topups (Figure 6). The figure is qualitiatively identical plotted with twenty bins. The line shows the best linear fit.

Figure 6: Correlation between State EITC Top-Ups and Recidivism



Note: To construct the binned scatter plot we plot the the offender's probability of recidivism (y-axis) over the state EITC top-up percent (x-axis), demeaning for state fixed effects. The residual rates of recidivism are divided into fifty equal-sized bins and plotted over the mean EITC from each bin. Fifty bins were chosen to so that the states without a state top-up (i.e. zeros) were not over-represented as bins. The figure is qualitiatively identical plotted with twenty bins, but far sparser. The line shows the best linear fit.

Table 1: Summary Statistics: Characteristics of Sample

	All	Recidivate 1 Year	Recidivate 3 Years
Male	0.882	0.903	0.905
White	0.463	0.444	0.433
Black	0.428	0.441	0.467
Hispanic	0.120	0.109	0.103
Less than HS Degree	0.388	0.401	0.421
HS Degree	0.315	0.325	0.312
College Degree	0.007	0.005	0.005
Prior Felony Incarceration	0.290	0.334	0.330
Age at Release	35.051	33.639	33.511
Time Served (Days)	655.457	485.922	541.711
Violent Offense	0.216	0.192	0.189
Property Offense	0.289	0.341	0.333
Drug Offense	0.293	0.273	0.292
Min Wage	6.404	6.313	6.092
State EITC	0.357	0.393	0.373
State EITC Perc	5.225	5.958	5.526
Observations	5792219	1001980	1650091

Note: Recidivate 1 year indicates those released prisoners who returned to prison within 1 year of their release (analogous for 3 years). Violent, Property, Drug are indicators for the offense for which the offender initially went to prison. The final 3 rows represent the average value of those policy variables for the state and month in which the offender was released - State EITC is a dummy for whether the State had it's own EITC and thus that row represents a proportion; State EITC Perc is the average percent of the federal EITC that the top-up represents.

Table 2: Summary Statistics: Recidivism Rates

	(1) Recidivate 1 Year	(2) Recidivate 3 Years
Overall	0.173	0.347
Men	0.177	0.355
Women	0.142	0.284
For New Crime	0.106	0.238
For New Violent	0.032	0.062
For New Property	0.057	0.113
For New Vice	0.001	0.002
For New Drug	0.047	0.103
For New DUI	0.006	0.014
For Parole/Prob Viol	0.067	0.109
Observations	5792219	4754532

Note: Recidivate 1 year indicates a return to prison within 1 year of their release (analogous for 3 years). For New Crime indicates that they were sent back to prison for a new crime, whereas a "Parole/Prob Viol" indicates being sent back for a parole or probation violation that did not involve the commission of a new crime. Column 2 has fewer observations to allow everyone to have 3 years of post-release data, where as Column 1 only requires 1 year of post-release data.

Table 3: Summary Statistics on Minimum Wages and EITCs by State-Year-Month 2000-2014

	mean	sd	min	max
Minimum Wage	6.43	1.10	5.15	9.50
Number of MW Changes	4.73	2.54	2.00	13.00
Size of MW Change	0.51	0.33	0.04	1.80
Size of MW Change (Perc)	0.08	0.06	0.01	0.35
Has State EITC	0.39	0.49	0.00	1.00
State EITC Perc	6.39	10.22	0.00	40.00

Note: Each observation is a state-year-month, hence there are 9180 observations (51 states including DC x 15 years x 12 months). A change in the state minimum wage could come from a state-level law or a federal minimum wage change. Minimum wages are measured in real 2011 dollars. Note: 17 States had no changes other than the federal minimum wage increases. State EITC perc is the percent of the federal EITC that the State EITC represents.

Table 4: Minimum Wage and State EITC Availability on 1 year Recidivism Rates

	(1)	(2)	(3)	(4)	(5)
Min Wage	-0.013***	-0.013***			-0.013***
	(0.004)	(0.004)			(0.004)
Min Wage x Female		0.001			0.002
		(0.003)			(0.003)
Female	-0.034***	-0.043**	-0.034***	-0.030***	-0.041**
	(0.004)	(0.016)	(0.004)	(0.004)	(0.017)
State EITC			0.009	0.011	0.011
			(0.009)	(0.010)	(0.009)
State EITC x Female				-0.016*	-0.016*
				(0.009)	(0.009)
Observations	5792219	5792219	5792219	5792219	5792219

Note: The dependent variable is return to prison in the same state within 1 year. Minimum wage is measured in dollars, State EITC is a dummy for the existence of a state top-up; both are measured in the state and month the offender was released. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 5: Minimum Wage on 1 year Recidivism Rates: Different Minimum Wage Definitions

	(1)	(2)	(3)	(4)	(5)
Min Wage	-0.013***				
	(0.004)				
Min Wage x Female	0.001				
	(0.003)				
Ln(Min Wage)		-0.073***			
		(0.023)			
Log Min Wage x Female		0.008			
		(0.016)			
Eff. MW			-0.069***		
			(0.024)		
Eff. MW x Female			0.035		
			(0.024)		
Avg MW 6 Mos				-0.016***	
				(0.005)	
Avg MW 6 Mos x Female				0.001	
				(0.003)	
Avg MW 12 Mos					-0.016***
					(0.005)
Avg MW 12 Mos x Female					0.001
					(0.003)
Observations	5792219	5792219	5792219	5792219	5792219

Note: The dependent variable is return to prison in the same state within 1 year. The first column recreates Table 4 Column 2, the subsequent columns consider different definitions of the min wage. In Column 1 the minimum wage is measured in the year, month, and county of release. In Columns (3) and (4) this is measured as the average of the minimum wage in the county you were released into 6 and 12 months after your release (respectively). The Effective Minimum Wage is ln(MW)-ln(median wage), a measure of how binding the minimum wage is, the no HS and no college versions use median wages for those with no high school and no college respectively. Median wages are measured in the CPS. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 6: State EITCs Size on 1 year Recidivism Rates

	(1)	(2)
State EITC Perc	0.001	0.001
	(0.001)	(0.001)
State EITC Perc x Female		-0.001*
		(0.000)
Female	-0.034***	-0.031***
	(0.004)	(0.004)
Observations	5792219	5792219

Note: The dependent variable is return to prison in the same state within 1 year. The State EITC top-up is measured as a percentage of the federal EITC. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 7: Minimum Wage and State EITC Availability on 1 year Recidivism Rates by Crime Type

	(1) Violent	(2) Property	(3) Drug
Min Wage	-0.002	-0.006***	-0.005*
	(0.001)	(0.001)	(0.003)
Min Wage x Female	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
State EITC	0.006***	0.001	0.007*
	(0.002)	(0.006)	(0.004)
State EITC x Female	-0.010**	0.003	-0.008
	(0.004)	(0.005)	(0.006)
Female	-0.022***	-0.016*	-0.002
	(0.006)	(0.008)	(0.007)
Observations	5792219	5792219	5792219

Note: This table presents our results for subsets of ex-offenders categorized by re-entry crime. The estimated coefficients are the impact of the minimum wage and state EITC at release on the probability of returning to prison for a specific category of crime within one year of release. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 8: Minimum Wage and State EITC Availability on 1 year Recidivism Rates by Education

	(1) Less than HS	(2) HS	(3) College
Min Wage	-0.017***	-0.012**	-0.014
	(0.005)	(0.005)	(0.010)
Min Wage x Female	0.002	0.003	0.005
	(0.002)	(0.002)	(0.003)
State EITC	0.014	0.006	-0.007
	(0.008)	(0.010)	(0.010)
State EITC x Female	-0.021	-0.016	-0.011
	(0.014)	(0.010)	(0.015)
Female	-0.041***	-0.054***	-0.060***
	(0.014)	(0.012)	(0.021)
Observations	2246642	1827028	42575

Note: This table presents our results subsets of ex-offenders categorized by educational achievement and estimates the impact of the minimum wage and state EITC at release on the probability of returning to prison within one year. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served) , time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level. Analysis loses 1.6 million observations that are missing education information (which are included in other tables with a dummy for missing).

Table 9: Minimum Wage and State EITC Availability on 1 year Recidivism Rates by Parole vs New Crime

	(1) Parole Revoked No New Conviction	(2) Parole Revoked Includes New Conviction	(3) New Criminal Conviction Outside of State Supervision
Min Wage	-0.004	-0.002	-0.009**
	(0.003)	(0.002)	(0.004)
Min Wage x Female	0.002	0.001*	-0.000
	(0.002)	(0.001)	(0.002)
State EITC	0.004	0.002	0.007
	(0.008)	(0.005)	(0.004)
State EITC x Female	-0.021**	0.000	0.005
	(0.010)	(0.002)	(0.006)
Female	-0.019	-0.009**	-0.022
	(0.012)	(0.003)	(0.014)
Observations	5792219	5792219	5792219

Note: This table presents our results by whether the offender was returned to prison for (1) a parole or probation violation that did not involve a new crime, (2) violations that included a conviction of a new crime, (3) solely for a new crime, outside of any conditional release. The estimated coefficients are the impact of the minimum wage and state EITC at release on the probability of returning to prison within one year of release. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). The Effective Minimum Wage is ln(MW)-ln(median wage), a measure of how binding the minimum wage is. Standard errors are clustered at the state level.

Table 10: Robustness and Alternative Specifications

	(1) Main	(2) 3 Year	(3) No Substate	(4) Substate
Min Wage	-0.013***	-0.021***	-0.013***	-0.013***
	(0.004)	(0.005)	(0.004)	(0.004)
Min Wage x Female	0.002	0.002	0.002	0.002
	(0.003)	(0.004)	(0.003)	(0.003)
State EITC	0.011	-0.005	0.011	0.011
	(0.009)	(0.008)	(0.009)	(0.009)
State EITC x Female	-0.016*	-0.021**	-0.016*	-0.016*
	(0.009)	(0.009)	(0.009)	(0.009)
Female	-0.041**	-0.074***	-0.041**	-0.041**
	(0.017)	(0.027)	(0.017)	(0.017)
Observations	5792219	4754532	5779109	5792219

Note: Column 1 recreates Table 4 Column 5. Column 2 substitutes return to prison within 3 years instead of 1 year as the dependent variable. Columns 3-4 address the role that substate (city or county) minimum wages may play in the impact of previous estimates of state minimum wage laws; recall our observations are county level and sometimes minimum wages differ at city level, thus Column 4 eliminates observations from counties that include cities that have higher minimum wages and column 5 assigns the city level minimum wages to the entire county. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served), time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 11: Lagged Minimum Wages

	(1)	(2)	(3)	(4)
Min Wage				-0.012***
				(0.004)
Min Wage - 1 Year Lag	-0.010*			-0.000
	(0.005)			(0.005)
Min Wage - 2 Year Lag		-0.008		-0.005*
		(0.005)		(0.003)
Min Wage - 3 Year Lag			-0.005	-0.003
			(0.005)	(0.004)
Min Wage x Female				-0.005
				(0.004)
Min Wage-1 Yr Lag x Female	0.002			-0.001
	(0.003)			(0.004)
Min Wage-2 Yr Lag x Female		0.003		0.009*
		(0.003)		(0.005)
Min Wage-3 Yr Lag x Female			0.004	0.000
			(0.003)	(0.004)
Female	-0.048***	-0.054***	-0.055***	-0.049**
	(0.016)	(0.017)	(0.017)	(0.019)
Observations	5792219	5792219	5792219	5792219

Note: This table estimates the impact of lagged minimum wages (with1, 2, and 3 year lags), in an effort to identify potential disemployment effects through slower economic growth. The estimated coefficients are the impact of the minimum wage at release on the probability of returning to prison for a non-criminal violation of the terms of their early-release, within one year of release. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served) time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

Table 12: Dealing with State Specific Heterogenity

	State-Specific Time Trend Polynomials				Shared Border Counties	Binding Fed Changes
	(1) Linear	(2) Second	(3) Third	(4) Fourth	(5) Clusters	(6) Bound
Min Wage	-0.005	-0.007**	-0.008***	-0.006*	-0.008**	-0.015***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Bound MW						-0.019
						(0.031)
Min Wage X Bound						0.002
						(0.005)
Observations	5792219	5792219	5792219	5792219	1437330	5792219

Note: Columns (1)-(4) adds state-specific time trends to the model from Column (1) of Table 4 with varying degrees of polynomials. Columns (5)-(6) we restrict analysis to either pairs (5) or triads (6) of counties that straddle state borders - in these specification county-cluster by year interactions are included. Column (7) includes a dummy variable "Bound" which indicates a state and year in which a state had a minimum wage below the new federal minimum that went into effect July of that year. All specifications include state and year fixed effects, as well as controls for the crime the offender went to prison for (offense and number of counts), characteristics of the defendant (race, education, prior felonies, age at release, and time served) time-varying characteristics of the state they were released into (housing price index and police per 1000 in population), and characteristics of county into which they were released (median income, percent of population age 15-24, percent black, percent Hispanic). Standard errors are clustered at the state level.

A Minimum Wages and EITC Values by State

Table A.1: Minimum Wages and EITC Top-Ups by State: 2000-2014

	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014	
	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC	MW	EITC
AL	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
AK	5.65		5.65		5.65		7.15		7.15		7.15		7.15		7.15		7.15		7.20		7.75		7.75		7.75		7.75		7.75	
AZ	5.15		5.15		5.15		5.15		5.15		5.15		5.15		6.75		6.90		7.25		7.25		7.35		7.65		7.80		7.90	
AR	5.15		5.15		5.15		5.15		5.15		5.15		5.43		6.25		6.40		6.90		7.25		7.25		7.25		7.25		7.25	
CA	5.75		6.25		6.75		6.75		6.75		6.75		6.75		7.50		8.00		8.00		8.00		8.00		8.00		8.00		8.50	
CO	5.15	10%	5.15	10%	5.15		5.15		5.15		5.15		5.15		6.85		7.02		7.28		7.25		7.36		7.64		7.78		8.00	10%
CT	6.15		6.40		6.70		6.90		7.10		7.10		7.40		7.65		7.65		8.00		8.25		8.25	30%	8.25	30%	8.25	30%	8.70	27.5%
DE	5.78		6.15		6.15		6.15		6.15		6.15		6.15	20%	6.65	20%	7.15	20%	7.20	20%	7.25	20%	7.25	20%	7.25	20%	7.25	20%	7.54	20%
DC	6.15	10%	6.15	25%	6.15	25%	6.15	25%	6.15	25%	6.60	35%	7.00	35%	7.00	35%	7.28	40%	7.90	40%	8.25	40%	8.25	40%	8.25	40%	8.25	40%	8.88	40%
FL	5.15		5.15		5.15		5.15		5.15		5.82		6.40		6.67		6.79		7.23		7.25		7.29		7.67		7.79		7.93	
GA	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
HI	5.25		5.25		5.75		6.25		6.25		6.25		6.75		7.25		7.25		7.25		7.25		7.25		7.25		7.25		7.25	
ID	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
IL	5.15	5%	5.15	5%	5.15	5%	5.15	5%	5.50	5%	6.50	5%	6.50	5%	7.00	5%	7.63	5%	7.88	5%	8.13	5%	8.25	5%	8.25	5%	8.25	5%	8.25	10%
IN	5.15		5.15		5.15		5.15	6%	5.15	6%	5.15	6%	5.15	6%	5.50	6%	6.20	6%	6.90	9%	7.25	9%	7.25	9%	7.25	9%	7.25	6%	7.25	9%
IA	5.15	6.5%	5.15	6.5%	5.15	6.5%	5.15	6.5%	5.15	6.5%	5.15	6.5%	5.15	6.5%	5.94	7%	7.25	7%	7.25	7%	7.25	7%	7.25	7%	7.25	7%	7.25	7%	7.25	14%
KS	5.15	10%	5.15	10%	5.15	15%	5.15	15%	5.15	15%	5.15	15%	5.15	15%	5.50	17%	6.20	17%	6.90	17%	7.25	18%	7.25	18%	7.25	18%	7.25	18%	7.25	17%
KY	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.56		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
LA	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20	3.5%	6.90	3.5%	7.25	3.5%	7.25	3.5%	7.25	3.5%	7.25	3.5%	7.25	3.5%
ME	5.15	5%	5.15	5%	5.75	5%	6.25	4.92%	6.28	4.92%	6.39	4.92%	6.56	5%	6.81	5%	7.06	5%	7.31	5%	7.50	5%	7.50	5%	7.50	5%	7.50	5%	7.50	5%
MD	5.15	15%	5.15	16%	5.15	16%	5.15	16%	5.15	20%	5.15	20%	5.15	20%	6.15	20%	6.35	20%	6.90	20%	7.25	25%	7.25	25%	7.25	25%	7.25	25%	7.25	25%
MA	6.00	10%	6.75	15%	6.75	15%	6.75	15%	6.75	15%	6.75	15%	6.75	15%	7.50	15%	8.00	15%	8.00	15%	8.00	15%	8.00	15%	8.00	15%	8.00	15%	8.00	15%
MI	5.15		5.15		5.15		5.15		5.15		5.15		5.60		7.05		7.28	10%	7.40	10%	7.40	20%	7.40	20%	7.40	6%	7.40	6%	7.65	6%
MN[a]	5.15	33%	5.15	33%	5.15	33%	5.15	33%	5.15	33%	5.57	33%	6.15	33%	6.15	33%	6.35	33%	6.90	33%	7.25	33%	7.25	33%	7.25	33%	7.25	33%	7.56	33%
MS	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
MO	5.15		5.15		5.15		5.15		5.15		5.15		5.15		6.50		6.65		7.15		7.25		7.25		7.25		7.35		7.50	
MT	5.15		5.15		5.15		5.15		5.15		5.15		5.15		6.15		6.40		7.08		7.25		7.35		7.65		7.80		7.90	
NE	5.15		5.15		5.15		5.15	8%	5.15	8%	5.15	8%	5.15	8%	5.50	8%	6.20	10%	6.90	10%	7.25	10%	7.25	10%	7.25	10%	7.25	10%	7.25	10%
NV	5.15		5.15		5.15		5.15		5.15		5.15		5.32		6.24		6.59		7.20		7.90		8.25		8.25		8.25		8.25	
NH	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.72		6.76		7.25		7.25		7.25		7.25		7.25		7.25	
NJ	5.15	10%	5.15	15%	5.15	17.5%	5.15	20%	5.15	20%	5.40	20%	6.40	20%	7.15	20%	7.15	22.5%	7.20	22.5%	7.25	20%	7.25	20%	7.25	20%	7.25	20%	8.25	20%
NM	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50	8%	6.53	10%	7.50	10%	7.50	10%	7.50	10%	7.50	10%	7.50	10%	7.50	10%

NY	5.15	22.5%	5.15	25.0%	5.15	27.5%	5.15	30%	5.15	30%	6.00	30%	6.75	30%	7.15	30%	7.15	30%	7.20	30%	7.25	30%	7.25	30%	7.25	30%	7.31	30%	8.06	30%
NC	5.15		5.15		5.15		5.15		5.15		5.15		6.15		6.35	3.5%	6.90	3.5%	7.25	5%	7.25	5%	7.25	5%	7.25	5%	7.25	5%
ND	5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
OH	5.15		5.15		5.15		5.15		5.15		5.15		6.85		7.00		7.30		7.30		7.40		7.70		7.85		7.95	
OK	5.15		5.15		5.15	5%	5.15	5%	5.15	5%	5.15	5%	5.15	5%	5.50	5%	6.20	5%	6.90	5%	7.25	5%	7.25	5%	7.25	5%	7.25	5%	7.25	5%
OR	6.50	5%	6.50	5%	6.50	5%	6.90	5%	7.05	5%	7.25	5%	7.50	5%	7.80	5%	7.95	6%	8.40	6%	8.40	6%	8.50	6%	8.80	6%	8.95	6%	9.10	6%
PA	5.15		5.15		5.15		5.15		5.15		5.15		5.15		6.70		7.15		7.20		7.25		7.25		7.25		7.25		7.25	
RI	5.82	26%	6.15	25.5%	6.15	25%	6.15	25%	6.75	25%	6.75	25%	7.04	25%	7.40	25%	7.40	25%	7.40	25%	7.40	25%	7.40	25%	7.40	25%	7.75	25%	8.00	25%
SC	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
SD	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
TN	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
TX	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
UT	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
VT	5.75	32%	6.25	32%	6.25	32%	6.25	32%	6.75	32%	7.00	32%	7.25	32%	7.53	32%	7.68	32%	8.06	32%	8.06	32%	8.15	32%	8.46	32%	8.60	32%	8.73	32%
VA	5.15		5.15		5.15		5.15		5.15		5.15		5.15	20%	5.50	20%	6.20	20%	6.90	20%	7.25	20%	7.25	20%	7.25	20%	7.25	20%	7.25	20%
WA	6.50		6.72		6.90		7.01		7.16		7.35		7.63		7.93		8.07		8.55		8.55		8.67		9.04		9.19	10%	9.32	10%
WV	5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25		7.25	
WI[b]	5.15	4/13/44%	5.15	4/13/44%	5.15	4/13/44%	5.15	4/13/44%	5.15	4/13/44%	5.47	4/13/44%	6.17	4/13/44%	6.50	4/13/44%	6.53	4/13/44%	6.90	4/13/44%	7.25	4/13/44%	7.25	4/11/44%	7.25	4/11/44%	7.25	4/11/44%	7.25	4/11/44%
WY	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	
Fed	5.15		5.15		5.15		5.15		5.15		5.15		5.15		5.50		6.20		6.90		7.25		7.25		7.25		7.25		7.25	

Notes: Minimum wages shown are the average for the year, in the actual analysis we have the year AND month and thus can be more exact. EITC is represented as the percent of the federal EITC.

[a] MN's EITC is not structured as a percentage of the federal. Depending on income it represents 25-45%, what is shown is the average

[b] WI's EITC varies based on number of children, shown are for 1/2/3 children

B Identifying and Defining Shared State Border Counties

Pairs of neighboring counties, each on opposite sides of a state border, are attractive as controls. Predicated on the intuition that adjacent counties are similar, changes in the minimum wage on one side of a state border separating two counties offers a compelling identification strategy. Allegretto et al. (2017) use contiguous pairs of counties along state borders as a spatial control, including a county pair by state-period fixed effect in their regression models. We use their set of identified "county pairs" to construct our own set of fixed effects.

Our data presents a slightly different challenge, however. Where the Allegretto et al. analysis is looking at unemployment across county pairs, our unit of observation is the individual who lives in a given county at a given time. A county may, of course, share borders with more than one county across a state line. We take two approaches to this. If we include only individuals who live in counties who share a cross-state border with a single county, we are forced to drop >90% of our observations. To better cope with the irregular patterning of shared county we borders, we construct "clusters" of counties who share borders with one or two other counties on the other side of a border. These clusters will include triplets–one with two border counties, and two counties with one (and, very rarely, quadruplets where two counties both share a single state border with two others). Expanding the our identification of border-sharing counties to a "county cluster" allows us to recover a considerably larger number of observations. Results are reported in columns 5 of Table 12. The identified effects of the minimum wage on one year recidivism rates are similar to those in our main specifications. Unsurprisingly the coefficient is smaller, given that observations are still reduced to 20% of the original sample, and the additional layer of local spatial fixed effects. The results nonetheless remain statistically significant ($p < 0.05$) and qualitiatively similar to our main specification.

C Defining Bound Minimum Wage Changes

Taking a cue from Clemens and Wither (2016) we focus some of our analysis on states that were bound by federal minimum wage increases. There were 3 increases in the federal minimum wage during our time period: from \$5.15 to \$5.85 on 7/24/2007, to \$6.55 on 7/24/2008, and to \$7.25 on 7/24/2009. We define a state-year pair as being bound by these federal minimum wage changes if, as of January 1 of that year the state had a minimum wage *below* what would become the federal level in July of that year.

Table C.1 below lists the states considered bound for each of the federal minimum wage change years: 2007, 2008, and 2009.

Table C.1: States Bound by Federal Changes

2007		2008		2009	
State	Jan 1 MW	State	Jan 1 MW	State	Jan 1 MW
				Alaska	$7.15
Alabama	N/A	Alabama	N/A	Alabama	N/A
		Arkansas	$6.25	Arkansas	$6.25
				Delaware	$7.15
				Florida	$7.21
Georgia	$5.15	Georgia	$5.15	Georgia	$5.15
Idaho	$5.15	Idaho	$5.85	Idaho	$6.55
Indiana	$5.15	Indiana	$5.85	Indiana	$6.55
Iowa	$5.15				
Kansas	$2.65	Kansas	$2.65	Kansas	$2.65
Kentucky	$5.15	Kentucky	$5.85	Kentucky	$6.55
Louisiana	N/A	Louisiana	N/A	Louisiana	$6.55
		Maryland	$6.15	Maryland	$6.55
		Minnesota	$6.15	Minnesota	$6.15
Mississippi	N/A	Mississippi	N/A	Mississippi	$6.55
				Missouri	$7.05
		Montana	$6.25	Montana	$6.90
Nebraska	$5.15	Nebraska	$5.85	Nebraska	$6.55
		Nevada	$6.33	Nevada	$6.85
				New Jersey	$7.15
				New York	$7.15
New Hampshire	$5.15	New Hampshire	$6.50		
New Mexico	$5.15	New Mexico	$6.50		
		North Carolina	$6.15	North Carolina	$6.55
North Dakota	$5.15	North Dakota	$5.85	North Dakota	$6.55
Oklahoma	$5.15	Oklahoma	$5.85	Oklahoma	$6.55
				Pennsylvania	$7.15
South Carolina	N/A	South Carolina	N/A	South Carolina	$6.55
South Dakota	$5.15	South Dakota	$5.85	South Dakota	$6.55
Tennessee	N/A	Tennessee	N/A	Tennessee	$6.55
Texas	$5.15	Texas	$5.85	Texas	$6.55
Utah	$5.15	Utah	$5.85	Utah	$6.55
Virginia	$5.15	Virginia	$5.85	Virginia	$6.55
		Wisconsin	$6.50	Wisconsin	$6.50
Wyoming	$5.15	Wyoming	$5.15	Wyoming	$5.15

Note: Data on state minimum wages from the U.S. Department of Labor "Changes in Basic Minimum Wages in Non-Farm Employment Under State Law: Selected Years 1968-2016" available at: https://www.dol.gov/whd/state/stateMinWageHis.htm. Federal minimum wages increased on July 24 of 2007 (to $5.85), of 2008 (to $6.55), and of 2009 (to $7.25). N/A indicates the state did not set a minimum wage, and thus minimum wages in that state are dictated by prevailing federal minimums.