Difference-in-Differences with Multiple Time Periods and an Application on the Minimum Wage and Employment

From what I understand, this process is still a regular diff-in-diff design except for the fact that we are allowing for multiple time periods/ treatment timing. So for example, say the minimum wage increases in 2021, we have group A that sees no change in their minimum wage, group B that changes their minimum wage immediately to the new min (so once huge change) and then group C that slowly changes their minimum wage over time. We would be comparing group B to group A, group C to group A and group C to group B. IS that correct?

Furthermore, I do not really understand the parallel trends assumption discussed in the paper. Could you elaborate on this please.

The Effect of Minimum Wages on Low-Wage Jobs

The research question posed by Cenzig et al is what is the overall effects of minimwages on low-wage jobs.

To answer this question they use a diff-in-diff design to stimate the impact of minimum wage increases on the entire frequency distribution of wages and focus only the bottom part of it as it is more likely to a) bind and b) not really affect people with higher than minimum wage. Because of this approach, Cenzig et al. claim that the effects of minimum wage increase policies will directly affect jobs that were previously paying under the minimum wage.

To identify the effect of the minimum wage on the frequency distribution of wages, they implement an even study analysis that exploits 138 prominent state-level minim wage increases between 1979 and 2016.

They find that an average minimum wage hike led to a large and significant decrease in the number of jobs below the minimum wage in the five years after the implementation of these policies. At the same time, there is clear evidence for the emergence of excess jobs at or slightly above the minimum wage. There is no evidence of that there was a shift from low-skill to high-skill workers at the bottom of the wage distribution by partitioning worker into groups based on education and age.

They show that the minimum wage is likely to have a negative effect on employment in the tradeable sector, and in manufacturing in particular—with an employment elasticity with respect to own wage of around −1.4—although the estimates are imprecise. At the same time, the effect of the minimum wage is close to 0 in nontradeable sectors (such as restaurants or retail), which employ most minimum wage workers in the United States today. This evidence suggests that the industry composition of the local economy is likely to play an important role in determining the disemployment effect of the minimum wage.

However, by disaggregating the standard diff-in-diff estimates by wage bins, they identify the effects of the minimum wage on overall employment and obtain meaningful first-stage wage effects at the same time. It is worth noting that the disagreement on the choice of specification for estimating the impact of minimum wages on teen employment is also driven by these early period confounding shocks.

Based on their research, they find no evidence of a change in employment up to five years after the minimum wage hike. In all cases, except for the black or Hispanic group, the excess jobs are larger than the missing jobs, indicating a positive albeit statistically insignificant employment effect. For black or Hispanic individuals, the difference between excess and missing jobs is negligible.

The Minimum Wage and Crime

They use the National Longitudinal Survey of Youth 1997 cohort to measure the effect of increases in the minimum wage on self-reported criminal activity and examine employment–crime substitution. Exploiting changes in state and federal minimum wage laws from 1997 to 2010, they find that workers who are affected by a change in the minimum wage are more likely to commit crime, become idle, and lose employment. Individuals experiencing a binding minimum wage change were more likely to commit crime and work only part time.

Does raising the minimum wage have the unintended effect of increasing crime? Economic reasoning and the recent literature on the minimum wage lead us to believe that the answer may be yes. If increases in the minimum wage lead to unemployment and idleness, some youth may choose crime as an alternative source of income. Research in “the new economics of the minimum wage” shows that increases in the minimum wage displace lower-skill workers and cause higher levels of unemployment among youth and workers with weak labor attachment.[1](https://www.degruyter.com/document/doi/10.1515/bejeap-2013-0130/html#FN0001_w2aab2b8e1326b1b7b1ab2b1aAa) Moreover, increases in the minimum wage raise the probability that teenagers will be idle: they are more likely to leave school and, conditional on not being in school, more likely to be unemployed.[2](https://www.degruyter.com/document/doi/10.1515/bejeap-2013-0130/html#FN0002_w2aab2b8e1326b1b7b1ab2b1b1Aa) Numerous studies have shown that idle youth are more likely to engage in crime, whether because they are not in school or not working.[3](https://www.degruyter.com/document/doi/10.1515/bejeap-2013-0130/html#FN0003_w2aab2b8e1326b1b7b1ab2b1b2Aa)

The existing evidence for the causal relationship between the minimum wage and crime is somewhat limited. [Hashimoto (1987)](https://www.degruyter.com/document/doi/10.1515/bejeap-2013-0130/html#CIT0008_w2aab2b8e1326b1b7b1ab2ab8Aa) provides national time series evidence that a positive relationship between the minimum wage and crime does exist in the United States. A limitation, however, of using nationally aggregated data to examine crime is that much of the variation in crime is lost. Additionally, national changes in the minimum wage may not be exogenous with respect to low-skill labor markets and crime–employment trends.

Further, we do not use arrest data because of the possible endogeneity of policy changes and policing.[8](https://www.degruyter.com/document/doi/10.1515/bejeap-2013-0130/html#FN0008_w2aab2b8e1326b1b7b1ab2b1b7Aa) We denote criminal activity by an indicator that respondents reported having engaged in selling drugs, stealing, vandalism, other property crimes, or violence since the date of their last interview. For respondents who ever report criminal activity, missing values are replaced by zeros under the assumption that any lack of response is due to inactivity.

We also separate crimes by monetary and non-monetary motivation, with money-related crimes being theft, drug sale, and “other property” crimes. Non-monetary crimes are defined as property damage and violent crimes (fighting or attacking with the intent to hurt).

Do minimum wage increases reduce crime?

The current study assesses the credibility of the CEA claim by comprehensively examining the relationship between minimum wages and crime. Using data from the 1998-2016 Uniform Crime Reports (UCR) and the 1998-2016 waves of the National Longitudinal Study of Youth 1997 (NLSY97), difference-in-differences estimates provide little evidence of crime-reducing effects of the minimum wage. Instead, we find robust evidence that minimum wage hikes increase property crime arrests among teenagers and young adults ages 16-to-24, a population for whom minimum wages are likely to bind (Bureau of Labor Statistics 2017). We estimate a property arrest elasticity with respect to the minimum wage of 0.2. This result is consistent with adverse labor demand effects of the minimum wage, a result that we confirm using data from Current Population Survey Outgoing Rotation Groups (CPS-ORG). Our confidence in the common trends assumption underlying our identification strategy is bolstered by event-study analyses. Furthermore, we find little evidence that minimum wage increases affect arrests for violent offenses, or net crime among older individuals, but do increase delinquency-related crimes related to teenage idleness (Jacob and Lefgren 2003; Luallen 2006; Anderson 2014). In contrast to Agan and Makowsky (2020), we find no evidence that increases in the minimum wage reduce net crime among working-age individuals, suggesting that different margins of criminal behavior may be differentially affected by minimum wages.

The Minimum Wage, EITC, and Criminal Recidivism

In this paper, we exploit changes in minimum wage laws and state EITCs to estimate the impact of these policies on the probability recently released prisoners return to prison. 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 potential criminal earnings. This observed reduction, within our theoretical framework, implies that, on net, there are more individuals for whom their wages of crime are higher than their uncontrolled market wage—the higher minimum wage draws them into the legal labor market, a phenomenon determined on the supply side of the labor market. Exploratory analysis of CPS data, replicating from the literature prior estimates of employment effects of the minimum wage on respondents more likely to have a felony record, suggests the possibility of net positive employment effects of minimum wages on employment for those carrying a criminal record.