Minimum Wage and Cross-Community Crime Disparities

Journal of Population Economics 37, 44 (2024)

Li Li[1]   Liu Haoming[2]

[1]School of Economics and Management, East China Normal University

[2]Department of Economics, National University of Singapore

Global GLO-JOPE Conference 2024

Motivation

- Enormous social costs imposed by crimes on society
  - Annual crime costs (crime-induced production, opportunity costs, and psychic costs) in US: $2.86–$3.92 trillion (Anderson, 2021)
- Pronounced **crime disparities** across communities
  - Crime concentrates on socially and economically disadvantaged communities (Peterson and Krivo, 2010)
    - A higher concentration of blacks, higher poverty and jobless rates, a higher share of female-headed families, and a lower share of college graduates (Peterson and Krivo, 2010)
  - Difficult to disentangle various factors behind the crime disparities
- **Minimum wage (MW) changes** mainly affecting the earnings of low-income workers (e.g., DiNardo et al., 1996; Autor et al., 2016; Dube, 2019)
- **Q: How do MW changes affect crime disparities across communities?**

Contributions

- The effect of MW changes on inequality
    - MW ↓ → wage inequality ↑ in US since the 1980s (DiNardo et al., 1996; Lee, 1999; Card and DiNardo, 2002; Autor et al., 2016; Bárány, 2016)
    - MW ↑ → racial earnings gap ↓ (Derenoncourt and Montialoux, 2021)
    - Hansen and Machin (2002): MW law in UK in 1999 → crime disparity ↓
    - **Our study: MW ↑ → cross-community violent crime disparities ↓**
- The effect of MW increases on crime
    - ↓ (Fernandez et al., 2014; Agan and Makowsky, 2018)
    - Mixed (Fone et al., 2023)
    - ↑ (Beauchamp and Chan, 2014)
    - **Our study: crime disparities; high-frequency tract-level crime data of general population**
- Determinants of crime
    - Economic conditions (e.g., Lin, 2008; Foley, 2011; Yang, 2017; Freedman et al., 2018)
    - Human capital investment (e.g., Lochner and Moretti, 2004)
    - Locality characteristics, e.g., income inequality (Kelly, 2000) and neighborhood quality (Ludwig et al., 2001; Kling et al., 2005)
    - **Our study: economic conditions of low-income workers and locality environment**

Theory and evidence linking MW to crime

- **Becker (1968)'s economic theory of crime**: individuals allocate time between legal and criminal activity by comparing the *expected return* from each while considering the likelihood and severity of punishment.
    - Existing evidence: linking economic conditions (wages (Yang, 2017), welfare-related income (Foley, 2011), unemployment (Oster and Agell, 2007; Lin, 2008), and employment opportunities (Schnepel, 2016; Freedman et al., 2018; Montolio, 2018)) and educational attainment (Lochner and Moretti, 2004) to crime

- **Merton (1938)'s strain theory**: individuals can experience *frustration* when they are unable to achieve socially accepted goals (usually monetary).
    - Existing evidence: positive link between inequality and crime (Kelly, 2000; Fajnzylber et al., 2002; Soares, 2004; Enamorado et al., 2016)

- **Shaw and McKay (1942)'s social disorganization theory**: the effectiveness of *informal social controls* in one's community is a substantial factor shaping one's likelihood of being involved in criminal activity.
    - Existing evidence: linking neighborhoods' characteristics to individuals' behavior (e.g., Ludwig et al., 2001; Kling et al., 2005; Damm and Dustmann, 2014)

Data sources

- **Crime data**: police incident data of 18 cities among Top 30 cities in US
  - Incidents with description and coordinates
  - Time span depends on data availability of each city (–2018q4)
  - Violent crimes: homicide (including manslaughter and murder), robbery, aggravated assault, and rape
- **Census tract coordinates**: 2010 Census
  - Census tract: a statistical area that generally has a population between 1,200 and 8,000 people
- **Census tract characteristics**: American Community Survey (ACS) 5-year estimates for census tracts (2006–2010, 2014–2018)
  - Demographic, economic, social, and housing characteristics
  - Median household income in 2006–2010 ACS 5-year estimates: **low- and high-income tracts**
- **Minimum wage adjustments**
  - At the **federal, state**, and substate (city and county) level

Sample construction

- **Full sample**: 6,779 census tracts from 18 cities in 15 states
  - Matching each crime to a 2010 census tract overlaying the crime location
  - Calculating crime rate (crime counts per 1,000) for each tract in each year-quarter
  - Merging MW data with crime rate data
- **Neighboring sample** (baseline sample)
  - Retaining **neighboring low- and high-income tracts** in full sample
    - Tracts sharing common boundaries with at least one tract of the opposite group
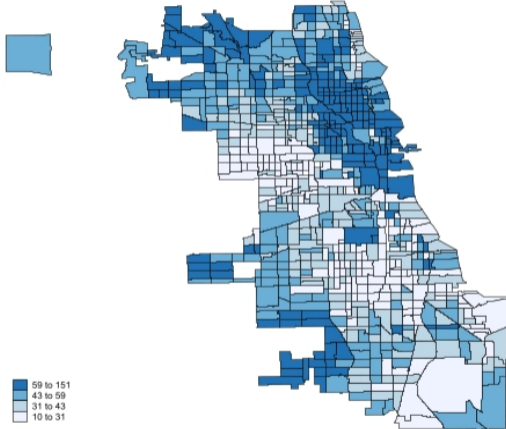 - 2,161 low-income tracts
 - 2,097 high-income tracts

Summary statistics

Neighboring sample

	N	mean	sd	min	max
Panel A. Minimum wage					
Federal/state MW	159,698	8.417	0.812	6.243	11.349
Panel B. Crime rates					
Violent crimes	159,698	2.446	3.075	0	71.505
Homicide[a]	153,975	0.035	0.136	0	3.934
Robbery	159,448	1	1.330	0	30.738
Aggravated assault	159,448	1.358	2.020	0	52.648
Rape[b]	72,541	0.126	0.283	0	7.386
Panel C. Tract characteristics in 2010					
Income-related social characteristics					
Median household income ($)	4,258	47,831	20,673	6,737	191,667
Multi-vehicle ownership rate	4,258	0.328	0.193	0	0.908
Share of household income < $15K	4,258	0.174	0.112	0	0.882
Poverty rate	4,258	0.164	0.129	0	0.891
Unemployment rate	4,258	0.109	0.076	0	0.770
Gini coefficient	4,193	0.380	0.104	0.029	0.760
Non-income-related social characteristics					
Teenage birth rate	4,114	0.032	0.094	0	1
High school completion rate	4,258	0.789	0.137	0.159	1
Share of individuals who moved in a year	4,258	0.165	0.103	0	0.778
Housing occupancy rate	4,258	0.888	0.085	0.292	1
Median housing value ($)	4,085	340,981	211,867	16,800	1,000,000

Census tract maps of Chicago: income in 2018

(a) Income quartiles, all tracts
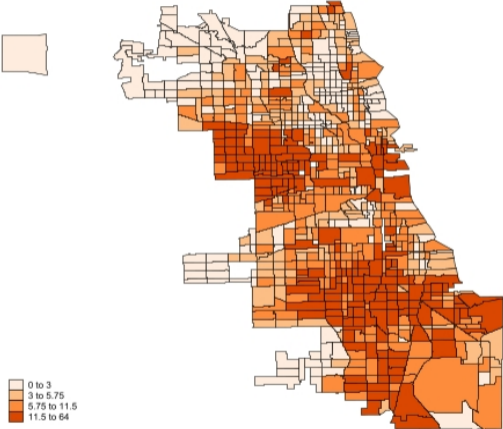
(b) Income quartiles, neighboring tracts
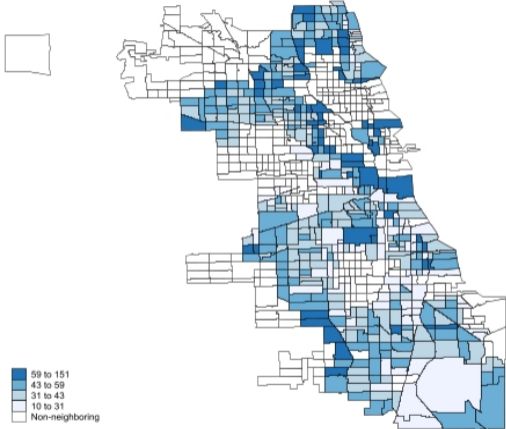
■	59 to 151
■	43 to 59
■	31 to 43
□	10 to 31

■	59 to 151
■	43 to 59
■	31 to 43
□	10 to 31
□	Non-neighboring

Notes: The shape boundary files of the 2010 census tracts and the cities are downloaded from `https://www2.census.gov/geo/tiger/TIGER2010DP1/`, accessed on July 25, 2020. "Income" denotes the median household income (in $1,000) at the tract level from the 2006–2010 ACS 5-year estimates.
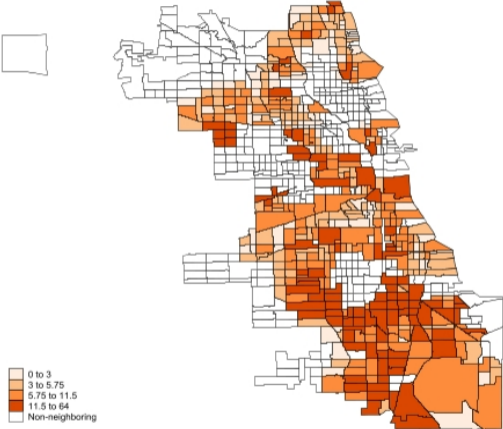
Census tract maps of Chicago: crime rates in 2018

(a) Violent crime quartiles, all tracts

(b) Violent crime quartiles, neighboring tracts

0 to 3
3 to 5.75
5.75 to 11.5
11.5 to 64

0 to 3
3 to 5.75
5.75 to 11.5
11.5 to 64
Non-neighboring

Notes: The shape boundary files of the 2010 census tracts and the cities are downloaded from https://www2.census.gov/geo/tiger/TIGER2010DP1/, accessed on July 25, 2020. The crime data of Chicago are downloaded from https://data.cityofchicago.org, accessed on August 7, 2020.

Empirical models

Model 1: In a tract r in state s at time t:

$$crime\ rate_{rt} = \alpha + \beta MW_{st} + \gamma lowinc_r \times MW_{st} + g_r + \delta_t + \epsilon_{rt} \tag{1}$$

- $crime\ rate_{rt}$: violent crime rate in tract r at time t
- MW_{st}: the higher of federal and state minimum wages
- $lowinc_r$: an indicator of low-income tract
- g_r: tract FE
- δ_t: year-quarter FE

Model 2:

$$crime\ rate_{rt} = \alpha + \gamma lowinc_r \times MW_{st} + g_r + \theta_{ct} + \epsilon_{rt} \tag{2}$$

- θ_{ct}: city-year-quarter fixed effects
- **Common trends assumption**: In the absence of MW changes, crime rates trend differently across cities but follow the same trends within a city.

Baseline results

Neighboring sample

Dep. var.	Violent crime rate	
	(1)	(2)
Federal/state MW	-0.030	
	(0.052)	
Low-income × federal/state MW	-0.172***	-0.161***
	(0.055)	(0.054)
Observations	159,698	159,698
R^2	0.783	0.808
$\bar{Y}$ of low-income tracts	3.099	3.099
$\bar{Y}$ of high-income tracts	1.768	1.768
Tract FE	✓	✓
Year-quarter FE	✓	
City-year-quarter FE		✓

Notes: * significant at 10%, ** significant at 5%, and *** significant at 1%. Standard errors in parentheses are clustered at two levels: tract and year-quarter. The sample comprises only neighboring tracts in both columns. An observation is a census tract in a year-quarter. The data on tract-level median household income are from the 2006–2010 ACS 5-year estimates.

-0.161*: violent crime disparity between low- and high-income tracts ↓ 12.1%**

Effect of MW adjustments by detailed crime types
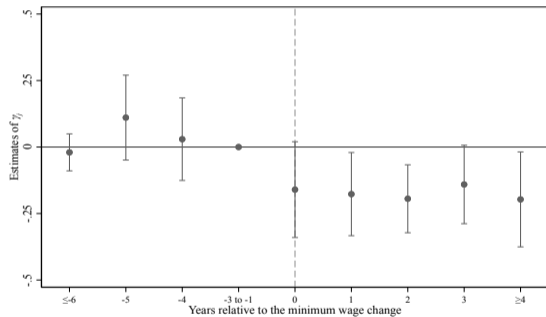
Model 2 and neighboring sample

Dep. var.	Violent crime rate			
	Homicide[a]	Robbery	Aggravated assault	Rape[b]
	(1)	(2)	(3)	(4)
Low-income × federal/state MW	-0.002	-0.043**	-0.113***	-0.006**
	(0.002)	(0.019)	(0.039)	(0.002)
Observations	153,974	159,447	159,447	72,540
R^2	0.150	0.664	0.769	0.305
$\bar{Y}$ of low-income tracts	0.047	1.223	1.760	0.160
$\bar{Y}$ of high-income tracts	0.022	0.769	0.941	0.090
Tract FE	✓	✓	✓	✓
City-year-quarter FE	✓	✓	✓	✓

Notes: * significant at 10%, ** significant at 5%, and *** significant at 1%. Standard errors in parentheses are clustered at two levels: tract and year-quarter. The sample comprises only neighboring tracts. An observation is a census tract in a year-quarter. The dependent variable of each regression is the number of crimes of a specific crime type (shown as the column name) per thousand population in a tract in a year-quarter. [a]Homicide data are not available for Seattle and Portland. [b]Rape data are not available for Austin, Boston, Dallas, Denver, Detroit, New York, Seattle, Memphis, Las Vegas, and Portland.
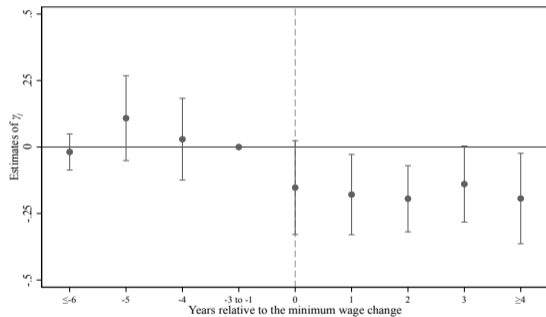
The validity of DID strategy

Neighboring sample

(a) Violent crime rate (Model 1)   (b) Violent crime rate (Model 2)

Notes: Notes: This figure plots point estimates and their 95% confidence intervals for the dynamic effects of minimum wage changes on the violent crime disparity between low- and high-income tracts. It covers the periods from at least six years before (indicated as ≤ -6) to at least four years after (indicated as ≥ 4) the changes, with 1–3 years before the changes as the reference period. Analysis is based on the neighboring sample.

Heterogeneity analysis by city characteristics

Model 2 and neighboring sample

- Grouping the 18 cities into 9 top and 9 bottom cities by:
  - Policing density: no difference across cities with a higher and lower number of police per 1,000
  - **Population size**: ↓ more in *more populous cities*
  - **Population aging**: ↓ more in *cities with a lower prop. of ppl older than 50*
  - **Income level**: ↓ more in *lower-income cities*
  - **Poverty level**: ↓ more in *cities with a higher prop. of ppl receiving food stamps*
  - **Education level**: ↓ more in *cities with a lower high school completion rate*

Mechanism analysis
Model 2 and neighboring sample

- Income channel
  - **Median household income** ↑*** (mainly attributed to low-income tracts)
  - **Multi-vehicle ownership rate** ↑**
  - **Gini coefficient** ↓**
  - Unemployment rate
  - Share of hh inc < $15K
  - Poverty rate
- Non-income channels
  - Teenage birth rate
  - High school completion rate
  - Share of ind who moved in a year
  - Housing occupancy rate
  - Median housing value

Robustness tests

- **Alternative specifications**: Real MW, nominal MW, log of (MW), number of violent crimes
- **Alternative sample**: full sample, non-neighboring tracts, no river or highways, no sudden change
- **Alternative measures of disadvantaged communities**: poverty rate, share of hh inc < $15K, share of blacks
- **The issue of heterogeneous treatment effects**: employing estimator proposed by de Chaisemartin and D'Haultfœuille (2020) and stacked event study applied in Cengiz et al. (2019)

Conclusion

- Using crime data from major cities in US, we find that increasing MW significantly ↓ violent crime disparity between low- and high-income regions.
- Possible channels: MW ↑ the income of low-income households and ↓ both intra- and inter-tract income inequalities
  - Aligning with Becker (1968)'s economic theory of crime and Merton (1938)'s sociological strain theory
- Implication: When deciding whether to increase MW and to what extent, government should consider its significant impact on crime, particularly the considerable differences in the effects across communities, crime types, and cities of different types.

Thank you!

liliecon10@gmail.com

Li, L., Liu, H.: The minimum wage and cross-community crime disparities. J Popul Econ 37, 44 (2024). https://doi.org/10.1007/s00148-024-01023-w

References I

Agan, A. Y. and Makowsky, M. D. (2018). The minimum wage, EITC, and criminal recidivism. Working Paper 25116, National Bureau of Economic Research.

Anderson, D. A. (2021). The aggregate cost of crime in the United States. *The Journal of Law and Economics*, 64(4):857–885.

Autor, D. H., Manning, A., and Smith, C. L. (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.

Bárány, Z. L. (2016). The minimum wage and inequality: The effects of education and technology. *Journal of Labor Economics*, 34(1):237–274.

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

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

References II

Card, D. and DiNardo, J. E. (2002). Skill-biased technological change and rising wage inequality: Some problems and puzzles. *Journal of Labor Economics*, 20(4):733–783.

Cengiz, D., Dube, A., Lindner, A., and Zipperer, B. (2019). The effect of minimum wages on low-wage jobs. *Quarterly Journal of Economics*, 134(3):1405–1454.

Damm, A. P. and Dustmann, C. (2014). Does growing up in a high crime neighborhood affect youth criminal behavior? *American Economic Review*, 104(6):1806–1832.

de Chaisemartin, C. and D'Haultfœuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, 110(9):2964–2996.

Derenoncourt, E. and Montialoux, C. (2021). Minimum wages and racial inequality. *Quarterly Journal of Economics*, pages 169–228.

DiNardo, J., Fortin, N. M., and Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973–1992: A semiparametric approach. *Econometrica*, 64(5):1001–1044.

Dube, A. (2019). Minimum wages and the distribution of family incomes. *American Economic Journal: Applied Economics*, 11(4):268–304.

References III

Enamorado, T., López-Calva, L. F., Rodríguez-Castelán, C., and Winkler, H. (2016). Income inequality and violent crime: Evidence from Mexico's drug war. *Journal of Development Economics*, 120:128–143.

Fajnzylber, P., Lederman, D., and Loayza, N. (2002). Inequality and violent crime. *The Journal of Law & Economics*, 45(1):1–39.

Fernandez, J., Holman, T., and Pepper, J. V. (2014). The impact of living-wage ordinances on urban crime. *Industrial Relations*, 53(3):478–500.

Foley, C. F. (2011). Welfare payments and crime. *Review of Economics and Statistics*, 93(1):97–112.

Fone, Z. S., Sabia, J. J., and Cesur, R. (2023). The unintended effects of minimum wage increases on crime. *Journal of Public Economics*, 219:104780.

Freedman, M., Owens, E., and Bohn, S. (2018). Immigration, employment opportunities, and criminal behavior. *American Economic Journal: Economic Policy*, 10(2):117–151.

Hansen, K. and Machin, S. (2002). Spatial crime patterns and the introduction of the UK minimum wage. *Oxford Bulletin of Economics and Statistics*, 64(Supplement):677–697.

References IV

Kelly, M. (2000). Inequality and crime. *Review of Economics and Statistics*, 82(4):530–539.

Kling, J. R., Ludwig, J., and Katz, L. F. (2005). Neighborhood effects on crime for female and male youth: Evidence from a randomized housing voucher experiment. *Quarterly Journal of Economics*, 120(1):87–130.

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

Lin, M. (2008). Does unemployment increase crime? Evidence from U.S. data 1974–2000. *Journal of Human Resources*, 43(2):413–436.

Lochner, L. and Moretti, E. (2004). The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. *American Economic Review*, 94(1):pp. 155–189.

Ludwig, J., Duncan, G. J., and Hirschfield, P. (2001). Urban poverty and juvenile crime: Evidence from a randomized housing-mobility experiment. *Quarterly Journal of Economics*, 116(2):655–679.

Merton, R. K. (1938). Social structure and anomie. *American Sociological Review*, 3(5):672–682.

References V

Montolio, D. (2018). The effects of local infrastructure investment on crime. *Labour Economics*, 52:210–230.

Oster, A. and Agell, J. (2007). Crime and unemployment in turbulent times. *Journal of the European Economic Association*, 5(4):752–775.

Peterson, R. D. and Krivo, L. J. (2010). *Divergent Social Worlds: Neighborhood Crime and the Racial-Spatial Divide*. Russell Sage Foundation.

Schnepel, K. T. (2016). Good jobs and recidivism. *The Economic Journal*, 128:447–469.

Shaw, C. and McKay, H. (1942). *Juvenile Delinquency and Urban Areas*. University of Chicago Press.

Soares, R. R. (2004). Development, crime and punishment: Accounting for the international differences in crime rates. *Journal of Development Economics*, 73(1):155–184.

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