

Appendix to “The Association Between State Minimum Wage and Firearm Homicides, 2000-2020”

American Journal of Preventive Medicine

Molly Merrill-Francis, May S Chen, Christopher Dunphy, Natalie H Lennon, Catherine Grady, Gabrielle F Miller, Alexander D McCourt

Minimum Wage and the Kaitz Index

State minimum wage was obtained from Temple Law Atlas (Policy Surveillance Program Staff, n.d.) and augmented by legal research. The Temple Law Atlas has minimum wage information available through 2016. To obtain state minimum wages between 2016-2020, we confirmed the minimum wage for each year from state law both directly from state websites and from state code using Westlaw’s legal database. If minimum wage changed in a calendar year, a weighted average was taken. For example, if minimum wage was \$7.50 for the first half of the year and \$8.00 the second half, the state-year minimum wage would be \$7.75.

Minimum wage rates were then conceptualized as a modified Kaitz Index, which is a ratio of the theoretical annual income of a full-time minimum wage worker over a state’s median income. State minimum wage rate was multiplied by 40 and 52 to create the theoretical income of a full-time worker earning minimum wage for comparability with a state-year’s median income. This conceptualization allows for variation across states in minimum wage income by standardizing to a ratio. The formula for the modified Kaitz Index is below.

Let t denote time and let i denote state

$$\begin{aligned} KI_{i,t} &= \frac{\text{Real minimum wage rate}_{i,t}}{\text{Real Median Income}_{i,t}} (40 * 52) \\ &= \frac{(\text{Nominal Minimum Wage Rate}_{i,t}) * (\text{Inflation Adjustment})}{(\text{Nominal Median Income}_{i,t}) * (\text{Inflation Adjustment})} (40 * 52) \\ &= \frac{\text{Nominal Minimum Wage Rate}_{i,t}}{\text{Nominal Median Income}_{i,t}} (40 * 52) \end{aligned}$$

For interpretability, the Kaitz Index was multiplied by 100 to convert into a percentage. Interpretation of the Kaitz Index would be the percent of the state-year median income a theoretical full-time worker earning minimum wage would earn.

Policy Surveillance Program Staff. Minimum wage laws. Temple University Center for Public Health Law Research, Policy Surveillance Program <https://www.lawatlas.org/topics>. Accessed January 2023.

Model Specification

Negative Binomial Regression Models

Let t denote time and let i denote state

Model: $Y_{it} \sim NB(\mu_t, \mu_t^2/k)$

$$\log(E[Y_{it}]) = \log(\mu_t) = \alpha + \beta K_{it} + \gamma P_{it} + \delta X_{it} + \theta_i + \theta_t$$

Where,

Y_{it} is the number of firearm homicides in state i at time t

K_{it} is the modified Kaitz Index (KI) in state i at time t

P_{it} is a set of firearm policy variables (i.e., permit to purchase, comprehensive background checks, and concealed carry laws) for state i at time t

X_{it} is a set of socioeconomic and demographic variables for state i at time t :

- Percent of state population in a Metropolitan Statistical Area (MSA)^b
- Percent of the state population consisting of male persons^c
- Percent of the state population consisting of non-Hispanic White persons^c
- Percent of the state population consisting of non-Hispanic Black persons^c
- Percent of the state population consisting of Hispanic persons^c
- Percent of the state population between the ages of 15 and 24 years^c
- Percent of the state population that held a bachelor's degree or higher^c
- Percent of the state population married^c

θ_i are state fixed effects

θ_t are year fixed effects

Notes: The above model specification was also estimated with the dependent variable stratified by decedent demographic characteristics (e.g., male firearm homicides, non-Hispanic Black firearm homicides). Furthermore, additional models included interaction terms between the modified KI and firearm ownership quartile variables. All models used the relevant state-year population as the model offset for interpretability of findings.

Data Sources:

^a Johns Hopkins Center for Gun Violence Prevention

^bWeb-based Injury Statistics Query and Reporting System (WISQARS)

^cIPUMSL

Appendix Table 1: State-year averages of model covariates

	Mean (<i>SD</i>)	Range
Kaitz Index (KI)	28.2 ± 4.6	16.2 to 42.5
State-year firearm homicides	249.8 ± 303.5	0 to 1883
Percent of the state population who are MSA residents	75.4 ± 18.2	29.6 to 100
Percent of the state population who are non-Hispanic Black	10.0 ± 9.4	0.1 to 38.0
Percent of the state population who are Non-Hispanic White	71.8 ± 15.5	20.6 to 97.1
Percent of the state population who are Hispanic	10.3 ± 10.0	0.5 to 49.3
Percent of the state population who are male	49.3 ± 0.8	47.0 to 52.7
Percent of the state population married	40.9 ± 2.6	34.1 to 47.4
Percent of the state population between the ages of 15 and 24 years	13.7 ± 1.0	10.9 to 20.2
Percent of the state population with a bachelor's degree or higher	13.2 ± 2.5	5.8 to 21.0

Note: Data was obtained from Temple Law Atlas, augmented by legal research, U.S. Census Bureau, National Vital Statistics System, and IPUMS.

State Categorization of Firearm Ownership

To help further understand the different contexts in which state minimum wage may be associated with firearm homicides, associations were explored among states with different quartiles of firearm ownership. Quartiles of firearm ownership were created by averaging estimates of state ownership rates across 2000-2016 (last year data were available) and assigned to a time-invariant category across the study period. State classifications for the purpose of this study are below.

Appendix Table 2: Categorization of Firearm Ownership^a by State

States in the lowest quartile of firearm ownership	States in the second lowest quartile of firearm ownership	States in the second highest quartile of firearm ownership	States in the highest quartile of firearm ownership
<ul style="list-style-type: none"> • California • Connecticut • Delaware • Florida • Hawaii • Illinois • Maryland • Massachusetts • New Jersey • New York • Ohio • Rhode Island 	<ul style="list-style-type: none"> • Arizona • Colorado • Indiana • Iowa • Michigan • Nevada • New Hampshire • New Mexico • North Carolina • Pennsylvania • Texas • Virginia • Washington 	<ul style="list-style-type: none"> • Georgia • Kansas • Maine • Minnesota • Missouri • Nebraska • Oregon • South Carolina • Tennessee • Utah • Vermont • Wisconsin 	<ul style="list-style-type: none"> • Alabama • Alaska • Arkansas • Idaho • Kentucky • Louisiana • Mississippi • Montana • North Dakota • Oklahoma • South Dakota • West Virginia • Wyoming

Note: Source is Schell et al., 2020

^a Estimates from 2000-2016 are averaged across years from: Schell TL, Peterson S, Vegetabile BG, Scherling A, Smart R, & Morral AR, State-Level estimates of household firearm ownership. Santa Monica, CA: RAND Corporation, 2020. <https://www.rand.org/pubs/tools/TL354.html>. Updated April 22,2020. Accessed October 2022.