



# Police Funding and Fatal Police Shootings in the U.S.

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## Abstract

The police use-of-force is meant to be used as a means to apprehend the person and keep citizens and themselves safe. However, with the increased awareness of the Black Lives Movement and the movement of Defunding the Police, there are speculations of the legitimacy of police use-of-force. In this work, we attempted to study the relationship between police funding and the rate of fatal police shootings in the U.S. at both the state and the city level. After accounting for many covariates, including population diversity index, crime index, firearm availability and percentage of resolved shooting incidents, our analysis shows that police funding is positively correlated with the rate of fatal police shootings at both state and city levels.

## Introduction

- The Black Lives Movement was first founded in response to the murder of Trayvon Martin. It has resurfaced due to the murder of George Floyd on May 25, 2020, spurring a mass movement of calling out the police for racism and the need for police reform.
- Defunding the Police is a movement that calls for deterring funds from the police departments to the community.
- Past research on fatal police shootings in the U.S. has focused on the topics of racial discrimination against black citizens, the role of firearm availability and the role of location type(urban, suburban, and rural).
- This study explores the relationship between police funding and the rate of fatal police shootings at both the state and the city level.
- To the best of our knowledge, this is the first study that attempts to explain this relationship.

## Data

- Robust combination of datasets was assembled and used in our analyses.
- At the state level, this combination consisted of:
  - Fatal Police Shootings 2015-2020.
  - Mapping Police Violence 2013-2020
  - Suicide Rates 2016.
  - Registered Firearms 2019.
  - Population 2015-2020.
  - Population Racial Diversity 2017.
  - State General Expenditure 2015-2017.
  - Offenses (Crime) 2015-2018.
  - Officer count 2015-16.
  - Population density 2017 & 2020.
- A similar combination was used at the city level.

## Methodology

- Poisson Regression Model
  - Used to model the relationship between the rate of shootings (response variable) and police expenditures (explanatory variable) while controlling for several covariates.
  - Chi-Square goodness-of-fit test showed that Poisson regression is a good fit to the data.
- Two levels of analyses
  - State Level
    - Based on the imputation of missing values, we bifurcated into two types of models covering the periods of 2015-2017 and 2015-2020.
    - For each period, we fit three models: Single variable model (only police expenditure), Full model (all covariates included) and Stepwise model (only important covariates are retained).
  - City Level
    - We made use of city level data.
    - Consists of four models: Single variable model, Full model, Stepwise model and Purposefully selected model (variable selection retaining police expenditures).

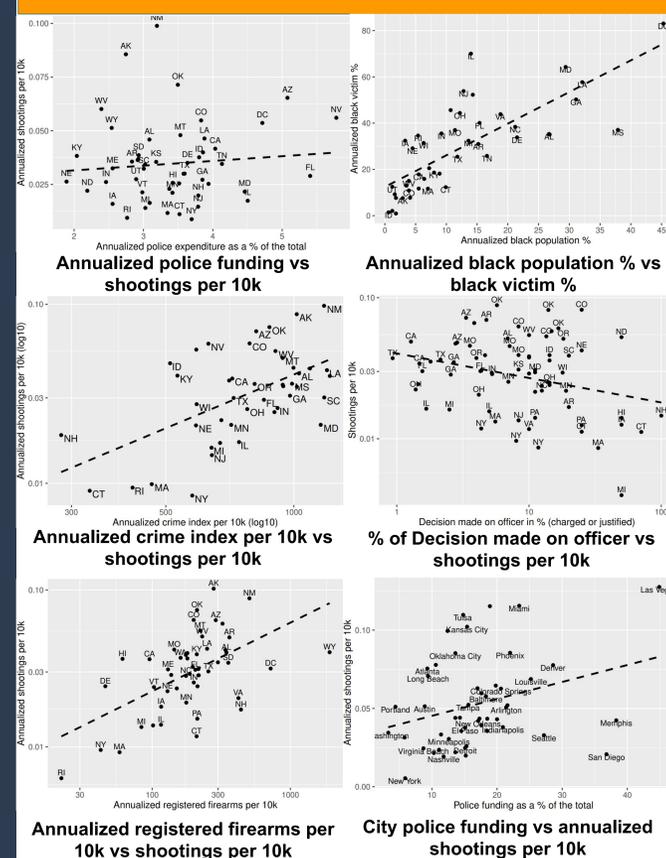
## Results

Variable	IRR	P-Value
(Intercept)	2.1E-09	2.9E-37
Black Population %	↓ 3.64%	6.6E-39
Firearms Per 10k	↑ 0.05%	2.0E-10
Population Density	↓ 0.004%	0.1629
Population Diversity Index	↑ 1.66%	8.6E-17
Decision made on Officer	↓ 0.4%	0.0599
Urbanization Index	↑ 3.86%	7.1E-69
Male Population %	↑ 8.26%	0.01429
Age Dist. (% of 20 to 45)	↑ 12.25%	1.7E-21
Crime Index Per 10k	↑ 0.09%	1.9E-41
Police Percentage of Total	↑ 41.74%	4.1E-42

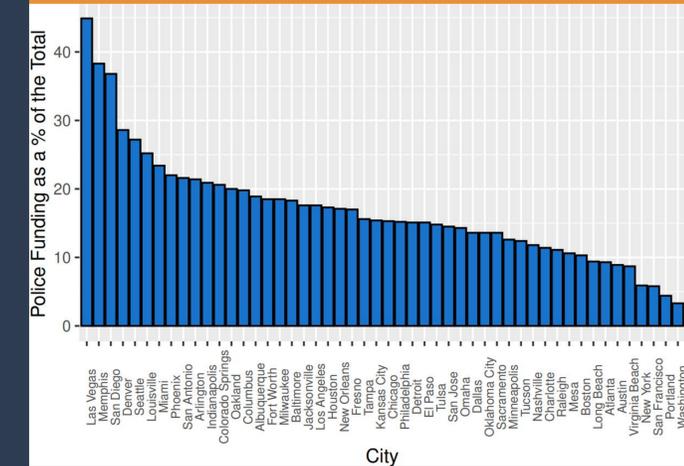
### State Level Model (Stepwise Model 2015-2020)

Variable	IRR	P-Value
(Intercept)	0.00009	6.0E-55
Police Funding as % of Total	↑ 0.99%	0.01844
Black Population %	↓ 3.02%	4.0E-22
Population Diversity Index	↓ 1.09%	0.00205
Crime Index per 10k	↑ 0.07%	4.4E-09
% of Population of Age between 18-64	↓ 2.27%	0.01239
Decision Made on Officer	↑ 0.68%	0.04335

### City Level Model (Purposefully selected model)



## Results (Cont.)



## Conclusions

- There seems to be no racial disparity in the descriptions of each incident observed.
- At the state level, the percentage of governmental expenditure spent on police expenditure has the most impact on the average rate of fatal police shootings.
- At the city level, Black Population percentage has the lowest reduction correlation with each unit increase on the rate of shootings on average.
- Police funding has sufficiently different correlation with rate of shootings in City level compared to the State level models.
- Although there is a positive correlation between police funding and the rate of fatal police shootings, this doesn't necessarily imply that defunding police departments will reduce the shooting rates.
- However, this might support the need for allocating larger parts of police funding towards training of officers.

## Acknowledgements

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