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Data Science 391

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Do Stricter Gun Laws by States Prevent Mass Shootings and Gun Deaths?

**Introduction**

This paper attempts to look at the politically divisive issue of guns in the United States. More specifically, how the laws and regulations of individual states affect the number of deaths due to firearms in that state. I will evaluate the strictness of each state’s gun laws, as well as the number of gun deaths it has, and determine whether there is a causation and correlation between the two. This is a politically salient issue to explore because although there is partisan discourse on each side of the issue there are also several undeniable facts. The most important being that the US has a gun epidemic and a gun violence crisis. The results of this paper will help to elucidate some of the claims that surround this issue and provide more information. I hypothesize that after controlling for several important variables, states with stricter gun laws will experience fewer gun deaths.

My approach was to obtain an independent analysis of gun laws by state and compare the statistics on mass shootings by state. Much of the data that analyzes how strict a state’s gun laws is potentially arbitrary and subject to partisan bias. For this reason, I used data from a historically liberal and staunch opponent of gun use, Giffords, coupled with data from a clearly conservative and pro-gun group called AZ Defenders. Giffords uses a grading scale from A to F to assess the strength of a state’s gun laws. AZD uses a “Gun Friendly Index” that ranges from 10.7 to 122.9. Using these two indexes together I will standardize them so that they are both between 0 and 100, and then I will average them together to offer a less biased coefficient on gun law strictness. My research finds that as states become looser with their gun regulations, gun deaths increase. There are, of course, possible other explanations for the correlation between the two, such as cultural factors or other outliers. The results of my study are relevant because it offers significant information about the how laws and regulations affect gun violence in a country that experiences more mass shootings than days in a calendar year (Gun Violence Archive 2020). Additionally, I found that the dataset I was going to use primarily did not account for population. After tallying the number of mass shootings by state and plotting them, I came across results contradictory to my hypothesis. I wanted to verify the results and came across the lack of normalization for population in the dataset. One option would be to account for population myself, but I saw this as an opportunity to shift the scope of my research question to gun deaths as opposed to purely mass shootings.

**Background**

Out of the developed democracies in the world, the US stands alone in gun homicides. Compared to other wealthy countries with populations greater than 10 million, the US ranks first in homicides by firearm, more than doubling the second entry on the list. In fact, the US ranks alongside countries like the Philippines and Uruguay in firearm-related deaths per 100k per year. World Population Review has the US at 10th in the world in homicides by firearm after standardizing for population (World Population Review 2021). Taking a deeper look at why the US has such high rates of gun violence and mass shootings might yield results suggesting that the 2nd Amendment, federalism, lax gun laws, or other factors are to blame. In this study I aim to look at whether stricter gun laws *actually* prevent mass shootings from occurring in any measurable way. I will use data from Giffords, World Population Review, and Gun Violence Archive to suggest there is a causal relationship.

I hypothesize that states with stricter gun laws experience fewer mass shootings and fewer gun-related deaths. I have these expectations because of simple cause and effect assumptions, and I surmise that there is a direct causation between the two.

**Data and Approach**

In my analysis I used several datasets relating to guns and gun violence. Primarily, I used a dataset that I developed myself by taking two separate data sets and using them to create my own coefficient. This dataset along with a dataset that enumerated gun deaths by state, were plotted together to demonstrate the correlation between remiss gun laws and gun deaths as they vary by state. The dataset relating to gun laws by state played a key role in my analysis. Throughout this paper I refer to it as the New Gun Friendly Index (NGFI). The data that I initially encountered from Giffords gave each state a grade from F to A on the strength of their gun laws. The AZ Defenders employed their own Gun Friendly Index ranking states on how weak their gun laws were, how “friendly” the state’s laws were to gun owners. In order to achieve a more refined and non-partisan dataset, I standardized the Gun Friendly Index so that each entry was between 0 and 1 as opposed to 10.7 and 122.9. This process is just simple subtraction and division, and then multiplication to get a range of results from 0 (lowest) to 100 (highest). The other dataset of grades from F to A was trickier. I assigned each cardinal letter grade a range also from 0 to 100, for instance, A was 0, B was 20, and so on.[[1]](#footnote-1) After normalizing both sets to scores between 0 and 1, I took the average of the two with respect to each individual state. The second dataset that I used was from WPR and provided me with data about each states gun deaths per 100k people.

My analysis looks at whether the dependent variable (gun deaths) is correlated with the independent variable (loose gun laws). Conversely, whether stricter gun laws prevent gun deaths on a state-by-state basis. I think my approach offers the best chance to yield the best results because I use my own fair index to analyze how strict a state’s gun laws are, and I use raw gun death data devoid of bias. My actual approach consisted of a scatterplot to visualize the results from the analysis.

**Results**

My analysis shows that as states become more relaxed with their gun regulations, there are more gun deaths. This is a strong correlation which can be suggestive of a causal relationship. Before I show the visualizations of my ideas, I think it would be worthwhile to show why normalizing by population is important. The figure on the right uses the same NGFI coefficient as the one on the left, but a different dataset for the shootings.

Chart, scatter chart

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The figure on the right does not account for population when it counts the number of mass shootings that a state has. Thus, states like California and New York, who have two of the strictest approaches to gun control, have two of the highest amount of mass shootings. The graph on the left uses the same NGFI. It, however, uses a metric that relays gun deaths per 100k people in a state. This accounts for population, and we can now clearly see that the “friendlier” a state is to gun ownership, the more gun deaths there are per 100k people. Effectively agreeing with our initial hypothesis that states with stricter gun laws experience fewer gun deaths.

**Conclusion**

This paper attempted to analyze the connection between how strict a state’s gun laws are and how many people die at the hands of guns per year in that state. Our research and results suggest that the friendlier states are with their gun laws, the more people die because of guns in that state. The scatterplot above suggests that both ends of the spectrum are true. Looser gun laws bring more deaths, stricter laws experience fewer deaths. These are important findings because the US is the only developed democracy in the world that experiences so much death at the hands of guns. Further, the state’s rights system places the US in a unique position to analyze the effects of each state’s laws on gun deaths. There are limitations to my findings, including alternative explanations and flaws in my New Gun Friendly Index. Just because there is a strong correlation between the two variables does not mean there is necessarily a causation as well. Future research could achieve a coefficient or index that accounts even further for cultural factors and attitudes.

**Appendix**

|  |  |
| --- | --- |
| State | State Represented |
| deaths | Gun deaths per 100k |
| Rank.x,y | Gun Friendly Rank out of 50 |
| GFI.x,y | Gun Friendly Index by State |
| GFI\_norm.x,y | Normalized GFI (0 to 1) |

Table

Description automatically generated**Diagram

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1. Note that I reversed the order of the letter grades, because I was calculating the gun *friendly* index. Therefore, a state with an A in gun strictness would not be a 100 in gun friendliness. [↑](#footnote-ref-1)