Econ 483
Winter 2019
Hugo Baldner
Research Project

Predicting Gun Death

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Introduction

Within the United States we are divided on the issue of Guns. This division is perhaps most evident in our presidential elections. Candidates ranged from wanting to ban guns outright to wanting to expand gun use to public teachers. This research project is meant to answer the question of "How does the gun to people ratio, democracy index, GDPPC, and happiness index of a country affect its' gun death rate?" However, we are in general looking for distinguishing factors that we can use to identify those locations that have higher Gun Death Rates. The data we use will be from a variety of locations such as The Economist and the journal of economic growth. Also, as we progress with our regressions and data collection we will make modifications to our analysis in order to capture a more complete picture of the variables that go into predicting the gun death rate.

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Data

In totality we will use seven pieces of data that will be collected into four different regressions. These seven resources will be The Journal of Economic Growth, US news and World Report, United States Census Bureau, Small Arms Survey, World Happiness Report, and the Washington Post. After some further research all of these resources appear to be reputable and will be combined to create a more capable dataset for answering our questions. We will use one "dummy" variable to represent the Area where the "sub region" corresponds the number in the following Table.

Code	Sub Region
1	Australia/New Zealand
2	Caribbean
3	Central America
4	Central Asia
5	Eastern Africa
6	Eastern Asia
7	Eastern Europe
8	Melanesia
9	Micronesia
10	Middle Africa
11	Northern Africa
12	Northern America
13	Northern Europe
14	Northern Ireland
15	Polynesia
16	South America
17	South-eastern Asia
18	Southern Africa
19	Southern Asia
20	Southern Europe
21	Western Africa
22	Western Asia
23	Western Europe

We will also be forced to take the Log of several of our data variables. This will be done specifically due to the skewed nature of some data points. For example, within Guns Per Capita the United States is highly skewed this will throw off any regression we do unless we scale back this skewed nature through taking the log of the data. These will be obvious due to the naming being "log" followed by the variable name. Another important issue we will face is the inconsistencies between different countries. While we start having close to 200 countries/territories to analysis many of these will have to be ignored as we continue. For instance, the Vatican is a complete outlier to our study since they are not in the practical sense a country. Other points don't keep proper accounts or frequent enough accounts of gun deaths to be usable within out project some of these are Nigeria and Argentina. Once all is done we will be left with 67 Countries for which our initial question (How does the gun to people ratio, democracy index, GDPPC, and happiness index of a country affect its' gun death rate?) can be asked.

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Regressions

- **Log(gun death rate) = β_0 + β_1 happiness index + β_2 GDPPC + β_3 Log(gun to people ratio)+ β_4 democracy index + i(Area)**

  This regression was done in order to test our original question of "How does the gun to people ratio, democracy index, GDPPC, and happiness index of a country affect its' gun death rate?"

Linear regression

Number of obs	=	67
F(14, 47)	=	.
Prob > F	=	.
R-squared	=	0.8026
Root MSE	=	.91819

LogFirearmsDeathRate	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
HappinessIndex	-.2226876	.3194083	-0.70	0.489	-.8652542	.4198789
GDPPC	-2.883248	.9443726	-3.05	0.004	-4.783081	-.9834155
Area						
2	2.600333	.5257935	4.95	0.000	1.542573	3.658093
3	2.28269	.6253776	3.65	0.001	1.024593	3.540788
4	-.7103056	.8910813	-0.80	0.429	-2.50293	1.082319
5	-2.078373	1.218853	-1.71	0.095	-4.530388	.3736428
6	-.7615081	1.239332	-0.61	0.542	-3.254722	1.731706
7	-.0203643	.7188967	-0.03	0.978	-1.466598	1.425869
12	1.060189	.6662927	1.59	0.118	-.2802192	2.400597
13	.2890448	.6439813	0.45	0.656	-1.006478	1.584568
16	2.049421	.6100247	3.36	0.002	.8222102	3.276633
17	.8204011	1.167381	0.70	0.486	-1.528066	3.168868
18	1.274902	.721198	1.77	0.084	-.1759611	2.725765
19	-2.46903	.8412882	-2.93	0.005	-4.161484	-.7765768
20	.323972	.5793746	0.56	0.579	-.8415794	1.489523
22	.1510722	.8408511	0.18	0.858	-1.540502	1.842646
23	.8426028	.3429431	2.46	0.018	.1526903	1.532515
LogCivilianFirearmsRate	.6218705	.2012136	3.09	0.003	.2170811	1.02666
DemocracyIndex	.206534	.1496062	1.38	0.174	-.0944349	.5075029
_cons	1.695309	2.156042	0.79	0.436	-2.642089	6.032706

We see here the effect of our rapid decline in data points. Of the 23 possible Areas a country could have been located in only 17 are shown. Of the other variables we see that only two are statistically significant. This being the GDP per Capita and the Civilian Firearms Rate. This becomes even more interesting when further analyzing our variables since the Happiness index takes into consideration GDPPC

and yet it is not statistically significant. On top of this upon further analyzing the data point per point we see one main outlier, Singapore. Singapore is indeed a unique case since it is a country that consists almost exclusively of one city to analyze all of these things further at this point it was decided that I run three more regressions.

- **Log(gun death rate) = β_0 + β_1 Religious Fractionalization + β_2 Ethnic Fractionalization + β_3 Log(gun to people ratio)+ β_4 Linguistic Fractionalization + β_5 GDPPC**

  This second regression was to account for the lack of diversity within Singapore. Using indexes developed with the Journal of Economic Growth we were able to run a regression testing how "How does the GDPPC, Ethnic, Linguistic, and Religious Fractionalization of a country affect its' gun death rate?"

Linear regression

Number of obs	=	65
F(5, 59)	=	13.57
Prob > F	=	0.0000
R-squared	=	0.4890
Root MSE	=	1.2773

LogFirearmsDeathRate	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPPC	-3.172821	.7783219	-4.08	0.000	-4.730239	-1.615403
LogCivilianFirearmsRate	.8707884	.131073	6.64	0.000	.6085119	1.133065
ReligiousFractionalization	-.4081575	.7876543	-0.52	0.606	-1.98425	1.167935
LinguisticFractionalization	-1.230897	.9964647	-1.24	0.222	-3.224819	.7630241
EthnicFractionalization	1.53752	1.021709	1.50	0.138	-.5069148	3.581954
_cons	2.15833	1.04595	2.06	0.043	.0653896	4.25127

We see, interestingly enough, (in the few data points that we were able to recover) that there seems to be no significance in any of the three added variables.

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- **Log(gun death rate) = β_0 + β_1 happiness index + β_2 GDPPC + β_3 Healthy Life Expectancy + β_4 Social Support + β_5 Freedom to make choices + β_6 Generosity + β_7 Corruption**

  The third regression we did was meant to tackle the ambiguity in the fact that the GDPPC had a significance on the Gun Death Rate. We tested every single contributing factor of the happiness index to see exactly what is a good measure and makes the index a bad overall measure. "How does the GDPPC, Happiness index, Social Support, Healthy Life Expectancy, Freedom to make life choices, Generosity, and Corruption of a country affect its' gun death rate?"

Linear regression

Number of obs	=	69
F(7, 61)	=	11.74
Prob > F	=	0.0000
R-squared	=	0.4648
Root MSE	=	1.3289

LogFirearmsDeathRate	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
HappinessIndex	1.535017	.3157923	4.86	0.000	.9035513	2.166483
GDPPC	-3.507863	1.004924	-3.49	0.001	-5.517332	-1.498394
socialsupport	1.543643	1.267206	1.22	0.228	-.9902914	4.077578
healthylifeexpectancy	-4.022072	1.953237	-2.06	0.044	-7.927811	-.1163331
freedomtomakelifechoic	-1.899467	2.002561	-0.95	0.347	-5.903836	2.104901
generosity	-6.406837	3.000337	-2.14	0.037	-12.40638	-.4072922
Corruption	-.5584287	2.673471	-0.21	0.835	-5.904364	4.787507
_cons	-1.798428	1.809458	-0.99	0.324	-5.416663	1.819808

We see here that of the six factors that go into the Happiness index only 3 of them are significant while 3 of them are far from it. This explains why in the previous regression the Happiness index was such a mediocre predictor of Gun Death Rates.

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- **gun murder rate = β_0 + β_1 Log(guns per capita) + β_2 poverty rater + β_3 healthcare rank + β_4 Corrections/Crime rank + β_5 economy rank + β_6 quality of life rank + β_7 infrastructure rank + β_8 fiscal stability rank + β_9 education rank**

  This final regression was done due to the fact that the other regressions were losing so many observations from the varied databases being used to collect the data. This limiting to the US also allowed us to not pay attention to Gun Accidents or Suicides since the US is more consistent amongst state collection of data than countries are. We tested How does the guns per capita, poverty rate, healthcare rank, Corrections/Crime rank, economy rank, quality of life rank, infrastructure rank, fiscal stability rank, education rank of a state affect the Gun Murders per capita.

Linear regression

Number of obs	= 50
F(9, 40)	= 7.38
Prob > F	= 0.0000
R-squared	= 0.6048
Root MSE	= 1.0463

gunmurdersrate	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LogGunsPerCapita	-.2774486	.2064618	-1.34	0.187	-.6947235	.1398262
povertyrate	3.728886	8.246277	0.45	0.654	-12.93746	20.39523
healthcare	.0528279	.0160488	3.29	0.002	.0203922	.0852637
crimeandcorrections	.0475069	.0144671	3.28	0.002	.0182678	.076746
economy	-.011508	.0117274	-0.98	0.332	-.0352101	.012194
qualityoflife	.02906	.0115019	2.53	0.016	.0058139	.0523061
infrastructure	.0165699	.010165	1.63	0.111	-.0039743	.0371141
fiscalstability	.0259659	.0136259	1.91	0.064	-.0015731	.0535049
education	-.0341533	.0170795	-2.00	0.052	-.0686724	.0003657
_cons	-.4920062	1.480269	-0.33	0.741	-3.483741	2.499729

Conclusions

Within these regressions it is very hard to draw general conclusions surrounding countries. This is because of the vast diversity in definitions and data collection reliability around the world. To counter this, I think our best regression when regarding us within the US is actually amongst our states to an extent. We see in our final regression that Our level of corrections to prevent repeat offenders and ensure public safety along with our healthcare are by far the biggest correlators with less gun murders. Part of this is likely due to the rehabilitation of those people who would commit such acts. However one note that must be considered when analyzing the data of this regression the individual states is the freedom of movement between states. An individual could easily be affected by one state and yet commit crimes in another state. Also the changing of gun death rate to the more accurate gun murder rate could also be affecting our regression. While more data analysis is needed, specifically over time, we can conclude that the effects of Healthcare and a proper prison correction program are quite significant when predicting a State's Gun Murder Rate.

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