

## Data Analysis Essay

(Due: 29 April **before** 2pm, Submit to eBART)

(**Instructions** for submission: Note that you will need to submit a single document to eBART that includes both the write-up of your statistical results and your R script/code. In both cases, please ensure that the section you are answering is clearly labelled and easy for the markers to find. We have provided an answer sheet “template”, which labels the questions to help you with structuring your answers. However, the answers in each section build on one another and thus it is important to view your answers as contributing to a cohesive overall answer. Also note that we **will not be enforcing the word limit** for this assignment. However, you should make every effort to not go 10% **over** the 3,000-word limit.)

### 1. What this essay is about

Global terrorism is among the most pressing international problems and considerable scholarship across criminology, economics, political science, and sociology is devoted to understanding the factors that facilitate and deter terrorist attacks. We will explore terror incidents using data from the University of Maryland’s Global Terrorism Database (GTD).<sup>1</sup> Specifically, we will use data on all terror incidents in 2017 to examine the factors influencing the severity and success of various types of attacks.

### 2. Data (5% of mark)

Please download the GTD dataset (gtd.csv or gtd.Rda) and codebook (gtd\_codebook.pdf) from the ELE page. Prior to analysis, please generate the following additional measures:

- 1) Generate a binary variable named “bombing” equal to 1 if the variable “attacktype1\_txt” is equal to “Bombing/Explosion” and 0 otherwise.
- 2) Generate a categorical variable named “attack.target” as follows:
  - If “targtype1\_txt” = “Business”, then “attack.target” = 1
  - If “targtype1\_txt” = “Government (General)”, then “attack.target” = 2
  - If “targtype1\_txt” = “Military”, then “attack.target” = 3
  - If “targtype1\_txt” = “Police”, then “attack.target” = 4
  - If “targtype1\_txt” = “Private Citizens & Property”, then “attack.target” = 5
  - Set “attack.target” to zero otherwise
- 3) Generate a categorical variable named “cat.gdp” as follows:
  - “gdp” < 25<sup>th</sup> percentile = 1
  - “gdp” >= 25<sup>th</sup> percentile and “gdp” < 50<sup>th</sup> percentile = 2
  - “gdp” >= 50<sup>th</sup> percentile and “gdp” < 75<sup>th</sup> percentile = 3
  - “gdp” >= 75<sup>th</sup> percentile = 4
- 4) Generate a binary variable named “low.capacity” equal to 1 if “cat.gdp” = 1 and 0 otherwise.

(**Note** that we will check the answers for this section by looking directly at your R code which should be pasted at the end of the essay).

### 3. Research questions (15% of mark)

- 1) *What factors influence the severity of an attack?*

In order to successfully mitigate the harmful effects of terrorist attacks, governments need to understand the factors that influence an incident’s severity. We will measure “severity” using the total

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<sup>1</sup> <https://www.start.umd.edu/gtd/>

number of fatalities associated with an incident and focus on two key explanatory factors: the *type* of attack and the *target* of the attack. First, considering the *type* of attack, we will examine the following sub-questions:

- a. On average, are bombings more or less lethal than other types of attack?
- b. On average, are suicide bombings more lethal than non-suicide bombings?

Please state the null and alternative hypotheses associated with both sub-question a) and b).

Next, we will examine whether there are differences in the severity of attacks across the targets measured in the “attack.target” variable (see Section 2). Note that while we believe that there will be differences in lethality across the various target types, we are unsure the exact form these differences will take. Please state the null and alternative hypotheses associated with the relationship between *target* type and the lethality of an attack.

## 2) *What factors influence the success or failure of an attack?*

To effectively combat terrorism, governments must also understand the factors that influence the success or failure of an attack. We will focus on two sets of factors in this section. First, we will once again examine the influence of *target* type on the likelihood of success using our “attack.target” variable. Is success more likely against some targets than others? Again, assume that we believe likelihood of success varies across the type of *target*, yet we are unsure exactly what form the differences are likely to take. Please state the null and alternative hypotheses associated with the relationship between *target* type and attack success.

Lastly, we will examine the extent to which the economic capacity of the target government influences the success or failure of an attack. A well-developed literature suggests that economic capacity is a key variable in deterring terrorism: governments with low levels of capacity have insufficient resources to effectively combat terrorist activities. Please state the null and alternative hypotheses associated with the relationship between low economic capacity and attack success.

## 4. Descriptive analysis (25% of mark)

The first step in any statistical report is to provide a descriptive analysis. The *goal* of this section is to use descriptive statistics and plots to 1) provide the reader with relevant information on the data used in the analysis and 2) offer a preliminary look at the main research questions of the study. Your job is to help your reader “get to know these data” in the context of your research questions.

(**Note:** You will want to support your description with relevant statistics and plots. As the analyst, it is up to you to choose which items to present and how to do so. **Please include 1 table and 3 figures to support this description.**)

## 5. Hypothesis testing (35% of mark)

After describing the data, it is time to carry out our main tests of the hypotheses from Section 3. First, with respect to attack severity:

- 1) Using the “bombing” measure generated in Section 2 and the total number of fatalities of an incident, test if bombings are more or less lethal than other types of attack. Can you reject the null hypotheses at “traditional” levels (i.e., 10%, 5%, and 1% error level)? Please explain your answer.
- 2) Test the hypothesis that suicide bombings are more lethal than non-suicide bombings. Can you reject the null hypotheses at “traditional” levels (i.e., 10%, 5%, and 1% error level)? |Defend your answer.

- 3) Does the lethality of an attack differ based on the intended target? Test the hypothesis associated with “attack.target” and the total number of fatalities outlined in Section 3. Can you reject the null hypotheses at “traditional” levels (i.e., 10%, 5%, and 1% error level)? Defend your answer.

Next, consider the factors that influence the success or failure of an attack:

- 4) Does the success of an attack differ based on the intended target? Test the hypothesis associated with “attack.target” and success outlined in Section 3. Can you reject the null hypotheses at “traditional” levels (i.e., 10%, 5%, and 1% error level)? Defend your answer.
- 5) Using the “low.capacity” dummy variable generated in Section 2, test the hypothesis between economic capacity and attack success outlined in Section 3. Can you reject the null hypotheses at “traditional” levels (i.e., 10%, 5%, and 1% error level)? Defend your answer.

## **6. Conclusion and limitations (20% of mark)**

Lastly, it is necessary to outline your main conclusion and the limitations associated with your analysis:

- 1) Is the analysis above (Sections 4 and 5) consistent with the expectations outlined in Section 3? Why or why not? What, if anything, does one learn from your analysis? Please explain your answer.
- 2) Do you see any limitations with the current analysis? Please explain your answer.