

Targeted Groups of Terrorist Attacks and Subsequent Casualties

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Introduction.

As the event of 11 September 2001 abruptly shattered the sense of security of America as well as the rest of the world, terrorism is becoming one of the world's greatest security concerns in the 21st century. As Antonio Guterres, the Secretary General of the United Nations, once said: "Terrorism is a persistent and evolving global menace. No country is immune." (2018). The nature of the relationship between terrorist attacks and their consequences has thus increasingly served as the major subject of considerable studies in recent years (Huddy, Feldman, Capelos, & Provost, 2002). Often regarded as low-probability, highly consequential events, terrorist attacks can bring a variety of outcomes ranging from immediate casualties to negative impacts on economic growth, politics and mental health to their intended audience (Arce, 2019).

Despite the fact that many of the goals and forms of terrorist behavior have changed with the times, the structure and functions of modern terrorism remain strongly consistent with the recent past (McCormick, 2003). Therefore, although one cannot confidently assume that terrorist incidents of the same magnitude will always recur under the same conditions (Rapoport, 2017), examining the history is able to present valuable insights about how potential attacks are likely to develop and how much damage they may incur. This research paper focuses on using the quantitative analysis to construct multiple regression models based on global terrorist events during the past five decades to explore the question of whether the difference in targeted groups selected prior to an attack would result in different outcomes on site and which subgroup of a population suffers more serious casualties. The results of the analysis reveal a statistically significant relationship between the types of targets chosen by terrorists and the casualties they cause. However, further studies should be conducted to account for more variations in casualties.

Literature Review.

The existing literature analyzing the characteristics of terrorist attacks looks primarily on certain noticeable branches, which are how well developed the targeted site is, the regime type of the country and the transnational or domestic origin of the perpetrators. These factors, studied extensively in the current field of terrorism, are found to have profound impacts on the economic, political and psychological consequences of the attacks.

One of the most direct and easily accomplished effects that a typical terrorist attack can cause is the economic losses. A determined terrorist organization may obtain its demands quicker by augmenting the economic consequences of its terrorist campaign (Gaibullov & Sandler, 2009). Scholars studying the factors that may influence the amount of economic losses generally agree that the demographic characteristics and the level of development of the potential attack sites play an important role here (Bruck & Wickstrom, 2004). Major cities where most political and commercial centers concentrate are believed to be more at risk of suffering huge economic damages on site than minor locales (Berrebi & Lakdawalla, 2007). However, the relation between the level of development and terrorist attacks' effects reverses in the long term among the international community. Economic experts argue that the consequences of terrorist attacks can cast a heavy shadow on tourism, investment, stock markets and foreign trade (Frey, Luechinger & Stutzer, 2007). Unlike developing countries, developed countries are proved to be capable of absorbing terrorism's impacts without displaying adverse economic consequences (Gaibullov & Sandler, 2009). When ascertaining the economic impact of terrorism on growth, researchers have found that terrorism in developing countries is apt to have the more chaotic and

catastrophic outcomes because it dissuades foreign direct investment, a particularly indispensable source of savings for these states (Enders, Sandler & Gaibullov, 2011). On the contrary, an economy as rich and diverse as the United States is found to be able to withstand most terrorist events with few macroeconomic consequences (Sandler & Enders, 2008). Furthermore, the study conducted by Chesney, Reshetar and Karaman also illustrates that the resilience of the Western markets to terrorist attacks can be explained by their stable domestic banking sector, which provides adequate liquidity to promote market stability (2011).

The regime type of the country that terrorist attacks targeted is also an area of strong interest for political scientists. Researchers have identified the regime type of the attacked country as a key factor of the political repercussions. Terrorist violence, which usually goes beyond damaging an enemy's human and material resources, communicates a political message with targeted governments (Crenshaw, 1981). Literature studying the political effects of terrorism in democratic and nondemocratic states largely focuses on their counterproductive nature (Friedland & Merari, 1985). Many researches point out that terrorism is more prevalent in stable democracies based on datasets of international terrorism. (Eubank & Weinberg, 2001; Sánchez-Cuenca & De la Calle, 2009). For example, Pape's findings have shown that suicide terrorism, a cruel and coercive mean designed to achieve specific political purposes, is more likely to be employed against states with democratic political systems than authoritarian governments, which are harder to threaten through political violence (2003). Realistic depiction of death and destruction is frequently used to intimate the audience and arouse domestic pressure on government actions (Gadarian, 2010). As Crenshaw once argued, terrorism is meant to produce a change in government position, not the destruction of military potential (1987).

However, the tendency of terrorist groups to target democracies more and raise public fear to achieve political goals are usually not as successful as they intended. According to statistical evidence, terrorist campaigns are significantly less effective than direct guerrilla warfare against military targets at inducing government concessions (Abrahms, 2012). In the research done by Huddy, Feldman and Weber on reactions to 9/11, they also find that the perceived future terrorist threat in fact leads to greater support for an aggressive national security policy as the public's sense of invulnerability and unparalleled might was threatened (2007).

The third major field of analyzing the cause and effect of terrorist events is the study of the transnational or domestic nature of the attack and its psychological consequences. This aspect of terrorist attacks is both indirect and critical as the effectiveness of terrorism is mostly determined by the psychological effects of violence on audiences (Crenshaw, 2000). For individuals, studies have indicated that the aftermaths of terrorist attacks could bring posttraumatic stress, depressive symptoms, substantial anxiety and even detrimental effects on physical health (Silver, Holman, McIntosh, Poulin & Gil-Rivas, 2002). In terms of larger collectives, transnational and domestic terrorisms cause diverging psychological and social impacts. Friedland and Merari's study suggests that transnational terrorism is highly effective in inducing worry and fear, even when the actual damage it causes is moderate (1985). Moreover, as advances in communication and media provide terrorists with convenient access to more citizens (Sandler & Lapan, 1988), consistent exposure to news about transnational terrorism confronts domestic receivers with thoughts about their own safety, which, in turn, increases prejudice toward outgroup members and encourages support for domestic security tasks (Das et al., 2009; Busch, 2014). On the other hand, incidents linked to domestic terrorist groups are more

likely to induce anger and cause doubts that shift public opinions towards the government (Lerner, Gonzalez, Small, & Fischhoff, 2003). Overall, although transnational terrorism brings more pessimistic feelings to the targeted population, both types of terrorisms cause mistrusts and a self-protective style of defensive coping (Hobfoll, Canetti-Nisim, & Johnson, 2006).

In general, the existing literature in the field of terrorism has made great contributions to the understanding of how specific characteristics of terrorism could result in various outcomes: the economic damages differ both by the level of development and the time span; regime types can influence the potential possibilities of incurring terrorist attacks and the likelihood of government concession, and transnational and domestic terrorisms could lead to psychological trauma and impacts on public policy differently. However, few empirical work has formally addressed one distinct characteristic of a terrorist event, the primary targets selected.

Although it is widely agreed among intellectuals that terrorism is a form of criminal violence intended to either intimidate a population or coerce a government (Chenoweth, English, Gofas, & Kalyvas, 2019), the exact targets of each terrorist attack often vary from civilian sectors like journalism, private businesses, and NGOs to military personnel, state officials and political leaders. Groups that differ by the level of protection they can receive are likely to have different amounts of casualties when being attacked. Much of the current literature discussing the targets and costs of terrorist attacks use countries as the units of analysis instead of measuring specific subgroups or classes of a population (Frey, Luechinger & Stutzer, 2007), thus failing to explain the difference in casualties among various groups of victims. Several scholars attempting to unravel this question focus on a limited number of aspects and case studies in certain geopolitical areas and lack strong evidence for generalization (Frey, Luechinger & Stutzer, 2007;

Berrebi & Lakdawalla, 2007). The course of this paper looks directly at whether targeting the common citizens, public facilities, the government or the military would yield significantly different outcomes and which group may incur more fatalities. Since the current literature has not yielded a convincing theory regarding the relationship between the identities of the victims and consequences of attacks, exploring the missing piece of the puzzle could help the decision makers to formulate policies that better protect the targeted subgroups of a population who tend to be more vulnerable to severe damages. Therefore, the present insufficiency of literature and the lack of understanding of how terrorism casualties are determined together pose the urgent need to study this topic through formal research in this paper.

To answer the question of whether targeted groups can determine the terrorist attacks' outcomes, I propose my hypothesis which suggests that in a comparison of various terrorist attacks, those that were targeting private businesses and individuals are likely to result in more deadly and destructive consequences than those that were targeting other groups like the public, government, and military because the first type of victims are less protected or armed; consequently their vulnerable lives can easily fall prey to the potential terrorist attacks. The fundamental rationales of this theory build on the level of protection that each group of targets usually receive, which is expected to influence the casualties as a result of the terrorist attack after controlling for the effects of other important characteristics of the incident.

Research Design.

In order to conduct a quantitative research on this topic, this paper's analysis mainly relies on two datasets: the Global Terrorism Database (GTD) and World Development Indicators

(WDI). As one of the first and also the most comprehensive worldwide datasets that include terrorist incidents for an extended time period (Enders, Sandler & Gaibullov, 2011), GTD came into existence in 2001 when researchers at the University of Maryland obtained an event database on terrorist attacks originally collected by the Pinkerton Global Intelligence Services for clients interested in knowing the terrorism risk in different countries (START, 2019). Pinkerton trained primarily retired U.S. Air Force personnel to identify and compile the terrorist event database, which records the incident's date, country location, type of targets, number of deaths and injuries, and other observations. In 2006, the newly formed National Consortium for the Study of Terrorism and Responses to Terrorism (START) took over the management of the dataset and has been working on cleaning and expanding the dataset. Currently, START's GTD that is used in this research possesses updated information on 191,464 domestic and international terrorist events around the world from 1970 to 2018, with at least 45 variables for each case.

To construct a model that accounts for the destruction caused by a terrorist attack, the independent variable is centered around the types of intended targets. The target information section in GTD is very detailed in describing the victims' groups. There are 22 available types of targets, such as business, police, journalists, educational institutions, tourists and so on. Each type has several subtypes, which constitute a total of more than 100 categories. In this research's model, targets will be classified into four major types depending on the protection that they can receive and their ability to protect themselves. The first group lacks the means of self-protection, which consists of mainly private sectors, including privately owned businesses, and individual citizens. The second group considers the general public areas and facilities that have certain protection, for example major public transportation systems, education institutions and

telecommunication centers. The third type is government related individuals and businesses that are often carefully protected, such as the royalty, heads of states, diplomats, and government controlled utility companies. The last group is characterized by stronger means of self-protection and is armed to some level, which includes the police, military forces, intelligence agencies and non-state militia. Interestingly, GTD also includes terrorist attacks targeting other terrorist organizations, violent political parties and extreme groups. Such events are categorized into the last group in this study due to the militant and offensive nature of these organizations.

As for the dependent variables, this paper is going to adopt two ways of accessing the direct damages after terrorist attacks, the number of fatalities and injuries. In terms of the casualties, GTD provides the total number of officially confirmed victims' deaths and injuries in each incident. One thing that needs to be noticed is that this particular number includes all victims and attackers who died or were injured as a direct result of the incident. Despite the fact that GTD does not have a single variable measuring the victims' casualties, it gives the casualties of perpetrators. Therefore, this study will create two new interval variables from GTD which measure the number of casualties focusing exclusively on the victims so that while constructing the model, the numbers of deaths and injuries after attacks are analyzed separately.

Control variables are a necessary component in forming the model as these factors may be able to explain variations in the consequences of attacks from different perspectives. GTD offers a number of potential variables that may influence the outcomes of the attacks for analysis. The size of the terrorist group, which is measured by the number of perpetrators directly involved in GTD, is an interval variable that could reflect how massive and destructive the attack is. The type of a terrorist attack, including assassination, kidnapping, hijacking or armed assaults,

implies what kind of actions the terrorists are likely to take. Cases where there is evidence that the perpetrators do not intend to escape from the attack alive can indicate the suicidal nature of the attack which tends to be more relentless and destructive. Considering such information about how well prepared and organized the attackers are helps explain additional variation in the amount of destruction besides the independent variable.

Apart from the basic preparations of terrorists prior to the attack, other characteristics of the event itself could also result in different amounts of casualties. There are three control variables accounting for these factors. Whether the attack is part of a series of multiple incidents and whether it is a transnational or domestic incident together determine the scale and influences of the attack. The nominal variable recording whether the duration extends more than 24 hours can explain how long the attack last. The more time terrorists have to conduct their attacks, the more deadly consequences they may bring to the victims.

To access another two important control variables in this analysis, I use World Development Indicators from the World Bank dataset to represent how developed and militarily prepared that the country is (World Bank, 2019). The most recent WDI has a temporal coverage from 1960 to 2019 and a spatial coverage of 217 countries around the world, which fully covers all of the cases in GTD. The level of development of a place at the time of the attack, measured by GDP per capita in current U.S. dollars, reflects the local property values and the strength of the government and brings significant impacts to the course of a terrorist attack. The amount of military expenditure of the GDP at the time of the attack implies how much the country values the national security issues and the ability to protect its people. Since GTD has already recorded

the locations and country codes of every attack site, combining WDI with GTD can add the additional variables accounting for these influences.

As the main object of the study, this research paper expects to use multiple regression models to explain how the group of targets selected prior to a terrorist attack contributes to the difference in the direct damages after the attack, which are mainly measured by the number of casualties, after controlling the effects of terrorists' plans, suicidal tendency, any potential correlation with other incidents, and the country's development and military expenditure.

Results.

Examination of the frequency counts gives a clear sense of how terrorist attacks are distributed among the four types of targets. Of the total of 185,015 cases¹ analyzed in this paper, 41.9% of them consider the private business and individuals as their targets, showing a relatively higher portion and risk of terrorist attacks striking this group.

Table 1. Attacks Distribution	Frequency	Percentage
Private	77'578	41.9%
Public	13'844	7.5%
Government	32'426	17.5%
Military	61'167	33.1%

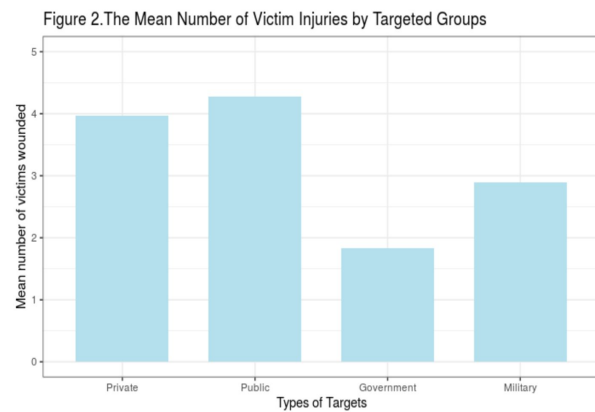
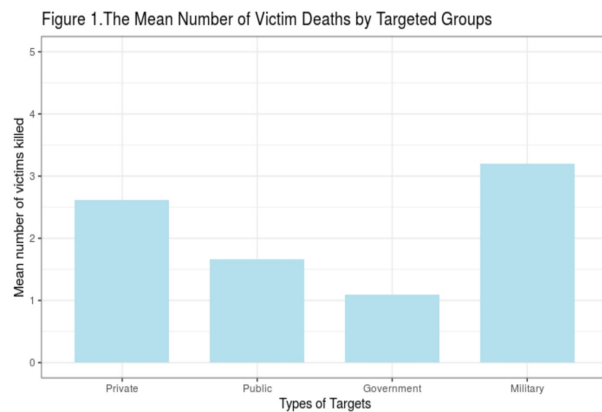
On the other hand, although the hypothesis prior to the research expects to see private business and the public, who are the relatively less protected groups, suffer more severe casualties than the military and government groups, the exploratory data analysis of the mean fatalities and injuries due to terrorist attacks exhibits a slightly different trend among various targeted groups of victims. As shown in Figure 1, the military group has the highest average

1. There are 6449 cases removed because of unknown or unspecified target information in GTD.

death toll during the terrorist attacks, followed by the private, public and government groups.

The hypothesis is more confirmed in the mean numbers of injuries by Figure 2, which suggests that the government and military groups have fewer injuries than the private and public groups.

In both cases, it is noticeable that the government related business and individuals in particular receive the fewest average casualties among all four types of targets.



The table illustrating the distribution of the number of total casualties indicates a similar pattern as outlined in the hypothesis. More than 95% of attacks targeting the government result in fewer than 10 casualties. In contrast, the private and public groups have higher percentages of receiving catastrophic losses exceeding more than 30 casualties than the government group in face of the attacks (3.9% & 4.3% vs. 1.5%).

Table 2. Total Casualties	Private	Public	Government	Military
Catastrophic loss (more than 30)	3.9%	4.3%	1.5%	3.2%
Major Casualties (10 to 30)	9.8%	7.9%	3.4%	10.9%
Minor Casualties (fewer than 10)	86.3%	87.8%	95.1%	85.9%

While constructing the multiple regression models to explain the possible relation of targets' identities and casualties, a considerable portion of missing values for the size of attacks measured by the number of perpetrators would force the number of cases available for analysis

to shrink over 90%. Similarly, The transnational or domestic nature of attacks also lacks enough valid records due to the ambiguous classification standards. Therefore, six control variables are employed in this study, which are whether it is correlated with multiple events, whether the perpetrators are suicidal, whether the incident extends more than 24 hours, the type of the attack, the military spending and GDP per capita of the attacked country. In order to improve the model linearity, there is a log transformation added to the GDP per capita variable. The outputs of the regression models are shown in the table below.

Multiple Regression Results		
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Dependent variable:		

Independent Variables	Killed (1)	Wounded (2)

target_typePublic	-1.050*** (0.126)	0.558 (0.540)
target_typeGovernment	-1.480*** (0.090)	-2.031*** (0.388)
target_typeMilitary	-0.146* (0.075)	-1.652*** (0.327)
multiple	0.010 (0.092)	1.097*** (0.402)
suicide	8.542*** (0.168)	20.728*** (0.733)
extended	1.578*** (0.219)	-2.466** (0.979)
attack_typeAssassination	-1.800*** (0.108)	-1.029** (0.477)
attack_typeBombing/Explosion	-1.684*** (0.073)	1.131*** (0.318)
attack_typeHostage Taking	-1.018*** (0.176)	2.713*** (0.772)
Military_expend_ofGDP	0.026* (0.014)	-0.031 (0.061)
log(GDP_PerCapita)	-0.616*** (0.028)	0.159 (0.120)
Constant	8.136*** (0.227)	1.572 (0.985)

Observations	133,525	128,755
R2	0.029	0.008
Adjusted R2	0.029	0.007
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Note:	*p<0.1; **p<0.05; ***p<0.01	

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2. In both multiple regression models, the Private group serves as the reference level for the target_type variable and the Assault group serves as the reference for the attack_type variable.

The hypothesis of the research is confirmed for the most parts according to the regression models established in the study. In terms of the death toll, the private group suffers the highest number of deaths after accounting for other control variables. All levels of the targets' types, with the exception of the public group in the wounded model, have strong statistical significance to the dependent variables. Considering the overall average death toll per attack is only 2.47 and the average number of injuries is 3.26, the model coefficients of independent variables also show moderately strong substantive significance of the effects. Similar to the exploratory data analysis, the coefficients of the government group suggest that, holding all other variables constant, the government related business and individuals suffer the fewest casualties among the four groups. The statistically significant terms of the military and the public groups also have negative coefficients, which further emphasize the relatively high casualties resulting from the attacks targeting private citizens and the vulnerability of this group due to the less protection provided for this big portion of the population and their weaker means of self-defense.

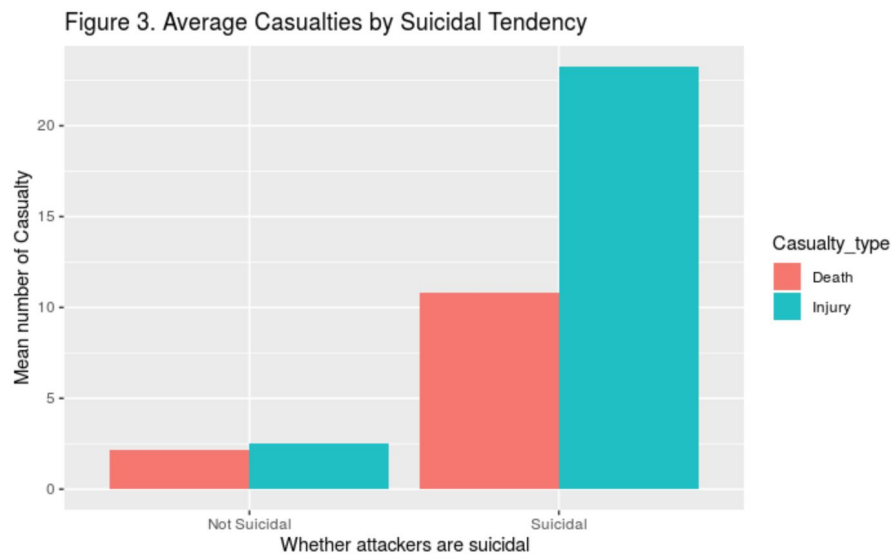
Similar to the pattern depicted in Figure 1, the military group in the death toll model also shows higher risks of receiving more severe fatalities than the public and government. Although this finding partially contradicts the hypothesis stating that the military targets under terrorist attacks should have better means of self-protection than the public, there are possible explanations for this phenomenon.

Openly attacking a military adversary usually involves violent and deadly measures that are likely to cause worse consequences as the terrorists have already prepared themselves to engage with armed and trained military and security personnel (Ganor, 2002). Under such circumstances, the perpetrators participating in these incidents are more likely to be desperate

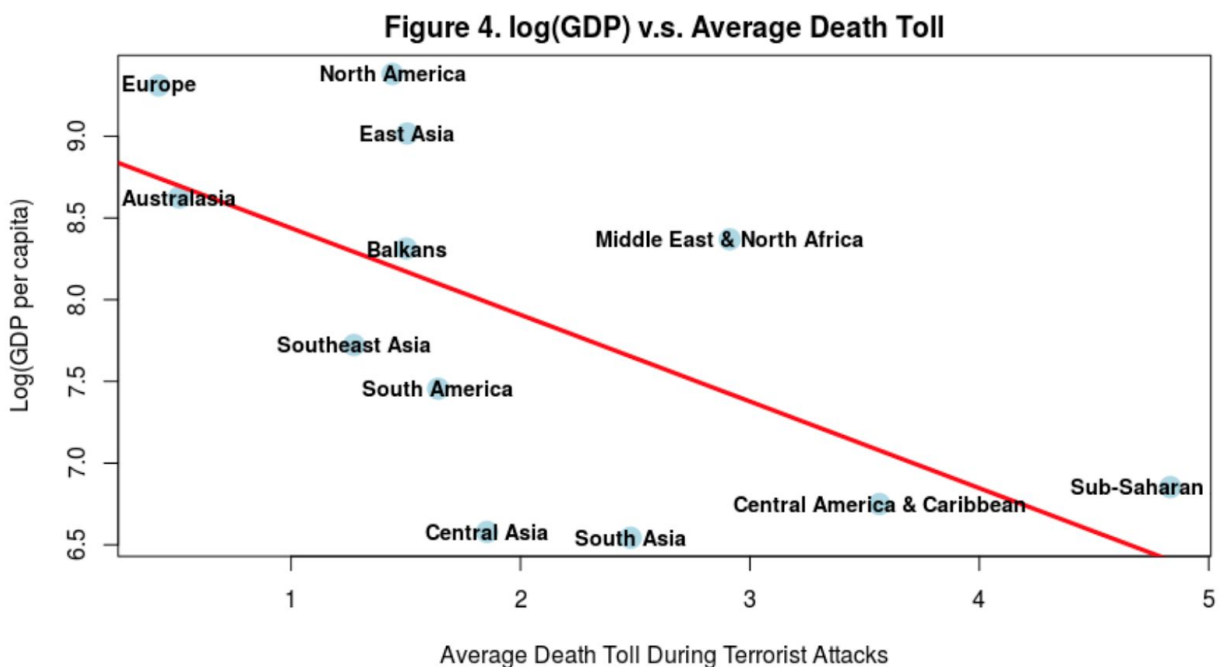
and relentless attackers. As Table 3 describes, a higher percentage of attacks against the military targets are suicidal than those against other types of victims, implying the far more serious threats that this particular group often has to face.

Table 3. Suicidal	Private	Public	Government	Military
Yes	97.5%	98.1%	97.4%	94.3%
No	2.5%	1.9%	2.6%	5.7%

Moreover, the control variables also provide us with some valuable insights as to how other factors can affect the casualties. Incidents that were coordinated together tend to be more dangerous as terrorist attacks that are parts of a series of organized events cause more injuries. The specific types of the attacks matters, for example attacks that are conducted through assassination are likely to cause fewer casualties than assaults according to the model. Events that last more than 24 hours, meaning that terrorists impose a longer threat to public safety, could also increase the number of deaths. These trends follow the common rationales and show the importance of the scale and methods employed by the attackers to the casualties they caused.



Often Motivated by religion extremism, nationalism, foreign occupation, or government brutality (Crenshaw, 2017), suicidal terrorism frequently plays a terrifying role in imposing both tremendous physical and psychological traumas to the audience. The suicidal tendency of the perpetrators is found to have very strong statistical as well as substantive significance to the casualties. Holding other variables constant, if the terrorists never plan to escape alive before commencing their attacks, the model predicts that there will be at least 8 more deaths and 20 more injuries as a result of the attackers' suicidal behaviors. The substantial increase of casualties related to suicidal terrorism is also portrayed in Figure 3.



Lastly, the amount of GDP per capita (after log transformation) and military spending are both statistically significant predictors in the death toll model. Having a higher percentage of a state's GDP used as military expenditures is in fact associated with more death tolls during terrorist attacks, while a higher value of GDP per capita after log transformation in Figure 4 shows a negative relationship with the number of fatalities with moderately strong substantive

significance. The magnitude of the variable coefficient of military spending, however, suggests that this relation possesses relatively weak substantive significance. The findings here may be explained by the fact that states considering themselves as having higher risks of imminent terrorism are more likely to distribute more of their budgets on the national defense as precautions than their safer counterparts and well developed countries are more capable of protecting the safety of their citizens and reducing the on-site casualties when being attacked through their advanced national security and medical systems.

The adjusted R^2 is 0.029 for the death toll model and 0.007 for the injury model, meaning that only about 3% and 0.7% of the variation in death tolls and injuries respectively can be explained through the current independent and control variables. These statistics point out the insufficiency of the models to fully explain terrorist attack casualties.

Two particular outliers stand out consistently in the regression diagnostic process. One of them is the tragic September 11 Attack in New York in 2001 and the other is the 2014 Camp Speicher massacre occurred in Tikrit, Iraq, which led to over 1,500 deaths. Both cases have extremely high casualties that far exceed other incidents. However, these two unusual incidents exert only limited influences on the models due to the enormous size of the available cases from GTD. Removing the outliers does not change the level of significance of any independent variable in both models. Therefore, there is no reason to exclude them from the analysis.

Limitations.

Several weaknesses and limitations of the current models should be acknowledged. As GTD records terrorist attacks that take place all around the world, it should not be considered as

a set of independent and identically distributed random variables; in other words, real-life terrorist attacks are not random events or completely independent with each other as shown by statistical models for the pooled time-series, cross-sectional data (Li & Schaub, 2004). Attacks happened in one place may be correlated with past or imminent attacks. Some geopolitical hotspots that were hit by terrorists before are likely to have higher risks of being under more dangerous attacks in the future as they may become major targets of transnational terrorism (Brandt & Sandler, 2010). The inherently correlated data, although undermining one of the key regression model assumptions, is mostly inevitable in the quantitative research of global terrorism as well as other major areas of comparative and international politics.

Normality is another aspect of regression diagnosis that is not well addressed in the models. The nonnormality points out the possibility of complex interactions between independent variables which have not been correctly modeled. Fortunately, there are few consequences associated with the violation of the normality assumption, as it does not contribute to notable biases or flaws in regression models. It is only important for the calculation of p-values for significance testing, but this is only a consideration when the sample size is very small. When the size of the analysis is sufficiently large, which is true for this study with more than 100,000 cases, the normality assumption is not concerning as the Central Limit Theorem ensures that the distribution will be approximately normal (Chihara & Hesterberg, 2019).

Conclusion.

The models established in this paper are able to find a statistically significant relationship between the identities of targets and the direct casualties of terrorist attacks. The result largely

confirms the previous hypothesis and indicates that certain groups of a population who can receive more care and protection, especially the government related individuals, are likely to have fewer casualties than common citizens and private businesses. The military group, including any type of organizations with some level of military strength, would suffer an unexpectedly higher death toll compared with the government and public groups due to the more violent and threatening attacks they potentially face. In terms of both fatalities and injuries, the private businesses and individuals are the most vulnerable group.

A number of control variables are also found to have some influences on the casualties. In general, a series of correlated attacks with suicidal tendency and longer duration happened in economically underdeveloped countries with higher percentage military spending of GDP should cause more severe casualties according to the models. Adjusting for the effects of these control variables helps to form models that are more appropriate for the analysis.

However, it must be acknowledged that much of the variations within casualties still cannot be explained by the present models. The models in this study can be further improved by considering the possible interactive terms between variables, for example relating the suicidal tendency with types of the attack, and incorporating more influential control variables. There are other seemingly crucial factors like the number of attackers, transnational or domestic nature of the attack and the regime type of the targeted country not taken into account when forming the final models due to the concerns about more missing values they may bring into the analysis. Therefore, I recommend that in order to get a truthful picture of how terrorist attacks' casualties are determined, more efforts should be made during the data gathering process in the future to compile a more accurate and comprehensive dataset in the field of terrorism research.

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