

## DOES NATURAL DISASTERS VULNERABILITY INDUCES THE RISK OF RADICAL ATTACK?

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**Abstract:** *Natural catastrophes bring a unique set of issues that require prompt attention. Existing humanitarian crises can be made worse by ongoing conflicts, which further undermines efforts to attain peace and stability. The combination of ongoing conflicts and natural disasters can have devastating effects on communities that are already vulnerable. The objective of this study is to investigate the impact that natural disasters have, both in develop countries and in developing countries, on acts of violent extremism. We found a strong positive effect on total deaths and the total occurrence of natural disasters on radical attacks by utilising the Logit and Probit models as well as detailed data on terrorism, natural disasters, and other control variables for 126 countries between the years 1970 and 2016. Our research covered the period from 1970 to 2016. On the other hand, the overall damage caused by natural disasters has been shown to have a negative and significant relationship with radical attack. When considering other variables, the findings are demonstrably significant. In light of the findings indicating a quick change in the frequency of natural disasters may increase the occurrence of radical attacks, greater attention and prevention should be given in order to decrease the risk of attacks.*

**Keywords:** *Natural Disasters, Radical Attack, Growth Per Capita, Human Capital, Trade Openness.*

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## Introduction

Natural disasters are an unexpected event that occurs around the world; and it can affect people's lives and the environment where they live. Many scholars agreed that natural disasters may cause major effects on the environment. Moreover, it may cause long term effect that develops slowly for instance, political, social, and psychological effects as observed by Nel (2008). Earthquake is one of the examples of natural disasters that has affected country's politic and these countries are Lisbon (1955), Peru (1970), Nicaragua (1972), and Guatemala (1976). Other types of natural disasters such as cyclone and hurricanes in Dominant Republic (1930), Haiti (1954), and East Pakistan (1970); volcanoes eruption on the island of Martinique in 1902; the Indian Ocean Tsunami in 2004 occurred in the Indonesia and Sri Lanka. Consequently, these natural disasters have caused hesitant colonial expansion, conflict between difference opponent, and ongoing conflict on rebellion to take over the scarcity of resources. The civilians who survived began to struggle of rebuilding and the local government face challenges. It is possible that after the vulnerability of disasters the terrorist group might explode. (Lee Billon and Waizenegger 2007). Previous theory suggested that there are several mechanisms that may trigger the radical attack for example, pre-existing societal divisions such as lack of government control in disasters affected area exposed to the terrorist threat (Berebbri and Lakdawalla,2007). As occurred of devastated flood in Pakistan in 2010, the local government face with the Taliban and other militant groups who have the ability to exploit the weaknesses state. (Hasan 2010). Thus, the purpose of this study is to determine empirically whether natural disaster elements have an effect on terrorism attack. In our analysis, the observation included 126 countries (total involved developed and developing countries) that facing radical attacks from the periods 1970 to 2016.

## Literature Review

**Potential Mechanisms** Several mechanisms may explain the relationship between natural disasters and terrorism. A recent study by Aksoy and Carter (2021) found a positive correlation between the occurrence of natural disasters and terrorist attacks. They found out natural disasters can create economic hardship, which can lead to frustration and resentment among the affected population. This frustration can create a favorable environment for extremist groups to gain support and recruit new members. Several researchers have noted the effect of natural disasters towards radical attack as Berrebi and Ostwald (2011) found that severe disasters such as tropical storms, floods, and landslides are typically causing massive material destruction, which means that such events are likely to foster instant human suffering and spontaneous large scale migration. The worsened environmental conditions may force people to migrate in large masses, thereby increasing environmental stress in the receiving area, and increasing the potential for radicalization and ethnic hatreds (Reuveny, 2007). In addition, the scarcity of resources induced loss of livelihood in agricultural societies give an increase on the pool of potential rebel recruits, which resulting in a higher risk of conflict. As more disasters such as frequent droughts, increased soil degradation, and higher temperatures may decrease the expected returns to farming as compared to joining criminal and insurgent groups. As Mehlum *et al.* (2006). Buhaug, Gleditsch and et al (2008) agreed the issue of climate change related to the natural disasters and the implications on this will increase the scarcity of resources. Unexpected climate change can cause sudden flash flood, tropical storms, landslides, wild fires, and drought that can make a threat to human security. Nel (2008) and Bhavnani (2006) showed that the natural disasters significantly increase the conflict of radical attack in short term and medium term in that country that is in low and medium incomes. The countries that face with inequality and instability of politic and sluggish economic are also part of it. If the host country has a weakness in political structures and unable delivering their own resident and incoming

refuges, the effect in short term or immediate effect people might engaged with violent to complete the living space.

### Methodology

This study implemented logit and probit regression test. The purpose of this method is to determine the effect of natural disasters into terrorism. In this study, the terrorism model can be specified as follows:

$$RA = f(TD, TDM, TO, LND, GDP, HC, TOP)$$

Where:

RA	total attack from terrorism
TD	Total death from natural disaster
TDM	Total Damage from natural disaster
TO	Total Occurrence from natural disaster
LND	Size of land sq.km
GDP	Gross Domestic Product per capita (constant 2010)
HC	Human capital (education of tertiary school enrolment)
TOP	Trade Openness (Export plus import divided by GDP)

For empirical analysis, radical attack model is specified in a stochastic form. Since the dependent variable is binary, the logistic regression equations as follows:

$$\text{Logit}_{it} = L\left(\frac{P_{it}}{1-P_{it}}\right) = \beta_1 + \beta_2 LTD_{it} + \beta_3 LTDM_{it} + \beta_4 LTO_{it} + \beta_5 LLND_{it} + \beta_6 LGDP_{it} + \beta_7 LHC_{it} + \beta_8 LTOP_{it} + \varepsilon_{it}$$

Where  $\text{Logit}_{it}$  represent logit,  $P_{it}$  is the probability of radical attack occurring, (1-) is the probability of no radical attack occurring, and L denotes variables in logarithm.  $i=1, \dots, N$  refers to countries,  $t=1 \dots T$  refer to the period of time, and  $\varepsilon_{it}$  is the error term. The logit model and probit model are applied to investigate the effect of natural disasters on radical attack. A previous studies have used this method to estimates the conflict. (Fearon and Latin, 2003 and Nel and Righarts, 2008).

In conducting the analysis, an annual panel dataset of 126 countries for the period covering from 1970 to 2016 are employed. To assess the relationship between natural disasters and radical attack, we utilized data on radical attack from Global Terrorism Database (GTD) and data on global natural disasters from the International Disasters Database (EM-DAT). The caused have been investigated (Guihui et al, 2014 and Berrebi and Ostwald, 2011). Meanwhile, other factors in the proposed model namely size of land sq.km are from the Global Economy, has been used by previous studies (Findley, 2015 and Ogundiya, 2011). GDP is represented by GDP per capita (constant 2010) as employed by some scholars (Toya and Skidmore, 2007 and Brock et al, 2004), human capital is measured by the education of tertiary school enrolment as used in previous studies (Maleckova and Stanistic, 2014), and country openness are from World

Development Indicator (WDI) database published by the World Bank as used by previous studies (Breckenridge and Moghaddam ,2012)

### Empirical Results

The results of the logit model and probit model are presented in Table 1. The results indicate that total death from natural disaster total damage from natural disaster, and total occurrence from natural disaster are significantly correlated with radical attack. For land, GDP per capita, human capital and trade openness, we found that they are statistically significant relationship with radical attack.

**Table 1: Results for Logit model and Probit model from 1970 until 2016.**

Variables	Model 1 (Logit)	Standard Error	Model 2 (Probit)	Standard Error
LTD	0.121** (0.017)	0.507	0.729** (0.012)	0.029
LTDM	-0.581* (0.098)	0.035	-0.034* (0.095)	0.020
LTO	0.246** (0.037)	0.118	0.155** (0.023)	0.068
LLND	0.187*** (0.001)	0.572	0.103***	0.032
LGDP	0.189** (0.032)	0.088	0.109** (0.039)	0.052
LHC	0.239* (0.032)	0.170	0.142* (0.053)	0.073
LTOP	-0.492*** (0.004)	0.170	-0.0280*** (0.005)	0.802
Constant	-2.078	1.357		
Number of obs	915		915	
Countries	126		126	
Pseudo R2	0.104			0.103

Notes:LTD is log of total death from natural disaster. LTDM is log of total damage from natural disasters. LTO is log of total occurrence from natural disaster. LLND is by size of land sq.km. LGDP is log of gross domestic product per capita (constant 2010). LHC is log of human capital and LCO is log of country openness. Figures in the parentheses () are p-values. Asteriks \*\*\*,\*\*,\* denote statistically significant at 1%,5% and 10%.

The result in Table 1 shows that the radical attack increased by 0.121% using logit model and 0.739% using probit model when there is 1% increase in total death from natural disasters. Meanwhile, total damage of natural disaster decreasing in total attack with 1% increase in total damage of natural disaster, total attack reduced to -0.581% by using logit model and -0.034% by using probit model. For total occurrence of natural disaster, an increasing percentage in natural disaster would increase the attack of terrorism around 0.246% by using logit model and 0.155% by using probit model. The result suggested that the larger the number of survivors and the greater the level of severity of a disaster, the greater the grievance and conflict. The studies conducted by Berrebi and Ostwald (2011), Buhaug, Gleditsch and et all (2008), Nel (2008), and Bhavnani (2006) provided similar results. The total death and the total occurrence of natural disaster would make people migrate to other countries, safer place, or remain at the same place, the rebellion would arise due to resource scarcity as well as the state government unfairly resources distribution. Inequality resources allocation would cause an increase in unemployment hence causing rebellion and anti-government movement. The relationship

between land area and terrorism attack is at 0.187% by using logit model and 0.103 probit model%, which mean the greater the land area per square feet, the more exposure one country has from terrorism attack. Findley (2015) considered that transnational terrorist attack should be based on the land area that is latitude and longitude of land area.

The coordinate of land is corresponded to population of that place along the rivers and road, the distance of international border of terrorist attack, forest coverage, and urban and rural areas. The results found that most location of attack happened in the location with recent of civil violent and focused on capital city. The area of mountain terrain, location with higher population, and low level of international border are mostly significantly correlated with terrorism. Another researcher such as Ogundiya (2011) explored the crisis in Niger Delta. The conflict not only happened in Niger Delta, but has spread to security and political effects on neighbouring countries such as Cameroon and Equatorial Guinea. Groups that are suspected to have links with Niger Delta militants have carried out a number of attacks in the two neighbouring countries. Recently, there had been an attack against their government because of corruption and mismanagement of oil mineral and scarce resources. This study included the transnational terrorism hot spots at the country level to assess empirically the impact of these hot spots to determine future patterns of terrorist incidents. The authors found that when a country is located within a terrorism hot spot neighborhood, it is very likely to experience a large increase in number of terrorist attacks in the next period.

For GDP per capita it is significantly related with terrorism attack, which an increase of 1% in GDP per capita, the terrorism attack would increase to 0.189% using logit model and 0.109 % using probit model. Bandyopadhyay et al. (2011) stated that countries with higher GDP growth are easily exposed to militants recruitment because of the purchasing power that militant groups have. Krieger et al. (2016) stated that countries with higher GDP per capita are easily exposed to radical attack because of the inequality distribution of income in those countries hence causing the society to rebel. The poor socioeconomic country may cause its citizens to involve in anti-government movement. High per capita income leads to terrorist activities because it reflects to greater state capacity as stated in Fearon and Latin (2003). State capacity is one of defining characteristics of political system. Insurgency and underground violent would cause striking as a state capacity arises.

Human capital significantly correlated with radical attack hence any percentage change in human capital would increase about 0.239% in radical attack by using logit model and 0.142% by using probit model. This is similar to findings by Maleckova and Stanic (2014) whom stated that the effect of gender and education are related to the occurrence of international radical attack. The demographic characteristics of the group of respondents are relevant to the occurrence of terrorism where women with tertiary education who justify suicide bombing and have an unfavorable opinion towards the countries are potential targets of international terrorism hence have a significant impact on the occurrence of terrorist acts. The results of their analysis also suggested that there is a significant link between highly educated women who support terrorism and have negative opinion on the targeted countries with international terrorism.

Trade openness is significantly negative relationship with radical attack hence 1% decreasing in trade openness would lead to radical attack at the percentage of -0.491% by using logit model and -.0280 by using probit model. Globalization and an openness of economic connect people from different parts of the world; and the connection gives many multiplier effects positively and negatively. Breckenridge and Moghaddam (2012) reported that there is connection between

radical attack and openness of the countries. Although many conservative governments join the European Union or the North American Free Trade Agreement in accepting the openness of free trade, majority saw greater risk of terrorism attacks domestically due to the strict application of Union or trade agreement policies in each member's countries. The strict policies trigger the radical group to go against the government. On the other hand, some of the policies help to control the terrorism attack.

### Conclusion

In this study, we sought to determine whether natural disasters have an effect on terrorist attacks. Using data on natural disasters and other pertinent economic variables, we determined that natural catastrophes are associated with the frequency of radical attacks. Focusing on the type of disaster, the total number of fatalities and total occurrence are indicative of the rose of attack. The occurrence of natural disasters will harm the environment's resources. Rising resource shortage might cause environmental stress. Frequent natural disasters would increase the scarcity of resources in a country, which could lead to unemployment and economic loss for both individuals and the government. In addition, rivalry over scarce resources will bring a group of ethnic extremists to the unstable political climate of that nation. In deteriorating conditions, there will be a significant migration that will strain their migration area and raise the likelihood of extremism and ethnic hatred. Finally, policymakers and academics should remain vigilant and aware of the kind of environmental changes occurring in their own countries. In addition, they should aid in preventing radical attacks. Future measures to avoid terrorism attacks must include an attempt to comprehend and enhance natural catastrophe resilience, since this could mitigate the devastation caused by both.

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