

Faktor Yang Mempengaruhi Kematian Akibat Bencana Alam: Satu Bukti Dari Negara-Negara Maju Dan Membangun

Factors Affecting Fatalities of Natural Disaster: An Evidence from Developed and Developing Countries

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ABSTRAK

Bencana alam telah menjadi penyebab yang buruk terhadap pertumbuhan negara dari sudut ekonomi. Bencana alam mempunyai kesan yang menyeluruh bukan sahaja kepada rakyat tetapi juga kepada ekonomi negara. Data yang diperolehi dari Centre for Research on the Epidemiology of Disasters (CRED) mendapati bahawa terdapat trend kenaikan bencana alam setiap tahun dalam tempoh 54 tahun yang lalu. Terdapat banyak jenis bencana alam tetapi dalam kajian ini akan memfokuskan kepada 4 jenis bencana alam. Antara bencana alam yang paling kerap berlaku didunia ialah gempa bumi, banjir, kemarau dan suhu yang melampau. Oleh itu, tujuan kajian ini adalah untuk menyiasat kesan sistem kewangan dan pembangunan ekonomi terhadap kemusnahan bencana alam dari tahun 1960 hingga 2014. Pembolehubah yang digunakan ialah keluaran dalam negara kasar per kapita (rgdpc), gunatena (emp), sistem kewangan (m2), modal insan (hc), buruh (labor), perbelanjaan kerajaan (govexp), kepadatan penduduk (popdensity), pelaburan (invest) dan keluasan kawasan tanah (land_area). Kajian ini telah menggunakan kaedah data panel bagi negara maju dan negara sedang membangun. Hasil kajian menunjukkan bahawa sistem kewangan mempunyai hubungan positif terhadap kemusnahan yang berlaku disebabkan oleh bencana alam.

Kata kunci: *Bencana Alam, Sistem Kewangan, Panel Data, Negara Membangun dan Negara sedang Membangun, Kewangan*

ABSTRACT

Natural disaster had become a tremendous reason for a country growth economically. Natural disaster has a huge impact not only on people but as well as the economics of the country. According to the data found from Centre for Research on the Epidemiology of Disasters (CRED) there is rising trend of natural disasters for the past 54 years. There is numerous natural disasters but in this study four natural disasters will be mainly focused. Among the most frequent natural disaster event is earthquake, flood, drought and extreme temperature. Thus, the purpose of the study is to investigate the impact of financial system and economic development on natural disaster damages from year 1960 to 2014. The variable used in this study is gross domestic product per capita, employment, money supply, human capital, labor, government expenditure, population density, gross fix formation and land area. In this study panel data method is

applied for developed and developing countries. The result of this study is the financial system has a positive relationship toward the damage occur because of the natural disasters.

Keywords: *Natural Disasters, Monetary Supply, Panel Data, Developed and Developing Countries, Finance*

1. Introduction

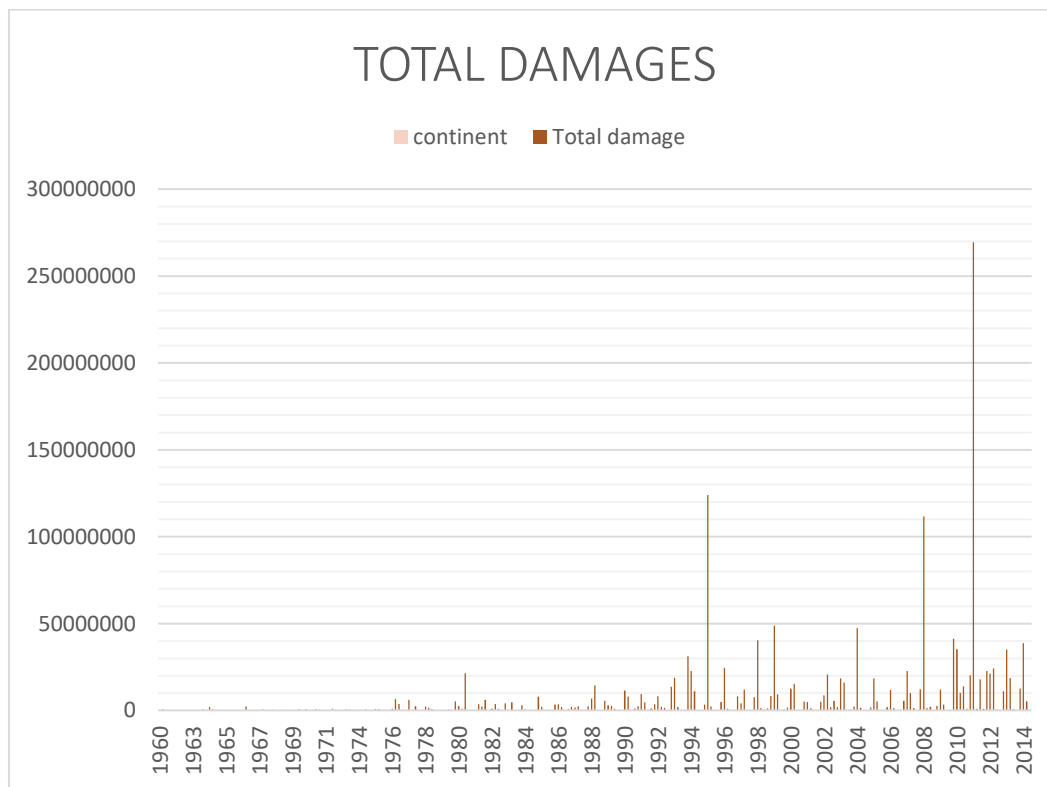
As the world going through tremendous transformation people start to get busy with their needs and take earth for granted. This irresponsible act had to face some consequences that endanger the living organisms in the earth that is known as natural disaster. Natural hazards where hazard means a dangerous condition, that threatening event that cause injury to life or damage to asset or the environment. The connection between natural disasters and natural hazards through the damage of the people's lives and livelihoods. The question that arise about natural disaster will be are we prepared to face the natural disaster? This make some difference about the developing and developed country. How well are they prepared and how they overcome the losses with minimum cost. As the natural disaster is a natural phenomenon that could not be predict accurately. A disaster is a sudden, a event resulting in great loss that seriously interrupt the function of a community or society. A disaster also cause human, material and economic or environmental losses that beyond the community's or society's ability to go through using the resources they own. Normally disasters are often caused by nature and disasters can have human origins.

Natural disasters and natural hazards is different but the similarities is establishing an indication of imminent danger. Human are exposed to natural hazards because of human activities. For instance, building homes near coastal zones. According to Burton and Kates (1964), define natural hazards as elements of the physical environment injurious to human and caused by forces extraneous to human. In other words, once a hazardous threat take place and harms humans, this event is called as natural disasters. Natural disaster can be classified into two that is natural hazards and man-made hazards. Natural disaster are hazards happens because of natural phenomena such as tsunami, earthquake and volcanic eruption which happens naturally. Natural disaster occur because of the human act toward the nature, climate change and some natural disaster happens naturally. Nature is a part of the earth. The earth had been a support to the living organism in the earth. Rapid growth of developed and developing country had caused the destruction of the nature just to achieve their materialistic happiness without thinking about the consequences that they and their future generation might go through.

Natural disaster is not just a part of human act. At the same time natural disaster could not be controlled for example, natural disaster such as flood happens because of deforestation but natural disaster such as hurricanes, volcanic eruptions are beyond human act as it occur naturally. Natural disaster can be categorized into geological disasters, hydrology disasters, meteorological disasters, wildfire, health disasters, and space disasters. There are millions of injuries, losses and death caused by natural disaster. Natural disaster is a huge problem especially to the poor people, the development of the country and the wealth of a country as the wealth of the country will be the source to repair the effect by the natural disaster. Financial economy have a strong relation with the natural disasters. Natural disaster normally causes many expenditure to the victim country after and before it take place for instance the country need to afford for the preparation

to face the natural disaster and ready to meet the cost to repair the damage caused by natural disaster. The government need to pay the cost of the damage for the public property and provide help for the victim. This is the importance of a country's financial economy stability as the cash flow out might interrupt the other plan of the country.

For instance the infrastructure that been damage may consume less time such as month but few years after the event happen. This is how financial economic related to the natural disaster. Financial disaster has its own importance and responsibility in the natural disaster event because financial economic aid in bringing back the country back to the normal state, record and mitigate the number of damages. The objective of this study will explain briefly about the motif and the main purpose of this research is held. The general objective of this study is to determine the impact of financial and government indicator to natural disaster fatalities. The specific objectives is to investigate the impact of the factor of natural disaster toward the financial economic of a developing and developed countries and also to identify the difference of a developed country and developing country in the method of overcome the natural disasters. This chart below show that there are increment in the damages in the selected natural disaster.



Source: EM-DAT: The OFDE/CRED International Disaster Database

2. Literature Review

According to Dean Yang (2008). This paper focus on hurricanes known as one of the most common and destructive type of disasters. Examine the impact of hurricanes damages on resources flow to affected countries. Due to the potential state of being endogenous of disaster

damage, Yang had exploit instrumental variables constructed from meteorological data on hurricanes. Instrumental variables estimates indicate that disaster damages lead to increase in national-level net inflow of migrant's remittances, foreign lending, and foreign direct investment. These types of flows respond rapidly, within the first year after damages.

Skidmore and Toya (2002) find positive long-run impacts from climate disasters. They couple historical disaster data for 89 countries with EM-DAT data. The authors regress average GDP growth (using ordinary least squares) on the total number of natural disaster events occurring in a country between 1960 and 1990. To explore the determinants of the positive relationship, they regress measures of physical and human capital accumulation on disaster variables, finding an increase in the latter after climatic disasters. They also find an increase in total factor productivity after climatic disasters.

Jeroen Klomp (2014), in his research that is financial fragility and natural disaster using data for more than 160 countries in the period 1997-2010. Klomp had explore the impact of large-scale natural disasters on the distance -to -default of commercial banks. The financial consequences of natural catastrophes may stress and threaten the existence of a bank by adversely affecting their solvency. The main finding suggest that natural disasters increase the likelihood of a banks default. The impact of a natural disaster depends on the size and scope of the catastrophe, the rigorousness of financial regulation and supervision, and the level of financial and economic development of a particular country.

Ozkazanc and Yuksel (2015), study about Evaluation of disaster awareness and sensitivity level of higher education students. Turkey is located in a region that frequently experience various disasters due to geological, morphological and climate characteristics. Earthquake, flooding and landslide are the premise fields along these disasters. Furthermore, devastating earthquake, floods that are seen as a result of climate global climate change has led to significant loss of both life and property in the region. On the other hand, human-induced disasters, as well as natural disasters, have become increasingly risky and harmful to society in Turkey.

According to Horwich (2000), a rise in income will provide not only general safety but, at high enough income levels, protection can be influenced to specifically to mitigate the impact of natural disasters fatalities and damages. Moreover, Kahn (2005), Stromberg (2007), has found that the rich countries report fewer death and lower economics and human losses, even if they do, they experience fewer impact from natural disasters. The excuse is that they can afford better housing, warning systems, medical care and better evacuation plans.

Raschky (2008), investigates the relationship between economic development and also vulnerability against natural disasters. The sample consists of 2792 events numbers of natural disasters victims are available and 1103 events with figures on economic losses. Empirical evidence show that countries with high quality of institution experience lower victims and less economic losses from natural disaster losses. Raschky further concludes that institutional framework is a key socioeconomic determinants of a countries vulnerability against natural disasters.

Phaup and Kirschner (2010) in their research had explain the potential to mitigate the fatalities of natural disaster. Through increasing the government expenses such as increase the national saving and adopting added supplement about the measurement to reduce risk of natural disaster. In this journal Phaup and Kirschner had state the importance of national government's role in natural disaster. There are four field of disaster management for the government

expenses: scientific technology research; disaster prevention and preparedness; national land conservation; and disaster recovery and rehabilitation.

Skidmore and Toya (2002) had proven that the outcome caused of population and land area is uncertain. In this study it shows that the disaster increase is related to the increasing rate of population. Raschky (2008) had also supported the relation of natural disaster fatalities toward population and land area. Population density in risky and dangerous areas is persistently increasing. As the number of population in a country soar up the land area will be finite because people will be to avoid capture from the over population in sequence for a fruitful living standard.

3. Data and Method of Estimation

To determine the relationship between the financial system and economic development toward damages occur from natural disaster impact, we follow Padli and Habibullah (2008). Based from the previous literature, the following equation is created,

$$\ln ND_{ij} = \beta_0 + \beta_1 \ln gdppc_{it} + \beta_2 \ln m2_{it} + \beta_3 \ln emp_{it} + \beta_4 \ln hc_{it} + \beta_5 \ln labor_{it} + \beta_6 \ln popdensity_{it} + \beta_7 \ln invest_{it} + \beta_8 \ln govexp_{it} + \beta_9 \ln land_area_{it} + \varepsilon_{it} \quad (1)$$

Model (1) is a log-log equation that use logarithm function for both dependent variable and independent variable. Where, $\ln ND$ is logarithm for the measurement of natural disaster fatalities caused by four type of natural disasters that is flood, drought, extreme temperature and earthquake. As for the regressors $\ln gdppc_{it}$ is the logarithm for real gross domestic product per capita, $\ln m2_{it}$ is money supply, $\ln emp_{it}$ is employment, $\ln hc_{it}$ is human capital, $\ln labor_{it}$ is labor, $\ln popdensity_{it}$ is population density, $\ln invest_{it}$ is gross fix formation, $\ln govexp_{it}$ is government expenses, and $\ln land_area_{it}$ is land area. Besides, j represent types of natural disasters, i denotes the selective developing and developed countries and t indicate year of the research tests. ε_{it} is the error term and β is the coefficient for the independent variables.

Pool technique is applied in this study because it benefit the study by providing the act of examining of variation among cross-sectional element that occur at the same time. This technique also useful for further complex analysis of the time series data analysis. Data is collected from certain data sources such as The World Bank and EM-DAT for this research to gain the accurate data for the natural disasters events that occurred. This sources provide the approximate number of statistical data that can be used for this research for the past years. For the money supply data are collected from International Financial Statistics. The rest of the variable data is gathered from the World Development Indicator Database.

4. Findings and Discussion

4.1 Finding 1

The estimated regression result for the connection between disaster fatalities that is damages and the financial system and economic development determinants of developing and developed countries are presented in Table 1 and 2. The observation obtained from Table 1 is the monetary

supply is positively significant to the natural disaster drought and flood respectively. This is because money supply in developing countries is too focused to the development of the country such as infrastructure and other projects that increase the income of the country. This caused the money supply for preparedness for natural disaster is less that causes the damages took place is higher. The result shows that gross domestic product per capita (gdppc) have positive relation to damages for natural disaster earthquake. This is because the increment in people's expenses causes them to do less saving for mitigate the damages they would go through from natural disaster. However, the education variable in this study is a proxy measurement for human capital (*hc*). Human capital have positive relation to damages for natural disaster flood and extreme temperature because the realization about natural disaster is higher but the occurrence of natural disaster is without any sign causes to mitigate the damages.

Other variables that had impact on natural disaster fatalities (damages) positively is population density for earthquake, flood and extreme temperature; investment for earthquake and government expenses for drought, earthquake, flood and extreme temperature. The higher the population density in developing country causes complex infrastructure that result in increase of pressure on environment that increase the damages which similar result to (Brauch, 2001,2002). As the investment is higher the damages will increase because the investment for developing project and infrastructure is higher. Government expenditure in a developing country is more focused to increase the income of the country that the saving and awareness for mitigating natural disaster fatalities is decrease causes the damages show a significant rise.

4.2 Finding 2

Table 2 shows the result for significance of money supply and economic development factor affecting natural disaster damages. The result shows that gdp per capita has negative relationship with natural disaster damages due to earthquake, flood and extreme temperature this suggest that the wealth of the developed nation could provide sufficient protection toward natural disaster damages as the finding supported by Kahn (2005). The money supply variable is positively significant because the even though the developed country is stable financially but the attention of the country is more to the war, profitable projects and other way to protect and develop the country tremendously as the its impossible to avoid damage caused by natural disaster. Human capital is the modal for education is negatively significant because as for developed the attainment of education is higher and through that it not only create awareness but there are many facilities to detect the natural disaster before the event occur. This finding supported by Nelson and Phelps (1966). Government expenses has negative proxy to the damages because the expenses of the government is more to the progress of gaining profit to the country that the saving for the emergency event such as natural disaster is less. Apart from that, other variables such as population density for earthquake and flood; land area for drought, flood and earthquake and labor for flood is positively significant to the natural disaster damages. The higher the population density the higher the expenses for the people in the country that the expenses and saving for damage expenses is neglected. The more the space for land area in developed country is conquer by buildings and factory and the damages of those infrastructure will be higher. The higher employment rate cause the income to increase and people use money for their pleasure and the owning of asset will be higher that causes higher damages during natural disaster event.

5. Conclusions and Recommendations

Natural disasters are event that occur frequently. The purpose of this study is to investigate the effect of natural disaster fatalities and finance or specifically money supply for developing and developed countries using panel data. Apart from that, there are some other economic variables included that might have effect on natural disaster fatalities. The variable include: gdppc, employment, human capital, government expenses, population density, gross fix formation and land area.

Our result show that the relationship between financial system and disaster damages is positively significant for developing and developed countries. Where the money supply is not efficiently used for mitigating the damages occur from natural disaster as the focus of the money supply is more to the develop the country for developing country while for the developed country the money supply is used for various kind of investment.

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TABLE 1: Factor Affecting Natural Disaster Fatalities (Damage) by Type of Disasters in Developing Countries

Variable	Drought	Earthquake	Extreme Temp	Flood
Lg_gdppc	0.010 (0.09)	0.193** (4.55)	0.001 (0.07)	0.084 (0.40)
Lg_emp	-0.455 (-1.92)	-	-	-2.053** (-4.50)
Lg_M2	0.348** (2.77)	0.115 (1.66)	0.011 (0.32)	0.759** (3.00)
Lg_hc	-	-	0.191** (2.60)	4.233** (6.47)
Lg_labor	-	-	-	-
Lg_govexp	-0.195 (-0.98)	-	0.060 (1.19)	-
Lg_popdensity	-	0.378** (11.67)	0.047** (2.76)	1.194** (8.86)
Lg_invest	-	0.230** (2.29)	-	-
Lg_land area	0.190** (5.02)	0.353** (16.23)	0.076** (6.60)	1.297** (14.48)
cons	-0.988 (-1.00)	-7.704** (-15.93)	-1.351** (-5.07)	-17.285** (-7.85)
No.of Observation	1289	3713	3289	1188
R ²	0.0296	0.0840	0.0192	0.2353
Adj R ²	0.0259	0.0828	0.0174	0.2314

Notes: Number in parenthesis (..) indicates *t*-statistic. (**), denotes statistically significant at 5% level

TABLE 2: Factor Affecting Natural Disaster Fatalities (Damage) by Type of Disasters in Developed Countries

Variable	Drought	Earthquake	Extreme Temp	Flood
Lg_gdppc	0.040 (0.42)	-0.675** (-3.09)	-0.008 (-0.10)	-0.158 (-0.89)
Lg_emp	-	-	-	-
Lg_M2	-0.041 (-0.28)	1.385** (4.69)	0.255** (2.32)	1.113** (4.16)
Lg_hc	-	-2.489** (-2.79)	-	-
Lg_labor	-	4.910** (3.41)	-	-
Lg_govexp	-0.298 (-1.58)	-	-0.197 (-1.32)	-1.063** (-3.10)
Lg_popdensity	0.082 (1.45)	0.676** (5.80)	-0.061** (-2.08)	0.450** (4.35)
Lg_invest	-1.108 (-0.60)	-	-0.051 (0.35)	0.415 (1.26)
Lg_land area	0.183** (5.85)	0.715** (8.16)	-	0.863** (12.52)
cons	-1.185 (-0.97)	-27.601** (-4.97)	0.219 (0.24)	-11.309** (-5.07)
No.of Observation	1128	654	1128	1128
R ²	0.0337	0.1638	0.0089	0.2031
Adj R ²	0.0286	0.1560	0.0044	0.1989

Notes: Number in parenthesis (..) indicates *t*-statistic. (**), denotes statistically significant at 5% level