

**TERRORISM EVENT STUDY: THE ANALYSIS OF ABNORMAL  
RETURN AND TRADING VOLUME ACTIVITY BEFORE,  
DURING AND AFTER TERRORISM ACT (A CASE STUDY ON  
INDONESIA TERRORISM ACTS IN 2005 – 2015)**

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**Abstract**

*The main objectives of the present research are to investigate the impact of terrorism act on stock and to compare the condition of the stock before, during and after the occurrence of terrorism act. The events used were terrorism acts that occur in Indonesia within an 11-year period. The method used is event-study method with the abnormal return and trading volume activity as the research variables. The result shows that terrorism acts give impacts during its occurrence. A significant different was found before and after the occurrence in the abnormal return as well as the trading volume activity. However, no significant difference was found during and after, or before and after terrorism act. The result of the present research can be used as a consideration reference by investors to make decisions upon occurrence of terrorism act.*

*Keywords: Event-study, abnormal return, trading volume activity, terrorism, Indonesia*

## INTRODUCTION

The capital market is a media for citizens to make investments and to use as a source of income in business. Investors will consider every information to decide whether they will invest on a company or not. The stock price is the reflection of all relevant information (efficient market hypothesis). The stock price of a company is affected by several things, including internal and external environmental conditions. One of the internal environmental conditions that affects the stock price is the company's performance. Meanwhile, one of the external environmental conditions that affect the stock price is terrorism act (Utama and Hapsari, 2012).

From economy and finance perspectives, terrorism has a number of negative impacts, such as critical infrastructural attack, the increase of financial instability and the decrease of investor confidence (Chesnay et al., 2011). Generally, investor can simply observe public information. Therefore, they can withdraw their money from a company if they think that the information will give negative impact to the company (Utama and Hapsari, 2012). In addition to the situation within a nation, the situation of different nations with terrorism act can also give global impacts (Chesnay et al, 2011).

Indonesia is one of the countries that has experienced bombing events several times as the actual form of terrorism act. The bombing events give impacts to The Indonesia Composite Index (IHSG). This has been proven by the article from Republika Online on September 13<sup>th</sup>, 2000, which stated that the bombing incident that directly attack the Indonesia Stock Exchange (BEI) building, decreased the IHSG to the level of 442.09. Bali bombing also affected the decrease of IHSG on October 12<sup>th</sup> 2002. The IHSG that was previously on the level of 376.466, had a 10.35% decrease to 337.475 in one day after the bombing event.

Researches related to the impact of terrorism act on stock market in Indonesia are commonly focused on one event only. In the present research, the analysis of the impact of bombing incidents in Indonesia within an eleven-year period, which is 2005 to 2015, was employed. The present research aimed at understanding how significant the changes caused by terrorism act is to IHSG in Indonesia, by using event study approach with the abnormal return and trading volume activity as the research variables.

## LITERATURE REVIEW

### Efficient Market Hypothesis

Market efficiency or efficient market is a condition where relevant and trustworthy information can be obtained easily so that it is reflected in stock price (Herlianto, 2013:71). Efficient market hypothesis is a security price in financial market that reflects all available information (Mishkinand Eakins, 2015:158).

According to Bodie et al. (2014:360), efficient market hypothesis means that the stock price has reflected all available information. There are three types of efficient market hypotheses (Bodie et al., 2014:364) namely the weak-form hypothesis, the semi strong-form hypothesis and the strong-form hypothesis.

### **Event Study**

Event study can be considered to be a semi-strong efficient market hypothesis test (Halim, 2015:102). Event study is a research technique used in empirical financial researches that allows researchers to be able to score the impact of an event to stock price (Bodie et al., 2014:369). Event study methodology has been generally used to measure the economic impact and the scope of other events.

The first common approach employed through this method is identifying the return when no event has occurred. Then, identifying the abnormal return related to the event as the deviation between the actual return and its benchmark (Bodie et al., 2014:370). Another indicator is the cumulative abnormal return to obtain the total movement of stock throughout the period when the market is responding to new information (Bodie et al., 2014:371).

### **Previous Studies**

Chesney et. al., (2011) have done a research that aimed at studying empirically the impact of terrorism to the stock market, debenture and commodity. The result of this research showed that terrorism attack gives significant impact to the stock market, debenture and commodity. Several markets reacted to terrorism attack during its occurrence, or after the day after the event occurred, and even both. Additionally, the research proved that there are similarities and differences between the impacts of terrorism to financial market and the impact of financial crashes as well as the natural disaster.

A research on the impact of terrorism attack have also been employed by Kollias, et al., (2011), which was aimed at identifying the market reactions towards terrorism by comparing two market capitalizations, namely London Stock Exchange (LSE) and Athens Stock Exchange (ASE). The research showed that abnormal return was not found significantly. Utama and Hapsari's (2012) research also showed that, in general, the market reaction did not show a statistically significant result in one or two days after the occurrence of terrorism act.

Hidayat (2012) investigated the impact of one of the terrorism act in Indonesia, which was JW Marriott/Ritz Carlton 2009 bombing. No significant different was found in the abnormal return, trading volume activity and security return variability variables before and after the day of the event.

Ramiah and Graham (2013) conducted a research to illustrate the impact of terrorist attack, both domestic and international, to capital market in Indonesia. The result of this research showed that two of the samples gave the most negative impact to the capital market in Indonesia, and one of those samples was a domestic attack of Bali Bombing.

## RESEARCH DESIGN

The present research employs an event - study method with 7 days of event period and 236 days of estimation period. The data used were the history of The Indonesia Composite Index (IHSG) price and the volume that occur around the date of each event. To obtain the abnormal return score, the expected return was calculated using mean-adjusted model, which was the mean of return in 236 days. The return can be identified using the following formula:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \quad (1)$$

Where,

$R_{it}$  is the stock return in  $t$  period,  $P_{it}$  is the stock price in  $t$  period and  $P_{it-1}$  is the stock price in the previous period.

After the return and expected return score are obtained, the abnormal return can be calculated using the following formula:

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

Where,

$AR_{it}$  is the stock abnormal return in  $t$  time,  $R_{it}$  is the stock return in  $t$  time and  $E(R_{it})$  is the expected return in  $t$  time.

Furthermore, to obtain the trading volume activity score, the following formula can be used:

$$TVA = \frac{\text{stock being sold}}{\text{number of stock spread}} \quad (3)$$

## RESULTS & DISCUSSION

This section presents the results of the present research and the discussion. The mean of abnormal return in every event can be seen in the following table:

## Terrorism Acts

Table 1.The Mean of Abnormal Return

Date	Terrorism Acts	<i>The Mean of Abnormal Return</i>		
		3 days before	During	3 days after
21/03/2005	Ambon Bombing	0,0020132	-0,0009876	-0,0172497
28/05/2005	Tentena Bombing	0,0036341	-0,0001763	0,0073761
08/06/2005	Pamulang Barat, Tangerang	-0,0014608	0,0005895	-0,0002447
01/10/2005	Bali Bombing	0,0124550	0,0029522	0,0031351
31/12/2005	Palu Bombing	0,0006732	0,0072420	0,0105362
22/03/2006	Poskamling, DesaToini, Poso Bombing	-0,0014216	0,0017172	0,0041731
01/07/2006	GKST Eklesia, Poso Bombing	0,0057387	0,0126151	0,0023403
03/08/2006	StadionKasintuwu, Poso Bombing	0,0062532	0,0062883	0,0049984
06/09/2006	Tangkura, PosoPesisir Selatan Bombing	0,0073496	0,0017293	-0,0069646
10/09/2006	Australia Embassy, Jakarta Bombing	0-,0018543	-0,0146546	0,0017780
17/07/2009	Ritz Carlton/JW Marriot Bombing	0,0160807	-0,0053819	0,0087086
15/04/2011	Cirebon Bombing	-0,0045032	0,0049395	0,0046016
19/08/2012	PospamGladak, Solo Bombing	0,0044887	0,0003170	-0,0017873
03/06/2013	Mapolres, Poso Bombing	-0,0082551	-0,0205028	-0,0083527
04/08/2013	ViharaEkayana Amara, Jakarta Barat Bombing	0,0018139	-0,0097832	0,0057981
08/04/2015	Tanah Abang Bombing	0,0013496	0,0020991	-0,0054880
09/07/2015	Mall AlamSutera I Bombing	-0,0074471	-0,0067862	0,0044067
28/10/2015	Mall AlamSutera II Bombing	0,0068816	-0,0135880	-0,0100255
16/11/2015	RadenIntan, Jakarta Bombing	0,0021440	-0,0063397	0,0062579

The above table shows that some events give negative impacts. One of the events, which is the bombing in the Regional Police Headquarter of Poso, give negative impact to the market because it has the lowest score of abnormal return during the event ( $t_0$ ) and three days after the event ( $t+3$ ). This means that many companies have their stock price decreased, therefore making the IHSG decreased as well. However, some events gave positive abnormal return during the event and after the event. This is presumably can happen due to the selective market behavior in determining the event to which they consider not giving significant impact or the news coverage that is not widely spread.

Some terrorism acts gave positive abnormal return before the event occurred. This represents that terrorism act is an unexpected event, so that generally it just affects the stock price during the event or after it and not give negative impact before the event occurred.

Table 2. The Mean of Trading Volume Activity

Date	Terrorism Acts	<i>The Mean of Abnormal Return</i>		
		3 days before	During	3 days after
21/03/2005	Ambon Bombing	0,0040625	0,0040224	0,0034450
28/05/2005	Tentena Bombing	0,0012599	0,0011522	0,0017154
08/06/2005	Pamulang Barat, Tangerang	0,0018839	0,0015933	0,0010101
01/10/2005	Bali Bombing	0,0012887	0,0012946	0,0018108
31/12/2005	Palu Bombing	0,0006840	0,0003914	0,0017139
22/03/2006	Poskamling, DesaToini, Poso Bombing	0,0043835	0,0024232	0,0013892
01/07/2006	GKST Eklesia, Poso Bombing	0,0012877	0,0013153	0,0013728
03/08/2006	StadionKasintuwu, Poso Bombing	0,0019104	0,0015528	0,0016885
06/09/2006	Tangkura, PosoPesisir Selatan Bombing	0,0016891	0,0015706	0,0017293
10/09/2006	Australia Embassy, Jakarta Bombing	0,0017985	0,0013630	0,0014099
17/07/2009	Ritz Carlton/JW Marriot Bombing	0,0059318	0,0055185	0,0063268
15/04/2011	Cirebon Bombing	0,0031167	0,0032023	0,0038855
19/08/2012	PospamGladak, Solo Bombing	0,0027225	0,0025709	0,0017893
03/06/2013	Mapolres, Poso Bombing	0,0061015	0,0057376	0,0047632
04/08/2013	ViharaEkayana Amara, Jakarta Barat Bombing	0,0028466	0,0026196	0,0031095
08/04/2015	Tanah Abang Bombing	0,0041946	0,0042263	0,0041484
09/07/2015	Mall AlamSutera I Bombing	0,0036325	0,0034126	0,0030943
28/10/2015	Mall AlamSutera II Bombing	0,0036233	0,0039830	0,0032509
16/11/2015	RadenIntan, Jakarta Bombing	0,0026667	0,0022127	0,0024794

Bombing event in Palu caused the stock transactions of companies decreased during the day the event occurred ( $t_0$ ). The bombing event in West Pamulang, Tangerang, also caused companies to have their number of stock transactions decreased one day after the event ( $t+1$ ) and three days after it ( $t+3$ ). In contrast, the bombing in the Regional Police Headquarter of Poso, Ritz Carlton / JW Marriot Hotel and Cirebon, perpetuate the highest number of stock transactions compared to the other events.

To see whether or not there is a significant difference before, during and after terrorism act, the followings are the results of paired sample t-test with SPSS 20 for the mean of abnormal return and trading volume activity.

## Abnormal Return IHSG

Table 3. Paired Sample T-Test of Abnormal Return Mean

			Paired Differences				T	df	Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
						Lower			
Pair 1	before - during	,004402	,008785	,002015	,000168	,008637	2.184	18	.042
Pair 2	during- after	-,002722	,009425	,002162	-,007264	,001821	-1.259	18	.224
Pair 3	before - after	,001681	,009012	,002068	-,002663	,006025	.813	18	.427

In the time before and during the occurrence of terrorism, the t-score measurement is 2.184 with the significance of 0.042 or less than 0.05. This means that, statistically, there is a significant difference in the abnormal return before and during terrorism act.

In the time during and after the occurrence of terrorism act, the t-score measurement is -1.259 with the significance of 0.224 or more than 0.05. This means that, statistically, there is no significant difference in the abnormal return during and after terrorism act.

In the time before and after the occurrence of terrorism act, the t-score measurement is 0.814 with the significance of 0.427 or more than 0.05. This means that, statistically, there is no significant difference in the abnormal return before and after terrorism act.

The above points prove that terrorism act causes the price of companies' stocks to decrease when terrorism act occurs, which makes the IHSG decreased as well. Therefore, the aforementioned events contain information that spreads quickly but forgotten quickly as well. This results in the market reaction to be a temporary panic response. After the occurrence of terrorism act, the market is back to its normal condition. This is supported by the statistical treatment of the data that discovered no significant difference between the time before and after terrorism acts.

## Trading Volume Activity IHSG

Table 4. Paired Sample T-Test of Trading Volume Activity Mean

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	before - during	,000259	,000463	,000106	,000036	,000482	2.440	18	.025
Pair 2	during- after	,000002	,000657	,000151	-,000315	,000318	.011	18	.992
Pair 3	before - after	,000261	,000898	,000206	-,000172	,000693	1.265	18	.222

In the time before and during the occurrence of terrorism, the t-score measurement is 2.440 with the significance of 0.025 or less than 0.05. This means that, statistically, there is a significant difference in the trading volume activity before and during terrorism act. In the time during and after the occurrence of terrorism act, the t-score measurement is 0.011 with the significance of 0.992 or more than 0.05. This means that, statistically, there is no significant difference in the trading volume activity during and after terrorism act. In the time before and after the occurrence of terrorism act, the t-score measurement is 1.265 with the significance of 0.222 or more than 0.05. This means that, statistically, there is no significant difference in the trading volume activity before and after terrorism act. In conclusion, there is a temporary panic among investors that cause the number of stock selling to increase during the occurrence of terrorism act. However, the events contain information that spreads quickly and disappears quickly as well. So, after the occurrence of terrorism act, the market reaction goes back to normal.

## CONCLUSION

The present research aimed at identifying significant differences in the stock market before, during and after the occurrence of terrorism act in Indonesia, using an event study approach. Terrorism act gives impact to the stock market in Indonesia. This has been proven by a statistical test on the mean of abnormal return and trading volume activity of IHSG. The test results on the two variables give the same decisions, which is the significant difference before and during the event, and no significant difference during and after the event as well as before and after the event.



The present research can be used as a consideration reference by investors to make decisions if terrorism act occurs. For long-term investors, they can preserve their stocks and wait for the market condition to go back to normal. Meanwhile, for speculative investors, they can buy stocks during the event with the decreased price. Therefore, when the price is stabilized after the event, it will give them capital gain.

### SCOPE FOR FURTHER STUDIES

For further studies, preferably using other indexes such as LQ45, KOMPAS100, or sectoral index to find out specifically companies or industries that experienced the most negative impact. And, give the significant differences during and after terrorism, as well as before and after terrorism. In addition, further studies can also use a large scale terrorist event that occur abroad to see if the capital market in Indonesia is susceptible to international terrorism.

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