STOCK RETURN REACTION TO COVID-19 PANDEMIC: AN EMPIRICAL STUDY

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THESIS

Presented as Partial Fulfilment of the Requirements To Obtain the Bachelor Degree in Management
In the School of Business
Nanjing Xiaozhuang University, 2020 Nanjing, Jiangsu

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DECLARATION OF AUTHENTICITY

Hereby I declare the originally of the thesis. I have not presented anyone else's work to obtain my university degree, nor have I presented anyone else's words, idea or expression without acknowledgement. All quotations are cited and listed in the bibliography of the thesis

If in the future this statement is proven to be false, I am willing to accept any sanction complying with the determined regulation or its consequence.

Yogyakarta, September 28th 2020.

Mohammad Alhaddid

ABSTRACT

The purpose of this research is to provide a study of how stock return response to COVID-19 pandemic. Using the semi-strong form of the Efficient Market Hypothesis, the abnormal return draws immediate reaction of stock market return after the announcement of COVID-19 pandemic by the World Health Organization on January 20, 2020. This research study company performances within the S&P500 Index taken 200 trading days before COVID-19 declared as a pandemic. This research select companies listed in the S&P500 Index because it represents the best-performing companies in the U.S and captured a foreseeable risk and return. The research sample consists of 5 industries; each represents by five companies meeting the sampling criteria by random sampling. Regression analysis uses to derive the value of the alpha and beta coefficient with daily stock return as the dependent variable and market daily return as the independent variable. Output value of the Abnormal Return (AR) for daily trading after the announcement then calculated using regression and use as the proxy to analyze stock returns after the COVID-19 pandemic. The result of AR then averaged into so-called Average Abnormal Return (AAR). This research uses descriptive analysis, regression analysis, and hypothesis test for data testing and analysis. This study showing a result of no evidence that the market is efficient reacting to COVID-19 pandemic under a semi-strong form of EMH. The result is backed by the significant value of Standardized Cumulative Abnormal Return (SCAR) on the observed trading days.

Keywords: Efficient Market Hypothesis, Semi-strong form, COVID-19 Pandemic, Market Model, Abnormal Return (AR), Average Abnornmal Return (AAR), Cumulative Average Abnormal Return).

ACKNOWLEDGEMENT

Assalamu'alaikum Warrahmatullahi Wabarakatuh

In the name of Allah, the most gracious, and the most merciful.

Alhamdulillahhirabbil'alamin. Thank Allah for allowing me to study, learn, make mistakes, good mental and physical condition, and all kinds of blessing that I have been experiencing. This research has been done under the protection and guidance of Allah. Thus I could finish this thesis entitled as "Stock Return Reaction To COVID-19 Pandemic: An Empirical Study" as a partial fulfilment of the requirements to obtain bachelor degree in Management from Faculty of Economics, Universitas Islam Indonesia and School of Business, Nanjing Xiaozhuang University. Greeting upon our beloved Prophet Muhammad SAW and to his family, friends, and followers.

This thesis has sentimental value because I have done this research under a unique circumstance, which under a lockdown. There are not too many physical interactions with friends, teachers, and family. But, along the way, I have many hands that put their efforts to help me finish this thesis. I want to express my appreciation to:

1. Associate Professor Zhou Hai Hua, as my thesis mentor who always helps and show me the right way to write my thesis, also to teach me how to do a proper research.
2. All professors, lecturers, staff, friends, and family of Universitas Islam Indonesia and Nanjing Xiaozhuang University who always keep helping, guiding, and providing resources in completing my study.
3. Mrs Sophie Mou, who always been there to support and guide all Indonesian students in Nanjing.
4. To my beloved parents, who never tired give me the best advice and providing all the best resources in completing my study. A special thanks to my Mom, who always listen and taking care of me, appreciate all of my decisions, and hate me when I was not feel grateful for everything I have.

5. The best regards for all of my friends. I could not manage this result if there are no friends that always stay alongside me, guiding, reminding, taking care, give suggestions, and loving me.
6. All people that I could not cite who has been a part of my journey in life and become one of the driving forces behind my learning curve.

May Allah gives the best of his blessing to all of us and accepts our good deeds. I hope this research could provide useful contribution for researchers, society, and others in the future and present.

Jakarta, May 2020.

Mohammad Alhaddid Syarifudin

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CHAPTER I

INTRODUCTION

1.1 RESEARCH BACKGROUND

The Sharpe (1964) and Lintner (1965) capital asset pricing model (CAPM) is the workhorse of finance for estimating the cost of capital for project selection. CAPM has been one of the fundamentals decision-making for portfolio selection. CAPM model has been restricted by the calculation of the beta coefficient that randomly moves. The non-diversifiable risk has a vital role in calculating the final result of expected return, therefore within two similar assets that have a different value of beta coefficient will have two valuations of CAPM. Given the same value of the risk-free asset and market-risk premium, the expected return of the Capital Asset Pricing Model determined only by the beta coefficient.

Companies are using for various tools to increase the value of their assets by creating a project from both internal and external. Adding a new project in a way to grow the total asset value means they need a unique indicator to tell whether to exercise the project or not by looking at the expected return. Companies could also reduce their number of projects, and at the same time, add new projects to maximize their utility. When a new project could exceed the current total projects value, companies could allocate their budget towards which the benefit could surpass the current number of expected returns. Professionals and financial institution can apply asset pricing model as the underlying decision-making process.

Capital Asset Pricing Model has been used in many calculations of assets, such as, Diversification, Project Management, Portfolio Investment, and all risk-return quantitative methods that are related. The intuition behind CAPM is a dollar spent on investment can be predicted the return using this model, and based on this model, and many users can evaluate their financial performance. In a robust demand, managers are

dealing with a complex decision-making process, all of the expected returns from various project are up to the manager's expectation; expect those all stocks return. CAPM has given a strong nudge for decision-makers to look carefully at the number of risks for both market and asset exposure.

In early 2020 the Coronavirus epidemic outbreak makes a significant turmoil around the world that starts from the sudden decrease of international trade both in volume and capacity. Capital markets in many countries are struggling to keep up with the unprecedented chaos and leads to a global panic that restricted the day-to-day activities. The constraint from the government makes small and medium enterprises are dealing with a considerable amount of profit loss; the vast majority of main businesses are being stopped. Daily business activities are restricted and making future profits decreasing for many companies; this event leads to poor financial performance and creating another turmoil. Stock market facing an unstable performance due to the company will fail to satisfy investor's expectation, and many people are liquidating their money to make a living.

Investors are usually facing many numbers of risks, and they are more concern of systemic risk that shows by Beta Coefficient. Bear in mind that the beta coefficient has a linear relation with the percentage of expected return and the pandemic makes the rate of return that investors are hoping to increase. More comprehensive analysis from the previous argumentation is related to risk and return management. Assuming that all investors are risk lover and following the non-satiation rule, they are expecting a new value of the return. The bottom line from the early cross-section regression tests of the CAPM, such as Fama and MacBeth (1973), and the early time-series regression tests, like Gibbons (1982) and Stambaugh (1982), is that standard market proxies seem to be on the minimum variance frontier. That is, the central predictions of the Black version of the CAPM, that market betas suffice to explain expected returns and that the risk premium for beta is positive, seem to hold.

Markets from around the world were experienced a long and strong Bull market trend since 2008. The outbreak has strongly shown the trend stop and nearly return to the

point where it began. The number change in market volatility has a positive correlation to the return of an asset, by which the number from one particular event sometimes has a strong causal effect of market volatility. The COVID-19 outbreak has reduced the performance of many industries and strongly suggest that those numbers are showing the change in market volatility, which arguably has increased the Beta Coefficient. The way of small and medium enterprises dealing with day-to-day activity is by changing almost into the opposite direction of how they usually did. This leads to how they become more or less volatile to the overall market and to determine which industry and company have the most dramatically changed. The market volatility has shows which project and stock could deliver the best value within a few years just by looking at how they are moving according to their market. A stock that has Beta Coefficient of 1 could move along with the market if the market increased the stock value will increase as well. If a stock has a beta coefficient of -1 showing that the stock is moving the other way of the market; if the market is moving down, the stock is moving up.

There are two argumentations mainly about the objective of an investor related to CAPM. In the CAPM, investors care only about the wealth their portfolio produces at the end of the current period. Merton (1973) argues that In the ICAPM, investors are concerned not only with their end-of-period payoff but also with the opportunities they will have to consume or invest the payoff. Thus, when choosing a portfolio at time t-1, ICAPM investors consider how their wealth at t might vary with future state variables, including labor income, the prices of consumption goods, and the nature of portfolio opportunities at t, and expectations about the labour income, consumption, and investment opportunities to be available after t. In the finance world, CAPM usually does not hold. The alpha on CAPM should be equals to zero if it were true, but in the real world, the CAPM often won't hold because alpha is excess or below zero.

In the finance world, every event has a causal effect on how company stock performs. There are three classic conditions related to events' impact, there are weak, semi-strong, and strong effect on stock performance. The stock market has been scrambling since a day after the World Health Organization announced that COVID-19 is a global concern and should be adequately anticipated, or in other words, it has been a

global pandemic. World Health Organization has announced the worldwide epidemic of January 20th, 2020.

Event study methodology has been performing for accumulating a particular stock performance under specific event, and it has strong incentives for investors, financial organization, or government to evaluate how efficient the market. The Efficient Market Hypothesis, Fama (1970) published in his article, besides the definition of efficient markets, also the distinction between the three forms of efficiency – weak, semi-strong and strong. The efficient market was defined as "a market with a great number of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where current important information is almost freely available to all participants". There are some debates and arguments related to EMH and how it has been performed in the real world. However, in semi-strong form of Efficient Market Hypothesis (EMH) is has been supporting the concern of firms announcing bonus issue experience, whether rise or fall in their stock market price on an average.

The best way to get the beta coefficient is by looking at the historical data provided within a market by using variance analysis. This research is aiming to empirical study related to how company stocks react to COVID-19 pandemic. However, how strong the causal effect of an event to the number change of the market volatility is another study related to the correlation value. The value of real and expected return, the event study methodology will be performed and analyze using empirical study format.

1.2 PROBLEM FORMULATION

The prior background has told the number of problems for this research. The following is a problem that needs to be solved:

1. Does stock returns are negatively or positively influenced by the COVID-19 pandemic?
2. Does the Abnormal Return of company stock significant a day and two day after the COVID-19 pandemic announcement?

3. Does the Abnormal Return of company stock significant a specified period after the COVID-19 pandemic announcement?
4. How big the value of Cumulative Abnormal Return since the day plus one and for a certain period?
5. Does efficient market hypothesis holds under semi-strong form in the COVID-19 pandemic periods?

1.3 RESEARCH OBJECTIVES

Under the problem formulations of the research, the objectives of this research are:

1. Analyze the company stock returns and sample industries react to COVID-19 pandemic.
2. Analyze the abnormal return a day and two days after the announcement of COVID-19 global pandemic.
3. Analyze the significant value of abnormal return after the announcement of COVID-19 pandemic.
4. Analyze the Cumulative Abnormal Return after the announcement of COVID-19 pandemic.
5. Analyze the significant value and the evidence of semi-strong form efficient market hypotesis.

1.4 RESEARCH CONTRIBUTIONS

This research aims to have three significant contributions. First, this research provides information about predictor values to determine the expected return of company stock. Second, this research study the influence of COVID-19 pandemic as an event and how significant the impact to stock return a day after the announcement. And third, this research determines the value of Cumulative Abnormal Return during a specific time after the publication of COVID-19 pandemic. Also, the following are vital users that would benefit from this research:

1. Investors for both private and government sectors. Through this research, decision-makers could evaluate their performance by looking at the expected return from CAPM that moves because market risk has risen.
2. Future Researchers. Given the same number of inputs in this research, future researchers could determine any similar events to look up the amount of risk consist. Besides, future researchers could examine the same method with addition sample to study the causal effect.

1.5 SYSTEMATIC OF WRITING

This research consists of five chapters. One and the other chapters have different explanations. The five chapters are as follow:

CHAPTER I: INTRODUCTION

This chapter explains the problem and motivation of the research. It also provides a summary of prior research on the same field of study. Furthermore, this chapter outlines the purpose and specific objectives of the research. The general description of the study as the outline of the foundation of thought consists of a background of the research, problem formulations, research objectives, research contributions, and systematic of writing.

CHAPTER II: LITERATURE REVIEW

This chapter points the review based on previous research studies concerning specific theories. It consists of a theoretical review, a correlation between variables, prior research, and conceptual framework.

CHAPTER III: RESEARCH METHOD

This chapter explains the method used in conducting the research. The method includes a type of research, research sampling, data selection, research variables, and data analysis method. This section also shows the hypothesis of this research.

CHAPTER IV: DATA ANALYSIS AND DISCUSSIONS

This chapter would focus on describing and explaining the research findings. It includes a general explanation of the empirical results of this research finding.

CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS

This chapter explains about conclusion, limitations, and recommendations for further research.

CHAPTER II:

LITERATURE REVIEW

2.1 THEORITICAL REVIEW

2.1.1 COVID-19 Pandemic

Adnan, Suliman, Abeer, Nadia, Rabeea (2020) explain that Coronaviruses belong to the Coronaviridae family in the Nidovirales order. Corona represents crown-like spikes on the outer surface of the virus; thus, it was named as a coronavirus. Coronaviruses are minute in size (65-125nm in diameter) and contain a single-stranded RNA as a nucleic material, size ranging from 26 to 32kbs in length. It has infected thousands of people around the world and killed not more than around 5% from the infected. The common source of origin and transfer to humans is not known. However, rapid human-to-human transfer has been confirmed widely. The cases have been rising since the first outbreak in Wuhan City, China. The causes of this virus are similar to Pneumonia symptoms such as high fever, cough, tiredness, some headache, and difficulty to breath, and even can lead to death.

According to several COVID-19 news sources, in late December 2019, a new disease outbreak was recorded in Wuhan. Later, on Dec. 31, the virus was first identified to the WHO. But it was not until Jan. 20, 2020, when the National Health and Fitness Commission of the People's Republic of China, proposed an interview that the new coronavirus could be transmitted among people, that the disease attracted full public attention.

2.1.3 Efficient Market Hypothesis

The efficient market hypothesis was first discussed in the 1960s when most of the research studies considered the capital markets to be efficient. Fama (1965) and

Samuelson (1965) were distributing their thoughts to the efficiency of the market and started in the next decades, more and more studies began to invalidate the hypothesis in all its three forms, weak, semi-strong and strong. Fama (1970) defined efficient market as a market with a great number of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where current important information is almost freely available to all participants. In addition, Fama describes three forms of market efficient, weak, semi-strong, and strong forms.

Fama (1970) defines the semi-strong form as investors are taking into consideration for a larger future income, meaning that stock prices increase after the announcement immediately or until the end of the month, and vice versa. The analysis was realized on a large sample of companies with data covering 24 months from the announcement date. Returning to Fama (1969 and 1970), the weak form of EMH was presented as the state of fact in which the current prices of financial assets incorporate, at any moment, all the existing historical financial information. As a result, the theory supports the idea that investors cannot obtain abnormal profits from investing in these financial assets. This EMH form implies that prices will exhibit a random walk.

As compared to the weak form of EMH, the semi-strong form assumes that financial assets' prices reflect, at any moment, all the information existent on the market, including historical prices and other historical information (which means this form also incorporates the weak form of EMH), and, additionally, the prices change rapidly and without biases to incorporate any other new public information released on the market. In case semi-strong form of EMH is present on a capital market, neither technical nor fundamental analysis can determine the way an investor should split his funds so that the obtained profitability is higher than that achieved in case of investment in a random portfolio of financial assets.

The strong form of EMH assumes that prices incorporate all the available information on a market, which includes: historical financial information (weak form), all new public information (semi-strong form) and all private information regarding a financial asset. During the following years and until nowadays, many different opinions

exist regarding the efficiency of the capital markets. There are so many different views that it is worth reviewing them and see if there is a predominant one that can prevail over the others.

2.1.4 Economic Impact on Virus Outbreak

Existing literature concentrates on illness-associated costs of medical or economic effects arising from morbidity as well as mortality due to disease. Siu and Wong (2016) studied the spread of Hong Kong's SARS epidemic, The SARS outbreak was an unexpected negative shock to Hong Kong's economy. The most signiacant negative effects were on the demand side. Local consumption and the export of services related to tourism and air travel were severely affected in the short run. The COVID-19 outbreak has made many governments restricted outdoor activities and declaired the stay at home policy. Consequently, people refrained from many consumption activities outside their homes. The drop in demand rippled through the whole economy: it affected other sectors, put further downward pres- sure on the price level, and worsened the unemployment problem.

By using the G-Cubed (Asia Pacific) model Lee and McKibbin (2004) evaluated the global economic impacts of the severe acute respiratory syndrome (SARS) and according to them the effect of the SARS. They describe the fast speed of contagion makes people avoid social interactions. The adverse demand shock becomes more substantial in regions that have much larger service-related activities and higher population densi- ties, such as Hong Kong or Beijing. The psychological shock, however, ripples around the world rather than affecting only the countries suffering from local trans- mission of SARS, because the world is closely linked by international travel.

2.1.5 Virus Outbreak Impacts on Stock Performance

DeLisle (2003) argues based on the cost of the 2003 outbreak, a serious SARS epidemic could cause losses as high as those of the Asian financial crisis, which have been estimated at $3 trillion in GDP and $2 trillion in equity on financial markets.3

Initially, SARS led forecasters to reduce projections for the PRC's growth rate by 0.5–1 percent for 2003, pushed Hong Kong's shakily recovering economy back to anticipated recession, and reversed Taiwan's recovery from its recent poor economic performance. According to Bai, Baker, Wurgler, and Yuan (2014) investors may feel pessimistic about investment prospects in a given market, selling off that market's stocks under communicable disease outbreak. They result also suggest that both global and local sentiment affect stock prices. When global and local sentiment are high, future local stock returns are low, and particularly so for stocks predicted to have high sentiment betas. The local sentiment effects extend the evidence from the United States on sentiment and the cross-section of stock returns. The effect of global sentiment suggests a more novel mechanism: sentiment may be contagious.

Chiang, Nam, and Li (2007) describe, as the crisis becomes public news, investor decisions tend to converge due to herding behavior, creating higher correlations. Given the increasing uncertainty in the markets, the cost of collecting credible information is relatively high during such a period, and investors are likely to follow major investors in making their own investing decisions. Any public news about one country may be interpreted as information regarding the entire region. There are consistently high correlations in 1998; this phenomenon is a result of herding behavior and identified as the second phase. As observed, the second phase started when South Korea was impacted and floated its currency, the won, on November 17, 1997. Thereafter, news in any country would affect other countries, representing the period of the most widespread panic.

2.1.6 Alpha Coefficient

From Regression Analysis of market model, an alpha coefficient is extracted alongside with beta coefficient and epsilon. Alpha coefficient can be used for determining the significant of Capital Asset Pricing Model were true under regression analysis (alpha = 0). The use of alpha for calculating abnormal return is playing a crucial role; therefore, the value of alpha will significantly help the Cumulative Abnormal Return. Chang (2016) explains an investment's abnormal return is what that pricing

factor cannot explain (alpha). Under the Capital Asset Pricing Model, the market is the single pricing factor, leading to CAPM alpha and beta estimates ubiquitous in academic and investment communities. The standard approach uses monthly returns with the implicit assumption that monthly alphas and betas are appropriate for everyone. Unlike bond investments, for example, term structure dynamics are rarely considered.

2.1.7 Beta Coefficient

Investors are aware of risk that they are facing during or prior to exercise an investment. The risk that investors are facing in a market or systemic risk is reflected by Beta Coefficient (β). Beta Coefficient is a percentage change of an asset's return given a 1% change in the market profit. This coefficient indicates how much of the variability of the dependent variable is explained by the independent variable. More this value tends to unity; greater is the dependence of the Beta from the benchmark portfolio. This coefficient has interpreted the covariance in a specific industry over number of variances within a stock.

The number of Beta Coefficient is correlates with the historical data of how the market moving in a certain period of time. The best model to validate this argument leads to the number of covariance of a stock over the market. The result of this equation tells how a particular stock moving corresponds to its market. Beta coefficient of 1 shows if the market value increase by one percentile, the stock follows to increase by one percentile. Beta coefficient of 2 shows if the market value increase by one percentile, the stocks follows to increase by two percentiles. There is special case for beta coefficient value is -1 shows that the market increases for 1 percentile, then the stocks move the other way.

In the Asset Pricing Theory, there is strong correlation in the cost of capital that function only for systemic risk. Coefficient beta is known in macroeconomics as link or determinants between a particular event and the premium in a specific activity. Using the equation above, we could examine the number of risks that correlates with investors are expecting. We believe that the COVID-19 outbreak has simultaneously increased the

expected return of project or stock. Given the risk-free asset and market return are constant, we could examine how big the impact of the outbreak to the expected return. This could also show how big the economics have been impacted due to COVID-19.

2.1.8 Event Study Methodology

Mackinlay (1997) believed that the idea of event study method was first embodied in research by Dolley (1933) before that Ball and Brown (1968) and Famaet al., (1969) first proposed the method systematically. According to the theory of the event study method, when an efficient market hypothesis is valid, the influence of a particular event will be reflected in the change of stock price, to explain the effect on the return of stocks and reaction to information disclosure. Therefore, the event study method is widely used in economics and finance empirical studies to identify the impact of specific events. Event study methodology is performed to determine a particular event to stock return using the predictor, which in this case CAPM plays the role to give alpha and beta value. Then, the result of prediction is real return on a certain return basis to analyze if there is any statisticaly significant using the model. Event study methodology then uses to investigate the abnormal returns (ARs) and cumulative abnormal returns (CARs) of the stocks against S&P500 index.

2.2 PRIOR RESEARCH

DeLisle (2003) studied the SARS crisis and made this study setup similar to the SARS pandemic. However, the most similar case with COVID-19 pandemic influenza, MERS, and SARS pandemics. These pandemics have the same implications with the COVID-19 outbreak, which impact the world in many sectors, such as policies, economics, social welfare, etc. Relating with Smith, Keogh-Brown, and Barnett research in 2011 that there is concern regarding the impact that a global infectious disease pandemic might have, especially the economic impact in the current financial climate. The main result of the research is to compute a one country Computable General Equilibrium that mainly explains about macroeconomics causal effect because of a global

pandemic. Smith, Keogh-Brown, and Barnett (2011) argue that the global pandemic has affected most financial sector and correspond with the Gross Domestic Product (GPD) of a country. In Australia, the financial sector has a role in supporting the total GDP by about 8%. During a pandemic, financial sector running through a jeopardize line due to people are scare and call-short their assets. If people are panic and shorting their assets, it leads to the price of certain portfolio assets drop and bring the aggregate of the market to the lower price. When the markets are touching low, many funds or assets are plumping. For example, when the financial crisis in the U.S 2008, many citizens lost their pension saving; workers at that time set the define-contribution pension fund, and the default is saving them to stock assets.

CHAPTER III

METHODOLOGY

3.1 DATA AND SAMPLE COLLECTION

This study is using an empirical research and we use the quantitative approach in order to finish the research. The data is examine using an appropriate statistical method and conduct a several formulas to test.

3.1.1 DATA COLLECTION METHOD

The data source used by this research is secondary data of the company stock return and the market return. Data collection technique in this study is obtained by using the documentation method by using Microsoft Excel software in the data processing.

3.1.2 POPULATION AND SAMPE COLLECTION METHOD

The population of this research consists of companies in the S&P500 index. The data is chosen from 5 most influenced industries because of COVID-19 pandemic within S&P500 index. Each industry represented by 5 companies; thus, the total sample uses for this research is 25 companies in the S&P500 Index. Company daily stock return is obtained as the sample from 1 April 2019 to 30 April 2020. The data sample also uses S&P500 daily return from 1 April 2019 to 30 April 2020. Data are obtained from Yahoo Finance Database in the historical data section. S&P500 is an index for top performance companies in the U.S. and it is one of the most commonly followed equity indices, and many consider it to be one of the best representations of the U.S. stock market.

Table 3 1 Selected Company Sample

Definition	Abbreviation
Neflix, Inc.	NFLX

Electonic Art, Inc.	EA
Facebook, Inc.	FB
Verizon Communications, Inc.	VZ
Live Nation Entertainment, Inc.	LYV
Cardinal Health, Inc.	CAH
The Cooper Companies, Inc.	COO
Dentsply Sirona, Inc.	XRAY
Edward Lifescience Corporation	EW
Gilead Science, Inc.	GILD
Exxon Mobile Corporation	XOM
Chevron Corporation	CVX
Kinder Morgan, Inc.	KMI
William Companies, Inc.	WMB
Pioneer Natural Resources Company	PXD
American Express Company	AXP
Bank of America Corporation	BAC
Discover Financial Services	DFS
Franklin Resources, Inc.	BEN
JP Morgan Chase & Co.	JPM
Apple, Inc.	AAPL
Amazon.com, Inc.	AMZN
AT&T, Inc.	T
HP Inc.	HPQ
Intel Corporation	INTC

There are criteria for a company to be included in S&P500. The criteria are:

1. The company must be existing and established in the United States
2. The minimum market capitalization must be at least $5.3 Billion or more
3. The public float must consist of at least 50% of outstanding shares

4. It must have positive reported earnings in the most recent quarter, as well as over the four most recent quarters.
5. The stock must have an active market and must trade for a reasonable share price.

However, to do a proper research, there are 500 companies within the index and will use 30 companies out of them to capture the significant of data. The sampling collection method was done by purposive sampling method by considering the specific characteristics with the following criteria:

1. Start from the first day of the outbreak and ended up to the closest quarter performance (3 months after the outbreak of Coronavirus). The coronavirus in the U.S has started from the mid January, thus the data captured for this research is fro January to March 2020.
2. Being listed in S&P500 index at least 10 years prior to the outbreak to make sure the beta coefficient before and after the event will shows a significant result.
3. The data are chosen randomly using the randomness method. We chose 5 industries and 30 companies to be tested empirically, respectively.
4. Having a good and reasonable financial condition and prospect.

3.2 METHODOLOGY

3.2.1 Event Study Methodology Set-up

This paper is trying to examine the unexpected and unprecedented Coronavirus Disease Outbreak from late 2019. In late December 2019, the coronavirus was first detected in Wuhan, Hubei Province China. In the 31 December, World Health Organization recognize this disease will be a pandemic and on 20 January 2020, when the National Health and Fitness Commission of the People's Republic of China high-level expert group leader Zhong Nanshan proposed in an interview that the new coronavirus could be transmitted among people, that the disease attracted wide public attention. Then, on 20 January 2020, the World Health Organization declared that there had been an emergency for Coronavirus Disease and changed its status into a global pandemic.

In this paper, there are two periods to study, one day after the pandemic has been declared from 22 January 2020 to 26 March 2020, and from 26 March to 30 April 2020. The trading days are in total 365 days, including days for prediction and days use for analysis. Then, t-test analysis uses the testing value of significance for each trading days.

3.2.2. Market Model Regression

The following regression model is performed to derived the expected return using the market model and the ordinary least square (OLS):

$$R_{i,t} = \alpha_i + \beta_i R_{mt} + \varepsilon_{i,t}$$

Ri,t is the return of index i and *Rmt* is the market return on day t (as the event day is day 0) within the estimated window, with *εi,t* as the statistic disturbance. The data input of the return index and market return index are return from 1 May 2019 to 17 February 2020. The stock return is obtained by subtracting stock price with the stock price a day before, then divided by the stock price a day before; the same way to calculate the market return The regression is done using statistic software with stock returns as the dependent variable and market returns as the dependent variable. The value derives from this regression are alpha and beta coefficient.

3.2.3 Alpha Coefficient (α) and Beta Coefficient (β)

Under CAPM analysis, if CAPM holds true, the value of alpha should be equal to zero. If the alpha value is not equal to zero, then CAPM rejected. This research wants to use the help of alpha coefficient to get the expected return. The value will derive after the market model regressed. Under CAPM analysis, if CAPM holds true, the string of positive idiosyncratic shocks over this period. The beta coefficient is regressed using the subtraction of stock and market return to risk-free asset. Beta coefficient under CAPM is showing the systemic risk of a portfolio over its market. Using the similar regression analysis as Market Model Regression, the value of alpha, beta, and epsilon will derive. If CAPM holds true, then the average $\varepsilon t > 0$ during this time period and if the stock is hold

long enough, an investor might expect a string of negative idiosyncratic shocks and in the long run the average of $\varepsilon t = 0$ and therefore the $\alpha = 0$.

3.2.4 Abnormal Return

After the inputs that are needed to calculate the expected return successfully extracted, the following equation use to get the value of Abnormal Return:

$$E(R_{i,t}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

$E(R_{i,t})$, $R_{i,t}$ and $AR_{i,t}$ are the expected return, real return and abnormal return of index *i* on day *t* within the trading days.

3.2.5 Cumulative Abnormal Return

Abnormal return and average abnormal return can be accumulated over time. The accumulation of Abnormal Return called Cumulative abnormal return (CAR) of index *I* over a while from t_0 to t_1 and cumulative average abnormal return (CAAR) are calculated based on:

$$CARi,(t0-t1) = \sum_{t=t0}^{t1} ARi,t$$

3.2.5 Average Abnormal Return and Cumulative Abnormal Return

In order to eliminate the effect of any one or group of securities on the abnormal returns, the ARs are averaged over the number of companies. The ARs of individual companies are averaged for each day surrounding the event-day (i.e., -15 to +15 days) using the following model:

$$AARt = \sum_{t=t0}^{t1} ARi,t/N$$

With a view to know the cumulative effect of AARs on days surrounding the event the Cumulative Average Abnormal Return (CAAR) are calculated for event days t1 through t2 by summing the average abnormal returns for these days, that is:

$$(CAARd) = \sum_{t=t1}^{t2} AARt$$

3.5 ANALYSIS METHOD

3.5.1 Descriptive Statistic

A descriptive statistic is a tool used to give a description or profile of sample data gathered on data collection in the study. It consists of a minimum, maximum, mean, and standard deviation. The data that will be analyzed are variables in this research.

3.5.2 T-Test Analysis

A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features. A t-test looks at the t-statistic and the degrees of freedom to determine the statistical significance. The T value is obtained by dividing the abnormal and cumulative abnormal returns with the standard errors from the market model regression.

3.5.3 Chart Analysis

Chart analysis will be presented to see the graphical intuition about what is happening to the results. After the mathematical representation, it is also important to understand the results using graphical representation. Chart analysis will help to understand the movement of Average Abnormal Return and Cumulative Abnormal Return.

3.5.4 Significant Test

To test the hypothesis, this research uses Z score and then converts to the p-value correspond with the one-tailed test. Standard deviation of abnormal returns for the estimation period -115 days to -16 days is computed first. Then the Standardized Abnormal Returns (SAR) for each company is obtained, by dividing abnormal returns of the event period (i.e., -15 to +15) by the standard deviation obtained. Same equation happens for the Standardized Cumulative Abnormal Return:

$$Zt = \sum_{i=1}^{N} SARit/\sqrt{N}$$

For testing cumulative excess returns for N securities over T days (event days t_1 through t_2) the Z-statistic is:

$$Zt = \sum_{i=t1i}^{t2i} \frac{SARit}{\sqrt{N * T}}$$

3.6 HYPOTHESIS

Based on the problem formulation, this research has main objective to find out if the market effective in the COVID-19 pandemic. Therefore, the hypothesis is:

H_0: Semi-strong form Efficient Market Hypothesis has significant value on stock return in the COVID-19 pandemic.

H_1: Semi-strong form Efficient Market Hypothesis has no significant value on stock return in the COVID-19 pandemic

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 GENERAL EXPLANATION OF RESEARCH OBJECT

Regression analysis is performed to extract the value of slope and intercept values with daily stock return as the dependent variable and market return as the independent variable. After running the regression analysis, the data capture is alpha coefficient, beta coefficient, and standard error. The predictor data use for this study is stock and market return from May 1st, 2019 to February 17th, 2020. The data uses for calculating the expected return and abnormal value are from January 21st, 2020 to April 30th, 2020. The following figure shows the sample for this study:

Table 4. 1 Sample Result

	Industry	Companies
A	Communication Service	5
B	Energy	5
C	Financial	5
D	Health Care	5
E	Information Technology	5
	Total	25

Source: Secondary Data Processed, 2020.

Selection of sample underlies on how significant the influence of COVID-19 on the stock return of a company. COVID-19 has showed a significance impact to the world economy with an unprecedented result, and many nations are facing a considerable amount of loss. Government can take an appropriate action by forecasting which industry has the most impact and starting to allocate the resource.

4.2 DESCRIPTIVE STATISTICS

Descriptive statistics are used to describe data that is seen from the mean, standard deviation, maximum, and minimum values (Ghozali, 2011). Before testing, the data will be presented in the form of descriptive statistics that are used to provide an overview of the research variable data. Table 4.2 and 4.3 are showing the value of the mean and standard deviation of each stock during two specific time periods. Most mean values are decreasing with DFS, LYV, JPM, XRAY, and GILD fell the most, respectively. On the other hand, most standard deviation values are increasing from the pre-event period to the post-event period.

Table 4. 2 Descriptive Result Pre-Event Period

	Pre-Event Period 04-01-2019 to 02-17-2020	
	Mean	Std. Dev
NFLX	-0,0002	0,0204
EA	0,0006	0,0164
FB	0,0015	0,0157
VZ	0,0003	0,0093
LYV	0,0009	0,0165
CAH	0,0008	0,0173
COO	0,0010	0,0123
XRAY	0,0010	0,0123
EW	0,0012	0,0154
GILD	0,0000	0,0128
XOM	-0,0006	0,0116
CVX	-0,0002	0,0116
KMI	0,0005	0,0099
WMB	-0,0007	0,0128
PXD	0,0002	0,0230

AXP	0,0009	0,0109
BAC	0,0015	0,0349
DFS	0,0009	0,0141
BEN	-0,0011	0,0156
JPM	0,0016	0,0118
AAPL	0,0027	0,0149
AMZN	0,0002	0,0124
T	0,0013	0,0107
HPQ	0,0007	0,0167
INTC	0,0007	0,0165

Source: Secondary Data Processed, 2020.

Table 4 3 Descriptive Result Post-Event Period

	Post-Event Period 02-20-2020 to 04-30-2020	
	Mean	Std. Dev.
NFLX	0,0037	0,0371
EA	0,0007	0,0336
FB	-0,0004	0,0398
VZ	-0,0002	0,0249
LYV	-0,0050	0,0678
CAH	-0,0003	0,0407
COO	-0,0023	0,0372
XRAY	-0,0041	0,0393
EW	-0,0004	0,0422
GILD	0,0049	0,0371
XOM	-0,0043	0,0450
CVX	-0,0012	0,0611
KMI	-0,0029	0,0571
WMB	-0,0004	0,0665

PXD	-0,0039	0,0762
AXP	-0,0032	0,0618
BAC	-0,0004	0,0136
DFS	-0,0058	0,0837
BEN	-0,0030	0,0477
JPM	-0,0036	0,0528
AAPL	-0,0001	0,0424
AMZN	0,0043	0,0305
T	-0,0025	0,0361
HPQ	-0,0035	0,0518
INTC	0,0013	0,0534

Source: Secondary Data Processed, 2020.

4.3 EMPIRICAL RESULT OF ABNORMAL RETURN

The abnormal return is acquired by running equation corresponds with the output of the market model regression. Table 4.4 showing the abnormal return during two period of time first is one day after the announcement and second is two days after the publication. Most abnormal returns are reacting negatively; Means the COVID-19 pandemic has influenced most of company stock price by negative results. NFLX, AMZN, and EW are the most increased return due to the COVID-19 pandemic announcement. Meanwhile, in the other direction, DFS, CAH, and KMI are the most fell return due to the COVID-19 pandemic announcement.

Table 4. 4 Abnormal Return Results

	AR One Day After The Announcement	AR Two Days After The Annuncement
NFLX	0,0001	-0,0350

EA	-0,0016	0,0059
FB	-0,0002	-0,0014
VZ	0,0043	0,0025
LYV	-0,0059	-0,0039
CAH	0,0040	0,0239
COO	0,0109	0,0034
XRAY	0,0079	0,0060
EW	0,0168	0,0028
GILD	-0,0025	0,0127
XOM	-0,0103	-0,0047
CVX	-0,0168	-0,0031
KMI	-0,0182	0,0012
WMB	-0,0320	-0,0150
PXD	-0,0048	-0,0180
AXP	-0,0046	0,0070
BAC	-0,0050	-0,0132
DFS	-0,0052	0,0196
BEN	-0,0029	0,0155
JPM	-0,0076	-0,0022
AAPL	-0,0044	0,0016
AMZN	0,0185	-0,0020
T	0,0045	0,0125
HPQ	0,0029	-0,0015
INTC	0,0197	0,0360

Source: Secondary Data Processed, 2020.

4.4 EMPIRICAL RESULT OF CUMULATIVE ABNORMAL RETURN

The abnormal return then accumulated using the equation mentioned early. The CAR shows in Table 4.5, and Table 4.6 are divided into two periods to be studied. T-test values are obtained by dividing the standard error from the predictor data with the value of observed. The t-test value then converted into p-value to see the significant value of the object observed. At the first observed period (Table 4.5), the health industry and energy industry are showing the most statistically significant results. COO has 3.83% (at 10% significant level) of cumulative abnormal return, and XRAY has negative 18.95% (at 10% significant level) of cumulative abnormal return. In the energy industry, CVX has negative 14.06 (at 10% significant level) of cumulative abnormal return. WMB has negative 17.39 (at 1% significant level) of cumulative abnormal return, and PXD has negative 13.00 (at 1% significant level) of cumulative abnormal return. Standing alone on the financial industry, JPM has negative 20.28 (at 5% significant level) of cumulative abnormal return. After analyzed the result of cumulative abnormal return over its statistical significance, most company returns are negatively influenced by the COVID-19 pandemic. There is no evidence that the market is showing statistically significant value 71 trading days after the COVID-19 pandemic.

The second observed period (Table 4.6) is also drawing no evidence of statistically significant value after 71 trading days following the COVID-19 pandemic. Communication service industry shows the most statistically significant value of the abnormal return. The data shows NFLX of 25,75% CAR (at 5% significant level), EA of 10.78% CAR (at 10% significant level), and FB of 4.05% CAR (at 1% significant level), respectively. The results show that most communication service industry, with respect the most significant value, has been positively influenced by the COVID-19 pandemic.

Table 4. 5 Cumulative Abnormal Return 35 Trading Days Results

	Cumulative Abnormal Return on 35 Trading Days After the Announcement		
	CAR(1,35)	T-Test	P-Value

NFLX	16,9236334	-0,7398486	0,7677650
EA	4,6529127	-1,8855070	0,9660350
FB	-4,1763103	-1,0153870	0,8414535
VZ	-0,0132533	-0,9676508	0,8299740
LYV	-16,9783625	1,1177926	0,1357459
CAH	3,8352215	-0,6242367	0,7316807
COO*	3,6748933	1,4460784	0,0786556
XRAY*	-18,9509311	1,4057232	0,0844397
EW	-2,2140578	0,8741382	0,1940879
GILD	27,8420365	-5,5183043	0,9999982
XOM	-26,9636458	-1,0608189	0,8518750
CVX*	-14,0619573	1,5121551	0,0698673
KMI	-18,6634774	-4,8640248	0,9999871
WMB***	-17,3957463	4,1022665	0,0001207
PXD***	-13,0083003	6,5255395	0,0000001
AXP	-10,6878068	-0,7042991	0,7569786
BAC	-3,1582633	0,9037896	0,1862332
DFS	-16,6159340	-1,3569410	0,9081295
BEN	4,0945225	-3,2372438	0,9986535
JPM**	-20,2882991	2,5419405	0,0078751
AAPL	5,3968437	-0,2155592	0,5846903
AMZN	24,5034965	-0,9164980	0,8170695
T	-0,3397329	0,2075137	0,4184233
HPQ	6,2979857	-0,3705889	0,6433787
INTC	8,2819264	-0,1404835	0,5554465
*Significant at the 10% level.			
**Significant at the 5% level.			
***Significant at the 1% level.			

Source: Secondary Data Processed, 2020.

Table 4.6 Cumulative Abnormal Return 71 Trading Days Results

	Cumulative Abnormal Return on 71 Trading Days After The Announcement		
	CAR(36-71)	T-Test	P-Value
NFLX**	25,7559063	1,8307745	0,0378296
EA*	10,7815968	1,5856187	0,0609104
FB***	4,0596522	5,2378443	0,0000039
VZ	2,5801439	-0,8713179	0,8052409
LYV	-19,0019584	-1,8069582	0,9603140
CAH	3,9133359	-1,7624189	0,9566348
COO	-11,3307578	-0,9827615	0,8337650
XRAY	-23,2731613	-3,0514343	0,9978367
EW	1,6211005	0,1513542	0,4402827
GILD**	43,5984197	1,7822506	0,0416929
XOM	-13,3671981	-1,1695857	0,8749644
CVX	4,1232816	-1,9535265	0,9706064
KMI	-17,3134511	-2,8945544	0,9967513
WMB	13,1740227	0,4179991	0,3392507
PXD	-4,1583715	0,4499677	0,3277542
AXP	-19,6862856	-5,7980686	0,9999993
BAC	-4,5047752	-0,4102398	0,6579347
DFS	-29,2772498	-5,2600228	0,9999963
BEN**	5,7798125	3,0518915	0,0021607
JPM	-25,7726027	-1,4246800	0,9184470
AAPL**	-0,0294108	3,2962054	0,0011264
AMZN***	54,4342445	6,3079654	0,0000002
T	-17,4142762	-2,6369413	0,9938039
HPQ	-8,9180643	-2,5491744	0,9923314
INTC	18,2558051	-1,2854692	0,8964654
*Significant at the 10% level.			

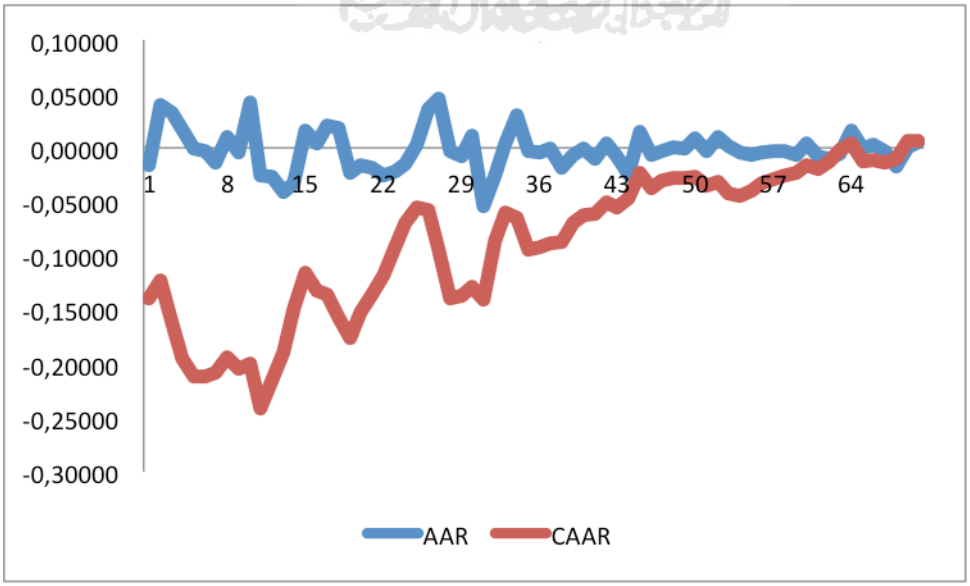
**Significant at the 5% level.
***Significant at the 1% level.

Source: Secondary Data Processed, 2020.

4.5 EMPIRICAL RESULT OF INDUSTRIES AAR AND CAAR

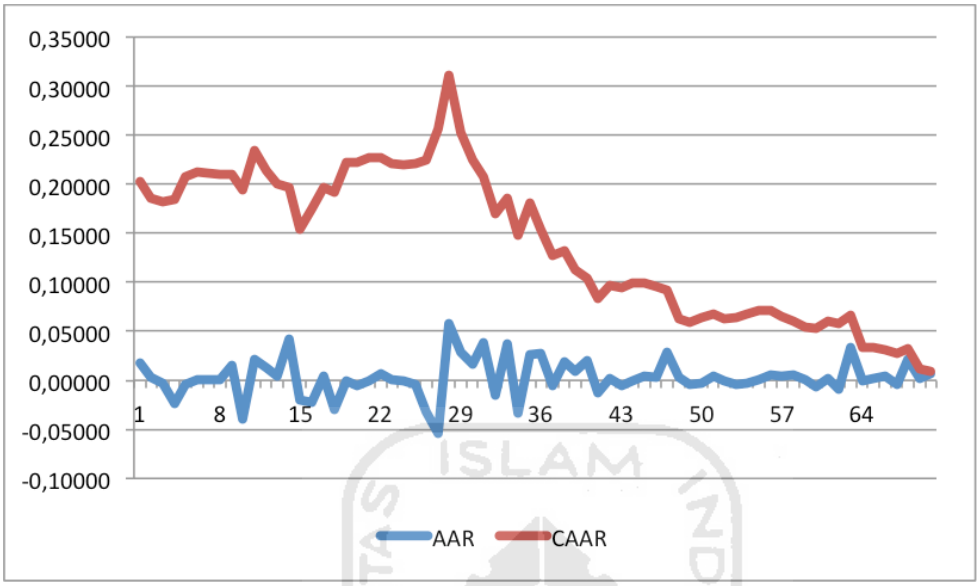
Figure 4.1 to Figure 4.5 are showing results of the average abnormal return, and the cumulative abnormal return of five industries reacting to COVID-19 pandemic. The abnormal return is standardized by dividing AR with total company in the industry for eliminate the effect of any one or group of the stocks on the abnormal returns. The financial industry has shown a gradual improvement of a return due to COVID-19 pandemic. Information technology, with best performing stocks are in this industry, shows a positive stock return in a month after the announcement then showing a gradual decrease. The communication industry stays normal after the announcement of COVID-19; this has shown evidence of how the market is efficient in this industry. The health industry is showing a gradual decrease in response to COVID-19 pandemic, while the energy industry has bounced from negative to positive results.

Figure 4. 1 AAR and CAAR of Financial Industry



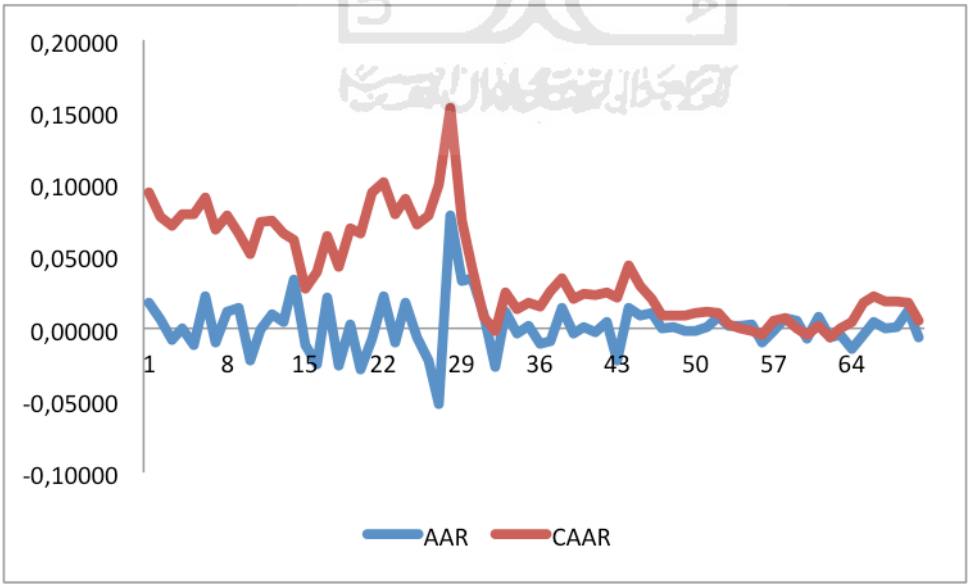
Source: Secondary Data Processed, 2020.

Figure 4.2 AAR and CAAR of Information Technology Industry



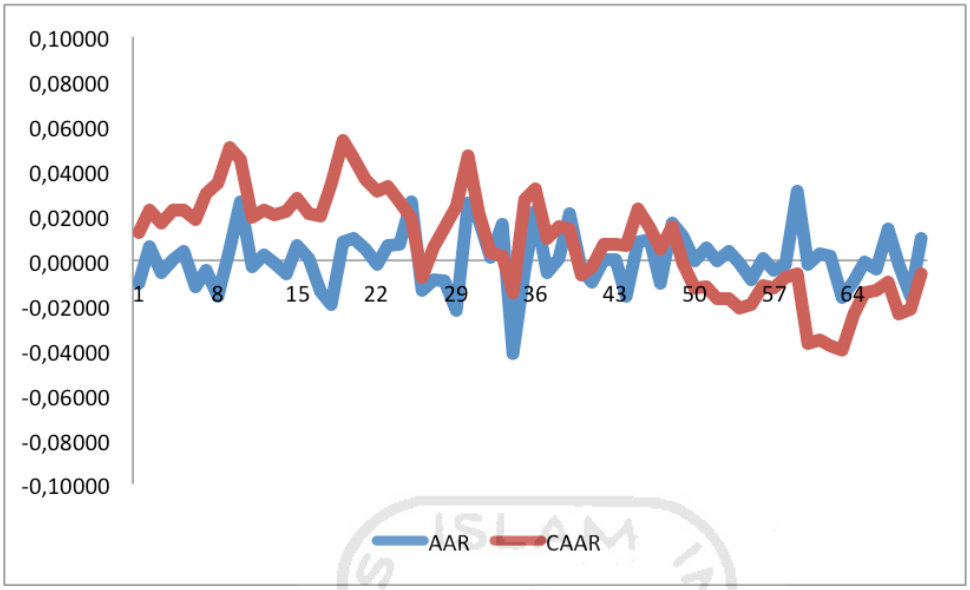
Source: Secondary Data Processed, 2020.

Figure 4.3 AAR and CAAR of Communication Service Industry



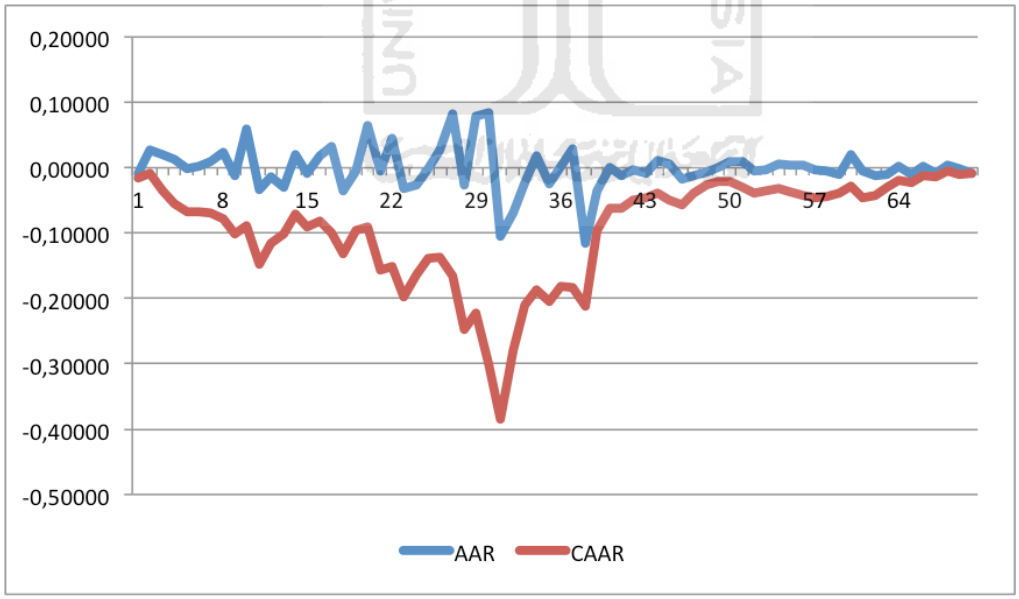
Source: Secondary Data Processed, 2020.

Figure 4.4 AAR and CAAR of Health Industry



Source: Secondary Data Processed, 2020.

Figure 4.5 AAR and CAAR of Energy Industry



Source: Secondary Data Processed, 2020.

4.6 HYPOTHESIS TESTING

To test the hypothesis, this research is using 15 days before and after the announcement day to study the immediate response of stock return. Then, the result is tested using the p-value to analyze the significant value.

4.6.1 STANDARDIZED ABNORMAL RETURN

The standardized abnormal returns at table 4.7 are showing, mostly, not showing statistically significant values. From t-15 to t-1, the SAR is showing a fluctuation of abnormal return for five industries this research observed. The abnormal return is showing a negative value after the announcement of COVID-19 pandemic by the World Health Organization. The result of this form is not consistent with the Semi-Strong Efficient Market Hypothesis; regardless, the standardized abnormal return shows a gradual downturn after the announcement of COVID-19 pandemic.

Table 4.7 Standardized Abnormal Return Results

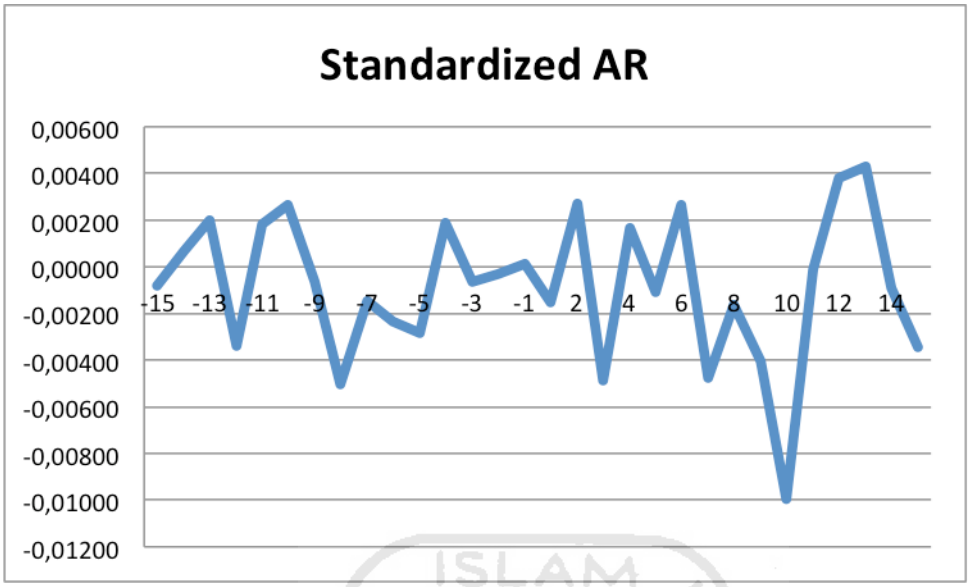
Days to Event	SAR	Z-score	P-Value
-15	-0,00080	-0,25617	0,39891
-14	0,00066	0,21142	0,58372
-13	0,00198	0,63532	0,73739
-12	-0,00339	-1,08717	0,13848
-11	0,00181	0,58225	0,71980
-10	0,00263	0,84308	0,80041
-9	-0,00063	-0,20297	0,41958
-8*	-0,00506	-1,62388	0,05220
-7	-0,00146	-0,46749	0,32007
-6	-0,00233	-0,74894	0,22695
-5	-0,00285	-0,91626	0,17977
-4	0,00186	0,59610	0,72445
-3	-0,00065	-0,20740	0,41785

-2	-0,00031	-0,09964	0,46031
-1	0,00014	0,04460	0,51779
1	-0,00150	-0,48221	0,31483
2	0,00271	0,87182	0,80835
3*	-0,00486	-1,55983	0,05940
4	0,00168	0,53846	0,70487
5	-0,00109	-0,34942	0,36339
6	0,00264	0,84665	0,80141
7*	-0,00479	-1,53694	0,06215
8	-0,00166	-0,53175	0,29745
9*	-0,00407	-1,30547	0,09587
10**	-0,00995	-3,19558	0,00070
11	-0,00009	-0,02892	0,48846
12	0,00382	1,22582	0,88987
13	0,00427	1,37190	0,91495
14	-0,00094	-0,30168	0,38145
15	-0,00343	-1,10300	0,13501
*Significant at 10% level.			
**Significant at 1% level.			

Source: Secondary Data Processed, 2020.

There is no evidence of significant fluctuation of standardized abnormal return after the announcement of COVID-19 pandemic shows by Figure 4.6 Most movement is stable prior to the announcement; this has given an analysis about how the market reacts to the COVID-19 pandemic in 15 days after the announcement. The market reacts a bullish in a week after the COVID-19 pandemic, and then it bounces to a positive average. The semi-strong form of Efficient Market Hypothesis has not proofed after the COVID-19 pandemic announcement, and before the announcement.

Figure 4.6 SAR Results



Source: Secondary Data Processed, 2020.

4.6.2 STANDARDIZED CUMULATIVE ABNORMAL RETURN

The cumulative abnormal return shows that most values are mostly statistically significant. But, by the rule of thumb, investors are responsive to the COVID-19 pandemic by drying out the market. Table. 4.8 shows there are statistically significant value of standardized average abnormal return.

Table 4.8 SCAR Results

Days	CAAR	Z-score	P-Value
-15**	-0,02565	-2,80319	0,00253
-14**	-0,02485	-2,71602	0,00330
-13**	-0,02551	-2,78796	0,00265
-12**	-0,02749	-3,00417	0,00133
-11**	-0,02410	-2,63420	0,00422
-10**	-0,02592	-2,83234	0,00231
-9***	-0,02854	-3,11925	0,00091
-8**	-0,02791	-3,05017	0,00114
-7**	-0,02285	-2,49756	0,00625
-6**	-0,02140	-2,33847	0,00968
-5*	-0,01907	-2,08360	0,01860

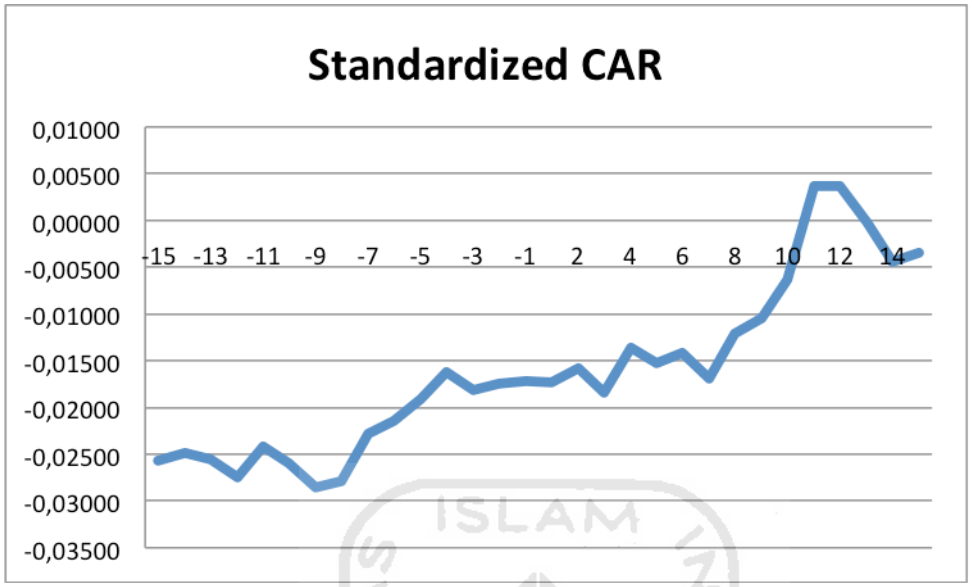
-4**	-0,01621	-1,77179	0,03821
-3**	-0,01807	-1,97465	0,02415
-2**	-0,01742	-1,90407	0,02845
-1**	-0,01711	-1,87016	0,03073
1**	-0,01725	-1,88534	0,02969
2**	-0,01575	-1,72124	0,04260
3**	-0,01847	-2,01793	0,02180
4**	-0,01361	-1,48711	0,06849
5**	-0,01528	-1,67035	0,04743
6**	-0,01420	-1,55144	0,06040
7**	-0,01683	-1,83956	0,03292
8*	-0,01205	-1,31653	0,09400
9	-0,01039	-1,13557	0,12807
10	-0,00633	-0,69132	0,24468
11	0,00363	0,39616	0,65401
12	0,00372	0,40600	0,65763
13	-0,00010	-0,01115	0,49555
14	-0,00437	-0,47802	0,31632
15	-0,00343	-0,37536	0,35370
*Significant at 10% level.			
**Significant at 5% level.			
***Significant at 1% level.			

Source: Secondary Data Processed, 2020.

The cumulative average abnormal return is showing a downtrend of results. This has an intuitive explanation that stock returns are decreasing since the announcement of COVID-19 pandemic. The observed value is only 15 days after the announcement to see the immediate response of the market. The result suggests that H_0 is accepted. In other words, there is some evidence of efficient market under semi-strong form. The result is not consistent with Fama (1970) that the market is efficient.

The cumulative abnormal return will touch the zero point in the semi-strong efficient market hypothesis. Fama (1970) pointed out that the semi-strong form as investors are taking into consideration for a larger future income, meaning that stock prices increase after the announcement immediately or until the end of the month, and vice versa.

Figure 4.7 SCAAR Results.



Source: Secondary Data Processed, 2020.

4.7 DISCUSSION

There are some discussions about the findings of this research:

1. The announcement of COVID-19 pandemic made stocks cumulative abnormal return decreasing since one day after the publication of COVID-19 pandemic, then most stocks are making a bouncing return. This research has found each stock and industry response differently towards COVID-19 pandemic, there is some number of stocks that received a positive impact, and some stocks received a negative impact.
2. Based on these finding, the null hypotheses of zero abnormal return is not accepted. To see the more effective result on how the stock impact by the COVID-19 pandemic, an OLS regression should be run with few inputs; thus, further research should be studied.
3. The semi-strong form of the Efficient Market Hypothesis is notfound in this study, thus H_o is rejected. The market is not showing a zero abnormal return after

15 and 71 trading days after the announcement of COVID-19 pandemic, and this indicates that the market is not efficient. There are some arguments related to this circumstance. The COVID-19 puts people into a lockdown situation, thus, people are starting to losing jobs caused by the employee could not pay the wages of their employees. People are noticed that the stock market after the COVID-19 pandemic is plunged quite down. Then, there is quite a significant number of people that wanted to take some advantage of this situation and started to buy stock to get extra income without paying too much attention about how volatile the market is. These results to the stock price, and market index, are experiencing a fast bounced back.

4. The COVID-19 pandemic has put communication service, in general, into an advantageous position where their stock cumulative abnormal return after 71 days of trading increased significantly. Besides, the sample from the health industry, showing a gradual decreased of cumulative abnormal return after 71 days of trading, only GILD shows a significant value after 71 trading days. This might be an indicator that they lose profit caused by allocating financial resources into medical research for fighting the coronavirus disease. Investors are expecting a significant bounce from health industry after the COVID-19 is more relax. Regardless of the average downturn of cumulative abnormal return in the information technology industry, Amazon holds quite a high positive performance after 71 trading days. Energy and Financial industry are not statistically significant after 71 trading days, but under the rule of thumb, both sectors are showing a negative cumulative abnormal return after 71 trading days.

CHAPTER 5

CONCLUCION AND RECCOMENDATION

5.1 CONCLUCION

This research conducted to study whether the semi-strong form on Efficient Market Hypothesis holds in the COVID-19 pandemic era. The market model uses to derive the value of alpha and beta coefficient as the inputs of Abnormal Return analysis using the mentioned equation. This research obtained the predictor using the market model from 200 trading days prior to the COVID-19 pandemic announcement. The input from market model regression then used for calculating expected return and real return after the event day. This research is using stock return in the United States against the S&P500 index daily return, and calculate the expected and real return for 71 days after the announcement of COVID-19.

The abnormal return after the event announcement has gradually pointed to negative values, and the cumulative abnormal return for most companies in this research sample are experiencing negative values. However, under COVID-19 pandemic, the significant value of the true efficient market hypothesis for semi-strong form could not be accepted because the abnormal and cumulative abnormal returns are not equal to zero. Thus, there as some pieces of evidence that the market is not efficient after the announcement event. The same result showed when the trading days is reduced to 15 days prior and after the announcement date. For trading days prior to the announcement date, there is no evidence that the market is showing the efficiency of the semi-strong form.

Communication Service industry, on average, has been influenced positively by the COVID-19 pandemic. The cumulative abnormal return after 71 trading days has been showing negative value for all Energy, Financial, Health, and Information Technology industries. Respective with this, Netflix, Amazon, and Gilead Science are companies with the highest positive value of the cumulative abnormal return. However, the rest sample observed in this research has been experiencing gradual negative return and acting differently.

5.2 RESEARCH LIMITATION

The study of efficient market hypothesis is very crucial for vast majority of economics studies. However, the research of how COVID-19 pandemic impacts the economy has not yet available. This research is benchmarking the COVID-19 pandemic with previous market condition for example, SARS, MERS, and Influenza. To capture how market response to COVID-19 pandemic, a further research is needed. The availability of researches about the COVID-19 pandemic brings a good or bad sentiment is also a big limitation.

5.3 RECCOMENDATION

Based on information obtained from this research, the following are the recommendation for the future researcher:

1. Future research is suggested to examine the expected return under before, during, and after the COVID-19 pandemic to study the volatility in the stock market for anticipating the coming crisis.
2. Future research is suggested to study the impact of COVID-19 pandemic on the broader stock market return.
3. Future research is suggested to study the impact of COVID-19 pandemic on economy condition.
4. Future research is suggested to study the sentiment of COVID-19 pandemic.
5. Future research is recommended to observe longer trading days.
6. Future research is suggested to run the OLS regression analysis to study the impact of confirmed cases with the stock market return.

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APPENDICES

Appendix 1:

List of Alpha Coefficient

	Alpha
NFLX	-0,0012
EA	-0,0002
FB	0,0005
VZ	0,0000
LYV	0,0002
CAH	0,0000
COO	0,0004
XRAY	0,0004
EW	0,0005
GILD	-0,0007
XOM	-0,0014
CVX	-0,0008
KMI	0,0000
WMB	-0,0014
PXD	-0,0009
AXP	0,0001
BAC	0,0016
DFS	-0,0002
BEN	-0,0022
JPM	0,0007
AAPL	0,0016
AMZN	-0,0007
T	0,0008
HPQ	-0,0002
INTC	-0,0003

Appendix 2:

List of Beta Coefficient (Systemic Risk)

	Beta
NFLX	1,3222
EA	1,0487
FB	1,2849
VZ	0,4220
LYV	0,9902
CAH	0,9511
COO	0,7870
XRAY	0,7414
EW	1,0025
GILD	0,9020
XOM	0,9710
CVX	0,7896
KMI	0,7338
WMB	0,8590
PXD	1,4814
AXP	1,1297
BAC	-0,1398
DFS	1,3551
BEN	1,4491
JPM	1,1349
AAPL	1,4701
AMZN	1,2000
T	0,6205
HPQ	1,1945
INTC	1,2908

Appendix 3:

Sample Standard Error and R-square

	Std. Error	R-Square
NFLX	0,0179	0,2351
EA	0,0145	0,2270
FB	0,0125	0,3718
VZ	0,0088	0,1147
LYV	0,0148	0,2010
CAH	0,0158	0,1686
COO	0,0109	0,2275
XRAY	0,0110	0,2043
EW	0,0135	0,2357
GILD	0,0109	0,2791
XOM	0,0090	0,3942
CVX	0,0101	0,2571
KMI	0,0082	0,3092
WMB	0,0111	0,2504
PXD	0,0202	0,2310
AXP	0,0070	0,5967
BAC	0,0349	0,0009
DFS	0,0098	0,5191
BEN	0,0113	0,4799
JPM	0,0082	0,5162
AAPL	0,0100	0,5463
AMZN	0,0086	0,5201
T	0,0097	0,1863
HPQ	0,0142	0,2853
INTC	0,0134	0,3420

Appendix 4:

Descriptive Statistic Pre-Announcement

Pre-Event Period 04-01-2019 to 02-17-2020		
	Mean	Std. Dev
NFLX	-0,0002	0,0204
EA	0,0006	0,0164
FB	0,0015	0,0157
VZ	0,0003	0,0093
LYV	0,0009	0,0165
CAH	0,0008	0,0173
COO	0,0010	0,0123
XRAY	0,0010	0,0123
EW	0,0012	0,0154
GILD	0,0000	0,0128
XOM	-0,0006	0,0116
CVX	-0,0002	0,0116
KMI	0,0005	0,0099
WMB	-0,0007	0,0128
PXD	0,0002	0,0230
AXP	0,0009	0,0109
BAC	0,0015	0,0349
DFS	0,0009	0,0141
BEN	-0,0011	0,0156
JPM	0,0016	0,0118
AAPL	0,0027	0,0149
AMZN	0,0002	0,0124
T	0,0013	0,0107
HPQ	0,0007	0,0167
INTC	0,0007	0,0165

Appendix 5:

Descriptive Statistic Post-Announcement

Post-Event Period 02-20-2020 to 04-30-2020		
	Mean 2	Std. Dev. 2
NFLX	0,0037	0,0371
EA	0,0007	0,0336
FB	-0,0004	0,0398
VZ	-0,0002	0,0249
LYV	-0,0050	0,0678
CAH	-0,0003	0,0407
COO	-0,0023	0,0372
XRAY	-0,0041	0,0393
EW	-0,0004	0,0422
GILD	0,0049	0,0371
XOM	-0,0043	0,0450
CVX	-0,0012	0,0611
KMI	-0,0029	0,0571
WMB	-0,0004	0,0665
PXD	-0,0039	0,0762
AXP	-0,0032	0,0618
BAC	-0,0004	0,0136
DFS	-0,0058	0,0837
BEN	-0,0030	0,0477
JPM	-0,0036	0,0528
AAPL	-0,0001	0,0424
AMZN	0,0043	0,0305
T	-0,0025	0,0361
HPQ	-0,0035	0,0518
INTC	0,0013	0,0534

Appendix 6:

Abnormal Return One Day After the Announcement

	AR t+1	T-Test	P-Value
NFLX	0,0001	0,0058	0,0001
EA	-0,0016	-0,1121	-0,0016
FB	-0,0002	-0,0195	-0,0003
VZ	0,0043	0,4861	0,0069
LYV	-0,0059	-0,3973	-0,0057
CAH	0,0040	0,2513	0,0036
COO	0,0109	0,9994	0,0143
XRAY	0,0079	0,7171	0,0102
EW	0,0168	1,2402	0,0177
GILD	-0,0025	-0,2275	-0,0032
XOM	-0,0103	-1,1479	-0,0164
CVX	-0,0168	-1,6681	-0,0238
KMI	-0,0182	-2,2118	-0,0316
WMB	-0,0320	-2,8737	-0,0411
PXD	-0,0048	-0,2387	-0,0034
AXP	-0,0046	-0,6615	-0,0095
BAC	-0,0050	-0,1444	-0,0021
DFS	-0,0052	-0,5353	-0,0076
BEN	-0,0029	-0,2558	-0,0037
JPM	-0,0076	-0,9176	-0,0131
AAPL	-0,0044	-0,4428	-0,0063
AMZN	0,0185	2,1455	0,0306
T	0,0045	0,4653	0,0066
HPQ	0,0029	0,2057	0,0029
INTC	0,0197	1,4682	0,0210

Appendix 7:

Abnormal Return Two Days After the Announcement

	AR t=2	CAR	T-Test
NFLX	0,0327	25,7559	1,8308
EA	0,0230	10,7816	1,5856
FB	0,0655	4,0597	5,2378
VZ	-0,0077	2,5801	-0,8713
LYV	-0,0267	-19,0020	-1,8070
CAH	-0,0279	3,9133	-1,7624
COO	-0,0107	-11,3308	-0,9828
XRAY	-0,0334	-23,2732	-3,0514
EW	0,0020	1,6211	0,1514
GILD	0,0193	43,5984	1,7823
XOM	-0,0105	-13,3672	-1,1696
CVX	-0,0196	4,1233	-1,9535
KMI	-0,0238	-17,3135	-2,8946
WMB	0,0047	13,1740	0,4180
PXD	0,0091	-4,1584	0,4500
AXP	-0,0403	-19,6863	-5,7981
BAC	-0,0143	-4,5048	-0,4102
DFS	-0,0514	-29,2772	-5,2600
BEN	0,0345	5,7798	3,0519
JPM	-0,0117	-25,7726	-1,4247
AAPL	0,0331	-0,0294	3,2962
AMZN	0,0545	54,4342	6,3080
T	-0,0256	-17,4143	-2,6369
HPQ	-0,0361	-8,9181	-2,5492
INTC	-0,0172	18,2558	-1,2855

Appendix 8:

Standardized Abnormal Return Around the Event Announcement

Days to Event	SAR	Z-score	P-Value
-15	-0,00080	-0,25617	0,39891
-14	0,00066	0,21142	0,58372
-13	0,00198	0,63532	0,73739
-12	-0,00339	-1,08717	0,13848
-11	0,00181	0,58225	0,71980
-10	0,00263	0,84308	0,80041
-9	-0,00063	-0,20297	0,41958
-8*	-0,00506	-1,62388	0,05220
-7	-0,00146	-0,46749	0,32007
-6	-0,00233	-0,74894	0,22695
-5	-0,00285	-0,91626	0,17977
-4	0,00186	0,59610	0,72445
-3	-0,00065	-0,20740	0,41785
-2	-0,00031	-0,09964	0,46031
-1	0,00014	0,04460	0,51779
1	-0,00150	-0,48221	0,31483
2	0,00271	0,87182	0,80835
3*	-0,00486	-1,55983	0,05940
4	0,00168	0,53846	0,70487
5	-0,00109	-0,34942	0,36339
6	0,00264	0,84665	0,80141
7*	-0,00479	-1,53694	0,06215
8	-0,00166	-0,53175	0,29745
9*	-0,00407	-1,30547	0,09587
10**	-0,00995	-3,19558	0,00070
11	-0,00009	-0,02892	0,48846
12	0,00382	1,22582	0,88987
13	0,00427	1,37190	0,91495
14	-0,00094	-0,30168	0,38145
15	-0,00343	-1,10300	0,13501
*Significant at 10% level.			
**Significant at 1% level.			

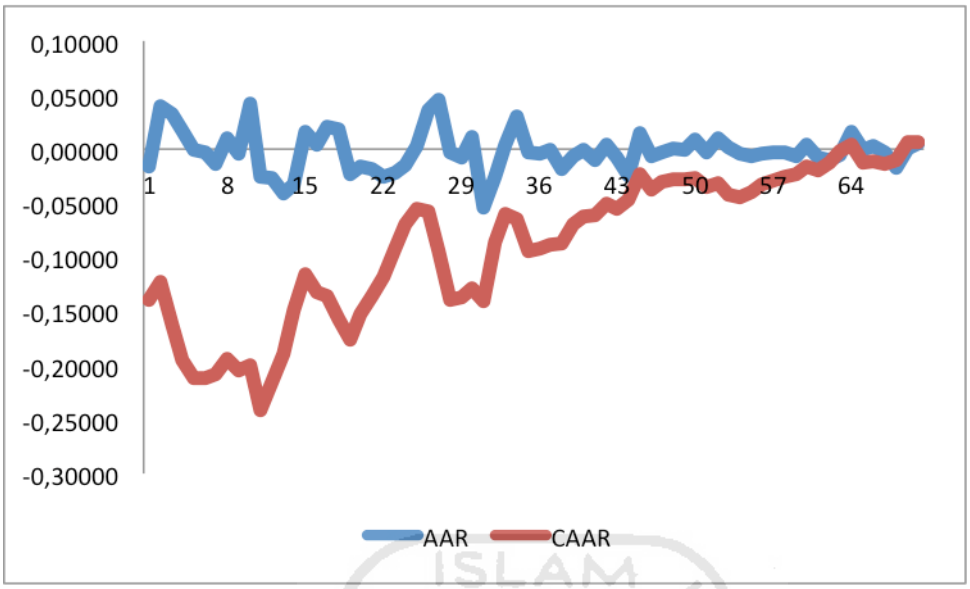
Appendix 9:

Standardized Average Abnormal Return Around the Announcement

Days	CAAR	Z-score	P-Value
-15**	-0,02565	-2,80319	0,00253
-14**	-0,02485	-2,71602	0,00330
-13**	-0,02551	-2,78796	0,00265
-12**	-0,02749	-3,00417	0,00133
-11**	-0,02410	-2,63420	0,00422
-10**	-0,02592	-2,83234	0,00231
-9***	-0,02854	-3,11925	0,00091
-8**	-0,02791	-3,05017	0,00114
-7**	-0,02285	-2,49756	0,00625
-6**	-0,02140	-2,33847	0,00968
-5*	-0,01907	-2,08360	0,01860
-4**	-0,01621	-1,77179	0,03821
-3**	-0,01807	-1,97465	0,02415
-2**	-0,01742	-1,90407	0,02845
-1**	-0,01711	-1,87016	0,03073
1**	-0,01725	-1,88534	0,02969
2**	-0,01575	-1,72124	0,04260
3**	-0,01847	-2,01793	0,02180
4**	-0,01361	-1,48711	0,06849
5**	-0,01528	-1,67035	0,04743
6**	-0,01420	-1,55144	0,06040
7**	-0,01683	-1,83956	0,03292
8*	-0,01205	-1,31653	0,09400
9	-0,01039	-1,13557	0,12807
10	-0,00633	-0,69132	0,24468
11	0,00363	0,39616	0,65401
12	0,00372	0,40600	0,65763
13	-0,00010	-0,01115	0,49555
14	-0,00437	-0,47802	0,31632
15	-0,00343	-0,37536	0,35370
*Significant at 10% level.			
**Significant at 5% level.			
***Significant at 1% level.			

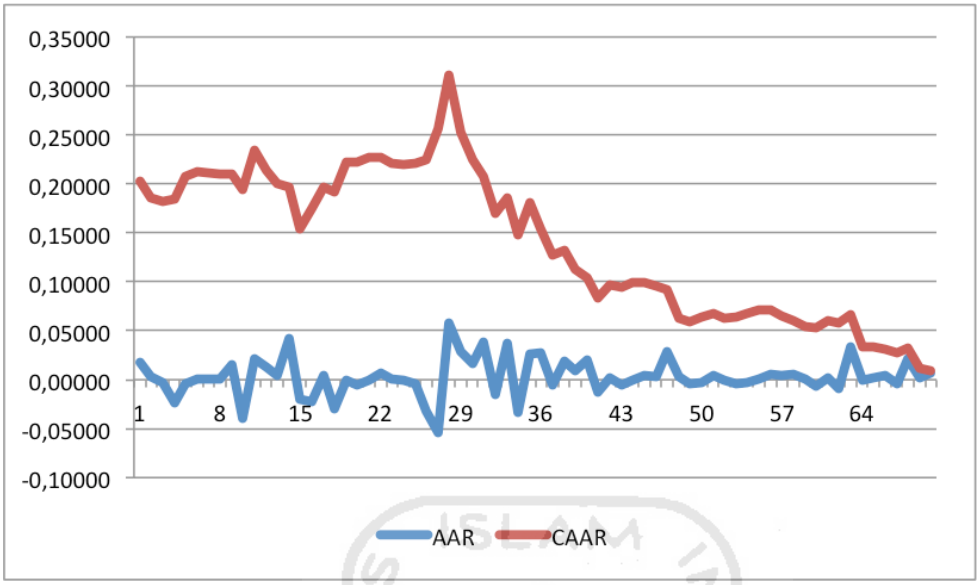
Appendix 10:

AAR and CAAR of Financial Industry



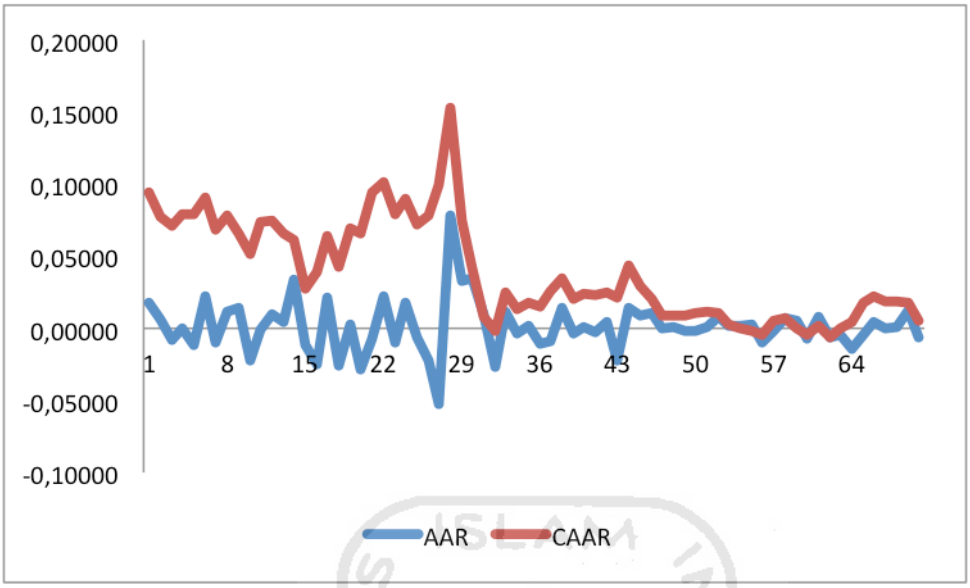
Appendix 11:

CAAR of Information Technology Industry



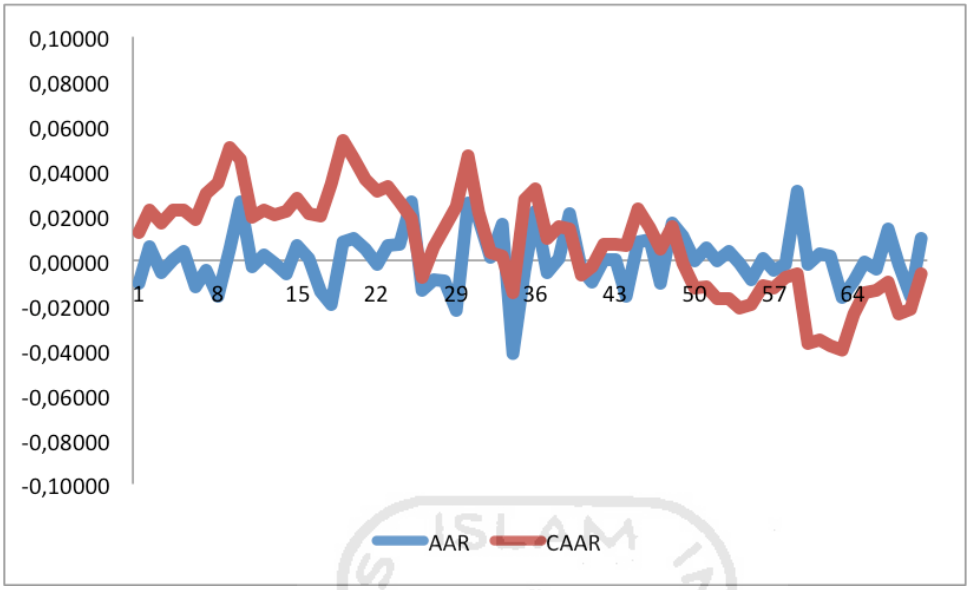
Appendix 12:

AAR and CAAR of Communication Service Industry



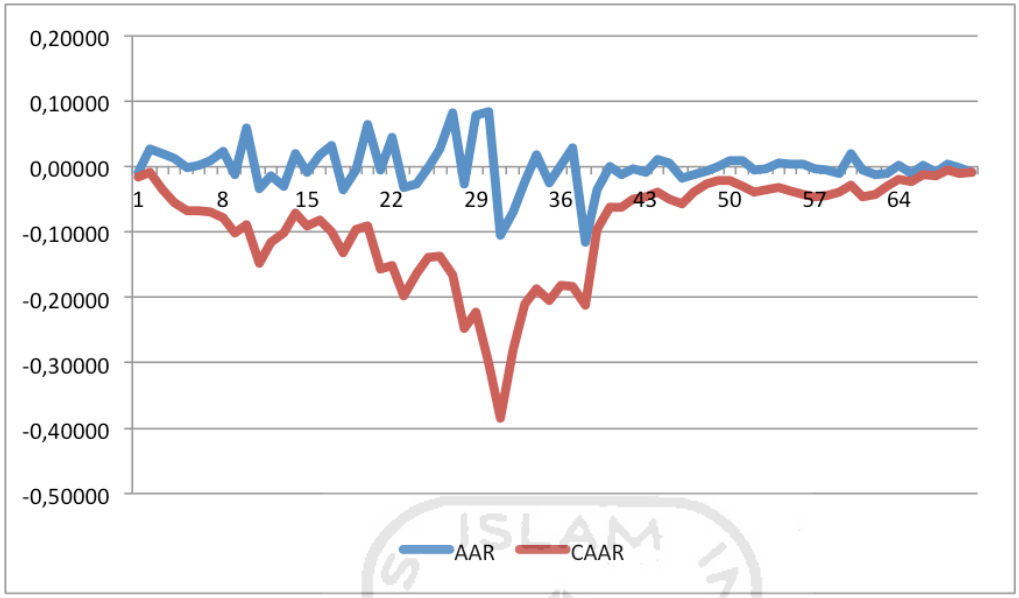
Appendix 13:

AAR and CAAR of Health Industry



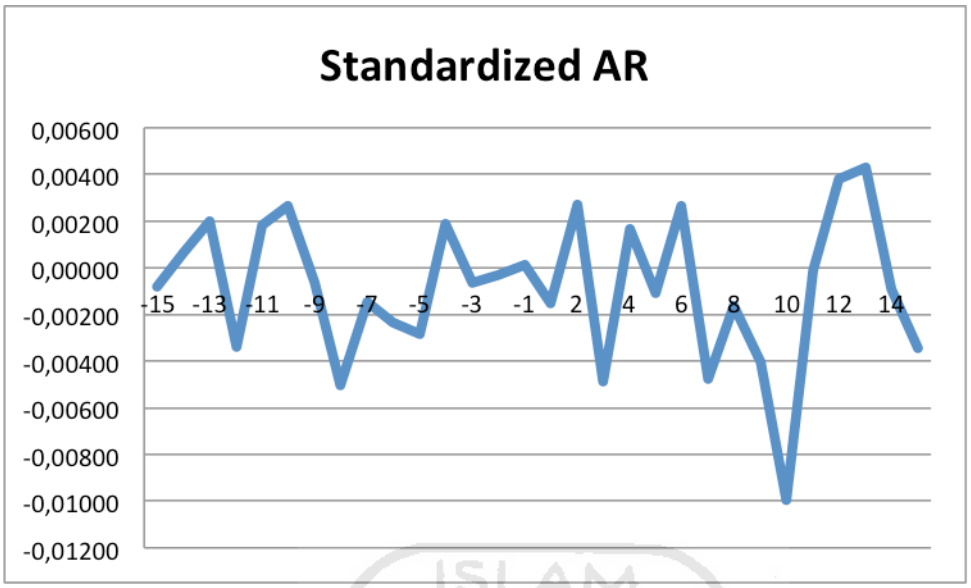
Appendix 14:

AAR and CAAR of Energy Industry



Appendix 15:

Standardized Abnormal Return Result.



Appendix 16:

Standardized Cumulative Abnormal Result