UNIVERSITI TEKNOLOGI MARA

THE IMPACT OF MACROECONOMIC VARIABLES AND CRUDE OIL PRICE TO BURSA MALAYSIA ENERGY INDEX

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Bachelor of Business Administration (Hons)

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The study aims to investigate the effect of macroeconomic variables and crude oil price towards Bursa Malaysia Energy Index. Four independent variables were chosen in conducting the research, namely, Industrial Production, Inflation, Money Supply (M2), and Crude Oil Price. The research utilized 34 monthly observations from the period October 2018 until July 2021. In this research, 3 major tests were conducted, which are descriptive analysis, correlational analysis, and regression analysis. Furthermore, 5 assumption test was conducted to ensure the reliability of the regression result, namely the unit root test, co-integration, serial correlation, heteroscedasticity, and multicollinearity. The unit root test showed all variables were stationary at the first differenced, while the co-integration result showed the existence of long linear relationship between the variables. The research founds 2 variables that give significance impact towards Bursa Malaysia Energy Index, which are Money Supply and Crude Oil Price. Industrial Production and Inflation on the other hand showed non-significant impact towards Bursa Malaysia Energy Index. This research provides insight to future researcher and investors on how macroeconomic variables could give impact on oil-sector index in Malaysia and the results may contribute to informed investment decision making.

ACKNOWLEDGEMENT

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Not to forget, my parents, whom have been supporting and taking care of me since I was a child, Alhamdulillah. May Allah release all the blessings on them. And lastly, the person who were with me through thick and thin. This study had taught me how to manage time, and thus improving myself in becoming a better person.

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

The study aims to investigate the impact of macroeconomic variables & crude oil price to Bursa Malaysia Energy Index. Many similar studies utilized the same concept in which researchers studied the impact of Macroeconomic variables such as Gross Domestic Product (GDP), Inflation, Interest rate, Money supply and Exchange Rate to a country stock Market Performance (Norehan, 2020; Hosseini, Ahmad, & Lai, 2011) Particularly in the case of Malaysia, past researchers indicate mixed results in concluding the effect of these variables to the nation stock market performance (Zakaria, 2012; Nordin, Nordin, & Ismail, 2014) Since Malaysia is the 4th biggest oil producers in Asia (Carpenter, 2021), crude oil is deemed as one of the most crucial commodities which contributes to the nation economic growth. Globally, due to crude oil being a crucial element on a country's economic performance, there were several researches which studied the impact of crude oil price/volatility and its influence on a country's economic and stock performance (Gokmenoglu, Azin, & Taspinar, 2015; Abdul Hadi, Yahya, & Shaari, The Effect of Oil Price Fluctuations on the Malaysian and Indonesian Stock Markets, 2009) Hence, this research aims to utilize both crude oil price and macroeconomic variables as an independent variable to study the its impact on the Malaysia stock market performance.

The Kuala Lumpur Composite Index (KLCI) is famously known to be the Malaysia stock market indicator. The index went through a series of revolutionary stages since its inception in 1976. (Bursa Malaysia, 2021) The KLCI which acts as a proxy of Malaysia stock market performance, was widely used as dependent variable by researches in gauging the effect of various variables towards the index (Ahmad Hamidi, Khalid, & Karim, 2018).

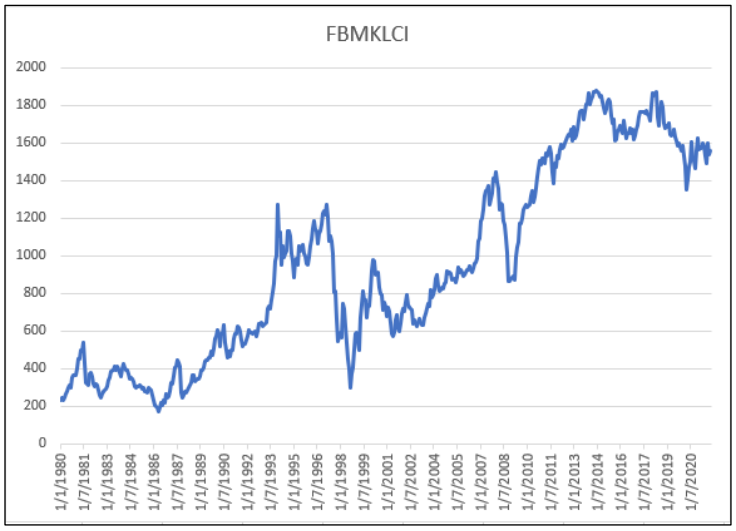

Figure 1: FBMKLCI (1980-2021)

Figure 1 shows the FBMKLCI from 1980 until 2021. It is crystal clear that KLCI index portrayed various short-term and midterm trends. This is mainly due to various type of crisis that hit Malaysia. One of the most hard-hit crises ever impacted was the Asian Financial Crisis 1998 which saw the index fall more than 70%. From the macroeconomic perspective, the crisis caused Malaysia real GDP growth rate declined from 7.3% in 1998 to -7.4% in 1998, the worst downturn since independence (Khoon & Mah-Hui, 2010) This suggests how terrible of an impact of the crisis towards both stock market and economic performance.

Research on the effect of microeconomic variables on a country's stock market performance was widely conducted. According to Norehan & Ridzuan (2020), inflation and exchange rate is significant and positively influenced stock market in Malaysia. On a global scale, Jordan stock market have a long-term equilibrium relationship with macroeconomics variables (Al-Sharkas & Adel, 2004) It is no doubt that a country's micro and macro variables plays and essential role in the overall performance of stock market (Ozcan, 2012). Unfortunately, not so much of the research focus on developing and non-developed countries. According to Ahmad, Lai & Hosseini (2011), most of the studies on the effect of macroeconomic variables towards stock market indices mainly focus on developed countries.

Crude oil price remains to be one of the essential commodities worldwide, according to Abdul Hadi (2009), oil is deemed as an essential commodity which is used in almost every aspect of an economy, the rise of crude oil price would put heave burden on an economy. It is widely proven that Crude oil do influence a country's economy and stock market performance. For example, Norway which involved in oil exporting activities shows a statistically significant positive relationship between crude oil price and stock returns. Furthermore, there was a study which combined both element of microeconomic variable and crude oil price to study the effect of these variables towards Canadian oil and gas industry, it is found that exchange rates, crude oil prices and interest rate have large and significant impacts on stock price returns in the Canadian oil and gas industry. (Sadorsky, 2001).

1.2 Background of the study

The effect of macroeconomic variables towards stock market performance has always been one of the most exciting topics among researchers. Macroeconomic indicator such as Gross Domestic Product, for example. would translates into higher economic activities in the country, in most cases, it is most likely that the variable would positively affect a company's profitability since higher economic activity is associated with the component C, Consumption from the mass public. In this research, the aim is not to investigate the effect of major indices, but to dive deeper which is to observe the impact of macroeconomic variables in Malaysia, along with crude oil price, towards the Bursa Malaysia Energy Index. Hence, the study conducted a sectoral basis analysis rather than a major index analysis.

1.3 Problem Statement

The overall spectrum of past research on this field mostly utilized the same dependent variables to study the effect microeconomic variables towards the stock market performance of a country, which is the stock index of the country itself. For example, a study was conducted by Wongbangpo & Sharma (2002), on 5 ASEAN countries, namely Singapore, Malaysia, Philippines, Singapore, and Thailand in which utilized 5 microeconomic indicators as the independent variables and Stock Index of each respective countries as the dependent variable. Another study which similarly aims to investigate the effect of Macroeconomic variables, utilized Athens Stock Exchange as the dependent variable (Apergis & Eleftheriou, 2002). There is much more past research in which merely utilized a country stock index rather than utilizing industrial or sectoral indices (Omran & Pointon, 2001; Kwofied & Ansah, 2018; Maysami & Koh, 2000; Nishat & Shaheenm 2004).

There were few studies that investigates the effect of macroeconomic variables and commodity price towards industry or sectoral indices. A study was done in which utilized global industry indices, found out that oil prices have a negative effect on stock returns for all sectors except mining and oil industries (Nanda & Faff, 2008). Particularly in the case of Malaysia, there were few research that utilized sectoral indices to relate with the effect of microeconomic variables. According to Pyeman & Ahmad (2017) there are limited studies which focused on the movement of sectoral

indices in relation to the changes in microeconomic variables. Hence, it is essential to utilize one of the sectoral indices as the dependent variable, which in this case is, Bursa Malaysia Energy Index will be utilized to study its impact from microeconomic variables and Crude oil price.

Furthermore, it is widely believed that the rise of crude oil price would benefits oil and gas firms since they will benefit from the higher oil prices and thus enhances their profitability. For example, a study was conducted in North America to investigate the relationship between crude oil price and oil and gas companies, it is found that crude oil price positively and significantly impacts the performance of oil and gas firms using accounting measures of performance (Dayanandan & Donker, 2011). In the case of Bursa Malaysia, since the constituents of Bursa Malaysia Energy Index is 98% is made up from oil and gas firms, in the year 2021, the index has fall more than 20% while the WTI crude oil price has rise more than 90% in the year 2021. Hence, the irregular movements between these variables must be discussed and studied to gain more insights along to provide references for investors to make informed decision making in the future.

1.4 Research Questions

1.4.1 Main Research Question

What is the effect of macroeconomic variables and crude oil prices towards Bursa Malaysia Energy Index and whether there exists any correlation between the variables?

1.4.2 Specific Research Question

I. Is there any significant positive relationship between Crude Oil Price and Bursa Malaysia Energy Index?

II. Is there a significant relationship between Industrial Production and Bursa Malaysia Energy Index?

III. Is there any significant relationship between Inflation and Bursa Malaysia Energy Index?

IV. Is there exists any correlation between Money Supply and Bursa Malaysia Energy Index?

1.5 Research Objectives

I. To investigate the relationship between Crude Oil Price and Bursa Malaysia Energy Index

II. To investigate the relationship between Industrial Production and Bursa Malaysia Energy Index

III. To investigate the relationship between Inflation and Bursa Malaysia Energy Index

IV. To investigate the relationship between Money Supply and Bursa Malaysia Energy Index

1.6 Significance of the study

The significance of conducting this study is none other than providing insight for investors and future research. Since there are very few studies that utilized sectoral index as the dependent variable, which in this case the Bursa Malaysia Energy Index, the findings on this study will provide information for investors in making informed decision making. The inclusion of Crude Oil Price as the independent variable particularly is essential in explaining the irregular correlation between oil price and Bursa Malaysia Energy Index. An understanding on the changes of oil prices whether it could pose a systematic asset pricing risk at the industry level is important in making informed investment and corporate management decisions (Elyasiani, Mansur, & Odusami, 2010). Furthermore, the execution of this study in Malaysia stock market could pave the way for future researcher to conduct similar study by utilizing different sectoral index, namely the technology, construction, transportation and healthcare index. Understanding the impact of crude oil prices and macroeconomic variables will provide information for future investors to gauge its risk tolerance. According to Pyeman & Ahmad (2017) investors face the highest risk when it comes to investing in the stock market as compared to other form of financial investment due to its nature of being sensitive to the environment particularly from macroeconomic perspective. Hence it is believed that the findings of this study will provide much usefulness to the investors.

1.7 Scope of the study

The study will be conducted within the context of Malaysian stock market and economy. Industrial Production, Inflation, Money Supply (M2) and Crude oil price will be utilized as the independent variables while Bursa Malaysia Energy Index will be used as the dependent variable. This study covers period from October 2018 until July 2021 using monthly data. Malaysia as a developing country were chose as the population of this research to give greater impact for local investors for future reference. A total of 34 monthly data will be used for analysis purposes. In terms of data collection, all the data that will be used are secondary data. Data for independent variables will be obtained from Thomson Reuters DataStream while data for the dependent variable, data is obtained from Trading view.

1.8 Limitation of the study

In this study, there were few limitations in conducting this study, first is limited knowledge in conducting testing procedures. Past researcher utilized more advanced testing methodology such as the Unit root test, Granger Causality test, co-integration and vector autoregression. Having limited options to conduct test, this study will only utilize 4 types of common test to conduct analysis on the data, namely regression analysis, normality test, correlational analysis and descriptive statistics. The lack of experience in conducting quantitative research data does pose a limitation in conducting this study, for example, the lack of skills in reading and skimming past research journals, the process of literature review will undoubtedly consume more time for the researcher to evaluate and assess past findings from past journals. Despite that, it is believed that this research will be conducted at the highest due diligence and moral practice.

1.9 Definition of Key Terms

Terms	Definition
Bursa Malaysia Energy Index	Index for Energy Industry in Bursa Malaysia
Industrial Production	Measures the rate of change in the production of industrial commodities in real terms over time for Manufacturing, Mining and Electricity Sectors
Inflation (Consumer Price Index)	Measures the percentage change through time in the basket of goods and services by a population group in a specified time
Money Supply (M2)	Money in circulation such as cash, deposits, cheques and easily convertible near money
Crude Oil Price	Oil price per barrel $ using OPEC price as reference

Table 1: Definition of Key Terms

1.10 Summary

This research is believed and expected to be conducted at the highest moral practice with the best due diligence to ensure reliability and reliance for the mass public and is expected to provide a greater impact for all level of knowledgeable society which includes student, academicians and even investor.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter will discuss past findings that are related to this topic. Most of the cited findings was from 2000 to 2018, this is to ensure the cited works from past researchers are not obsolete and as well to maintain relevance and quality of this research. In general, there were many macroeconomic variables used from past researchers which includes those that were not considered in this research study such as exchange rate, interest rate, Gross Domestic Product (GDP) and unemployment. Hence, the findings that were cited in this topic comprises all mixture of macroeconomic variables. It is essential for researcher to make comparison with the previous findings to gain more insight and deeper understanding on the topic.

2.2 Macroeconomic variables impact on Stock Exchange and Sectoral Indices

The study of Macroeconomic variables towards stock market performance has been widely discussed around the world. Various methodology was used by past researcher in their studies, such as Error correction mechanisms (ECM), Vector error correction model (VECM), Johansen co-integration test and Philip-Person unit root test and the results were rather mixed. For example, a study was conducted in the Malaysian stock market to investigate the dynamic movement between sectoral indices and macroeconomic variables, it is found that there exists a short run relationship between macroeconomic variables and sectoral indices namely Financial, Industrial, Consumer Product, Industrial Product, Properties and Trade and service (Pyeman & Ahmad, 2017). This study went through on a micro level of sectoral basis in analyzing the impact of macroeconomic variables.

Furthermore, A study was conducted in Turkey to investigate the effect of Macroeconomic Variables to the Industry Index using data from 2003 to 2010, it is found that macroeconomic variables exhibit a long run equilibrium relationship with the ISE industry index. (Ozcan, 2012). As for the ASEAN context, there was a study in 2002 in which aims to observed the impact of macroeconomic variables on 5 ASEAN countries (Singapore, Malaysia, Philippines, Singapore, and Thailand) in which they

found that Gross National Product, Consumer Price Index, Money Supply, interest rate and exchange rate has long and short term relationship to the stock prices of the respective countries, furthermore, using Granger causality test, the study also found out that the macroeconomic variables in respective countries cause and are caused by stock prices. (Wongbangpo & Sharma, 2002).

There were not so much of studies that utilized sectoral index as the dependent variable as most studies utilized major stock index in assessing the impact of macroeconomic variables. According to Sadorsky (2001) exchange rates, crude oil prices and interest rate have large and significant impacts on stock price returns in the Canadian oil and gas industry. In a more non-developed studies, a study was conducted on Nigerian stock market using data from 1975 to 2005 which found out that microeconomic variables influence the stock market index in Nigeria. (Osamwinyi & Evbayiro-Osagie, 2012). Despite there were not so many studies that utilized Sectoral indices as the dependent variable, but the concept and objectives of past studies remain the same, which is to investigates the macroeconomic impacts to a stock exchange and if there exist any linkages between them.

2.3 Industrial Production

The usage of Industrial Production as a proxy to includes the nation industrial economic activities in assessing its impact towards stock market performance were widely used. For example, a study was conducted on six European countries on the effect of economic activity on stock prices using Johansen Cointegration test, it is found that stock price is significantly related to industrial production. The study also concluded that stock prices are determined and have causal relationship with industrial production (Nassed & Strauss, 2000). A similar study was conducted in Jordanian financial market in which aims to investigate the effect of microeconomic variables on stock returns using annual data from 1976 until 2016 in which industrial production were part of it, it is found that industrial production has a statistically significant effect on the returns of shares as 1% significant level. (Ahmed & Mohamed, 2018)

A study that was executed in United Stated in which aims to investigate the existence of long-run equilibrium relationship among stock prices and few macroeconomic variables using monthly data from the period 1974-1998 found out that S&P 500 is positively related to the industrial production but negatively related to

exchange rate, interest rate and inflation (Kim, 2003). In the Malaysia context, a study was conducted in Malaysia spectrum in which found that there is a presence of a long-run relationship between share prices and economic activity (Jiun Chia & Lim, 2015). The study utilized Autoregressive Distributed Lag (ARDL) bounds methodology in determining the long-run relationship between the variables. There was also a study that was conducted in a less-developed market, for example, a study by Nishat & Shaheen (2004) found out their industrial production is the largest positive determinant to Pakistani stock prices. (Nishat & Shaheen, 2004).

2.4 Crude Oil Price

According to Abdul Hadi (2009), oil deemed as an essential commodity which is used in almost every aspect of an economy, the rise of crude oil price would put a heavy burden on an economy. There is no doubt that oil do plays a crucial role in an economy and thus, the stock market. There were few studies that utilized crude oil price to assess its impact towards stock market performance and even in a sectoral-basis analysis. For example, a study which utilized global industry indices from period April 1983 to September 2005 found out that oil price rises have a negative effect on stock returns for all sectors except mining and oil & gas industries. (Nandha & Faff, 2008). Furthermore, there was even a study on an oil exporting country, for example, Norway which involved in oil exporting activities shows a statistically significant positive relationship between oil price and real stock returns (Park & Ratti, 2008).

On the effect of crude oil price on sectoral indices, there was a study conducted by Sadorsky (2001) which found out that an Increase in oil price increases the return to Canadian oil and gas stock prices. Furthermore, a study was conducted in United State stock Exchange in which aims to investigate the impact of oil shocks to S&P 500 sectoral indices in, it is concluded that negative effect of real oil price impacts on all sectoral indices except energy and utility. (Sakaki, 2019). In a similar study that was conducted by Sakaki (2019), oil price volatility is found to pose a negative and significant effect on all industries, even on oil-related industries. (Sakaki, 2019). Most findings here do imply that crude oil price does pose an impact towards a stock market performance.

Furthermore, there was a study that was conducted in North America in which aims to investigate the relationship between commodity prices of crude oil price and

oil and gas companies, crude oil price is found to positively and significantly impact the performance of oil and gas firms using accounting measures of performance (Dayanandan & Donker, 2011) This indicates a positive correlational between crude oil price and the profitability of oil and gas firms. There was also a study in Australia to examine the impact of crude oil towards industry returns, the study concluded than oil price is an essential determinant of returns in the banking, energy, materials, retailing and transportation industries. The study also found out that the effect of oil price movements is continuing, for example, returns on retail industry are negatively related to current on and three-month lagged to oil price changes (Worthington & McSweeney, 2008).

2.5 Inflation (Consumer Price Index)

Inflation is known as a rise in Consumer Price Index due to higher demand and spending from the mass public or due to supply shocks (Ciccarelli & Mojon, 2010). Inflation does play a crucial role in determining the wellbeing of an economy. Since inflation is deemed as one of the focuses when assessing an economy, there were numerous past research that utilizes inflation and its impact towards stock market performance. For example, a study was conducted in Egypt using data from 1980 – 1998 found that inflation rate has impact to Egyptian stock market performance. (Omran & Pointon, 2001). Furthermore, a study conducted in Greece in the period 1988-1999 to study the effect of inflation towards Athens stock Exchanges concludes that the gradual reduction of inflation rate in Greece contributes to higher stock prices and economic growth. (Apergis & Eleftheriou, 2002). There is no doubt that inflation does pose effect on a country's stock market performance.

On a less-developing countries, a study was conducted in Ghana to investigate the effect of inflation to the Ghana Stock Exchange (GSE), it is observed that there exists a significant long-run relationship between them. (Kwofied & Ansah, 2018). Furthermore, a study was conducted in 2004 on the Karachi Stock Exchange Index to study the effect of macroeconomic variables and the stock market, it is observed that there exists a causal relationship between the stock market and economy, furthermore, the study also found that inflation is the largest negative determinant of stock prices in Pakistan. (Nishat & Shaheen, 2004). There was also a study conducted by Apergies &

Eleftheriou (2002) in which shows that inflation exerts more impact to the stock exchange than interest rate.

2.6 Money Supply

Money Supply (M2) is a measure of the money available in an economy which includes cash, deposits, cheques and others easily convertible near money. The use of Money Supply (M2) as macroeconomic variable was widely used from past researcher due to the believe that it is associated with public spending and inflation. For example, a study conducted on the effect of macroeconomic variables to the Singapore stock index indicates that the country's index has a form of cointegrating relationship with inflation, money supply, interest rates and exchange rates. (Maysami & Koh, 2000). Furthermore, a study that was conducted on Jordan financial market in 2018 found that money supply has significant positive impact on stock returns. (Ahmed & Mohamed, 2018).

There was a study conducted by Padhi & Naik (2012) in Indian stock market index to study the impact of macroeconomic variables, it is found that money supply has positive linkages with the Indian Stock Market Index (Padhi & Naik, 2012). Furthermore, A study was conducted in Stockholm Stock Exchange in 2013 found out that money supply is positively linked to stock prices, but it is insignificant. (Talla, 2013). The cited findings do suggest that money supply do pose an impact to a country's stock index. Despite not so many studies that dive deeper into sectoral basis analysis, but the concept remains the same, which is to study the effect towards a country's stock index.

2.7 Research Framework

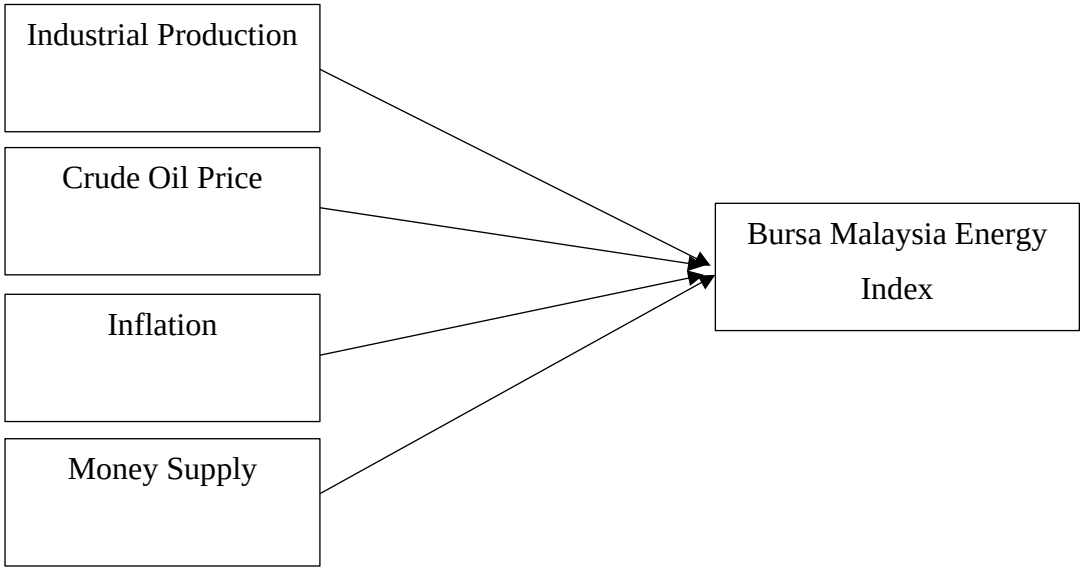

Figure 2: Research Framework

2.8 Summary

The previous findings from past researchers does give an insight on how these macroeconomic variables namely, Industrial Production, Crude Oil Price, Money Supply (M2) and Inflation gives a linkages and impact towards a stock exchange, be it sectoral indices or major indices. It can be concluded that for all variables, it has mixed findings and in the context of Malaysia particularly, there were not so many studies regarding this topic, hence there will be a limitation in making comparison later in the Malaysian context.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

An appropriate and suitable research methodology is important when it comes to conducting high-quality research. The Source of data must accurately be presented to ensure quality. In this research, secondary data will be utilized from a trusted international data provide. The number of observations consists of 34 monthly data for all the related variables, namely Crude Oil Price, Industrial Production, Inflation, Money Supply, and Bursa Malaysia Energy Index. This section will review thoroughly on method of conducting analysis on the data. The source of data and type of study for this research will be discussed on this topic

3.2 Sampling

The population for this research is the Malaysia economic data. According to Ozcan (2012) a country economy is divided into the macroeconomics and microeconomic variables, and it is no doubt that these variable gives important role in the overall performance of stock market. Historically, Malaysian data on economic indicator such as Industrial Production, Money Supply and Inflation were available since 1980s, more than 40 years of annual observations and approximately around 450 of monthly observations. In this study only 34 monthly observations that will be utilized as our sample size which covers the period from October 2018 until July 2021.

3.3 Data collection

The secondary data that will be utilized for this research for both dependent and independent variables, is obtained from Thompson DataStream International and Trading view website. All the data for independent variables; Industrial Production, Crude Oil Price, Money Supply (M2) and Inflation is solely obtained from Thompson Data Stream International. DataStream is widely used and recognized among researchers worldwide due to its ease of accessibility, availability, trustworthy and exclusivity. As for the dependent variable, which is Bursa Malaysia Energy Index, the data is obtained from Trading view website. Trading view is one of the biggest data

providers for price reference for all asset classes which includes, commodities, derivatives, cryptocurrency, and currencies.

3.4 Variables

In this research, a total of 5 major variables will be utilized in conducting this study. As for the dependent variable, Bursa Malaysia Energy Index will be used. This Index represents the performance of Energy Industry in Bursa Malaysia which mostly comprises of oil & gas firms. The index constitutes comprises of 25 Energy-related companies (according to market capitalization). As for the independent variables, there are 3 macroeconomic indicator that will be used, namely Industrial Production which acts as a proxy for economic activities, Money Supply which gauges the total supply of money circulating in the country and lastly inflation rate which measures the rise of overall cost of goods and services in the country. Furthermore, Crude Oil Price will also be used as the independent variable, OPEC Oil Price per barrel is used as the reference for pricing purposes. This research aims to study the effect between one variable to another one.

3.5 Research Design

3.5.1 Purpose of Study

Determining the purpose of a research is crucial in producing high quality research. It will provide pathway and guidelines on what needs to be prioritized, what can be developed, and what can be contributed to the society. The topic of investigating the effect of macroeconomic variables to a stock market performance, be it sectoral or major indices, has always been a field that excites researcher. The purpose of this study is to analyse the impact of macroeconomic variables (Industrial Production, Inflation, Money Supply (M2) along with crude oil prices) on the Bursa Malaysia Energy Index. The findings of this research will be shared to the mass public for future references.

3.5.2 Type of Investigation

Determining the type of investigation is important in a research study as it provides context on the results and findings later. Generally, there were several methods of investigation for research such as correlational and causal. In this research, the type and nature of the investigation which will be executed is correlational, which is to investigate whether there exists any correlation between the identified independent variable; Industrial Production, Money Supply, Inflation, Crude Oil Price, and Bursa Malaysia Energy Index along with its significance at the 5% level of confidence.

3.5.3 Research Interference

Research interference is the concept and idea of determining the possible interference and disruptions faced by the researcher in executing the normal flow of the research itself. Most of correlational studies has very minimal interference due to its uncomplicated process in conducting research. Since the nature of this research is correlational, this translates to a minimal interference faced by researcher in the normal flow of work. The workflow of correlational investigation tends to be less disruptive as compared to causal investigation.

3.5.4 Study Setting

Study setting is divided into two types, contrived and non-contrived setting. For this research, the setting is considered as non-contrived setting. This is because the work is being done in the natural environment without being artificially adjusted. Most correlational studies tend to be in the non-contrived settings, meanwhile most causal studies are usually conducted in contrived settings.

3.5.5 Time Horizon

In context, the data that will be conducted in this is research is in the form of time series. Hence, the data tracks the progress of the variables over time. The data will track the progress of Industrial Production, Inflation, Money Supply, Crude Oil Price and Bursa Malaysia Energy Index since 2018 until 2021. In total, there are 34 monthly data that will be used.

3.6 Hypothesis Statement

3.6.1 Industrial Production

Ho: Industrial Production has no significant impact to the Bursa Malaysia Energy Index

Ha: Industrial Production has significant impact to the Bursa Malaysia Energy Index

3.6.2 Inflation

Ho: Inflation has no significant impact to the Bursa Malaysia Energy Index

Ha: Inflation has significant impact to the Bursa Malaysia Energy Index

3.6.3 Crude Oil Price

Ho: Crude Oil price has no significant impact to the Bursa Malaysia Energy Index

Ha: Crude Oil Price has significant impact to the Bursa Malaysia Energy Index

3.6.4 Money Supply

Ho: Money Supply has significant impact to the Bursa Malaysia Energy Index

Ha: Money Supply has no significant impact to the Bursa Malaysia Energy Index

3.7 Research Methodology

3.7.1 Descriptive Analysis

Descriptive analysis is one of the methods for conducting statistical analysis which goal is to identify trends and variation in dataset. According to Zikmund (2003), descriptive statistics is the obvious way to measure the overall data which decipher its fundamental patterns. In many instances, description analysis tends to point out the understanding behind causal relationships. Since all the analysis here is quantitative, the descriptive analysis objective is more towards understanding the patterns across a population of interest. The most common tools to be utilized for descriptive analysis in explaining the patterns and variations in the data set are mean, mode, median and as well analysis of the dispersion which Is through standard deviation, variance, kurtosis, and skewness. In this research study, all the tools are deemed to be essential for the end-product of our study.

Descriptive element such as mean will be calculated to determine the average value of the group of data, be it dependent or independent variables. For example, the mean for all the variables; Industrial Production, Inflation, Money Supply, Crude Oil price, Bursa Malaysia Energy Index will be calculated. The analysis regarding dispersion of the data will be utilized through the findings of variance and standard deviation. Standard deviation and variance determined the spread of raw data from its mean values. Furthermore, the minimum and maximum value of the identified variables will also be calculated. Overall, descriptive analysis will facilitate the researcher to grasp the overall characteristics of its data and will be helpful for future researcher for reference.

3.7.2 Correlation Analysis

Correlation analysis is defined as the statistical method to identify if there is any relationship between dependent and independent variables. According to Agresti, (2018), correlation is utilized to test the relationship between categorical variables and quantitative variables. This analysis provides information on how strong the relationship between the variables. Correlation found between two variables indicates that when there is a change in one variable, there is also a change in the other. Hence, correlation analysis is meant for identifying the strength of a relationship. The coefficient of correlation is determined using the range from -1.0 until +1.0. The sign indicates whether there is a positive or negative correlation between the variables. Hence, it is essential to determine the correlation between the variables

3.7.3 Regression Analysis

Regression analysis is the most widely used statistical technique for investigating and estimating relationship between a set of dependent and independent variables. In this method, the independent variable is the predictor which in this case, the Industrial Production, Money Supply (M2), Inflation and Crude Oil Price. Meanwhile the dependent variable is the outcome to the specific question. Most of the researcher utilized this analysis to understand the relationship between variables and can be further used to forecast the best outcome.

F test

F test is a method to under regression analysis which aims to test the overall significant in the regression model whether the regression model provides the best fit to a data set than a model with no independent variables.

$$H0: \beta 1 LNINDUSTRIAL = \beta 2 LNINFLATION = \beta 3 LNM2 = \beta 4 LNOIL = 0$$

$$Ha: \beta 1 LNINDUSTRIAL \neq \beta 2 LNINFLATION \neq \beta 3 LNM2 \neq \beta 4 LNOIL \neq 0$$

Where:

LNINDUSTRIAL	Industrial Production
LNINFLATION	Consumer Price Index
LNM2	Money Supply
OIL	Crude Oil Price

Table 2: Regression terms

T test

T-test is a method that will determine whether the independent variables are significant enough to the dependent variables. That is, the concept is to determine whether Industrial Production, Money Supply, Inflation, and Crude Oil Price are significant enough to the dependent variable, Bursa Malaysia Energy Index. Below are the initial hypothesis using inflation as the independent variable.

$$H0: \beta 1INFLATION = 0$$

$$HA: \beta 1INFLATION \neq 0$$

Coefficient of Determination

Coefficient of is a method to determine the overall fitness of the regression model. According to Grant (2019), it is defined as the scale of the how much is explained by the independent variable to the difference in the dependent variable. Furthermore, according to Bougie & Sekaran (2019), the coefficient of determination is a method to measure to decipher the overall fitness or goodness of the regression model. The range of Coefficient of Determination, R2, will be in the range of 0 until 1. The higher the R2, the fitter is the regression model.

3.8 Stationarity, Cointegration and OLS Assumptions

To ensure the reliability of OLS estimates, it is essential to conduct few tests before regressing using Ordinary Least Square (OLS) model. Below is the type of test conducted prior to regression analysis.

OLS Assumptions	Testing methodology
Observations of the error term are uncorrelated with each other	Serial correlation test
The error term has a constant variance	Heteroscedasticity test
No independent variable is a perfect linear function of other explanatory variables	Multicollinearity test
Unit Root Test	
Co-integration test	

Table 3: Stationarity, Cointegration and OLS Assumptions

3.9 Summary

This research has obviously shown a clear and thorough method of execution. Hence, according to the methodology, only 4 types of tests will be conducted, namely descriptive, correlational, regression analysis and normality test. It is expected that the research will be conducted smoothly and with less disruptions

CHAPTER FOUR

ANALYSIS AND RESULTS

4.1 Descriptive Analysis

Descriptive analysis was conducted to identify trends and variation in dataset of the variables involved which is the patterns of dataset for all the variables involved. Bursa Malaysia Energy Index, Industrial Production, was identified and analyzed by using Mean, Median, Maximum, Minimum, Standard Deviation, Skewness and Kurtosis. Since all the analysis here is quantitative, the descriptive analysis objective is more towards understanding the patterns across a population of interest.

	Inflation	Industrial Production	Money Supply RM (000,000)	Oil Price ($ Per barrel)	Bursa Malaysia Energy Index
Mean	121.2118	113.3088	1,971,524	55.90912	916.9318
Median	121.2500	114.3500	1,955,850	60.80500	896.7600
Maximum	123.2000	122.3000	2,100,135	75.24000	1240.860
Minimum	117.6000	79.70000	1,862,634	14.36000	616.8900
Std. Dev	1.359092	7.634823	75471.77	14.95307	167.5306
Skewness	-0.785643	-3.187572	0.145208	-1.046464	0.186825
Kurtosis	3.495823	13.81544	1.554474	3.512800	2.024049
Jarque-Bera	3.845942	223.2895	3.079673	6.578023	1.547133
Probability	0.146172	0.000000	0.214416	0.037291	0.461365
Sum	4121.200	3852.500	67031831	1900.910	31175.68
Sum Sq Dev.	60.95529	1923.587	1.88E+11	7378.607	926194.8
Observations	34	34	34	34	34

Table 4: Descriptive Statistics

4.1.1 Inflation (Consumer Price Index)

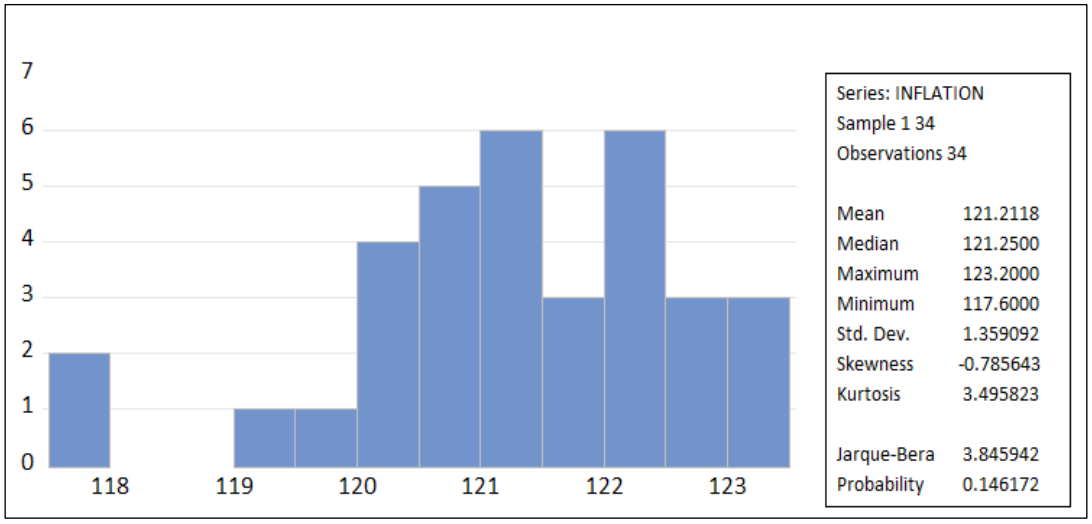

Figure 3: Inflation (Consumer Price Index)

The mean for inflation is 121.21, which indicates that the average inflation indices figure in Malaysia from 2018 until 2021 is 121.21. The highest Consumer Price Index is 123.2 which was in July 2021. The lowest Consumer Price Index is 117.600 which was in April 2020. As for the Median which measures the central tendency for skewed distributions, the value is 121.25. The variability of Inflation index from its mean is 1.3591. From the graph above, the graph slightly skewed to the left.

The skewness for this variable is -0.7856 which is negatively skewed to the left which indicates that the size of the right-handed tail is larger than the left-handed tail. As for the kurtosis which measures the tail-heaviness of the distribution, the value is 3.4958 which is greater than 3, this suggests that inflation is leptokurtic which means that the data has higher value than its mean. As for the Jarque-Bera value, which measures the normality of distribution, it can be seen than the p-value of the Jarque-Bera is more than 5% level of significance which indicates the data normally distributed.

4.1.2 Industrial Production

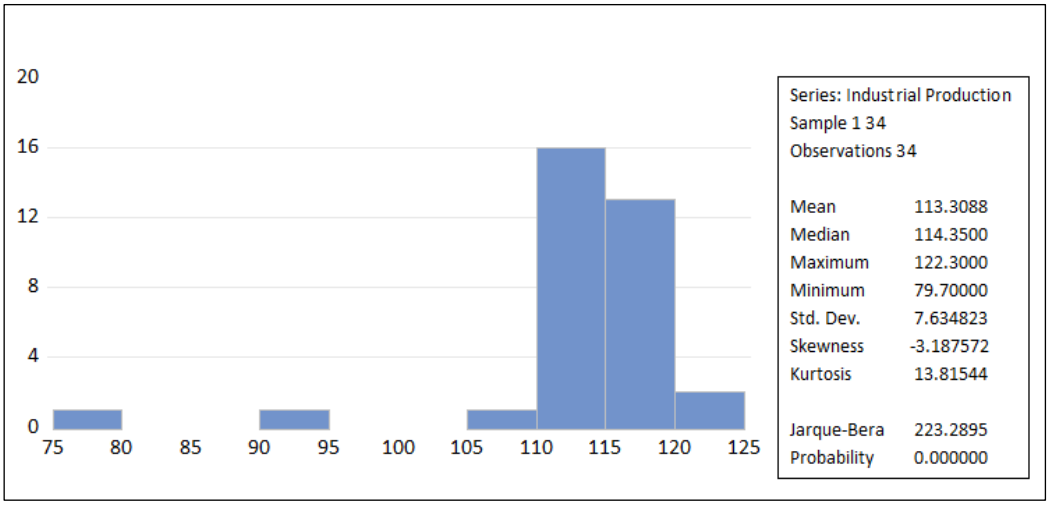

Figure 4: Industrial Production

The mean for Industrial Production Index is 113.3088, which indicates that the average Industrial Production indices figure in Malaysia from 2018 until 2021 is 113.31 which is 13% above the base index of 100. The highest value for this variable is 122.30 which was in December 2019 while the lowest value is 79.700 which was in April 2020. As for the Median which measures the central tendency of the distributions, the value is 114.35. The variability of Industrial Production Index from its mean value is 7.634.

From the graph above, it can be clearly seen that the data skewed to the left. The skewness for this variable is -3.18757 which indicates that the size of the right-handed tail is larger than the left-handed tail. As for the kurtosis which measures the tail-heaviness of the distribution, the value is 13.81544 which is greater than 3, this suggests that industrial production is leptokurtic which means that most of the data has higher value than its mean. As for the Jarque-Bera value, which measures the normality of distribution, it can be seen than the p-value of the Jarque-Bera is less than 5% level of significance which indicates the data is not normally distributed.

4.1.3 Money Supply (M2)

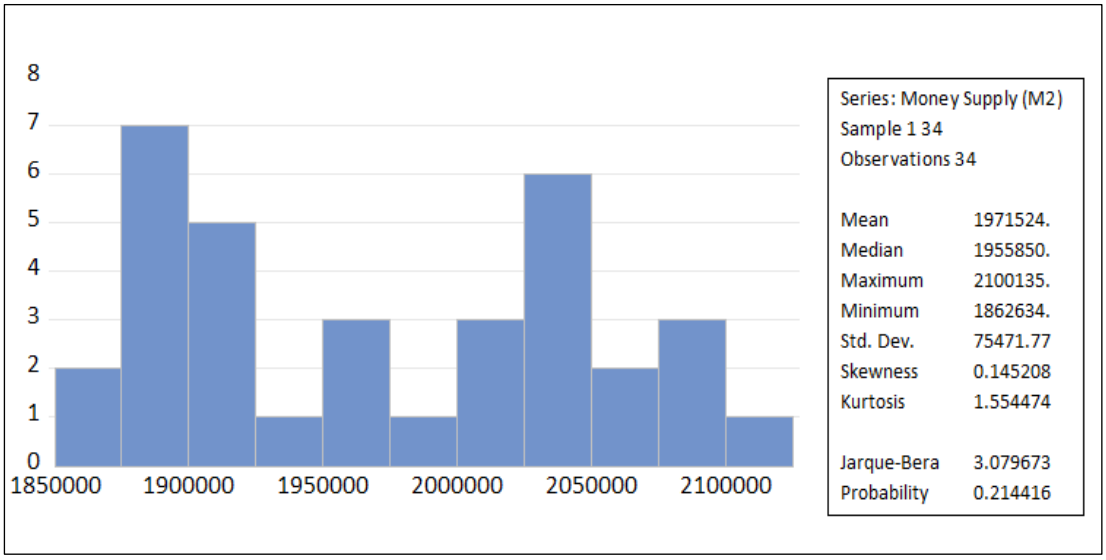

Figure 5: Money Supply (M2)

The mean for Money Supply (M2) is RM 1,971,524 million, which indicates that in average, the amount of Money Supply in Malaysia since 2018 is amounted to RM 1.971 trillion. The highest amount of Money Supply (M2) circulated in Malaysia for this data is RM 2,100,135 million which was in April 2020. The lowest amount of M2 ever circulated for this period is RM 1,862,634 million which was in October 2018. As for the Median for this data, which measures the central tendency of the distributions, the value is RM 1,955,850 million. The variability of Money Supply (M2) from its mean value is 75471.77.

From the graph above, it can be clearly seen that the graph neither has extreme skewness to the left or right. The skewness for this variable is 0.1452 which indicates that the data mirrors a normal skewness since its value is close to zero. As for the kurtosis which measures the tail-heaviness of the distribution, the value is 1.5545 which is lower than the benchmark of 3, this suggests that inflation is platykurtic which means that most of the data has lower value than its mean. As for the Jarque-Bera value, which measures the normality of distribution, it can be seen than the p-value of the Jarque-Bera is more than 5% level of significance which indicates the data is normally distributed.

4.1.4 Oil Price

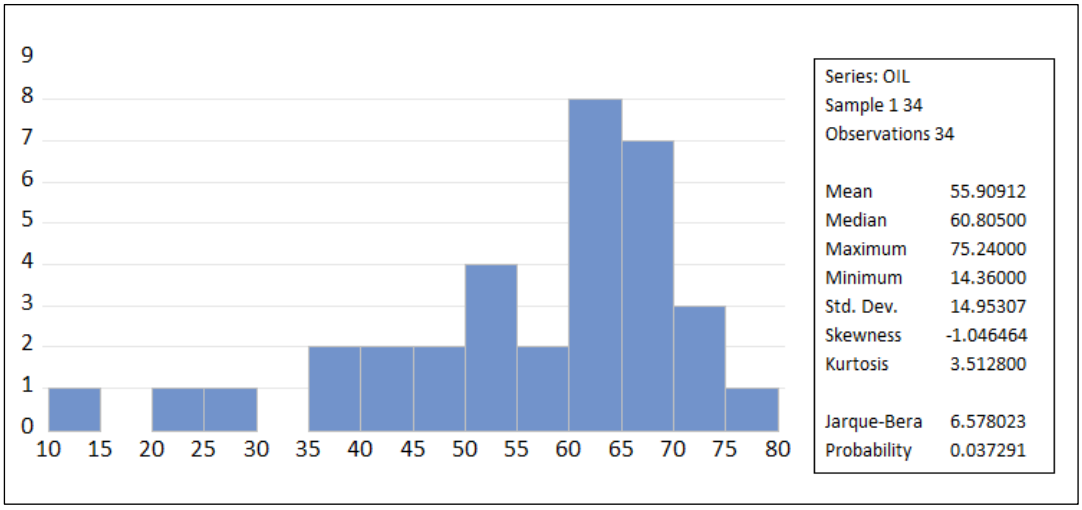

Figure 6: Oil Price

The average value for Oil price per barrel for this data is 55.91$ which indicates that the average oil price since 2018 is only 55.91$. The highest Oil price ever reached is 75.24$ which was in October 2018 meanwhile, the lowest amount of oil was 14.36$ was in April 2020 which during the first Movement Control Order took place. The Median value for oil price is 60.81$. The variability of oil price from its mean value is 14.95$. From the graph above, it can be clearly seen that the graph skewed to the left which indicates that it has longer left tail.

The skewness for this variable is -1.0465 which indicates that the data did skew to the left. As for the kurtosis which measures the tail-heaviness of the data, the value is 3.5128 which is closer to the benchmark of 3, this suggests that the data is mesokurtic which means that the probability of extreme, rare, or outlier data is close to zero. As for the Jarque-Bera value, which measures the normality of distribution, it can be seen than the p-value of the Jarque-Bera is less than 5% level of significance which indicates the data is not normally distributed.

4.1.5 Bursa Malaysia Energy Index

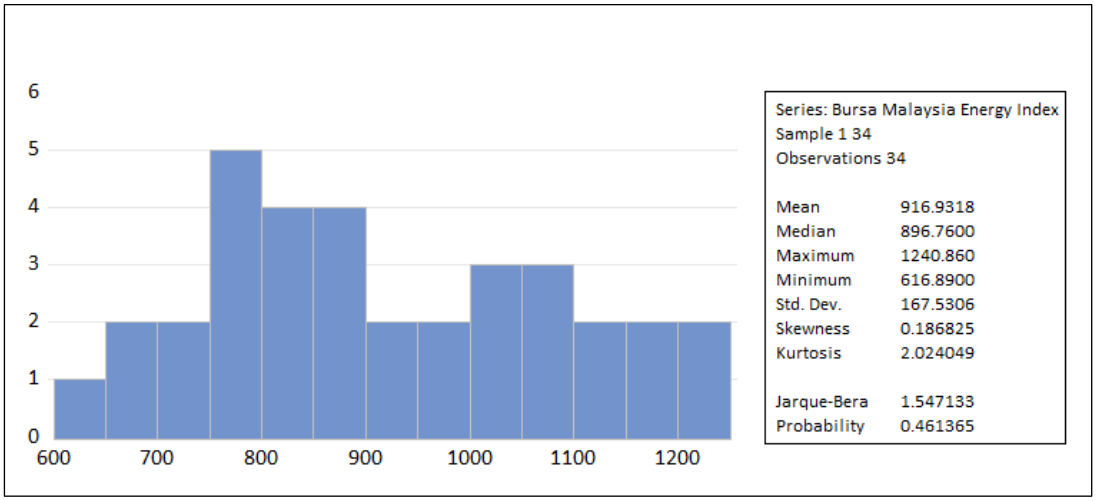

Figure 7: Bursa Malaysia Energy Index

The mean value for Bursa Malaysia Energy Index is 916.93, which indicates that the average performance of the energy index is 916.93 for the period 2018 – 2020. The highest value for this variable is 1240.86 which was in December 2019, meanwhile, the lowest value of the variable is 616.89 which was in March 2020. The Median value for this variable is 896.76. The variability of Bursa Malaysia Energy Index from its mean value is 167.5306.

The skewness for this variable is 0.186825 which indicates that the data mirrors a normal skewness since its value is close to zero. As for the kurtosis which measures the tail-heaviness of the distribution, the value is 2.02 which is lower than the benchmark of 3, this suggests that inflation is platykurtic which means that most of the data has lower value than its mean. As for the Jarque-Bera value, which measures the normality of distribution, it can be seen than the p-value of the Jarque-Bera is more than 5% level of significance which indicates the data is normally distributed.

4.2 Correlational Analysis

Correlation analysis is meant for identifying the strength of a relationship. The coefficient of correlation is determined using the range from -1.0 until +1.0. The sign indicates whether there is a positive or negative correlation between the variables. Hence, it is essential to determine the correlation between the variables to get deeper insight of linkages between the dependent and independent variable. The decision rule is to reject the null hypothesis if p-value is lesser than 5% level of significance. The hypothesis and result are as followed:

Null Hypothesis: Ho	correlation coefficient is not significantly different from 0
Alternate Hypothesis: Ha	correlation coefficient is significantly different from 0

Table 5: Hypothesis for Correlational Analysis

Covariance Analysis: Ordinary
Date: 12/30/21 Time: 14:52
Sample: 2018M10 2021M07
Included observations: 34

Correlation Probability Observations	ENERGY	INFLATION	IP	OIL	M2
ENERGY	1.000000 ----- 34				
INFLATION	0.450020 0.0076 34	1.000000 ----- 34			
IP	0.335882 0.0521 34	0.703069 0.0000 34	1.000000 ----- 34		
OIL	0.607916 0.0001 34	0.746371 0.0000 34	0.632101 0.0001 34	1.000000 ----- 34	
M2	-0.548593 0.0008 34	0.133321 0.4522 34	0.033434 0.8511 34	-0.178710 0.3119 34	1.000000 ----- 34

Figure 8: Correlational Analysis

From the results above, Inflation is proven to have a significant and moderate correlation of 0.4500 on the Bursa Malaysia Energy Index. The significance of the correlation is purely determined by the decision rules of the P-value, which is to reject the null. Turned out the P-value of 0.076 is lesser than 5% level of significance. The result suggests that Inflation has a significant correlation to the dependent variable, the Bursa Malaysia Energy Index.

Moreover, the variable Industrial Production has insignificant and weak positive correlation of 0.3359 on Bursa Malaysia Energy Index. The correlation is insignificant due to its P-value of 0.0521 which is slightly greater than 0.05 level of significance. Hence, for this correlational analysis, it is proven that Industrial Production has no real correlation with the Bursa Malaysia Energy Index.

Furthermore, the correlational analysis above showed that oil price has a significant positive correlation to the Bursa Malaysia Energy Index. The correlation between Oil Price and the dependent variable is considered moderate as the correlation value of 0.6079 is greater than the benchmark level of 0.5. Furthermore, the significance of the correlation is determined purely by comparing its p-value of 0.0001 with the significance level of 5% in which the p-value is lesser than the significance level of 5%. The p value suggests there is less than 5% probability that the null hypothesis is correct. This indicates Oil price has significance positive linkages to the Bursa Malaysia Energy Index.

Lastly, the correlational analysis also showed that Money Supply has a significant and negative correlation on Bursa Malaysia Energy Index. The correlation is deemed moderate as the correlation value of -0.5486 is greater than the benchmark level of 0.5. The p-value of 0.0008 suggests strong likelihood of the null hypothesis to be false, which consequently indicates the significant correlation between these variables. Thus, it is concluded that Money Supply (M2) has significance and moderate negative correlation to the Bursa Malaysia Energy Index.

4.3 Unit Root Test

Testing for stationarity for time-series model is an essential element to avoid spurious regression results. A spurious regression result simply means the estimated OLS equation is unreliable and useless as it inflates the t-statistics and the R^2. According to Studentmund (2016), a stationary time series data is one whose basic properties, for example, its mean and its variance, do not change over time, meanwhile, a nonstationary series has one or more basic properties that do change over time. Most of economic data has a non-stationary properties. To ensure that the OLS estimate yield a reliable regression result, the time series data shall be in a stationary form, or does not have a unit root. For this test, the Augmented Dickey Fuller unit root test is utilized. The Decision rule is to reject the null hypothesis if p-value is lesser than 5% level of signifiance. In this research, the p value is being reported. The hypotheses and results of each variable are as followed:

Null Hypothesis: Ho	Has unit root and non-stationary
Alternate Hypothesis: Ha	Does not have unit root and stationary

Table 6: Hypothesis for Unit Root Test

ADF Unit Root Test		
	Level	First Differenced
	Trend & Intercept	Trend & Intercept
LNENERGY	0.4068	0.0004*
LNINDUSTRIAL	0.0124*	0.0000*
LNINFLATION	0.2627	0.0108*
LNOIL	0.3332	0.0028*
LNMONEYSUPPLY	0.4701	0.0009*

Note: (*) indicates significant at 5% level of significant

Table 7: Result for Unit Root Test

From the results, almost all the variable has a unit root at level I(0). Only LNINDUSTRIAL does not have unit root at level. At the first differenced, all of the variable does not have unit root or the series is now become stationary. This result are essential before proceeding into regression analysis using Ordinary Least Square.

4.4 Cointegration test

Cointegration test is used to detect if there is long-run relationship between the dependent variables and independent variables. Usually, when a time-series data possesses a unit root, converting the data into first different would solve the problem of non-stationarity, but that would damage the essential economic element of the data itself, hence, cost-benefit analysis must consider first, which is by detecting the long run relationship between the variables, or called as cointegrated. The Bound test Cointegration will be used in conducting the test. According to Ridzuan (2020), If the F-statistic of the bound test falls below the bound level, the null hypothesis cannot be rejected. On the other hand, if the F-statistic lies exceed the upper bound level, the null hypothesis is rejected, which indicated the existence of cointegration. If, however, it falls within the band, the result isinconclusive. Below is the resultss obtained from Eview :

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	6.549821	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	30	Finite Sample: n=30		
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Figure 9: Cointegration test

The F statistics value of 6.5498 is obviously above the upper bound level, which is the I(1). The decision rule is to reject null hyphotehsis of no cointegration if F value is greater than upper bound level. Thus, it can be concluded that it there is a long run relationship between the variables and it is cointegrated. If a model is cointegrated and has unit root, it is advisable for the model to be estimated in its original units, that is, there is no need for the series to be converted to the first difference and thus, spurrious results can be avoided. Even though individual variables might be nonstationary, it's possible for linear combinations of nonstationary variables to be stationary, or *cointegrated* (Studentmund, 2016).

4.5 Serial Correlation

Serial Correlation is a phenomenon in which there exists a connection between current values of error term with the past value of other error term. The past value of error term could be in the form of 1 day lagged of its current error term. Identification of serial correlation is important to ensure the estimated regression output could be the most minimized standard errors and variance, thus, to increase the reliability of the equation. Source of serial correlation could also be due to the omitting important explanatory variables. For this research, the LM test will be utilized in conducting the test, in which the chi-square will be the subject of the decision rule at the 5% level of significance.

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	10.71395	Prob. F(2,27)	0.0004
Obs*R-squared	15.04398	Prob. Chi-Square(2)	0.0005

Figure 10: Serial Correlation

The above is the result of serial correlation test at up to 2 lags, the results suggest the p-value of the Chi-Square is lesser than 5% level of significance and thus reject the null hypothesis and concluded that the equation has a serial correlation problem. Despite having serial correlation problem, the researcher has decided to proceed the OLS estimation without employing any remedy to fix the issue. According to Maeshiro (1996), the bias introduced by serial correlation often are of opposite signs, so they offset each other. As a result, OLS can do better than a technique that eliminates only the bias caused by serial correlation. Furthermore, a study by Keele & Kelly (2006) quoted evidence from Monte Carlo studies that the size of the bias introduced by seriall correlation in a small sample is often fairly low, which is applicable in this research, which only utilized 34 observations.

4.6 Heteroskedasticity Test

One of the OLS assumptions is constant variance of the error term, or in another words, the variance of the error term shall be equal. When the variance of error term being equal, it is called homoscedastic while if the variance being unequal, it is called heteroskedastic. Ensuring homoscedastic of the equation is essential in producing the best minimized error estimated output. The presence of heteroskedasticity would cause a downward biased on the standard errors. This will consequently affect the reliability of t-test onwards since Standard error were crucial element in computing t-value. In this research, Breusch – Pagan – Godfrey heteroskedasticity test will be utilized. The decision rule for this test Is to reject the null hypothesis if p-value is lesser than 5% level of significance. Below are the hypotheses and result of the heteroscedasticity test.

Null Hypothesis: Ho	Homoskedasticity (Error variances are equal)
Alternate Hypothesis: Ha	Heteroskedasticity (Error variances are not equal)

Table 8: Hypothesis for Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.700901	Prob. F(4,29)	0.1768
Obs*R-squared	6.460872	Prob. Chi-Square(4)	0.1673
Scaled explained SS	2.556944	Prob. Chi-Square(4)	0.6345

Figure 11: Heteroskedasticity

The result showed that P-value for Chi-Square is more than 5%, which translates to the failure of rejecting the null hypothesis. This indicates that the equation does not have heteroskedasticity problem, thus meeting the OLS assumption. The avoidance of the problem is attributed to the employment of double-log function form. The equation was regressed using double log functional form, which is one of the remedies in dealing with heteroskedasticity. The removal of the effect of heteroskedasticity will yield a much reliable hypothesis testing later.

4.7 Multicollinearity

Multicollinearity is a phenomenon in which there is a perfect correlation between the independent variables. One of the OLS assumptions emphasized that no independent variable is a perfect linear function of other explanatory variables. The consequences of multicollinearity are like heteroskedastic model, which it will produce higher variance and standard errors. The effect of independent variables on another independent variable would make it hard for the software to distinguish the effect of one to another and thus produce an unreliable beta coefficient. In a model that has multicollinearity, the minimum variance of each variable is just large and thus effect the reliability of the regression output.

This research will utilize Variance Inflation Factor (VIF) to conduct Multicollinearity test. The decision rule for this statistical procedure is by comparing the Centered VIF value of each variable to the benchmark value of 5, if the VIF value of the respective variable is larger than 5, it is said that the variable has a severe multicollinearity. Below is the summary of the VIF results:

Variance Inflation Factors
Date: 12/31/21 Time: 14:38
Sample: 2018M10 2021M07
Included observations: 34

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	183.6591	452278.2	NA
LNINDUSTRIAL	0.184770	10171.85	2.576578
LNINFLATION	9.325219	528543.3	2.827524
LNM2	0.350221	181172.1	1.221998
LNOIL	0.011394	446.5061	3.496627

Figure 12: Variance Inflation Factors

Variable	Results
Inflation	No severe multicollinearity
Industrial Production	No severe multicollinearity
Money Supply	No severe multicollinearity
Crude Oil	No severe multicollinearity
Bursa Malaysia Energy Index	No severe multicollinearity

Table 9: Result for Multicollinearity

4.8 Normality Test

Testing the normality of the data is an essential element before conducting any further statistical analysis. For example, in conducting t-test, it is assumed that the data is normally distributed, hence, normality test is needed, and if there is any non-normal distribution of the data, further adjustment is required in the form of remedy. Jarque-Bera normality test is utilized for this research. The null hypothesis for this test is that the data is normally distributed while the alternative hypothesis is vice versa. The decision rule for this testing is, if p-value is bigger than 5% level of significance, it fails to reject the null hypothesis and conclude that the data is normally distributed. Below is the summary of all normality test for each variable:

Variable	p- value	Decision Rule
Inflation	0.1462	Fail to reject Ho: Data is normally distributed
Bursa Malaysia Energy Index	0.4614	Fail to reject Ho: Data is normally distributed
Money Supply	0.2144	Fail to reject Ho: Data is normally distributed
Oil	0.0373	Reject Ho Data is not normally distributed
Industrial Production	0.0000	Reject Ho: Data is not normally distributed

Table 10: Result for Normality Test

The results above showed only 3 variables that had its raw series to be normally distributed, namely Inflation, Money Supply, and Bursa Malaysia Energy Index. Series for Oil and Industrial Production are not normally distributed given their p values lower than 5% level of significance. Despite two of the raw data being not normally distributed, the double log functional form is employed to all the variables in running the regression analysis. Initially, the researcher thought that converting all the variables into log-form would help to solve the normality problem, but unfortunately, it does not. Despite that, the researcher has decided to maintain the variables in the model.

4.9 Regression Analysis

The regression analysis method is used to assess the relationship between more than two variables and determine whether the independent variables can explain the variation of the dependent variable. The researcher utilized the value of coefficients to interpret the impact of independent variables on the dependent variable. The log base (ln) is being applied to all the variables to facilitate a more straightforward interpretation of data, which is in percentage- basis. Percentage basis were widely used for the movement and comparison of economic and financial data. Consequently, this translates to the equation of being double-log form.

Dependent Variable: LNENERGY
Method: Least Squares
Date: 12/31/21 Time: 12:04
Sample: 2018M10 2021M07
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.40927	13.55209	1.358409	0.1848
LNINDUSTRIAL	-0.527851	0.429848	-1.227993	0.2293
LNINFLATION	5.148589	3.053722	1.686004	0.1025
LNM2	-2.400558	0.591795	-4.056403	0.0003
LNOIL	0.247468	0.106742	2.318374	0.0277

R-squared	0.643220	Mean dependent var	6.804664
Adjusted R-squared	0.594009	S.D. dependent var	0.184410
S.E. of regression	0.117501	Akaike info criterion	-1.309681
Sum squared resid	0.400390	Schwarz criterion	-1.085216
Log likelihood	27.26458	Hannan-Quinn criter.	-1.233132
F-statistic	13.07066	Durbin-Watson stat	0.842345
Prob(F-statistic)	0.000003		

Figure 13: Regression Analysis

Estimated Equation
LNENERGY = 18.4093 - 0.5279LNINDUSTRIAL + 5.1486LNINFLATION – 2.4006LNM2 + 0.2475LNOIL

Two variables showed statistically significant results at the 5% level, which are Money Supply and Oil price, given their P-value of 0.0003 and 0.0277 respectively. Meanwhile, Inflation and Industrial Production had their p-values higher than 5%, suggesting that the variables have no significant impact on the dependent variable. Below ae the summary of the p values for all the variables.

Variable	Decision Rule
Money Supply	P-value < 0.05, reject null hypothesis The variable is statistically significant
Oil	P-value < 0.05, reject null hypothesis The variable is statistically significant
Industrial Production	P-value > 0.05, fail to reject null hypothesis The variable is not statistically significant
Inflation	P-value > 0.05, fail to reject null hypothesis The variable is not statistically significant

Table 11: P-value decision rule

4.9.1 T-test

The T-test measures the individual hypotheses of slope coefficients. The regression results showed that only two variables were statistically significant at the 5% level of significance which are Money Supply and Oil price. These are similar to the findings of the P-value, as P-value is deemed an alternative for the T-test. Furthermore, Industrial Production and Inflation were proven to have statistically insignificant impact on the Bursa Malaysia Energy Index. The Degrees of Freedom (DOF) in conducting the T-test is 29 (34 - 4 -1). The Degrees of Freedom (DOF) facilitates in finding the critical T-value at 5% level of significance. The critical T-value at 5% level of significance with Degrees of Freedom (DOF) of 29 is 2.0453 (Two-tailed). The two-tailed critical t value is utilized rather than the one-tailed because the nature of the proposed hypothesis is non-directional. Non-directional hypothesis translates in using a two-tailed T-test. Below is the summary for the t-test.

Variables	T value	Critical T value	Decision Rule	Conclusion
Oil Price	2.3184	2.0453	2.3184 > 2.0453	Significant
Money Supply	4.0564	2.0453	4.0564 > 2.0453	Significant
Industrial Production	1.2280	2.0453	1.2280 < 2.0453	Insignificant
Inflation	1.6860	2.0453	1.6860 < 2.0453	Insignificant

Table 12: T value decision Rule

4.9.2 F-test

The F test measures the fitness of the whole equation. Using the decision rule, the F value of the equation is 13.0706, which is higher than the critical F value of 2.7014. The result suggests that the overall equation has a significant overall fit. The F value is purely obtained from the regression results above.

F Value	Critical F value	Decision Rule	Conclusion
13.0706	2.7014	Reject the null hypothesis if: F Value > Critical F Value	The F value of 13.0706 is greater than the critical F value of 2.7014. The equation is proven to have a significant overall fit

Table 13: F value decision rule

4.9.3 Coefficient of Determination

The Coefficient of Determination, R^2, measures the equation's overall fitness, which indicates the variation of Y around its mean explained by the regression model (Pearson, 2016). In this case, the coefficient of determination measures the variation of the dependent variable, Bursa Malaysia Energy Index, around its mean. Hence, the Coefficient of Determination is the ratio of the Explained Sum of Squares (ESS) to the (TSS) Total Sum of Squares. If the variation of the dependent variable is explained chiefly, the proportion of Explained Sum of Squares (ESS) is high, the value of R^2 must be closer to 1. The range of R^2 is within the range of 0 until 1. R^2 close to 1 shows an excellent overall fit, whereas a value near zero shows a failure of the estimated regression equation to explain the values of Y variation around its mean. In this case, the R^2 is 0.6432, which is greater than 0.5. The value indicates that only 64.32 % of the total variation of our dependent variable can be explained by the regression model, while the remaining 35.68 % of the variation is unexplained.

4.9.4 Adjusted Coefficient of Determination (Adjusted R^2)

The Coefficient of Determination is adjusted by factoring in the degrees of freedom to avoid a nonsensical increase of R^2 value. According to Studentmund (2016), the Adjusted R^2 measures the percentage of the variation of Y around its mean that is explained by the regression equation, adjusted for degrees of freedom. An increase in the Adjusted R^2 tells that the benefit of adding a new variable exceeds the cost, while a decrease in R^2 value indicates that the marginal cost exceeds the benefit. In this regression model, the Adjusted R^2 of 0.5940 is slightly lower than the value of R^2. The value tells that after adjusting to degrees of freedom, only 59.40 % explained the variation of dependent variables.

4.10 Summary of Results

4.10.1 Oil Pirce

	Hypothesis	Outcomes
Ho	Oil price has no significant impact on Bursa Malaysia Energy Index	Not Supported
Ha	Oil price has significant impact on Bursa Malaysia Energy Index	Supported

Based on the regression results, it is proven that Oil price has significant impact on Bursa Malaysia Energy Index. The significance of this variable was proven by both statistical testing of t-test and p-value, in which favored to the rejection of null hypothesis. The Beta coefficient of 0.2475 is being interpreted as follow: If Oil price increase by 1%, Bursa Malaysia Energy Index will increase by 0.2475%. Furthermore, the correlational analysis of oil price and Bursa Malaysia Energy Index also showed a significant and positive moderate correlation between the variables. These results were conceptually in line with study by Park & Ratti (2008) which found a statistically significant positive relationship between oil price and real stock returns in Norway. In Addition, the result above is similar to a study by Sadorsky (2001) which investigates the effect of crude oil price on sectoral indices, the study found that an increase in oil price increases the return to Canadian oil and gas stock prices.

4.10.2 Industrial Production

	Hypothesis	Outcomes
Ho	Industrial Production has no significant impact on Bursa Malaysia Energy Index	Supported
Ha	Industrial Production has significant impact towards Bursa Malaysia Energy Index	Not supported

The regression result showed Industrial Production to have no significance impact on Bursa Malaysia Energy Index. The non-significance of this variable was proven by both statistical testing of t-test and p-value, in which favored to the failure of rejecting the null hypothesis. P-value was obviously greater than 5% level of significance. The insignificance impact of this variable on dependent variable would make the interpretation of the coefficient to be rather useless. The results of the correlational analysis also provide the similar outcome in which there is no significance correlation with the Energy Index.

4.10.3 Money Supply (M2)

	Hypothesis	Outcomes
Ho	Money Supply has no significant impact towards Bursa Malaysia Energy Index	Not supported
Ha	Money Supply has significant impact towards Bursa Malaysia Energy Index	Supported

Money Supply has significant impact on Bursa Malaysia Energy Index. The significance was proven by both t-test and p-value, in which favored to the rejection of null hypothesis. The regression coefficient of -2.40006 for this variable is being interpreted as follow: If Money Supply price increase by 1%, Bursa Malaysia Energy Index will decrease by 2.4%. In Addition, the correlational analysis of Money Supply and Bursa Malaysia Energy Index also showed a significant and negative moderate correlation between the variables, both regression and correlation results indicate a similar negative linkage between these variables. These results were against the previous study, which found that money supply has significant positive impact on stock returns. (Ahmed & Mohamed, 2018 ; Padhi & Naik, 2012).

4.10.4 Inflation

	Hypothesis	Outcomes
Ho	Inflation has no significant impact towards Bursa Malaysia Energy Index	Supported
Ha	Inflation has significant impact towards Bursa Malaysia Energy Index	Not supported

Based on the regression results, Inflation is seen to have no significant impact on Bursa Malaysia Energy Index. The non-significance of this variable was proven by both statistical testing of t-test and p-value, in which favored to the failure of rejecting the null hypothesis. The insignificance impact of this variable on the energy index would make the interpretation of the coefficient to be useless. The results were contrary from previous study which found significant impact of inflation towards the stock market performance (Omran & Pointon, 2001; Kwofied & Ansah, 2018; Nishat & Shaheen, 2004; Apergies & Eleftheriou, 2002).

CHAPTER FIVE
CONCLUSION

5.1 Introduction

This chapter will discuss the overall findings of each variable from the previous chapter and conclude the significance of each variable. The chapter begins with a recapitulation of the study, the conclusion of the main findings, and recommendations for future research.

5.2 Recapitulation of Study

The primary objective of conducting this study is to investigate the effect of Industrial Production, Inflation, Money Supply and Oil Price towards the Bursa Malaysia Energy Index. The study has decided to utilize one dependent variable, Bursa Malaysia Energy Index and four independent variables: Industrial Production, Inflation, Money Supply and Oil price. The objective of this research can be summarized as below:

I. To study the relationship between Crude Oil Price and Bursa Malaysia Energy Index
II. To investigate the relationship between Industrial Production and Bursa Malaysia Energy Index
III. To study the relationship between Inflation (CPI) and Bursa Malaysia Energy Index
IV. To investigate the relationship between Money Supply and Bursa Malaysia Energy Index

5.3 Conclusion and Main findings

The research on the impact of macroeconomic variables and oil price towards Bursa Malaysia Energy Index has been an interesting topic to explore. The data analysis of this research employed 3 major testing procedures (Descriptive analysis, Correlation analysis and Regression analysis) and 5 minor testing procedures (Unit Root Test, Cointegration, Serial Correlation, Heteroskedasticity and Multicollinearity) prior to the estimation of Ordinary Least Square (OLS) equation. The unit root test suggested the series were integrated at level I(o), which indicates that the equation might produce spurious regression results. Despite that, the co-integration test revealed the existence of a long run relationship between the dependent and independent variable in which consequently suggests the estimation using OLS is reliable. As for the regression results, out of all the four independent variables, only 2 of the variables have significant impact towards the dependent variable, which are Money Supply and Oil price.

First, Oil price was proven to have a significant impact on Bursa Malaysia Energy Index. The result of correlational analysis was also similar, both tests concluded the significance impact of oil price on Bursa Malaysia Energy Index. The results were similar to previous studies, which found a statistically significant relationship between the variables (Park & Ratti, 2008; Sarodsky, 2001). Our findings were deemed logical and relevant based on 1 premise, which is, 95% of the constituents of the Energy Index were from oil & gas firms and these firms benefited from the rise of crude oil price due to higher profit margins. Having this argument intact, there is nothing suspicious and unique to have such regression and correlational results which favours to the significant impact of the variable towards the energy Index.

Second, the regression and correlational results as well proved the independent variable, money supply, to have a statistically significant impact on Bursa Malaysia Energy Index but favored towards having an inverse relationship between the variables. In terms of relationship-direction, the results were against the previous study, which found that money supply has significant positive impact on stock returns. (Ahmed & Mohamed, 2018 ; Padhi & Naik, 2012). The justification of having different relationship direction is most likely due to different usage of dependent variable, previous results utilized a country's stock index as a dependent variable, which this research utilized a country energy index, thus, it is not an apple-

to-apple comparison Having said that, this finding undoubtedly provides new insight on how the amount of money supply affect oil and gas firms, which the index act as a proxy.

Third, Inflation proves to have no significance impact on Bursa Malaysia Energy Index. Despite that, the correlational analysis provides a different outcome, in which there is a significance and positive moderate relationship between the variables. This research will prioritize the outcome of regression result. Most of the previous study found a significant impact of inflation towards stock market performance (Talla, 2003; Omran & Pointon, 2001; Kwofied & Ansah, 2018). The justification for the variable having no insignificant impact on the energy index is an interesting topic to be discussed, since Consumer Price Index usually factor in the oil price in the computation of the Price Index, the researcher expects a significant impact of this variable on the energy index. Despite that, it is undeniable that there might be some technical errors such as serial correlation, which might affect the regression result.

Lastly, both regression and correlational analysis yield a similar output for Industrial Production, in which the variable have no significance impact towards Bursa Malaysia Energy Index. These results were not in line with previous studies, which found a statistically significant impact of Industrial Production towards stock market performance (Ahmed & Mohammed, 2018; Kim, 2003; Nishat & Shaheen; 2004). The justification to this is probably due to shift of sectors from investors, in the event of rising economic activities, it is expected that investors will look into cyclical stocks such as those who are in Consumer Product & Services and Industrial Product. Thus, it is not a rare phenomenon for the researcher to get such out outcomes.

5.4 Limitation of study

5.4.1 Does not consider any fundamental impact

This research does not consider any fundamental influence that could impact on the Energy Index. Fundamental influence such as Political landscape, News on Natural Disaster, or anything external matter that could influence an investor's decision making.

5.5 Recommendation for future research

5.5.1 Utilize different sectoral index as dependent variable

It is recommended for future researcher to utilize different sectoral indices as the dependent variable to observe how macroeconomic factor might affect them. There are few available indices such as transportation index, consumer product and service, financial services, healthcare, and others. It is believed that having more insight on how economic factors might influence these indices will undoubtedly contributes to better decision making among investors.

5.5.2 Fix serial correlation error to obtain better OLS estimates

The researcher had initially found a serial correlation error on the model prior to the regression estimation. Despite that, the researcher has decided to continue estimating the model as the researcher thought that the effect of serial correlation in a small sample is not severe. Despite that, it is recommended for future investor to employ remedy into their model if serial correlation exists, this is to obtain Best Linear Unbiased Equation.

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