THE IMPACT OF COMMODITIES PRICE ON VOLATILITY OF RINGGIT MALAYSIA

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The Impact of Commodities Price on Volatility of Ringgit Malaysia

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DECLARATION

I hereby declared that:

1) MBBC25106 Research Project is the end result of my own work and that due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

2) No portion of this research project has been submitted in supporting of any application for any other degree or qualification of this or any other university.

3) The word count of this research report is 8835 words

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DEDICATION

The research project is dedicated to those who had fully supported me throughout my study life. I am glad and would like to dedicate this research project to my parents who had given their support with encouragement throughout the years. I also dedication to my siblings and friends for their continuous help and support without reciprocate.

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ABSTRACT

The purpose of this research is to examine the impact of commodities price on volatility of Ringgit Malaysia by using monthly data from year 2010-2014. Multiple linear regression model is regressed using E-View to study the impact of commodities price (crude oil price, palm oil price, rubber price and iron ore price) on volatility of Ringgit Malaysia (USD/MYR).

Empirical results show that crude oil price and rubber price has significant negative impact on volatility of exchange rate (USD/MYR) while palm oil price and iron ore price do not have significant impact on exchange rate. Throughout the analysis process, Ordinary Least Square model is adopted in this study.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

In this chapter, we will explain the purpose of conducting this research and summary which link to the other chapter. There are limited studies on volatility of exchange rate by the commodities price in different country and the importance of this study will be discussed. This topic is focus on exchange rate volatility in Malaysia and problem statement will be introduced followed by purpose and hypothesis. Research question and hypothesis will be listed and significant of the study will be elaborated here. Lastly, layout of the research will be outlined.

1.1 Background of Study

Exchange rate is the value of a country's currency in term of another currency. At the same time, exchange rate can be fixed or floating. The currency is determined by market force is known as floating rate while the currency is pegged with another nation currency is known as fixed rate. Malaysia had adopted the both method in determining the exchange rate. Before 1998 September, Malaysia adopting floating rate, however, during the economic crisis in 1997, Ringgit Malaysia depreciated sharply which lead to Ringgit lost 50% of its value against US dollar. Therefore, Bank Negara Malaysia pegged the currency with US dollar at the rate of USD/MYR 3.8 to stop the Ringgit swing.

After several years, Bank Negara Malaysia decided to stop pegging Ringgit on US dollar until today. However, this action has great impact on country economic as the Ringgit is determine by the market force. This also mean that the business or any interest dealing with Ringgit now facing the exchange rate as previously exchange rate is not volatile but now yes. The volatility of currency will affect the country trade flow in short run and might led to long run effect on several industries (Bahmani-Oskooee & Harvey, 2011; Barkoulas, Baum, & Caglayan, 2002). Other than trade flow, exchange rate variability actually has impact on the growth of international trade(De Grauwe, 1988).

Commodity is a basic goods used in business that is interchangeable with other commodities and normally act as the inputs to produce services or goods. Commodity price is decided as a function of its market as a whole and for those well-established commodity, it is traded actively on spot and derivative markets. There are a lot commodities traded in the world and can be classified into few major groups like energy, metals, agricultural and others. The prices of the commodities are in floating rate and it based on the demand and supply of the particular commodity.

In Malaysia, petroleum, natural gas, palm oil, rubber, textiles, solar panel and others commodities are exported. The commodity prices actually have impact on the exchange rate of exporters (Chen & Rogoff, 2003). For countries like Malaysia which have varieties of commodity and accounted huge amount in national exports, the increase or decrease of commodity prices would definitely reduce or increase the national income will lead to fluctuation of exchange rate. In this research, crude oil, palm oil, rubber and iron price will be included in determining the impact on exchange rate of Ringgit.

Crude oil is one of the most important commodities in the world. Crude oil is the raw material and can be refined to produce different types of useful product like fuel oil and gasoline, asphalt, lubricating oil, plastic and others. The exporters and importers of crude oil are affected by the volatility of price. Research are carried out on this issue around the world to determine its impact on their economy (Dauvin, 2014; Eslamloueyan & Kia, 2015; Masih, Peters, & De Mello, 2011). Hence, it shows that the crude oil movement has significant impact on country economy. Therefore, some of the researchers tend to find out the model to predict the exchange rate using the crude oil prices (Ferraro, Rogoff, & Rossi, 2015).

Palm oil is the major export of some South East Asia export like Indonesia and Malaysia. According to MPOC (2014), the palm oil export of Malaysia is accounted for 44% of world export. Palm oil are normally manufacture into cooking oil as main product. As the time go on, the idea of biofuel is researched and finally they found out the new uses of palm oil. The research done on the relationship between palm oil and exchange rate are limited as there is a lot of substitution throughout the world.

Besides, the use of natural rubber decrease since the scientist discovered the synthetic rubber. However, in certain product like glove synthetic rubber cannot be used in the production as it contain lot of chemical which will cause skin allergic. In some of the Tropicana country, lands are preserved for the plantation of rubber tree. In fact, the major rubber exporter like Thailand and Malaysia do promote the farmer to plant rubber tree. However, according to the Natural Rubber Statistics (2015), the export of rubber has the sign of stagnant or decreasing.

This research is conducted to find out the impact of commodities price on volatility of Ringgit. The objective of the research is to provide useful information to help policy makers in decision making and improve the economic growth.

1.2 Problem Statement

According to a news reported by Kok (2014), decrease in commodity price led to reduces in disposable incomes of consumer, exports and term of trade in

Malaysia. In addition, the news also reported that lower commodity prices would worsen the government's fiscal balance and hit the Malaysian economy through government spending. Furthermore, oil and gas sector in Malaysia contributed 30% of government annual revenue. Therefore, it becomes an interest point for us to find out whether the commodities price has impact on Ringgit exchange rate or not.

Many researches had been done by the previous researcher regarding the impact of volatility of exchange rate on economy factors like GDP, term of trade, foreign direct investment and many more. However, the researches on impact of commodities prices on exchange rate volatility are very limited and most of the studies done were based on foreign country. Therefore, this study intends to fill the gap by determine the commodities that have impact on Ringgit exchange rate.

This study measures the alternatives to determine the exchange rate of Ringgit. Examination on the impact between commodities price which are crude oil, palm oil, rubber and iron on volatility of Ringgit.

1.3 Research Objective

This study is to identify the impact of commodities price on volatility of Ringgit Malaysia. In the study, we selected the time frame from 2010 to 2014 and the data are collected in monthly basis. All the data collected are from secondary sources to determine the volatility of ringgit.

1.3.1 General Objective

This study is to measures the impact of commodities price on volatility of Ringgit Malaysia. We analyze the significant commodities export by Malaysia. We also analyze the selected independent variable individually.

1.3.2 Specific Objective

i. To study the impact of crude oil, palm oil, rubber and iron on volatility of Ringgit Malaysia from 2010 to 2014.
ii. To study the impact of crude oil on Ringgit Malaysia from 2010 to 2014.
iii. To study the impact of palm oil on Ringgit Malaysia from 2010 to 2014.
iv. To study the impact of rubber on Ringgit Malaysia from 2010 to 2014.
v. To study the impact of iron on Ringgit Malaysia from 2010 to 2014.

1.4 Research Question

i. Is there any significant impact between crude oil, palm oil, rubber and iron on volatility of Ringgit Malaysia from 2010 to 2014?

ii. Is there any significant impact between crude oil and volatility of Ringgit Malaysia from 2010 to 2014?

iii. Is there any significant impact between palm oil and volatility of Ringgit Malaysia from 2010 to 2014?

iv. Is there any significant impact between rubber and volatility of Ringgit Malaysia from 2010 to 2014?

v. Is there any significant impact between iron and volatility of Ringgit Malaysia from 2010 to 2014?

1.5 Hypothesis of the Study

H0: There is no significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia.

H1: There is significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia.

H0: $\beta 1 = 0$ (There is no impact between crude oil and volatility of Ringgit Malaysia)

H1: $\beta 1 \neq 0$ (There is significant impact between crude oil and volatility of Ringgit Malaysia)

H0: $\beta 2 = 0$ (There is no impact between palm oil and volatility of Ringgit Malaysia)

H1: $\beta 2 \neq 0$ (There is significant impact between palm oil and volatility of Ringgit Malaysia)

H0: $\beta 3 = 0$ (There is no impact between rubber and volatility of Ringgit Malaysia)

H1: $\beta 3 \neq 0$ (There is significant impact between rubber and volatility of Ringgit Malaysia)

H0: $\beta 4 = 0$ (There is no impact between iron and volatility of Ringgit Malaysia)

H1: $\beta 4 \neq 0$ (There is significant impact between iron and volatility of Ringgit Malaysia)

1.6 Significance of the Study

The significance of this research is to identify the commodities that affect the Ringgit exchange rate. By carry out this study, we would have a clearer picture on which commodities is affecting the exchange rate and let the readers have a better understanding on the impact of commodities price on exchange rate volatility. Hence, the result of this research will provide information to aid the future researchers, policy makers and even investors in making their decision.

It is important to better understanding on which commodities will have significant impact on exchange rate of Ringgit. We believe that this study providing an empirical evidence to help the investors, companies and government to formulate their strategy to reduce their exchange risk by referring to the significant commodities price. Furthermore, analyzing the impact of commodities price on volatility of exchange rate would able to identify which commodities have greater impact on exchange rate. Hence, the related parties will have better knowledge on handling this issue when any favorable or unfavorable event occurs especially in this unexpected economic condition.

Lastly, this study will provide some insight to the future researchers with our research result. Future researcher can use the result of this research as their reference which their topic has similar issue. This may help them in constructing or guiding them to obtain more accurate result for either academic or business purposes.

1.7 Chapter Layout

Chapter 1

The introduction chapter included the background of the study, problem statement, research objective, hypothesis and significance of study.

Chapter 2

The literature review chapter included the summary of the studies that on the same field, exploratory framework. Review of associated theories and conceptual framework will be carried out in this chapter.

Chapter 3

In this chapter, the steps used to analyze the data will be explained. It consist of research design, method to collect data, sampling design and size, research instrument, data processing and lastly the data analysis.

Chapter 4

The data collected will be analyzed in this chapter by using Eview. At the same time, the hypothesis written in chapter 1 will be analyzed.

Chapter 5

The discussion of major findings, implication for managerial and study, limitation and recommendation will be carried out in this chapter.

1.8 Conclusion

In this chapter, research background, problem statement, objective of research, research questions, hypotheses of study, significant of study and chapter layout were done. The purpose of chapter 1 is to give an overview of this research objective. In next chapter, literature review will be carried out.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, the independent variable (crude oil price, palm oil price, rubber price and iron ore price) will be examined to determine whether it have impact on volatility of Ringgit or not. Besides, the review of theoretical framework will be carried out and a new framework will be proposed in the following step. Lastly, hypotheses in line with the objective and literature will be developed.

2.1 Literature Review

2.1 .1 Volatility of MYR (Dependent Variable)

Volatility can be defined as the degree of changes over time. When the degree of changes is high, the more volatile it is. According to Barkoulas, Baum and Caglayan (2002), the volatility of exchange rate will decrease the trade volume as it increase the risk of trading due to the uncertain movement of the currency. To avoid the risk brought by the volatile exchange rate, risk adverse trader will trade less on these currencies. However, the very risk adverse traders would trade more in order to protect their revenue (De Grauwe, 1988). In other words, the change in trade volume would affect the volatility of MYR and vice versa.

Malaysia was pegged with USD until 2005 and floating rate replaced it afterward. Besides, Malaysia is a commodities exporter as the commodities make up a significant element in exports amount. This is very similar with the sample used in the research of (Chen & Rogoff, 2003) consisting of Australia, New Zealand and Canada which their floating real rates are influenced by the price of their commodities exports. In other words, we can assume one of the factors that affect volatility of Ringgit is the price of Malaysian exports. This is consistent with the result of Ferraro, Rogoff and Rossi (2015) where the exchange rate of the country changed when it's major exports price changed. This relationship is robust when the researchers applied the realized commodity price changes in their regression analysis but not the lagged price change test.

The volatility of commodity exporters' currency is highly related with the volatility of commodity prices. However, commodity prices not only affected the exporters' currency but do impact the commodity importers' currency as the change in commodity price would impact their cost on acquiring the commodities (Gochoco-Bautista, Wang and Yang, 2014). Gochoco-Bautista et al. (2014) also proven that large economies countries like India, Japan and Korea with significant heavy industries are sensitive with the commodities prices.

2.1.2.1Crude oil

Crude oil also named as “black gold” has various colour and viscosity based on its hydrocarbon composition. It can be refined to produce diesel, gasoline and various forms of petrochemicals. Crude oil has a lot impact on the importer or exporter economy. According to Masih, Peters and De Mello (2011), increase in the oil price brings two crucial impact on the economic. First, countries with the oil constitute larger portion in energy sector having inflation when the oil price increased. Second, cost of final good increase when oil price increase. This is cause by increase in cost of gas and petroleum lead to cost of production increase.

Most of the large economies countries in Asia with significant heavy industries like Japan, India and Korea that strong dependence on energy import are heavily impacted by change in the price of energy. According to Gochoco-Bautista et al. (2014), the changes in energy commodities price have a strong impact on their interest rate and industrial production. For the countries that do not have significant industries like Philippines, Thailand and Taiwan currencies are not sensitive with the energy price change.

Fuel and non-fuel commodity prices encountered fluctuation in the early 2000s has sparked interest on the relationship between term-of-trade of countries and real exchange rate whose exports are mainly constitute of commodities. According to Chen and Rogoff (2003), their research shows that there is positive relationship between the term-of-trade and real exchange rate. Oil currencies were then observed in several research with definition of currencies that appreciate when the price of oil increase (Korhonen and Juurikkala, 2009). In addition, Dauvin (2014) has investigated the relationship between the real effective exchange rate and energy prices of commodity-exporting countries. Based on the estimation, the researcher able to prove that “energy currencies” is exist which consistent with previous result.

Furthermore, Habib and Kalamova (2007) had carried out a research on three main oil exporting countries: Saudi Arabia, Norway and Russia whether the oil price has an effect on the real exchange rates. In their result, Russia has positive long run relationship between oil price and real exchange rate. However, the real oil prices do not have impact on the real exchange rates for Saudi Arabia and Norway. The real oil price together with term of trade, reserve differential and productivity differential is an important factor of the real exchange rate (Tsen, 2011). The external factors like debt management and foreign countries’ debt as well as crisis can affect the real exchange rate of an oil-producing country had been ignored in the existing literature. In addition, it is possible that a small change from a long-run equilibrium is ignored but agents reach considerably to an enormous deviation.

2.1.2.2 Palm oil

Palm oil is an edible vegetable oil extracted from the reddish pulp of the fruit of the oil palms, mainly the African oil palm Elaeis guineensis and to a lesser extent from American oil palm Elaeis oleifera and maripa palm Attalea maripa. Oil palm is considered as an agricultural commodity and has negative relationship with the value of USD dollar. In other words, an increase in agricultural commodity prices occurs simultaneously with the decrease in value of USD. The findings of Rezitis (2015) indicate that US dollar exchange rate as well as the world oil prices affect the agricultural commodity prices. In addition, the research support bidirectional panel causality effects between crude oil prices and international agricultural prices as well as between US exchange rates and international agricultural prices.

Based on the historical data, past increase of crude oil prices may have caused in higher agricultural commodity prices as most of the production may rely on the use of crude oil. At the same time, higher demand for biofuels has further strengthened the connection between crude oil and agricultural commodities which can be explained as the higher crude oil price led to a higher demand for agricultural commodities to substitute biofuel for crude oil (Abbott, Hurt and Tyner, 2008, 2011). Furthermore, Rezitis and Sassi (2013) shows that US real effective exchange rate has negative effect on commodities food prices while crude oil has a positive effect and food prices present cyclically.

Besides, Nazlioglu and Soytas (2012) investigate the dynamic relationship between US dollar exchange rates, oil prices and 24 world agricultural commodities in a panel framework using causality analysis and panel co-integration for the interval from 1980 to 2010. In their findings, the researchers proven that there is positive impact of a weak dollar on agricultural prices. Besides, impact of world oil price changes on agricultural commodity prices also determined by their empirical result.

Financial crisis in 1997 had caused the Asian country exchange rate plunged significantly especially the South East Asia country. During that time, Malaysia and Indonesia is the main palm oil exporter in the world. According to Ardiansyah (2002), the plunge in exchange rate had contributed to the increase in demand of palm oil and palm kernel. The increase in the demand of palm oil and palm kernel had led to the increment in their prices. In other word, foreign exchange rate of the palm oil exporters have negative relationship with the palm oil and kernel prices.

2.1.2.3 Natural Rubber

Natural rubber also known as India rubber makes up by organic compound isoprene and other components is widely produced in Malaysia. According to Natural Rubber Statistics (2015), rubber industry in Malaysia had contributed RM30.94 billion in our export figures. The rubbers are widely used in the production of glove, tyres, latex thread and others which increase the revenue of the country. However, the natural rubber production in Malaysia is declining since 2006 from 1.28million tonnes to 0.67 million tonnes in 2014. One of the reasons that cause the decrease in production is the plunge in rubber price (Yulisman, 2013).

Rubber trees are widely found in South East Asia and some of the tropical climates country. Hence, it becomes an advantage for the exporters as the supplies of natural rubber are limited. However, the prices of natural rubber are affected by some factors. According to Sang, Songsak, Sanzidur, Huang and Aree (2012), volatility of exchange rate, crude oil market and climatic factors have significant impact on Thai rubber price return in the world market using VARMA-GARCH and copula-based model.

In the study of Soares, Silva and Rossmann (2013), the author examine the effect of exchange rate adopted by Brazil and of the dollar over the prices of Brazilian natural rubber in Brazilian currency. As a result, the author concluded that the natural rubber priced in Brazilian currency was more affected by the dollar variation instead of variation in exchange rate. In other word, the variation of US dollar exchange rate would have more impact than Brazilian Real on rubber price.

Furthermore, the exchange rate will affect the trade flow among the countries. In the study of Soleymani and Chua (2014), the result shows that out payments and in payments of for most of industries in the short run and minority of industries in the long run are affected significantly by the bilateral exchange rate between China and Malaysia. Rubber material, electrical apparatus and telecommunications equipment industry are most sensitive to real exchange rate depreciation in Malaysia compare to others industries. In addition, Bahmani-Oskooee and Xu (2012) found that materials of rubber have negative significant coefficient on exchange rate volatility. According to Seuk and Mohamad (2013), rubber has significant positive impact on exchange rate of Malaysia, Indonesia and Thailand.

2.1.2.4 Iron ore

Iron ore is a simple product compared with other energy and mineral commodities. In 2004, the iron ore price rises 6 year consecutively until 2009. The factors that caused the prices of iron ores increase are growth in China's steel industry, growth in global iron ore demand, depreciation of US dollars, introduction of export duty in India and increase in iron ore production cost (Rohan, 2007). When the US dollar depreciated, it also means exporters currency strengthening. From the statement, we able to deduce that iron ore price increase when exporter's currency appreciated (positive relationship).

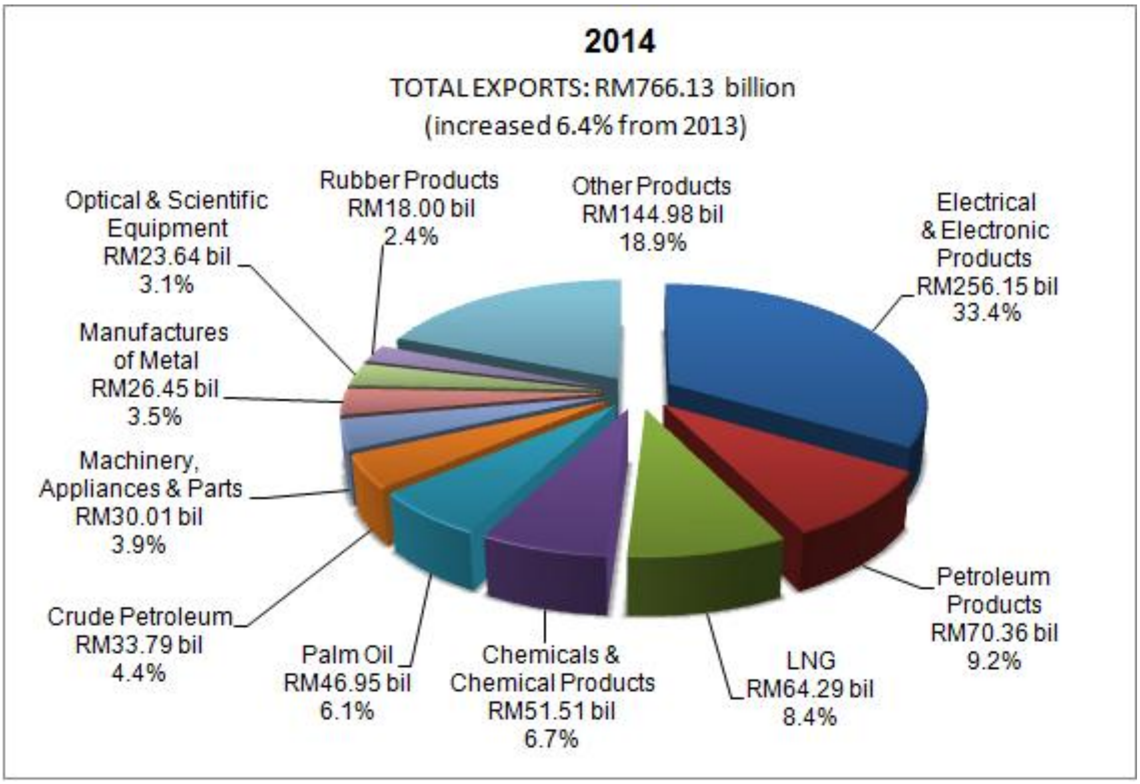
During the financial crisis, the exchange rate of the country depreciated which may lead to a shift from non-tradable to tradable goods. The mineral (iron ore, copper, manganese and silver) may choose to expand the production because of a substantially lower cost of hiring even though the mineral prices are decreasing or stagnant. However, this action had led to the sharp decrease in production and the production back to normal rate (Brown, Lax and Petersen, 2010). Therefore, depreciate in home currency exchange rate led to increase in production which then caused the commodities price dropped.

Australia is classified as a commodities currencies and it major exports are the mineral such as iron ore (Chen and Rogoff, 2003). In addition, the empirical result of Makin (2013) shows that commodity prices received by commodity exporters and their exchange rates move in sync. Hence, we can assume that the iron ore price is positively related with the exporters' exchange rate.

2.2 Review of Relevant Theoretical Model

The volatility of exchange rate is affected by a lot factors. One of the factors the affecting a commodity export country is the commodity prices. Theoretically, commodities price has direct impact on exchange rate volatility of commodity exporters. It is more significant during the sharp increase or decrease in the commodity price. For example, the crude oil price dropped from $93/barrel at September 2014 to $59/barrel at December 2014. This has caused USD/MYR exchange rate increase from RM3.27/dollar to RM3.50/ dollar at the same period. This also mean that drop in crude oil price had caused the Ringgit depreciated.

According to Chen and Rogoff (2003), the researchers stated that for those commodities that constitute a large portion of the country export, the commodities price has strong impact on the floating rate of the country currency. For example, the top 10 exports of Malaysia in Matrade (2014) statistic show the 10 most important exports of Malaysia. These top 10 exports contribute to large portion of Malaysia total export. By relating the trade statistics with Chen and Rogoff (2003) study, an exploratory framework can be obtained.



2.3 Proposed Framework

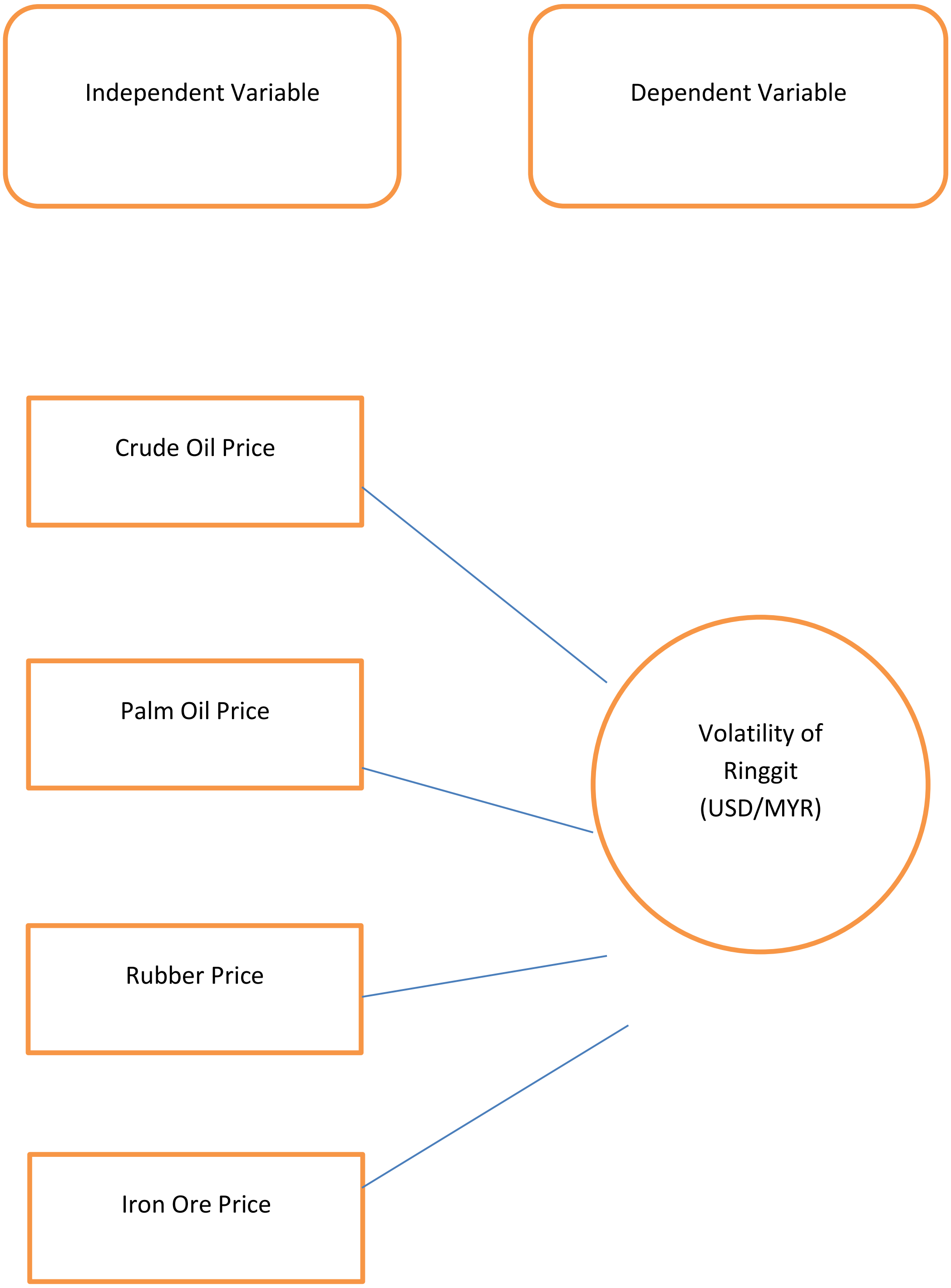


Figure 2.1: Research Model

USD/MYR= β0+β1 CRUDE+β2 PALM+β3 RUBBER+β4 IRON

2.4 Hypotheses Development

By referring to the problem statement, object and literature review of the study, several key hypotheses to fulfill the objective of the research developed.

H0: There is no significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia.

H1: There is significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia.

H0: $\beta 1 = 0$ (There is no impact between crude oil and volatility of Ringgit Malaysia)

H1: $\beta 1 \neq 0$ (There is significant impact between crude oil and volatility of Ringgit Malaysia)

H0: $\beta 2 = 0$ (There is no impact between palm oil and volatility of Ringgit Malaysia)

H1: $\beta 2 \neq 0$ (There is significant impact between palm oil and volatility of Ringgit Malaysia)

H0: $\beta 3 = 0$ (There is no impact between rubber and volatility of Ringgit Malaysia)

H1: $\beta 3 \neq 0$ (There is significant impact between rubber and volatility of Ringgit Malaysia)

H0: $\beta 4 = 0$ (There is no impact between iron and volatility of Ringgit Malaysia)

H1: $\beta 4 \neq 0$ (There is significant impact between iron and volatility of Ringgit Malaysia)

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

In order to achieve the objectives of this research, the research methods, patterns and steps of diversity are required. Hence, the methodology that adopted in this research will be discussed in this chapter like the specific methods applied, types of data collected, research method and study. The data are extracted from Quandl.com and indexmundi.com and it's a secondary data.

Last but not least, the main purposes of the research methodology are on how is the research carried out based on the research design, data collection method, construction measurement, sampling design, analysis method and measuring scales.

3.1 Research Design

In order to carry out the research, quantitative research has been applied in this research. Therefore, the data is collected in numerical form to answer the research questions. The data collected are in the time series form as it consists of few different variables and 60months periodical data. The dependent variable is the volatility of exchange rate (USD/MYR) while the independent variables are crude oil price, palm oil price, rubber price and iron ore price. This is to examine whether there are significant relationships between the dependent and independent variables.

3.2 Data collection method

The data of dependent variable is collected from Quandl.com while independent variables collected from indexmundi.com which ranged from year 2010 until 2014. The reason of choosing this time frame for the research is to avoid the fluctuation in currency due to the subprime crisis in 2008. The subprime crises which cause the economic crisis heavily affected the world economic and abnormal volatility of the exchange rate that diverge the result of this research. The data collected are from the secondary sources. In Quandl.com and indexmundi.com, all the data required are accessible and collected by manual way. In this case, the targeted dependent and independent variable monthly closing rate were located and collected. All the data were then organized accordingly from oldest to latest data. There are few purposes of using the secondary like cost saving, time saving and reliable data can be collected through this method.

3.3 Sampling design

3.3.1 Target sampling

There are over hundred commodities were traded in the world. Since, it is difficult to include all the commodities into the research. Therefore, in this research, crude oil, palm oil, rubber and iron ore prices are included. According to Matrade (2014), there is few major export commodities were stated in their statistics. We suspect that these few commodities would heavily impact the MYR. Therefore, we included these commodities as our target sampling to identify its' impact of on volatility of MYR.

3.3.2 Sampling Technique

No sampling technique was adopted in this research.

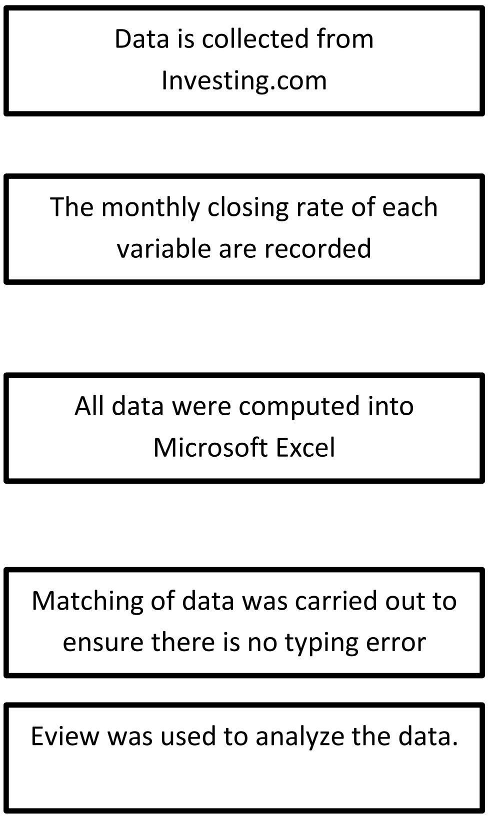
3.3.3 Sampling Size

In this research, 60months of data were collected in the time frame of 2010 to 2014. Monthly data was used in this research is to increase the sample size of this research. Other than that, it can measure the volatility of MYR more precisely compare to annual data as more sample collected until certain extend.

3.4 Data Processing

The data is collected from Quandl.com and Indexmundi.com. The monthly closing rate of USD/MYR, crude oil price, palm oil price, rubber price and iron ore price were extracted and recorded in ascending order which from oldest to latest data. After that, the percentage change compared with previous month rate were calculated and recorded. After the calculation is done, the data was recalculated to ensure the data is consistent with previous calculation. All the data were computed into Microsoft Excel and matching of data was carried out to ensure there is no typing error. Lastly, Eviews are adopted to analyze the data.

Figure 3.1: Diagram of data processing



3.5 Data Analysis

Eviews also known as Electronic Views will be used to analyze the data recorded in the Excel and the statistical test will be carried out using this software.

3.5.1 E-views

It is software that run statistical test in Windows which often use to regress time-series oriented data. Basically, this software suitable for statistical analysis likes forecasting, panel data analysis, time series estimation and cross-section. Besides, this software only can read data in STATA, PSPP/SPSS, RATS, TSP, databank format, DAP/SAS and Excel saved in 97-2003 type. This software use programming language combine with Window GUI and shows object in limited way (Renfro, 2004). Eviews will be used to diagnose the regression model whether it have autocorrelation, multicollinearity and heteroscedasticity problem and estimate the multiple regression model.

3.5.2 Multi Linear Regressions Model

In the multi linear regressions model, few independent variables will be used to estimate the dependent variable outcome. One of the goals using this method is to interpret the correlation between variables. Referring to Gujarati and Porter (2009) study, at least two independent and one dependent variable included in the regression model is a multi linear regression model.

In this study, four independent variables together with one dependent variable will be included in the regression to obtain an accurate result. The statistical method for this study is Ordinary Least Square (OLS). This statistical method is to estimate the relationship between two variables using the data collected. Hence, the multiple linear regression model for this research is constructed as below:

$$y = \beta 0 + \beta 1 CRUDE + \beta 2 PALM + \beta 3 RUBBER + \beta 4 IRON + e$$

Where; y= volatility of exchange rate (USD/MYR)

β0= Intercept

β1, β2, β3, β4= Coefficient of Regression

CRUDE = Crude oil price

PALM = Palm oil price

RUBBER = Rubber price

IRON = Iron ore price

e = error term

3.5.3 F-test Statistics

Asymptotic theory was formed a technique for the estimation model by GMM (Generalized Method of Moment) and focusing on intuitive F-Test (Andrews, 1993). F-test was named by using a well-known statistician R. A. Fisher and the test also called as Fisher F distribution. ANOVA (Analysis of Variance) often use F-distribution and comparing statistical model that determine the best fit model for the sample data. Other than that, this test also uses group variance to against null hypothesis. In order to determine the model is significant, the Prob(F-statistics) need to be smaller than the pre-determined significance level like 1%, 5% or 10%. In this study, 5% significance level practice will be adopted in the test.

3.5.4 T-test Statistic

According to Lucey (2002), a statistically significant t-test result is one of the differences between two samples are improbable to happen due to the abnormal of sample. When the variances are equal, time ratio and the sample population need to assume normally distributed for T-test. The criteria for statistical significance is by identify the standard deviation, difference size between group mean and sample size. If the p-value of the T-test is less than the predetermined significance level of 1%, 5% or 10%, significant impact between the independent and dependent variable can be concluded.

3.5.5 Pearson Correlation

Pearson Correlation is used to determine the linear relationship between two variables. There are three types of correlation: no correlation, positive correlation and negative correlation. No correlation occurs when the change in one variable do not influence the other variable change. Positive correlation shows that an increase in one variable will lead to an increase in another variable. Lastly, negative correlation mean an increase in one variable will lead to decrease of another variable.

The coefficient of Pearson's correlation determines the strength of the relationship between two variables which denoted from 0 to 1.0. By referring to Dancey and Reidy (2004), the strength of correlation is recorded as table below:

Table 3.1: Strength of Correlation

Correlation coefficient	Strength of correlation
1	Perfect
0.7-0.9	Strong
0.4-0.6	Moderate
0.1-0.3	Weak
0	No

3.5.6 Diagnostic Checking

3.5.6.1 Heteroscedasticity

The meaning of heteroscedasticity is unequal spread. The spread always indicate the error variance spread in econometrics. This problem occurs when the data has problem or model misspecification occur. Autoregressive Conditional Heteroscedasticity (ARCH) test is one of the tests to detect this problem and developed in the research of Engle (1982). However, the condition to use this test is the data need to be in time series form. Heteroscedasticity problem also can be explained as the model error term variances are not constant (Gujarati and Porter, 2009). The variances of error term are not at optimal point when some of the value of independent variables is bigger or smaller. Therefore, hypothesis testing will be conducted to detect this problem. If null hypothesis not rejected, the model is free from heteroscedasticity problem.

H0 : The model do not has heteroscedasticity problem

H1: The model has heteroscedasticity problem

Decision rule: Reject H0 if p-value is smaller than significance level. Otherwise, reject H0.

3.5.6.2 Model Specification Test

Model specification determines the inclusion or exclusion of important explanatory variable in a regression model (Gujarati and Porter, 2009). Estimate parameter of model, interpretation and model specification are the three stages of regression analysis. First, the model needs to specify correctly as it will lead to more accurate result when estimating the parameter and interpret the result. The result of OLS estimation will become biased when we included too many insignificant variables or excluded the significant variable. However, this problem can be detected by using Ramsey's RESET Test.

3.5.6.3 Multicollinearity

Multicollinearity happens when two or more independent variables have high correlation. In other word, the movement of one independent variable can be predicted by another independent variable. The symptoms of multicollinearity problem is high R-square value but a lot insignificant variable and high-pair wise correlation between two independent variable. This problem can be detected by removing or adding independent variable which caused great change in the estimation. Variance Inflation Factor (VIF) is a strong tool to determine the seriousness of the multicollinearity. The formula of VIF is 1/ (1-R-Square). If the value of VIF is between 1 and 10, the multicollinearity problem is not serious whereas more than 10 are considered as serious multicollinearity problem.

3.5.6.4 Autocorrelation

Autocorrelation problem occur when there is relationship between current and previous error term. Besides, omitting of significant variable and wrong functional form will cause this problem which will lead to inconsistent and bias result. Therefore, Breusch-Godfrey Serial Correlation LM test will be run by using E-View to detect this problem. When the test is significant which mean p-value is smaller than significance level and rejected hypothesis null, autocorrelation problem detected. Otherwise, there will be no autocorrelation problem is the test is significant.

3.5.6.5 Normality Test

Normality test is to test the distribution of error term whether it is normally distributed or not. According to Gujarati and Porter (2009), there are two methods in determining normality which is graphical and statistical. However, statistical method provides more precise result as actual probability is calculated. There are few test under statistical method which is Jarque Bera test, Sapiro Test, D'Agostino test, W/Stest and Kolmogorov-Smirnov test. In this study, Jaqrue Bera test will be used for the normality test and this test is a goodness-of-fit test. If the p-value is greater than significance level, the null hypothesis would not be rejected which mean the error term is normally distributed.

3.6 Conclusion

Lastly, this chapter is discussing the flow, method and test used to conduct this research. In addition, the economic treatments are discussed as well. In next chapter, the test result and measurement based on data collected will be recorded.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, varies diagnostic checking technique like Ramsey's RESET test, Jarque-Bera normality test, multicollinearity test, Autoregressive Condition Heteroscedasticity (ARCH) test and Breush-Godfrey LM were applied. The results of the test are then interpreted.

4.1 Descriptive Analysis

Table 4.1: Descriptive Analysis of the Multiple Linear Regressions

	USD_MYR	CRUDE	PALM	RUBBER	IRON
Mean	3.161122	91.93200	875.9767	150.5870	135.0483
Median	3.154095	94.31000	805.2950	144.8000	136.2950
Maximum	3.499460	110.0400	1248.550	280.7900	187.1800
Minimum	2.946550	59.10000	624.5400	72.72000	68.80000
Std. Dev.	0.118370	10.41644	161.0144	49.05414	28.07006
Skewness	0.540168	-0.649743	0.649294	0.615705	-0.291832
Kurtosis	2.938344	3.160175	2.322745	2.999789	2.731701
Jarque-Bera	2.927313	4.285799	5.362519	3.790929	1.031620
Probability	0.231389	0.117314	0.068477	0.150249	0.597017

Sum	189.6673	5515.920	52558.60	9035.220	8102.900
Sum Sq. Dev.	0.826669	6401.635	1529612.	141972.2	46487.77
Observations	60	60	60	60	60

4.2 Scale Measurement

Table 4.2: Results of Diagnostic Checking For Multiple Linear Regressions

	Hypothesis Testing	p-value
1.	Jarque-Bera normality test	0.8163
2.	Ramsey's RESET test	0.0050
3.	Multicollinearity test Correlation and Variance Inflation Factor (VIF)	-
4	Autoregressive Condition Heteroscedasticity	0.0008
5	Breush-Godfrey LM test	0.0000

In order to determine whether the error term is normally distributed or not, Jarque Bera test was carried out. Based on the result, we can conclude that the error is normally distributed as p-value of 0.8163 is greater than $\alpha = 0.05$. The misspecification error of the model was found in the model after we carried out the Ramsey RESET test as the result shows that the p-value of 0.005 is smaller than then significance level of 0.05.

Table 4.3: Correlation Table

	USD_MYR	CRUDE	PALM	RUBBER	IRON
USD_MYR	1.000000	-0.365502	-0.624374	-0.650003	-0.555487
CRUDE	-0.365502	1.000000	0.252145	0.046480	0.093629
PALM	-0.624374	0.252145	1.000000	0.857417	0.721249
RUBBER	-0.650003	0.046480	0.857417	1.000000	0.896508
IRON	-0.555487	0.093629	0.721249	0.896508	1.000000

The correlation test was carried out next to investigate the magnitude of correlation between the variables. Based on the result above, we found out that there is correlation between palm oil, rubber and iron ore. However, there is no serious multicollinearity problem occurred as the Variance Inflation Factor (VIF) is less than 10 which show in the tables below.

Table 4.4: The least square for palm oil and rubber

Prob(F-statistics)	0.0000
Coefficient	2.8144
R-Square	0.7352
Adjusted R-Square	0.7306
VIF	3.7764

Table 4.5: The least square for palm oil and iron ore

Prob(F-statistics)	0.0000
Coefficient	4.1372
R-Square	0.5202
Adjusted R-Square	0.5119
VIF	2.0842

Table 4.6: The least square for rubber and iron ore

Prob(F-statistics)	0.0000
Coefficient	1.5667
R-Square	0.8037
Adjusted R-Square	0.8000
VIF	5.0942

After that, we carried out the Autoregressive Conditional Heteroscedasticity (ARCH) to ensure that there is no heteroscedasticity problem while Breusch – Godfrey LM test for autocorrelation problem. We found out that the model has heteroscedasticity problem as the result is significant at significance level of 0.05 and we do found that the model has autocorrelation problem as it show a significant result.

4.3 Inferential Analysis

4.3.1 Multiple Linear Regressions

Referring back to research methodology, we able to construct a model as below:

$y = \beta_0 + \beta_1\text{CRUDE} + \beta_2\text{PALM} + \beta_3\text{RUBBER} + \beta_4\text{IRON}$

The coefficients of the independent variables were substituted with the result regressed by E-view and shown as below.

USD/MYR = 3.683664 – 0.004184CRUDE + 0.000647PALM - 0.002267 RUBBER + 0.001086 IRON

Throughout the empirical analysis, confidence level of 5% or p-value = 0.05 were used as a standard in determining the significance of results. When the p-value is greater than 0.05, the regressed model and variables are significant. The result regarding the empirical result of the model is recorded at below.

Dependent variable = USD/MYR

	Coefficient	p-value
Constant, β_0	3.683664	0.0000
Crude, β_1	– 0.004184	0.0007
Palm, β_2	0.000647	0.6644
Rubber, β_3	- 0.002267	0.0033
Iron, β_4	0.001086	0.2363

R^2	0.547057

Adjusted R^2	0.514116
Prob (F-statistic)	0.000000

Table 4.7: Least Squares results of independent variables

R^2= 0.547057 which mean 54.7057% of the variation in the dependent variable can be explained by the variation in the independent variable. By referring the table above, we can conclude that crude oil and rubber prices have significant impact on volatility of MYR. However, palm oil and iron ore price have insignificant impact on volatility of MYR as the p-value is greater than 0.05.

β_0 = 3.683664

β_0 also known as the intercept value which shows the USD/MYR exchange rate is 3.683664 when all the independent variables are zero.

B_1 = – 0.004184

If crude oil prices is expected to increase by 1$, the exchange rate of USD/MYR will decrease by 0.004184 holding the value of other variable constant.

B_3 = - 0.002267

If rubber prices is expected to increase by 1$, the exchange rate of USD/MYR will decrease by 0.002267 holding the value of other variable constant.

4.3.2 Pearson Correlation

4.3.2.1 Crude oil

Table 4.8: Independent variable: Crude Oil

Prob(F-statistic)	0.004083
Coefficient	-0.004153
R-Square	0.133592
Adjusted R-Square	0.118654

Based on result obtained above, prob(F-statistics) shows a significant result as 0.004083 is smaller than significance level of 0.05. Therefore, crude oil has significant impact on USD/MYR exchange rate. When the crude oil price increases by $1, the USD/MYR exchange rate on average will decrease by 0.004153 holding other variable constant. The R-squared has a value of 0.133592 which mean 13.3592% variation in USD/MYR exchange rate can be explained by the variation in crude oil price.

4.3.2.2 Palm oil

Table 4.9: Independent variable: Liquidity

Prob(F-statistic)	0.00000
Coefficient	-0.000459
R-Square	0.389843
Adjusted R-Square	0.379323

Based on result obtained above, prob(F-statistics) shows a significant result as 0.000000 is smaller than significance level of 0.05. Therefore, palm oil has significant impact on USD/MYR exchange rate. When the palm oil price increases by $1, the USD/MYR exchange rate on average will decrease by 0.000459 holding other variable constant. The R-squared has a value of 0.389843 which means 38.9843% variation in USD/MYR exchange rate can be explained by the variation in palm oil price.

4.3.2.3 Rubber

Table 4.10: Independent variable: Rubber

Prob(F-statistic)	0.000000
Coefficient	-0.001568
R-Square	0.422503
Adjusted R-Square	0.412547

Based on result obtained above, prob(F-statistics) shows an significant result as 0.000000 is smaller than significance level of 0.05. Therefore, rubber has significant impact on USD/MYR exchange rate. When the rubber price increases by $1, the USD/MYR exchange rate on average will decrease by 0.001568 holding other variable constant. The R-squared has a value of 0.422503 which mean 42.2503% variation in USD/MYR exchange rate can be explained by the variation in rubber price.

4.3.2.4 Iron ore

Table 4.11: Independent Variable: Iron ore

Prob(F-statistic)	0.000004
Coefficient	-0.002342
R-Square	0.308566
Adjusted R-Square	0.296645

Based on result obtained above, prob(F-statistics) shows a significant result as 0.000004 is smaller than significance level of 0.05. Therefore, iron ore has significant impact on USD/MYR exchange rate. When the iron ore price increases by $1, the USD/MYR exchange rate on average will decrease by 0.002342 holding other variable constant. The R-squared has a value of 0.308566 which mean 30.8566% variation in USD/MYR exchange rate can be explained by the variation in iron ore price.

4.4 Conclusion

By referring the empirical analysis result, crude oil and rubber has positive and significant impact on USD/MYR exchange rate whereas palm oil and iron show insignificant result. The results also show that the model error terms are normally distributed and do not have serious multicollinearity problem, however, it has autocorrelation problem, heteroscedasticity problem and model specification problem. Major findings, implication and recommendation for future researchers will be concluded in next chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

In this chapter, result obtained from the E-View test in previous chapter will be analyzed and summarized in this chapter. First of all, the empirical findings from the previous chapter will be discussed in the major findings. After that, implication of the study to the related parties will be discussed and finally, the limitation and recommendation for future researcher will be carried out on next part.

5.1 Summary of Statistical Analyses

The statistical results of previous chapter shows that error terms are normally distributed and do not have serious multicollinearity problem, however, model specification error, heteroscedasticity problem and autocorrelation problem has occurred. The multiple linear regression result shows that there is impact between volatility of Ringgit Malaysia exchange rate and the independent variable we included in this research. Based on result of the regression, crude oil, palm oil, rubber and iron found to have significant impact on exchange rate volatility.

Table 5.1: Decision for the Hypotheses of the Study

	Hypothesis of the study	Decision
i.	H0: There is no significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia. H1: There is significant impact between crude oil, palm oil, rubber, iron and volatility of Ringgit Malaysia.	Reject H0.
ii.	H0: $\beta 1 = 0$ (There is no impact between crude oil and volatility of Ringgit Malaysia) H1: $\beta 1 \neq 0$ (There is significant impact between crude oil and volatility of Ringgit Malaysia)	Reject H0
iii.	H0: $\beta 2 = 0$ (There is no impact between palm oil and volatility of Ringgit Malaysia) H1: $\beta 2 \neq 0$ (There is significant impact between palm oil and volatility of Ringgit Malaysia)	Reject H0.
iv.	H0: $\beta 3 = 0$ (There is no impact between rubber and volatility of Ringgit Malaysia) H1: $\beta 3 \neq 0$ (There is significant impact between rubber and volatility of Ringgit Malaysia)	Reject H0

v.	H0: β4 = 0 (There is no impact between iron and volatility of Ringgit Malaysia) H1: β4 ≠ 0 (There is significant impact between iron and volatility of Ringgit Malaysia)	Reject H0

5.2 Discussion of Major findings

The overall result shows that all the independent variables have significant impact on volatility of Ringgit Malaysia. Crude oil is found to have significant negative impact on exchange rate of USD/MYR. When crude oil price increase, the exchange rate of USD/MYR drop which also mean MYR appreciated. Drop in USD/MYR rate also indicate that the amount required to exchange a US dollar using MYR is reduced. The result is consistent with the study of Korhonen and Juurikkala (2009) which stated that crude oil exporters currencies appreciated when oil price increased. In the news reported by Kok (2014), oil and gas sector in Malaysia had contributed 30% of the national revenue. In other word, crude oil price has significant impact on this sector and hence influence the country revenue.

Next, rubber price shows significant negative impact on USD/MYR exchange rate volatility in the regression. This can be explained as increase in rubber price will lead to appreciation of Ringgit. The result is consistent with Seuk and Mohamad (2013) that rubber has positive significant value on Ringgit. This is reasonable as the rubber is the top 10 export of Malaysia. Besides, synthetic rubber had become an alternative in producing certain products and the cost is cheaper compare to natural rubber. However, certain product like surgeon gloves, condom, balloon and etc. cannot use synthetic rubber in production as it contain a lot of chemical which might cause allergic and other health issues. Therefore, natural rubber actually has its own competitive advantage compare to synthetic rubber.

Lastly, result stated in the regression shows that palm oil has insignificant impact on the USD/MYR exchange rate volatility. The result also implies that there is no impact of palm oil price on volatility of exchange rate. According to Indexmundi (2014), the exports volume of Malaysia palm oil stagnant over pass 5 year which around 17million kg per year. In other words, the impact of palm oil export towards Malaysia remains constant.

At the same time, iron ore found to have insignificant impact on the USD/MYR exchange rate volatility. This result is contradict with result of Makin (2013) that commodity prices received by commodity exporters and their exchange rates move in sync. One of the reasons is the iron exports of Malaysia only contributed around 3% of total exports. By applying the findings of Chen and Rogoff (2003), when the contribution of particular export is too low, the commodities price tend to have no impact on exchange rate.

5.3 Implication of the Study

5.3.1 Managerial Implication

From the research, crude oil and rubber price has significant impact on exchange rate of Ringgit. According to the result, higher crude oil price and rubber price will result in appreciation of Ringgit. These findings provide useful information for the company manager who dealing with the foreign exchange rate. Since the commodity prices are affected by demand and supply of the market, it is hardly for the company manager to control the price. However, the manager can use the commodity price as the indicator of determining the trend of Ringgit. This can help to reduce the exchange rate risk and might gain from the difference in exchange rate.

Besides, the result is useful for the company that have business on oversea. The exchange rate changes will impact the company return. For example, when currency depreciated, exporters will have benefit from that and vice versa. Hence, it can improve the capital movement decision between local and subsidiaries in oversea. Company that is sensitive with the exchange rate volatility, for example, bank can hedge the exchange rate ahead before the depreciation of Ringgit happen.

While for the policy maker, government can control the output or supply of the commodity in market. However, commodities like crude oil are hardly can be controlled by government. This is because the market share of Malaysia export on this commodity is not significant. But, Malaysia is the major player on exporting the rubber around the world. By controlling the output together with the major players like Indonesia and Thailand can effectively control the price. A stable commodity price will reduce the volatility of exchange which will reduce the risk faced by the investors.

5.3.2 Implication for Study

From the research, crude oil price and rubber price have impact on Ringgit Malaysia exchange rate. The finding of this study can act as a guide for future researcher who wants to carry out the research on exchange rate volatility as they can include the significant independent variable like crude oil price and rubber price into their model. Besides, it also provides some insight regarding the impact or relationship between commodities price and exchange rate volatility. However, palm oil and iron ore price is insignificant in this study. This result does benefit the future researcher as they can drop these two variables from their study and focus more on other variables. Lastly, this study has filled some of the research gap in determining Ringgit exchange rate.

5.4 Limitations of Study

In this study, several limitations had found when doing the research. First, the monthly data collected are ranging from 2010 to 2014 which is seemed to be insufficient. This is because subprime crisis occur at 2008-2009 has caused the irregular volatility of exchange rate which might have outliers that can influence the result of the regression. Besides, the model have econometric problem like heteroscedasticity and autocorrelation. This might affect the preciseness of the result obtained.

The second limitation is there are limited numbers of research done on this topic. Hence, when doing the literature review, journal available to support the relationship between independent and dependent variable are limited. Although in the end I manage to found some literature on this, however, it seems like insufficient. For example, the article regarding the palm oil price do no has significant impact on volatility of exchange rate cannot be found.

The third limitation is the result of this study only applicable in Malaysia. This is because the model formed is based on the major exports of Malaysia. Therefore, it might not applicable to other country which have different composition of exports or different commodities. However, it might applicable for those country that export similar commodities.

5.5 Recommendations for Future Research

In the study, monthly data regarding the commodities price and exchange rate are collected. This might have problem in determining the actual volatility of exchange rate as the monthly might not respond and track the data precisely. Therefore, I suggest that future researcher can change the monthly data into weekly or daily data. Weekly or daily data has higher frequency and larger sample size which might contain more information compare to monthly data.

Besides, future researchers are recommended to use other regression method to determine the impact of commodities price on exchange rate volatility instead of Ordinary Least Square (OLS). Future can use the regression method like cointegration test and autoregressive distributed lag to regress the model. This might able to produce a much better result than OLS.

Lastly, future researchers are advice to replace the insignificant variable with other sound variables. At the same time, future researchers are encouraged to include those macroeconomic factors like gross domestic production (GDP), tax rate and others. Besides, researcher can further the investigation of impact of commodities price on exchange rate volatility by adding other commodities variable like liquefied natural gas (LNG) into the new model.

5.6 Conclusion

The result of this study concluded that crude oil and rubber price have significant impact in determining the volatility of Ringgit. However, palm oil and iron ore price are in opposite way. All the results except palm oil are consistent and supported by findings of previous researchers. Besides, the result of this study do provide insight for policy makers and managers on commodities that has impact on Ringgit exchange rate as well as to increase their profitability and reduce their risk.

References

Abbott, P. C., Hurt, C., & Tyner, W. E. (2008). What's Driving Food Prices. *Farm Foundation*.

Abbott, P. C., Hurt, C., & Tyner, W. E. (2011). What ' s Driving Food Prices in 2011 ? *Farm Foundation*. Retrieved from http://farmfoundation.org/news/articlefiles/1742-FoodPrices_web.pdf

Andrew, D. W. K. (1993). Tests for Paramter Instability and Structural Change With Unknown Change Point. *Econometrica*, 61, 821-856.

Ardiansyah, M. (2002). Impact of the 1997-1998 Asian Financial Crisis on the Indonesian and Malaysian Palm Oil and Palm Kernel Industries (Doctorate dissertation). Retrieved from ProQuest and Learning. (UMI No. 3057265).

Bahmani-Oskooee, M., & Harvey, H. (2011). Exchange-rate volatility and industry trade between the U.S. and Malaysia. *Research in International Business and Finance*, *25*(2), 127–155. http://doi.org/10.1016/j.ribaf.2011.01.002

Bahmani-Oskooee, M., & Xu, J. (2012). Impact of exchange rate volatility on commodity trade between US and Thailand. *International Review of Applied Economics*, *26*(4), 1–29. http://doi.org/10.1080/02692171.2012.700703

Barkoulas, J. T., Baum, C. F., & Caglayan, M. (2002). Exchange rate effects on the volume and variability of trade flows. *Journal of International Money and Finance*, *21*(4), 481–496. http://doi.org/10.1016/S0261-5606(02)00003-7

Brown, J. R., Lax, L. C., & Petersen, B. C. (2010). Financial Market Crises and Natural Resource Production. *International Review of Finance*, *10*(1), 93–124. http://doi.org/10.1111/j.1468-2443.2009.01101.x

Chen, Y., & Rogoff, K. (2003). Commodity currencies. *International Economics*, *60*, 133–160. http://doi.org/10.1016/S0022-1996(02)00072-7

Dauvin, M. (2014). Energy prices and the real exchange rate of commodity-exporting countries. *International Economics*, *137*, 52–72. http://doi.org/10.1016/j.inteco.2013.11.001

De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade. *Staff Papers-International Monetary Fund*, *35*(1), 63–84.

Engle, R. (1982). Autoregressive Conditional Heteroskedasticity with Estimates of United Kingdom Inflation. *Econometrica,* 50, 987-1008.

Eslamloueyan, K., & Kia, A. (2015). Determinants of the Real Exchange Rate in Oil-Producing Countries of the Middle East and North Africa: A Panel Data Investigation. *Emerging Markets Finance and Trade*, *51*(4), 842–855. http://doi.org/10.1080/1540496X.2015.1043213

Ferraro, D., Rogoff, K., & Rossi, B. (2015). Can oil prices forecast exchange rates? An empirical analysis of the relationship between commodity prices and exchange rates. *Journal of International Money and Finance*, *54*, 116–141. http://doi.org/10.1016/j.jimonfin.2015.03.001

Gochoco-Bautista, M. S., Wang, J., & Yang, M. (2014). Commodity price, carry trade, and the volatility and liquidity of Asian Currencies. *World Economy*, *37*(6), 811–833. http://doi.org/10.1111/twec.12089

Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics. (5th ed.). Boston, MA: McGraw-Hill/Irwin.

Habib, M. M., & Kalamova, M. M. (2007). Are there oil currencies? The real exchange rate of oil exporting countries (Working Paper No. 839). Retrieved from Social Science Research network http://ssrn.com/abstract_id=1032834., (8).

Indexmundi. (2014). Malaysia Palm Oil Exports by Year 2014. Retrieved August 25, 2015 from http://www.indexmundi.com/agriculture/?country=my&commodity=palm-oil&graph=exports

Kok, C. (2014). Falling Commodity Prices Present Downside Risk to Malaysia's Economy. *TheStar*. Retrieved from http://www.thestar.com.my/Business/Business-News/2014/10/25/Pressure-on-growth-Falling-commodity-prices-present-downside-risk-to-Malaysias-economy/?style=biz

Korhonen, I., & Juurikkala, T. (2009). Equilibrium exchange rates in oil-exporting countries. *Journal of Economics and Finance*, *33*(1), 71–79. http://doi.org/10.1007/s12197-008-9067-x

Lucey, T. (2002). Quantitative Techniques. Cheriton, NW: Cengage Learning EMEA.

Makin, A. J. (2013). Commodity prices and the macroeconomy: An extended dependent economy approach. *Journal of Asian Economics*, *24*, 80–88. http://doi.org/10.1016/j.asieco.2012.10.001

Masih, R., Peters, S., & De Mello, L. (2011). Oil price volatility and stock price fluctuations in an emerging market: Evidence from South Korea. *Energy Economics*, *33*(5), 975–986. http://doi.org/10.1016/j.eneco.2011.03.015

Natural Rubber Statistics. (2015). Retrieved from http://www.lgm.gov.my/nrstat/NRstatisticworld.aspx

Nazlioglu, S., & Soytas, U. (2012). Oil price, agricultural commodity prices, and the dollar: A panel cointegration and causality analysis. *Energy Economics*, *34*(4), 1098–1104. http://doi.org/10.1016/j.eneco.2011.09.008

Renfro, C. G. (2004). A Compendium of Existing Econometric Software Packages. *Journal of Economic and Social Measurement*, 29, 359-409.

Rezitis, A. N. (2015). The relationship between agricultural commodity prices, crude oil prices and US dollar exchange rates: a panel VAR approach and causality analysis. *International Review of Applied Economics*, *29*(3), 403–434. http://doi.org/10.1080/02692171.2014.1001325

Rezitis, A. N., & Sassi, M. (2013). Commodity Food Prices: Review and Empirics. *Economics Research International*, *2013*, 1–15. http://doi.org/10.1155/2013/694507

Rohan, K. (2007). Appreciation of Australian Dollar to Affect Export Earnings. *Autralian Commodities*, *14*(4), 637–657.

Sang, W. C., Songsak, S., Sanzidur, R., Huang, W. T., & Aree, W. (2012). Modeling Volatility and Interdependencies of Thai Rubber Spot Price Return with Climatic Factors , Exchange Rate and Crude Oil Markets. 財金論文叢刊, *16*, 1–20.

Seuk, Y. P., & Mohamad, T. I. (2013). Rubber Price Effect on Exchange Rate : A Bayesian Mixture Model Approach. *Information Management and Business Review*, *5*, 263–269.

Soares, N. S., Silva, M. L., & Rossmann, H. (2013). Influence of Exchange Rate and Dollar Over The Brazilian Natural Rubber Price. *Revista Árvore*, *37*(2), 339–346. http://doi.org/10.1590/S0100-67622013000200015

Soleymani, A., & Chua, S. Y. (2014). How responsive are trade fl ows between Malaysia and China to the exchange rate ? Evidence from industry data, *28*(2), 191–209.

Tsen, W. H. (2011). The real exchange rate determination: An empirical investigation. *International Review of Economics and Finance*, *20*(4), 800–811. http://doi.org/10.1016/j.iref.2011.02.002

APPENDICES

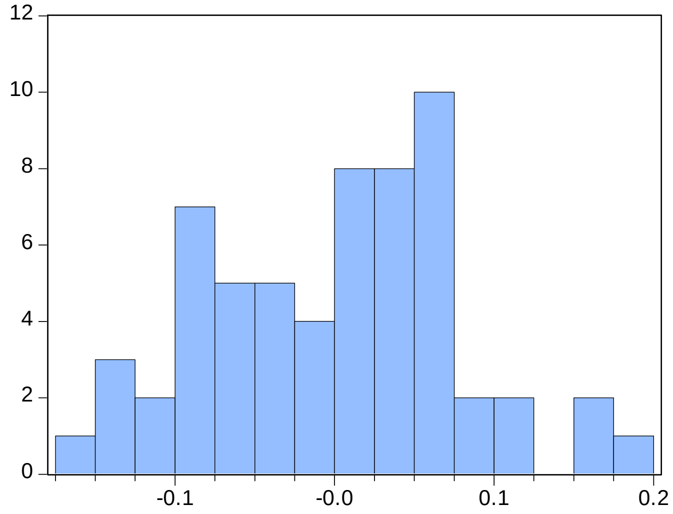
Appendix 1:

Descriptive Analysis of Multiple Linear Regression Model

	USD_MYR	CRUDE	PALM	RUBBER	IRON
Mean	3.161122	91.93200	875.9767	150.5870	135.0483
Median	3.154095	94.31000	805.2950	144.8000	136.2950
Maximum	3.499460	110.0400	1248.550	280.7900	187.1800
Minimum	2.946550	59.10000	624.5400	72.72000	68.80000
Std. Dev.	0.118370	10.41644	161.0144	49.05414	28.07006
Skewness	0.540168	-0.649743	0.649294	0.615705	-0.291832
Kurtosis	2.938344	3.160175	2.322745	2.999789	2.731701
Jarque-Bera	2.927313	4.285799	5.362519	3.790929	1.031620
Probability	0.231389	0.117314	0.068477	0.150249	0.597017
Sum	189.6673	5515.920	52558.60	9035.220	8102.900
Sum Sq. Dev.	0.826669	6401.635	1529612.	141972.2	46487.77
Observations	60	60	60	60	60

Appendix 2:

Normality Test: Jarque-Bera Normality Test



Series: Residuals	
Sample 1 60	
Observations 60	
Mean	5.98e-16
Median	0.013385
Maximum	0.196190
Minimum	-0.169240
Std. Dev.	0.079664
Skewness	0.093342
Kurtosis	2.642932
Jarque-Bera	0.405870
Probability	0.816331

H0: Error Terms are normally distributed

H1: Error terms are not normally distributed

Critical value: α= 0.05

Test statistics: p-value = 0.816331

Decision rules: Reject H0, if p-value less than α= 0.05, otherwise do not reject H0.

Decision: Do not reject H0, since p-value (0.816331) is greater than α= 0.05

Conclusion: We have sufficient evidence to conclude that the error terms are normally distributed

Appendix 3:
Model Specification Test: Ramsey RESET Test

Ramsey RESET Test:

F-statistic	8.552290	Prob. F(1,54)	0.0050
Log likelihood ratio	8.821128	Prob. Chi-Square(1)	0.0030

Test Equation:
Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 10:57
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRUDE	0.066107	0.024060	2.747534	0.0081
PALM	-0.000963	0.000378	-2.547603	0.0137
RUBBER	0.034749	0.012676	2.741275	0.0083
IRON	-0.015815	0.005842	-2.707340	0.0091
C	-31.84406	12.14906	-2.621114	0.0114
FITTED^2	2.667386	0.912105	2.924430	0.0050

R-squared	0.608985	Mean dependent var	3.161122
Adjusted R-squared	0.572780	S.D. dependent var	0.118370
S.E. of regression	0.077369	Akaike info criterion	-2.185827
Sum squared resid	0.323240	Schwarz criterion	-1.976392
Log likelihood	71.57481	Hannan-Quinn criter.	-2.103906
F-statistic	16.82041	Durbin-Watson stat	0.784057
Prob(F-statistic)	0.000000		

H0: Model specification is correct.

H1: Model specification is incorrect

Critical value: α= 0.05

Test statistics: p-value = 0.0050

Decision rules: Reject H0, if p-value less than α= 0.05, otherwise do not reject H0.

Decision: Reject H0, since p-value (0.0050) is smaller than α= 0.05

Conclusion: We have sufficient evidence to conclude that the model specification is incorrect.

Appendix 4:
Multicollinearity Testing of Multiple Linear Regression Model

	USD_MYR	CRUDE	PALM	RUBBER	IRON
USD_MYR	1.000000	-0.365502	-0.624374	-0.650003	-0.555487
CRUDE	-0.365502	1.000000	0.252145	0.046480	0.093629
PALM	-0.624374	0.252145	1.000000	0.857417	0.721249
RUBBER	-0.650003	0.046480	0.857417	1.000000	0.896508
IRON	-0.555487	0.093629	0.721249	0.896508	1.000000

Appendix 5:
Heteroscedasticity Testing (Autoregressive Conditional Heteroscedasticity (ARCH) test

Heteroskedasticity Test: ARCH

F-statistic	12.45766	Prob. F(1,57)	0.0008
Obs*R-squared	10.58201	Prob. Chi-Square(1)	0.0011

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/03/15 Time: 11:11
Sample (adjusted): 2 60
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003472	0.001037	3.348012	0.0014
RESID^2(-1)	0.362485	0.102700	3.529540	0.0008

R-squared	0.179356	Mean dependent var	0.005694
Adjusted R-squared	0.164959	S.D. dependent var	0.006925
S.E. of regression	0.006328	Akaike info criterion	-7.254366
Sum squared resid	0.002282	Schwarz criterion	-7.183941
Log likelihood	216.0038	Hannan-Quinn criter.	-7.226875
F-statistic	12.45766	Durbin-Watson stat	1.968884
Prob(F-statistic)	0.000831		

H0: There is no heteroscedasticity problem.

H1: There is heteroscedasticity problem.

Critical value: α= 0.05

Test statistics: p-value = 0.0008

Decision rules: Reject H0, if p-value less than α= 0.05, otherwise do not reject H0.

Decision: Reject H0, since p-value (0.0008) is smaller than α= 0.05

Conclusion: We have sufficient evidence to conclude that the model has heteroscedasticity problem.

Appendix 6
Autocorrelation Testing (Breusch-Godfreh LM Test)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	17.66315	Prob. F(2,53)	0.0000
Obs*R-squared	23.99713	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/03/15 Time: 11:12
Sample: 1 60
Included observations: 60
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRUDE	-0.000363	0.000921	-0.393848	0.6953
PALM	1.71E-06	0.000117	0.014607	0.9884
RUBBER	8.56E-05	0.000582	0.146999	0.8837
IRON	-0.000182	0.000718	-0.253821	0.8006
C	0.044611	0.089434	0.498816	0.6200
RESID(-1)	0.720630	0.138689	5.196020	0.0000
RESID(-2)	-0.132761	0.139104	-0.954398	0.3442

R-squared	0.399952	Mean dependent var	5.98E-16
Adjusted R-squared	0.332022	S.D. dependent var	0.079664
S.E. of regression	0.065109	Akaike info criterion	-2.516221
Sum squared resid	0.224678	Schwarz criterion	-2.271880
Log likelihood	82.48662	Hannan-Quinn criter.	-2.420646
F-statistic	5.887716	Durbin-Watson stat	1.793656
Prob(F-statistic)	0.000093		

H0: There is no autocorrelation problem.

H1: There is autocorrelation problem.

Critical value: α= 0.05

Test statistics: p-value = 0.0000

Decision rules: Reject H0, if p-value less than α= 0.05, otherwise do not reject H0.

Decision: Reject H0, since p-value (0.0000) is smaller than α= 0.05

Conclusion: We have sufficient evidence to conclude that the model have autocorrelation problem.

Appendix 7:
Empirical result between PALM and RUBBER

Dependent Variable: PALM
Method: Least Squares
Date: 09/03/15 Time: 11:18
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RUBBER	2.814370	0.221801	12.68872	0.0000
C	452.1691	35.09971	12.88242	0.0000

R-squared	0.735164	Mean dependent var	875.9767
Adjusted R-squared	0.730598	S.D. dependent var	161.0144
S.E. of regression	83.57282	Akaike info criterion	11.72208
Sum squared resid	405096.1	Schwarz criterion	11.79189
Log likelihood	-349.6624	Hannan-Quinn criter.	11.74939
F-statistic	161.0036	Durbin-Watson stat	0.376478
Prob(F-statistic)	0.000000		

Appendix 8

Empirical result between PALM and IRON

Dependent Variable: PALM
Method: Least Squares
Date: 09/02/15 Time: 02:13
Sample: 2010M01 2014M12
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IRON	4.137199	0.521720	7.929922	0.0000
C	317.2548	71.93845	4.410087	0.0000

R-squared	0.520200	Mean dependent var	875.9767
Adjusted R-squared	0.511927	S.D. dependent var	161.0144
S.E. of regression	112.4882	Akaike info criterion	12.31634
Sum squared resid	733908.2	Schwarz criterion	12.38615
Log likelihood	-367.4902	Hannan-Quinn criter.	12.34365
F-statistic	62.88367	Durbin-Watson stat	0.245997
Prob(F-statistic)	0.000000		

Appendix 9
Empirical result between RUBBER and IRON

Dependent Variable: RUBBER
Method: Least Squares
Date: 09/02/15 Time: 02:16
Sample: 2010M01 2014M12
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IRON	1.566703	0.101660	15.41126	0.0000
C	-60.99358	14.01755	-4.351229	0.0001

R-squared	0.803727	Mean dependent var	150.5870
Adjusted R-squared	0.800343	S.D. dependent var	49.05414
S.E. of regression	21.91886	Akaike info criterion	9.045337
Sum squared resid	27865.31	Schwarz criterion	9.115148
Log likelihood	-269.3601	Hannan-Quinn criter.	9.072644
F-statistic	237.5068	Durbin-Watson stat	0.430700
Prob(F-statistic)	0.000000		

Appendixt 10

Empirical Result of Multiple Linear Regression

Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 11:22
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRUDE	-0.004184	0.001164	-3.593455	0.0007
PALM	6.47E-05	0.000148	0.436193	0.6644
RUBBER	-0.002267	0.000737	-3.076940	0.0033
IRON	0.001086	0.000907	1.197419	0.2363
C	3.683664	0.112488	32.74715	0.0000

R-squared	0.547057	Mean dependent var	3.161122
Adjusted R-squared	0.514116	S.D. dependent var	0.118370
S.E. of regression	0.082510	Akaike info criterion	-2.072141
Sum squared resid	0.374434	Schwarz criterion	-1.897613
Log likelihood	67.16424	Hannan-Quinn criter.	-2.003874
F-statistic	16.60705	Durbin-Watson stat	0.643008
Prob(F-statistic)	0.000000		

Appendix 11
Least Squares results between USD_MYR and CRUDE

Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 11:32
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRUDE	-0.004153	0.001389	-2.990491	0.0041
C	3.542958	0.128487	27.57448	0.0000

R-squared	0.133592	Mean dependent var	3.161122
Adjusted R-squared	0.118654	S.D. dependent var	0.118370
S.E. of regression	0.111125	Akaike info criterion	-1.523550
Sum squared resid	0.716233	Schwarz criterion	-1.453739
Log likelihood	47.70651	Hannan-Quinn criter.	-1.496243
F-statistic	8.943034	Durbin-Watson stat	0.347659
Prob(F-statistic)	0.004083		

Appendix 12
Least squares result between USD_MYR and PALM

Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 11:35
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PALM	-0.000459	7.54E-05	-6.087486	0.0000
C	3.563202	0.067139	53.07240	0.0000

R-squared	0.389843	Mean dependent var	3.161122
Adjusted R-squared	0.379323	S.D. dependent var	0.118370
S.E. of regression	0.093255	Akaike info criterion	-1.874190
Sum squared resid	0.504398	Schwarz criterion	-1.804379
Log likelihood	58.22571	Hannan-Quinn criter.	-1.846883
F-statistic	37.05748	Durbin-Watson stat	0.561570
Prob(F-statistic)	0.000000		

Appendix 13
Least square result between USD_MYR and Rubber

Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 11:39
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RUBBER	-0.001568	0.000241	-6.514099	0.0000
C	3.397315	0.038104	89.16013	0.0000

R-squared	0.422503	Mean dependent var	3.161122
Adjusted R-squared	0.412547	S.D. dependent var	0.118370
S.E. of regression	0.090725	Akaike info criterion	-1.929204
Sum squared resid	0.477399	Schwarz criterion	-1.859393
Log likelihood	59.87612	Hannan-Quinn criter.	-1.901897
F-statistic	42.43348	Durbin-Watson stat	0.542268
Prob(F-statistic)	0.000000		

Appendix 14
Least square result between USD_MYR and IRON

Dependent Variable: USD_MYR
Method: Least Squares
Date: 09/03/15 Time: 11:42
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IRON	-0.002342	0.000460	-5.087598	0.0000
C	3.477466	0.063487	54.77488	0.0000

R-squared	0.308566	Mean dependent var	3.161122
Adjusted R-squared	0.296645	S.D. dependent var	0.118370
S.E. of regression	0.099272	Akaike info criterion	-1.749139
Sum squared resid	0.571587	Schwarz criterion	-1.679328
Log likelihood	54.47418	Hannan-Quinn criter.	-1.721832
F-statistic	25.88365	Durbin-Watson stat	0.513666
Prob(F-statistic)	0.000004		