RELATIONSHIP BETWEEN COMMODITIES MARKET AND STOCK MARKETS: EVIDENCE FROM MALAYSIA AND CHINA

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our 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 support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

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DEDICATION

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PREFACE

This paper presents "Relationship between commodities market and stock market: Evidence from Malaysia and China." It includes the determinants of stock markets mainly focus in commodities market from precious metals sector, energy sector and industry metals sector as well as the relation among the commodities market in emerging countries.

The commodities play a significance role in our daily life as it is very common goods in part of our live. Commodity market is traded every day and it lead to an up and down of a country's economy around the world. Therefore, commodities are the fundamentals on stock market which affects the economy activities in country. With regards to this, there will be a decrease in GDP when happens an increase in commodities index. In this situation, there is inflation in the country which results from the increasing in interest rate as long as the cost of borrowing. Consequently, it brings down a country's economy since there is a decrease in GDP. On the other hand, there is possible for stock market to become bear market as worst as a recession in the economy when occurs a decline in commodity market. However, it is unable to predict the future commodity market due to the fluctuation of the demand and supply of commodities time to time.

Indeed, there will be different impacts from the fluctuating of commodities index for every different countries. Regarding this, there are more than 250 goods in commodities and it used to be classified into different categories where every commodity will have its own level of impacts to the stock market. As a rational and successful investor, there must be sufficient information as long as understanding of commodities before they make any investment in commodities. As a consequence, a successful investor might not have to invest with insufficient information and lack of understanding no matter it is investing in stocks, bonds or currencies as well. In addition, most of the investor will face difficulty in diversifying their portfolio since

there is different categories investment either in stocks or commodities. With the exception of this, the relationship of stocks and commodities have blurred in mind either inversely correlated or positively correlated as long as uncorrelated asset classes. In this situation, most of the investor is still confusing about the actual relationship between commodities market and stock market thus affecting their making decision. Besides, the uncertainty relationship causes most of the mangers to use commodity-related investments as it able to hedge the equity exposure in this situation. However, the difficulty in making investment decision not only facing by professional managers and investors, but also the policy makers, commodities' producers as long as those developing countries.

Consequently, we are more interested to determine the relationship between commodities index in United States and the stock markets in the case of Malaysia and China in our study. In this thesis, the lead-lag relationship between the values of representative indices of the markets have been identifying as long as various methods using in order to study this relationships. Other than that, there will useful able solutions of the questions confuse about the commodities as long as understandable instructions for the investors who are interested to invest in particular market. With the exception of this, our research studies the impacts of commodities index in western developed country which is United States to developing countries which are Malaysia and China. On the other hand, the stock market for Malaysia is Kuala Lumpur Composite Index (KLCI) and China is Shanghai Stock Exchange (SSE) while the commodities index for United States is Goldman Sachs Commodity Index (S&P GSCI) for Gold, Crude Oil and Copper.

ABSTRACT

The globalization causes the commodity price and stock markets in the world become more integrated. It was believed that the performance of stock markets will be affected by global commodity price. Thus, we decided to carry out a research to examine the connection between global commodity price and stock markets. Two stock markets were selected as the research target which is Kuala Lumpur Composite Index (KLCI) and Shanghai Stock Exchange (SSE). This study uses 10 years data from the year 2003 to 2012. The VAR model and Granger Causality test was implemented in this thesis to study the relationship between global commodity prices and stock markets. The overall result showed that some of the commodity prices have short term bilateral effect across the stock markets while some have only unilateral effect. Other than that, we also examine the impulse response function (IRF) and function and variance decomposition analysis is performed to examine the pattern of dynamic responses of one variable to another and its forecast error variance. Overall, our findings illustrate several important implications for investors in making optimal investment decisions while engaging in risk management and forecasting changes in stock markets.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

The background of the research carried out will be discussed in this chapter. Besides, problem statements, research objectives, research questions, hypothesis of the research study and significance of the study will be stated clearly in this chapter.

1.1 Introduction of Commodity Market

Commodity market is a marketplace with the purpose of buying, selling as long as trading products. Commodity market is similar to an Equity market as buying or selling commodities instead of buying or selling shares. There are almost 100 primary commodities which allow investors to facilitate investment trade in around 50 commodity markets worldwide. Furthermore, there are various types of commodities include hard commodities and soft commodities in the market. Hard commodities are those resources exist naturally and must be extracted for example gold, rubber, oil, etc. While soft commodities are products mostly from agricultural such as corn, wheat, coffee, sugar, soybeans, etc.

Moreover, the commodities market is diversified into two different segments which are Over the Counter (OTC) market as long as the Exchange based market. For the OTC market, there are usually specified the commodities and it is trading based on delivery. In this market, both of the buyer and seller have their own brokers in order to

help in negotiating the prices on behalf of them. While for the exchange-traded markets, there are virtually only derivative markets where everything is being standardized in this market and people is allowed to purchase a contract with a percentage of the contract value.

However, there are some ways for investors to make their investment in commodities. Normally, most of the investors may prefer the stock in the corporations that mainly focus on commodities prices. An exchange-based platform is benefiting with an efficiency price formation mechanism as the larger the participation in the market. Besides, investors may purchase mutual fund, index fund as long as exchange-traded funds (ETFs) which focus mainly on the companies that are commodities related as one of the alternative way in investing in commodities.

In contrast, there is an easiest and convenient way to invest in commodities by purchasing into a futures contract that accelerate the activities of speculation, hedging and arbitrage to the investors. There are opportunities offered to people in order to trade on the perceptions in the volatility of commodity prices with facilitating speculation. On the other hand, the price movement in the commodities futures market could be prevented with an effective hedging mechanism while most of the traders are preferable with the using of arbitrage opportunities which generates different prices between the two different exchanges in the same underlying.

According to Chandraserkhar and Ghosh (n.d.), there was an unpredicted price volatility of global commodity markets over the recent past year even the rising of global prices in oil by the middle of 2008 which caused by the real changes in demand and supply in the market. The market was experiencing sharp falls in price during the period of the crisis. However, there was a collapse of commodity prices subsequently and the price gains during the period of 2007 to the mid of 2008 have been wiped out by the later fall in prices in commodity (Swamy & Sreejesh, 2011).

Although there was a fact that price falling in commodity market which lead to a shortage in a short term, but it is still unable to justify higher commodity price. However, the commodities markets will rebound sometimes as hedge funds and this caused the investors to withdraw the money in order to invest in commodity markets. By doing so, commodity market will start to tumbling afterwards. Therefore, most of the investors are preferable to look for the safer investments such as gold and crude oil which are categorized in commodities markets during the recession time. In this situation, it could lead to an attractive of numerous financial investments in commodity markets as long as there are the incentives and approaches for the investors.

Unfortunately, the commodity markets had no longer provide the trading as well as goods delivery but have become the speculative and hedging purposes due to the steady fluctuation in the markets. Therefore, there is largely participation of investors in derivatives markets since the enlargement in financialization of commodity markets. There have been widely gained by the financial activity in the commodity markets in this situation thus lead to an increasing of production of many other commodities in the markets. Furthermore, the increase in financialization of commodity markets may cause the exposure of macroeconomic and also financial shocks as well.

1.2 Introduction of Stock Market

A stock market is known as equity market, plays an important role to the free-market economy since it enable the investors in participating themselves in the financial achievements. The purpose of stock market is to facilitate the exchange of securities among buyers and sellers, thus providing a marketplace either in virtual or real. It serves as a center of transaction network where securities buyers meet sellers at an agreed price. Stock market provides a marketplace where those publicly held shares are being issued and traded either via over-the-counter (OTC) or exchanges markets.

Furthermore, there are two different sections of stock market which is the primary market and the secondary market.

Besides that, stock market plays a significant role in providing the sources for companies to raise capital. All the businesses are allowed to trade publicly in the stock market as long as raise capital by selling shares. Moreover, it is a liquid investments as the investors are able to sell securities in hurry and convenient. Investing in stocks is more attractive compared to other less liquid investments. Additionally, share price is one of the main economy activities and it could affect social mood which reflects from the increasing of business investment causing by the rising of share prices. On the other hand, the price movement in stock market is captured in price indices.

1.3 Stock market Index

1.3.1 KLCI

Bursa Malaysia represents the stock exchange in Malaysia while Kuala Lumpur Composite Index (KLCI) acts as a capitalization weighted index that maps approximately the top 100 companies of the Bursa Malaysia. The FTSE Bursa Malaysia KLCI (FBM KLCI) acts as a market benchmark for the Malaysian market. In order to enhance the tradability of the index, the form of FBM KLCI will change from 100 to 30 companies while the Malaysian stock market is being remained representative. In 2007, there is a net receipt of trade that remained by Malaysia and also a rise in aggregate domestic liquidity contributed from capital flows. Meanwhile, there was a higher net portfolio investments compared to 2006. Besides that, floating rate was being introduced by Bank Negara Monetary Notes (BNMN) in order to expand the spectrum of debt instruments which have been used as the purpose of managing liquidity in the financial market during 2007.

According to the FTSE Bursa Malaysia KLCI analysis chart, it shows that there was a little bearish outlook in year 2009 due to the global financial crisis of 2008-09. Then, BNM has implemented expansionary monetary policy to lower down the interest rate thus beneficial to the global financial crisis on Malaysia economy with flexible exchange rate. After that, KLCI has strengthened among offshore markets in year 2011 but the trend is still volatile due to geopolitics issue in the Middle East and North Africa and earthquake in Japan (*Public Mutual, 2012*). In the last quarter of 2011, KLCI enters a bearish outlook due to the over concerns of European sovereign debt crisis as long as the global economic activities slowdown. Given the strong domestic-owned and non-European banks in Malaysia, there was a steadily growth of Malaysia economy with low and stable inflation, while the financial system is more developed. Therefore, KLCI shows a linear trend of market outlook and hits a peak on 31st December 2012 throughout the ups and downs across the year.

1.3.2 SSE

On the other hand, Shanghai SE Composite Index (SSE) is a stock market index of all stocks which are traded at the Shanghai Stock Exchange. It takes December 19, 1990 as the base day and the total market capitalization of all the listed stocks on the same day as the base period, with a base of 100 points. The market trend China shown by SSE Composite index reflects a stable horizontal trend across the years. Then, it shows an upward trend started from 2006 due to the domination of financial sector stocks in the market especially after the ICBC listing. About half of the index has been aggregated by other nine listed banks with their price performance and strong trading volume other than high share of market capitalization. Next, PetroChina has become the largest single stock in last quarter of 2007 which keep pushing on the market during Bull Run in 2006-2007. However, the financial crisis in 2008 has caused SSE Composite Index to sink in last quarter. The China government then immediately switched its monetary policy objective to control inflation and thus loosened the tight

monetary policy in 2008. With the effective China's monetary policy in addressing the crisis, the economy had been stable while the SSE Composite Index had been increased slightly in August 2009.

1.4 Commodities Market Index

The S&P GSCI (Goldman Sachs Commodity Index), was developed by Goldman Sachs in the late 1980s, is known as a measurement of general price movements as well as inflation in the economy. Besides, the S&P GSCI is world-production weighted with production expressed in terms of futures contract equivalents or "contract production weights", while it is the index that representing market beta (Peterson, 2011). Consequently, it is a benchmark in commodity markets' investment and also uses to measure the commodity performance. On the other hand, it is an index which can be traded since it contains liquid commodity futures with the purpose of diversification with low correlations to other asset classes. There are total 24 commodities from all commodity sectors in S&P GSCI and it uses futures prices for non-spot contract months. Meanwhile, not all contract months are used for certain commodities due to liquidity level differences. The S&P GSCI is calculated and maintained by S&P Dow Jones Indices.

The path of GSCI shows a flat-to-negative returns starting from the late 1990s. Since early 2000s, commodity has emerged as a popular asset class for many financial institutions. From 2002 onwards, it shows a rapid appreciation in the spot index. The spot index has appreciated at an annualized rate of 12.5% through 2008 (Philips, n.d.). However, there was a sharp price decline of commodity market in July 2008 that continued until March 2009, particularly a 62.4% drop in the S&P GSCI (Norish, 2009). Investors were unable to benefit in the same way as long-short strategies and have been looking further to obtain returns in all market conditions due to financial crisis. As a result, the popularity of passive long-only indices commodity investment has diminished over the past few years. According to Norish (2009), the commodities

have lost its diversification benefits due to the positive correlation between S&P GSCI with the local equity market after crisis. Start from 2010, an analysis of the S&P GSCI suggests that there is recovery of global manufacturing as compared to previously. Therefore, the ratio of industrial to precious metals being used in order to view the precious metals as safe haven.

1.5 Background on Study

Malaysia and China are selected in this study to examine how the commodity markets include crude oil, gold and copper affect the stock prices in both country. Kuala Lumpur Composite index (KLCI) and Shanghai Composite Index are the stock market index for these two countries. Besides, S&P GSCI (formerly Goldman Sachs Commodity Index) serves as United States commodity index benchmark to measure the commodity performance of China and Malaysia over time.

China is driving up the world markets as it plays an important role to the economic growth while Malaysia is one of the countries that are fast growing in economics among the South East Asian, besides, they are also the key contributor of consumption in commodities (Gelec et al., 2012). Therefore, it raise the concentration of investors to understand the relation between stock market and commodities market since China's is one of the largest emerging countries and it may provide considerable information to the investor. The reason behind in selecting developing countries is due to the attractive and volatile in growth rates. Many emerging markets are expected to grow faster than developed economies; higher economic growth rate will translate to higher rate of earning growth, contributing to more return in equity market. As emerging markets continue on their extraordinary growth path, there is a real need for basic financial services, including retail banking, insurance, asset management, and capital market services.

The current overview of commodities market indicates that broader commodity sector was largely supported by the stronger performance of energy and gold prices in February. Oil price is expected to trade within the USD100 to USD104 per barrel range within the near term. Softer US economic data provided a push in demand for gold prices, pushing prices of the precious metal to reach a high of USD1, 345.52 an ounce. On the other hand, prices of copper slipping to its lowest price in more than 2 months over concerns of a slowing growth, and rising stockpiles in China (Hwang Global Commodities Fund, 2014). Recently, he current commodities market price movement raises the concern of portfolio manager, this may due to the importance of the risk diversification purpose in designing or making decision in their portfolio investment as well as affecting the stock price. However, in Malaysia, gold and copper market is still receiving less concentration and less active as compared to others. Therefore, most of the investors and fund manager will tend to have risk diversification by investing into commodities fund, public trust or unit trust to other countries, while United States commodities market remaining the most popular investment target country for investor and fund manager.

In fact, Hwang Global Commodities Funds reports the target fund sector allocation for energy sector and metal sector weighted at around 67.10% of total funds. Crude oil, gold and copper remains three of the top 5 holding variables in the commodities fund. Several indexes have been used as the benchmark of commodities prices by Hwang commodities fund manager such as S&P Goldman Sachs Commodities index (S&P GSCI), Dow jones-AIG Commodities index and Reuter/Jefferies-CRB index. On the other hand, Dow-Jones Islamic Market Oil &Gas index and Dow Jones Islamic Market Basic Material Index have also been used by CIMB Islamic Global Commodities Equity Fund group. The statistical reports stated the sector breakdown for oil and gas, and basic material weighted highest percentage of the commodities fund of 43.36% and 31.71%, respectively. Furthermore, the breakdown of country allocation stated CIMB fund manager has targeted largest proportion (47.81%) of their fund into United States. This once again proven that

United States remains the target country for their investment as well as serve as the benchmark for fund manager in referring the commodities market price.

On the other hand, the relation of commodities trading between the countries can be view through the trade volume as well. According to United Nation Commodity Trade Statistic Database (UN Comtrade), the trade volume of gold between Malaysia and United States increasing over the time from 5.22 million in year 2003 to 6.11 million in year 2013 while the trading volume between China and United States is 6.46 million in year 2003 and increase to 576 million in year 2013. In year 2003, Malaysia has traded 38 million of copper while China traded at about 448 million with United States and the trade volumes are increasing over the time. By looking to crude oil, the trading volume of Malaysia increase significantly from 28 million in year 2003 to 418 million in years 2013 While China has traded 225 million in year 2003 and 2.79 billion in year 2013. Malaysia prime minister, Datuk Seri Najib Razak made the startling statement that Malaysia's cannot continue to rely on the oil sector as it will become a net oil importer in 2009. The statement was then repeated in an article by the National Economic Action Council (Prambudia.Y & Nakano.M, 2012).

However, what is the relation or linkage between the commodities market and stock market? As mentioned, investor and fund manager will concern with the price movement of commodities market and invest into the market. Therefore, if commodities price is highly volatile, it directly affect the return of investor. Investor may have lower or higher investment power and thus affect their investment decision into stock market. This can be seen through two perspectives which are in term of return and cost. First, when commodities market is performing well, the return of investor increased and thus increases the spending power of investor. Hence, investor may have more demand on stock market and increase the stock market performance, vice versa. Second, if there is rise in commodities price in the market, it will increase the cost of input of company and slower down the stock performance, vice versa. Therefore, this paper attempt to provide investor the information and evidence about the relationship

between stock market and commodities market and the impact of commodities market to stock market as well.

1.6 Problem Statement

Recently, risk diversification in portfolio investment by including commodities have raise the concern of investor due to the financialization of commodity markets and increased financial integration of the countries. It is essential to have a good understanding about the relation between the stock market and commodities market in order to benefit from investment opportunities. According to Vivian and Wohar (2012), commodities market are currently highly liquid and a proportion of investors view commodities purely as the investment assets or securities instead of purchase tangible assets of commodities for the purpose of risk diversification. By adding the commodities assets in portfolio investment, it may minimize the risk and enhance the performance of portfolio.

Stoll and Whaley (2010) stated that the inclusion of commodities assets into a portfolio to serve as diversifying assets has become common since 1998. This may lead to increase in the speculator in the market who is viewing commodities as an investment asset. They stated the inclusion of commodities considered as the new environment in the market compared with traditional environment which only involved producer and consumer of commodities goods. The research by Creti et al. (2013) and Gilbert (2010) reported there is both stock market and commodities markets are inter-connected and their correlation have increased over the time since year 2000. Besides, the research by Valiante (2011) supports the statement that speculator is one of the key factors in affecting commodities prices since year 2000. While the correlation between commodities and stocks may not only due to the financialization of commodities, it is possible due to the global economic conditions such as deterioration. Deterioration remains key contributing factor to the spike in correlations between the stock market

and crude oil prices during 2008 to 2009. For example, KL Composite Index (KLCI) fell 38.9% from 1,435.68 to 876.75 (The Star Online, 2009), the performance of stock market has fallen accompanied crude oil price falls. The role of commodities tends to be an important issue on investment trading. It draws the attention of investors since the both commodity and stock markets is highly correlated while it could lead to investor suffer from losses if they forgo the importance of commodities market in their investment plan.

Therefore, it is crucial to study the relationship between commodities market and stock market so that investor can sustain their wealth in different economic condition and make wise decision. From the previous study, many researchers and investors have dedicated their studies to the correlation and relationship between stock market and commodities market. For example, according to Ziaei (2012) showed significant negative correlation between commodities market and stock market. Research of Ray (2013) which the evidence from Indian stock market stated that there is co-integration does exist between stock price and commodity market. With above study, we understand the relationship between commodities and stock market has drawn investor attention and macroeconomics indicators are giving different impact on stock market price movement. As we can know, the increase in commodities index would lead to an inversely impact to the stock market which most probably affect the country's economy. A worsen stock market would definitely cause a downturn of the country's economy as stock market is one of the major contribution to a country's economy nowadays.

However, it is insufficient to have an overall clear answer on reaction of any dynamic system in response to some external change. Therefore, this paper importantly extends prior literature by examine granger cause, impulse respond and variance composition on the commodities market and stock market from existing studies as most of past researches are focusing on specific market. The construction of this model in this study to determine the relationship between 3 hot commodities market and stock market will serve the purpose of formulating guidelines for investor and portfolio

manager in making decision in different commodity market and stock markets. Besides, do the commodities play the same role in China and Malaysia? Is different sector of commodities has different impact towards the stock market? Therefore, we attempt to examine the relationship between stock market and commodities market in our paper.

1.7 Objective

The purposes of this research paper are generally examining the relationship from global commodities index to the stock market in Malaysia and China. In this research paper, we are focusing on energy, precious metal and industrial sector of commodities market.

(i) Determine the relationship between global commodity market and stock market in China and Malaysia.

(ii) Determine the causal relationship between global commodities market and stock market in Malaysia and China.

(iii) To compare the effect of global commodity market on Malaysia stock market and China stock market whether there is stronger effect on Malaysia stock market or China stock market.

1.8 Significance of Study

The aim of our research is to determine the relationship between commodities index in United States and the stock markets in the case of Malaysia and China. Yet, the relationship is being investigate either in short-run or long-run. In this research, we figure out the importance of precious metal such as gold, energy product such as crude oil as long as industrial metals sector such as copper that is the movement of stock price to the countries we have selected.

Our research provides information which beneficial to investors as well as portfolio managers as they able to gather more information based on the interaction between both markets in our research. In our research, it reflects the value of related commodity which impacts to the stock price does provides sufficient basic information to the investors who is interested in this particular field. On the other hand, commodities and stock market are significant for investors to include in their portfolio in order to reduce risk of their portfolio investment. Therefore, our study provides exhaustive information to investor and portfolio manager on the interaction between stock market and commodities market. By determine the reaction of any dynamic system in response to some external change, it may provide another picture to investor in understanding the linkage between the markets. Therefore, this research may serve as the reference for investors and portfolio manager in conducting the portfolio diversification and investment strategy.

1.9 Chapter Layout

There are total of 5 chapters in our research. The chapter 1 introduction follows by chapter 2 literature review. Chapter 3 is methodology and chapter 4 is empirical result. Last but not least, it will be conclusion of the whole research. Content of each chapter will be upload as below:

Chapter 1 is about introduction of the research topic. It will outline the economic outlook and stock market outlook of China and Malaysia as well as the overview of commodity market included the background of three sectors that we chose in commodity markets which are precious metals sector, industrial metals sector and energy sector. Other than that, the background of the three independent variables which are Gold, Copper and Crude oil also have include in this chapter. In addition, problem statement, objectives of our research and significance of study will be highlighted in

this chapter. Lastly, the chapter layout and conclusion of chapter 1 will be written in this chapter as well.

Chapter 2 is about review on the previous research based on the relationship between commodity markets and stock market as well as the short run or long run relationship also will be written. Besides, data review and data description about what kind of data we extracted and data sources also will be highlighted. Other than the ideas proposed by the previous research, the theoretical framework will be shown in this chapter. Lastly is the conclusion of chapter 2.

In this chapter 3, the data will be collected and shown in this chapter. The theoretical framework, analysis of the data collected and empirical framework will be shown in details. Furthermore, the steps in process the data, the design of the model, test of the model as well as the construct of measurement will be reported in this chapter. Lastly, the summarized of chapter 3 provide linkage to the next chapter.

Chapter 4 will discuss the processed of data collected and testing the model will be analyzed in this chapter. The empirical results from the tests being held will be reported in details under this section. Other than that, ideas and conclusion on the empirical results will be written. In the end of the chapter, summarized of the result will be further implication in the follow chapter.

Chapter 5 is the final part of the research. All the major findings and summary of the research will be highlighted. Moreover, limitations and recommendations will be made for further research as well as policy implications will be discussed in this chapter.

1.10 Conclusion

In general, chapter 1 only highlighted the important information and knowledge to the reader on the research topic. Other than that, it also provides an overall idea and picture to reader to ensure they understand the research that carries out. The outline of this chapter also provides the researchers examine their objectives in the right track.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In the past, the researchers have been investigating the effect of commodity price that causes changes in stock markets performance. As investments are growing in these markets, this study aims to further explore the interrelationship between global commodity price and stock markets. In this chapter, we will be examining each independent variable (gold price, crude oil price, and copper price) that affects the dependent variables (KLCI and SSE). Besides that, the relationship between variables is being studied in terms of positively or negatively correlated and whether they have a long run relationship and their causal relationship.

2.1 Literature Review

Over the last decade, simultaneous phases of rising and falling trends of the commodity prices caused commodity market experienced an exceptional volatility. At the view of macroeconomic, commodity prices and its correlations are significant concerned by policymakers as it is given the potential to feed the pressure of volatility and inflation of the commodity and thus remained at central issue in the world of economics. Furthermore, the analysis of relationships between commodity and stock markets is a topic of interest for financial players because many investment portfolios are included raw materials together with stock classes (Dwyer, Gardner, & Williams,

2011; Silvennoinen & Thorp, 2010; Vivian & Wohar, 2012; Conover, Jensen, Johnson, & Mercer, 2007). Moreover, traders concurrently investigate the stock and commodity market fluctuations will influence the trend of other market as documented by Mensi, Hammoudeh and Yoon (2013); Creti, Joets and Mignon (2013); Choi and Hammoudeh (2010).This is because traders might gather useful information and implement substitution strategies between stock and commodity market by comparing the dynamic volatility of commodities and stock prices.

In addition, Gorton and Rouwenhorst (2004) had constructed an index of commodity market price returns from 1959 to 2004, the result showed that a strong negative relationship to stocks price and this is due to different behaviors over the business cycle. Moreover, it showed that the commodities returns increasingly matched with the stock market (Buyuksahin & Robe, 2011). According to Bank of Japan report, this can be explained that if financial investors are facing risk of loss or the risk-appetite of financial investors increase is likely to affect prices of risky assets, this will lead to positive correlation between the return on commodities and stocks.

In particular, previous researches Creti et al. (2013); Mensi, Bekjid, Boubaker and Managi (2013); Masih, Peters and Mello (2011); Wen, Wei and Huang (2012); Hood and Malik (2013) shown that the commodities from precious metal and energy sector remained key sector in representing commodity market in the studies.

2.2 Commodity Markets and Stock Markets

2.2.1 Gold Price and Stock Markets

For many centuries, gold has played as a special role as a hedging tool especially political and economic uncertainty exist (Baur & Lucey, 2010). Gold is outstanding among the other commodities due to high performance in term of return in

the market and effectiveness in risk reduction feature. Therefore, researchers have paid highly attention to the gold market.

In addition, empirical studies showed that if financial deregulation was implemented, country stock markets will become sensitive to domestic and external factors which gold price is one of the external factors. The research by Baur and Lucey (2010); Baur and McDermott (2010); Hood and Malik (2013); Ciner, Gurdgiev and Lucey (2013) indicated that the feature of gold as a hedging tool enable investors to protect their wealth during bearish market condition. Hillier, Draper and Faff (2006) also stated that the greater advantage of invest in precious metals is it can perform better in high volatility market.

In the research by Lucey, Tully and Poti (2006) found that gold and future market has negative effect by examine the seasonality in conditional and unconditional mean and variance of gold contract. From 1979 to 2009, the result showed that gold is negative correlated with stock market and as an effective hedging tool for stock market of major European countries and US excluding for stock markets of emerging countries during Global Financial Crisis. According to Ziaei (2012) showed significant negative correlation between gold and stock market but gold price cannot be considered a safe haven in ASEAN +3 case. Moreover, the research also saying that gold price and stock market is move in opposite direction. Basically, when gold price falls, people will tend to withdraw their investment from gold and then invest in the stock markets which in turn increase the price of stock market due to heavy investment. Nevertheless, when the gold price increase, investors will tend to reduce investment in stocks since they tend to invest more in gold market which leading the reduction in stock price. Other than that, previous studies also found that there are negative relationship between gold market and stock market. This can be explain as a gold mining firm's stock price is related to the price of gold so if a firm that use the commodity as an input will see the stock price fall due to the increased costs that lead to lower profit . The researcher identify that in Turkey, the price of gold had insignificant effect on ISE-100 Index (Buyuksalvarci, 2010).

In addition, the research by Baur and Lucey (2010) found that gold is hedge against stocks on average and a safe haven in extreme stock market by examining the constant and time-varying relations between US, UK and German stock return and gold return using daily data from 1995 to 2005. Besides, they also found that the safe haven is short-lived by performing a portfolio analysis. Furthermore, gold prices and stock price indices are not co-integrated which mean there is no long-run equilibrium. With the exception of this, previous research done by Giam, Mcaleer and Sriboonchitta (2009) showed that there is short run relationship between gold market to ASEAN emerging stock markets for example GOLDFIX and SET (Stock Exchange of Thailand) and VNI (Vietnam Information Share Price). It is important to know that GOLDFIX is not integrated with all ASEAN emerging stock market indexes. In term of international investment in the region, realization of market co-integrations is an important issue since that if the stock market indexes and gold market move in the same direction then investors will not gain long term profit from invests in these markets in portfolio diversification. However, in the research of Ray (2013) which the evidence from Indian stock market saying that the co-integration test that he conducted confirmed that co-integration do exist between stock price and gold price imply that long term relationship do exist as well.

Meanwhile, there is no causal relationship between gold and Karachi Stock Exchange (KSE) in previous study (Talib, Bilal, Naveed, & Khan, 2013). These results similar with the studies by Creti et al. (2013); Baur and McDermott (2010), who examine the role of gold in the global financial system by testing the hypothesis that gold represents a safe haven against stocks of major emerging and developed countries. The Granger causality test showed there is unidirectional causality from gold price to stock price. From evidence in India during 1991 to 2009, the result proved that there is bidirectional granger cause between gold prices and stock market returns (Razak, Gan, Mohd Hussin, Muhammad, & Marwan, 2013).The result showed that, the stock prices granger cause the gold prices in developing countries whereas the gold prices is granger cause the stock prices in developed countries. Additionally, recent study by Ray (2012)

in examining the volatility spillover and return between stock market and gold in Indian industrial sectors shows that they do not have any significant evidence of volatility spillover from gold to stock market in Indian. Moreover, Anand and Madhogaria (2012) had conducted the relationship between stock market return and gold prices in six countries which including developed and developing countries such as China, German, India, Japan, UK and USA. For example in developing countries such as China, gold is more attractive compared to invest in stocks, bonds and bank deposits thus people in this nation always believe that gold is a better investment. Besides it is a form of saving or investment, gold also acts as an integral part of various social and religious customs.

Other than that, the investment behavior of developing country and developed country are different. The people in these countries are normally following their sentiments and thus they will take a longer time to change their present investment in gold. Furthermore, in developing countries, gold still act as an effective safe haven investment tool particularly during crisis. However, on the developed countries such as USA, the people are more practical compared to developing countries, thus they have reverse reaction from the observation in gold and stock investments. Since the gold price start to appreciate, it affect the stock prices as well, as the gold price increase, the currency of their countries become powerful in turn increase the purchasing power of the people plus they have ability to invest in more stocks and gold assets. On the other hand, the relationship between gold and stock price moves from positive to negative on a daily basis concluded that there are invalid to proof that the intuitive notion held by people.

2.2.2 Crude Oil and Stock Markets

Since the relationship between stock markets and commodity market become a central matter in global economics, investors and practitioners have investigates the correlations between stock markets and commodity markets in different sectors. Since

1970s, academic and policy maker are interested to the changes in oil price. Previous studies by Driesprong, Jacobsen and Maat (2008); Narayan and Sharma (2011); Masih, Peters and Mello (2011) had recorded as evidence that the oil price remained as a determining factor and one of the factor to forest for stock prices.

According to Masih et al. (2011), this has been due to the reason that rising in the oil price brings two important effects on the economic. First, increase in oil prices leading to increase in cost of petroleum and gas therefore cost of production and cost of final goods of consumption will increase causes economic dampened. Second, increase in oil price has the tendency in leading to the inflation especially in the countries where the oil constitute larger portion in energy sector. According to Tansuchat, McAleer and Chang (2009) the direction of the stock price whether it is negative or positive of the stock price effect is depend on whether a stock is an oil producer or an oil consumer or the oil-related products because most of the firms are oil consumers then the performance of the stock market will be negatively correlated.

A research done by Arouri and Rault (2011) and Bjornland (2009) indicated that a positive relationship exist between oil and stock market in oil-exporting countries while the negative relationship which shown in the previous researches does not exist in these countries. While for the oil-importing country, the studies done by Chinn and LeBlanc (2004) and Hooker (1996) reported that the increase in the oil price will tend to have opposite results. In fact, several research Hamilton (2003); Cunado and Perez de Gracia (2005); Balaz and Londarev (2006); Cologni and Manera (2008); Kilian (2008); Alvarez, Hurtado, Sanchez and Thomas (2010) have documented there are negative relationship between oil price and economic activity in selected main oil-import developed countries and emerging countries. Besides, Jones and Kaul (1996) also stated the effect of stock returns in several developed countries markets such as Canada, Japan, the UK, and US. They found that there is negative links between oil price changes and stock returns in the US and Canada while it is inconclusive for Japan and UK. The researches by Arouri and Nguyen (2010); Backus and Crucini (2000); Kim and Loungani (1992) indicate that the increase in the oil price will to increase in

the cost of production since oil is the most significant production factor and it restrain the profit of them. Hamilton (1988) stated that the increase in cost of production will lead to higher consumer prices and the cost is transferred to the consumer, therefore, it lead to lower demand and consumption since the purchasing power of consumers were dropped. In the view of macroeconomics, lower consumption could lead to the increasing of unemployment due to the reason of lower production and this statement is further proven in the researches by Lardic and Mignon (2006) and Brown and Yucel (2002). Therefore, the oil market and stock market are negatively correlated which proven by the researches of Sadorsky (1999) and Jones and Kaul (1996). Besides, Park and Ratti (2008) found that oil price shocks negative influence on US and Canadian quarterly stock prices and West Texas Intermediate (WTI) oil price have negative impact on S&P 500 (Chiou & Lee, 2009; Choi & Hammaudeh, 2010).

However, Gogineni (2007); Yurtsever and Zahor (2007) provide a different empirical support which oil prices are positively moving with stock price if oil price shocks reflect changes in aggregate demand. On the other hand, they are negatively correlated with stock prices if they reflect changes in the supply. This is due to the oil shock will caused decrease in aggregate demand because the redistributes income will rise between the net oil import and export countries. Other than that, the aggregate supply will decrease as the firms purchase less energy due to increases in oil price. Thus, the productivity in capital and labor falls as well as potential output falls. Consequently, the real wages will be lower (Cunado et al., 2005). Besides, the research by Arouri, Jouini and Nguyen (2012) indicated that a positive relationship between oil and stock market in oil-exporting countries and also research in examining the correlation between oil and stock market return in Gulf Cooperation Council (GCC) countries by using industry level data. Other than that, the researcher also found that there is co-integration exists between oil prices and stock prices this imply that the increases in oil price will positively affect GCC stock price. Additionally, the empirical studies also show positive association Basher and Sadorsky (2006); Sadorsky (2006) or there is no association between the stock and oil market (Chen, Roll, & Ross, 1986; Huang, Masulis, & Stoll, 1996).

However, according to Fillis, Degiannakis and Floros (2010); Apergis and Miller (2009), they stated that there are no relationship between oil prices and stock market returns. Furthermore, oil price shocks are one of the examples as proven by the researches of Bernanke, Gertler and Watson (1997); Lescaroux and Mignon (2008) and thus oil price is not significant to the stock market. Moreover, Nordhaus (2007) support the finding that the oil price does not affect the stock market by suggested that the impact of oil shocks can be reduce by changing the wages, the country with greater wage flexibility responses to the oil price shock to be neoclassical rather than Keynesian. In other words, the country is focusing on supply and demand of the market rather than in the view of aggregate demand. In contrast to the Keynesians theory, neoclassical theory argues the effect on output is less significant and thus oil price shocks should have a minimum or no impact on the stock market.

In particular, a number of researches Fillis (2010); Miller and Ratti (2009); Oberndorfer (2009); Chiou and Lee (2009); Nandha and Faff (2008); Park and Ratti (2008) showed there is significant but small negative effect between crude oil and stock market. These finding is similar to other studies (Arouri et al., 2011; Choi & Hammoudeh, 2010; Fowowe, 2013), the results showed that the relationship between oil market and stock market in Nigeria are insignificant. According to Fowowe (2013), the possible explanation for the results is due to the stock market is mainly control by banking sector. In addition, there is fewer oil imported or exported firm to warrant in stock market when oil price increase due to high transaction cost and less liquidity in the stock market.

Furthermore, the research evidence from Iran Stock Market and oil price by Oskooe (2012) showed that the causality in mean exist when oil price changes with Iran stock returns. However, the finding showed that there is no causality in variance from oil prices. In other words, the variance of fluctuations of oil prices do not affect the variance of Iran stock market returns this imply that no volatility spillover between Iran stock market and global oil market. According to Apergis and Miller (2009), they

showed that there is no causality of the oil market on the stock market return. Also, causality strength oil price changes is low indicates that if various structural shocks in the oil market happened, it has low predictability for the stock returns from the event. Meanwhile, another research showed Granger causality between Islamic stock return and crude oil price so it concluded that among strategic commodities only oil price variables impact the Islamic stock return in the long run and short run in Malaysia (Abdul Razak et al. 2013). Furthermore, the empirical results from OECD and non-OECD countries, there are Granger causality showed that there are bi-directional long run granger causality between crude oil shocks and stock markets for these countries (Du, Yu, & Hayes, 2011).

2.2.3 Copper and Stock Market

Copper is served as a key input factor in many sectors such as manufacturing, construction, and energy sector which is important for a nation's development. As such, copper is widely used in electric cables and generators to generate electricity and has been utilized during building construction too. The copper industry is one of the major contributors to the global economy while mainland China is the major user of copper. Copper is a widely used as basic material and is imperative for industrial and economic development in China. Thus, Chinese copper industry has made significant progress driven by large domestic copper demand after 1990s (Zhang, Yang, Cai, & Yuan, 2014). Meanwhile, the rise in refined copper production has become an important way to relief copper resource constraint which would affect the price of copper. A 65% usage of all copper by emerging economies shows that copper price movements has the ability in predicting economic activity, and thus affecting economic growth (Sadorsky, 2014). Besides that, the findings of his studies indicate that copper consumption is rising rapidly due to domestic economy development and opening of the consumption market in China.

On the other hand, Emanuele De Meo (2013) has chosen copper as one of the variables in his research study on the fundamentals of commodity prices. He stated that copper is one of the commodities that experienced the sharpest price increase in the past 10 years and has higher liquidity. Jaunky (2013) who studied the cointegration and the causal analysis of copper consumption and economic growth in developed countries suggests policymakers should concern on mineral policies to ensure sufficient and adequate copper supply in the country because it is important to sustain long term development goals. This is because the results from both Unit Root and cointegration tests showed that, in developed countries, copper consumption and economic growth is cointegrated. Thus, copper has significant effect on economic development in a nation. In all, the copper production may affect the price of copper and thus affecting copper consumption and the economic growth of a country.

The research done by Jaunky (2013) found that there are both unidirectional and bi-directional causality of copper consumption and economic growth in few developed countries such as Spain, Japan, Belgium, Italy, and South Korea. The importance of copper in driving economic growth can be clearly seen through these research papers. Besides that, it has listed copper as an important commodity which represents the industrial metals in commodity sectors. Furthermore, the research shows positive and significant price reactions across the indices of all the East Asian stock markets to the lagged overnight returns of copper and soybeans. Their findings suggest that East Asian stock markets tend to interpret increases in commodity prices (copper is one of the main variable in this study) as positive news to their economies. Creti et al. (2013); Liu and An (2011); Stevenson (2004); Lee (2013) also used copper in their studies.

Meanwhile, copper has least volatility. Thus, traders and investors can use copper to predict the business cycle to adjust or hedge against volatility with its wide linkages with the global economy (Choi & Hammoudeh, 2010). This may be due to high competition in copper market and has more substitutes which lead to less monopoly power and low volatility. Furthermore, Sadorsky (2014) uses copper price

as one of the indicator in modeling the volatility and correlations between emerging market stock price because of its importance to the global economic. Moreover, after year 2008 the dynamic correlation between stock market and copper is increasing .This paper shows an interflow of returns for both financial and commodity markets by mentioning copper is the most expensive hedge for emerging market stock price.

2.2.4 Individual Country and Cross Countries

There are numerous studies on the efficiency of stock price on commodity market in developing countries such as United Kingdom and USA. The studies have reported that the price movement in stock market is efficient to the commodities markets (Garbade & Silber, 1983). In other word, commodities are said to have impacts on the stock market. Based on the research done by Chakrabarty and Sarkar (2010), their literature was studying on individual country which was on India for their investigation about the stock price to the commodities market. Furthermore, the researchers in this paper studied the commodity market for only the main agricultural commodity in India which is commonly known as rice. Moreover, the researchers also compare only oil prices to the impact of stock markets in Australia while the observation was positively correlated in the country (Asteriou, Dimitras, & Lendewig, 2013). With the exception of this, according to Rahman (2012), the literature shows the comparison for only crude palm oil and the stock market in Malaysia. Nicolau (2010); Zapata et al. (2012); Creti et al. (2013); Choi and Hammoudeh (2010); Oskooe (2012) were study only individual country investigation which is United States. Meanwhile Fowowe (2013) studied only the oil prices effect in Nigerian country. Research which was done by Liu and Wan (2012) only studied on China market.

Cross countries comparison was found in GCC countries which border Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates for their commodity price and stock market. As we known, the changes in oil price tends to be a significant economic activities in developing countries. Therefore, the researchers have done the

studies with focusing on only oil price to the impact of stock market due to the significant relationships between oil prices and stock market in GCC countries (Arouri, Bellalah, & Nguyen, 2011). According to Asteriou, Dimitras and Lendewig (2013), the oil price was negatively influenced the stock markets for the cross countries such as China and India in their research work. Moreover, based on the research paper of Korhonen and Peresetsky (2013), they have been studied the oil prices in the United States and Japan responded to stock market in Russian but the oil price is insignificant among these countries. Besides, they also consider the stock markets in Polaand, Czech Republic, Hungary, Turkey and also South Africa. Furthermore, the existing literatures were cross countries comparison done on Asia-Pacific region which contain of ten countries by Zhu et al. (2014). The research by Apergis and Miller (2009) investigated the effect of oil prices changes on stock market returns in eight countries which is the G7 group and Australia. Lee and Zeng (2011) also study the impact of real oil prices changes on the stock returns of G7 countries.

2.3 Data Review and Data Description

The benchmark for commodity investment is known as S&P GSCI (Standard & Poor's Goldman Sachs Commodity Index). It is used to measure the performance of commodity market over time. The index was originally developed by Goldman Sachs. In 2007, the ownership of GSCI was transferred to Standard & Poor's. A multiple of 250 is used by the futures of S&P GSCI. Besides that, the index is exposed more to energy than the other commodity price indices for instant Dow Jones-UBS Commodity Index. The reason of using S&P GSCI in our study is due to the wide range of fundamental commodities which provides a high level of diversification. Its large proportion in the economic allows the index to respond to the world economic growth firmly. Since S&P GSCI is a world-production weighted index which is based on the average commodity production in the index over the last five years of available data, it is served as an economic indicator to measure investment performance.

The S&P GSCI was launched in January 1991 with backfilled historical data by the index providers since January 1970. The index is currently investing in 24 commodities which have been classified into 5 groups including energy, industrial metals, agricultural, precious metals, and livestock. It is heavily concentrated in the energy sector which occupied almost 70% of the total index value (Daskalaki & Skiadopoulos, 2011). Sometimes, the S&P GSCI and Dow Jones UBS Commodity Index will be used by popular traded indices of collateralized commodity futures as a basis for weighting calculations. In addition, there are eighty billion U.S Dollar of commodity-linked investment are currently benchmarked to the S&P GSCI.

Other than S&P GSCI, others indexes such as Commodity Research Bureau (CRB), Deutsche Bank Liquid Commodities Index (DBLCI), Dow Jones-UBS Commodity Index (DJ-AIG) and Rogers International Commodities Index (RICI) are being used in research to measure the level and the movement of commodities. Nicolau (2010) used CRB Commodity Index and Dow Jones Industrial Average monthly data to examine the theoretical perspectives of financial markets show typical and strong correlations between them. In the research of Creti et al. (2013), they used CRB index to analyze the relation between commodity and stock markets with daily datafor ten years of samples. CRB is an average weighted index of commodity futures and its database has been adjusted for nine times for reflecting the market structure and the movement trend more accurately. CRB has the oldest index similar to S&P GSCI which CRB begun in 1957 and the index is equally weighted.

Other than S&P GSCI, Dow Jones-UBS Commodity Index (DJ-UBS) isthe second most used commodity index by researchers which was launched in July 1998**.** With its broadly diversified index, DJ-UBSCI allows investors to trace commodity futures through single and simple measure. The rules of ensuring the relative proportion of each underlying commodities significantly reflects its global economic and market liquidity has been complied with the calculation of the commodity weightings in DJ-UBSCI. As mentioned before, in the research of Nicolau (2010) uses CRB Commodity Index and DJ-UBS monthly data to examine the relationship between financial markets

and commodity market. Besides, Daskalaki and Skiadopoulos (2011) used **S**&P GSCI and DJ-UBS monthly data to examine the individual commodity futures contracts how it influences the commodity asset class. Their findings also stated that the index was invested in 19 commodities from different sectors such as the energy, precious metal, industrial metals, agricultural and livestock sectors. As compare to S&P GSCI, the DJ-UBSCI relies on two important rules to ensure diversification. Firstly, the minimum and the maximum allowable weight for any individual commodity must be in between two to fifteen percent, whereas the maximum allowable for any sector is thirty three percent (Erb & Harvey, 2006). Tang and Xiong (2012) also used S&P GSCI and DJ-UBSCI to show the significance of United States non-energy commodity in these two popular commodity indices.

The most recent created commodity index, Deutsche Bank Liquid Commodities Index (DBLCI) which is launched in February 2013, tracks the performance of six commodities including energy, precious metals, industrial metals and grain sectors. DBLCI is used to select the most liquid market from each respective sector and attempts to be consistent with the global production, usage and stocks. Gorton and Rouwenhorst (2004) have used DBLCI, Dow Jones-AIG, CRB and GSCI to study commodity changes relative to stock market.

Rogers International Commodities Index (RICI) is a broad wide index of commodity futures designed by Jim Rogers in 1996 and he labeled commodity markets as the "world's best market". The RICI is created to measure the worldwide trends in commodity prices (Zapata, Detre, & Hanabuchi, 2012). It is designed to meet the need for consistent commodities investment through an international vehicle. The commodity might be included in the index if it has a significant role in the worldwide either in developed and developing countries consumption.

In the previous research, Standard & Poor's 500 (S&P 500) is the most commonly used stock market index. S&P 500 index contains 500 stocks of large capitalized publicly traded corporations while most of these stocks are American that

traded at the New York Stock Exchange and NASDAQ. It is considered as guidance for the U.S. economy and is a component of the U.S. Index of Leading Economic Indicator (Choi & Hammoudeh, 2010). Zapata et al. (2012) use S&P 500 monthly data and Producer Price Index (PPI) for all commodities and for selected components such as farm, food, fuel and metals are used to represent stock and commodity prices respectively. Creti et al. (2013) also used S&P 500 index daily data to investigate twenty five commodities that covering the various sectors such as energy, non-ferrous metals, precious metal, agricultural, food, exotic, oleaginous, and livestock. All the prices are quoted in U.S. Dollar. Chen (2010) investigated if a higher oil price can push the stock market into bear territory by providing empirical evidence from monthly returns on the S&P 500 price index. It suggests that an increase in oil prices leads to a higher probability of emerging bear market.

Besides S&P 500, there are many other stock market indexes around the world. In the research of Zhu, Li and Li (2014), they investigated the dynamics dependence between the price of crude oil and stock markets in ten countries. The daily dataset of crude oil prices and stock returns from ten countries in the Asian-Pacific region are the main indices that used in the respective countries and all index data are denominated in USD which are Australia S&P (ASX 200), China Shanghai composite, Malaysia Kuala Lumpur Composite, Hong Kong Hang Seng, Indonesia Jakarta SE composite, India BSE National, Japan Nikkei 225 Stock Average, South Korea Kospi, Singapore Strait Times, and Taiwan SE weighted.

From the literatures, in the research framework the authors used stock market as their dependent variables and commodity index as their independent variable. They used more than two commodities as their independent variable (Nicolau, 2010; Zapata et al., 2012; Creti et al., 2013; Daskalaki & Skiadopoulos, 2011). Meanwhile, Arouri (2011); Apergis and Miller (2009); Oskooe (2012); Fowowe (2013); Zhu et al. (2014); Choi and Hammoudeh (2010) only focused on oil prices as independent variable. In other words, commodities are said to have impacts on the stock market. Based on the research done by Chakrabarty and Sarkar (2010), their literature was studying on

individual country which was on India for their investigation about the stock price to the commodities market. Furthermore, the researchers in this paper studied the commodity market for only the main agricultural commodity in India which is commonly known as rice. Moreover, the researchers also compare only oil prices to the impact of stock markets in Australia while the observation was positively correlated in the country (Asteriou, Dimitras, & Lendewig, 2013).

2.4 Review of methodology

Before using cointegration test, we need to perform the Unit Root test on time series to determine the stationarity of model. Stationarity of a series can have strong influential to its behavior and properties. As an example, continuous of shocks will be infinite for non-stationary series. Thus, it is important to check the stationarity of data series by using Unit Root test. Unit root test such as Augmented Dickey-Fuller (1979, 1981) test, Phillips-Perron (1988) test and Kwiatowski, Phillips, Schmidt and Shin (1992) test have been adopted by Heaney (2005) in his research paper to test the non-stationary of data. The PP test is similar to ADF test but auto-correlated residuals are allowed in PP test when PP is incorporated an automatic correction to the DF procedure. Choi and Hammoudeh (2010) who studies the risk and return relationship in stock market and commodity prices, used the ADF and PP Unit Root tests to indicate the stationary process of the return series and found that the return series is stationary. The ADF test is applied to identify the stationary of series and its randomness and found that all variables are stationary at level on the basis of criteria. The ADF unit root test is also applied by Zhu, Li & Yu (2011) to capture the stationary of the series because ADF allows varying across cross-sections as well as the lag order in the ADF regression. Before conducting cointegration test, the researchers used ADF, PP, and KPSS test to determine is the series is stationary. They uses Schwarz information criterion (SIC) and Newey-West criterion to determine the optimal lag length of the unit root test.

The Johansen cointegration test is always used to examine the cointegration relationship between variables. Natanelov, Alam, McKenzie & Huylenbroeck (2011) carried out Johansen cointegration test to investigate whether a stable long-run relationship exists between each pair of agriculture commodities price and crude oil in a panel framework. According to the recent studies of Liu and Wan (2012), they states that the traditional cointegration test approach does not consider the impact of a structural break on the cointegration relationship and suggest to use cointegration test which is proposed by Gregory and Hansen (1996).

Sadorsky (2012) uses vector autoregressive (VAR) model to study the relationship between the oil price changes and real stock returns in United States. The literature finds that both oil price changes and volatility play important roles in affecting the real stock returns especially during positive oil price shocks. Lombardi and Ravazzolo (2013) also use VAR to identify the commodity and equity returns over the sample. They also used VAR model to perform Granger causality test as cointegration does not exist between variables. While Schwarz information criterion (SIC) is used to determine the optimal lag length of VAR. Issler, Rodrigues, & Burjack (2014) have constructed two sets of VAR models to serve as reduced forms for their research and found that there is no cointegration between metal prices with both global and U.S production. While the other models such as VECM and AR have performed well for different metal prices.

However, there are researches uses simple regression models and vector error correction model (VECM) to investigate the impact of oil prices on stock returns. Papapetrou (2001); Jones and Kaul (1996) found that commodity price have a negative impact on stock returns. Furthermore, Issler et al. (2014) who study and forecast the behavior of metal-commodity prices at different horizons states that restricted VECM is the best model in forecasting the metal price and industrial production in U.S. This cointegration theory and VECM are usually used to study the linear combination of all non-stationary variables in the system and examine both long-run and short-run dynamic co-movement of these variables. For example, Golec, Murat, Tokat and

Turksen (2012) use VECM to determine the relationship between Shanghai index and CRB commodity index. A research study on the dynamic linkages and the propagation mechanism that affect international stock markets investigated the causal movements by using VECM and found that the crash in US market does not affect other markets (Masih, 1997). Ferretti and Gonzalo (2010) suggest that the flexible nonlinear VECM framework is critical allowing for time variation in the number of participants in the spot and futures markets. Zhu et al. (2011) suggest that threshold vector error correction model (TVECM) should be utilized to study the asymmetric adjustment toward the long run equilibrium.

A panel VECM is used to explain for the Granger causality tests, given the cointegrated variables. The short run Granger causality test shows the response of dependent variable caused by the short term shocks (Zhu et al., 2011). However, the results show that bidirectional long run Granger causal relation exists between crude oil and stock markets in the OECD and non-OECD countries. Besides that, Liu and Wan (2012) also used Granger causality test to investigate the linear and nonlinear causal relationship of Shanghai Composite Index and exchange rate. However, the findings of Bilal and Talib (2013) in their study found that long-run relationship does not exists between monthly average gold prices and Karachi Stock Exchange (KSE) 100 Index but this long-run relationship does exists in Bombay Stock Exchange (BSE). Then, the researchers used the minimum negative value of SIC which provided optimal lag length and the Granger causality test has finally find out no causal relationship between average gold prices, KSE 100 index and BSE.

From the literatures, GARCH model is the most used methodology in capturing the symmetric conditional volatility in a wide range of financial returns time series. According to Chan and McAleer (n.d.), the univariate GARCH can capture multivariate effects but it has two important restrictions in which it does not coordinate the asymmetric effects of positive and negative shocks. Meanwhile, univariate GARCH assumes independence between conditional volatilities across different markets.

On top of that, model which is commonly used to study the relationship and volatility transmission between stock market and commodity price index is Vector Autoregressive Moving Average- Generalized Autoregressive Conditional Heteroscedasticity (VAR-GARCH) model (Mensi, Beljid, Boubaker, & Managi, 2013). Besides that, Mensi et al. (2013), Arouri, Jouini and Nguyen (2012); Ling and McAleer (2003) also use VAR-GARCH approach which allows us to analyze the spillover effects in both returns and conditional volatility. It also provides meaningful estimates of the unknown parameters with less computational complication than the full-factor multivariate GARCH model (Hammoudeh, Yuan, & McAleer, 2009).

The study of conditional correlations by using the DCC-GARCH model provides evidence for correlations between oil and stock price with time and the result shows a significant increase in the mean of dynamic conditional correlation coefficient of the examined series data (Choi & Hammoudeh, 2010; Guesmi, 2014). Delatte and Lopez (2013) uses copula approach to examine the cross-market linkages between equity and commodity markets because it considers a wide range of dependence compositions to describe the co-movement between these two markets.

2.5 Review of theoretical framework

Financial markets are persistently affect each other performances as they are interrelated. Theoretically, commodities are inversely affect stocks. It is more obvious during economic downturn, investors will more prefer gold and other commodities instead of riskier investment tools like shares. Based on the economic theory, the explanation of movement of investors between commodities and stocks is simple. For example, reported earnings of the companies with stock trading on index will affect stock market up and down. When a business is growing, or the cost of production is dropping, the earning of the respective company will rise and so do stock prices, vice versa. It is because when there is an increase in demand for goods and services, it will lead to an increase in both consumption and production level. Hence, there will be

growth in business activities that hints to company shares changes, an increase of the value for this case.

On the other hand, according to Stevenson (2004), he stated that price transmission will happen between the relative commodity price and stock price of the producing firm. For example, a decrease in the value of related commodity such as oil will decrease the earnings and decrease stock price of an oil producing firm due to a drop in investor demand for the firm's stock. Likewise a decrease in the price of a commodity input would increase the earning and stock price of a manufacturing firm that uses the input, thus increase in the demand of stock and stock price for that firm.

By taking gold as one of the examples, according to Bilal (2013), most of the people invest in gold market is to counterbalance the stock market decline, to hedge against deflation and to respond to currency depreciate. The result from Baur and McDermott (2009) reveals that gold is mostly used as safe haven tool for majority of European and U.S. stock market. Gold investors use it to protect their wealth during economic downturn like subprime crisis in the year 2007. Such situation created high demand for gold and lead to increase of gold price. Most of the people include gold in their portfolio because gold is served as a role of an asset of last resort. This point possibly concludes that gold price has negative relationship with stock market. On the other hand, when gold price is relatively high, existing gold investors would have extra money to buy more shares. This in turn leads to a better stock performance. In all, the relationship of gold and stock is inconclusive. Hence, we want to examine the relationship of commodity market to stock market on KLCI and Shanghai Index.

2.6 Conclusion

Based on previous literature reviews, all the evidence provided was strong to confirm the direction of this study. The effects of independent variables on dependent variables are proven to have significant relationship. Therefore, the significance of the

objective of this research is going to be confirmed through the following chapter. The methodology used will be elaborated in Chapter 3.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The major methodology that will be adopted in this study to meet our research objectives will be discussed in this chapter. The model specification, sampling technique, data processing, data treatment and data analysis will be further discussed in this study. Besides that, variables analyses and inferences analysis will also be presented in this chapter. In this chapter, we will separate into analysis of data and empirical framework. Various statistical test will be used in order to get more accurate result on our research. We will start by check normality by Jacque-Bera (JB) test, autocorrelation by Breusch-Godfrey LM Test, heteroscedasticity by Autoregressive Conditional Heteroscedasticity (ARCH) test and Ramsey Rest test.

Second, we will use unit root test to examine time series variable stationary or non-stationary. Two unit root test are employed which is Augmented Dickey Fuller (ADF) and Phillips Perron Test (PP test). If the variables are non-stationary, there is a possibility model will contribute to spurious regression. Hence, we will use Johansen Juselius co-integration test to inspect whether there are short run or long run relationship exists between the variables. Next, we will use Vector Auto regression (VAR) model to capture the linear interdependence among the variables when there is short run relationship between the variables. If there are cointegrated between variables, we will proceed with Vector Error Correlation Model (VECM) model. After that, Granger causality/Block exogeneity Wald test is use to test the existence and

nature of the causality relationship between the variables. The major computer program that will be used to analyze the data will be the E-view 6.0. Moreover, the major statistical techniques applied would be discussed in this section.

3.1 Analysis of Data

In our research paper, the data we adopted are secondary data. The quarterly data we get is from 2003 to 2012. They are Malaysian's and China stock indexes and S&P GSCI indexes. The Kuala Lumpur Composite Index (KLCI) will represent the stock return index of Malaysia while Shanghai Composite Index (SSI) represent for China. Moreover, we chooses 3 hot commodity index to represent 3 sector which is S&P GSCI Crude Oil for energy sector, S&P GSCI Gold for precious metal sector, and S&P GSCI Copper for industrial metal sector. All the indexes were collected from Thomas Reuters DataStream. It is a trustable DataStream and able to provide more than 400,000 economic data series sourced from OECD and others. DataStream also contain around 3 million of financial data. S&P GSCI data will be our benchmark to carry out our study for commodity market.

The dependent variable is stock market index (Y) and the independent variable is S&P GSCI index. We had selected 3 hot commodity index represent each sector which are S&P GSCI Crude Oil for energy sector (CO), S&P GSCI Gold for precious metal sector(GD), S&P GSCI Copper for industrial metal sector (CP) as out independent variables.

3.2 Empirical Framework

In our research paper, we will examine the relationship between each S&P GSCI index to stock market of Malaysia and China. S&P GSCI will act as benchmark

of commodity market and examine their effect to Malaysia's KLCI and China's SSE. There are two equations we use to investigate to observe the relationship.

Equation 1

$$KLCI_t = \alpha_0 + \alpha_1 CrudeOil_t + \alpha_2 Gold_t + \alpha_3 Copper_t + \varepsilon_t$$

Equation 2

$$SSE_t = \alpha_0 + \alpha_1 CrudeOil_t + \alpha_2 Gold_t + \alpha_3 Copper_t + \varepsilon_t$$

The dependent variable we use in equation 1 is stock market index from Malaysia's KLCI, while for the model 2 is stock market index from China's SSE. Both model independent variables are commodity index from S&P 500 GSCI which acts as benchmark.

The equation 1,2, and 3 above shows the relationship between KLCI index and 3 commodity index of crude oil (CO), gold (GD), and copper (CP).While the equation 4,5,and 6 shows the relationship between SSE index and crude oil (CO), gold (GD), and copper (CP).

From model 1 and model 2, we expect that crude oil index (CO) will have negative relationship with stock index of both countries. It is because when increase price of crude oil will lead to increase of cost of production of company and inflation. Company will transfer the cost to customer instead absorb the cost, it will lower customer purchasing power. At the end, company stock price will decrease.

Besides, gold also expect have an inversely relationship with stock market. Gold is act as a tool to diversify and protect wealth especially during economic downturn. Most of the investor will shift their investment in stock to invest in commodity especially gold to protect their wealth.

Moreover, we expect copper will have positive relationship with stock market. It is because the copper very important for manufacturing sector. When the economy boom, it will lead to increase demand in copper as company production increase. Indirectly, demand of copper increase will lead to price of copper increase too.

3.3 Diagnostic Checking

3.3.1 Normality of Residual Test (Jarque-Bera Test)

According to Gujarati and Dawn (2009), Jarque-Bera Test is used to determine whether the error term is normally distributed. The null hypothesis is error term is normally distributed while alternative hypothesis would be error term is not normally distributed. The decision rule is to reject null hypothesis if P-value of JB statistics is less than the level of significance. Otherwise, do not reject null hypothesis.

The Jacque Bera is presented as:

$$JB = \frac{n}{6}[S^2 + \frac{(K-3)^2}{4}]$$

Where n=sample size, S= Skewness, K= Kurtosis

Normality of residuals or errors testing is important; the assumption is that the error term is normally distributed so that the specification model is correct.

3.3.2 Autocorrelation

The autocorrelation is defined as a problem exists when the random variable, ordered over time that show nonzero covariance. Autocorrelation always refers to the correlation of a time series with its own past and future values. For instance, it generally refers to the correlation of error term at one date to the error terms in the previous period. This problem can be detected by Breusch-Godfrey LM test. LM test is better

than Durbin-Watson and Durbin-h tests because it takes into the account of higher orders of serial correlation and the lagged dependent variable (Gujarati & Dawn, 2009). The null hypothesis is there is no autocorrelation problem. The decision rule is to reject null hypothesis if P-value of F-statistics is lower than the level of significance. Otherwise, do not reject null hypothesis.

3.3.3 Heteroscedasticity

Heteroscedasticity occurs when the variance of the disturbance is not constant across the independent variables. Nonetheless, it is a problem common in a series of cross sectional data (Gujarati & Dawn, 2009). However this test can be detected by using Autoregressive Conditional Heteroscedasticity (ARCH) test. The null hypothesis is there is no autocorrelation problem. The decision rule is to reject null hypothesis if P-value of F-statistics is lower than the level of significance. Otherwise, do not reject null hypothesis.

3.3.4 Ramsey Reset Test

Last but not least, if the model contains irrelevant variable, specification errors may occur in the investigating model. Inclusion of irrelevant variable would cause multicollinearity when it correlates with another variable in the model. This problem is likely to be arising in most of the time series model. In this case, we adopt Ramsey Reset test to determine if the models containing specification errors. There is no misspecification in the model would be the null hypothesis for this test. We will reject the null hypothesis if the p-value of Ramsey Reset test is lower than the significant level of 1%, 5% or 10% which indicates that there is misspecification problem in the model.

3.4 Unit Root Test

To undergo testing procedure for time series data, variable are required to test for stationary. According to Gujarati and Dawn (2009), if mean and variance are constant over time and the autocorrelation depends only on the time, it said to be stationary. If time series data is non-stationary, it may contribute to spurious regression which mean the estimators and test statistic are misleading.

The stationary of a series can strongly influence its behavior and properties. For example, persistent shock will be infinite for non-stationary series. For a time series model, if a linear stochastic process have unit root, there will be non-stationary. But what is spurious regression and how non stationary will contribute to spurious regression? Spurious regression means that if two variables are trending over time, there will be high R^2 even if two variables are unrelated (Engle & Granger, 1987). If the regression are no stationary, it also mean that the usual 't-ratio' will be different from t-distribution, hence we will reject the hypothesis test for the regression parameter. As a result, a non-stationary regression lead to unreliable and spurious result and leads to poor forecasting and understanding.

3.4.1 The Augmented Dickey Fuller (ADF)

The model will be tested by The Augmented Dickey Fuller (ADF) test. This test was developed by Dickey and Fuller for the situations which $u_t$are correlated. This test is conducted by 'augmenting' the preceding equation by adding the lagged value of the dependent variableΔY_t. It able to test for larger and more complex set of time series data. The equation of ADF unit root test is given by:

$$\Delta Y_t = \alpha_0 + \alpha_{1t} + \delta Y_{t-1} + \sum \gamma_i \Delta Y_{t-i} + \varepsilon_t$$

While in this equation, Y_t is refer to level form of series (KLCI, SSE, GD, CO, CP) and the first difference of the series (ΔKLCI, ΔSSE, ΔGD, ΔCO, ΔCP). While α_0 is an intercept term, $\alpha_{1t}$is the trend variable, $\delta\, Y_{t-1}$ is the lagged level, and $\sum \gamma_i\, \Delta Y_{t-i}$ is the total lagged changes in variables. Δis the first difference operator, where ε_t is white noise error term. Moreover, ε_t will be autocorrelated if there was autocorrelation in the dependent variable of the regression (ΔY_t) which has not modelled.

The null hypothesis of Augmented Dickey-Fuller is there is a unit root or the time series is non-stationary while the alternative is the time series is stationary. We will reject the null hypothesis if the p-value is smaller than 5%, otherwise we do not reject the null hypothesis.

3.4.2 Phillips-Perron (PP)

Phillips-Perron (PP) test is an alternative test. The serial correlation in the error term will be minimize via add lagged difference term of regressand in ADF test. Meanwhile, in PP test it will minimize the serial correlation in the error term thru using nonparametric statistical method without add lagged difference terms.

$$\Delta Y_t = \beta' D_t + \rho\, Y_{t-1} + \varepsilon_t$$

Beside, PP test is similar to ADF test. Both ADF and PP usually give same result. The first advantage of the Phillips-Perron test across the ADF test is we do not require identifying a lag length for the check (Gujarati & Dawn, 2009). In addition, PP test across ADF test which is PP test give more powerful estimation while the series has time independent heteroscedasticity and serial correlation. Both test share the same null hypothesis which is the variable contains a unit root while the alternative is that the variable does not contain a unit root.

3.5 Cointegration

According to Gujarati and Dawn (2009), when the variables are co-integrated it means they are long term or equilibrium relationship between them. The purpose of co-integration test is to determine whether a group of non-stationary series is co-integrated or not. If cointegrating relationship is not recognized between the variables, the series will remain using VAR for estimation.

Hence, we will use the Johansen and Juselius (JJ) Cointegration Test to examine the cointegrating relationship among variables. Johansen (1988) and Johansen and Juselius (1990) have introduced JJ test. This test is examine cointegration among the nonstationary variables which calculated by looking at the rank of the Π matrix via its eigen values.

There are few reasons to use JJ Cointegration test. The first reason is this test can avoid to treat the variables asymmetrically and to specify one as dependent variables and others as independent variables, it is hard to define endogenous and exogeneous variables. This is because it assume all variables are endogenous to avoid and willful choices of dependent variable. Next, this test also can perform any hypothesis tests about the actual cointegratin relationship (with two statistical procedures). Moreover, unit root test indicated that all of the variables have same number of integrated order, therefore JJ cointegration test is appropriate to be adopted in this paper.

Trace statistic null hypothesis of r cointegrating relations, where n is the number of variables in the system for r=0, 1, 2... n-1. Its equation is computed according to the following formula:

$$LR_{tr}(r/n) = -T * \sum_{i=r+1}^{n} log\,(1 - \hat{\lambda}_i)$$

The Maximum Eigenvalue statistic test the null hypothesis of r cointegrating relationship against the alternative of r+1 cointegrating relation for r=0, 1, 2… n-1. This test statistic is computed as:

$$LR_{max}(r/n) = -T * log(1 - \hat{\lambda}_i)$$

Where λ is the Maximum Eigenvalue while T is the sample size. When Trace and Maximum statistic may yield different result, the result of trace should be chosen (Alexander, 2011). However, Johansen and Juselius (1990) declared that the λ_{max}test is more powerful relative to the trace test. Based on the power of the test, the test statistic λ_{max} is often preferred. It is because Maximum statistic can identify the number of cointegrating vector, r more accurate than Trace statistic. Hence, we will use both test and crosscheck their result.

To explain how a VAR is estimated, we assume that each equation contains k lag values of Y (as measured by Y_1) and X.

$$Y_{1t} = \alpha + \sum_{j=1}^{k} \beta_j Y_{t-j} + \sum_{j=1}^{k} \gamma_j X_{t-j} + u_{1t}$$

$$Y_{2t} = \alpha' + \sum_{j=1}^{k} \theta_j Y_{t-j} + \sum_{j=1}^{k} \gamma_j X_{t-j} + u_{2t}$$

Where the Y_{1t} refer to KLCI andY_{2t} refer to SSI, u's are the stochastic error terms, called impulses or innovations or shock is the language of VAR. We need decide on the maximum lag length, k. One of the approach is choose the lag length by use a criterion like the s AIC (Akaike's Information Criterion) or SC (Schwarz criterion). According Gujarati and Dawn (2009), including too much lagged will consume degree of freedom or model will be over-parameterized. Including too few lags the model will be misspecified.

3.6 Granger Causality

According to Gujarati and Dawn (2009), although regression analysis variable may have effects on another variable, but it does not necessarily denotes causation. The existence of a relationship between variable does not show causality or the trend or impact.

We will apply the Granger causality/ Block exogeneity Wald test (Enders, 2003). This test detects whether the lags of one variable can Granger-cause any other variables in the VAR system. The null hypothesis is that all lags of one variable can be excluded from each equation in the VAR system.

$$(T - 3p - 1)(log\left|\sum re\right| - log\left|\sum un\right|) \sim X^2(2\rho)$$

Where T is the number of observations; ∑un is variance/covariance matrices of the unrestricted VAR system; ∑re is variance/covariance matrices of the restricted system when the lag of a variable is excluded from the VAR system; and p is the number of lags of the variable that is excluded from the VAR system.

The null hypothesis is variable X does not granger-cause the variable Y. We reject the null hypothesis if the p-value of F test statistic is lower than significance level of 1% and 5% and 10%. In another words, it also mean that X granger-cause the variable Y.

However based on granger causality test result, we can't determine whether these 3 commodities have positive effect on KLCI or SSI. It also remains uncertain whether impact of which commodity index of gold, copper or crude oil has stronger impact on KLCI or SSI. Hence, we will analyze by impulse-response function and the variance decomposition.

3.7 Impulse-response function

Generally, the reaction of dynamic system in response to some external change is defined as impulse response function (IRF). The effect of standard deviation shock to the innovations on current or future time values of endogenous variables are stated by impulse response function. IRF does provide the direction and magnitude of the effect between those endogenous variable. At first, a shock from endogenous variable is directly influences itself and thus influences the other endogenous variable as well through VAR and VEC dynamic structure. With a coming up of a new information, any shock occurred in a variable will affect the variable itself and other variable in the system. By comparing with granger-causality, granger-causality may not interpret the complete information about the interaction between the variable of a system. In applied case, people are interested to study the response of one variable to the impulse on another variable which involves several variables as well.

3.8 Variance decomposition

The variance decomposition will explain how much a variable changes under the effect of its individual shock and the shock of other variables. It defines as the relative importance of each random innovation in affecting the variables in VAR. Variance decomposition will use to predict the variance percentage contribution of each variable due to changes in certain variables in the VAR system.

3.9 Conclusion

This chapter discusses the overall research method which will be carried out under certain activities. Specifically, these activities are included the research design, data collection method, sampling design, data processing, and data analysis. Eventually, the following chapter will discuss about the econometric treatment of this research regarding the tests, measurements, and results.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Chapter 4 is to interpret and analyze the empirical results from the methodology in Chapter 3. This chapter contains several empirical tests. Firstly, we apply Unit Root test to examine the stationary of data and then determine the optimal lag length for our model. Secondly, cointegration test is employed to check whether there is long run relationship between commodity prices and stock markets. Then, Granger Causality test is being utilized to measure the relationship of commodity prices with stock markets. Last but not least, impulse response function and variance decomposition analysis is performed to examine the pattern of dynamic responses of one variable to another and its forecast error variance.

4.1 Diagnostic Checking

Diagnostic Test for Stock Market

Table 4.1: Diagnostic Test-Summary Statistics

	Normality	Heteroscedasticity	Autocorrelation	Misspecification
KLCI	**0.6637**	**0.7269**	**0.6623**	**0.9887**
SSE	**0.7855**	**0.2826**	**0.1437**	**0.6377**

Based on the Table 4.1, the model used is applicable in all the selected countries because the error terms are normally distributed among the countries. The p-values of KLCI and SSE for JB test are all greater than 10% significance level. Besides, autocorrelation problem was one of the problem frequently exist in time series data. By using Breusch-Godfrey Serial Correlation LM Test, this problem can be detected easily. P-value of both models is greater than 10% significance level. Therefore, no autocorrelation problem exists for these countries. Furthermore, ARCH test is to be used to determine whether the heteroscedasticity problem present in the models. The p-value for KLCI and SSE is greater than 10% significance level. This implies that there is no heteroscedasticity problem in the models. Meanwhile, Ramsey Reset test has been used to determine whether there is misspecification error in the models. The p-value of KLCI and SSE is greater than 10% significance level which shows that the models have no specification error.

4.2 Unit Root Test Result

Table 4.2: Unit Root Test-Summary Statistics

Details	In Level I-(0)		In Level I-(0)	
Variables	ADF		PP	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
KLCIR	0.0005***	0.0031***	0.0005***	0.0030***
SSER	0.0009***	0.0045***	0.0008***	0.0046***
COR	0.0000***	0.0000***	0.0001***	0.0001***
GDR	0.0000***	0.0000***	0.0000***	0.0000***
CPR	0.0001***	0.0004***	0.0001***	0.0004***

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively

Table 4.2 presents the results for the unit root tests using ADF (Augmented Dickey-Fulller), PP (Philips-Perron) tests for the order of integration of each variable. The tests have a null hypothesis of the presence of a unit root in series against the alternative of the series being stationary.

From Table 4.2, the results are consistent with what has been found in most of the previous literature using such types of data. Specifically, the two tests show that the all series are stationary and significant at 1% significance level.

For the ADF and PP tests, the null hypothesis is the data series has unit root which indicate that it is non-stationary thus we normally reject null hypothesis to prove that the data is stationary. From the Table 4.2, KLCI, SSE, Gold price, Crude Oil price and Copper price all showed significance at the first difference. Thus, we reject the null hypothesis this imply that the variables are stationary series.

4.3 Lag Length Determination in VAR

The frequency distributions of lag lengths have been computed and being used in order to select the alternative lag criterion. However, the most common method which being used to evaluate the lag length in VAR model are Akaike information criterion (AIC) and Schwarz information criterion (SIC). In our research, the lag length is determined based on SIC in order to estimate a short run equation due to the reason of SIC is underestimating the lag length in the selection process, this may prevent from

the problem of loss of information since low frequency data is selected in conducting the research.

$$AIC(k) = T \ln(\frac{SSR(k)}{T}) + 2q$$

$$SC(k) = T \ln(\frac{SSR(k)}{T}) + q \ln(T)$$

T = number of observation

SSR = Sum Square Residual

k = lag length

q = number of regressor = k + 1 = number of estimated parameter

Table 4.3 Lag length selection based on SC criterion

	KLCI			SSE		
Lag	**Gold**	**Crude oil**	**Copper**	**Gold**	**Crude oil**	**Copper**
0	-4.43189*	-2.055829*	-1.934880*	-3.261998*	-0.579109*	-0.609348*
1	-4.144072	-1.694628	-1.604159	-2.936560	-0.449656	-0.258879
2	-3.721556	-1.899562	-1.301061	-2.675020	-0.544298	0.022494
3	-3.550903	-1.671913	-0.852898	-2.457556	-0.443645	0.409039

For the case of KLCI and GOLD, the lag order selected by the criterion based on SC is 0. Thus, we have chosen the second lowest SC lag order as the lag length which is 1. Besides that, the lag length for KLCI and crude oil is 2 based on the SC criterion. Furthermore, SC criterion selected 1 as the lag order for KLCI and copper.

For the case of SSE and GOLD, the lag order selected by the criterion based on SC is 0. Thus, we had chosen the second lowest SC lag order as the optimal lag length which is 1. Besides that, the SE and crude oil is 2 based on SC criterion. Furthermore, SC criterion selected 1 as the lag order for SSE and copper.

4.4 Cointegration Test

The purpose of cointegration test is to evaluate more than one similar movement as long as relationship stability between two or more variables. The cointegration test is being evaluating when there is a unit root as long as there is same order integrated for all the variables in a data series. With the exception of this, the test is being indicated whether there is an existence of cointegrating vector as long as the existence of minimum a linear independent combination from all variables in the particular model. We should proceed to run a Vector Error Correction Model (VECM) if there is the existence of an error correction in a cointegrated regression, otherwise, VAR model will be selected.

Table 4.4 Cointegration Test-Summary Statistics

LNKLCI - LNCO

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	9.327796	15.4971	r=0	r=1	6.287042	14.26460
1	r≤1	r>2	3.040754	3.841466	r=1	r=2	3.040754	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

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LNKLCI - LNGD

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	11.66106	15.49471	r=0	r=1	11.64045	14.26460
1	r≤1	r>2	0.020608	3.841466	r=1	r=2	0.020608	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

LNKLCI - LNCP

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	10.51409	15.4971	r=0	r=1	7.455787	14.26460
1	r≤1	r>2	3.058298	3.841466	r=1	r=2	3.058298	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

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LNSSE - LNCO

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	20.61783	15.49471	r=0	r=1	14.32978	14.26460
1	r≤1	r>2	6.288051	3.841466	r=1	r=2	6.288051	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

LNKLCI - LNGD

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	4.530941	15.4971	r=0	r=1	4.520530	14.26460
1	r≤1	r>2	0.010411	3.841466	r=1	r=2	0.010411	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

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LNSSE - LNCP

	Hypothesis		Trace Test		Hypothesis		Maximum-Eigen Value	
r	H_o	H_1	λ_{Trace}	95% Critical Value	H_o	H_1	λ_{Max}	95% Critical Value
0	r=0	r>1	14.78697	15.49471	r=0	r=1	7.826484	14.26460
1	r≤1	r>2	6.960489	3.841466	r=1	r=2	6.960489	3.841466

Note : *,**,*** denotes that reject the null hypothesis at the level of significance of 10%, 5% and 1% respectively.

To consider the hypothesis that the variables are not cointegrated (r=0) against the alternative of one or more cointegrating vectors (r>0), we have to look at the value of λ_{TRACE} equal to each number of the cointegrating vector: $\lambda_{TRACE}\ (0) = 14.78697$ and $\lambda_{TRACE}\ (1) = 6.960489$. In the case of SSE and Copper return, since $\lambda_{TRACE}\ (1)$ exceeds the critical value (2.7055) at the 0.1 significance level, we can reject the null hypothesis of one cointegrating vectors (r≤1) and accept the alternative hypothesis of more than one cointegrating vectors (r>1) at the 0.1 level. So that, the trace test showed 2 cointegration equations.

Besides that, we have to look into the $\lambda_{MAX}\ (0)$ and $\lambda_{MAX}\ (1)$ are 7.8264 and 6.9604 respectively. The test of the null hypothesis r=0 against the specific alternative r≥ 1 cannot be rejected at the 0.1 significance level, because the value of $\lambda_{MAX}\ (0)$ is less than the 10 percent critical value of 12.29652. This suggest that the number of cointegration vectors is zero since do not reject null hypothesis. According to Gregory (1994), if we found there are conflict result of the two test, more weight should be given to eigenvalue test since he pointed out that the size is better for eigenvalue test. So that, we use the eigenvalue test to conclude the existence of no cointegration vector in this case thus there are no long run equilibrium relationship between SSE and copper.

For the case of SSE and gold return, the table indicated that there are no cointegration between SSE and gold return at 0.10 level of significant. The result is same when using Max-eigenvalue test. While in the case of SSE and crude oil return, the trace test and Max-eigenvalue test showed cointegration at 0.05 significant level.

For the case in Malaysia, the Trace test shows that there is no cointegration between KLCI and the commodities return index (gold, crude oil, copper) at 0.10 level. On the other hand, Max-eigenvalue test also indicated that there is no cointegration at the 0.10 level in our analysis based on the results. Therefore, the results can be confirmed and trusted for the case of Malaysia since we are able to generate consistent results with cointegration analysis. In this situation, the results show that commodities markets do not have long-term relationship with the stock market.

In conclusion, from the both test applied in China, only SSE and crude oil showed long run relationship while in the case of SSE and gold return and copper return there have no long run relationship exist. Meanwhile there is only short-term relation being indicated in between KLCI and gold return, crude oil return, and copper return.

4.5 Granger Causality

Table 4.5: Granger Causality test

Dependent / Independent	KLCI	SSE	GOLD	COPPER	CRUDE OIL
KLCI	-	-	0.2115	0.0958*	0.0051***
SSE	-	-	0.9838	0.8866	0.2714
GOLD	0.8827	0.6892	-	-	-
COPPER	0.7886	0.6219	-	-	-
CRUDE OIL	0.0026***	0.0062***	-	-	-

*denotes rejection of the hypothesis at the 0.1 level
**denotes rejection of the hypothesis at the 0.5 level
*** denotes rejection of the hypothesis at the 0.01 level

Based on Table 4.5, we can identify that KLCI have bidirectional causality relationship with crude oil as the p-value in the granger causality result does have enough evidence to reject the null hypothesis in different significant level. This result consistent with previous studied from (Li, Yu and Zhi, 2011) showed their evidence

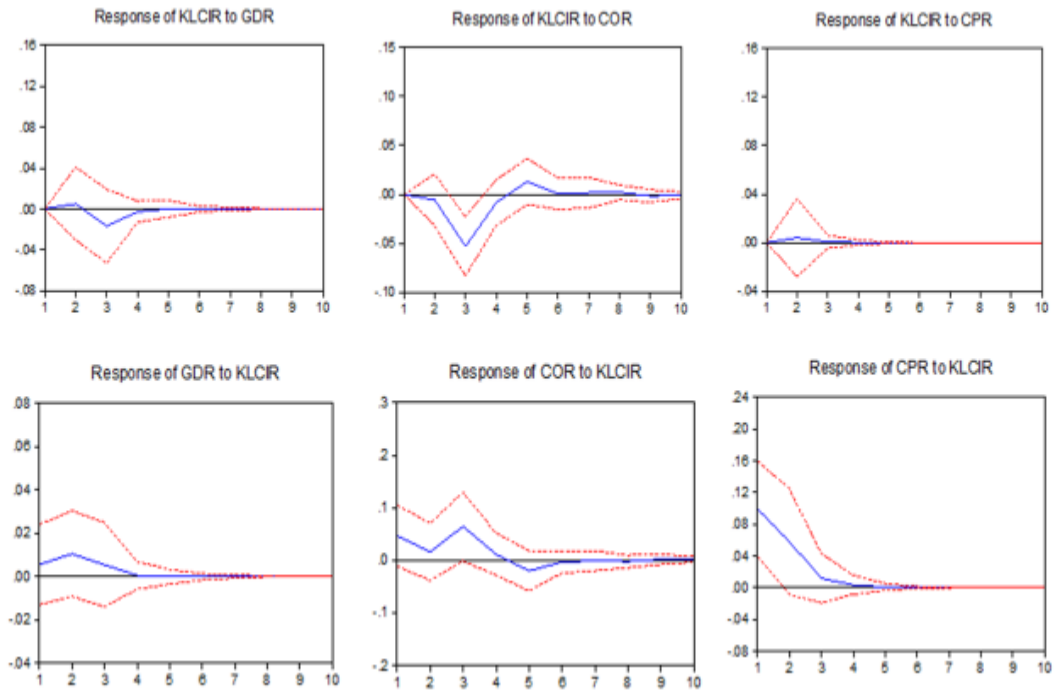
from OECD and non-OECE countries that there is bidirectional relationship granger causality between crude oil and stock market return. Besides that, the Granger Causality result shows that there is unidirectional causality relationship between KLCI and copper. In other words, KLCI does granger cause copper at 10% significant level but no vice versa. However, there are evidences showed that KLCI and gold does not granger cause each other. This result has been supported by the study of Raza Bilal et al (2013), who indicated there is no causal relationship between gold and Karachi Stock Exchange (KSE).

In the case of China, there are no granger causality relationship between gold return to SSE and copper return to SSE. However, the table showed that crude oil has unidirectional relationship with SSE at 0.01 significance level. From Chen and Wu (2009), US oil price has indirectly influence the China stock market since US owns most of the world's largest oil companies, and most petroleum products are priced in US dollars. China is the oil importing countries has influenced from the supply and demand of world crude oil from US.

4.6 Empirical analysis of Impulse Response Function

As mentioned above, the dynamic effect of the system is to be analyzed by the IRF function of VAR when the model was received an impulse. However, if we are using VAR model for constructing Impulse Response Functions, we are typically required to compute the confidence band as to go with the IRF due to the reason of the latter are simply 'point prediction'. By using EViews, it is just a selection in the software to get asymptotically valid confidence bands. There are four variables in our VAR model, we are going to study the response between all variables and the response function for 10 upcoming periods was displayed as below.

Figure 4.1: The impulse response among KLCI stock index and commodities returns index



After testing causality, responses of the indices to an impulse in independent variables are analysed. Impulse response functions reveal the effects of an unexpected shock given to a variable on the future values of its own and also other variables. As a result of impulse response functions, dynamics relationships can be observed among the variable and adjustment process can be detected.

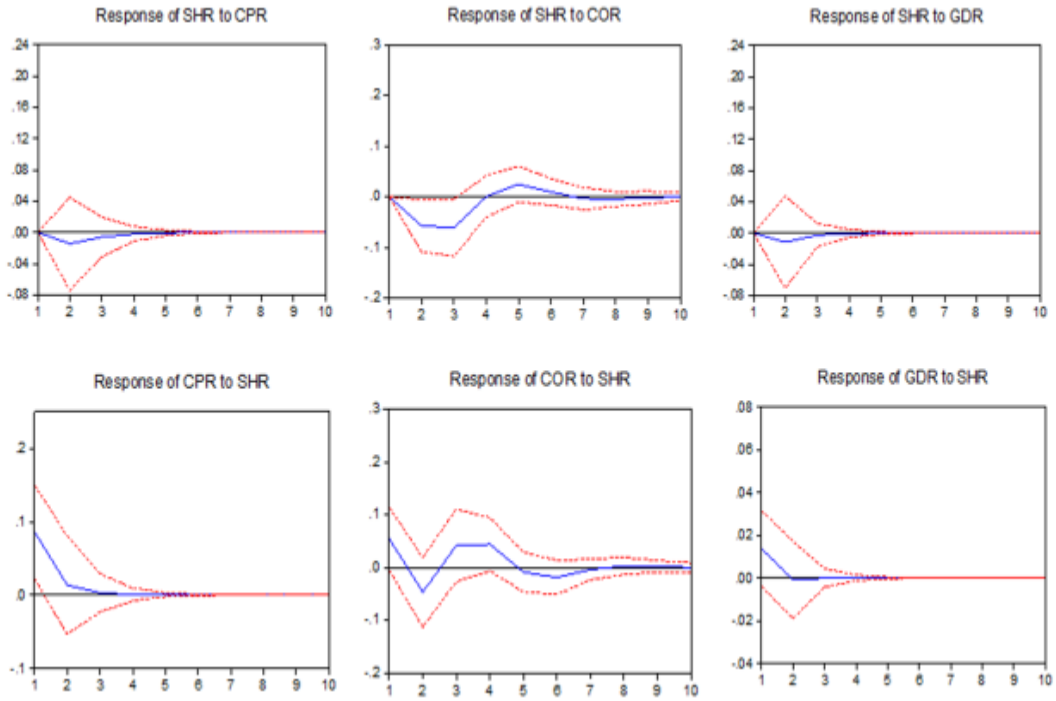
The figure 4.2 shows the impulse response of Kuala Lumpur Composite Index (KLCI) to gold indicates an unstable movement of KLCI due to a shock in gold. The response of KLCI to a shock in gold fluctuates a little across the period while it has minimal effect in 10th period. On the other hand, a fluctuation in KLCI brought a small positive movement in gold return index in the first 2 periods. Then it falls and remains minimal effect across the period.

By looking at the Impulse Response Function between KLCI and crude oil, we noted that a shock in one variable has caused fluctuations to another variable. In other words, KLCI responded in a negative manner in the first 3 periods and reacted

positively until 5th period. Then, KLCI moves slightly above the horizon from period 6 to 10th. On the other hand, due to a shock in KLCI, the return index of crude oil fluctuates across the first 6 periods and started to have minimal effect until the 10th period. These results have supported the Granger Causality test of KLCI and crude oil which shows there is bidirectional causality between variables.

A shock to copper evokes a relatively small positive response in KLCI, smooth fluctuation across the entire horizon and remains calm start from period 5 onwards. Meanwhile, there is a steep falls of copper return index due to a shock in KLCI. Therefore, these IRF results have supported the Granger Causality result which shows a unidirectional causal relationships of copper and KLCI.

Figure 4.2: The impulse response among Shanghai stock index and commodities return index



The graph which showed the impulse response of SSE returns to gold in order words the movement of SSE due to 1 shock occurs in gold market. If there are shocks in gold market, the SSE will have short term negative effect until third period and then remained constant. On the other hand, a fluctuation in SSE brought a negative movement in gold return index in the first 2 periods. Then it falls and remains minimal effect across the period.

By looking at the Impulse Response Function between SSE and crude oil, we noted that a shock in one variable has caused fluctuations to another variable. In other words, SSE responded in a negative manner in the first 3 periods and reacted positively from 4th period until 7th period. Then, SSE moves slightly below the horizon from period 7th. On the other hand, due to a shock in SSE, the return index of crude oil move from positive to lowest negative to 2nd period and then bound up to positive until 5th period. After that, it showed fluctuation from 5th period to 10th period. These results have supported the Granger Causality test of SSE and crude oil which shows there is unidirectional causality between variables.

A shock to copper evokes a relatively small negatively response in SSE, smooth fluctuation across the entire horizon and remains calm start from period 4 onwards. Meanwhile, there is a steep falls of copper return index due to a shock in SSE.

4.7 Variance Decomposition Analysis

Table 4.7 Variance Decomposition Analysis Test-Summary Statistic

Series Explained - KLCIR

Horizon	Proportion of forecast error variance explained by		
	GDr	**Cor**	**CPr**
1	0.000000	6.605432	24.66723
5	2.919357	25.17203	25.65463
10	2.919689	25.18858	25.65464

Series Explained - SSER

Horizon	Proportion of forecast error variance explained by		
	GDr	**Cor**	**CPr**
1	0.000000	8.823847	17.31996
5	0.432631	19.30663	15.99177
10	0.432648	19.27772	15.99166

Series Explained- GDR

Horizon	Proportion of forecast error variance explained by		
	KLCIR	**SSER**	**-**
1	0.944981	6.083393	-
5	4.963322	6.092954	-
10	4.964165	6.092954	-

Series Explained- Cor

Horizon	Proportion of forecast error variance explained by		
	KLCIR	**SSER**	**-**
1	0.000000	0.000000	-
5	18.25859	19.65475	-
10	18.26974	20.46324	-

Series Explained- Cpr

Horizon	Proportion of forecast error variance explained by shock to		
	KLCIR	**SSER**	**-**
1	0.000000	0.000000	-
5	7.238593	0.061887	-
10	7.238671	0.061888	-

Table 4.7 tabulates the variance decomposition of each variable over a ten-year period. The second column (S.E), contains the forecast error of output at the given forecast horizon. The remaining columns give the percentage of the forecast variance due to each innovation. From table 4.7, it can be seen that after 10 years, a shock in gold explains 2.92% of the forecast error variance of KLCI and 0.43% of that of SSE. On the other side, after 10 periods, the percentage error variation of gold return index due to KLCI and SSE are 4.96% and 6.09%. Hence, it appears that gold return index has low impact on stock markets but both KLCI and SSE has stronger impact on gold return index. SSE explains the variance in gold 1.2 times more than the KLCI.

Besides that, the forecast error variance of KLCI and SSE can be explained by 25.19% and 19.28% of a shock in crude oil in the 10^{th} period. While the forecast error variance of crude oil is explained by a shock in KLCI and SSE by 18.27% and 20.46% respectively. This results showed that SSE explains the variance in crude oil 1 times more than the KLCI after 10 periods. Meanwhile, crude oil explains the variance in KLCI 1.3 times more than in SSE. In other words, SSE has stronger impact in explaining crude oil meanwhile crude oil has stronger role in explaining KLCI.

Furthermore, the percentage error variation of copper due to KLCI and SSE are 7.23% and 0.06% in 10^{th} period. Then, the forecast error variance of KLCI and SSE can be explained by 25.65% and 15.99% of a shock in copper after 10 periods. This shows that copper has greater role in explaining the error variance of KLCI and SSE rather than being explain by them. Meanwhile, copper explains the variance in KLCI 1.6 times more than in SSE.

4.8 Conclusion

Chapter 4 is basically analyzed the relationship among three global commodity prices in two different stock markets. All the empirical results have been shown clearly in the tables and graphs with precise explanation. Besides that, the results from this chapter have achieved the objective of the research. The summary of the whole research will be listed in Chapter 5.

CHAPTER 5: CONCLUSION

5.0 Introduction

In our studies, the purpose of the entire research is to investigate the relationship between stock markets and commodity prices. Our research may benefit investors as it could allow them to figure out clearly about the flow of each commodity price to stock markets when trading in the stock markets. This study focuses on two stock markets (KLCI and SSE) and three hot commodities in global which are gold, copper, and crude oil from year 2003 to 2012. This enables stockholders to make wise decision when looking at the movement of commodity price, vice versa. Besides that, this study also investigates the effect of each global commodity price on how it interrelated with stock markets of different countries.

Chapter 5 presents the conclusion of our findings on the relationship between global commodity prices and stock markets. This research has included managerial implications that provide practical implications for investors, brokers and traders in this chapter and discussed our major findings that listed in chapter four with those points of view from previous researchers. In addition, several limitations which have encountered during the progress of our research were presented in this chapter as well as the recommendations for future research. Lastly, the overall conclusion for the whole research was stated as an ending for this project.

5.1 Summary of Statistical Analyses

5.1.1 Diagnostic Checking

We had adopted diagnostic checking to confirm that our model are free from heteroscedasticity, autocorrelation and is normally distributed. The result of diagnostic checking is reported on table 5.1. Hence, the models are unbiased, efficient and consistent.

Table 5.1: Summary of Diagnostic Checking

Econometric Problem	Description on results
Normally Distributed	The model is normally distributed.
Heteroscedasticity	The model is free from heteroscedasticity problem.
Autocorrelation	The model is free from autocorrelation problem.
Model Specification	The model is correctly specified.

5.1.2 Relationship Between The Markets

Table 5.2 Summary of Short/ Long Run Equilibrium Results

Stock Market	Short run equilibrium/long run equilibrium
KLCI	Short run equilibrium
SSE	Short run equilibrium

On the other hand, Unit Root test is a statistical test to investigate the proposition in an autoregressive statistical model in a time series data. Unit root test will show us the stationarity of our variable across the time. Our result will become biased if there are non-stationary variables in the regression model. We have employed

two different Unit Root tests which are ADF and PP in our study and the results shows that all variables are stationary.

Besides that, cointegration is a statistical property of time series variables and is used to check whether the independent variables have long run relationship with the dependent variable. The cointegration test must be taken into account when choosing a technique to test hypotheses concerning the relationship between variables having unit roots. Cointegration between non-stationary variables should not be happened. The empirical of cointegration results show that there is only short run relationship among commodity returns and stock markets.

In order to examine the relationship among financial market, Granger Causality test is employed. Granger Causality is a statistical hypothesis test to determine whether a variable is useful in forecasting another. This test is applied to examine the relationship of three commodity returns in two different stock markets. The Table 5.3 below shows a summary of our empirical results.

Table 5.3 Summary of Granger Causality result

KLCI	**Causality Relationship**
Gold does not granger cause KLCI KLCI does not granger cause gold	No granger cause
Copper does not granger cause KLCI KLCI granger cause copper	Unidirectional
Crude Oil granger cause KLCI KLCI granger cause crude oil	Bidirectional
SSE	**Causality Relationship**
Gold does not granger cause SSE SSE does not granger cause gold	No granger cause

Copper does not granger cause SSE SSE does not granger cause copper	No granger cause
Crude Oil granger cause SSE SSE does not granger cause crude oil	Unidirectional

Furthermore, the impulse response function refers to the reaction of any dynamic system in response to some external change. Table 5.4 and 5.5 below shows the summary of impulse response function results which represents the reaction of commodity returns in response of a change in stock market, vice versa.

Table 5.4 Summary of impulse response function result of KLCI

A shock of Stock Market	Respond of Commodity	Effect
KLCI	Gold	Positive, negative
	Copper	Negative
	Crude oil	Fluctuates
A shock of Commodity	**Respond of Stock Market**	**Effect**
Gold	**KLCI**	Fluctuates
Copper		Slight positive
Crude oil		Fluctuates

Table 5.5 Summary of impulse response function result of SSE

One shock of Stock Market	Respond of Commodity	Effect
SSE	Gold	Negative
	Copper	Negative
	Crude oil	Fluctuates
One shock of Commodity	**Respond of Stock Market**	**Effect**
Gold	**SSE**	Slightly negative
Copper		Fluctuates
Crude oil		Fluctuates

5.2 Discussion on major finding

Based on result reported on chapter 4, there is a clear conclusive result between dependent variable and independent variables.

5.2.1 Relationship of Gold

First, the relationship of Gold of our finding on stock market KLCI and SSE is negative. Gold is significant on SSI but insignificant on KLCI. The previous studies indicated that gold functions as a hedge and a safe haven asset. It allows investor a chance to protect their fortune when there is adverse market condition such as economy crisis (Baur & Lucey, 2010); Baur & McDermott, 2010; Hood & Malik, 2013; Ciner et al., 2013). Furthermore, the researcher further proved that during the timeframe of high market volatility, precious metal able act as hedging tools to unfavorable market condition (Baur & McDermott, 2010; Hillier et al. 2006). The research by Baur and Lucey (2010) find that gold is negative relationship with stock market between US, UK

and German stock return and gold return. Our finding is simultaneous with theory that gold serve as hedging tools.

Next, according to our finding indicates that Gold is not cointegrated with stock market index which mean there are just short run equilibrium. It consistent with previous studied done by Giam, McAleer and Sriboonchitta (2009). Conversely, Ray (2013) identifies that gold and stock was cointegrated and shows there are long run relationship from Indian evidence.

5.2.2 Relationship of Copper

Next, the copper found that there is positive relationship on stock market of KLCI and SSE. Based on Jaunky (2013), the result shows significant price reactions between East Asian stock price and copper. Moreover, after year 2008 the dynamic correlation between stock market and copper is increasing.

5.2.3 Relationship of Crude Oil

Meanwhile, our result also reported that relationship between oil and stock market is negative. Our finding is similar with the result of Jones and Kaul (1996). Their result reported oil price and stock in US and Canada is negative relationship. But it is ambiguous for Japan and UK. Furthermore, numerous studies (Hamilton, 2003; Cunado & Perez de Gracia, 2005; Balaz & Londarev, 2006; Cologni & Manera, 2008; Kilian, 2008; Alvarez et al., 2011) have reported negative effects between oil price and stock market. The researcher further proved that oil price shocks had adverse effect on stock price. Their evidence was proved with sample of 13 developed markets (O'Neil et al., 2008; Park & Ratti, 2008).

Miller and Ratti (2009) further proved that stock exchange react negatively to oil price in long term. The researcher had adopted VECM model to examine the relationship of crude oil price and stock exchange within OECD countries. However, our finding indicate that there are no cointegrated between crude oil and stock market return, hence there is no long run equilibrium.

5.2.4 Causal Relation of Commodity market to Stock market

From evidence in India during 1991 to 2009, the result proved that there is bidirectional granger cause between gold prices and stock market returns (Mishra et al., 2010). The result further proved by (Anand and Madhogaria, 2012). Their result show that in developed countries gold price is granger cause the stock price while in developing countries the stock price granger cause the gold price. The Granger causality test showed there is unidirectional causality from gold price to stock price (Ray, 2013). The past research studies showed that gold price has no granger cause to the stock index (Creti et al., 2013; Baur & McDermott, 2010).All the researcher examine the role of gold in the global financial system by testing the hypothesis that gold represents a safe haven against stocks of major emerging and developed countries.

According to Jones and Kaul (1996) research shows that there are bi-directional causality between crude oil and stock market in Japan. Oskooe (2012) further proved that oil price have granger cause to Iran stock market. However, the result proved that there is no causality between oil price to stock market (Apergis & Miller, 2009; Oskooe, 2012).

5.3 Comparison of Malaysia and China

According to the Impulse Response Function of KLCI to each commodity, it shows that KLCI fluctuates across the period when there is a shock in gold and crude

oil markets. The movements of KLCI as a result of shocks in gold and crude oil are more or less the same which is reacted negatively at first followed by upward trend and remain minimal effect across the horizon. Such movements might be due to short selling of commodities. When gold market and crude oil market fluctuates, investors will lack of confidence investing in commodity market because they could not foresee the market condition. Thus, they short sell in commodity market which in turns affecting KLCI trade volume. After a while, analysis on the commodity market condition would be reported by fund managers or researchers. Investors could form short term forecast and expectation on the movements of commodity markets. This means that investors would have confidence investing in commodity market again after reviewing on the analysis reports. Therefore, the performance of KLCI back on track after that. Furthermore, there is bidirectional Granger causal relation between crude oil and stock market which would lead to fluctuation of stock market when the volatility increases in crude oil (Li et al., 2011). Meanwhile, a shock of copper market only has slightly positive effect on KLCI. This may be due to copper itself is a raw material which is relatively important for economic development. In other words, copper price is inelastic. Thus, investors do not worry in investing in it and KLCI shows a little positive trend across the period.

Other than looking at the response of commodities due to a shock in stock market, we have generated the impulse response functions of each commodity market to KLCI. First, we found that the gold market reacts positively and then remain minimal effect when there is a shock in KLCI. Gold is largely served as a hedging tool for investment. When KLCI fluctuates, investors would invest more in gold market. Thus, gold market rose at the beginning and started to remain at minimal effects after the first two periods. This trend is supported by a research study which stated that gold is a safe haven for stocks in short run and suggested that investors sell gold when stock market volatility is lower (Baur and Lucey, 2010). Besides that, crude oil market fluctuates in response of a shock in KLCI. When the performance in KLCI is unstable, it is affecting the profit and returns of investors and corporations. Meanwhile, this is affecting human investment behaviour especially in crude oil market because oil price has direct effect

on daily consumption. Therefore, crude oil market fluctuates when there is a shock in KLCI. Furthermore, the response of copper to KLCI shows a negative trend across the period. As mentioned earlier, the performance of KLCI has direct effect on corporations' profit. When KLCI fluctuates, corporations and investors could not generate stable profit or income. They might lower down their production. Copper is largely used in generators and cables. When production falls, demand on copper will also falls. Thus, copper market shows a negative trend during KLCI shock.

In the case of China, when there is shock in gold market, the SSE will have short term negative effect until third period and then remained constant. On the other hand, a fluctuation in SSE brought a negative movement in gold return index in the first 2 periods. Then it falls and remains minimal effect across the period. This can be explained by the investors and fund managers seeking profit from trading gold and China stocks may consider active investment strategies based on volatility persistence and current market trends. For instance, if the markets are rising they might increase the amount of portfolio investment while the market are falling they might decrease. The viability of strategies depends on the stability and the strength of performance.

The impulse response functions between SSE and crude oil has caused fluctuations to another variable. In other words, SSE responded fluctuations from negative to positive and eventually disappears after 7^{th} period. On the other hand, due to a shock in SSE, the return index of crude oil move significance fluctuates from positive to lowest negative to 2^{nd} period then rose to positive until 5^{th} period. These results have supported the Granger Causality test of SSE and crude oil which shows there is unidirectional causality between variables. Evidence from Wang and Firth (2004) showed that the segmented and integrated China stock market is mixed this implies that the China stock market is "partially integrated" with the other stock market and oil price shocks. The stock returns may differ greatly depending on whether the increase of the price of crude oil is driven by demand or supply shocks in the crude oil market since the emergence of China is one major development in both oil market and international monetary system. Furthermore, the impact of oil price shocks on the

China stock prices has been mixed. For example, when oil specific demand shock occurred, positive expectation effect of China's fast economic growth may greater than the negative effect of demand shock.

A shock to copper evokes a relatively small negatively response in SSE, smooth fluctuation across the entire horizon and remains calm start from period 4 onwards. Meanwhile, there is a steep falls of copper return index due to a shock in SSE. The rapid emerging economics as China has led to growing demand for many commodities for example copper. While demand shocks will drives up the future prices of commodities and lead to higher stock prices due to increased cost of commodity imports. As the economic environment in the copper markets is likely to change over time, the composition of shocks to the SSE might change over time but it is insignificant effect due to China's stock market is largely segmented from the outside world because it is capital controls it would not expect trading by outside investor to directly affect the Shanghai Market Index thus the effect is insignificant.

A deeper understanding of stock markets and commodities returns can be seen through variance decomposition among them. The results show that the error variance of gold can be explained by SSE and KLCI significantly but SSE explains 1.2 times more than that KLCI. This is might be due to the gold trading in Malaysia still not as active as in Shanghai. Thus, SSE has greater role in explaining gold returns. Besides that, copper returns has greater role in explaining both forecast error variance of SSE and KLCI. This might be due to copper is served as a key input factor in many sectors such as manufacturing, construction, and energy sector which is important for a nation's development. Last but not least, Malaysia is an oil-export country. The returns from crude oil market are relatively important and have significant impact on Malaysian's economy. Thus, the variance decomposition result of crude oil is match with theory. It shows that crude oil explains more on the forecast error variance of KLCI than SSE.

5.4 Policy Implications

In the commodity part, there are investors may lack of specific knowledge on commodity and may have a different behavior towards commodity stocks. For example, they will trade based on their perceptions of the macroeconomic condition rather than the specific factors of market. Other than that, most of the fund managers suggest their customers to include commodity-related products in their portfolios as one of the strategy to reduce the risk or as hedging tool. Overall, findings of this study could provide some foresee perception or cautions decision making for local and other international investors especially for those who are interested in stock and commodity market investment. These results are useful in portfolio risk management as investors aimed at using commodity to preserve their wealth fare. Our findings had illustrated several significant implications for portfolio hedgers and investor for making best asset allocations in their investment decision.

There was an increasing on the investment of commodities over the past few years. Based on the empirical results, it has proven that the global commodity index has short run relationship with the Malaysia and China stock market (KLCI and SSE). From the Granger causality test, it shows that only global crude oil index has bidirectional effect with KLCI and unidirectional effect to SSE. This displays that the crude oil has gained a remarkable soaring market position and extensive acknowledgement of investors as an important raw material of industrial production. When investor invests in stock market, investors and traders should firstly concern the short run future price of global crude oil. This further suggests that investor should be careful in selecting their investment portfolio when there is fluctuation in oil price since the response of KLCI and SSE highly volatile across the periods.

It is a commonly held view that gold protects investors' wealth or serve as a hedging tools in an investment portfolio. This paper suggests that gold may serves as hedging tools for KLCI as the respond in gold market increased when stock market is volatile. However, this does not applicable to SSE since the respond of gold market is

decreasing when stock market is volatile. On the other hand, investor may pay close attention in the stock markets with the fluctuation in copper market in short term investment. The evidence stated that when there is increasing volatile in stock market, the respond of copper market decreases significantly. This suggest that the performance of stock market significant in affecting copper market, investor and portfolio manager may try to reallocate their investment portion into copper market when stock market is highly fluctuated or look for other alternatives.

5.5 Limitation of the Study

Along the study to examine the relationship of Malaysia and China stock market and U.S. commodity markets, we found several limitations. In our study, we only examined the relationship between Malaysia stock market and China stock market by using U.S. commodity indices. In other words, our result only can be used as reference in emerging countries meanwhile the result may be different if apply in other developed countries.

The model we used in our study is VAR model; we are only focused on the overall relationship between stock market and commodity market of Malaysia and China by using US commodity market as benchmark. In other words, we only interpret the result by observed the means and variance of the data thus the results are relatively static with an average meaning. The VAR model only can examine whether the data variables is in short run relationship. However, the volatility spillovers and market shocks are also important in the study information transmission from one market to another market because volatility is a source of information to which investors react and form new expectations.

The data that we used in our study is quarterly data; it has lower frequency than daily data. According to Dobrev and Szerszen (2010) daily frequency can be obtained almost as precisely as if volatility data is extracted from high frequency data. Besides

that, Malaysian investors are more active in stocks and bond market. Our study has shown only the relationship between KLCI and commodity markets.

In our study, we only examine three variables from commodity markets in precious metals sector, energy sector and industry metals sector. From the result, we know that all the commodities are significant to China stock market and Malaysia stock market. However, the granger cause of other commodities among the sectors or other sectors whether affect the three independent variables that we examined are remain uncertain.

5.6 Recommendation

In our study we are focused on the overall relationship of the commodity markets and stock markets. Other than that, future researchers should pay attention to their dynamic and time-varying interaction by using GARCH model. The study of volatility and time varying interaction of the commodity and stock market are much more benefits to the practitioners and investors whether still used commodity market as their hedging tools after study the effects among commodities market as well as the shocks happened in economy.

When using GARCH model, daily data is utilized since the daily estimates of volatility are more accurate than the monthly estimates. The GARCH stimulations to exhibits a small amount of variance compression which the monthly estimates is smaller than daily. So by using daily data the results will be more precise and accurate. The gap of our study is we are not comparing developed and developing country so that the future research can improved by comparing the developed and developing country to investigate the spillover effect between difference region since the economic changes of the commodity market will affect globally.

Likewise, the study is limited to find the relationship between commodity and stock market indices however; the future research may explore the relationship of commodity at a larger scale. We should also extend to other nations for example Asian, European or American countries. We also suggest comparative study among different regional stock markets. Other microeconomic factors also take into consideration in the future research to examine the short term relationship between commodity and stock market return. Furthermore, future research could include more commodities into the independent variables such as wheat, livestock, silver and others.

5.7 Conclusion

In this research, the main objective is to determine the relationship from global commodities returns index to the stock markets in Malaysia and China. The study has conducted using 10 years data from year 2003 to 2012. For this, we use Granger causality tests and VAR to test the relation. We further proceed to cointegration test to determine whether our models have long run relationship. Besides that, factor analysis statistical method has applied for processing and grouping of data while Eviews statistical method was utilized to analyze the relationship between the stock market and commodity price index. The study provides evidence for time-varying correlations between global commodity prices and stock markets in Malaysia and China.

In conclusion, the research objectives in this study had been reasonably achieved as the relationships among global commodity index and stock market in both Malaysia and China were examined. There is a significant direct relationship for each pair of commodity price and stock market. Meanwhile, there is only short run relationship between commodity prices and examined stock markets. Besides, there is bidirectional causal relationship between crude oil and KLCI while there is unidirectional causal relationship between crude oil and SSE. This paper also suggests that gold may serve as hedging tools in Malaysia, crude oil and copper remains the key factor in explaining the variation of KLCI and SSE while gold has less impact to both

stock markets. The result in this paper is useful for individual and institutional investors, brokers and traders who are concerned with global commodity price index in Malaysia's and China's stock markets (KLCI and SSE). In all, the paper improves the knowledge about the interaction between global commodity index and stock market in Malaysia and China.

Reference

Agren, M. (2006, October).*Does oil price uncertainty transmit to stock markets?* Retrieved January 16, 2014, from http://uu.diva-portal.org/smash/get/diva2:111165/FULLTEXT01.pdf

Alexander, C. (2001). *Market models: A guide to financial data analysis*. John Wiley & Sons Ltd.

Alvarez, L. J., Hurtado, S., Sanchez, I., & Thomas, C. (2011). The impact of oil price changes on Spanish and euro area consumer price inflation. *Economic Modelling, 28(1-2),* 422–431.

Anand, R., &Madhogaria, S. (2012). Is gold a 'safe-haven'? An econometric analysis.*Procedia Economics and Finance, 1,* 24-33.

Apergis, N., & Miller, S. M. (2009). Do structural oil-market shocks affect stock prices? *Energy Economics, 31(4),* 569-575.

Arouri, M. E. H. (2011). Does crude oil move stock markets in Europe? A sector investigation.*Economic Modelling, 28,* 1716-1725.

Arouri, M. E. H., & Nguyen, D. K. (2010). Oil prices, stock markets and portfolio investement: Evidence from sector analysis in Europe over the last decade. *Energy Policy, 38,* 4528-4539.

Arouri, M. E. H., &Rault, C. (2011). Oil prices and stock markets in GCC countries: Empirical evidence from panel analysis. *Internatinal Journal of Finance and Economics.*doi:10.1002/ijfe.443

Arouri, M. E. H., Bellalah, M., & Nguyen, D. K. (2011). Further evidence on the responses of stock prices in GCC countries to oil price shocks. *International Journal of Business, 16(1),* 89-102.

Arouri, M. E. H., Jouini, J., & Nguyen, D. K. (2011). Volatility spillovers between oil prices and stock sector returns: Implications for portfolio management. *Journal of International Money and Finance, 30,* 1387-1405.

Arouri, M. E. H., Jouini, J., & Nguyen, D. K. (2012). On the impacts of oil price fluctuations on European equity markets: Volatility spillover and hedging effectiveness. *EnergyEconomics, 34,* 611-617.

Arouri, M. E. H., Lahiani, A., & Nguyen, D. K. (2011).Return and volatility transmission between world oil prices and stock markets of the GCC countries.*Economic Modelling, 28(4),* 1815-1825.

Asteriou, D., Dimitras, A., &Lendewig, A. (2013). The influence of oil prices on stock market returns: Empirical evidence from oil exporting and oil importing countries. *International Journal of Business and Management, 8(18),* 101-120.

Backus, K. D., &Crucini, M. J. (2000).Oil prices and the terms of trade.*Journal of International economics, 50,* 185-213.

Balaz, P., &Londarev, A. (2006).Oil and its position in the process of globalization of the world economy.*PolitickaEkonomie, 54(4),* 508-528.

Basher, S. A., &Sadorsky, P. (2006).Oil price risk and emerging stock markets.*Global Finance Journal, 17(2),* 224-251.

Baur, D. G., &Lucey, B. M. (2010). Is gold a hedge or a safe haven? An analysis of stocks, bonds and gold.*Financial Review, 45,* 217-229.

Baur, D. G., & McDermott, T. K. (2010). Is gold a safe haven? International evidence.*Journal of Banking and Finance, 34,* 1886-1898.

Bernanke, S. B., Gertler, M., & Watson, M. (1997). Systematic monetary policy and the effects of oil price shocks. *Brookings Papers on Economic Activity, 1,* 91-148.

Bilal, A. R., &Talib, N. A. (2013). How Gold Prices Correspond to Stock Index: A Comparative Analysis of Karachi Stock Exchange and Bombay Stock Exchange. *World Applied Sciences Journal, 21(4),* 485-491.

Bjornland, C. H. (2009). Oil price shocks and stock market booms in an oil exporting country.*Scottish Journal of Political Economy, 2(5),* 232-254.

Bodie, Z. V. I. &Rosansky. (1980). Risk and return in commodity futures.*Financial Analysts Journal, 36,* 27–39

Bollerslev, T. (1990). Modeling the Coherence in Short-Run Nominal Exchange Rates: A Multivariate Generalized ARCH Model. *Review of Economics and Statistics, 72,* 498-505.

Bollerslev, T., Engle, R., & Wooldridge, J. (1988).A capital asset pricing model with time-varying covariances.*Journal of Political Economy, 96(1),* 116-31.

Bouchentouf, A. (n.d.). *Effect of government financial crises on commodities and stock markets.* Retrieved January 6, 2014, from http://www.dummies.com/how-to/content/effect-of-government-financial-crises-on-commoditi.html

Brown, P. A. S., &Yucel, M. K. (2002). Energy pirces and aggregate economic activity: an interpretative survey. *The Quarterly Review of Economics and Finance, 42,* 193-208.

Buyuksahin, B., & Robe, M. A. (2011, July).*Does "paper oil" matter? Energy markets' financialization and equity-commodity co-movements.* Retrieved February 17, 2014, from http://www.parisschoolofeconomics.eu/IMG/pdf/buyuksahin_paper.pdf

Buyuksalvarci, A. (2010). The effects of macroeconomics variables on stock returns: Evidence from Turkey. *European Journal of Social Sciences*, *14(3),* 404-416.

Chakrabarty, R., & Sarkar, A. (2010).Efficiency of the Indian commodity and stock market with focus on some agricultural product.*Paradigm, 14(1),* 85-96.

Chan, F., &McAleer, M. (n.d.).*Empirical modeling of multivariate asymmetric financial volatility.* Retrieved January 16, 2014, from http://bschool.nus.edu/departments/financenaccounting/seminars/papers/michael.pdf

Chandrasekhar, C.P., & Ghosh, J. (n.d.).*Global crisis and commodity prices.* Retrieved January 6, 2014, from http://www.networkideas.org/featart/dec2008/Global_Crisis.pdf

Chang, C., McAleer, M., &Tansuchat, R. (2013).Conditional correlations and volatility spillovers between crude oil and stock index returns.*The North American Journal of Economics and Finance, 25,* 116-138.

Chen, N. F., (1983). Some empirical tests of the Arbitrage Pricing Theory.*Journal of Finance, 38,* 1393-1414.

Chen, N. F., Roll, R., & Ross, S. A. (1986).Economic forces and the stock market.*Journal of Business, 59,* 383–403.

Chen, S. S. (2010). Do higher oil prices push the stock market into bear territory? *Energy Economics, 32(2),* 490-495.

Cheung, C. S., &Miu, P. (2010). Diversification benefits of commodity futures. *Journal of International Financial Markets, Institutions and Money, 20(5),* 451-474.

Chin, J. (2009, January 1). Disappointing 2008 with KLCI losing nearly 39% amid global crisis. Retrieved April 16, 2014, from http://www.thestar.com.my/story.aspx/?file=%2f2009%2f1%2f1%2fbusiness%2f2924831

Chinn, D. M., & LeBlanc, M. (2004). Do high oil prices presage inflation? The evidence from G5 countries.*Business Economics, 34,* 38-48.

Chiou, J. S., Lee, Y. H. (2009). Jump dynamics and volatility: Oil and stock markets. *Energy 34,* 788-796.

Choi, K., &Hammoudeh, S. (2010). Volatility behavior of oil, industrial commodity and stock markets in a regime-switching environment.*Energy Policy, 38(8),* 4388-4399.

Ciner, C., Gurdgiev, C., &Lucey, B. M. (2013). Hedges and safe havens: An examination of stocks, bonds, gold, oil and exchange rates. *International Review of Financial Analysis, 29,* 202-211.

Cologni, A., &Manera, M. (2008). Oil prices, inflation and interest rates in a structuralcointegrated VAR model for the G-7 countries. *Energy Economies, 30,* 856-888.

Commodities.(n.d.). Retrieved February 19, 2014, from http://asia.spindices.com/performance-overview/commodities/sp-gsci?indexId=spgscirg--usd----sp------

Connor, G., &Korajczyk, R. A., (1988). Risk and return in an equilibrium APT: Application of a new test methodology. *Journal of Financial Economics, 21,* 255-289.

Conover, C. M., Jensen, G. R., Johnson, R. R. & Mercer, J. M. (2007, November). *Can precious metals make your portfolio shine?* Retrieved February 17, 2014, from https://www.google.com.my/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CC8QFjAB&url=http%3A%2F%2Fwww.researchg

ate.net%2Fpublication%2F228478827_Can_Precious_Metals_Make_Your_Portfolio_Shine%2Ffile%2F9c96052a8d02daf31f.pdf&ei=7NgdU7C-CcigiQf7-IGQCA&usg=AFQjCNEKPTf79MfbZr5c-TRhj7X9IBHjvg&sig2=RZaV2gV5bzV4_efNKtrz6A&bvm=bv.62578216,d.aGc

Conover, C. M., Jensen, G. R., Johnson, R. R., & Mercer, J. M. (2010). Is now the time to add commodities to your portfolio? *Journal of Investing, 19,* 10-19.

Coudert, V., & Raymond-Feingold, H. (2011). Gold and financial assets: Are there any safe havens in bear markets? *Economics Bulletin, 31(2),* 1613-1622.

Creti, A., Joets, M., & Mignon, V. (2013).On the links between stock and commodity markets' volatility.*Energy Economics, 37,* 16-28.

Cunado, J., & Perez de Gracia, F. (2005). Oil prices, economic activity and inflation: Evidence for some Asian countries. The *Quarterly Review of Economics and Finance 45 (1),* 65–83.

Daskalaki, C., &Skiadopoulos, G. (2011). Should investors include commodities in their portfolios after all? New evidence.*Journal of Banking & Finance, 35,* 2606-2626.

Delatte, A, & Lopez, C. (2013). Commodity and equity markets: Some stylized facts from a copula approach. *Journal of Banking & Finance, 37(12),* 5346-5356.

Do, G. Q., &Sriboonchitta, S. (2009). Cointegration and causality among international gold and ASEAN emerging stock markets.

Dobrev, D., &Szerszen, P. (2010, July).The information content of high-frequency data for extimating equity return models and forecasting risk. Retrieved February 28, 2014, from http://www.federalreserve.gov/pubs/feds/2010/201045/201045pap.pdf

Driesprong, G., Jacobsen, B., &Maat, B. (2004).Stock markets and oil prices.

Driesprong, G., Jacobsen, B., &Maat, B. (2008). Striking oil: Another puzzle? *Journal of Financial Economics, 89,* 307-327.

Du, X., Yu, C. L., & Hayes, D. J. (2011). Speculation and volatility spillover in the crude oil and agricultural commodity markets: A Bayesian analysis. *Energy Economics, 33,* 497-503.

Dwyer, A., Gardner, G., Williams, T. (2011).Global commodity markets-price volatility and financialisation.*Reserve Bank of Australia Bulletin*.

Economic Transformation Programme.(2012). *Annual Report.*

Elekdag, S., Lall, & S, Alp, H. (2012).An assessment of Malaysian Monetary Policy during the global financial crisis of 2008-09.

Emanuele De Meo. (2013). Are commodity prices driven by fundamentals? *Banca Monte deiPaschi di Siena SpA, 42(1),* 19-46.

Enders, W. (2003).*Applied Econometric Time Series*. Hoboken, NJ: Wiley.

Engle, R., & Kroner, K. (1995). Multivariate simultaneous generalized ARCH. *Econometric Theory, 11,* 122-50.

Engle, R. F., & Granger, W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica, 55(2),* 251-276.

Erb, C.B., & Harvey, C.R. (2006).The tactical and strategic value of commodity futures.*Duke University working paper*, 61.

Every user of UN comtrade should know the coverage and limitations of the data. (n.d.). Retrieved April 16, 2014, from http://comtrade.un.org/db/help/ureadMeFirst.aspx?returnPath=%2fdb%2fdqBasicQueryResults.aspx%3fpx%3dH1%26cc%3d7108%26r%3d458%26y%3d2003

Ferretti, I. F.,& Gonzalo, J. (2010). Modeling and measuring price discovery in commodity markets. *Journal of Econometrics, 158(1)*, 95-107.

Fillis, G. (2010). Macro economy, stock market and oil prices: Do meaningful relationships exist among their cyclical fluctuations? *Energy Economics, 32(4),* 877-886.

Fillis, G., Degiannakis, S., &Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International Review of Financial Analysis, 20,* 152-164.

Fowowe, B. (2013). Jump dynamics in the relationship between oil prices and the stock market: Evidence from Nigeria. *Energy, 56(1),* 31-38.

FTSE Bursa Malaysia indices overview. (n. d.). Retrieved February 19, 2014, from http://www.bursamalaysia.com/market/products-services/indices/ftse-bursa-malaysia-indices/overview/

FTSE Bursa Malaysia indices.(n.d.). Retrieved February 19, 2014, from http://www.bursamalaysia.com/market/products-services/indices/ftse-bursa-malaysia-indices/overview/

FTSE Bursa Malaysia KLCI.(2009). *FTSE Asia Research.*

Fundamentals: Types of copper and properties.(n.d.). Retrieved January 7, 2014, from http://www.copper.org/applications/architecture/arch_dhb/technical-discussion/fundamentals/intro.html

Garbade, K. D. & Silber, WX. (1983). Price movements and price discovery in futures and cash markets.*Review of Economics and Statistics, 65(2),* 289-297.

Giam, Q. D., McAleer, M., &Sriboonchitta, S. (2009). Effects of international gold market on stock exchange volatility: evidence from asean emerging stock market. *Economics Bullentin, 29,* 599-610.

Gilbert, C.L. (2010). How to understand high food prices. *Journal of Agricultural Economics, 61,* 398-425.

Gogineni, S. (2007).The stock market reaction to oil price changes.Working Paper.University of Oklahoma.

Golec, A., Murat, A., Tokat, E., &Turksen, B. (2012).Forecasting model of Shanghai and CRB commodity indexes.*Expert Systems with Applications, 39(10),* 9275-9281.

Gorton, G., &Rouwenhorst, K. G. (2004, June).*Facts and fantasies about commodity futures.* Retrieved February 17, 2014, from http://fic.wharton.upenn.edu/fic/papers/06/0607.pdf

Granger, C., &Newbold, P. (1974).Spurious regression in econometrics.*Journal of Econometrics,* 2, 111-20.

Gregory, A. W., & Hansen, B. E. (1996).Residual-based tests for cointegration in models with regime shifts.*Journal of Econometrics, 70(1),* 99-126.

Guesmi, K.(2014). Dynamic spillover between the oil and stock markets of emerging oil-exporting countries.*The Journal of Applied Business Research, 30(1)*.

Gujarati, D. N., & Dawn, P. C. (2009). *Basic Econometrics.* New York: McGraw-Hill.

Hamilton, D. J. (1988).A neoclassical model of unemployment and the business cycle.*Journal of Political Economy, 96,* 593-617.

Hamilton, J.D. (2003). What is an oil shock? *Journal of Econometrics, 113,* 363-398.

Hammoudeh, S. M., Yuan, Y., &McAleer, M. (2009). Shock and volatility spillovers among equity sectors of the Gulf Arab stock markets. *The Quarterly Review of Economics and Finance, 49(3),* 829-842.

Hassan, S. A., & Malik, F. (2007).Multivariate GARCH modeling of sector volatility transmission.*The Quarterly Review of Economics and Finance, 47,* 470-480.

Hayat, A., & Narayan, P. K. (2011). Do demand and supply shocks explain USA's oil stock fluctuations? *Applied Energy, 88,* 2908-2915.

He, L., & Chen, S. (2011). Nonlinear bivariate dependency of price-volume relationships in agricultural commodity futures markets: A perspective from multifractaldetrended cross-correlation analysis. *Physica A, 390,* 297-308.

Heaney, R. A., (2005). An Empirical Analysis of Commodity Pricing.*Journal of Future Markets 18,* 1-25.

Hillier, D., Draper, P., & Faff, R. (2006). Do precious metals shine? An investment perspective.*Financial Analysts Journal, 62,* 98-106.

Hood, M., & Malik, F. (2013). Is gold the best hedge and a safe haven under changing stock market volatility? *Review of Financial Economics, 22(2),* 47-52.

Hooker, A. M. (1996). What happened to the oil price-macroeconomy relationship? *Journal of Monetary Economics, 38,* 195-213.

Hoti, S., Chan, F., &McAleer, M. (2002, July).*Structure and asymptotic theory for multivariate asymmetric volatility: Empirical evidence for country risk ratings.* Paper presented to the Australasian Meeting of the Econometric Society, Brisbane, Australia.

Hu, C., &Xiong, W. (2013, May).*The informational role of commodity futures prices.* Retrieved January 20, 2014, from http://www.eia.gov/finance/markets/reports_presentations/WXInformationCommodity.pdf

Huang, R. D., Masulis, R. W., & Stoll, H. R. (1996).Energy shocks and financial markets.*Journal of Futures Markets, 16,* 1-27.

Hunjra, A. I., Azam, M., Niazi, G. S. K., Butt, B. Z., Kashif-Ur-Rehman, &Azam, R. I. (2011). Risk and return relationship in stock market and commodity prices: A comprehensive study of Pakistani markets. *World Applied Sciences Journal, 13(3),* 470-481.

Hussin, Y., Muhammad, F., Razak, A. Tha, G. P., & Marwan, N. (2013). The link between gold price, oil price and Islamic stock market: Experience from Malaysia. *Journal of Studies in Social Sciences, 4(2),* 161-182.

Hwang Global Commodity Fund. (2014, March). Retrieved April 16, 2014, from http://www.hsbc.com.my/1/PA_ES_Content_Mgmt/content/website/pdf/fund_express/adventurous/hwang_global_commodity_fund.pdf

Impulse response functions from VECMs.(2011, November). Retrieved February 5, 2014, from http://davegiles.blogspot.com/2011/11/impulse-response-functions-from-vecms.html

Industrial sector: Manufacturing and agriculture. (n.d.). Retrieved February 9, 2014, from http://www.aceee.org/sector/industrial

Issler, J. V., Rodrigues, C., &Burjack, R. (2014). Using common features to understand the behavior of metal-commodity prices and forecast them at different horizons. *Journal of International Money and Finance, 42,* 310-335.

Jaunky, V. C. (2013). A cointegration and causality analysis of copper consumption and economic growth in rich countries.*Resources Policy, 38(4),* 628-639.

Johansen, S. &Juselius, K. (1990).Maximum likelihood estimation and inference on cointegration with application to the demand for money.*Oxford Bulletin of Economics and Statistic*s, *52(2),* 169-210.

Jones, C. M., &Kaul, G. (1996).Oil and the stock markets.*Journal of Finance, 51(2),* 463-491.

Kilian, L. (2008). Exogenous oil supply shocks: how big are they and how much do they matter for the US economy? *Review of Economics and Statistics, 90,* 216-240.

Kim, I. M., &Loungani, P. (1992).The role of energy in real business cycle models.*Journal of Monetary Economics, 29,* 173-189.

Korhonen, I., &Peresetsky, A. (2013). What determines stock market behavior in Russia and other emerging countries? *BOFIT Discussion Papers, 2013(4),* 4-26.

Kroner, K., & Ng, V. (1998).Modelling asymmetric comovements of asset retruns.*Review of Financial Studies,* 11(4), 817-44.

Kumar, S., Managi, S., & Matsuda, A. (2012). Stock prices of clean energy firms, oil and carbon markets: A vector autoregressive analysis. *Energy Economics, 34,* 215-226.

Kwiatowski, Phillips, Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics, 54,* 159-178.

Lardic, S., & Mignon, V. (2006). Oil prices and economic activity: an asymmetric cointegrationappoarch. *Energy Economics, 34,* 3910-3915.

Lee, C. C., & Zeng, J. H. (2011). The impact of oil price shocks on stock market activities: Asymmetric effect with quantile regression. *Mathematics and Computers in Simulation, 81(9),* 1910-1920.

Lee, J. (2013). Relationships between commodities and macro financial variables: A structural VAR analysis.

Lescaroux, F., & Mignon, V. (2008).On the influence of oil prices on economic activity and other macroeconomic and financial variables.*OPEC Energy Review, 32(4),* 343-380.

Lien, D., & Yang, L. (2008). Asymmetric effect of basis on dynamic futures hedging: Empirical evidence from commodity markets. *Journal of Banking & Finance 32,* 187-198.

Ling, S., &McAleer, M. (2003).Asymptotic theory for a vector ARMA-GARCH model.*Econometric Theory, 19,* 278–308.

Liu, L., & Wan, J. (2012). The relationships between Shanghai stock market and CNY/USD exchange rate: New evidence based on cross-correlation analysis, structural cointegration and nonlinear causality test. *Physica A: Statistical Mechanics and its Applications, 391(23),* 6051-6059.

Liu, Q., &An, Y. (2011). Information transmission in informationally linked markets: Evidence from US and Chinese commodity futures markets. *Journal of International Money and Finance, 30(5),* 778-795.

Lombardi, M., &Ravazzolo, F. (2013, July).*On the correlation between commodity and equity returns: Implications for portfolio allocation.* Retrieved January 16, 2014, from http://www.bis.org/publ/work420.pdf

Lucey, B. M., Tully, E., &Poti, V. (2006).International portfolio formation, skewness and the role of gold.*Frontiers in Finance and Economics, 3,* 1-17.

Malaysia economy profile 2013.(n.d.). Retrieved February 22, 2014, from http://www.indexmundi.com/malaysia/economy_profile.html

Malik, F., & Ewing, B. T. (2009).Volatility transmission between oil prices and equity sector returns.*International Review of Financial Analysis, 18,* 95-100.

Malik, F., &Hammoudeh, S. (2007).Shock and volatility transmission in the oil, US and Gulf equity markets.*International Review of Economics and Finance, 17,* 357-368.

Marwan Al-Nahleh,& Khaled Al-Zaubia. (2011). Oil prices and financial markets activity: Empirical evidence from some MENA countries. *International Business Research, 4(2),* 193-200.

Masih, A. M. M. (1997). Dynamic linkages and the propagation mechanism driving major international stock markets: An analysis of the pre- and post- crash eras. *The Quarterly Review of Economics and Finance, 37(4),* 859-885.

Masih, R., Peters, S., & Mello, L. D. (2011). Oil price volatility and stock price fluctuations in an emerging market: Evidence from South Korea. *Energy Economics, 33(5),* 975-986.

Mensi, W., Beljid, M, Boubaker, A., &Managi, S. (2013). Correlations and volatility spillovers across commodity and stock markets: Linking energies, food, and gold. *Economic Modelling, 32,* 15-22.

Mensi, W., Hammoudeh, S., & Yoon, S. (2013). Structural breaks and long memory in modeling and forecasting volatility of foreign exchange markets of oil exporters: The importance of scheduled and unscheduled news announcements. *International Review of Economics and Finance, 30,* 101-119.

Metal sector.(n.d.). Retrieved February 9, 2014, from http://www.epa.gov/compliance/assistance/sectors/metals.html

Metals & minerals.(n.d.). Retrieved January 9, 2014, from http://empirestatemetals.com/precious-metals.shtml

Miller, J. I., &Ratti, R. A. (2009). Crude oil and stock markets: Stability, instability and bubbles. *Energy Economics, 31(4),* 559-568.

Mishra P. K., Das J. R., & Mishra S. K. (2010). Gold price volatility and stock market returns in India. *American Journal of Scientific Research, 9,* 47-55.

Monetary Policy in 2007.(2007). *Annual Report.*

Nandha, M., & Faff, R. (2008). Does oil move equity prices? A global view. Energy *Economics, 30,* 986-997.

Narayan, P. K., & Sharma, S. (2011). New evidence on oil price and firm returns.*Journal of Banking and Finance, 35,* 3253-3262.

Natanelov, V., Alam, M. J., McKenzie, A. M., &Huylenbroeck, G. V. (2011). Is there co-movement of agricultural commodities futures prices and crude oil? *Energy Policy, 39(9),* 4971-4984.

Natural gas.(n.d.). Retrieved January 8, 2014, from http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html

Nicolau, M. (2010). Financial markets interactions between economic theory and practice. *Economics and Applied Informatics, 2,* 27-36.

Nordhaus, W. (2007). Who's afraid of a big bad oil shock? *Brookings Papers on Economic Activity, 2,* 219-240.

Norish, K. (2009, August). *Investing in commodities in a diversified world.* Paper presented at the Conference on Australian Technology Park, Eveleigh, Sydney.

O' Neil, T. J., Penm, J., & Terrell, R. D. (2008), The role higher oil prices: A case of major developed countries. *Research in Finance, 24,* 287-299.

Oberndorfer, U. (2009). Energy prices, volatility, and the stock market: Evidence from the Eurozone. *Energy Policy, 37,* 5787-5795.

Oskooe, S. A. P. (2012). Oil price shocks and stock market in oil-exporting countries: Evidence from Iran stock market.

Outlook and Policy in 2012.(2011). *Annual Report.*

Palm oil.(n.d.). Retrieved February 22, 2014, from http://www.beagriculture.com/index.php/palm-oil-trading

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economy, 23,* 511-532.

Patel, S. A. (2013). Causal relationship between stock market indices and gold price: Evidence from India. IUP Journal of Applied Finance, 19(1), 99-109.

Park, J., &Ratti, R. A. (2008).Oil price shocks and stock markets in the U.S. and 13 European countries.*Energy Economics, 30,* 2587-2608.

PaythakhtiOskooe, S. A. (2012). Emerging stock market efficiency: Nonlinearity and episodic dependences evidence from Iran stock market. *Journal of Basic and Applied Scientific Research, 2(11),* 11370-11380.

Peterson, P. E. (2011, April). *Do roll returns really exist? An analysis of the S&P GSCI.* Paper presented at the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, St. Louis, Missouri.

Philips, C. B. (n.d.). Commodities: *The Building Blocks of Forward Returns.* Retrieved February 19, 2014, fromhttps://institutional.vanguard.com/iwe/pdf/commodities.pdf

Phillips, P. C., &Perron, P. (1988).Testing for unit root in time series regression.*Biometrica, 75,* 335-346.

Priestley, R. (1996). The arbitrage pricing theory, macroeconomic and financial factors, and expectations generating processes.*Journal of Banking & Finance, 20,* 869-890.

Public Mutual.(2012). *Annual Report.*

Qin, X. (2011).Essays on pricing behaviors of energy commodities.

Rahman, N. M. N. A. (2012). The cointegration analysis on the spot prices of the Malaysian crude palm oil futures market.*International Journal of Economics and Finance, 4(7),* 95-104.

Ray, S. (2012). Testing granger causal relationship between macroeconomic variabs and stock price behavior: Evidence from India.*Advances in Applied Economics and Finance Analysis, 20,* 152-164.

Ray, S. (2013). Causal nexus between gold price movement and stock market: Evidence from India stock market. *Sciknow Publications Ltd. Econometrics, 1(1),* 12-19.

Razak, A. A., Gan, MohdHussin, P. T. M., Muhammad, M. Y., &Marwan, N. (2013). The Link between Gold Price, Oil Price and Islamic Stock Market: Experience from Malaysia. *Journal of Studies in Social Science, 4(2),* 161-182.

Richards, N. D. and Simpson, J., & Evans, J. (2009). The interaction between exchange rates and stock prices: An Australian context. *International Journal of Economics and Finance, 1(1),* 3-23.

Sadorsky, P. (1999). Oil price shocks and stock market activity.*Energy Economics, 21,* 449-469.

Sadorsky, P. (2006). Modeling and forecasting petroleum futures volatility. *Energy Economics, 28,* 467-488.

Sadorsky, P. (2012). Correlations and volatility spillovers between oil prices and the stock prices of clean energy and technology companies.*Energy Economics, 34,* 248-255.

Sadorsky, P. (2014). Modeling volatility and correlations between emerging market stock prices and the prices of copper, oil and wheat.*Energy Economics.*

Ray, S. (2012). Testing Granger Causal Relationship between Macroeconomic Variables and Stock Price Behaviour: Evidence from India.*Advances in Applied Economics and Finance (AAEF), 3(1),* 2167-6348.

Silvennoinen, A., &Thorp, S. (2010). Financialization, crisis and commodity correlation dynamics.*Research Paper, 267.*Quantitative Research Finance Center, University of Sydney.

Stevenson, A. J. (2004). Price relationships between resource based stock prices and commodity prices.

Stoll, H.R., & Whaley, R. (2010). Commodity index investing and commodity futures prices. *Journal of Applied Finance, 20,* 7-46.

Swamy, V., &Sreejesh, S. (2011). Inter-linkages between commodity markets and capital markets during the global financial crisis: Application of likelihood-based cointegration approach. *Economics, Management and Financial Markets, 6(3),* 66-85.

Talib, N. A., Bilal, A. R., Naveed, M.,& Khan, M. N. A. A. (2013). Inevitability of Cross-Section Stock Return: Evidence from Equity Markets of Pakistan. *Middle-East Journal of Scientific Research, 13(2),* 241-247. doi:10.5829/idosi.mejsr.2013.13.2.1894

Tang, K., &Xiong, W. (2012).Index investment and the financialization of commodities.*Financial Analysis Journal, 68(6).*

Tansuchat, R., McAleer, M., & Chang, C. (2009).Volatility spillovers between crude oil futures returns and oil company stock returns.18th World IMACS/MODSIM congress.

Teulon, F., &Guesmi, K. (2014).Dynamic spillover between the oil and stock markets of emerging oil-exporting countries.*Journal of Applied Business Research, 30(1).*

The changing relationship between copper and the stock market.(2011, January). Retrieved March 3, 2014, from http://www.mcoscillator.com/learning_center/weekly_chart/the_changing_relationship_between_copper_and_the_stock_market/

The energy story.(n.d.). Retrieved January 9, 2014, from http://www.energyquest.ca.gov/story/chapter01.html

The world factbook.(n.d.). Retrieved February 22, 2014, from https://www.cia.gov/library/publications/the-world-factbook/fields/2116.html

Tian, X., & Shen, X. (2005).An analysis on the relationship of the futures copper between SHFE and LME.*Journal of Capital University of Economics and Business, 3,* 34-38.

Tilton, J. E., Humphreys, D., &Radetzki, M. (2011).Investor demand and spot commodity prices.*Resources Policy, 36(3),*187-195.

Types of gold.(n.d.). Retrieved August 25, 2013, fromhttp://goldresource.net/types-of-gold/

Valiante, D. (2011). Commodity price formation in boom-and-bust cycles. *ECMI Commentaries, 29*.

Vivian, A., &Wohar, M. E. (2012). Commodity volatility breaks. *Journal of International Financial Markets, Institutions & Money, 22,* 395-422.

Wen, X., Wei, Y., & Huang, D. (2012).Measuring contagion between energy market and stock market during financial crisis: A copula approach.*Energy Economics, 34(5),* 1435-1446.

What is a commodity market?(2006, December). Retrieved September 8, 2013, from http://www.commodityonline.com/learning/5/What-is-a-Commodity-Market.html

What is natural gas?(n.d.). Retrieved January 8, 2014, from http://www.energy.alberta.ca/naturalgas/723.asp

Wojes, R. (n.d.). *What is copper?* Retrieved January 7, 2014, from http://metals.about.com/od/metalproperties/a/Material_Profile_-_Copper.htm

Xie, Y. (2009, December). *China's monetary policy during the recent financial crisis.*Retrieved February 19, 2014, fromhttp://gppreview.com/2009/12/31/chinas-monetary-policy-during-the-recent-financial-crisis/

Yao, S., Luo, D., & Morgan, S. (2008). *Shanghai stock exchange composite index and bank stock prices in China: A causality analysis.*The University of Nottingham.

Yilmaz, K. (2010). Return and volatility spillovers among the East Asian equity markets.*Journal of Asian Economics, 21,* 304-313.

Yurtsever, C., Zahor, T. (2007).Oil price shocks and stock market in the Netherlands.Working Paper Series.University of Groningen.

Zapata, H. O., Detre, J. D., &Hanabuchi, T. (2012).Historical performance of commodity and stock markets.*Journal of Agricultural and Applied Economics, 44(3),* 339-357.

Zhang, L., Yang, J., Cai, Z., & Yuan, Z. (2014). Analysis of copper flows in China from 1975 to 2010.*Science of The Total Environment, 478,* 80-89.

Zhang, Y., Wei, Y. (2010). The crude oil market and the gold market: Evidence for cointegration, causality and price discovery. *Resources Policy, 35(3),* 168-177.

Zhu, H., Li, R., & Li, S. (2014). Modelling dynamic dependence between crude oil prices and Asia-Pacific stock market returns.*International Review of Economics & Finance, 29,* 208-223.

Zhu, H., Li, S., & Yu, K. (2011). Crude oil shocks and stock markets: A panel threshold cointegration approach. *Energy Economics, 33(5),* 987-994.

Ziaei, S. M. (2012). Effects of gold price on equity, bond and domestic credit: Evidence from ASEAN +3. *Procedia – Social and Behavioral Sciences, 40,* 341-346.

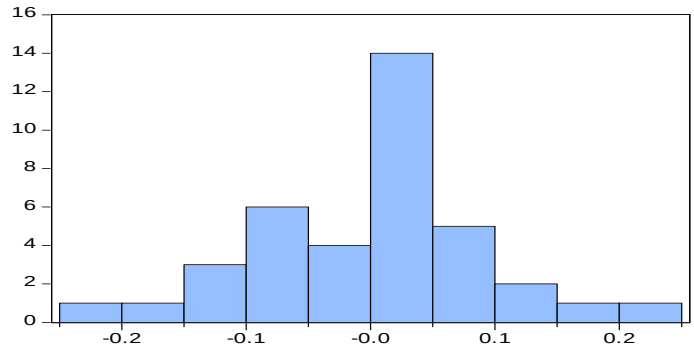
APPENDICES

1.0 Diagnostic Checking

Results

Malaysia

Normality – JB test



Series: Residuals	
Sample 3 40	
Observations 38	
Mean	-7.67e-18
Median	0.015516
Maximum	0.210539
Minimum	-0.245804
Std. Dev.	0.094051
Skewness	-0.331818
Kurtosis	3.278177
Jarque-Bera	0.819843
Probability	0.663702

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.161453	Prob. F(1,32)	0.6905
Obs*R-squared	0.190763	Prob. Chi-Square(1)	0.6623

Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.115805	Prob. F(1,35)	0.7357
Obs*R-squared	0.122018	Prob. Chi-Square(1)	0.7269

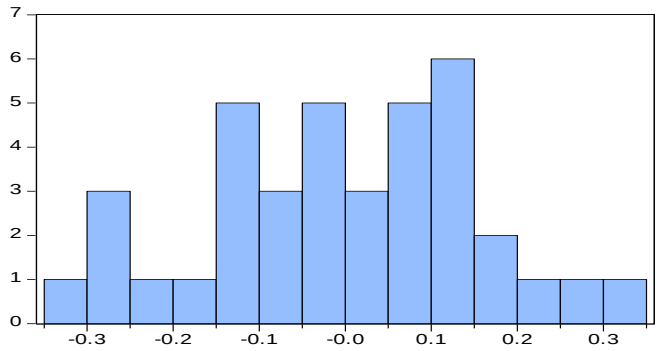
Ramsey RESET Test

Ramsey RESET Test:

F-statistic	0.000176	Prob. F(1,34)	0.9895
Log likelihood ratio	0.000202	Prob. Chi-Square(1)	0.9887

China

Normality – JB test



Series: Residuals
Sample 3 40
Observations 38

Mean	7.30e-18
Median	0.002183
Maximum	0.307463
Minimum	-0.321479
Std. Dev.	0.153434
Skewness	-0.174804
Kurtosis	2.572561
Jarque-Bera	0.482806
Probability	0.785525

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.907445	Prob. F(1,32)	0.1768
Obs*R-squared	2.137670	Prob. Chi-Square(1)	0.1437

Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	1.127493	Prob. F(1,35)	0.2956
Obs*R-squared	1.154722	Prob. Chi-Square(1)	0.2826

Ramsey RESET Test

Ramsey RESET Test:

F-statistic	0.193881	Prob. F(1,34)	0.6625
Log likelihood ratio	0.221761	Prob. Chi-Square(1)	0.6377

2.0 Unit Root Test

Augmented Dickey Fuller Test (ADF)

KLCIR (Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.721356	0.0005
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

KLCIR (Trend & Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.673416	0.0031
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

SSER (Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.536507	0.0009
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

SSER (Trend & Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.560114	0.0045
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

COR (Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.931816	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

COR (Trend & Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.942905	0.0001
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

GDR (Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.396522	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

GDR (Trend & Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.306765	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

CPR (Intercept)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.378781	0.0001
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

CPR (Trend & Intercept)

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.449633	0.0004
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

Phillips-Perron Test (PP)

KLCIR (Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.727440	0.0005
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

KLCIR (Intercept & Trend)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.680139	0.0030
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

SSER (Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.561691	0.0008
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

SSER (Trend & intercept)

Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.523311	0.0046
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

COR (Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.906832	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

COR (Trend & Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.934437	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

GDR (Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.652266	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

GDR (Trend &Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.538407	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

CPR (Intercept)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.395364	0.0001
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

CPR (Intercept & Trend)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.479853	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

3.0 Cointegration Test

Malaysia

KLCI and Gold

Trace test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.269924	11.66106	15.49471	0.1739
At most 1	0.000557	0.020608	3.841466	0.8858

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.269924	11.64045	14.26460	0.1249
At most 1	0.000557	0.020608	3.841466	0.8858

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

KLCI and Crude Oil

Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.160241	9.327796	15.49471	0.3359
At most 1	0.080997	3.040754	3.841466	0.0812

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.160241	6.287042	14.26460	0.5767
At most 1	0.080997	3.040754	3.841466	0.0812

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

KLCI and Copper

Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.182503	10.51409	15.49471	0.2432
At most 1	0.079333	3.058298	3.841466	0.0803

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.182503	7.455787	14.26460	0.4367
At most 1	0.079333	3.058298	3.841466	0.0803

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

China

SSE and Copper

Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.1 Critical Value	Prob.**
None *	0.190652	14.78697	13.42878	0.0637
At most 1 *	0.171486	6.960489	2.705545	0.0083

Trace test indicates 2 cointegrating eqn(s) at the 0.1 level
* denotes rejection of the hypothesis at the 0.1 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.1 Critical Value	Prob.**
None	0.190652	7.826484	12.29652	0.3966
At most 1 *	0.171486	6.960489	2.705545	0.0083

Max-eigenvalue test indicates no cointegration at the 0.1 level
* denotes rejection of the hypothesis at the 0.1 level
**MacKinnon-Haug-Michelis (1999) p-values

SSE and Crude Oil

Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.328371	20.61783	15.49471	0.0077
At most 1 *	0.160264	6.288051	3.841466	0.0122

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.328371	14.32978	14.26460	0.0488
At most 1 *	0.160264	6.288051	3.841466	0.0122

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

SSE and Gold

Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.115008	4.530941	15.49471	0.8564
At most 1	0.000281	0.010411	3.841466	0.9184

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.115008	4.520530	14.26460	0.8007
At most 1	0.000281	0.010411	3.841466	0.9184

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.0 Granger Causality Test

Malaysia

KLCI and Gold

Dependent variable: KLCIR
Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.021779	(1, 35)	0.8835
Chi-square	0.021779	1	0.8827

Dependent variable: GDR
Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.560892	(1, 35)	0.2198
Chi-square	1.560892	1	0.2115

KLCI and Crude Oil

Wald Test: dependent is klcir
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	9.075712	(1, 32)	0.0050
Chi-square	9.075712	1	0.0026

Wald Test: dependent is cor
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	5.286432	(2, 32)	0.0104
Chi-square	10.57286	2	0.0051

KLCI and Copper

Wald Test: Dependent variable is KLCIR
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.071873	(1, 35)	0.7902
Chi-square	0.071873	1	0.7886

Wald Test: dependent variable is CPR
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.773885	(1, 35)	0.1047
Chi-square	2.773885	1	0.0958

China

SSE and Copper

Wald Test: dependent variable is shr
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.243252	(1, 35)	0.6249
Chi-square	0.243252	1	0.6219

Wald Test: dependent variable cpr
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.020346	(1, 35)	0.8874
Chi-square	0.020346	1	0.8866

SSE and Crude Oil

Wald Test: dependent variable is shr
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	7.484217	(1, 32)	0.0101
Chi-square	7.484217	1	0.0062

Wald Test: dependent variable is cor
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.209787	(1, 32)	0.2796
Chi-square	1.209787	1	0.2714

SSE and Gold

Wald Test: dependent is shr
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.159956	(1, 35)	0.6916
Chi-square	0.159956	1	0.6892

Wald Test: dependent is gdr
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.000413	(1, 35)	0.9839
Chi-square	0.000413	1	0.9838