

THE IMPACT OF ECONOMIC POLICY
UNCERTAINTY AND OIL MARKET UNCERTAINTY
ON MALAYSIAN STOCK MARKET RETURNS: A
COMPARISON BETWEEN EPU IN THE UNITED
STATES 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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TABLE OF CONTENTS

	Page
Copyright Page	i
Declaration	ii
Acknowledgement	iii
Table of Contents	iv - vi
List of Tables	vii
List of Figures	vii
List of Abbreviations	viii
Abstract	ix
CHAPTER ONE: RESEARCH REVIEW	
1.0 Introduction	1
1.1 Research Background	1
1.1.1 Malaysian Stock Market	1 - 4
1.1.2 Economic Policy Uncertainty (EPU)	5 - 9
1.1.2.1 EPU in the United States	9 - 12
1.1.2.2 EPU in China	12 - 14
1.1.3 Global Oil Market	15 - 18
1.1.3.1 Oil Market Uncertainty	18
1.1.3.2 Oil Market and Stock Market Return	18 - 19
1.2 Problem Statement	19 - 22
1.3 Research Questions	23
1.4 Hypothesis Statement	23
1.5 Research Objectives	23
1.5.1 General Objective	23
1.5.2 Specific Objectives	24
1.6 Significance of Study	24 - 25
1.7 Chapter Layout	25 - 26
CHAPTER TWO: LITERATURE REVIEW	
2.0 Introduction	27
2.1 EPU and Stock Market Return	27 - 27
2.1.1 Evidence from Developed Countries	28 - 32
2.1.2 Evidence from Developing Countries	32 - 37
2.1.3 Evidence from Malaysia	37 - 39
2.2 Oil Market Uncertainty and Stock Market Return	39 - 40

CHAPTER FOUR: DATA ANALYSIS	
4.0 Introduction	81
4.1 Unit Root Test	81 - 83
4.2 ARDL Bounds Testing	83 - 84
4.3 ARDL Cointegration and Long Run Relationship	85 - 87
4.4 Diagnostic Checking	88 - 92
4.5 Chapter Summary	93
CHAPTER FIVE: DISCUSSION, CONCLUSION AND IMPLICATION	
5.0 Introduction	94
5.1 Discussion of Major Findings	94 - 96
5.2 Implications of Study	96 - 98
5.3 Limitations of Study	98 - 99
5.4 Recommendations for Future Research	99 - 100
REFERENCE	101 - 120

LIST OF TABLES

	Page
Table 1.1: World Crude Production for the period 1910-1970, in million barrels per day (mbd)	15
Table 3.1: Variables and Sources of Data	56
Table 4.1.1: Augmented Dickey-Fuller (ADF) Test Result	82
Table 4.1.2: Phillips-Perron (PP) Test Results	83
Table 4.2: ARDL Bound Test Results	84
Table 4.3: Long Run Coefficient of ARDL Approach Results	85
Table 4.4.1: Diagnostic Checking Results	88
Table 4.4.2: CUSUM and CUSUM of Squares Results	90 - 92

LIST OF FIGURES

	Page
Figure 1.1: FTSE Malaysia KLCI for the Period January 1977 to December 2018	2
Figure 1.2: Global Economic Policy Uncertainty for the Period 1997-2018	6
Figure 1.3: The Movement of KLCI Index and United States Economic Policy Uncertainty Index	10
Figure 1.4: The Movement of KLCI Index and China Economic Policy Uncertainty Index	13

LIST OF ABBREVIATIONS

EPU	Economic Policy Uncertainty
OVX	Oil Market Volatility
REER	Real Effective Exchange Rate
NEER	Nominal Effective Exchange Rate
OMR	Overnight Market Rate

ABSTRACT

This research project examines the relationship between Economic Policy Uncertainty (EPU), oil market uncertainty on Malaysian stock market return. Particularly, there is a comparison between the impact of EPU in the US and EPU in China on Malaysian stock market return. Time series data is applied on this research, which the data is collected on monthly basis, starting from May 2007 to December 2018. The research data has gone through various tests such as Augmented Dickey Fuller (ADF) test, Phillip Perron (PP) test, Bound test, Autoregressive Conditional Heteroskedasticity (ARCH) test, Breusch-Godfrey Serial Correlation LM test and Ramsey RESET test in order to determine the validity of the regression model. Hence, the regression model has proven to free from unit root, heteroscedasticity, autocorrelation and specification error problem. The employment of Autoregressive Distributive Lag (ARDL) in this study aims to examine the existence of a long run relationship between dependent and independent variables. The outcome shows that there is a long-run equilibrium relationship between EPU, oil market uncertainty and Malaysian stock market return. Moreover, the findings of this research indicate that all independent variables including EPU in the US, EPU in China and oil market uncertainty have negative impact on Malaysian stock market return. In brief, these results bring significant implication to investors, policymakers and future researchers.

CHAPTER ONE: RESEARCH OVERVIEW

1.0 Introduction

This chapter commences with an introduction on Malaysian stock market and its linkage with economic policy uncertainty (EPU) in the United States (US) and China as well as oil market uncertainty, followed by problem statements, research questions, hypothesis statement, research objectives and significance of study. The last part of this chapter outlines the layout of each chapter for this research.

1.1 Research Background

1.1.1 Malaysian Stock Market

Stock market return can be expressed as a return investor generates from the trading of securities listed on Bursa Malaysia. The Kuala Lumpur Composite Index, also known as KLCI comprises of the 30 largest companies listed on Bursa Malaysia with full market capitalization (FTSE Bursa Malaysia KLCI, 2019). KLCI normally being employed to indicate stock market performance in Malaysia which it is determined by the weighted market value of the 30 largest companies while the return is usually measured based on the variation of the index from time to time (FTSE Bursa Malaysia KLCI, 2011).

Figure 1.1 illustrates the price of KLCI from January 1977 to December 2018. Based on the data given, the lowest KLCI index was 89.54 points in April 1977, whereas its peak was at 1,882.71 point in June 2014. The average of the KLCI index during the period was 855.18 point. At the end of 2006, the KLCI index broke its first 1,000 point, with 1,080.66 point in November 2006 and reached 1,518.91 point at the end of 2010.

Figure 1.1: FTSE Malaysia KLCI from January 1977 to December 2018



Source: FTSE Malaysia KLCI Data

Malaysian stock market is interesting due to its unique features. Since the late 1980s, the stock market in Malaysia has gone through vigorous development and it has successfully become one of the developing markets that is undergoing the fastest growth in the region. The market capitalization per GDP of Bursa Malaysia (10.51%) is the highest among the developing markets such as Argentina (1.45%), Brazil (2.29%), Chile (2.59%), and Mexico (1.57%). At that time, Malaysia was eventually comparable to some developed countries due to the rapid stock market growth. According to Law and Ibrahim (2014), the database for Malaysia

is regarded comparably good for emerging country's standard and can be served as an ideal laboratory to examine the behaviour of sectoral return.

In July 1997, the Asian Financial Crisis that initiated in Thailand had made a tremendous outbreak to the Malaysian stock market. This is because according to Goh and Michael (2010), the Gross Domestic Product (GDP) growth in Malaysia started to contract when the Asian Financial Crisis struck on Malaysian stock market. Before the crisis happened, KLCI index was experiencing remarkable performance such that it reached more than 1200 points. As the crisis spread to Malaysia, KLCI index declined drastically by approximately 500 points (Asmy, Rohinila, Hassama, & Fouad, 2009). Besides, recapping one of the major global events in September 2008, the collapse of Lehman Brothers affected the global economy which Malaysia also not excluded for being affected by the worsening global financial condition. As a result, the KLCI index dropped by 558.93 point, which was around 40 percent in its value. However, the index had recovered and grown strongly to around 1,174 point from May to July 2009 (Angabini & Wasiuzzaman, 2011).

At the end of 2007, it can be observed that the Global Financial Crisis led to gradually decline in the KLCI index. The crisis brought an enormous impact on financial markets and institutions around the world. As a small open and export-dependent economy, Malaysia was also being influenced by this external shock (Goh & Michael, 2010). These negative shocks were reflected in Malaysian economy, with a significant drop in KLCI index from 1,018.68 point to 863.61 point in October 2008. At that moment, the exports and industrial outputs were threatened and investments were declining. Other than that, financial crisis had also adversely impacted the consumer sentiment. Simultaneous to the decline in KLCI index, the GDP growth of 0.1% was significantly lower as compared to the first nine-month average of 5.9% of the year (Goh &

Michael, 2010). The KLCI index managed to grow back to 1,044.11 point in May 2009.

In 2016, Malaysian stock market was anticipated to be bearish, resulting from the global economic slowdown, collapse of commodities prices, flatten earnings, and tighten monetary policy (Yoke, 2018). Recently, KLCI index reaches 1679.86 point at the end of November 2018.

Based on the empirical study by Chen (2012), stock return can be used to forecast the trading volume of both bear and bull markets. Kana (2018) stated that the increment of nearly 118% of KLCI index since the recovery of Bursa Malaysia after March 2009 had urged the benchmark FBM KLCI to be one of the best performing indices in the world. The index stood at 1,820 points with the expectation that the psychological level of 1,900 points to be breached by the end of 2018. This is due to the fact that the international investors are looking for substitute investment other than developed countries such as the US. At the same time, healthy macroeconomic fundamentals, continued development of corporate sector and inflow of foreign funds into Malaysian equities were well supporting Malaysian domestic market, which lead to a high expectation of KLCI index in the near future. However, on the last trading day of 2018, Bursa Malaysia's key index was nearly 10 points off the 1,700 points in early trade (Amir, 2019). FTSE Bursa Malaysia KLCI declined to 1,690.58 points from the close of 1,692.07 on Friday, which had contributed to a loss of around RM270 billion in value of Malaysia's broader stock market.

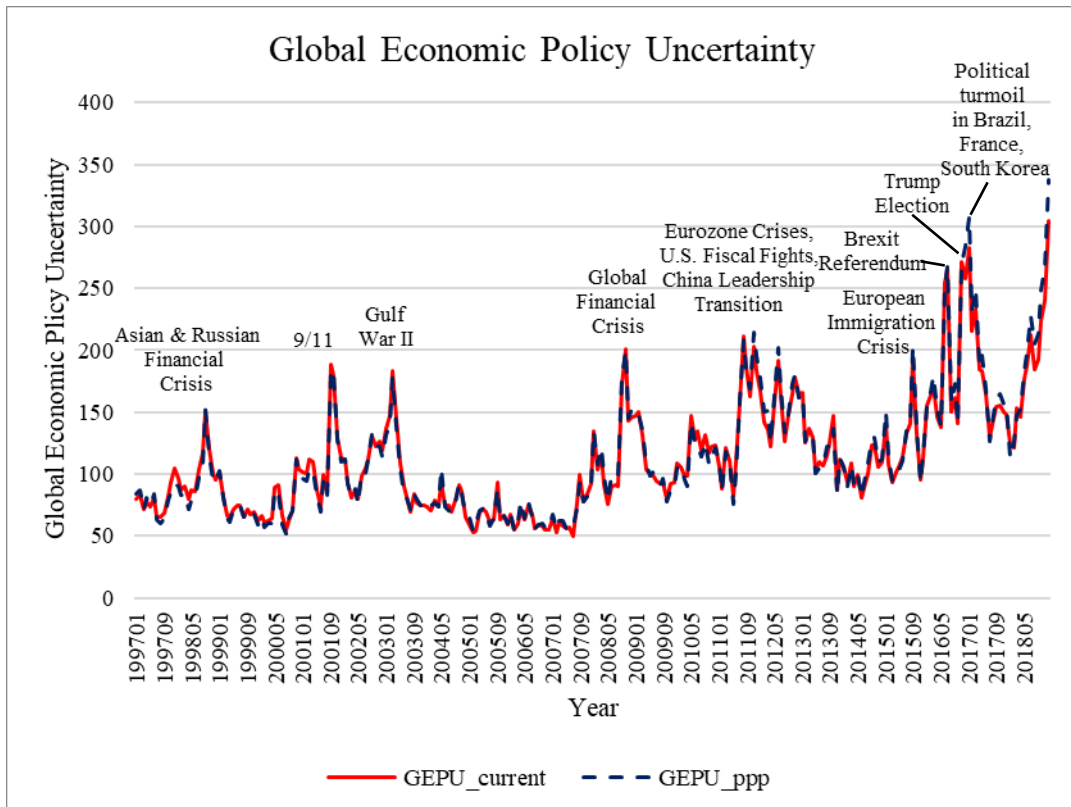
1.1.2 Economic Policy Uncertainty

EPU is referred to as the non-zero probability of adjustment of the prevailing economic policies determining the boundaries of decision-making process of various economic agents (Arouri, Estay, Rault, & Roubaud, 2016). According to Chen, Jiang, and Tong (2017), the tacking of policy risk by EPU index is real-time and continuous, at the same time providing advantages of being forward looking, model-free and comprehensively reflecting policy uncertainty related risk information of a country. According to Hasset and Sullivan (2016), tons of previous studies have established the key linkages between economic activity and the measures of policy uncertainty as well as the variables that affect policy uncertainty, such as elections and debt level. Notably, Lynch (2014) stated that economic recession, political uncertainty and military conduct will lead to a significant rise in EPU. This can be clearly observed from the Global EPU (GEPU) Index, a measure of worldwide policy uncertainty, discovered by Baker, Bloom and Davis (2013).

In late 1990s and 2000s, the GEPU had risen dramatically due to two major events of economic downturn, that is, the Asian and Russian Financial Crises and Global Financial Crisis. The Asian and Russian Financial Crises had caused significant depreciation of currency in Asian countries and serious debt issues respectively, while the Global Financial Crisis is said to be the worst financial crisis since the Great Depression in the 1930s (Thakor, 2015). Thus, financial policy reforms are essential to save the situation after financial crises (Hlaing & Kakinaka, 2018). Such reform usually involves both enhancement of prudential regulation and liberalization of financial system which aims to provide economy flexibility as well as to prevent crisis of similar causes to happen in the future. However, Funke, Schularick, and Trebesch (2016) stated that unprecedented policy reforms tend to originate great degree of uncertainty about the consequences of these policies. This is in accordance with the

findings of Baker et al. (2015), where a high level of the policy-related economic uncertainty in the US and many other countries were mainly contributed from tax, spending, and regulatory policies during the period of Global Financial Crisis in late 2008.

Figure 1.2: Global Economic Policy Uncertainty for the Period 1997-2018



Source: Baker, Bloom, and Davis (2019)

Since the beginning of 2015, European Union (EU) started to experience vast influx of migrants and refugees, who are the asylum seekers from the Middle East, North Africa and Southwest Asian (Poddar, 2016). This situation is referred to as the European Migrant Crisis or European Refugee Crisis. Thereupon, Europe is concerned about the weakening of economies ranging from increased unemployment, overloaded public budget to strained infrastructural capacity as a result of the crisis (Poddar, 2016). In consequence, policymakers play a crucial role in controlling the

overwhelming situation. In this context, Baker et al. (2015) pointed out that the response of policymakers towards the situation and the consequences of the respond are the key sources of economic uncertainty.

On top of that, based on the study by Poddar (2016), the European Migrant Crisis was one of the main reasons that urge the withdrawal of the United Kingdom (UK) from the EU. This is because United Kingdom worried that the uncontrolled immigration policy with EU nations will result in the migration of asylum seekers to Britain one day. Noted by Pástor and Veronesi (2012), political uncertainty is identified as not knowing how the existing government policy will change (Hill, Korczak, & Korczak, 2019). Correspondingly, Pástor and Veronesi (2013) defined political uncertainty as the unpredictability about future actions of the government. Convincingly, the event of Brexit could explain the spike of GEPU as it fits the notion of Pástor and Veronesi (2012; 2013) very well.

Noted by Bouiuyour and Selmi (2017), elections, wars and governmental processes and threats are all viewed as uncertain political phenomena. Other than Brexit, the Eurozone Crisis in late 2009, the China leadership transition in late 2012 and the US Fiscal Fights in early 2013, Trump's election in late 2016 had also contributed to the fluctuation of political uncertainty. By observing the annotated global economic uncertainty, among all the major global events, the announcement of Donald Trump as the next president of the US has resulted in the most significant spike in the GEPU. This was justified by Baker et al. (2013) in their studies that national elections usually will produce extreme rise in policy uncertainty, particularly around presidential congress as the partisan control of Congress in the US has changed recurrently, causing the presidential elections to be competitive.

On September 11, 2001 (referred as 9/11 by American), the US was being attacked by Islamic terrorists. Four hijacked commercial airplanes were crash at different spots of the US, causing approximately 3,000 people to be killed (United States Department of State, 2002). It was then being recognized as one of the biggest incidents in the 21st century. As the US held a large segment in the world economy, the world's market was affected even though the attack happened solely in the US. Unsurprisingly, the impact of 9/11 attack was more significant than other incidents being investigated in previous researches (Chau, Deesomsak, & Wang, 2014). This was justified by Dakhlaoui and Aloui (2016) that a transmission of economic and financial system shocks could happen significantly from one market to another in the world in a direct or indirect way. Sum (2012) added that the extent of the effect became symbolic when it is initiated from one of the dominating economies in the world, the US in this case.

EPU has been a major core of the macroeconomic, public finance and environmental economics literatures. Recently, there is growing interest in discovering the role played by EPU in driving macroeconomic fluctuations, for instance, economic rise, financial growth, foreign direct investment (FDI), employment and etcetera (Kido, 2018). Similarly, Das, Kannadhasan, and Bhattacharyya (2019) pointed out that EPU has been an important key driver of economic cycle, investment decision and policy making.

Throughout the event of financial crises, that is, Asian Financial Crisis 1997/98, Russian Financial Crisis 1998, Global Financial Crisis 2007 and etc, EPU has raised a lot of interest among the researchers. According to Christou, Cunado, Gupta, and Hassapis (2017), the rising interest was a result of the potential adverse effects of EPU on economic activities. It was supported by Kido (2018) where in principal, EPU which encounters the uncertainty related to policies or regulations can negatively affect economic activities. For instance, as the US news-based EPU increases,

the production, employment and investment in the US will drop (Baker, Bloom, & Davis, 2015). Correspondingly, noted by Abdiweli (2001), who studied the volatility of economic policy revealed that almost all the correlation between policy uncertainty and economic growth are significant and negative (Dima, Dinca, Dima & Dinca, 2017).

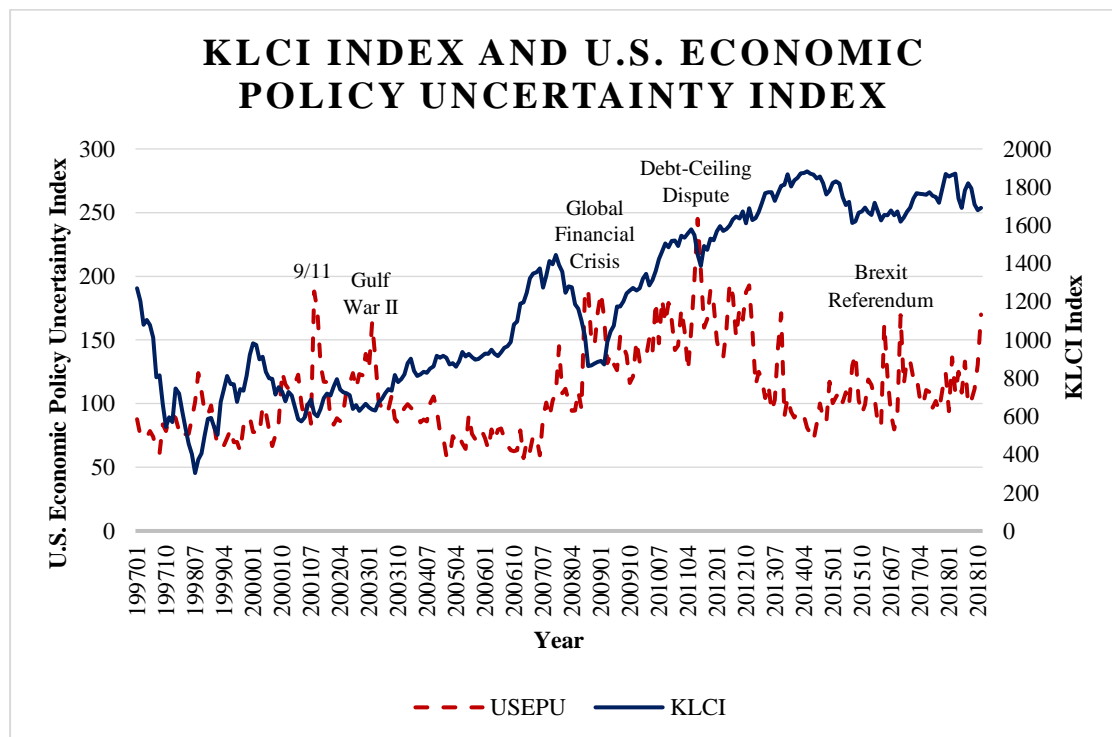
According to Deutsche Bank Research (2018), these uncertainties are being monitored closely by financial sectors, businesses and even by households, taking into consideration the potential negative spillovers from policy uncertainty to economies in other parts of the world. In the context of financial market, Xiong, Bian, and Shen (2018) stated that stock market plays vital roles in financial markets, which is similar to the findings of Dakhlaoui and Aloui (2016), where EPU is widely recognized in demonstrating significant impact on stock market returns. Henceforth, Zhang, Lei, Ji, and Kutan (2019) advised policymakers to keep an eye on the stock markets dynamics and thus establish appropriate policies to hold back the negative consequences of systematic risks and potential spreading effects.

1.1.2.1 Economic Policy Uncertainty in the United States

The US has been leading the world economic development since the post-World War II period (Zhang et al., 2019). In particular, the findings of Kido (2018) showed that EPU in the US is a major driver of global financial markets as well as a significant source of fluctuation in financial markets. Other than that, in the context of Asian countries, Kido (2018) found that Asian currencies would depreciate as EPU in the US rises. Obviously, it is undeniable that the US economy is influential internationally (Christou et al., 2017).

Figure 1.3 demonstrates the historical evolution of the EPU in the US from January 1997 to December 2018. The index had dramatically elevated after several major events like 9/11 attack, Gulf War II, where the highest level of policy uncertainty in the US was correspond to the debt-ceiling dispute in 2011 (Christou et al., 2017). It can also be seen that at most of the time, as the EPU in the US were of high levels, the KLCI index were at low points, vice versa. There are however some periods where when the EPU is increasing, the KLCI index is also rising. Hence, it triggered further investigation on how and to what extent the US EPU could affect Malaysian stock market.

Figure 1.3 The Movement of KLCI Index and United States Economic Policy Uncertainty Index



Source: Bloomberg (2018); Baker, Bloom, and Davis (2019)

Based on figure 1.3, over the 21 years, EPU in the US reached its peak in 2011 as a result of debt-ceiling dispute, which result in a contentious debate regarding the maximum amount of borrowings that the US government should be allowed to undertake (Kenton, 2018). The debate created tensions, leading to high-stakes

bargaining situation in which political incentives from brinkmanship will generate a great level of uncertainty (Baker, Bloom, Canes-Wrone, Davis, & Rodden, 2015). Besides, the public became flustered as the rise in debt ceiling could simply mean that the government might default on interest payments to creditors. Consequently, interest rates were driven up, causing the costs of government borrowing to increase. Eventually, the credit-rating agency, Standard and Poor's, reviewed and downgraded US sovereign credit rating for the first time in the history of the US, citing "greater policymaker uncertainty", which drove the US into unfavourable economic condition (Kimball, 2011).

Concerning the consequences of Brexit Referendum, it does not only affect the GEPU mentioned earlier, but also affected the EPU in the US. Evidence shows that the day after the Brexit vote, Dow Jones fell by 610.32 points (Gold & Bird, 2016). According to Amadeo (2019), the currency markets were in turmoil as well, where the value of the US dollar had increased, causing the American shares to be more expensive for foreign investors, which is not a good strength for US stock markets. Murad (2017) added that weaker pound will make US products more expensive and thus potentially less appealing while according to Amadeo (2019), UK is US's fourth-largest export market.

It is important for Malaysian markets to be always alert on the movement of American markets as studies and statistics have proven that Malaysia is having strong trade relationship with the US. According to the U.S. Department of State (2018), since 1957, the US has established diplomatic relations with Malaysia. Thereafter, Malaysia is having close engagement on trade and investment issues with the US, including under the US Trade and Investment Framework Agreement in 2004 and Comprehensive Partnership in April 2014 (Office of the United States Trade Representative, 2019; U.S. Department of State, 2018). Throughout this over 60-year trade relationship, Malaysia has now become 17th largest overall trading partner of the US in 2017 (United States Census Bureau, 2019). Meanwhile, the US is consistently being ranked at top three export destinations and import origins of Malaysia, after China and Singapore (Office of the United States

Trade Representative, 2019). In terms of investment, the US was the 5th countries with highest cumulative Foreign Direct Investment (FDI) in Malaysia in 2017 (The Star Online, 2018). Provided that Malaysia and the US are having such strong relationship in terms of trading and investment, Malaysia should always pay attention to the incidents happens in the US, particularly in policy-related uncertainty for this study, and therefore, figure out the potential impacts of the events and provide appropriate resolutions in response.

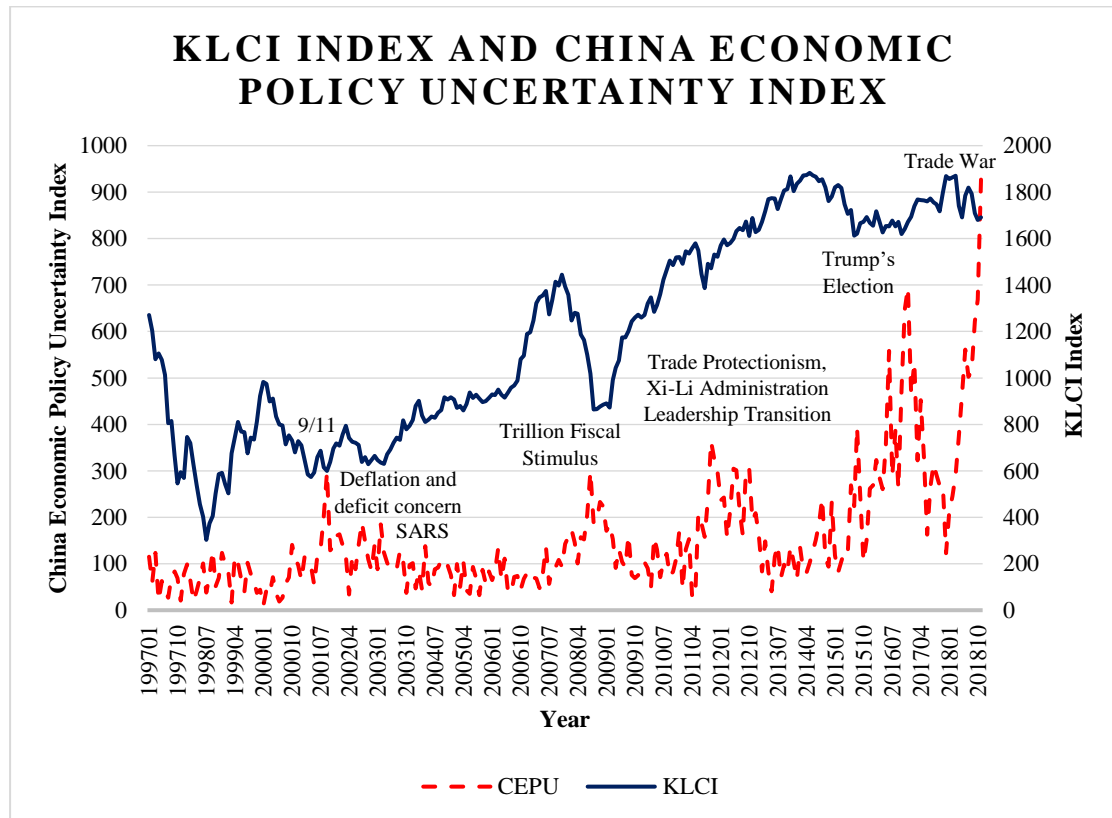
1.1.2.2 Economic Policy Uncertainty in China

China, with the greatest population over the world, is dominating the second-largest economy, after the US, while holding a critical economic superpower. In October 2018, the report from 19th National Congress of Chinese Communist Party (CCP) revealed that Chinese economy is having significant contribution to the growth of global economic (Zhang et al., 2019). As China became more developed, researchers started to extensively discuss about its role in the international economic system (Zhang et al., 2019). Since China and Malaysia are actively trading among each other, it triggers our curiosity on how policy uncertainty in China would influence Malaysian stock market.

Figure 1.4 displays the movement of KLCI index and EPU in China from January 1997 to December 2018. Bloom (2013) stated that the movement of Chinese EPU shows some similarity to the US with recently very high level, the Chinese EPU however dances to its own tune as well. From January 1997 to April 2014, there is no clear movement of trend over time, but it can be seen that the index had sharply increased around 2001, 2002, 2003, 2008, 2011 and 2012 due to a few major global incidents, that are, 9/11 attack ,deflation and deficit concerns, the public health concern of SARS, the four Trillion fiscal stimulus which subsequently resulted in extensive inflationary pressure, the trade protectionism fear and the political transition into a new national congress respectively (Chen et

al., 2017). Since then, the index started to fluctuate more and keep creating various new highs, where trade war between the US and China boosted the EPU in China to the highest point, followed by Trump’s election.

Figure 1.4 The Movement of KLCI Index and China Economic Policy Uncertainty Index



Source: Bloomberg (2018), Baker, Bloom, and Davis (2019)

In late 2012, China experienced leadership transition which appeared to be about as important as the global economic slowdown for policy uncertainty (Bloom, 2013). Since the transition took place, numerous analysts have examined the interests and perceptions of President Xi and other top leaders in China. Nevertheless, Blanchard (2015), through his study, remained unsure about the extent to which the intervention of China leaders in government policies would affect the country’s economy. Consequently, great uncertainty was created and thus causing relatively high EPU in 2012 as observed in figure 1.4. Bloom (2013)

added that prior to the leadership transition, EPU in China has also spiked greatly after events like the handover of Hong Kong in October 2001 and the inflationary pressure in late 2008.

In late 2016, Trump's Election had imposed great impact on China, which spikes China's EPU to its peak since 1997. Before Trump was elected as the president of the US, he was a successful businessman who has long incriminated China for manipulating its currency to improve its exports' global competitiveness. On top of that, in his campaign manifesto, he pledged to immediately declare China as a currency manipulator and force stop every illegal export subsidies and lax labour, and environmental standards in China if he wins the election. Hence, as Trump won the election, China immediately felt the pressure and was uncertain about Trump's intervention on policies related to their country, causing EPU in China to surge significantly.

Malaysia should concern about the consequences of the events in China, as according to the report from China Daily (2016), China has also been Malaysia's major trading partner starting from 2009. Evidence by the Observatory of Economic Complexity (2019) had proven that China is on the top three export destinations and import origins of Malaysia. Also, based on the data obtained from Bank Negara Malaysia (2018), the FDI flow from China to Malaysia has risen drastically since 2012, from RM9,620,000 in 2011 to RM23,540,000 in 2012, and reached its new high at RM98,770,000 in 2017. Meanwhile, the FDI flow from Malaysia to China has also risen significantly since 2011, from RM9,370,000 in 2011 to RM22,580,000 in 2012 and reached its peak at RM29,390,000 in 2017. Hence, any changes associated in China might have great and direct impact on Malaysian welfare. Consequently, it drives us to further examine, precisely, the effect of China policy uncertainty on Malaysian stock market return.

1.1.3 Global Oil Market

Previously, the US was the leader of world oil producer and net exporter. Prior to 1973, the government agencies had regulated the US oil prices which then resulted in the lengthened periods of oil prices remain unchanged.

However, in the early 1970s, the failure of the US to cope with the growing demand of oil winded up its oil price regulation system and the US started to rely on oil imports from the Middle East, as shown in table 1.1, where the oil price could no longer be administered domestically (Yergin, 1992).

Table 1.1: World Crude Production for the period 1910-1970, in million barrels per day (mbd)

Year	U.S.	Mexico	Venezuela	Russia	Indonesia	Middle East
1910	575	10	0	170	30	0
1920	1,214	430	1	70	48	31
1930	2,460	408	374	344	114	126
1940	3,707	12	508	599	170	280
1950	5,407	198	1,498	729	133	1,755
1960	7,055	271	2,854	2,957	419	5,255
1970	9,637	487	3,708	6,985	854	13,957

Source: Department of Energy and Mineral Engineering, College of Earth and Mineral Sciences (2018)

The 1973/74 oil crisis showed the existence of negative disturbance to the supply of crude oil to the extent where in the last quarter of 1973, a fall in the quantity of oil produced was accompanied by a rise in oil price. According to Jazeera (2018), the war between Israel and an affiliation of

Arab countries in 1973 gave an opportunity for Arab OPEC countries to consciously reduce their oil production and raise the oil prices. However, this is not the major cause of the oil crisis. Instead, it was the 1971 Tehran/Tripoli agreements between oil companies and governments of oil producing countries in the Middle East to fix crude oil price that caused the crisis. As a result, the oil demand in global increased significantly in 1972 and 1973. Many Middle Eastern countries were not able to raise the oil production whereas the others, notably Kuwait and Saudi Arabia were forced to increase their oil production as they were capable to do so. As a result, this urged increased Arab opposition to the agreements and finally terminated the agreement with oil producers that were in the view to increase oil price by reducing their production (United States Department of State, 2019).

The next major oil crisis in 1979/80 was happened after 1973/74 oil crisis, in which the West Texas Intermediate crude oil price increased by more than \$25 per barrel to almost \$40 per barrel. According to Hamilton (2003), the oil crisis was resulting from the cutback in Iranian oil production which was being known as the Iranian Revolution. However, Barsky and Kilian (2002) stated that this event is not a reasonable explanation for the oil crisis as the surge of oil prices took about one year to reach its peak level of \$40 per barrel after the Iranian Revolution. The oil expectation is believed to be influenced by Iranian Revolution in place of the flow of oil output although no fair explanation is provided on the delayed effect of an oil price shock (Kilian & Murphy, 2014). The empirical oil market models showed that higher inventory demand as a result of prediction on oil shortages in future and the demand disturbances triggered by a sudden strong global economy will lead to the rising of oil price, which is consistent with what Kilian (2009) stated previously.

According to Hamilton (2003), the outbreak of Iran-Iraq war from 1980 to 1988 had caused oil supply shock. The WTI oil price increased from \$36

per barrel to \$38 per barrel. However, this shock has not much influence on the oil price fluctuation. In the early 1980s, the contraction of global monetary policy administration which was led by the raise of interest rates in the US had decreased the oil prices. This global recession reduced the oil demand and thus declining the oil prices. Besides that, global recession made the stocks of oil less attractive and hence the investors were unwilling to hold them and sell them off. In the 1990s, the oil price diminished further, where it reached \$11 per barrel because of the Asian Financial Crisis 1997/98, subsequently followed by economic downturn in Argentina, Brazil, Russia and etc. In 1999, the oil price started to recover, yet, the subsequent oil supply disruptions hit hard the oil market in late 2002 and early 2003. This was mainly due to the civil unrest in Venezuela and Iraq war. This oil supply disturbance is important as the oil price proved resilience to geopolitical events (Lynch, 2017).

From 2003 to 2008, the oil price showed a dramatic increase from \$28 to \$134 per barrel, caused by the unawares global economy expansion and strong oil demand in Asian countries (Smith, 2009). However, some observers stated that this surge of oil price could merely be explained by the actions of speculative financial trades in the oil futures market. Fattouh, Killian, and Mahadeva (2013) had reviewed this literature in depth and discovered that this great surge of oil prices was followed by financial crisis in 2008, which caused a dramatic decline in the demand for oil and therefore a significant drop of oil price from \$134 per barrel to \$39 per barrel. This showed a great effect in the global real GDP.

Since 2011, an additional development had widened the spread between two main benchmarks for oil prices, which are West Texas Intermediate (WTI) and Brent prices. According to Kilian (2014), WTI oil is traded at a discount due to the higher oil supply than demand in the central US, which led by the increase in the US shale oil production. Therefore, Brent crude

oil price had replaced WTI price of crude oil as a benchmark for global oil prices in recent years.

1.1.3.1 Oil Market Uncertainty

Oil is a global commodity that is shipped all over the world. It is not only important for consumption but also important for economic growth. Therefore, the oil price, which is contingent upon the global supply and demand for oil, is essential for the oil market. Yet, the global supply and demand for oil is also the main factor that triggers uncertainty in oil price. Volatility measures oil price uncertainty, where price volatility refers to the pace of price movements and how widely they swing (Amadeo, 2019). The researchers, Elder and Serletis (2010) used volatility to capture oil price uncertainty and found that high oil price uncertainty could reduce economic growth.

1.1.3.2 Oil Market Uncertainty and Stock Market Return

Malaysia as one of the largest net oil exporting and oil producing countries was ranked 24th among the crude oil exporting countries with a value of \$6.9 billion in 2017 (Workman, 2019). The oil sector plays a vital role in Malaysian economy. According to Prime Minister's Department (2016), oil revenue of Malaysia in 2014 contributed about 20% of Malaysian national income. Therefore, Malaysian economy is said to be sensitive to the fluctuation in world oil prices.

According to Sadorsky (1999), Papapetrou (2001), Killian and Park (2009), Malik and Ewing (2009), Lee and Chiou (2011), Arouri, Jouini, and Nguyen (2011), Arouri, Jouini, and Nguyen (2012), Bouri (2015a) and Bouri (2015b), oil market

and stock market are correlated with each other, while oil market uncertainty has different impacts on stock returns across countries. According to Caporale, Ali, and Spagnolo (2015), oil price volatility has positive impact on stock returns in China in which they are characterized by demand-shock sides. However, Park and Ratti (2008) revealed that the oil price volatility is negatively affects real stock returns in many European countries. Furthermore, Dutta (2017) revealed a mixed result in which the OVX shocks are positively or negatively related to the clean energy stock market returns. Yet, Alsalman (2016) discovered that the volatility of oil price has insignificant impact on the US stock returns.

Nevertheless, there is limited study on the interactions between oil market uncertainty and Malaysian stock market returns. Among the limited evidences, Surya and Wibowo (2018) pointed out that KLCI index return has a negative dynamic correlation with RV and OVX index between 2007 and 2017. Therefore, we are interested to gain more understanding on the relationship between oil market uncertainty and Malaysian stock market returns.

1.2 Problem Statement

Stock return is vital to economic activity as it forecasts investment and Gross National Products (GNP) (Cochrane, 1991). It is found to be positively affecting consumer confidence and maintaining a high level of investors' confidence, encouraging them to trade more when they experienced the same return (Kale & Akkaya, 2016; Hoffmann & Post, 2016). According to the background stated previously, EPU¹ can act as an important proxy to study the impacts of policy uncertainty on Malaysian stock market returns (Economic Policy Uncertainty Index, 2019).

¹ EPU is measured based on newspaper coverage of policy-related economic uncertainty, the number of federal tax code provisions set to expire in future years and disagreement among economic forecasters.

Based on New Straits Times (2018), Malaysia as an open economy is susceptible to global trends. Given that Malaysia is having strong linkage with the US and China in terms of trade and investment, the newly erupted US-China trade war could affect Malaysian economy, including stock market performance (The Star Online, 2018). According to Mohamad, Muhamad, Afiah, Ooi, and Lim (2018), the proposed trade actions by the US and China would have impact on Malaysia's growth prospects due to Malaysia's trade and financial openness. The firms' profitability and households' income would be affected due to lower trade activity while the sentiments could also be dampened because of greater financial market volatility. Besides, economists pointed out that Malaysia could be hit significantly if US-China trade war escalates into a global scenario as the US and China are two of the largest trading partners for Malaysia. (Sheikh, 2018).

According to Torry (2018), forecasters regard political uncertainty and the potential of new punitive tariff barriers brought up by US-China trade war as a risk greater than those associated with macroeconomic or financial disruptions. Malaysia's international trade and industry minister, Darell Leiking said the uncertainty created by the US-China trade conflict had caused a shift in the region's supply chain that would have a global impact for five to ten years to come (Wong, 2019). However, based on the research by Tham, Kam and Tee (2019), the tariffs imposed on China due to US-China trade war is found to raise the possibility of trade and investment diversion to Malaysia, which the trade war is a benefit for Malaysia. Since US-China trade war is affecting Malaysia with a contradiction from different perspectives, thus, under one of the components in EPU Index, disagreement among forecasters, EPU in the US and China were chosen as the independent variables in our study to investigate and compare their effects on Malaysian stock market returns.

Previous studies had examined the impact of EPU on stock market returns. For developed countries, high uncertainty in US and the UK economic policies can result in a decline in stock prices (Chang, Chen, Gupta, & Nguyen, 2015; Bijsterbosh & Guérin, 2013). Besides, there are empirical researches showing a

significant negative impact of EPU on the returns of stock market (Kang & Ratti, 2013; Sum, 2012; Sum, 2013; Christou et al., 2017; Rehman, 2017; Antonakakis, Chatziantoniou, & Filis, 2013; Arouri et al., 2016; Ahmad & Sharma, 2018). However, Guo, Zhu, and You (2018) found that France and UK stock market are not influenced by EPU although the EPU creates negative impact during bearish market in G7 countries. In addition, EPU in the US is found to be positively affecting the stock markets returns in Australia (Christou et al., 2017).

For developing countries, large fluctuations of policy uncertainty reduce the Chinese stock market return (Xiong et al., 2018). Plenty of researchers found that EPU and stock market returns are negatively related (Christou et al., 2017; You, Guo, Zhu, & Tang, 2017; Chen et al., 2017; Kang & Ratti, 2014; Hu, Kutan, & Sun, 2017; Yang & Jiang, 2016; Li, Balcilar, Gupta, & Chang, 2015; Tiryaki & Tiryaki, 2019; Sum, 2012; Ahmad & Sharma, 2018; Dakhlaoui & Aloui, 2016; Guo et al., 2018; Arouri, Rault, & Teulon, 2014; Sum, 2013). Yet, Yu, Fang, and Sun (2018) revealed a positive influence of EPU on stock market returns. Furthermore, BRICS stock market returns is not influenced by EPU (Mensi, Hammoudeh, Reboredo, & Nguyen, 2014; Mensi, Hammoudeh, Yoon, & Nguyen, 2016).

Other than the influences from policy uncertainty, Malaysia relies heavily on oil commodity as the oil price hiked approximately at 41% in June 2008 had adversely affected the Malaysian economy (Shaari, Pei, & Rahim, 2013). Based on Du, He, and Wei (2010), rising oil price caused inflation and led to low market liquidity, which subsequently imposed a downward pressure on the share price. Stock cash flow pricing model indicated that an increase in oil prices will burden production costs, which resulted in lower profitability level and lesser future expected cash flow for a company or corporation and subsequently devaluing the stock price (Apergis & Miller, 2009; Arouri & Nguyen, 2010). However, energy index on Bursa Malaysia had fallen by 11.52 points to 900.86 points since crude oil prices slipped (Murugiah, 2018). According to Hun (2018), Malaysian stock market might be affected by American stock market that suffered losses in equity

as investors always keep an eye on the movement of crude oil prices after OPEC came out with its plan to raise oil output. Since there is an argument occurred that lead to different results, therefore oil market uncertainty is chosen as one of the variables that is worth to be investigated.

Extensive studies examined the effect of oil price uncertainty on stock market returns. Few studies pointed out oil price volatility is negatively affecting stock markets (Sadorsky, 1999; Park & Ratti, 2008; Dutta, Nikkinen, & Rothovius, 2017(a); Dutta, Noor, & Dutta, 2017(b); Luo & Qin, 2017; Xiao, Zhou, Wen, & Wen, 2018; Surya & Wibowo, 2018). Xiao et al. (2018) pointed out an increase in oil price volatility significantly depresses Chinese stock returns. Yet, Caporale, et al. (2015) proved that stock return is positively affect oil price volatility for the shocks from demand aspect for most sectors in China. There are also few researches that found insignificant linkage between oil price volatility and stock market returns (Cong, Wei, Jiao, & Fan, 2008; Liu, Ji, & Fan, 2013; Alsalman, 2016).

In conclusion, based on the empirical studies, contradictions have arisen, where negative, positive and no relationship can be found between EPU and stock market returns and also between oil market uncertainty and stock market returns. From this, it can be speculated that the rising of the American and China EPU and oil market uncertainty may negatively impact stock market returns in Malaysia according to the results derived from the majority of past studies, yet, the impact may not be necessarily negative since there were contradictions between the results revealed by different researchers. Therefore, the relationship between EPU and oil market uncertainty will be examined in this study. Besides, the lack of empirical studies about the interaction of EPU and oil market uncertainty on stock returns especially obvious in Malaysia. Hence, this topic will be valuable to several parties especially policymakers and investors.

1.3 Research Questions

The following research questions were developed from the problem statement of this research:

1. Do EPU and oil market uncertainty affect Malaysian stock market returns in the long run?
2. Do EPU in the US and China have the same impact on Malaysian stock market returns?

1.4 Hypothesis Statements

Hypothesis statements are formed based on the research questions proposed above:

H_1 : There is significant relationship between EPU and oil market uncertainty, and Malaysian stock market return in the long run.

H_2 : EPU in the US and China have the same impact on Malaysian stock market returns.

1.5 Research Objectives

1.5.1 General Objective

The general objective of this study is to examine the relationship between EPU and oil market uncertainty, and Malaysian stock market returns.

1.5.2 Specific Objectives

The specific objectives derived from the general objective are:

- (1) To examine the existence of long-run relationship between EPU, oil market uncertainty and Malaysian stock market returns.
- (2) To compare the impact of EPU in the US and China on Malaysian stock market returns.

1.6 Significance of Study

Through observations over the period from May 2007 to December 2018, this research emphasizes on the outcomes of EPU in the US and China, oil market uncertainty, exchange rate and interest rate as the determinants of Malaysian stock returns. Another major contribution of this research is the comparison between the extent of impact of US and China EPU on Malaysian stock market return, as well as to figure out the influence of oil market uncertainty on stock return, which makes this paper an important tool for plenty of users such as policymakers, investors, and researchers for better decision making.

Firstly, for investors, the impact on stock market returns brought by EPU and oil market uncertainty can be detected. Generally, the market offers various asset categories, either in short-term or long-term, where investors can allocate their assets with diversification for wealth creation (Nathan, 2019). The fluctuations in asset prices become a matter of concern for investors as they desire to maximize profits earned from their stock investment. Hence, investors tend to make risk reduction through their market observation by seeking improvements in asset returns. Through our study, investors are exposed to clearer and deeper view on the effect of EPU and oil market uncertainty on Malaysian stock market returns

and thus enabling the investors to make better investment decisions with greater possibility in getting higher Malaysian stock market returns.

Secondly, this research could contribute towards future studies. It generates an idea about the impact of EPU and oil market uncertainty on Malaysian stock returns for researchers to conduct future research. Since only limited studies have been proposed, in which partially related to current topic, this research hence can be viewed as a pioneer work for those researchers who wish to carry out further investigation on the linkage between EPU in the US and China, oil market uncertainty and Malaysian stock returns.

Besides, Malaysian stock market is commented to be easily affected by external factors (The Star Online, 2018). According to Ho and Iyke (2017), stock market development will react positively towards good corporate governance, financial liberalization, high trade openness and legal protection of investors. Since EPU and oil market uncertainty is the main concern to determine their effects on stock market returns in Malaysia in this research, thus it could act as a reference for policymakers. In turn, policymakers could have deeper understanding about Malaysian stock market performance in regards to EPU in the US and China, as well as oil market uncertainty on stock market returns in Malaysia, thereby being able to propose better policies in future. As a result, higher market efficiency can be achieved with guided trading and timely disclosure of information by considering EPU and oil market uncertainty.

1.7 Chapter Layout

This research consists of a total of 5 chapters. Chapter 1 is the introductory chapter, with an overview of the topic. Chapter 2 reveals literature review with definitions of EPU and oil market uncertainty, as well as viewpoints of

researchers in their previous studies in relation to this research in general. Chapter 3 investigates the methodology of conducting this research, explaining the research process and research design, and data collection method. Next, Chapter 4 includes the discussions and analyses on the reliability of the empirical results using E-views. Finally, a summary will be made in Chapter 5 based on the major findings of this paper, along with the implications and limitations of this study, and lastly followed by the recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter reviews the relationship between EPU, oil market uncertainty and stock market return on previous studies. The following section first analyses the effect of EPU and stock market return in developed countries, in developing countries and in Malaysia. Followed by the effect of oil market uncertainty on stock market return in developed countries, in developing countries and in Malaysia. Finally, theoretical framework and gap of study will be discussed at the end of this chapter.

2.1 Economic Policy Uncertainty and Stock Market Return

There is a strong effect across the globe instantly when a disruptive shockwave is transmitted from one of the dominating economies in the world as the world economy is globally connected (Sum, 2012). The US and China were predicted to be the two largest economy in the world for 2019 and 2020 by measuring its gross domestic product (GDP) growth (FocusEconomics, 2019). Based on Free Malaysia Today (2019), Finance Minister of Malaysia, Lim Guan Eng, said that Malaysian economy will encounter big challenges in year 2019 due to US-China trade war, global monetary contracting, geopolitical concerns in Middle East and swings in oil prices. Therefore, Malaysian stock market is easily affected by external factors that take place beyond own country. Yet, if there is a trade war resolution being proposed in solving such critical issue, the stock market is most likely to rise very soon afterwards. The purpose of this study is to find out the impact of US and China EPU on Malaysian stock market return.

2.1.1 Evidence from Developed Countries

According to Sum (2012), empirical study investigated the impact of US EPU on Canadian stock market returns through time varying OLS regression. EPU in the US exhibits a significant and negative effect on stock market performance in Canada, however the alteration in US trade balance with Canada shows no significant impact on Canadian stock market performance. The finding also pointed out stock market return in Canada is highly connected with economic policy conditions. In addition, the empirical result is also well contributed to equity investment and risk management on Canadian stock market. Further study by Sum (2013a), using time series OLS regression as well, pointed out stock market performance in Australia as well as New Zealand is significantly associated with the US EPU. This is in line with the findings of Forbes and Chinn (2004) which discovered that significant spillover effect in a certain region is normally originated from a country with the largest economy in that particular region, the US in this case. Moreover, Sum (2013a) also concluded that the association in both case of Australia and New Zealand is negatively linked.

Focusing on the very high fluctuation periods in the US with the employment of Markov-switching model, Bijsterbosch and Guérin (2013) discovered that high uncertainty periods are associated with weakening growth performance, constant and significant sharp decline in stock prices in the US. This can be explained by the weakening macroeconomic and financial conditions whenever the economy is in a very high uncertainty episode. By adopting the same methodology, Arouri et al. (2016) further looked into the impact of EPU on stock market in the US. The finding demonstrated that stock market returns will drop significantly in case of a rise in policy uncertainty. Nevertheless, EPU exerts different degree of influence on stock market returns according to the market states. The relationship was investigated to be non-linear, whereby the EPU is

strongly and persistently influencing the US stock market returns during extreme volatile periods. Other than US EPU, Arouri et al. (2016) included a vector of control variables in their model as well. This is because EPU may simply represent a proxy of other economic variables that influence stock market returns. When EPU covered other important macroeconomic variables that were being omitted, it would result into specification bias problem in the regression model. Hence, control variables are needed while examining the effect of EPU on stock market return.

By employing Structured VAR model, the findings of Kang and Ratti (2013) pointed out that an unanticipated rise in policy uncertainty can negatively and significantly affect the real stock returns. Similar results discovered by Ahmad and Sharma (2018) in G7 countries by resorting VAR model showed that US EPU influences the stock market returns adversely. The real stock returns particularly in Canada and Europe, the Canadian and European EPU which presented through forecast error variance decomposition, have allocated for a statistically significant 13.5% and 24.5% of the volatility in domestic real stock returns respectively, both in the long run. From findings above, it illustrated that European EPU has highly affected its country's real stock market performance as compared to Canadian EPU, yet both countries have proven that EPU brings significant impact since it cause the domestic stock return to fluctuate all the way. In overall, 19% of the long-term variability in real stock returns was caused by the EPU. Hence, Kang and Ratti (2013) concluded that during the period of high level of EPU in Canada, Europe will face a reduction in respective domestic real stock returns as well.

Through the employment of Panel VAR model, Christou et al. (2017) revealed that increased levels of own country's policy uncertainty is negatively affecting the stock market returns in Australia, Canada, Korea, Japan and the US. Furthermore, barring the case of Australia, significant persistent negative relationship can be observed between US EPU shocks

and stock market return in all countries by taking into consideration the uncertainty spillovers, although its effect on the US economy is retarded. For Australia, which is contradicting with the results obtained in other countries, the positive effect of US EPU shocks on Australian stock market returns could be explained by the favourable opportunities investors could grab by temporarily diversifying their portfolios after a global rise in the levels of policy uncertainty. Thus, an increment in the level of US EPU may attract investors to invest more in Australia, while gains might not fulfill investors' expectation as it turns insignificant.

Other than that, dependence structure between EPU and stock market returns was assessed by Guo et al. (2018) in G7 countries including Canada, France, Germany, Italy, Japan, UK and the US. By adopting panel quantile regression model, empirical results revealed that EPU is negatively impact stock market return of G7 countries during bearish market condition. Particularly in Italy and the US, same result was applied in bearish market while positive impact of EPU can be observed when the market is bullish and is in extreme fluctuations. Nevertheless, under the same study, they pointed out the non-existence of obvious relationship between EPU in France and UK stock markets. In other words, this means that EPU in one country might not significantly influence the stock market return in another country just like the case of EPU in France and UK stock market performance, which show no linkage in the transmission of EPU to stock market. Of course, the connection between EPU and stock return might not simply conclude in such a way since things might turn around if different conditions apply or different countries were being investigated. To clarify, mixed relationship of EPU and stock return in the G7 stock market are typically influenced by behavioural finance, in which the reaction of stock prices changed and finance risks are easily transmitted from one nation to another nation due to close economic integration that creates economies ties.

Taking a close look in OECD countries (Canada, France, Germany, Italy, Spain, UK and the US), empirical research pointed out the volatility of economic policies in the US and UK can lead to poorer stock market performance, yet not all stock price indices are easily affected by the political uncertainty (Chang et al., 2015). The result was confirmed effectively by bootstrap panel causality test, specifying that only stock prices in Italy and Spain are being affected. On the other hand, as in the UK and the US, investors in stock markets are concerned about political uncertainty shocks which volatility in economic policies can cause a drop in stock prices. Besides that, Chang et al. (2015) did mention that bullish or bearish stock market can affect differently on policy uncertainty, which is in line with the studied by Arouri et al. (2016) where EPU influences stock market returns differently based on market conditions.

In the case of Japan, findings of Rehman (2017) by adopting DCC model, suggested that besides the latest turmoil in Japan, Japanese stock market returns and policy uncertainty is found to be negatively related in a consistent basis overtime. Note that, over the recession period, only the policy uncertainty during financial turmoil from year 2000 to 2002 shows a significant positive effect on Japanese stock market return. This finding is consistent with the previous study conducted by Antonakakis et al. (2013), in which consistent negative dynamic correlation is found between policy uncertainty and equity market index over time through DCC-GARCH model, apart from the latest financial crisis, in which the correlations become positive. Both findings share a similarity which a rise in policy uncertainty will lead to a rise in stock market return too, yet this theory only holds during financial crisis period. This positive return could be explained by the unprecedented rescue package by government for backing the banking sector in the US in 2008 and the stimulus package in 2009. Antonakakis et al. (2013) further discovered that high policy uncertainty was proven to dampen stock market returns since there is a surge in stock market volatility.

Furthermore, by employing non-parametric causality-in-quantiles method, Balcilar, Gupta, Kim, and Kyei (2019) analysed the causality-in-quantiles running from EPU to stock returns in South Korea and Hong Kong. Yet, the results reported for these two countries were distinct. For the case of Hong Kong, both domestic and global EPU has no impact on stock return volatility in all stock market conditions, whereas in the case of South Korea, US EPU is the main origin of predictability of South Korean stock market return while its domestic EPU plays an integral role in estimating the stock return volatility in normal to well market performance.

2.1.2 Evidence from Developing Countries

Sum (2012) analyzed the effect of US EPU changes on Mexican stock market performance by adopting time-varying OLS regression. Results indicated that the performance of Mexican stock market is negatively influenced by EPU in the US significantly. By using the same methodology, time-series OLS regression, Sum (2013b) analysed the effect of the changes in US EPU on the stock market returns in Indonesia, Malaysia, Philippines, Singapore and Thailand, which are categorized as ASEAN countries. In addition, Granger causality test is applied as well in order to investigate whether the changes in EPU could bring impact towards particular stock market under ASEAN countries. Similar with the result obtained by Sum (2012), findings showed that US EPU adversely affects the stock market returns in Indonesia, Philippines and Thailand. Moreover, the causality test justified that the changes in the US EPU can cause the returns on stock market in these three countries. Furthermore, the VAR analyses revealed that the changes of EPU will promptly cause the three stock markets returns to respond negatively.

By adopting panel data regression, Arouri et al. (2014) assessed the effect of EPU in the US, Europe and China on the stock market GCC countries (Bahrain, Oman, Kuwait, Qatar and Saudi Arabia). The result was similar to that of time-series analysis by Sum (2012; 2013b) where negative sign of coefficient obtained revealed that an increase in the US EPU is associated with a significant drop in stock market return of GCC countries persistently. More precisely, Arouri et al. (2014) also discovered that strong effect of EPU on the stock market returns is originated from the US and Europe. It is also indicated that policy uncertainty increased global risk in GCC economies and future stock market volatility.

Apart from that, Dakhlaoui and Aloui (2016) using ARCH model explored the bidirectional interactive relationship between EPU in the US and four BRIC (Brazil, China, India and Russia) stock market returns. The result revealed a decreasing function applied on the changes in the US EPU index towards stock return of BRIC countries. This is due to the ignorance of investors on the bad news for high uncertainty level periods. Empirical studies also strongly proved that existence of volatility transmission between US EPU and stock market returns in Russia, India and China under short-run relationship. Yet, the interaction between EPU and stock returns does not reflect in long-term relationship. To assess the interaction between US EPU and BRIC stock indexes, rolling correlation approach was being employed and discovered that, with the support of Jarque-Bera test, there is solid proof of a time-varying correlation between the two variables. Besides, the evidence implies that BRIC stock market performance and EPU are interconnected.

Limited studies are found to be employing Autoregressive Distributed Lag (ARDL) model to define the association between EPU and stock market returns. One of them was done by the recent study of Tiryaki and Tiryaki (2018) that determines the short-run and long-run dynamic relationships between macroeconomic determinants and Turkish stock returns. Results

illustrated that a rise in EPU influences Turkish stock returns adversely, referring to external demand and supply shocks will affect domestic stock market performance. This could be explained in which during the episodes of high levels of policy uncertainty, investors' willingness to take risks may decline and hence lead to a decrease in the overall size of capital flows to emerging markets in order to stay safe. As a result, a rise in US EPU could have negative spillover effects in emerging economies through a decrease in capital inflows.

Research done by Kang and Ratti (2013) using SVAR model had examined the interdependencies of Chinese EPU and stock market returns in China. Results showed positive shocks to the policy uncertainty can result in statistically significant and persistent decline in real stock market returns on China. This is consistent with the study from Ahmad and Sharma (2018) who resorted VAR model in IBSA countries (India, Brazil and South Africa) and found that US EPU affects IBSA stock market returns negatively. The effect in China is however delayed, where the impact of the shocks is noticeable after three months. This contradicts with the finding of Sum (2013b) where the effects can be observed immediately in ASEAN stock markets. Instead of using time series analysis, Christou et al. (2017), based on Panel VAR model estimated using Stochastic Search Specification Selection (SSSS) prior, revealed that increased levels of EPU have been negatively affecting the stock returns in China market significantly and persistently when uncertainty spillovers are considered.

Concerning the predictability of stock market returns by EPU, Chen et al. (2017), through standard predictable regression framework, had conducted an investigation on the forecasting power of Chinese EPU on its domestic stock market expected returns on time series variation. Results revealed that EPU, with strong predictive power, forecasts future stock market returns adversely at different horizon, where the source of predictability is originated from the cash flow channel. Due to high level of EPU and

restriction on feedback in accurate way, this condition has created a greater speculative component in the stock price under short sales constraints. It magnifies investor behavioural biases under behavioural asset pricing model. However, limited cash flow is channelled when there is a fall in stock prices and diminishing of the speculative component, which then resulted in a low future stock return. Chen et al. (2017) also concluded that a higher China EPU could result in a lower aggregate level of stock return significantly.

Chinese stock market was suggested by Yang and Jian (2016) to be sensitive to the intervention of central government of China on policy and discovered that the stock market is affected by policy uncertainty negatively, that can last for eight months and the impact disappear as time lapsed. By adopting SVAR model, the variance decomposition results showed that policy uncertainty does affect the stock market returns with one-month lag, but the impact will rise at first and then stabilize afterwards. Yet, the results obtained from the DCC-MGARCH model pointed out policy uncertainty and stock market returns are weakly correlated. Their fluctuations are originated from the volatility in the last period, referring to fluctuations of each variable are greatly influenced by the value in previous period, which could result from the irrational investment in Chinese stock markets and defective stock market mechanism. Anyway, relationship between EPU and stock market return was proven even though their correlation is low.

By employing ARMA and GARCH model, Zhijun, Kutan, and Sun (2017) pointed out that US EPU shock can significantly explain the returns of Chinese A-shares with a one-week lag in adverse direction. More precisely, the market index that include small and growth stocks are more sensitive to the shock in US EPU than those comprising big and value stocks at market level. Specifically, industries such as information technology (IT), manufacturing and media industries are more sensitive to US EPU shocks

than those being classified under agricultural and real estate industries at industry level while the stocks that decline more in response to the shock are mainly small and growth stocks, concluding that, individual stock have higher stock returns.

Apart from that, Xiong et al. (2018) assessed the time-varying correlation between EPU and Chinese stock market returns using DCC-GARCH model. Their study concluded that absolute changes in EPU can greatly influence the stock market returns. Moreover, in general, the EPU and Chinese stock markets has a negative relationship, indicating that the fluctuation of policy uncertainty could end up with decreasing Chinese stock market return. Since this study covered the period of global financial crisis, the authors found that the fluctuation on Chinese policy uncertainty towards stock market returns during the crash of Chinese stock market are unexpectedly higher than during the Global Financial Crisis, which revealed that Chinese stock market is more reactive towards stock market crash. Thus, a positive relationship exhibits between the volatility of Chinese policy uncertainty and volatility in Chinese stock market return as high volatility of EPU in China may lead to high volatility for Chinese stock market returns.

To determine the impact of GEPU on the volatility of Chinese stock market, Shanghai Composite index, Yu et al. (2018) applied generalized autoregressive conditional heteroscedastic mixed data sampling (GARCH-MIDAS) in their studies. Results obtained indicated that GEPU has positive and significant influence on Chinese stock market volatility, implying that Chinese stock market is slowly infused into global economy. The use of GARCH-MIDAS method also illustrates the importance of GEPU in forecasting Chinese stock market volatility in the long run.

Besides that, You et al. (2017) pointed out the asymmetric effects of EPU are highly dependent on the stock market condition. To address this issue, quantile regression technique was being employed to precisely investigate the influence of EPU and stock returns in China under various market conditions. Result implied that high uncertainty level can affect the stock returns negatively. By examining around the period of Global Financial Crisis, You et al. (2017) also found that the impact of EPU is consistently negative in both pre- and post-crisis period. In other words, in most market circumstances, EPU depresses the stock market returns. Specifically, the degree of the effect on stocks before crisis is larger than after crisis as positive effects of government rescues after the crisis may offset the negative impacts of EPU on stocks.

Further investigation on the dependence structure between EPU and stock market return in BRIC was conducted by Guo et al. (2018), employing the same approach, quantile regression technique. Strong evidence showed that EPU impacts both bullish and bearish markets significantly and adversely in all countries. It is also found that Brazil, India and China are having asymmetric dependence structure while Russia is having intermediate structure of dependence through Wald test. Nevertheless, similarly using quantile regression approach, Mensi et al. (2014) and Mensi et al. (2015) revealed that US EPU has no statistically significant impact on BRICS (Brazil, Russia, India, China and South Africa) stock markets.

2.1.3 Evidence from Malaysia

As one of the dominant financial markets in Southeast Asia, there is growing interest on the studies of Malaysian stock market. Subject to the previous studies, it can be seen that the studies were mostly focusing on

the developed markets, for instance, the US, G7 countries and Canada. Studies can be found in developing markets as well but were mainly focusing on China and BRIC countries. However, we found that lack of studies related to the effect of EPU on Malaysian stock market returns. Hence, contributed to our study.

Sum (2013b) analyzed the effect of the changes in US EPU on the stock market returns of five ASEAN countries, including Malaysia, which are of concern. It was found out that US EPU can adversely affect Malaysian stock market and changes in US EPU can cause Malaysian stock market return through Granger causality test. By employing time-series OLS regression and VAR analyses, it was revealed that return on Malaysian stock market negatively react to the changes in EPU immediately which provided useful implication for risk management and stock investment in Malaysia in relation to global transmission and financial shocks if the impact is originated from the US particularly. By enlarging the sample size, Donadelli (2014) studied the impact of US macroeconomic conditions changes on the excess return of stock returns in 10 Asian countries. Looking particularly into Malaysian stock market, Donadelli (2014) through Pairwise Granger-causality test concluded that the level of US EPU might not cause the excess return in Malaysia.

Through Markov-switching model, Hoque and Zaidi (2018) investigated the influence of GEPU on Malaysian sectoral stock returns in regime switching environment. GARCH model was first being employed to ensure that all sectors in Malaysian stock market are significantly related to Malaysian stock market performance. The empirical outcomes revealed that linear framework is not able to find out the effect of GEPU, while the Markov-switching model showed significant negative effects of GEPU on all Malaysian sectoral stock returns, except for the technology sector which exhibited insignificant effect. The impacts on stock return is said to be greater in high-volatility regime.

However, by adopting a hybrid approach of non-parametric causality-in-quantiles test and standard linear Granger causality test in the study of Balcilar et al. (2019), a different perspective on the role of EPU on stock volatility and return in Malaysia was revealed. Results showed that the EPU in Hong Kong, China, the European Area, Japan and the US cannot predict Malaysian stock returns, whereas the stock return volatility is predictable by domestic EPU and GEPUs over Malaysia's entire conditional distribution. More precisely, the strong predictability comes from Japanese EPU in bear regime, European Area EPU in normal regime, with the Chinese and US EPUs in the bull regime. Especially during bull phase in stock market that associated with higher risks and returns, Malaysian investors tend to depend on information about EPU that is retrieved from Malaysia's major trading partners, the US and China.

To sum up, most of the prior research pointed out EPU is negatively impacting the stock market returns in developed countries, developing countries and in Malaysia. However, Christou et al. (2017), Balcilar et al. (2019), Mensi et al. (2014) and Mensi et al. (2015) demonstrated contradict results where Christou et al. (2017) found out that EPU is positively affect stock market returns while the others pointed out EPU have no influence on returns of the stock market.

2.2 Oil Market Uncertainty and Stock Market Return

Researchers have been discussing in depth about topic regarding to oil market and stock market since decades ago. Empirical studies such as Jones and Kaul (1996), Kilian and Park (2009) provided major contributions in the linkage of oil market and the stock market by suggesting different point of view based on their state of research. Yet, these researches have been focusing on the oil price shocks, left out with insufficient research attention being paid to the issue that has arisen due to oil

market uncertainty on stock return. The two main areas for oil market can be further categorised into oil price shock and oil price uncertainty. Oil price shock is mostly used in explaining the changes in oil price, whereas the latter term captures the meaning of oil price volatility, which is measured through a complex method. In fact, oil price uncertainty affects important decision making from the aspects of investments, consumption, production, and other issues. As such, substantial changes in oil prices may influence economic activities, eventually, the stock market (Fowowe, 2013). Subsequently, the oil market uncertainty is inevitably affecting the financial system and economic, in which the immediate instabilities will adversely impact the financial asset returns (Bouri, 2015a). Undeniably, further investigation on oil-stock relationships regarding uncertainty is necessary.

2.2.1 Evidence from Developed Countries

Based on the earlier literature, the linkage between oil market and stock market in developed countries in developed countries is being studied. Basically, the research was done by having primarily discovery on the impact of oil price shocks on stock returns. The research conducted by Sadorsky (1999) is in conformity with the results of Park and Ratti (2008). The researcher had further studied on oil-stock nexus regarding volatility, analysing that volatility in oil price produced by GARCH model showed the effect on real stock returns in the US is significant and negative. Findings further suggested that the result is asymmetric for the reaction of the stock market to oil price shocks. Through VAR model and realized volatility (RV), Park and Ratti (2008) pointed out stock return is negatively correlated to oil price volatility for nine out of thirteen European countries, instead of the US. The volatility is insignificantly affecting real stock returns in the US.

Asalman (2016) had concentrated his findings on investigating impact of oil price volatility on American stock returns at two levels, which are sectoral and aggregate levels. The results depicted that the relationship between oil price uncertainty and stock returns in the US is insignificant. Specifically, the application of hedging strategies by most companies in dealing with the fluctuations in oil price might cause absence of uncertainty effect of oil prices on stock returns. Besides that, some companies were able to transfer the risk inherent in oil price uncertainty by charging higher production cost to customers. Thorough investigation done by Asalman (2016) found out whether the stock returns react positively or negatively toward oil price volatility. The outcome showed that the symmetric transmission on aggregate stock returns was caused by the insignificant effect of uncertainty of oil price. Yet, this symmetric effect is not same for all the sectors.

Based on a RV model, Dutta (2017) explained that the US sectoral stock returns in clean energy were highly sensitive to crude oil volatility index (OVX) shocks. OVX is applied to indicate uncertainty of oil market and it had provided extra information on what should be included inside the historical data. The result analysed an asymmetric effect of OVX on equity returns, which simply pointed out that different outcomes on the stock market return can be produced which depends on the rise or decline in oil volatility index. Maghyereh, Awartani, and Bouri (2016) focused their studies on two areas, the directional connectedness between the OVX and the implied volatility indices of global equity markets. This study tends to find out whether the fluctuation in oil price movement will cause a volatility in global stock indices, or vice versa whereby stock indices bring influence to the OVX. They found out in other way around, the OVX has largely controlled the uncertainty transmission in oil and equity markets. In the highest ranking, approximately 29% of oil volatility connectedness was observed from oil to Canada stock market return. Followed by the US and UK market, hold for the second and third highest ranking in the

observation, where the contribution of oil is allocated to 18.4% and 19.5% in the oil volatility connectedness.

2.2.2 Evidence from Developing Countries

Apart from the studies in developed countries, there is a rising attention to investigate the association between oil market and stock market in emerging countries. Due to immature financial policies and investors, oil price uncertainty is highly possible to bring influence on developing countries (You et al., 2017). Cong et al. (2008) used multivariate vector auto-regression (VAR) to examine the effect of oil price shocks on Chinese stock market and explored the linkage between RV and Chinese stock returns. The research depicted that oil price volatility shock and returns for a vast majority of the Chinese stock indices have statistically insignificant association, with exception for mining index and petrochemicals index. Oil volatility shocks is positively affecting the stock returns significantly, particularly in mining and petrochemicals sector, whereby speculation activities had caused oil volatility to increase and thus resulting in increased stock return. With the employment of a bivariate VAR-GARCH-in-mean model, Caporale et al. (2015) have discovered that there is a positive intercorrelation between oil price uncertainty and Chinese stock returns at disaggregate level, especially in demand-side shocks for most of the cases, but excluding oil and gas, consumer services, and financial sectors.

Dutta et al. (2017b) utilized GARCH model to conduct an investigation on the implication of shocks in oil volatility on global emerging market stock returns. By using OVX as an indicator for oil price volatility, it was found to be statistically significant towards stock returns. An increase in uncertainty of oil price has subsequently depressed the stock return,

because of the negative effect of OVX towards equity market return. The effects of OVX is symmetric, and the findings further illustrated that the OVX has larger impact than oil price shock. Dutta et al. (2017b) further conducted a study on Middle East and African stock markets. They demonstrated that oil market uncertainty brought substantial effects on the RV on stocks by using an extended version of GARCH model. Not surprisingly, significant coefficients were proved to be negative in a further report, as higher oil price uncertainty leads the stock prices to decline. However, oil-stock link is found to be insignificant for stock market in three countries, which refers to Saudi, Kuwaiti and the UAE. This was in line with the findings by Arouri, Lahiani, and Nguyen (2011) and Choi and Hammoudeh (2010). They argued that the lower reliance of oil companies in affecting Kuwaiti stock market and lower annual turnover in Saudi Arabia and UAE had led to the insignificant result.

By employing ARDL framework, Liu et al. (2013) argued that the uncertainty can be transmitted from oil market to other markets in a short period. Furthermore, Liu et al. (2013) indicated that it could be more informative when OVX is applied in measuring the uncertainty in oil market. This is due to the fact that OVX contains both the information of the expectations of investors on future volatility and historical volatility of oil prices in spot market. Similarity was shown in the findings of Luo and Qin (2017) as well, which suggested to employ OVX as the proxy for oil price uncertainty. They proposed that negative relationship can be obtained between oil price uncertainty and Chinese stock returns. In contrast to this, the RV shocks showed negligible effects.

Xiao et al. (2018) also measure oil price uncertainty by applying OVX with the purpose to explore the consequences of OVX shocks on Chinese stock returns. Since existing studies in developing countries ignored the impact of oil price uncertainty on stock returns that possibly vary according to market circumstances, Xiao et al. (2018) took initiative on

selecting quantile regression model for measuring stock market return, the endogenous variable, under different conditional distribution. The findings indicated that OVX changes and stock returns have significant and negative impact in both aggregate and sectoral market level especially during bearish market. Also, positive shocks of the OVX was shown to have larger effects than negative shocks of the OVX. This implied that asymmetric effect was found from the effect of oil market shocks on stock returns. Generally, positive and negative shocks of oil market impose different effects on the cash flow of firms that uses oil for production or consumption caused asymmetric impact on oil-stock link (Salisu & Isah, 2017). Furthermore, You et al. (2017) stated that oil price shocks whether in positive or negative way are heterogeneously influencing the investors' sensitivity towards stock returns, thereby resulting in asymmetric impact of oil price shocks on stock market returns.

2.2.3 Evidence from Malaysia

Malaysian stock market presents as one of the top dominating financial markets in Southeast Asia. Existing studies mostly focused on well-developed markets such as the US (Sadorsky, 1999; Alsalman, 2016; Dutta, 2017), European countries (Park & Ratti, 2008) and even in developing markets in countries like China (Cong et al., 2008; Liu et al., 2013; Caporale et al., 2015; Luo & Qin, 2017; Xiao et al., 2018). Less attention was paid to Malaysia where only few relevant studies in regard to this topic was being explored. Main evidence found in the research done by Surya and Wibowo (2018), studied that there is a dynamic correlation between oil volatility and five ASEAN stock markets by using DCC-GARCH approach. OVX, as a proxy for oil price volatility, concluded a negative correlation on most of the Asean 5 countries, including Malaysia. For further description, KLCI index return had a negative dynamic

correlation with the OVX index throughout the study period between 2007 and 2017. Frankly speaking, only little evidence was found in the investigation of the oil market uncertainty and Malaysian stock return. Especially the research that solely based in Malaysia being conducted by Al-hajj, Al-Mulali, and Solarin (2018), who discussed relationship between oil price shocks and Malaysian stock market return by applying nonlinear ARDL. The findings showed that oil price shocks and stock market returns are negatively related in all sectors, barring from the case of aggregate stock market returns. When oil price decreases, stock market returns increase, no matter the direction of oil price shock was in an appreciation or a depreciation way.

In short, most existing studies revealed a negative interrelationship between oil market uncertainty and stock market return in developed countries, developing countries as well as in Malaysia. Meanwhile, empirical research carried out by Cong et al. (2008), Liu et al. (2013), Caporale et al. (2015) and Alsalman (2016) proposed contradict findings with previous studies. Caporale et al. (2015) revealed oil price volatility and stock return have a positive relationship, yet the other three studies showed that the relatedness between oil price uncertainty and stock market returns is insignificant.

2.3 Theoretical Framework

Based on our study on the impact of the American and Chinese EPU on Malaysian stock market return in long run, three theories are being adopted including general equilibrium theory, discounted cash flow theory and real option theory. General equilibrium model is applied to explain the impact of political uncertainty on stock prices while the impact of oil price changes on stock returns can be explained by the discounted cash flow approach.

2.3.1 General Equilibrium Model

Pástor and Veronesi (2013) proposed a general equilibrium model to examine linkage between political uncertainty and stock prices. From previous studies, there is lack of explaining on how asset prices react to political news. Therefore, the researchers try to use general equilibrium model to fill this gap by investigating the asset pricing implications of political uncertainty. This model is different from the theoretical works of previous research in which it considers a wider set of government actions. Besides that, Pástor and Veronesi (2013) use different modelling techniques and feature Bayesian learning. In this model, agents learn that political risk premium and political shocks are the two major costs associated from potential new policies. Furthermore, this model considers dissimilar policies. When all potential new policies were alike a priori, political uncertainty would be irrelevant. Therefore, policy heterogeneity is important to the results. Moreover, the researchers concentrate on analysing the association between stock prices and political signals to make future policy decisions.

Pástor and Veronesi (2013) consider the firms (denoted by i) are continuous with $i \in [0, 1]$ in the limited horizon of $[0, T]$. They use B_t^i to denote the capital of firm i at time t and it represents book value of equity. Besides that, they standardized $B_0^i = 1$ at time 0, in which all firms allocate same amount of capital. Firm i 's capital is invested in a linear way where the rate of return ($d\Pi_t^i$) is random and all profits will be reinvested. Therefore, the firm i 's capital evolves into $dB_t^i = B_t^i d\Pi_t^i$. The following regression equation can be conducted in the horizon of $t \in [0, T]$:

$$d\Pi_t^i = (\mu + g_t)dt + \sigma dZ_t + \sigma_1 dZ_t^i \quad (2.1)$$

where (μ, σ, σ_1) are constants and observable, Z_t is a Brownian motion of the system, and Z_t^i is an independent Brownian motion of firm i . The variable g_t stands for the effect of current government policy on the average of each firm's profitability process. The government policy has no effect on profitability if $g_t = 0$.

Pástor and Veronesi (2013) assumes the impact of g_t to remain unchanged until the policy is altered at a given time τ ($0 < \tau < T$). At time τ , the government makes a decision whether to alter the policy or not. The value of g_t is as below:

$$g_t \begin{cases} g^0 & \text{for } t \leq \tau \\ g^0 & \text{for } t > \tau \\ g^n & \text{for } t > \tau \end{cases} \quad \begin{array}{l} \text{if the old policy is retained} \\ \text{if the new policy is chosen} \end{array} \quad (2.2)$$

where the g^0 denotes the effect of old policy and g^n denotes the effect of n -th new policy. g^n replaces g^0 when there is a policy change, thereby causing a permanent shift in average profitability. After the revealing of policy at time τ , the policy decision becomes effective immediately.

Pástor and Veronesi (2013) also assume the value of g_t is anonymous for all $t \in [0, T]$, which means the government policies is ambiguous on the profitability of a firm. At time 0, the prior distributions of all policy effects are assumed to be neutral:

$$g^0 \sim N(0, \sigma_g^2) \quad (2.3)$$

$$g^n \sim N(\mu_{g,n}^n, \sigma_{g,n}^2) \quad \text{for } n = \{1, \dots, N\} \quad (2.4)$$

The researchers expect the old policy is neutral from the earlier without the loss of generality while the new policies have heterogeneous prior beliefs about g^n . Government and investors who own the firms are not known to the values of $\{g^0, g^1, \dots, g^N\}$.

$$u(W_T^j) = \frac{(W_T^j)^{1-\gamma}}{1-\gamma} \quad (2.5)$$

$$\max_{n \in \{0, \dots, N\}} \left\{ E_\tau \left[\frac{C^n W_T^{1-\gamma}}{1-\gamma} \mid \text{policy } n \right] \right\} \quad (2.6)$$

$$c^n = \log(C^n) \sim N \left(-\frac{1}{2} \sigma_c^2, \sigma_c^2 \right) \quad \text{for } n = \{1, \dots, N\} \quad (2.7)$$

The investors' utility depends on their willingness to take risk and wealth. At time 0, the shares of firms are equally distributed to all investors and they will receive dividends at time T. Every investor knows clearly about the current policy with the assumption that information is completely disclosed. Despite the government's utility maximization, it still faces a benefit or non-benefit cost when there is a change in old policy. $C^n > 1$ refers to political cost is greater than benefit while $C^n < 1$ refers to political cost is smaller than benefit. Pástor and Veronesi (2013) normalize $C^0 = 1$ to indicate the old policy is known with certainty hence imposing no political costs or benefits to government. The government maximizes the welfare of investors when $E_0[C^n] = 1$ for all n but it may deviate from this objective in a random fashion. Variance of political cost (σ_c) denotes the political uncertainty in which investors are ambiguous about the enforcement of government policy in the future. The government's policy is certainly predictable immediately before time τ when $\sigma_c = 0$ while there is political shock when $\sigma_c > 0$, where the complexity of such uncertainty makes it difficult for policymakers and investors to forecast the effect of a political decision.

In conclusion, by using general equilibrium model, Pástor and Veronesi (2013) pointed out political uncertainty tends to be larger during economic downturns. Subsequently, political uncertainty can increase volatility and correlation of stocks and thus causing greater risk premium when the economy is weak.

2.3.2 Discounted Cash Flow Approach

Discounted Cash Flow (DCF) approach is a method of valuation that is employed to estimate the value of an investment by using a discount rate to discount its expected future cash flows (Chen, 2018). The estimated present value is used to make decisions regarding the potential investment. We should accept the investment if the estimated present value is higher than the cost of investment and vice versa.

Following previous work of Huang, Masulis, and Stoll (1996), DCF approach is applied to explain the association between oil and stock prices. It is used to estimate the value of a company's stock by discounting its expected future cash flows. Therefore, the expected future cash flows and discount rate are the two important factors affecting the stock returns. The oil price influences these two factors in several ways due to different causes. Oil is a global commodity and raw material for production of many goods. It means that oil prices in the future will affect expected cash flows. Higher crude oil prices cause higher energy prices and therefore higher costs for all businesses and industries that are using energy. Thus, expected energy price changes lead to similar change in expected costs and opposite change in stock prices. It is important for a company to be a net consumer or a net producer of oil to determine whether a company gains or losses from the changes of oil prices. When the oil price increases, the earnings for producer increase and earnings for the consumer decrease.

According to Huang et al. (1996), oil prices impact the aggregate stock returns negatively for the economy as a whole. Since oil price is crucial to the company's stock, it is important for the company to have some knowledge about the future trend of oil price, or else the company might be confusing in making decisions as unexpected changes in oil prices create uncertainty to the company.

2.4 Literature Gaps

Some literature gaps have been identified based on the literature review above. First and foremost, the linkage between EPU and stock market return, and between oil market uncertainty and stock market return remain unclear and thus result in an ambiguous finding. Basically, most of the empirical evidences claimed that EPU is negatively affecting the stock market return (Forbes & Chinn, 2004; Sum, 2012; Sum, 2013a; Sum, 2013b; Bijsterbosch & Guérin, 2013; Antonakakis et al., 2013; Arouri et al., 2014; Mensi et al., 2014; Mensi et al., 2015, Li et al., 2015; Arouri et al., 2016; Dakhlaoui & Aloui, 2016; Chen et al., 2017; Christou et al., 2017; Rehman, 2017; Ahmad & Sharma, 2018; Guo et al., 2018; Tiryaki & Tiryaki, 2018, Xiong et al., 2018; Yu et al., 2018). However, study by Balcilar et al. (2018), Mensi et al. (2014) and Mensi et al. (2015) found no linkage between EPU and stock market return. Besides, Christou et al. (2017) has pointed out EPU and stock market return have a positive relationship. Similarly, there were researchers who pointed out that oil market uncertainty and stock market return are negatively related (Sadorsky, 1999; Park & Ratti, 2008; Dutta et al., 2017a; Dutta et al., 2017b; Luo & Qin, 2017; Xiao et al., 2018; Surya & Wibowo, 2018) while some mentioned that oil market uncertainty and stock return have a positive relationship (Cong et al., 2008; Liu et al., 2013; Caporale et al., 2015; Alsalman, 2016). One of the reasons imposed on the conflicts may be due to the research period done on examining the impacts of EPU and oil market uncertainty on stock market return. For instance, with the same methodology, quantile regression

approach, You et al. (2017) found EPU negatively impacts the stock market return with a longer period from 1995 to 2016 while Mensi et al. (2014) and Mensi et al. (2016) examined no linkage between EPU and stock market return with period from 1997 to 2013 and from 1995 to 2013 respectively.

Apart from that, assessing on interaction between oil and stock markets, earlier literature has frequently conducted their findings in determining the linkage between oil price shocks² and stock market return. Aside from the studies that concerned on oil price shocks as their state of research, an exploration from a new perspective of volatility by Sadorsky (1999), has introduced oil price uncertainty to be involved in future findings. Indeed, it is worth mentioning that the researchers have an increasing incentive to focus on the impact of oil on stock market return in developed and emerging economies (Sadorsky, 1999; Park & Ratti, 2008; Cong et al., 2008; Alsalman, 2016; Luo & Qin, 2017; Dutta, 2017). OVX is considered as a more precise and direct measure of the oil market uncertainty (Liu et al., 2013; Luo & Qin, 2017; Xiao et al., 2018). However, the research with respect to this topic is still insufficient. There was little focus paid to the OVX-stock nexus in Malaysia. Although Surya and Wibowo (2018) carried out their investigation on OVX-stock nexus in five ASEAN countries including Malaysia, their studies were not solely based in Malaysia. Apart from that, instead of using oil price uncertainty, Al-hajj et al. (2018) who conducted their findings in Malaysia, have assessed the effect of oil price shocks on Malaysian stock market. Therefore, further investigation on linkage between oil market uncertainty and Malaysian stock return is definitely indeed.

Moreover, we could hardly find a research paper that explains the impact of EPU and oil market uncertainty on stock market returns. The majority of past studies

² According to Sadorsky (1999), real oil prices is derived to measure oil price shocks with the formula as following: $\text{Real oil price} = (\text{PWFUEL}^*)/(\text{PZUNEW}^*) \times 100$

where, PWFUEL* = producer price index of fuels, 1982 = 100, seasonally adjusted

PZUNEW* = consumer price index, 1982 = 100, seasonally adjusted

were focusing on either one of our main variables, that is, to study the linkage between EPU and stock market return and the linkage between oil market uncertainty and stock market return. There is only one paper being found to be determining the interaction between EPU, oil price shocks and stock market return, instead of oil market uncertainty (Arouri et al., 2014). Furthermore, there is a lack of evidence being identified in the case of Malaysia. As mentioned in the problem statement earlier, Malaysia has an open economy in which it is susceptible to global trends and is heavily relying on oil commodity, the changes occur in EPU and oil market uncertainty could exert significant impact on Malaysian economy and markets. Therefore, a comprehensive study on the impact of EPU and oil market uncertainty on Malaysian stock market return is worth exploring.

Furthermore, according to Arouri et al. (2014), EPU in the US and China could impose different extent of impacts on the stock return in GCC countries. Based on our research, the study by Arouri et al. (2014) and Zhang et al. (2019) had compared the extent of US and China EPU impact on GCC countries' stock market return and global stock market return respectively and revealed that the impact of EPU in the US is greater. However, there is no study to prove and compare the degree of impact of EPU in the US and China on Malaysia stock market return. As discussed earlier in Chapter 1, Malaysia is having strong linkage with these two countries in terms of trading and investing. We are hence interested in figuring out whether the EPU in these two countries could exert different amplitude of impact on Malaysian stock market return. If yes, which country's EPU has greater influence on the stock market return in Malaysia.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter introduces the data and methods being employed in this paper. Section 3.1 explains the selected variables and the sources of data. Section 3.2 proposes the econometric framework being resorted in this paper, as well as discusses the expected signs of the coefficients. Furthermore, Section 3.3 shows the empirical testing producers of our econometric framework while Section 3.4 explains the diagnostic checking for our model.

The economic framework applied in this research is ARDL model. Noted by Pesaran and Smith (1998), variables in ARDL model can be a mixture of level integration, $I(0)$, and first order integration, $I(1)$, and also cointegrated so that the model can be recognized as an error correction mechanism. Before the ARDL model is being estimated, two main unit root tests, namely Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test with the most general form of specification including trend and intercept, have to be adopted to avoid the inclusion of second order integration, $I(2)$, and to ensure the stationarity of the variables (Sahoo & Das, 2012). Then, bounds test will be conducted to investigate whether long run relationship does exist between the variables in our models. Moreover, ARDL cointegration and long-run form will be conducted as well to examine the long run effects of the explanatory variables on the dependent variable. As for diagnostic checking, Breusch-Godfrey Serial Correlation LM test and Autoregressive Conditional Heteroskedasticity (ARCH) test will be employed to check if the models are unbiased, consistent and effective. Furthermore, cumulative sum of recursive residuals test (CUSUM) and cumulative sum of recursive residuals of square test (CUSUMSQ) are to be employed to make sure that the variables in our model are stable.

3.1 Data Collection Procedure

3.1.1 Research Design

Research design is regarded as a framework of techniques and methods employed to associate the components of a research in a reasonably logical and sound manner in order to address research objectives in an efficient way. Hence, research design has to be formulated prior to the data collection. As such, quantitative approach which focuses on the derivation of conclusions from existing data is being adopted in this paper.

According to Wright, O'Brien, Nimmon, Law, and Mylopoulos (2016), quantitative approach involves deductive logic with general arguments of theories and concepts that result in data points. It generalizes the findings by collecting reliable and valid evidence besides using large and randomly generated samples, especially for generalizing to other populations. Besides, quantitative research involves larger sample for estimation and is more likely to be generalized to a whole population or sub-population (Rahman, 2017). Based on Daniel (2016), the advantages of quantitative approaches include the ease in generalization of data collection and analysis, no intelligent guesswork is required, unbiased data collection and analysis, full control for alternatives like interpretations, explanations and conclusions.

3.1.2 Data Collection Methods

Time series data is being introduced in this study to investigate the relationship between Malaysian stock market returns (KLCD) and five independent variables including Economic Policy Uncertainty Index (EPU), Oil Volatility Index (OVX), Nominal Effective Exchange Rate (NEER), Real Effective Exchange Rate (REER) and Overnight Market Rate (OMR), based on secondary data collected for the period from May 2007 to December 2018, with a sample size of 138 in total. All data are being collected on a monthly basis and have been transformed into log function.

Other than that, by referring to the second objective of this research, the data of EPU in the US and China are being collected to compare the magnitude of their impacts on Malaysian stock market return. In addition, two types of exchange rate are being employed in this research, that are, NEER and REER to examine if the difference along the exchange rate indicators (NEER and REER) will affect the empirical results, for robustness checking. Table 3.1 presents the various reliable sources accessed for data collection:

Table 3.1: Variables and Sources of Data

Variables	Proxy	Description	Data Source
Stock Return	KLCI	<p>Kuala Lumpur Composite Index</p> <p>An index derived from 30 largest companies that fulfil the requirements of Bursa Malaysia to be listed on the exchange. Returns³ are computed from KLCI index as a measure of Malaysian stock market return.</p>	Bloomberg Terminal
Economic Policy Uncertainty	EPU	<p>Economic Policy Uncertainty Index</p> <p>An index constructed from information about newspaper coverage of policy-related economic uncertainty, offering a good proxy for the movements in policy-related economic uncertainty over time.</p>	Baker et al. (2019)
Oil Market Uncertainty	OVX	<p>Oil Volatility Index</p> <p>An index which applies CBOE Volatility Index (VIX) methodology to options on the US Oil Funds (USO) to measure the market's expectation of 30-day crude oil prices volatility.</p>	Bloomberg Terminal
Interest Rate	OMR	<p>Overnight Market Rate</p> <p>A rate computed by the average of interest rate applied to all individual deals, used to determine the rate at which short-term funds are lent and borrowed among banks.</p>	Bank Negara Malaysia (BNM)
Exchange Rate	NEER	<p>Nominal Effective Exchange Rate</p> <p>An index calculated by the weighted-average of nominal exchange rate to measure the competitiveness of product in the international market.</p>	Bank for International Settlements (BIS)
	REER	<p>Real Effective Exchange Rate</p> <p>An index calculated by the weighted-average of a country's currency towards a basket of major currencies to compare the standard of living in a country with another.</p>	Bank for International Settlements (BIS)

³ The return on KLCI is derived from $ln = (P_1/P_0)$, which is the natural logarithm of the price today over the price the day before.

3.1.3 Data Processing

According to the information presented in Table 3.1, the data were collected from various sources, which are Bloomberg Terminal, Economic Policy Uncertainty Index, Bank of International Settlement and Bank Negara Malaysia respectively. After the data collection is completed, the data are then being reorganized and transformed into log function using Microsoft Excel before running the data using E-views 9. Subsequently, the generated outcomes and results are being presented, interpreted, analysed and explained in detailed, as well as checking on their consistency with past studies.

3.2 The Rationale of Variable Choices

3.2.1 Stock Market Return

Stock return is the return investors could earn by trading securities listed on organized exchange. According to Haniff and Pok (2010), KLCI Index was the unit measurement used in their research to measure the dependent variable, that is, stock return in Malaysia. As referenced, KLCI Index is being employed in this paper in the computation of Malaysian stock market return as presented in Table 3.1.

3.2.2 Economic Policy Uncertainty (EPU)

As stated by Baker et al. (2013), EPU index acts as a suitable proxy for measuring the movements in policy-related economic uncertainty over time. The EPU index as a proxy of uncertainty is constructed from information about newspaper coverage of policy-related economic uncertainty from ten well-known newspaper press⁴, disagreement among economic forecasters and number of federal tax code provisions set to expire in future years.

The uncertainty regarding to government intervention in the economy and market that could influence consumption, production, economic growth and business investments most probably will lead to an impact on stock prices through EPU index significantly (Chang, Chen, Gupta, & Nguyen, 2015). Based on the study by Sum (2013), investors can take a short position in the ASEAN stock markets when the EPU in the US is high and long these stock markets when the US EPU is low. Tiryaki and Tiryaki (2018) further revealed that increases in US EPU could have negative spillover effects in emerging economies through a decrease in capital inflows since a higher EPU of the US may decrease investors' willingness to take risks. Our concern of EPU on Malaysian stock market return is closely related to the research done by Sum (2013) and Tiryaki and Tiryaki (2018) as Malaysia is one of the ASEAN countries that involved in emerging market. As well, EPU has persistently served as a predominant concern for investors and policymakers to make decision by investigating the relationship between EPU and stock market return (Sum, 2012; Bijsterbosch & Guérin, 2013; Kang & Ratti, 2014; Balcilar et al., 2015; Arouri et al., 2016; Yang & Jiang, 2016; Li & Peng, 2017; You et al., 2017; Ahmad & Sharma, 2018; Guo et al., 2018; Hu et al., 2018; Rehman, 2018; Yu et al., 2018).

⁴ EPU contains information obtained from USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the New York Times, and the Wall Street Journal.

As a result, by including EPU as one of the independent variables, prediction on Malaysian stock market return can be well justified if EPU is found to be significantly correlated to the stock market returns. Thus, EPU is expected to be negatively impacting the Malaysian stock market return based on the empirical results by the majority of past researches that found that the relationship between EPU and stock market return is negatively related (Sum, 2013; Kang & Ratti, 2013; Antonakakis et al., 2016; Arouri et al., 2014; Kang & Ratti, 2014; Li et al., 2015; Arouri et al., 2016; Dakhlaoui & Aloui, 2016; Yang & Jiang, 2016; Chen et al., 2017; You et al., 2017, Hu et al., 2017; Rehman, 2017; Tiryaki & Tiryaki, 2018; Xiong et al., 2018). With the reasons stated above, EPU is encouraged to serve as an indicator in our model for the estimation.

3.2.3 Oil Market Volatility (OVX)

According to the Chicago Board Options Exchange (2008), the Chicago Board Options Exchange (CBOE) announced Crude Oil Volatility Index (OVX) is used to measure the market's expectation of 30-day volatility of crude oil prices to options on the United States Oil Funds (USO), spanning a wide range of exercise prices. Chen, He, and Yu (2015) found OVX is a way to predict future oil prices and consequently of hedging from potential severe shocks. OVX in spirit is similar to CBOE Volatility Index (VIX) in terms of calculations. The difference between VIX and OVX is VIX calculation uses options written on the S&P 500 index, while OVX uses options on the USO Fund option prices. According to Siriopoulos and Fassas (2012) and Maghyreh et al. (2016), the formula of OVX is derived as below:

$$OVX = 100 * \sqrt{\frac{2}{T} \sum \frac{\Delta K_i}{K_i^2} e^{RT} Q(K_i) - \frac{1}{T} \left(\frac{F}{K_0} - 1\right)^2}$$

where, T = time to the maturity of the set of options

F = forward price level derived from the lowest call-put option
premium difference

R = risk free interest rate

ΔK_i = average interval between the strike price of the options
adjacent to option i and the strike price of option i

K_0 = first strike price below the forward price level

$Q(K_i)$ = mid-point of the bid-ask spread of each option with strike K_i

The formula shows that OVX is model-free because it is computed without any option valuation models. This index can reflect the thought of option traders in future market volatility since it is directly related to the market values of call and out. Thus, it is said to provide more information in terms of measurement and prediction as compared to the historical volatility. Based on Dupoyet and Shank (2018), OVX is the foremost crude oil implied volatility index by applying VIX methodology which captures the aggregate level of market prediction on future oil volatility. OVX is also examined to act as a proxy for implied volatility (Haugom, Langeland, Molnar, & Westgaard, 2014). This is because OVX can forecast future oil spot volatility with significantly positive effects on current volatility of oil returns (Chen, Liu, & Li, 2018). Hence, higher OVX will lead to higher implied volatility.

OVX is said to be a good indicator of oil market uncertainty according to Dutta et al. (2017b). The reason to support OVX as an ideal measurement is because it embodies historical volatility information, along with investors' expectations towards future oil market conditions. Xiao et al. (2018) further agreed that OVX is a better measurement as it provides an exploration on economic and financial consequences of oil price uncertainty in a new perspective. Oil price uncertainty which is measured using OVX is important to the economic growth of a country as it can affect the timing and content of vital decisions about production,

consumption, investments, and other issues (You et al., 2017). In accordance with the study by Fowowe (2013), high oil prices can slow down the economy and thus cause the consumers and producers to reduce investment and consumption, which may adversely affect the stock markets. Thus, we intended to measure the impact of oil price uncertainty on Malaysian stock market return using OVX. At last, by using OVX as a proxy, the relationship between oil market uncertainty and stock market return is expected to be negative in Malaysia because most of the past studies done showed OVX negatively affects the stock market return (Chen & Zou, 2015; Luo & Qin, 2017; Xiao et al., 2018; Surya & Wibowo, 2018).

3.2.4 Control Variables

The findings by Arouri et al. (2016) revealed the importance of having control variables in a model to investigate the relationship between EPU and stock market returns, in which the EPU may simply being replaced by other economic determinants that could influence the stock market returns as well. Therefore, we have included two control variables, that is, exchange rates and interest rate while investigating the impact of EPU on stock market to avoid the problem of “proxy effect”.

3.2.4.1 Interest Rate

Interest rate can be explained as the proportion of an amount loaned by a lender to the borrower by charging an interest and is normally expressed in an annual percentage. OMR, which is defined as a short-term fund lent and borrowed among depository institutions (Shahiduzzaman & Naser, 2019), normally used as a proxy

of interest rate in this research. It can be computed by the average of interest rates that applied to all individual deals. Subsequently, OMR reflects the supply and demand behaviour of bank reserves as well as provides a signal for central bank to understand the market pressure. Moreover, it is also an important link in chain from the liquidity of the banking system to longer-term interest rates. As interest rate increases, the cost of financing through loan by firm rises as well. This could lead the firm to issue more shares in order to raise investment funding, which in turn reduces the stock market returns (Otieno, Ngugi, & Wawire, 2017). In brief, the stock return will decrease when interest rate increases.

3.2.4.2 Exchange Rate

Exchange rate is the currency value of a country versus the currency value of another country or economic zone. Floating exchange rates are dominant and will fluctuate based on market demand forces and market supply forces. Nevertheless, effective exchange rate, which is an index that used to depict the strength of one country's currency relative to a basket of foreign currencies, is being adopted in this paper as the proxy of exchange rate, instead of the exchange rate measured in value. This is because effective exchange rate serves as an indicator of a country's international competitiveness based on the efficiency of foreign exchange market, which makes it comparable between countries and thus outstanding the exchange rate measured in value. Subsequently, NEER and REER are the two indicators of exchange rate used in this paper.

According to Goswami and Sarker (2011), NEER is an index that calculated by weighted-average of nominal exchange rate. It shows the price of the country's currency against a basket of currencies of its main trading partners which is extremely useful in the situation of open economy microeconomics (Goswami & Sarker, 2011). The NEER can be regulated to indemnify inflation rate of the domestic market against the inflation rate of its trading partners. NEER

appreciates when the value of home currency increases relative to a basket of other currencies that adopt floating exchange rate system. Or else, NEER will depreciate if the home currency drops against the basket.

REER can be defined as the weighted average of a country's currency towards a basket of major currencies (Bank Negara Malaysia, 2019). It differs from NEER in the sense that it is adjusted to inflation. According to Betliy (2002), REER is commonly used to measure the standards living in one country against the other country. It can also be used to determine the competitiveness of traded goods sector as well as to detect currency crises and be a determinant in monetary and exchange rate policies (Betliy, 2002).

Theoretically, an appreciation in effective exchange rate makes a country's exports less competitive due to higher price, hence, the demand for local exports by foreigners will decrease. Ultimately, the firm's profits will decrease, and so the stock prices (Makori, 2017). Therefore, the higher the exchange rate, the lower the stock returns.

3.3 Econometric Framework

3.3.1 Base Model

This paper proposes an econometric model in which Malaysian stock market returns as a function of EPU, OVX, NEER, REER and OMR. The models formed in this research include one dependent variable and four independent variables.

$$RET = f(EPU, OVX, OMR, EXC) \quad (3.1)$$

where, RET = Return on KLCI by computing $\ln(P_1/P_0)$

EPU = Economic Policy Uncertainty Index in US (EPUUS) and
China (EPUC)

OVX = Oil Volatility Index

OMR = Overnight Market Rate

EXC = Nominal Effective Exchange Rate (NEER) and Real
Effective Exchange Rate (REER)

As shown is the base model applied in this research. There is a total of four models in this paper to address the literature gap mentioned in Chapter 2, comparing the impact of EPU in the US and China on stock market returns on Malaysia, and the impact on empirical results from the application of different exchange rate indicators in the models.

3.3.2 Long Run Model

$$RET_t = a_0 + a_1EPU_t + a_2OVX_t + a_3OMR_t + a_4EXC_t + \varepsilon_t \quad (3.2)$$

where, RET_t = Return on KLCI at time t

EPU_t = Economic Policy Uncertainty Index in the US
(EPUUS) and China (EPUC) at time t

OVX_t = Oil Volatility Index at time t

OMR_t = Overnight Market Rate at time t

EXC_t = Nominal Effective Exchange Rate (NEER) and

Real Effective Exchange Rate (REER) at time t

ε_t = Error term at time t

As shown is the long run model constructed in this research and the data consists of RET_t as dependent variable, and independent variables, including EPU_t (in the US and China), OVX_t , OMR_t , and EXC_t (NEER and REER) and the time period, t , denotes the monthly time series for the period from May 2007 to December 2018 as the index is published only in April 2007.

a_0 indicates the coefficient of return on stock return in Malaysian, derived from changes in KLCI Index; a_1 refers to the estimated coefficient of EPU; a_2 represents the estimate coefficient of oil price volatility; a_3 serves as the estimated coefficient of exchange rate; a_4 exhibits the estimated coefficient of interest rate; ε_t refers to the error term in the regression model. The t indicates the time periods of the data while $t - 1$ represents the lag of one-time period. Based on the estimated model, EPU, oil price volatility, exchange rate and interest rate are predicted to have a negative relationship towards Malaysian stock market returns.

3.4 Empirical Testing Procedures

3.4.1 Autoregressive Distributed Lag (ARDL) Framework

ARDL framework is a methodology to determine the presence of long run relationship between variables of interest. One of the most common advantages of applying ARDL framework is that the ARDL approach provides more flexibility, in which it can be employed no matter the regressors are purely $I(0)$, purely $I(1)$, or a combination of both while yielding consistent estimated of the long run coefficient that are asymptotically normal, which is not applicable in other cointegration techniques (Pesaran, Shin, & Smith, 2001; Paseran & Shin, 1997). Specifically, unit root test must be carried out before the employment of ARDL framework to make sure all the independent variables are statistically significant at $I(0)$ or $I(1)$ in the model. Pesaran et al. (2001) added that the ARDL procedure can differentiate response and independent variables in a single long run relationship with the assumption that the relationship exists in a single reduced form equation.

Furthermore, ARDL approach also allows the reparameterization of ARDL model into Error Correction Model (ECM) through a simple linear transformation by integrating short run adjustments with long run equilibrium without losing of long run information. This allows the employment of OLS regression to estimate the ARDL model and its associated ECM. According to Pesaran and Pesaran (1997), the first step of ARDL approach is to investigate the presence of any long run relationship between variables by using Bounds test, followed by the estimation of coefficient of long-run relationship through cointegration.

According to Nkoro and Uko (2016), most of the time series data are non-stationary (Difference Stationary Process [DSP]) rather than stationary (Trend Stationary Process [TSP]). This backed the reason of the employment of ARDL approach instead of OLS in this paper, where the use of DSP to estimate an econometric model can cause the OLS traditional diagnostic statistics⁵ that are used to evaluate the validity of the model estimates to be highly misleading and unreliable in terms of prediction and policy making. Furthermore, the mean, variance, covariance and autocorrelation functions of DSP can change over time, which will affect the long run development of the series, besides the assumption of constant mean and variances of OLS will be violated.

Notably, ARDL model is usually denoted with notation of lag length that is selected using proper model order selection criteria, for instance, Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) or Hannan-Quinn Criterion (HQC). In this paper, the optimum lag length for the models is determined based on AIC with maximum dependent lags of 4. The lag length of each model is presented as (p, q_1, q_2, q_3, q_4) , where p is the lag length for dependent variable while q_1 is the lag length for first independent variable and q_k is the lag length for k-th independent variable.

3.4.1.1 Unit Root Test

The presence of unit root is one of the sources of non-stationary in a model. A non-stationary stochastic process could be TSP or DSP as mentioned earlier. If the trend of variables under consideration is completely predictable and not varying, the time series is said to be trend stationary. In contrast, if the unpredictable variables are regarded as difference or integrated trend, representing mean of non-

⁵ The examples of traditional OLS diagnostic statistics are coefficient of determination (R^2), Fisher's Ratio (F-statistic), Durbin-Watson (DW-stat), t-statistic and etc.

stationary do not contribute to or impact the development of the time series in the long run (Nkoro & Uko, 2016). Hence, the stationarity of variables of interest should be confirmed to ensure that the empirical results may address the research objective (1) and (2) of this paper.

Stationary refers to the consistency of mean and variance remains over a specific time period. While unit root test is regarded as the best choice to determine the time series stationarity and unit root existence. Before estimating ARDL model, unit root test is carried out to ensure the stationarity in all of the variables is either at level, $I(0)$, or at first order, $I(1)$, and being fitted to the model. It is vital to ensure that non-stationary variables are not included in our model as such variables could produce misleading results which can totally affect the research outcome.

In general, time series with unit roots will imply an unpredictable trend that occurs systematically, which is not capable of providing absolute understanding behind the scene, thus problems incurred when it comes to statistical interpretation. According to Yule (1926), the absence of association between two $I(1)$ series, known as spurious correlation, can either lead to plus or minus one. While Granger and Newbold (1974) revealed that a regression of $I(1)$ series will produce a R^2 that is nearer to one.

Constant stationary and trend stationary models, are two alternatives that can be used to stimulate the procedure of unit root tests. Since both models provide different predictions, it is crucial for the researchers to select the suitable model for their studies. ADF test and PP test are the unit root tests that have been chosen to examine the research model under this study.

3.4.1.1.1 Augmented Dicky-Fuller (ADF) Test

ADF test as one of the unit root tests for stationarity is applied to examine the presence of a unit root in a time series sample. The null hypothesis indicates that a unit root exists in the variable, whereas alternative hypothesis refers to unit root absences in the variable. ADF test is better than Dickey-Fuller (DF) test as ADF test can handle a bigger or more complex set of time series models. The ADF statistic applied for the test is expressed in negative sign. Larger negative number implies higher possibility for rejecting the null hypothesis, indicating unit root occurrence at certain confidence level. If variable being rejected at constant level, it means that the variable is I(0). If the variable cannot be rejected at constant level, yet can be rejected at first difference, then the variable indicates I(1). In case the variable is not rejected at first difference, further rejection of the variable at second difference, I(2) is not supported because ARDL cointegration method will no longer applicable for this stage.

The DF test is carried out by determining the AR(1) equation, where the pure AR(1) process is written as:

$$y_t = \phi y_{t-1} + \epsilon_t \quad (3.3)$$

In order to test whether ϕ is equal to 1, y_{t-1} is being subtracted from both sides, forming the AR(1) model as below:

$$y_t - y_{t-1} = (\phi - 1)y_{t-1} + \epsilon_t \quad (3.4)$$

$$(3.5)$$

$$\Delta y_t = \delta y_{t-1} + \epsilon_t$$

where $\delta = \rho - 1$.

ADF test differs from DF test in the sense that ADF test allows higher-order AR dynamic, where the AR(p) model can be written as:

$$\Delta y_t = \delta y_{t-1} + \sum_{i=1}^p \beta \Delta y_{t-i} + \epsilon_t \quad (3.6)$$

Furthermore, the stationarity of each regressor can be tested by taking into account of the trend and/or intercept while adopting ADF test. Firstly, considering the intercept along with AR, the model can be illustrated as:

$$\Delta y_t = \alpha + \delta y_{t-1} + \epsilon_t \quad (3.7)$$

where, α indicates the drift or intercept in the AR.

Secondly, taking the intercept and trend into account with AR, the model is presented as:

$$\Delta y_t = \alpha + \delta y_{t-1} + \gamma t + \epsilon_t \quad (3.8)$$

where γt represents the time trend in the AR.

The subsequent steps of the DF test and ADF test shall be the same, where the null hypothesis may be written as:

$$H_0: \delta = 0$$

Then, evaluate the stationarity of each underlying variable using conventional t-ratio for δ :

$$t_\delta = \hat{\delta} / (se(\hat{\delta})) \quad (3.9)$$

where $\hat{\delta}$ is the estimate coefficient of δ , and $se(\hat{\delta})$ is the standard error of the coefficient.

If the t-ratio is larger than upper DF critical value, rejection of the null hypothesis cannot be executed, concluding that unit root presents in the regressor whereas in vice versa, the null hypothesis is rejected when t-ratio does not exceed the upper DF critical value, indicating that the variable is stationary.

3.4.1.1.2 Phillips-Perron (PP) Test

PP test examines the integration of time series. Almost like the ADF test, null hypothesis refers to the existence of a unit root in the variable. Additional to this, the variable should be rejected at constant level or at first difference, but not under second difference. PP test accounts for serial correlation by applying Newey-West estimator (1987). However, it does

not support any add on to the lagged difference term in the variables because it is a non-parametric test. PP test statistics built on DF statistics, and it is more powerful when autocorrelation and heteroscedasticity are unspecified in the disturbance process of equation model. PP test is appropriate for research in small sample size. Yet, an argument arisen by Davidson and MacKinnon (2004) as their findings reported that PP test does not perform well than ADF test in finite sample.

ADF test and PP test share the same test regression, which can also take into account either intercept (3.7) or both intercept and trend (3.8) along with the AR model that is presented as:

Similarly, the null hypothesis may be constructed as:

$$H_0: \delta = 0$$

Nevertheless, the t-statistic of PP test differentiates it from ADF test, as follows:

$$\tilde{t}_\delta = t_\delta \left(\frac{\gamma_0}{f_0}\right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\delta}))}{2f_0^{1/2}S} \quad (3.10)$$

where $\hat{\delta}$ refers to the estimated coefficient of δ , t_δ refers to the t-ratio of δ , $se(\hat{\delta})$ denotes the standard error of coefficient. In addition, γ_0 denotes the consistent estimate of the error variance in equation (3.5), while f_0 is an estimator of the residual spectrum at frequency zero.

If the t-statistic greater than upper DF critical value, the null hypothesis cannot be rejected, concluding that the variables possess a unit root. In

contrast, the null hypothesis is rejected when t-statistic does not exceed the upper DF critical value, indicating that the variable is stationary.

3.4.1.2 ARDL Bounds Test for Detecting Cointegration Relationship

Pesaran et al. (2001) had developed ARDL bounds testing approach, which is a cointegration method to test the cointegration between series integrated of different orders of less than (2). They further described Bounds testing as a methodology to test if the variables in ARDL model are having long run relationship. Therefore, the long-run equation (3.2) is possible to modify into the following autoregressive distributed lag function:

$$\begin{aligned} \Delta RET_t = & \beta_0 + \beta_1 EPU_{t-1} + \beta_2 OVX_{t-1} + \beta_3 OMR_{t-1} + \beta_4 EXC_{t-1} \\ & + \sum_{p=1}^{n1} \theta_1 \Delta EPU_{t-p} + \sum_{p=1}^{n1} \theta_2 \Delta OVX_{t-p} + \sum_{p=1}^{n1} \theta_3 \Delta OMR_{t-p} \\ & + \sum_{p=1}^{n1} \theta_4 \Delta EXC_{t-p} + \mu_t \end{aligned} \quad (3.10)$$

where Δ denotes the difference operator, β_0 refers to the constant term that may include intercept term, a linear trend, or both, and μ_t refers to the residual of the ARDL model.

Following that, the null hypothesis is constructed to detect the occurrence of long run relationship, as follows:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

which means the independent and dependent variables do not have long run relationship. Subsequently, Wald F-test is applied to examine whether the normalized long-run coefficients ($\beta_1, \beta_2, \beta_3, \beta_4$) are jointly significant. When Wald F-statistic is larger than the upper bound critical value, the model contains cointegration. In other words, long-run relationship exists between the variables.

This paper adopts this approach due to its numerous advantages over the classical cointegration tests, for instance, Engle-Granger (1987) or Johansen's (1991, 1995) method. Firstly, ARDL approach is applicable regardless of the regressors' integration order in the model, whereas the traditional approaches mentioned above demand all variables to be I(1) or demand specification of whether the underlying variables are I(0) or I(1). Secondly, procedure to run bounds test is easy and fast as compared to the traditional multivariate cointegration techniques (Frimpong & Oteng-Abayie, 2006). Thirdly, ARDL bounds testing approach is better and able to generate consistent results for small sample size which includes both short run and long run dynamics (Haug, 2002).

3.4.1.3 ARDL Cointegration and Long Run Form

Following the ARDL bounds test is the ARDL cointegration and long run form. As mentioned earlier, most of the time series are DSP, but after differencing, many time series variables become stationary. However, the use of differenced in variables can result in missing of relevant long run characteristics of equilibrium relationship. Hence, cointegration is needed to extract relevant long run information of the relationship that being lost on differencing and thus, providing the basis of obtaining realistic and efficient estimates which drives a meaningful forecast and policy implementation (Nkoro and Uko, 2016).

3.5 Diagnostic Checking

There are three crucial tests to be conducted to verify the specification of ARDL model, including Breusch-Godfrey Serial Correlation LM test, ARCH test and RESET test. Besides that, it is also needed to include CUSUM and CUSUMSQ tests.

3.5.1 Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey was introduced after Trevor S. Breusch and Leslie G. Godfrey. Breusch-Godfrey test is used to find out the serial correlation from the errors of a regression model by estimating their test statistic. It is statistically stronger as compared to Durbin's h-statistic. Moreover, Durbin-Watson Test can only detect first-order autoregressive model while Breusch-Godfrey (BG) test can detect higher order of serial correlation as well as lagged dependent variable (Gujarati & Dawn, 2009).

The auxiliary regression model is constructed from equation (3.10):

$$\hat{\mu}_t = c_0 + c_1 x_t + \rho_1 \hat{\varepsilon}_{t-1} + \rho_2 \hat{\varepsilon}_{t-2} + \dots + \rho_p \hat{\varepsilon}_{t-p} + v_t \quad (3.11)$$

where $\hat{\mu}_t$ is the error term of ARDL model at period t , x_t denotes the vector of explanatory variables, and v_t denotes the white noise error term.

The null hypothesis is displayed as below:

$$H_0 = \rho_1 = \rho_2 = \dots = \rho_p = 0$$

which means that serial correlation problem does not exist in the model. LM test is then conducted to study the independence of $\hat{\mu}_t$ to the lagged residuals $(\rho_1, \rho_2, \dots, \rho_p)$. If the LM test statistics nR^2 is greater than the chi-square critical value with p degrees of freedom, indicating that the null hypothesis should be rejected, concluding that the model faces serial correlation problem.

3.5.2 Autoregressive Conditional Heteroskedasticity (ARCH) Test

Heteroscedasticity problem can be detected by using ARCH test. According to Eagle (1982), Langrage Multiple (LM) test is used to examine the significance level of ARCH effect in order to test whether heteroscedasticity exists in the residual or not. ARCH test attempts to model the variance of error terms. On the other hand, the problem of the result for heteroscedasticity can be corrected by using ARCH test. Besides, the asset return volatility can also be forecasted through ARCH models (Degiannakis & Xekalaki, 2004), as well as to forecast the time varying confidence intervals, financial time series analysis, to evaluate the price of an option and to obtain more efficient estimators.

According to Engle (1982), to determine the presence of ARCH effects in residuals, an auxiliary model, ARCH(q) model, is constructed:

$$\hat{\mu}_t^2 = \alpha_0 + \theta_1 \hat{\mu}_{t-1}^2 + \theta_2 \hat{\mu}_{t-2}^2 + \dots + \theta_q \hat{\mu}_{t-q}^2 + e_t \quad (3.12)$$

where $\hat{\mu}_t^2$ is the estimated error variable, α_0 is the constant term, and e_t is the white noise error term.

The null hypothesis is formed as below:

$$H_0 = \theta_1 = \theta_2 = \dots = \theta_q = 0$$

which tells that the $\hat{\mu}_t^2$ of equation 3.12 is constant, that is, the model does not face heteroscedasticity problem. Similar to LM test for serial correlation, when the LM test statistics nR^2 is larger than the chi-square critical value with q degrees of freedom, it is subjected to the rejection of the null hypothesis, concluding that the model faces heteroscedasticity problem.

3.5.3 Ramsey Regression Equation Specification Error Test (RESET) Test

Ramsey RESET test referred to a test of linear specification error against a non-linear specification suggested by Ramsey (1969). In general, RESET is used to examine the four types of specification errors, such as the omission of variable, misspecification of functional form, simultaneous equation errors and simple heteroscedasticity (Ramsey, 1969). Apart from other model specification tests, Ramsey RESET test can also be used to test for a non-zero mean of the error term. The easy implementation of Ramsey RESET test and the fact that it employed F-statistics makes it popular to be used (DeBenedictis & Giles, 1998).

For the sake of determining the presence of specification error in the model, we first have to consider the model presented below:

$$\hat{y} = E(y|x) = \beta x \quad (3.12)$$

Then, Ramsey RESET test will be carried out to examine whether $(\beta x)^2$, $(\beta x)^3$, $(\beta x)^4$ and $(\beta x)^5$ is able to explain the dependent variable. Subsequently, the test is executed by estimating the following linear regression expanded from equation (3.10):

$$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \dots + \alpha_k x_k + \pi_1 \hat{y}^2 + \pi_2 \hat{y}^3 + \dots + \pi_{r-1} \hat{y}^r + \varepsilon \quad (3.13)$$

where α denotes the value of unknown parameter for independent variable, \hat{y} is the fitted values from estimating equation (3.10), and π represents the vector of unknown parameters for the fitted value.

The null hypothesis is constructed as following:

$$H_0 = \pi_1 = \pi_2 = \dots = \pi_{p-1} = 0$$

which indicates that the model is correctly specified. Subsequently, RESET test is employed to evaluate the coefficients of expanded model (3.13). If the F-statistic is greater than the chi-square critical value with $r - 1$ degrees of freedom, we should reject the null hypothesis, otherwise, do not reject.

3.5.4 CUSUM and CUSUM of Squares Tests

The CUSUM and CUSUMSQ tests are applied to determine the model structural stability at critical bounds in accordance with the analysis of the scaled recursive residuals. The adoption of these two tests is advantageous over the Chow (1960) tests in the sense that they do not require advanced knowledge of the point at which the hypothesized structural break takes place (Turner, 2010).

The CUSUM test statistic for test structure change is given by:

$$W_t = \sum_{r=k+1}^t \frac{w_r}{s}, \quad \text{for } t = k + 1, \dots, T \quad (3.14)$$

where k denotes the number of coefficients in the model, w refers to the recursive residual terms and s denotes the standard deviation of the recursive residual terms.

Given the estimates of coefficients are stable across the period, the expected value of W_t will be zero. However, as the estimates change over time, the expected value of W_t might run away from zero. If the W_t exceeds the parallel of 95% critical bounds significantly, the parameter variances are said to be unstable.

On the other hand, the CUSUMSQ test is applied to examine the stability of error variance within the observed period. The test statistics of the CUSUMSQ test presented as:

$$S_t = \frac{\sum_{r=k+1}^t w_r^2}{\sum_{r=k+1}^T w_r^2}, \quad \text{for } t = k + 1, \dots, T. \quad (3.15)$$

where the expected value of S_t is as below:

$$E(S_t) = \frac{t - k}{T - k} \quad (3.16)$$

which ranges from 0 ($t = k$) to 1 ($t = T$). Similar to CUSUM test, if S_t falls within the parallel of 95% critical bounds, we can conclude that the error variances are stable.

3.6 Chapter Summary

This chapter revealed the data sources and methodology adopted for analysis purpose. This research applies ARDL methodology to analyse the long run relationship between Malaysian stock market return and EPU in the US and China, oil market uncertainty, exchange rates and interest rates. All variables are expressed in log form. The following chapter will discuss about the empirical results.

CHAPTER FOUR: DATA ANALYSIS

4.0 Introduction

This chapter depicts the results obtained from the methodology introduced in chapter three. The structure of this chapter includes section 4.1 which shows the results of unit root test, followed by section 4.2 and 4.3 that revealed the existence of and information of the long run relationship between stock market returns and its determinants where the results will be interpreted and explained. Moreover, section 4.4 discusses about the results of diagnostic tests while section 4.5 summarizes the contents of this chapter.

4.1 Unit Root Test

The analysis begins by running the unit root test for all variables using ADF test and PP test. Null rejection implies that the particular variable is stationary. Table 4.1.1 and Table 4.1.2 summarize the generated outcome of ADF and PP test at both level and first difference form for all variables respectively, as well as take into account the intercept and trend with the AR.

Table 4.1.1: Augmented Dickey-Fuller (ADF) Test Results

Variables	Augmented Dickey-Fuller (ADF) Test			
	Intercept		Trend and Intercept	
	Level	First Difference	Level	First Difference
EPUUS	-11.46715*** (0.0000***)	-11.65507*** (0.0000***)	-11.45207*** (0.0000***)	-11.63137*** (0.0000***)
EPUC	-16.33545*** (0.0000***)	-7.844845*** (0.0000***)	-16.32291*** (0.0000***)	-7.890842*** (0.0000***)
OVX	-10.65400*** (0.0000***)	-13.51701*** (0.0000***)	-10.62421*** (0.0000***)	-13.47852*** (0.0000***)
OMR	-2.448291 (0.1306)	-6.469148*** (0.0000***)	-2.662112 (0.2541)	-6.490444*** (0.0000***)
NEER	-1.087807 (0.7196)	-9.081270*** (0.0000***)	-1.825605 (0.6871)	-9.059256*** (0.0000***)
REER	-1.409344 (0.5761)	-9.811756*** (0.0000***)	-2.176862 (0.4983)	-9.783657*** (0.0000***)

*Notes: *, **, *** represent rejection of null hypothesis at 10%, 5% and 1 % significance level, respectively. P-value is written in parentheses. Lag length selection for ADF test is based on Schwarz Info Criterion (SIC) and the maximum lags implemented is 13.*

Based on the ADF and PP test results, at the level form, the null hypothesis for EPUC, EPUUS and OVX are rejected at 1% significance level, taking into account of the intercept or both trend and intercept with the AR, indicating that they are stationary and are I(0) regressors. Apart from that, OMR, NEER and REER are considered as I(1) regressors as their respective null hypotheses are rejected at 1% significance level when taking into account of the intercept as well as trend and intercept only at first difference form in both unit root tests. The results from both ADF and PP test are consistent with each other.

To conclude, unit root tests at this stage confirmed the inclusion of only I(0) and I(1) regressors, which is permitted in ARDL model. Therefore, bounds test can be proceeded to detect the presence of long run relationship between the variables.

Table 4.1.2: Phillips-Perron (PP) Test Results

Variables	Phillips-Perron (PP) Test			
	Intercept		Trend and Intercept	
	Level	First Difference	Level	First Difference
EPUUS	-21.06353*** (0.0000***)	-73.50358*** (0.0001***)	-21.09090*** (0.0000***)	-72.76843*** (0.0001***)
EPUC	-18.24472*** (0.0000***)	-40.44339*** (0.0001***)	-18.20640*** (0.0000***)	-40.32011*** (0.0001***)
OVX	-10.59859*** (0.0000***)	-58.22531*** (0.0001***)	-10.56698*** (0.0000***)	-64.71067*** (0.0001***)
OMR	-2.063405 (0.2599)	-6.377024*** (0.0000***)	-2.257609 (0.4538)	-6.386534*** (0.0000***)
NEER	-1.044921 (0.7360)	-9.107077*** (0.0000***)	-1.703016 (0.7450)	-9.083298*** (0.0000***)
REER	-1.341294 (0.6091)	-9.719097*** (0.0000***)	-1.938274 (0.6291)	-9.686027*** (0.0000***)

*Notes: *, **, *** represent rejection of null hypothesis at 10%, 5% and 1 % significance level, respectively. P-value is written in parentheses. The bandwidth selection is based on Newey-West Bandwidth using the Bartlett kernel method for PP test.*

4.2 ARDL Bounds Testing

As shown are the four models formulated in this paper. As to address the second specific objective of this study, which is to compare the impact of EPU in the US

and China on Malaysian stock market, model (1) and (2) were formed while model (3) and (4) were formed for robustness checking.

$$\widehat{RET}_t = \widehat{\beta}_0 + \widehat{\beta}_1 EPUUS_t + \widehat{\beta}_2 OVX_t + \widehat{\beta}_3 OMR_t + \widehat{\beta}_4 NEER_t + \widehat{\epsilon}_t \quad (1)$$

$$\widehat{RET}_t = \widehat{\beta}_0 + \widehat{\beta}_1 EPUC_t + \widehat{\beta}_2 OVX_t + \widehat{\beta}_3 OMR_t + \widehat{\beta}_4 NEER_t + \widehat{\epsilon}_t \quad (2)$$

$$\widehat{RET}_t = \widehat{\beta}_0 + \widehat{\beta}_1 EPUUS_t + \widehat{\beta}_2 OVX_t + \widehat{\beta}_3 OMR_t + \widehat{\beta}_4 REER_t + \widehat{\epsilon}_t \quad (3)$$

$$\widehat{RET}_t = \widehat{\beta}_0 + \widehat{\beta}_1 EPUC_t + \widehat{\beta}_2 OVX_t + \widehat{\beta}_3 OMR_t + \widehat{\beta}_4 REER_t + \widehat{\epsilon}_t \quad (4)$$

Table 4.2 demonstrates the results of ARDL Bounds test, which its role is to examine the presence of long run relationship among the variables of interest. Rejection of the null hypothesis symbolizes the existence of long run relationship.

Table 4.2: ARDL Bounds Test Results

Critical Value	Lower Bound, I(0)		Upper Bound, I(1)	
1%	3.74		5.06	
5%	2.86		4.01	
10%	2.45		3.52	
Model	(1)	(2)	(3)	(4)
F-statistics	27.49485***	26.92894***	27.41649***	27.15654***
k	4	4	4	4
Result	Cointegrated	Cointegrated	Cointegrated	Cointegrated

*Notes: *, **, *** indicates that the model is cointegrated at 10%, 5% and 1% significance level. The lag length selection for model (1) is (1, 1, 0, 1, 2); model (2) is (1, 2, 0, 1, 0); model (3) is (1, 1, 0, 1, 2) and model (4) is (1, 2, 0, 1, 0).*

According to Table 4.2, the F-statistics for all of the models are larger than the upper bounds of the critical value at 1% significance level, hence, reject the null hypothesis. Therefore, there is sufficient evidence to conclude that the models are cointegrated.

4.3 ARDL Cointegration and Long Run Form

Table 4.3 displayed the long run relationship among the variables of stock market return models of this study.

Table 4.3: Long Run Coefficient of ARDL Approach Results

Model	(1)	(2)	(3)	(4)
Long-Run Relations:				
EPU	-0.063541 (0.0068***)	-0.034707 (0.0302**)	-0.062583 (0.0075***)	-0.034902 (0.0291**)
OVX	-0.050463 (0.0085***)	-0.057863 (0.0025***)	-0.050673 (0.0086***)	-0.057273 (0.0027***)
OMR	-6.712727 (0.0001***)	-6.453165 (0.0002***)	-6.890849 (0.0001***)	-6.517635 (0.0002***)
EXC	-0.954584 (0.7848)	-1.073422 (0.7572)	-2.009813 (0.6518)	-2.446229 (0.5759)
Constant	11.650673 (0.4720)	11.947755 (0.4588)	16.642881 (0.4190)	18.275660 (0.3671)

*Notes: *, **, *** represent null rejection at 10%, 5% and 1 % significance level, respectively. P-value is written in parentheses. The lag length selection for model (1) is (1, 1, 0, 1, 2); model (2) is (1, 2, 0, 1, 0); model (3) is (1, 1, 0, 1, 2) and model (4) is (1, 2, 0, 1, 0).*

In light of the results from table 4.3, EPU in the US and China affects Malaysian stock market returns negatively in the long run at 1% and 5% significance level respectively. More precisely, for every 1% increase in EPU in the US, on average, Malaysian stock market return will decrease by 0.063541%, holding other variables constant; for every 1% rise in EPU in China, on average, Malaysian stock market return will drop by 0.034707%, ceteris paribus. As if the exchange rate indicator is changed to REER instead of NEER, for every 1% increment in EPU in the US, on average, Malaysian stock market return will drop by

0.062583%, *ceteris paribus*; for every 1% rise in EPU in China, on average, the stock market return will decline by 0.034902%, holding other variables constant. It can be seen that the change in EPU in the US imposes greater impact on Malaysian stock market return. This finding is in conformity with the findings of Arouri et al. (2014) which mentioned that effect of EPU on stock market return is more significant when the uncertainty is originated from the US than from China. As well, Zhang et al. (2019) through their study pointed out that the EPU in the US imposes greater contributions to global stock market due to its more internationalised stock market.

Moreover, the negative sign of OVX coefficient indicates that OVX can influence Malaysian stock market return adversely in the long run at a significance level of 1%. Using NEER as exchange rate indicator, for every 1% increase in OVX, on average, Malaysian stock market return is going to reduce by 0.050463%, holding other variables remain unchanged; for every 1% rise in OVX, on average, the stock market return will decrease by 0.057863%, *ceteris paribus*. While replacing NEER with REER, for every 1% increase in OVX, on average, Malaysian stock market return will drop by 0.050673%, *ceteris paribus*; for every 1% OVX increment, on average, the stock market return in going to decline by 0.057273%, holding other variables constant. These results are in line with the expectation that high oil price uncertainty tends to influence Malaysian stock market return negatively, as well as consistent with empirical results shown in Xiao et al. (2018), which proved that the relationship between oil price volatility and stock market returns is negatively significant.

Apart from that, negative coefficient of OMR implies that an increase in OMR will lead to a significant decrease in stock market returns. From table 4.3, in the case of examining the impact of EPU in the US on Malaysian stock market return while using NEER as an indicator for exchange rate, for every 1% increase in OMR, on average, Malaysian stock market return will decline by 6.712727%, holding other variables constant; as NEER is replaced by REER, for every 1% increase in OMR, on average, the stock market return will drop by 6.890849%, *ceteris paribus*. In the case of determining the influence of EPU in China on

Malaysian stock market return while using NEER as exchange rate indicator, for every 1% rise in OMR, on average, the stock market return will reduce by 6.453165%, *ceteris paribus*; while using REER as exchange rate indicator, for every 1% increase in OMR, on average, the stock market return will decline by 6.517635%, holding other variables remain unchanged.

The coefficient of exchange rate, for both NEER and REER, are found to be adversely influencing the stock market return, however, the impact is insignificant. In the case of examining impact of EPU in the US on Malaysian stock market return, on average, for every 1% increase in NEER, stock market return will decline by 0.954584%, *ceteris paribus*; for every 1% increase in REER, stock market returns will drop by 2.009813%, holding other variables constant. While in the extent of determining the influence of EPU in China on Malaysian stock market return, on average, for every 1% increase in NEER, stock market return will decrease by 1.073422%, holding other variables remain unchanged; for every 1% increase in REER, stock market return will reduce by 2.446229%, *ceteris paribus*.

To ensure the reliability of the results obtained, robustness checking has been conducted by interchanging NEER with REER while determining the effect of EPU in the US and China and OVX on Malaysian stock market return. Results indicate that the use of neither of the exchange rate indicators have any effects on the negativity and significance of both EPU in the US and China, as well as OVX and OMR, where these variables remain significant and impose negative influence on the stock market return.

4.4 Diagnostic Checking

Table 4.4.1 and Table 4.4.2 demonstrate the diagnostic tests conducted to ensure efficiency of the models. The diagnostic tests include Breusch-Godfrey Serial Correlation LM test, ARCH test, Ramsey RESET test, as well as CUSUM and CUSUMSQ tests.

Table 4.4.1: Diagnostic Checking Results

Model	(1)	(2)	(3)	(4)
Diagnostic Checking:				
ECT(-1)	-1.012944 (0.0000***)	-1.042561 (0.0000***)	-1.009101 (0.0000***)	-1.043504 (0.0000***)
LM(2)	1.085001 (0.5813)	0.318967 (0.8526)	0.918715 (0.6317)	0.306530 (0.8579)
ARCH(1)	0.991050 (0.3195)	0.936931 (0.3331)	0.862011 (0.3532)	0.947193 (0.3304)
Ramsey RESET(1)	1.075548 (0.3017)	0.164673 (0.6856)	0.871702 (0.3523)	0.159146 (0.6906)
CUSUM	S	S	S	S
CUSUMSQ	S	S	S	S

Notes: P-value is written in parentheses. Assume lag length selection for LM test, ARCH test and Ramsey RESET test are 2, 1 and 1, respectively. The letter 'S' denotes stable estimates for CUSUM and CUSUMSQ tests.

Table 4.4.1 displays the results of Error Correction Term (ECT), serial correlation, heteroscedasticity, model specification and structural stability test. Firstly, the ECT is referred to as the deviation (error) from a long run equilibrium that affects its short-run dynamics. It is widely used to directly measure the speed at which the dependent variable returns to its equilibrium when there is a change in other variables. The generated outcomes for each model are 1.012944, 1.042561, 1.009101 and 1.043504 respectively, expressed in negative sign, and are all

significant at 10%, 5% and 1% significance level. It can be interpreted as the short-run will adjust 101.2944%, 104.2561%, 100.9101% and 104.3504% per year respectively to achieve their long-run relationship, where the errors of the variables are overcorrected by 1.2944%, 4.2561%, 0.9101% and 4.3504% respectively, in each time period.

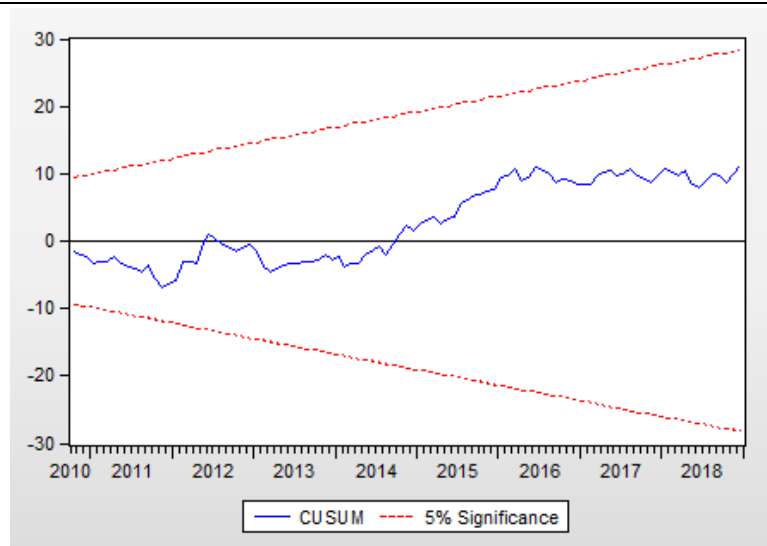
Besides, the LM test has proven that all of the models are not serially correlated as the null hypothesis of the models are not rejected, in which the p-values of chi-square distribution are greater than 10%, 5% and 1% significance level. Results also revealed that, through ARCH test, the p-values of chi-square distribution of every model are greater than 10%, 5% and 1% significance level, implying that there is no heteroscedasticity problem in the models. Furthermore, the null hypothesis for Ramsey RESET test are not rejected due to larger p-values of F-statistics than 10%, 5% and 1% significance level, thus concluding that the models do not suffer from any specification errors. In short, it is clear that the four models are all exempted from the problem of autocorrelation, heteroscedasticity and model misspecification.

In order to ensure the stability of the long run coefficients, CUSUM and CUSUMSQ tests were conducted and the results are presented in Table 4.4.2. It can be observed that even though the test statistics of CUSUM test deviated from zero, they still fall within the line of 5% significance level. Therefore, a conclusion that the estimated models are stable over the sampled period can be made.

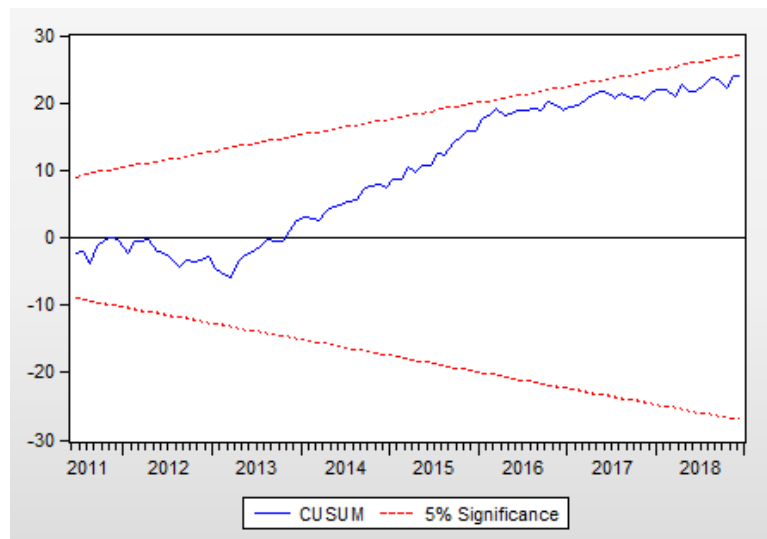
Table 4.4.2: CUSUM and CUSUMSQ Results

CUSUM

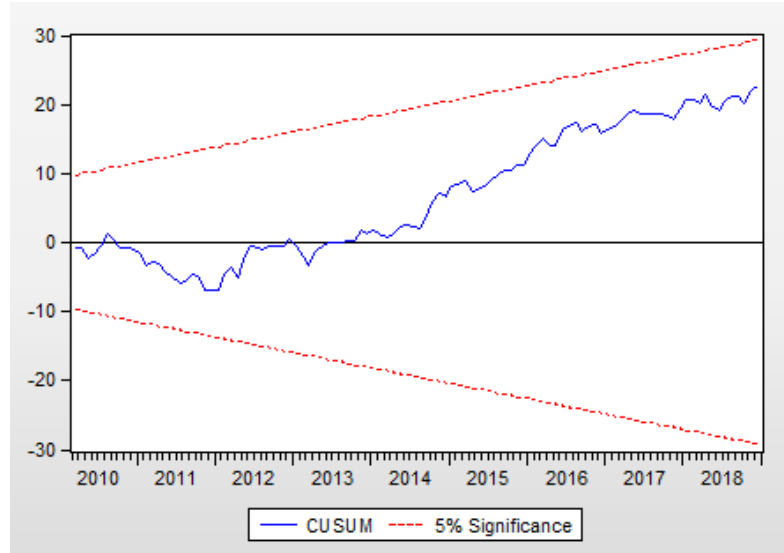
(1)



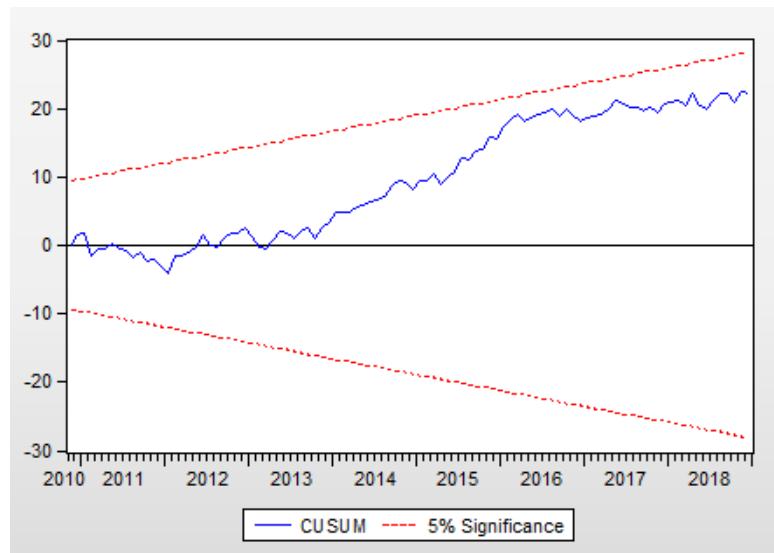
(2)



(3)

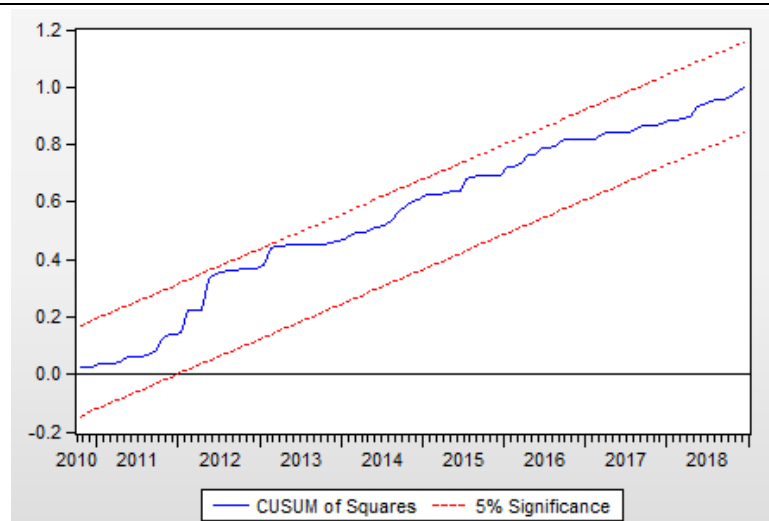


(4)

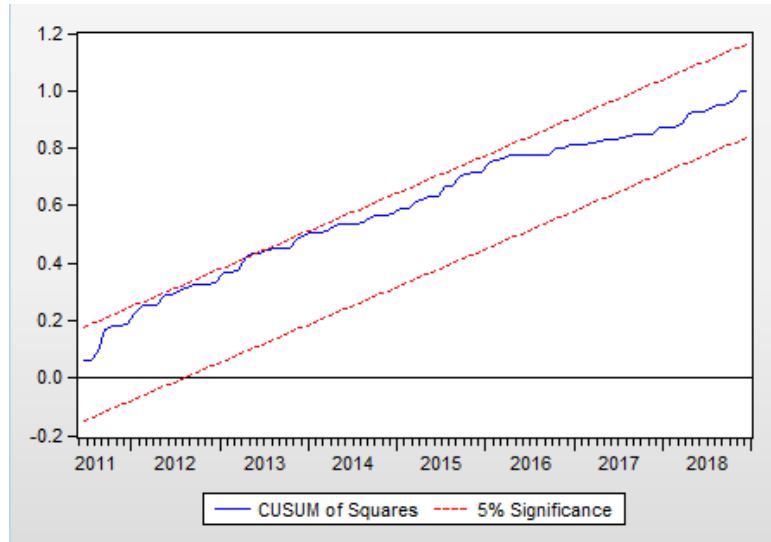


CUSUM of Squares

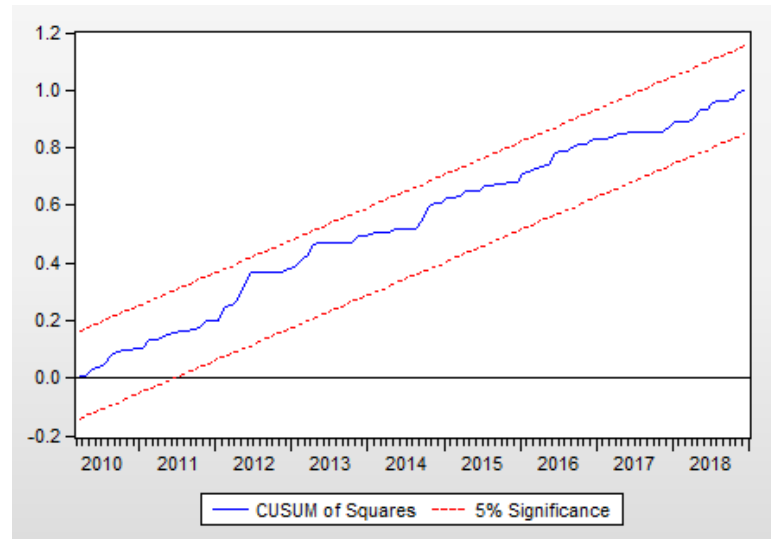
(1)



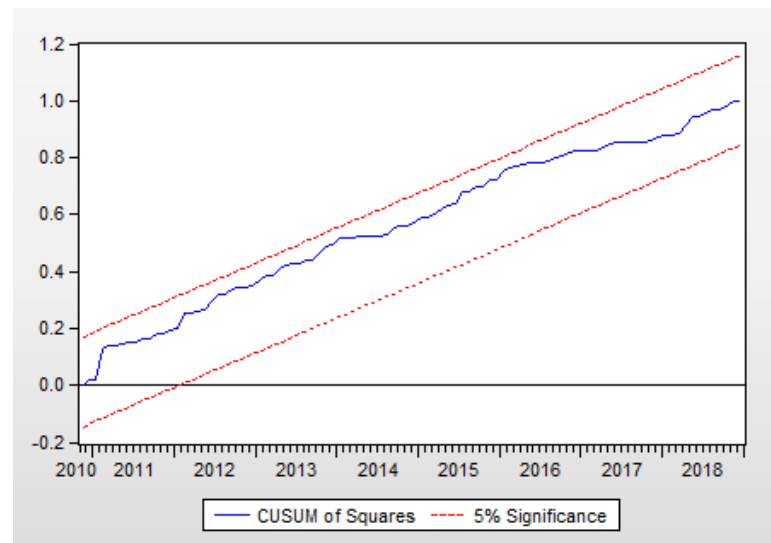
(2)



(3)



(4)



4.5 Chapter Summary

To conclude, unit root tests were conducted to confirm that the variables of interest are stationary at level and first difference only. Proceeding to the bounds testing, cointegration relationship is found to be existed between stock market returns, EPU, oil market uncertainty, exchange rates and interest rates. Furthermore, the information regarding the long run relationship is captured using the ARDL cointegration and long run form. From the findings above, all independent variables studied in this paper can influence the stock market return negatively and significantly, barring from the case where exchange rate was found to produce an insignificant effect. Subsequently, diagnostic testing was conducted; for instance, LM test and ARCH test proved that the models are free from serial correlation and heteroscedasticity problems respectively while the CUSUM and CUSUM of squares tests ensure the structural stability of the models. All empirical results were displayed and will be concluded in chapter five.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND IMPLICATION

5.0 Introduction

Following chapter reveals a detailed discussion about the factors and influence of this research based on the overall results and findings in previous chapters. Firstly, section 5.1 discusses and displays a summary of main findings, followed by the implications of study in section 5.2 to provide valuable insights for various related parties in addressing respective issues or problems. Lastly, in section 5.4, suggestions for future research will be presented in respect to the limitations of this study exhibited in section 5.3.

5.1 Discussion of Major Findings

To conclude, the major contribution of the current study is to determine the existence of long run relationship between EPU, oil market uncertainty and Malaysian stock market return; to extract comprehensive information of the long run relationship from the models formulated and subsequently, to compare the extent of influence of EPU in the US and China from May 2007 to December 2018. As such, ARDL approach is being applied, along with unit root test, bounds test, ARDL cointegration and long run form and various diagnostic tests.

By employing ARDL approach, the outcomes show that EPU in the US and China, oil market uncertainty and interest rates are significant in explaining Malaysian stock market return over long run period. Whereas, two different indicators of

exchange rate exert insignificant result towards Malaysian stock market return. The coefficients of all variables exhibit negative sign, implying that a rise in the independent variables can result in lower stock market returns.

US EPU and China EPU are found to impose a significant and negative effect on Malaysian stock market returns in accordance to the empirical results in this research. Both were illustrated to be significantly impacting the stock market returns in an adverse direction, yet the EPU in US shows greater impact on Malaysian stock market return as if compare to EPU in China. This implied that higher level of EPU in the US result in a lower Malaysian stock market return, which imposed greater magnitude of its impact than EPU in China. Consistent with the majority of existing studies, the relationship between EPU and stock market returns is found to be negative (Sum, 2012; Sum, 2013a; Bijsterbosch & Guérin, 2013; Arouri et al., 2016; Kang & Ratti, 2013; Christou et al., 2017; Guo et al., 2018; Chang et al., 2015; Rehman, 2017; Antonakakis et al., 2013; Sum, 2012; Sum, 2013a; Arouri et al., 2014; Dakhlaoui & Aloui, 2016; Li et al., 2015; Tiryaki & Tiryaki, 2018; Kang & Ratti, 2014; Christou et al., 2017; Ahmad & Sharma, 2018; Chen et al., 2017; Yang & Jian, 2016; Zhijun et al., 2017; Xiong et al., 2018; Yu et al., 2018; You et al. 2017; Guo et al., 2018; Mensi et al., 2014; Mensi et al., 2015; Sum, 2013b; Donadelli, 2014; Hoque & Zaidi, 2018; Balcilar et al., 2019). Moreover, our empirical results also show that EPU in the US could exert greater impact on stock market return in Malaysia as compared to the EPU in China. This result is consistent with the findings of Arouri et al. (2014) and Zhang et al. (2019). However, our result is contradicting with the theory proposed in Chapter 2, the General Equilibrium Model, which is adopted by Pástor and Veronesi (2013) which explains that higher EPU in the countries produces greater uncertainty. As such, investors would request for greater compensation, causing the risk premium to increase and thus cut back the implicit value of put protection by government.

In accordance with the results generated, OVX is found negatively affecting Malaysian stock market return. This implied that higher OVX can result in a lower

stock market return in Malaysia. Although there are only few researches being conducted on the connection of OVX with its impact towards stock market returns, yet a discovery of adverse relationship between OVX and Malaysian stock market return is similar to the outcomes of major findings of other researches (Dutta et al., 2017b; Luo & Qin, 2017, Xiao et al., 2018; Surya & Wibowo, 2018). Supportive reason is the rising of future oil price will cause inflation and led to low market liquidity which subsequently imposed a downward pressure on the share price (Du et al., 2010). Furthermore, a surge in oil prices will burden the production costs of goods and services, which resulted in lower profitability level and lesser future expected cash flow for a company or corporation. Subsequently, followed by a decline in the company's stock price (Apergis & Miller, 2009; Arouri & Nguyen, 2010). The research by Huang et al. (1996) studied about DCF approach also found that the increase of oil price would decrease aggregate stock return in case oil acts as an input material in the production of goods, which is corresponding with the findings by Du et al. (2010), Apergis and Miller (2009) and Arouri and Nguyen (2010). Thus, one of the independent variables, OVX can be explained with DCF approach as the approach can explain the relationship between oil and stock prices (Huang et al., 1996).

5.2 Implications of Study

Current research may bring great significance to Malaysian investors, as well as international investors who wish to invest in Malaysian stock market. The outcome of stock return can be well estimated based on the event occurrence of EPU and oil market uncertainty. Malaysian stock market is likely to be adversely influenced during the period of high-level economic uncertainty in China and the US. Facing high volatility in global oil prices, Malaysian stock market return is also found to be negatively impacted. Through information obtained from findings above, investors are able to decide the trading timing and strategy applied for their stock investment in order to reap higher return with lower risk exposure in the

stock market. Particularly for foreign investors, their intention to diversify their portfolio internationally can further minimize market risk. For portfolio managers from insurance companies, investment banks, mutual and pension funds, empirical results may have significant implications on their decision on investment strategies since they can inspect the determinants on stock market relationship in accordance with the market conditions. In case of a determination of bull market, it is certainly favourable to investors and fund managers; in case of a determination of bear market, they can choose to hedge the risk using alternative plan.

Stock market acts as a reflection on economic performance of a country. Hence, policymakers may capture implication on policy effectiveness from the findings. Policymakers are advised to take into consideration of global market condition such as high EPU in the US and China and high fluctuation period in oil price when making decisions for local policies. This is because such events can greatly affect Malaysian stock market and indirectly affecting market development through policies. Modification on policies must be considered occasionally due to varying market conditions. Policymakers should reduce the uncertainty about economic policy so as to mark down the potential risk in the stock market (Li et al., 2018). They could make use of the fiscal and monetary policies to adjust systematic risk exposure when the EPU index is predicted to be high due to future volatility in economic policies (Yu et al., 2018). During periods of oil market uncertainty, policymakers can adopt effective measures and strategies, such as increasing the usage of renewable energy as one of the possible schemes to reduce the oil price risk (Dutta et al., 2017b). According to Noor and Dutta (2017), government in emerging countries are advised to charge tax on fossil fuel usage for the purpose of encouraging the use of environmentally friendly energies. Policymakers are urged to foster domestic firms to improve energy efficiency by utilizing alternative sources with the purpose to prevent earnings and equity prices fluctuations (Maghyreh & Awartani, 2015). By designing and implementing proper policies, Malaysian economy is believed to achieve outstanding performance in the next decade, align with better expectation in future.

In addition, current finding contributes to future researches by providing researchers a synthesis on what have been done. A comprehensive study regarding current topic of the impact of EPU in the US and China as well as oil market uncertainty on Malaysian stock market return can provide researchers with deeper exploitation and exploration towards the stock market structure in Malaysia. Yet, researchers are encouraged to broaden their scope of study on current topic by investigating on the relationship between EPU, oil market uncertainty and financial markets.

5.3 Limitations of Study

Imperfection leads to improvement. Few limitations are being justified in this research and modifications will be further discussed in the next section. Since this research project examines the linkage between EPU in the US and China, oil market uncertainty and Malaysian stock return, the result is only applicable to one market sector, which is the stock market. Specifically, a sound financial market development is constituted of a variety of financial assets. Hence, the adoption of such related topic in different financial market sectors such as bond market can provide investors with better understanding in portfolio diversification and greater opportunity to grab higher return from their financial investment. A wise investment decision can be made by altering investment strategy between times.

Lack of investigation for EPU index in more countries in regard to this topic might limit the research evidence. The measurement of EPU is mainly focused on two superpowers in this world, which are the US and China, whilst overlook EPU indexes in other countries. Well-developed countries such as European, Japan, Australia and others, who play also dominant position in leading the pace of global economic growth. With the intention to avoid the illegibility of focal point in this research, the EPU indexes in some other countries are being discarded. Thereby, this study comes out with a selection within two countries, which the

political uncertainty in both countries that most likely bring significant impact towards Malaysian stock return. Yet, such selection might lead to a problem, as the result might not fully capture on how the Malaysian stock return being affected.

Apart from that, this study measures the stock market return in Malaysia by using FTSE KLCI index as its proxy. However, a questionable statement arises of using KLCI index to measure Malaysian stock return, considering the inclusion of variety of supplementary stock indexes that can also be used in this case. Since KLCI index measures only top 30 listed companies among all other listed companies, therefore it might not able to capture the picture as a whole. Besides, these companies comprise of various sectors which include construction, finance, trading and services, plantation and etcetera. Thus, there is a possibility that companies from different sectors might react in different way towards independent variables.

5.4 Recommendations for Future Research

Recommendation deems as resolution for limitation, associated with its objective to avoid the occurrence of repeated mistakes. Stock market contributes a center role in this investigation, yet there are increasing interest among investors who trade in different asset markets, following the current trend of financial market development. Based on Balcilar, Gupta, Kyei and Wohar (2015), they examined the impact of EPU differentials on US dollar-based exchange rate returns for sixteen developed and developing countries. The correlation between US EPU and US against Japan foreign exchange rate is also being studied by Kurasawa (2016). On the other hand, the relationship between crude oil price movement and bond market return was investigated (Kang, Ratti, & Yoon, 2014; Nazlioglu, Gupta, & Bouri, 2019). As a result, the impact of EPU and oil market uncertainty on Malaysian financial market such as bond market and foreign exchange (FOREX)

market is suggested for future researches. This is because the markets suggested may turn into favourite assets market for investors to expand their trading opportunities by having more choices as their trading instruments. It enables investors to manage their investment risk through portfolio diversification. If the stock market volatility is high, they can invest at other financial asset markets.

For future researchers, they can run data for broader coverage, using EPU index in other countries or using global EPU index. This allows future researchers to make a comparison in depth among those selected countries, to what extent the impact of EPU indexes, differ one from another, towards the Malaysian stock market return. For instance, the EPU index in Japan, in some degree, might bring impact towards Malaysia economy. The linkage on whether EPU in Japan can also greatly influence the Malaysian stock market, its effect is yet to study.

A suggestion on stock index restriction is that future researchers can use other stock indices to measure the stock market return which able to provide better match with their area of research. More to say, KLCI index might not be the perfect indicator in measuring the Malaysian stock return since there are still a lot of other Malaysia indexes that could be used, including Top 100 Index, ACE Index, Hijrah Shariah Index, EMAS Shariah Index, and Palm Oil Plantation Index. These indexes can be employed to measure the Malaysian stock returns in a more detailed and specific way as different indexes measure different scopes such as conventional, start-ups for SME enterprises, Shariah principles, and palm oil plantation.

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