STOCK MARKET INTEGRATION IN THE PRESENCE OF THE LEADING MACROECONOMIC INDICATORS: EMPIRICAL EVIDENCE FROM 30 COUNTRIES

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SULTAN IDRIS EDUCATION UNIVERSITY

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This declaration is made on the 13th day of August 2021.

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I, LIM SHU ERN, M20171000795, FAKULTI PENGURUSAN DAN EKONOMI hereby declare that the work entitled STOCK MARKET INTEGRATION IN THE PRESENCE OF THE LEADING MACROECONOMIC INDICATORS: EMPIRICAL EVIDENCE FROM 30 COUNTRIES is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledge is made explicitly in the text, nor has any part been written for me by another person.

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I ASSOCIATE PROFESSOR DR. NORIMAH BINTI RAMBELI@RAMLI hereby certifies that the work entitled STOCK MARKET INTEGRATION IN THE PRESENCE OF THE LEADING MACROECONOMIC INDICATORS: EMPIRICAL EVIDENCE FROM 30 COUNTRIES was prepared by the above named student, and was submitted to the Institute of Graduate Studies as a full fulfilment for the conferment of MASTER OF ECONOMICS (FINANCIAL ECONOMICS), and the aforementioned work, to the best of my knowledge, is the said student's work.

13 August 2021
_____
Date

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Signature of the Supervisor

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ABSTRACT

This study aims to determine the integration of stock markets in the presence of the leading macroeconomic indicators. Specifically, this study aims to determine the causal effect of the leading macroeconomic indicators on the stock market, the cointegration relationship between the stock market and the leading macroeconomic indicators, and the integration of stock markets across national borders. This study is underpinned by the information efficient market at semi-strong form. The data used in this study are from 30 countries based on the year 1995 quarter one to the year 2018 quarter one. The methods employed are Toda-Yamamoto causality analysis, Granger causality analysis, panel heterogeneous cointegration analysis and catching-up analysis. The findings show that the leading macroeconomic indicators have a causal effect on the stock markets, the stock market and leading macroeconomic indicators have a long-run and short-run cointegration relationship, and the stock markets across national borders are integrated especially during post-recession periods. Overall, the findings of this study show that the leading macroeconomic indicators may foster stock market integration. The policy implication from the findings of this study are, this study may help fund managers, investors, and investment agencies to predict changes in the stock market; this study may serve as an information guide to stakeholders to optimise stock market returns from investments; and this study may serve as a guide to help policymakers to develop a better economic policy in efforts to minimise the negative impact during financial turbulence.

INTEGRASI PASARAN SAHAM DALAM KEHADIRAN FAKTOR-FAKTOR PEMACU MAKROEKONOMI

ABSTRAK

Kajian ini bertujuan untuk mengkaji integrasi pasaran saham dengan adanya kehadiran faktor-faktor pemacu makroekonomi. Secara khususnya kajian ini ingin menentukan hubungan sebab-menyebab antara integrasi pasaran saham dengan faktor-faktor pemacu makroekonomi, hubungan kointegrasi antara integrasi pasaran saham dengan faktor-faktor pemacu makroekonomi, dan kebolehan integrasi pasaran saham. Untuk menyokong kajian ini, konsep maklumat kecekapan pasaran separa kuat digunakan. Kajian ini menggunakan data siri masa suku tahunan yang bermula dari 1:1995 sehingga 1:2018 daripada 30 buah negara. Analisis sebab-menyebab Toda-Yamamoto, analisis sebab-menyebab Granger, analisis heterogen kointegrasi panel dan analisis catching-up digunakan untuk mengkaji hubungan antara integrasi pasaran saham dengan faktor-faktor makroekonomi pemacu. Dapatan kajian ini menunjukkan bahawa faktor-faktor pemacu makroekonomi mempunyai hubungan sebab-menyebab dengan pasaran saham; pasaran saham dan faktor-faktor pemacu makroekonomi mempunyai hubungan kointegrasi jangka panjang dan jangka pendek; dan pasaran saham merentasi sempadan adalah berintegrasi terutamanya pada tempoh selepas kemelesetan ekonomi. Secara keseluruhan, dapatan kajian ini menunjukkan bahawa faktor-faktor pemacu makroekonomi dapat membantu pasaran saham untuk berintegrasi. Kesimpulannya, dapatan kajian ini menunjukkan bahawa faktor-faktor pemacu makroekonomi dapat membantu pasaran saham untuk berintegrasi. Implikasi dasar bagi kajian ini adalah kajian ini dapat membantu pengurus dana, pelabur dan agensi pelaburan untuk meramal perubahan dalam pasaran saham; kajian ini dapat berfungsi sebagai panduan maklumat kepada pihak berkepentingan untuk mengoptimumkan pulangan saham daripada pelaburan; dan kajian ini dapat berfungsi sebagai panduan untuk membantu pihak pembuat dasar untuk menghasilkan dasar ekonomi yang lebih baik dalam menangani impak negatif daripada krisis kewangan.

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LIST OF ABBREVIATIONS

ADF   Augmented Dickey-Fuller

APT   Arbitrage Pricing Theory

ARCH   Autoregressive Conditional Heteroscedasticity

ARDL   Autoregressive Distributed Lag

ASEAN   Association of Southeast Asian Nation

BIS   Bank of International Settlements

CAPM   Capital Asset Pricing Model

CD   Cross-section Dependency

CPI   Consumer Price Index

CUSUM   Cumulative Sum

CUSUMSQ   Cumulative Sum Square

ECM   Error Correction Model

EMH   Efficient Market Hypothesis

IFS   International Financial Statistic

IMF   International Monetary Fund

IPS   Im, Pesaran and Shin

JB   Jarque-Bera

KPSS   Kwiatkowski-Phillips-Schmidt-Shin

LLC   Levin Lin and Chu

LM   Lagrange Multiplier

MG	Mean Group
MW	Maddala and Wu
MWald	Modified Wald
PMG	Pooled Mean Group
PP	Phillip-Perron
RESET	Regression Specification Error
SIC	Schwarz Information Criterion
UK	United Kingdom
US	United States
VAR	Vector Autoregression

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CHAPTER 1

INTRODUCTION

Lately, the topic of stock market integration has caught the attention of many scholars (Aladesanmi, Casalin, & Metcalf, 2019; Hillier & Loncan, 2019; Mohti, Dionísio, Vieira, & Ferreira, 2019). Stock market integration as expressed by Gan et al. (2020) is a situation in which stock markets from different countries are closely associated with one another. In addition to that, stock market integration may refer to the movement of stocks without the influence of trade barriers or other physical restrictions across borders (Lane & Milesi-Ferretti, 2003). Stock markets are increasingly associated with one another beyond its national boundaries due to the financial liberalisation that encourages the buying and selling of stocks without restrictions. However, the leading

macroeconomic indicator refers to a macroeconomic factor that is used to forecast the economy because that variable changes first before other economic variables are influenced (Black, Hashimzade, & Myles, 2017). Various leading economic indicators have the potential to be adjusted to bring about an expansion in the economy via monetary policy (Bernanke, 2005).

This chapter provides an overview of the whole study. Section 1.2 discusses the background of the study, Section 1.3 elaborates the problem statement of the study, Section 1.4 states the questions to be answered in this study, Section 1.5 elaborates the hypotheses of this study, Section 1.6 elaborates the general and specific objective of this study, Section 1.7 explains the framework of this study, Section 1.8 defines the operational definition for the stock market and the leading macroeconomic indicators, Section 1.9 discusses a few limitations of this study, Section 1.10 explains the significance of this study and lastly, Section 1.11 concludes the discussion in this chapter.

1.2   Background of the Study

The stock market is an essential part of the economy, as it is through the stock market that companies obtain capital and this will help to boost the economic growth. According to Joseph, Larrain, and Turner (2017), the stock market is an important structure of the economy because economic activity and stock prices are interrelated. The stock market acts as a barometer to indicate the economic health of a country because the stock market are influenced by economic performances and the political

situation of a country (Jebran, Chen, Saeed, & Zeb, 2017). The stock markets of different countries have different financial policies and different development but somehow due to the interdependence of our economy the stock markets across countries are interconnected. This can be further supported by the fact that the global financial crisis in September 2008 started in the United States but the crisis spilled over to the stock markets across the world (International Monetary Fund, 2009). The stock market of the United States plays an important role in the global economy because it is the largest stock market in the world (World Bank, 2001). The United Kingdom's stock market played a crucial role the development of the European countries' economies (Narayanaswamy, Blitzer, & Carvajal, 2017). The stock markets in the developing countries have been rapidly growing and the International Finance Corporation (IFC) have been encouraging the development of the developing countries' stock markets (Ajit, 1991). Among the developing countries the Korean stock market is one of the fastest developing stock markets in the Pacific Basin (Kwon & Shin, 1999). Both the stock market in develop and the developing countries are important to our global economy.

The development of the stock market is important for the development of the economy, hence, a study on factors influencing the development of the stock market will contribute to the economy (El-Wassal, 2013). The macroeconomic factors that influences the United States' and Japan's stock market are output, inflation and interest rate (Humpe, & Macmillan, 2009). According to Kalam (2020), the Malaysian stock market are negatively influence by exchange rate and interest rate, and is positively influence by gross domestic product and inflation. Bilson, Brailsford, and Hooper, (2001) did a study on emerging markets and they found that in a few Latin American

stock markets (i.e., Argentina, Brazil, Colombia and Mexico) and Asian stock markets (i.e., Malaysia, Philippines and Thailand) the macroeconomic variables (i.e., inflation, output and exchange rate) does have a relationship with the stock markets. According to Wongbangpo and Sharma (2002), they found that in the ASEAN-5 countries (i.e., Indonesia, Malaysia, Singapore and Thailand) the output, inflation, interest rate and exchange rate can influence the stock markets and macroeconomic variables is able to be a useful tool in predicting the stock markets. The macroeconomic variables (i.e., output, inflation, exchange rate and interest rate) can contribute to the development of the stock markets in Czech Republic and Poland (Horobet & Dumitrescu, 2009). According to Masuduzzaman (2012), in a develop country (i.e., United Kingdom) the variables that showed short-run or long-run impact on the stock markets are inflation, exchange rate and gross domestic production. The macroeconomic variables are one of the catalyst in the development of the stock market.

The development of the stock markets across the world has led stock markets to be interdependent on one another. The following will explain how stock markets are integrated. Over the years, cross border financial flow has encouraged markets across national borders to be integrated (Kose, Prasad, Rogoff, & Wei, 2006). An example of stock market integration can be seen within the stock markets of the Asian countries, in which, economic efforts have been made within the Asian region to encourage the freely movements of capital within ASEAN countries (ASEAN, 2015). Marfatia (2020) suggested that the world stock markets can be globally integrated because economic policies across national borders are coordinated. In addition to that, Caporale, You, and Chen (2019) found that trading activities across the border and economic development have encouraged stock market integration within the Asian markets. The increase in

stock market integration within stock markets of different countries may have benefited the development of many economies. According to Baele, Ferrando, Hördahl, Krylova, and Monnet (2004), the integration of the stock market can encourage risk-sharing[1], efficiency in capital allocation and the ability to boost economic growth. In addition to that, according to Oprea and Stoica (2018), the integration of stock markets has encouraged many economic activities that can foster economic growth. However, stock market integration has made the economy vulnerable to financial turbulence and has been an obstacle to financial stability (Kose et al., 2006; Didier, Love, & Peria, 2010; Berger & Pukthuanthong, 2012). Furthermore, Büttner and Hayo (2011) argued that stock markets that are integrated are more susceptible to financial catastrophes.

In recent years, it has been an interest for many researchers to study the factors influencing stock market integration. According to Karolyi and Stulz (1996), the co-movement (i.e., integration) of stock market returns across countries can be explained by the contagion effect, in which, the enthusiasm or lack in a stock market can cause the same enthusiasm or lack effect in another market. This shows that an economic movement which impacts an individual stock market can cause an impact to closely associated stock markets which causes stock markets to move in unison. According to Hooy and Goh (2007), cross-border trading practices and trade deals between countries play an important role in the integration of stock markets. According to Caporale et al. (2019), the development in the individual stock market stimulates stock market integration across borders. The bilateral exchange rate is found to be able to stimulate the co-movement of stock markets (Mukherjee & Mishra, 2007). Chen, Chen, and Lee

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[1] According to Iwata and Wu (2009), risk sharing means shocks are shared and absorb together between associated markets.

(2014) mentioned that the changes in macroeconomic indicators of a frontier market can influence the stock market integration between frontier stock markets and leading stock markets. The changes in macroeconomic variables of a respective economy can influence its dependency with another economy, hence, this can explain how the integration between two stock markets can be influenced (Bracker, Docking, & Koch, 1999). The changes in macroeconomic indicators, such as gross domestic production, inflation and interest rate can trigger the integration of stock markets, especially during major economic events (Gkillas, Tsagkanos, & Vortelinos, 2019). The integration of stock markets across borders can be influenced by the movement of macroeconomic variables in individual countries.

This study includes output, inflation, interest rate and exchange rate as the leading macroeconomic indicators that influence the integration of stock markets. Output plays a central role in the stock market and has an explanatory power on stock market return (Fama, 1990). Output can be considered as a leading macroeconomic indicator because economist and policymakers have always relied on output (i.e., gross domestic product) to measure the economic activity and to forecast economic performance (Pritzker, Arnold, & Moyer, 2015). Inflation is an influential macroeconomic variable with regards to the stock market because inflation influences the purchasing power of consumer which can influence the ability to invest (Sathyanarayana & Gargesa, 2018). Inflation is chosen as a leading macroeconomic indicator because inflation can influence future consumption and economic activities, in which, has an impact on the stock market return (Chen, 2009).

Interest rate is one of the key macroeconomic factors in influencing the stock market returns because the stock market return is very sensitive to interest rate movements (Tangjitprom, 2012). In addition to that, interest rate is an important variable and can be considered as a leading macroeconomic indicator as most countries use interest rate to fine-tune the economy (Ball, 1997). The information gain from examining the relationship between the stock market and interest rate can be helpful to in asset allocation, handling risk and fine-tuning the economic policy (Ferrer, Bolós, & Benítez, 2016). Wong (2017) suggested that the exchange rate can be used by policymakers to predict stock market return. Exchange rate is chosen as a leading macroeconomic indicator because according to Reinhart, Kaminsky, and Lizondo (1998), the exchange rate can be used to provide useful and efficient information in forecasting economic activities. The following sections in this chapter will further elaborate on the focus of this study.

1.3   Problem Statement

This study is driven by two motivations. Firstly, this study is motivated by the fact that stock market integration may respond to information from the leading macroeconomic indicators. The early studies on the stock market have shown that the stock market may not be influenced by other variables (i.e., historical information, public information and private information) (Fama, 1965a; Fama, 1965b; Robert, 1967; Samuelson, 1965; Fama, 1991). However lately, there have been a number of studies on the macroeconomic factors influencing stock market but not the influence of leading macroeconomic indicators on stock market integration (Pilinkus, 2010; Ahmad &

Sharma, 2018; Pan & Mishra, 2018). The impact of the leading macroeconomic indicators on stock market integration is examined in this study because the leading macroeconomic indicators can serve as the key indicators in signalling the global economic trends, in which, is able to influence the global stock markets (Sagaert, Aghezzaf, Kourentzes, & Desmet, 2018). The forecasting power of the leading macroeconomic indicators are able to reflect future changes in stock markets and can help stakeholders in the decision-making process (Verstraete, Aghezzaf, & Desmet, 2020). Hence, the leading macroeconomic indicators can be a useful tool in examining the integration of stock markets across national borders. The changes in the leading macroeconomic indicators of a leading economy can have a significant impact not only on its stock market but also to stock markets that are closely associated to or integrated to its market (Hussain & Omrane, 2020). The interdependence of stock markets across national borders causes the stock markets to share common shocks leading from macroeconomic announcements (Fedorova, Wellenius, & Collan, 2014). The globalisation in financial markets has caused stock markets across borders to co-move, and this is due to the influence of macroeconomic indicators (Dickinson, 2000). With that said, this shows that movements in the leading macroeconomic indicators can have an impact on the stock markets of economies that are interdependent on one another.

Secondly, this study is motivated by the fact that stock markets across national borders can be integrated. The integration of stock markets across borders is not in line with the well-known investment theory (i.e., efficient market hypothesis) that states the stock market may not be influenced by any other factors because stock market prices fully reflect all information (Malkiel, 2003). However, due to the global interdependence and cross borders economic activities, there has been an increase in

the integration of stock markets across borders (International Monetary Fund, 2016). The increase in global economic activities has caused stock markets to experience common shocks, in which, implies that there is an integration of stock markets across borders (Heimonen, 2002). The economic uncertainty in a large economy does not only influence its stock market but can potentially cause a movement in global stock markets which indicates the existence of stock market integration (Marfatia, 2020). The regional trade agreements between countries of the same region have encouraged stock market integration within a region due to the interdependence between countries (Guesmi, Kaabia, & Abid, 2017). The integration of stock markets within each region have been growing stronger due to various economic activities within each region (Sehgal, Pandey, & Deisting, 2017). However, the stock markets tend to be more integrated during an economic turbulence because the stock markets are more interdependent due to the contagion effect[2] (Huyghebaert & Wang, 2010). Therefore, the stock markets are integrated with one another in this globalised era.

1.4 Research Questions

This section shows the question needed to be answered in this study. The research questions for this study are in agreement with the objectives of this study. The general research question is, are the stock markets integrated in the presence of leading macroeconomic indicators?.

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[2] Contagion results from the transmission of economic change from one stock market to stock market (Karolyi & Stulz, 1996; Kao, Zhao, Ku, & Nieh, 2019).

The following represents the specific research questions to this study:

1) Does the leading macroeconomic indicators have a causal effect on the stock market?

2) Does a cointegration relationship between the stock market and the leading macroeconomic indicators exist?

3) Does the integration of stock markets across national borders exist?

1.5 Hypotheses

The following are the null hypotheses of this research:

1) H_0: The leading macroeconomic indicators have no causal relationship with the stock market.

2) H_0: The leading macroeconomic indicators and the stock market do not have a cointegration relationship.

3) H_0: The stock markets across national barriers are not integrated.

1.6   Objectives

The general objective of this study is to determine the integration of stock markets in the presence of leading macroeconomic indicators based on 30 countries[3], namely, Argentina, Australia, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Finland, Hong Kong, Indonesia, Ireland, Italy, Japan, Malaysia, Mexico, New Zealand, Philippines, Poland, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom and the United States.

The specific objectives of this study are as follow:

1) To determine the causal effect of the leading macroeconomic indicators on the stock market.

2) To determine the cointegration relationship between the stock market and the leading macroeconomic indicators.

3) To determine the integration of stock markets across national borders.

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[3] The reasons to the 30 sample size are explained in Chapter 3, Section 3.3.

1.7   Framework of the Study
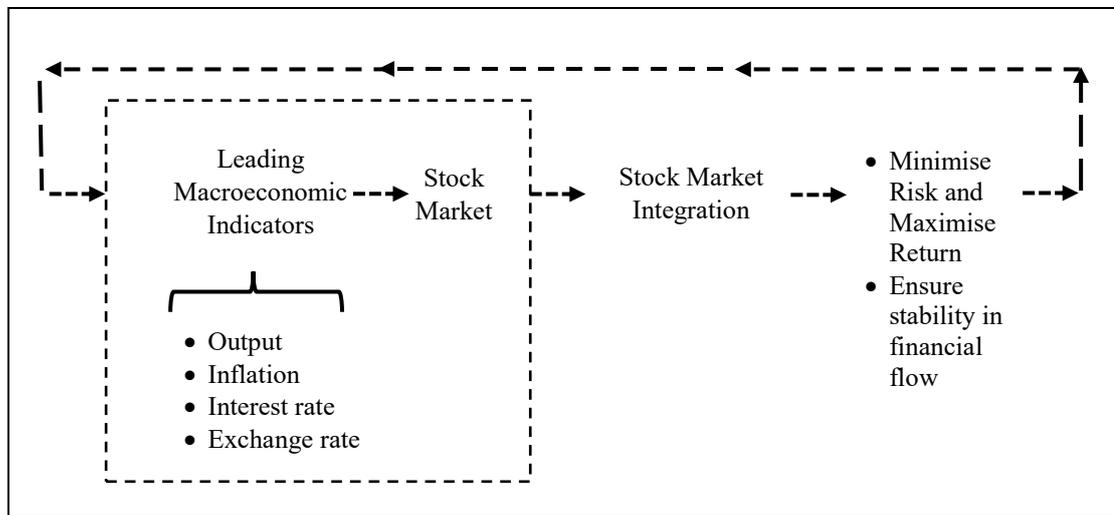
Figure 1.1. The Framework of the Relationship between Leading Macroeconomic Indicators, Stock Market and Stock Market Integration

The framework in Figure 1.1 is in line with the objective of this study. This study begins by analysing the relationship of the leading macroeconomic indicators, namely, output, inflation, interest rate and exchange rate on the stock market. In doing so, stakeholders are able to predict changes and trends in the stock market and optimise investment gains. After identifying the relationship between the stock market and the leading macroeconomic indicators, the integration between stock markets across national borders are determined. The integration of stock markets is examined based on different financial periods. The inference obtained from the study on stock market integration may serve as a guide to policymakers. The role of the leading macroeconomic indicators on stock market integration can be investigated by examining the causal and cointegration relationship between the stock market and the leading macroeconomic indicators, and integration of stock markets across national borders. This study may

help stakeholders to minimised risk and maximised returns, and help policymakers to ensure stability in the financial system.

1.8 Operational Definition

This section defines the variables used for this study. This section is to ensure the terms used for the study are well understood as meant by the researcher. The operational definition section defines the dependent variable (stock market) of this study and the independent variables (output, inflation, interest rate and exchange rate) of this study.

1.8.1 Stock Market

In this study, the stock market is measured by the stock market returns. The stock market returns refer to gains obtained from an increase in the value of capital or shares; and shares that are held by investors represents ownership to a company (Black et al., 2017). Hence, the decrease in stock market return means that the investor gain from the value of shares at a decreasing rate. In this study, the stock market return is calculated from the percentage change in the stock price index. The percentage change in the stock price index is then subtracted with the inflation rate to remove the influence of inflation, hence, resulting in the real stock market return. There are a few terms that are commonly misunderstood when it comes to this topic and they are stock exchange, stock market and stocks. The stock exchange refers to the physical organisation that facilitates the buying and selling of stocks, whereby, they set the rules that govern a

smooth trading process (Dodd, 2017a). The stock market refers to the platform where companies list their shares to be sold, therefore, the stock market represents all the listed companies. Stocks refer to shares that investors buy to gain ownership of a firm, hence, the owners of a company are shareholders (Black et al., 2017). The aims of shareholders are to maximise gains and minimise losses from stock market returns.

There are many factors that can contribute to the increase and decrease in stock market returns. The changes in stock market returns can be influenced by macroeconomic factors because the stock market is sensitive to the movements of economic activities (Li & Hu, 1998). To strengthen this point, Chen, Roll, and Ross (1986) explained that stock market returns can be influenced by economic variables because the stock market is sensitive to changes in the economic variables. The movement in stock market activities is influenced by announcements on public information. This statement can be supported by Mitchell and Mulherin (1994) in which they found a significant relationship between the stock market and the publicly announced information. The March 2020 stock market crash showed that investor's perspective on economic changes are factors that caused the stock market to deteriorate (Giglio, Maggiori, Stroebel, & Utkus, 2020). The March 2020 stock market crash was because of the Covid-19 catastrophe which caused a downturn in the economic activities, hence, causing stock markets to crash. Wei, Qin, Li, Zhu, and Wei (2019) showed that macroeconomic factors play an important role in influencing the stock market. The study on the changes in the stock market is an important study and can be benefited by stakeholders (Chun, Cho, & Ryu, 2020). Stakeholders can benefit by identifying factors that influenced the stock market returns.

1.8.2 Output

Nalewaik, Diebold, and Landefeld (2010) stated that output can be measured via the gross domestic product as well as gross domestic income, however, in this study output is measured by gross domestic product. According to Black et al. (2017), gross domestic product refers to the value of goods and services produced from activities within local borders. This means that gross domestic product accounts for the value in goods and services of foreign companies that resides within the borders of a country. The gross domestic product used in this study is in real form. The real gross domestic product refers to gross domestic product without the influence of inflation. Output in this study is computed by taking the nominal gross domestic product and dividing it with consumer price index (CPI) to obtain the real gross domestic product. There are three conventional approaches to measure gross domestic product namely the expenditure approach, production approach and income approach (Reddy, 2012). Expenditure approach measures the value spent on goods and services, production approach measures the value-added on goods and services; and the income approach measures the income from products. The approach to measuring the gross domestic product can vary depending on the country's economic policy. Callen (2017) stated that gross domestic product is an important indicator in measuring the performance of an economy. In addition to that, the author also mentioned that gross domestic product can measure the performance of the economy but fails to measure the well-being of the people. This is mention because a country may have a high gross domestic product with a high poverty rate.

The role of output on the stock market can be deduced from an economic recession, where the reduction in economic growth (i.e., output) causes a devaluation in stock price and thereby, causes a decrease in stock market return (Adrangi, Chatrath, & Sanvicente, 2002). The increase in output is associated with an increase in the stock market return because the two variables have a long-run positive cointegration relationship; and the output can be used to predict the stock market return (Österhlom, 2016). A study on causality has shown that output growth may prompt an increase in stock market return (Pan & Mishra, 2018). The economic growth that is driven by an increase in the gross domestic product can increase future investments and economic opportunities, hence, increases stock return; the stock market return is influenced by a positive relationship with output in the long-run (Oskooe, 2010). The output is a key factor in signalling changes in the stock market return and an increase in output can positively increase stock market returns (Peiró, 2016). Raghutla, Sampath, and Vadivel (2019) stated that output decreases when the cost of things become more expensive and this can eventually decrease stock market returns.

Marathe and Shawky (1994) explained that output can negatively and significantly influence the stock market. According to them, industrial production is a component in gross domestic product and it is used as a proxy of output. The authors showed that output is able to predict changes in the stock market. Hosseini, Ahmad, and Lai (2011) explained that output has a long-run relationship with the stock market. They explained that an increasing output can negatively influence the stock market because the sudden increase in borrowing of money by investors can decrease the value of the future currency which affects stock market negatively. This is also in agreement with Rashid's (2008) explanation on the negative relationship between the stock market

and output. The author explained that output growth may reflect growth in the economy which encourages investors to borrow money for investment, hence, the increase in demand for money can have a negative impact on the economy and in return negatively influence the stock market. Hsing (2004) explained that the relationship between the stock market and output maybe be negative in the short-run but becomes positive in the long-run. Ahmed and Mustafa (2012) explained that the sudden growth in output has an impact on the stock market. In addition to that, the unexpected changes in output cause a negative influence on the stock market. Ram and Spencer (1983) measured output by using industrial production. They examined the relationship between output and the stock market and they found that as output increases stock market returns decreases. It is interesting to find that output and unexpected output has a different impact on the stock market. According to Zhao (1999), output has a negative significant relationship with the stock market whereas unexpected output has a positive relationship with the stock market.

1.8.3 Inflation

Inflation refers to the ongoing increase in prices which can be reflected by the changes in prices (Black et al., 2017). In this study, inflation is obtained from the consumer price index. This study computes inflation by calculating the percentage of change in the consumer price index. To obtain the percentage change of the consumer price index, the consumer price index of a given year is minus by the consumer price index of previous year then the value is divided by the consumer price index of the previous year, i.e., $\frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}$. For example, from the base year the CPI is 100 and the following

year the CPI becomes 115, hence, it can be concluded that there is an inflation of 15%
in the economy. According to Oner (2017), the consumer price index is commonly used
to measure inflation across different economies. Inflation can be reflected by the
increase in the cost of living because it involves the prices of goods and services.
Inflation causes the purchasing power of consumers to reduce because during inflation,
consumers obtain less from the same amount of money spent. Bernanke (2007) stated
that the central bank's aim is to control inflation because inflation has a different effect
on the economy in the long-run and short-run. This show inflation is an important
variable in influencing the well-being of the economy. The central bank ensures that
there is low inflation to encourage healthy economic growth because low inflation
eliminates economic uncertainty (Choi, Furceri, & Loungani, 2018). Healthy economic
growth can encourage investment which leads to an improvement in stock market
prices.

Inflation and the stock market can be related positively or negatively. There are
a few research papers that discussed the relationship between the stock market with
inflation. Choundhry (2001) found the inflation and interest rate has a positive
relationship and this effect applies to the short-run. This findings from Choundhry
(2001) is in agreement with Kim and In (2005), where they found that an increase in
inflation causes the stock market return to increase within a month's timeframe. In
addition to that, according to the authors in the long-run, the stock market reacts
inversely towards inflation movements. Ciner (2015) explained that the impact of
inflation varies from sector to sector. The author showed that increasing inflation has a
positive relationship with stock prices that are linked to commodity and technology.
Tiwari, Dar, Bhanja, Arouri, and Teulon (2015) explained that inflation does not

negatively influence the stock market in the long-run because they showed that an upward movement of inflation can lead to an upward movement of stock market returns. Hosseini et al. (2011) explained that the positive relationship between the stock market and inflation is because of the expectation of investors on the stock market return. During high inflation, there is high uncertainty and this causes investors to expect more returns to compensate for high-risk investment. In addition to that, the authors also explained that during high inflation the intervention of the government's economic policy may cause the stock market to react positively to increasing inflations. Syprou (2004) showed that the stock market and inflation has a significant positive relationship because of the changes in money demand and supply. Li, Narayan, and Zheng (2010) showed that in the medium-term stock market and inflation are significantly positive.

Cozier and Rahman (1988) found that inflation does not directly affect the stock market return, however, high inflation does negatively influence the stock market return. High inflation has a negative impact on the overall consumption and economic and thus, causing an impact on the stock market prices which then depresses stock market returns (Paul & Mallik, 2003). This is because inflation influences the ability to purchase of a consumer which leads to a decrease in investment. On the other hand, Feldstein (1980) explained that the negative relationship between stock market return and inflation is because of the taxation system, in which tax can cause an increase in inflation that can reduce gains and indirectly reduces stock market returns. Inflation has a significantly negative relationship with the stock market return because high inflation causes the economic policymakers to implement a more restrictive economic policy, which causes a decrease in stock market return due to a drop the stock market price

(Funke & Matsuda, 2002). The negative relationship of inflation on the stock market return has an indirect influence on the investment decision of investors (Lopez, 2018). High inflation causes a decrease in stock market prices, in which, can influence the profit and gain of the firm and thereby, reduces stock market return (Apergis & Eleftheriou, 2002). A decrease in inflation rate encourages investors to invest more and in doing so, this can help businesses expand and potentially increase profits, in turn, increasing stock market returns (Omran & Pointon, 2001).

1.8.4   Interest Rate

According to Black et al. (2017), interest rate refers to the cost of taking a loan. Interest rate is the percentage of charges upon taking up a loan. Most central banks use the interest rate as the monetary policy tool to ensure the stability of the economy (Mathai, 2009). In this study, the real money market rate is used to measure interest rate. The real money market rate is obtained by subtracting the inflation rate from the nominal money market rate. Money market rate is the interest rate for short-term securities which the maturity of the loan varies from a day to a year (Dodd, 2017b). The author so explains that the money market rate is an important part of the financial system. Money market rates refer to rates for treasury bills, commercial papers and certificates of deposit. Abbassi and Linzert (2012) explained that central bank plays an important role in fine-tuning the money market rate as it is able to impact the economy and they found that controlling the money market rate can be effective in steering the economy during a crisis. Suhaibu, Harvey, and Amidu (2017) mentioned that economist used interest rate very commonly as their tool in monetary policy.

Interest rate influences the economy and can have a positive and negative impact on the stock market. According to Hu, Jiang, and Pan (2020), stock market and interest rate have a positive relationship and they explained that the positive relationship is associated with the high expectation or anticipation of investors. Ratanapakorn and Sharma (2007) found that the relationship between the stock market and interest rate varies in the long-run and short-run wherein the short-run the relationship between the stock market and interest rate is positive and in the long-run, there is a negative relationship. Ferrer et al. (2016) explained that the positive relationship between the interest rate and the stock market is because investor tends to move from stock markets to the bond market during risker times. Khrawish, Siam, and Jaradat (2010) argued that the interest rate is useful in encouraging growth in the stock market and they found that the interest rate and stock market have a significant positive relationship. Erdem, Arslan, and Erdem (2005) argued that it is important to examine the relationship between the stock market and interest rate because the interest rate has a significant impact on the stock market prices. They showed that there is a strong positive and unidirectional relationship from interest rate to the stock market. Suhaibu et al.'s (2017) findings are in agreement with Erdem et al. (2005) where their finding showed that there is a strong positive correlation between the stock market and interest rate.

According to Tangjitprom (2012), a decrease in interest rate can increase the stock market return and an increase in interest rate can decrease stock market returns. Nissim and Penman (2003) argued that the negative correlations between the stock market and interest rate can be explained by the negative impact of high-interest rate on expected earnings, hence, reducing the value of assets and stock market returns. An increase in interest rate may increase financial cost and reduce profits in a firm which

then, leads to a negative impact on stock market return (Ratanopakorn & Sharma, 2007). The monetary policy influences the stock market by controlling the interest rate; a low-interest rate may positively influence future cash flow, hence, this may increase the stock market return (Chatziantoniou, Duffy, & Filis, 2013). Stock market analyst often relies on the interest rate to predict stock market return because of its strong negative relation with stock market return (Lv, Dong, & Fang, 2015). Huang, Mollick, and Nguyen (2016) explained that a low-interest rate can encourage high stock market returns because low-interest rates can increase expected earning and this can cause an increase in stock market prices and stock market returns.

1.8.5   Exchange Rate

Exchange rate refers to the value of a local currency that is defined in another currency (Black et al., 2017). For example when the exchange rate between Malaysia and the United States is RM3.5/1USD then this means one US dollar is equivalent to 3.50 ringgit Malaysia. In this study, the exchange rate is the real effective exchange rate. The real effective exchange rate is obtained by deducting the nominal effective exchange rate with the inflation rate. The real effective exchange rate omits the influence of inflation. Catão (2017) defined real effective exchange as the mean or average of bilateral real exchange rates from a collection of exchange rates. The bilateral exchange rate here means the exchange rate that is between two countries (Kenen & Rodrik, 1986; Zhang, 2018). The changes in the exchange rate influence the import and export of goods in a country. The decrease in the exchange rate causes an appreciation in domestic currency and the increase in the exchange rate causes depreciation in domestic

currency. Chortareas, Cipollini, and Eissa (2012) explained that the exchange rate has an impact on the economy especially on firms that are linked to imported and exported goods and services.

The exchange rate can be an influential factor in the economy. This section explains through past research papers on how the exchange rate can influence the economy via the stock market. It is found an increasing exchange rate can positively influence the economy because an increase in the exchange rate can cause the stock market to have abnormal stock market returns (Chortareas et al., 2012). These findings can be supported by Khan and Zaman (2012) where they found the exchange rate and stock market have a strong positive significant relationship with the stock market. Lee and Brahmasrene (2019) showed that the exchange rate and stock market have a positive relationship in the long-run as well as the short-run. The authors also mentioned that the exchange rate can be an effective tool in fine-tuning the economy. Narayan and Narayan (2010) found an increase in the exchange rate can positively influence the stock market only in the long-run. This shows that the impact of the exchange rate on the stock market can vary depending on the research sample. Aurangzeb (2012) explained that when our currency depreciates this can attract more in-flow of investment into the country by foreign investors and this can increase stock market returns. Iheanacho (2016) showed that there is a positive causal effect from exchange rate to the stock market in the short-run.

Delgado, Delgado, and Saucedo (2018) stated that the exchange rate and stock return are negatively correlated because an appreciation in the currency can cause the stock return to increase. A news announcement on an increase in the exchange rate

causes a negative stock market return (Patro, Wald, & Wu, 2014). The devaluation on the currency often time causes an increase in the cost of production and causes a decline in gains in which negatively influence the stock market return (Glen, 2002). The increase in the exchange rate has a negative impact on importers, because an increase in exchange rate causes a reduction in imported goods, hence, influencing the firm's performance and reducing firm's stock market return (Becker, Gelos, & Richards, 2000). Fang (2002) investigated the Asian stock markets during the 1997-1999 Asian crisis, and during the crisis, the exchange rate depreciated and the depreciation in the exchange rate leads to a decrease in the stock market return. Due to financial liberalisation, the relationship between exchange rate and the stock market return is strong, therefore, the appreciation of the exchange rate can potentially attract foreign investment into the domestic market, in which, increases the stock market return (Zhang & Li, 2010).

1.9   Study Limitation

This study on the stock market integration in the presence of leading macroeconomic indicators has its limitations. Firstly, this study only limits to four leading macroeconomic indicators, namely, output, inflation, interest rate and exchange rate. However, there are many other macroeconomic indicators that may represent the leading macroeconomic indicators. Secondly, this study only has 30 sample countries to study stock market integration in the presence of the leading macroeconomic indicators. The sample size used in this study can be a limitation to obtain a more meaningful result. Thirdly, this study employs only one approach to measure

integration. The method used to measure integration is the catching-up method, whereby, this method limits the integration analysis only to a descriptive approach. Fourthly, this study does not take into account the economic regimes, whereby, countries in the same economic regimes share similar economic characteristics. For instance, this study examines the integration of the stock market in the presence of leading macroeconomic indicators based on 30 countries with different economic characteristics. Lastly, the data used for this study has a limited time frame. The data used in this study are from the year 1995 quarter one to the year 2018 quarter one due to the limited data source at the time of data analysis. Nevertheless, regardless of the limitations in this study the variables, sample size, approached, scope and data period used in this study are sufficient enough to achieve the objectives of this study.

1.10   Significance of the Study

This study on stock market integration and the leading macroeconomic indicators can benefit both the economic policymakers and the stakeholders. The study on the causal effect of the leading macroeconomic indicators on the stock market may help fund managers, investors and investment agencies to predict the movement of the stock markets by knowing which leading macroeconomic indicators can potentially influence the stock market. In doing so, stakeholders (e.g., fund managers, investors and investment agencies) may minimise potential risk and maximise potential gains. With that being said, this study on the causal effect of the leading macroeconomic indicators on the stock market may shed light on investment decision making. The study on the short-run and long-run cointegration relationship of the leading macroeconomic

indicators with the stock market integration may serve as a guide to stakeholders to optimise investment gains. The cointegration relationship between the stock market and the leading macroeconomic indicators reveals the common behaviour and trends of the stock market, thus, this may effectively provide useful information to manage risk associated with investment and to select an optimal portfolio for investment. Stakeholders may observe the changes in the leading macroeconomic indicators to predict the trends in the movement of the stock market.

The study on the integration of stock markets may serve as a guide to economic policymakers in the development of a better economic policy. This is because, in this study, the study on the integration of stock markets according to different financial periods may be informative to policymakers, as this study may bring awareness of a possibility to the spread of economic turbulence from one country to another. With the information from this study, policymakers may be able to minimise the negative impact during financial turbulence by adjusting the monetary policy to coordinate the financial inflow and outflow of the country. In addition to that, this study on stock market integration in the presence of macroeconomic indicators may be able to serve as a reference to economic policymakers because this study may help policymakers to identify the possible influence of the leading macroeconomic indicators on the integration of stock markets. In doing so, policymakers are able to develop a better economic policy to ensure stability in financial flow, thus, maintaining a stable financial system to encourage investors into the country.

1.11   Summary

The discussion of this chapter starts with an introduction to this study then followed by a discussion on the study background, the motivation of the study, the research questions, the hypotheses of the study, the objective of the study, the framework of this study and lastly, the operational definition of related terms and the significance of the study. The content in this chapter shows the direction of this study. However, the following chapters will further discuss the details of this study. Chapter 2 discusses the theoretical review and empirical review. Chapter 3 discusses the methodology used to investigate the objectives of this study. Chapter 4 reports the findings of the analysis on the causal analysis, cointegration analysis and integration analysis. Chapter 5 concludes the study, discusses the implication of the study and discusses the limitation of the study with recommendations for future research.