STOCK MARKET AND MACROECONOMIC INTEGRATION: AN ASYMMETRIC EVIDENCE ON SELECTED FIVE COUNTRIES

BY

BAR SEOW POH
GAN YIN CHOONG
HEE CAI YUN
TEH MEI CHING

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CHAPTER 1: INTRODUCTION

1.1 Background of Study

Increasing attention is being paid to the relationship between stock prices and macroeconomic variable. Stock prices are adjusted by macroeconomic variables such as inflation rate, industrial production index (IPI), exchange rate, interest rate, and money supply. This is because macroeconomic variables are used to represent good and bad news in stock markets. Therefore, stock prices are well predicted by these variables as these variables can significantly affect the stock prices movement. Such statement is supported by Booth and Booth (1997), Fama and Schwert (1977), Islam (2003), Maysami and Koh (2000), Mukherjee and Naka (1995) and Mukhopadhyay and Sarkar (2003) who revealed that these five variables are the most popular significant determinants to explain movement of stock prices in developed as well as emerging economy. Furthermore, Fama (1981) states that stock prices are the reflector of various variables such as industrial production index, inflation rate, exchange rate, interest rate and money supply. For instances, when the growth rate of IPI is lower than people expectation, stock prices fall as this designated bad news to the public. Meanwhile, the stock prices increase when the growth rate of IPI is higher than people expectation as this designated good news to the public.

Most of the previous researchers such as Fifield, Power and Sinclair (2002), Kurihara and Nezu (2006), Mukhopadhyay and Sarkar (2003) and Singh, Mehta and Varsha (2011) studied the relationship between stock price and macroeconomic variables by assuming the market is efficient. Efficient market is where all available information is reflected by its stock prices. According to Malkiel (2003), stock prices can be adjusted timely based on the latest information in efficient market. There is no

undervalued or overvalued of securities. Since the prices are equal to the fair price, the price adjustment is the same for both positive and negative announcements. Thus, efficient market is known as symmetric.

However, there are many arguments proving the market is not entirely efficient. The economic rationale for asymmetric response can also be explained from the behavioral standpoint of investor psychology based on the study of Verma and Verma (2010). Investors are normally risk-aversion. They are concerned about market downturn more than upturns. Consequently, this risk-aversion behavior will be reflected in market prices, making greater market responses to downturns than upturns. According to Colombo (2008), stocks are overpriced or underpriced as a result of market overreaction. This can be seen in "dotcom bubble" in late 1990s where many IT companies were driven up to unreasonable price level (overly bullish market). The stock prices were driven up after few years where the NASDAQ stock index exploded from 600 to 5000 points from year 1996 to 2000. However, the stock prices crashed within a month by early 2000 from 5000 to 2000 points after the investors realized the dot-com dream had turned into a speculative bubble. Therefore, it is reasonable to assume that the market is not entirely efficient or at least not efficient at all the time.

As reported by the Cable News Network (2012), the global stock markets crashed down within few days on May 2012 as investors worry that Greece would exit from the Euro. The stock indices in many countries have dropped significantly within few days after the announcements being released. Chinese stocks dropped with Hong Kong's Hang Seng index off 2.3% and China's Shanghai Composite index 0.6% lower. The MSCI Asia Pacific index lost 1.5%, Australia's S&P/ASX 200 index down 1.7%, Japan's Nikkei 225 Stock Average dropped almost 2.2%, and South Korea's Kospi Composite index lower 2.1%.

On the other hand, the United States Labor Department (DoL) declared that unemployment rate in the United States fell to 8.1% in the month of April, reaching its lowest level in three years as reported by Thaindian News (2012). The released positive announcements regarding economic data in United States and the temporary stability of euro zone crisis drove global stock market up. However, the speed and magnitude of increase are not as much as negative announcements, showing difference between positive shock effect and negative shock effect.

Chin (2012) stated that as the announcement of Greece failed to form a coalition on 16 May 2012, Kuala Lumpur Composite Index (KLCI) dropped 25.03 points or 1.60% to 1536.20 within a day. It would take weeks for the KLCI to increase 1.60% but it could fall 1.60% within a day. The negative macroeconomic events trigger the investor's confidence and obviously cause greater market responses to downturns than upturns. It indicated that asymmetric impact of stock prices happened in real world.

The events of September 11 terrorist attacks happened in United States by Davis (2011) proved that the stock market is asymmetric as it is more responsive to negative news than positive news. The terrorist attacks severely destroyed telecommunication system near the World Trade Center, therefore, stock market remained close until September 17. The market lost over 684 points, a 7.1% decline, setting a record of the single biggest one day drop in the exchanges history during its first day of trading after the attacks. The Dow Jones had lost over 1360 points or 14% of its value by the end of that first week back open. It was estimated to be around $1.2 trillion money losses during that time. Risk-aversion investors usually pay more attention to negative rather than positive announcements. The reaction of stock price to negative announcements is much greater in magnitude than the reaction of stock price to positive announcements.

Additionally, volatility issue argues that the market is not efficient. Malkiel (2003) stated that market volatility is a popular model in explaining price fluctuations. Efficient market only take economy into considerations, yet, market volatility proposes the investor reactions in the view of psychological or sociological. For instance, "meltdown Monday" or stock market crash of 1987 show that the investors may act inappropriately to the information they receive. As a result, the fluctuation is no longer symmetric as the negative shock is higher than positive shock based on the Computer Business Review (1989).

In reality, market is not symmetric but asymmetric as the effect of positive shock and negative shock is different. Based on the Figure 1.1, 1.2, 1.3, 1.4 and 1.5 in appendix, stock prices in five countries studied (United States, United Kingdom, Japan, South Africa, and Philippines) increase in different motion when the market is in bull and in bear. For instance, in Figure 1.2, FTSE (stock prices in United Kingdom) decreases in faster motion when the market is in bear. Conversely, FTSE increases in slower motion when the market is in bull. This shows that five countries studied in this paper are asymmetric. However, most of the previous researchers studied the relationship between macroeconomic variables and stock prices with the assumption that the market is symmetric. Thus, this paper is to examine the relationship between macroeconomic variables and stock prices in the view of asymmetric.

1.1.1 How Stock Markets are developed

Growth of stock market is vital in both developed and developing countries as overall performance of the economy is strongly related to the performance of its stock market. Below is how the countries studied in this paper (United States, United Kingdom, Japan, South Africa, and Philippines) developed their stock markets.

1.1.1.1 How United States Developed Its Stock Market

A stock market is basically an intermediary for securities buyers meet seller for their dealing at a specific price. It is like a center of transactions network. In United States, its main stock market is New York Stock Exchange (NYSE) as reported by World Stock Exchanges (2008). Although New York Stock Exchange was not the first created stock market as it was created in 1973 while Philadelphia Stock Exchange in 1970, NYSE grew powerful later on. Now, it is the world's largest stock exchange by market capitalization and it is operated by NYSE Euronext which is a Euro-American multinational financial services corporation.

In 1792, there were 24 men came to an agreement to start off New York Stock Exchange as reported by The Associated Press (2011). According to Rose (2009), Wall Street was already the main center of transactions by that time. Thus, NYSE is now located at 11, Wall Street, Lower Manhattan, New York City. Today, there are over 2800 listed securities in NYSE. It provides facilities to the buyers and sellers to trade stocks, securities and other financial instruments. The main indexes are S&P 500, Dow Jones Industrial Average and NYSE composite.

Dow Jones Industrial Average is a stock market index which was founded in May 26, 1896 by Charles Dow, co-founder of Dow Jones and Company and Wall Street journal editor. It is an index which shows how the 30 large, publicly owned companies in United States have traded. Dow Jones index can be traded in the two largest stock markets which are NYSE Euronext and also NASDAQ QMX. S&P 500 was the first stock index introduced in 1923 by Standard and Poor's. It has been the best representative in U.S. economy based on Standard & Poors (2012). S&P 500 was based on the common stock prices of 500 American companies. According to NYSE EuroNext (2012), NYSE composite is stock market index by more than 2000 stocks whereby, 1600 are United States companies and over 360 are foreign listing

companies. Basically, it covered all the common stocks that are listed on New York Stock Exchange.

1.1.1.2 How United Kingdom Developed Its Stock Market

London Stock Exchange is located in the city of London in United Kingdom. It is the most important exchange in Europe and the fourth largest stock exchange in the world. Based on the Traders Day Trading (2012), it has the average shares of 5 billion being traded in every single business day and with the total market capitalization of US$3.266 trillion. There are 3000 companies being listed on London Stock Exchange and 350 companies coming from 50 different countries and therefore it is the most globalize exchange among all the exchanges.

According to ADVFN (2011), it consists of two different stock markets which are the Main Market and the Alternative Investment Market (AIM). Main Market has the strict listing requirement which only traded by those well established and high performance companies. There are about 1800 companies being traded in this market and the total market capitalization is over 3500 billion. The Alternative Investment Market (AIM) is adversely traded by over 1060 small capital and new enterprise with high growth potential companies with 37 billion of total capitalization.

The FTSE 100 Index is the major stock market index in London Stock Exchange which tracks the performance of the companies that based in the United Kingdom. It is the most recognized share index or indicator of the stocks for 100 largest companies that have the largest market capitalization which listed on the London Stock Exchange based on Traders Day Trading (2012). It is an indicator to measure the performance of stock in United Kingdom for investors and assists the finance professionals to manage their investment portfolio. Also, it is crucial for the

companies as it helps to track rival's performance, supports the liquidity of the company as well as helps them in funds rising.

Moreover, it is one of the world's oldest stock exchanges with 330 years of history and its origin was an informal trading whereby the exchange started its life in coffee houses during 17th century in London. Stock brokers are not allowed to trade in Royal Exchange which acts as a centre of commerce in the city of London because of their rude manner. According to Escape Currency (2012), they started to operate in the street and coffee houses particular in Jonathan's Coffee House whereby a man named John Castaing started issuing a list of some commodity prices and exchange rates called 'The Course of the Exchange and Other Things' at coffee houses in 1698 which was only a list for a few days of the week not in daily list.

During the 17th century, the Royal Exchange was rebuilt in 1669 after it was destroyed by a great fire in London. In 1761, 150 of these stockbrokers started to set up their own building with a dealing room on the ground floor and coffee room above in Sweeting's Alley for selling and purchasing shares. It was known as "New Jonathan's" and eventually changed the name to "The Stock Exchange". London Stock Exchange (2012) stated it became an official exchange on 3rd of March in 1801 which is the first regulated modern stock exchanges in London that operated under formal membership subscription basis.

1.1.1.3 How Japan Developed Its Stock Market

Stock market is where buyers and sellers trade on financial instruments. In Japan, the main stock exchange is the Tokyo Stock Exchange (Tosho or TSE) which located in Tokyo, Japan. According to Tokyo Stock Exchange Group (2006), it was established

on May 15, 1878 under the governance of Finance Minister, Okuma Shigenobu and Capitalist Advocate, Shibusawa Eiichi. Official trading began on June 1, 1878.

The exchange merged with another ten major stock exchanges in Japan into a single Japanese Stock Exchange in 1943 as stated in Exchanges Journal (2012). It was known as Nippon Shoken Torihikisho. However, this exchange was closed and restructured after the event of bombing at Nagasaki. On May 16, 1949, The Tokyo Stock Exchange reopened under the pursuant to the new Securities Exchange Act. Its sudden and unexpected increase in price from 1983 to 1990 made TSE accounted for more than 60% of the world stock market capitalization. It was the world's largest stock market capitalization before TSE was falling in value and rankings. However, it still remains as the third largest stock exchange in the world by aggregate market capitalization of its listed companies.

Based on Money-Zine (2012), the main indices in TSE are the Nikkei 225 index. It operates from 9am to 11am and 12.30pm to 3 pm. Its stocks are divided into three sections. Large companies are categorized into First Section while mid-sized companies are categorized into Second Section. Mothers Section is for high-growth companies. Currently, TSE has developed into one of the main stock exchanges in Asia after Hong Kong Stock Exchange and Bombay Stock exchange.

1.1.1.4 How South Africa Developed Its Stock Market

According to Downing, Underwood and Xing (2009), stock market provides a market where securities can be traded freely under a regulated procedure. It not only channels funds into the economy, but also provides investors with returns on investments in the form of dividends. The largest stock market in Africa is Johannesburg Stock Exchange (JSE) which located at Sandton, Gauteng.

On 1886, discovery of gold at Witwatersrand created abundant of mining and financial companies. Such event created a need for stock market. As a result, JSE was established by a London businessman, Benjamin Minors Woollan on November 8, 1887 as recorded in Johannesburg Stock Exchange (2012).

Initially, JSE was located at the corner of Commissioner and Simmonds Streets. In 1890, the trading hall moved into the street as its space become inadequate. However, after World War II, the building became too small again. Thus, the second exchange was opened on February 1961 at Hollard Street. Based on Johannesburg Stock Exchange (2012), JSE changed its official name to the JSE Securities Exchange in September 2000 and moved to its current location in Sandton, Gauteng.

JSE is currently the 16th largest stock exchange worldwide although it is still developing. Its trading system is according to London Stock exchange due to an agreement with the London Stock Exchange. It operates from 9am to 5pm on all weekdays except Saturdays, Sundays and public holidays by Johannesburg Stock Exchange (2012).

1.1.1.5 How Philippines Developed Its Stock Market

The national stock exchange of Philippines, known as Philippines Stock Exchange (PSE), is one of the oldest stock exchanges in Southeast Asia. According to the Philippines Stock Exchange (2012), PSE Composite index is the main index for PSE. It consists of 30 listed companies, which is selected based on certain criteria. The purpose of PSE is to provide and maintain a fair, efficient, transparent and orderly market for the purchase and sale of securities such as stocks, warrants, bonds, option and others.

The Philippines Stock Exchange (PSE) is the combination of Manila Stock Exchange (MSE) and Makita Stock Exchange (MKSE) based on Philippines Stock Exchange (2012). The Manila Stock Exchange was created on August 8, 1927 by five Manila based businessman. On May 27, 1963 five other businessmen organized the Makita Stock Exchange. The confusion among investors happened when there were two stock exchanges exist in a country. The policies and members of both bourses were different. Most importantly, the stock prices for the same listed stock had found difference between both exchanges in Philippines. On March 4, 1994 the Philippines Stock Exchange was granted its license to operate as a securities exchange in the country by Securities and Exchange Commission. A unified Stock Exchange eliminated the confusion among investors and began to develop a strong capital market and a sustainable economic growth. The Philippine Stock Exchange is currently the only organized exchange in the Philippines licensed for trading stocks and warrants.

Philippines Stock Exchange (2012) further states that the PSE plays a crucial role in financing productive enterprises to expand and grow their business. Listed companies can have easier access to funds by raising capital through the issue of new securities. It is easier and less expensive for a company listed in the Exchange to raise new capital through an additional public offering. The expansion of business creates more jobs and leads to higher employment. Therefore, it is essential to the growth of the Philippines economy. Besides that, the PSE facilitates the selling and buying of the issued stocks and warrants. The PSE acts as an intermediary to facilitate flow of funds where individuals and organizations seeking to invest their saving or excess funds through the purchase of securities.

1.2 Problem Statement

The previous researchers studied the relationship between stock prices and macroeconomics variables with the assumption that the market is symmetric. However, the market is asymmetric or at least not entirely symmetric in reality as the effects of positive shock and negative shock are different.

Refer to fact mentioned in part 1.1, figures 1.1 to 1.5 in appendix shows the evidence that the market is asymmetric as stock prices in selected five countries rise and fall in different motion. For instances, Nikkei 225 in Japan rises in lower speed when the markets in in bull. However, Nikkei 225 in Japan falls in higher speed when the market is in bear. This shows that five countries studied in this paper are asymmetric. Therefore, this paper is to study the stock prices and macroeconomics variables with the assumption that the market is asymmetric.

1.3 Objectives

The objectives in this paper are as followed:

-The general objective is to investigate the relationship between stock prices and macroeconomic variables.

-The more specific objectives are:

   i.   To show the market reacts asymmetrically to good news and bad news.
   ii.   To show the stock price and macroeconomic variables are asymmetric in short run and long run integration.
   iii. To compare the result in developed and developing countries.

1.4 Research Questions

There are four research questions in this paper:

- What are the relationship between stock price and macroeconomic variables?

- Is the market reacts asymmetrically to good news and bad news?

- Are the dependent variables (stock prices) and independent variables (inflation rate, industrial production index, exchange rate, interest rate and money supply) asymmetric in short run and long run integration?

- What are the results in developed (United States, United Kingdom and Japan) and developing countries (South Africa and Philippines)?

1.5 Significant of Study

Most of the empirical studies like Gjerde and Saettem (1999), Kurihara and Nezu (2006), Parsva and Hooi (2011) and Robert (2008) involve the bigger stock market in the world when studying the relationship between stock prices and macroeconomic variables. Although a few empirical studies on emerging, smaller and underdeveloped stock markets such as Ahmed and Imam (2007), Ali (2011), Ho (2011) and Rahman, Sidek and Tafri (2009) have recently taken place, studies on South Africa is limited. In this paper, relationship between stock prices and macroeconomic variables in South Africa are examined.

This paper is beneficial as it suggests the market is asymmetric, which is entirely different from the previous assumption that the market is symmetric. Therefore, parties involved such as hedgers and speculators can invest in more appropriate way to increase their profitability.

Various methodologies have been used in testing the relationship between stock prices and macroeconomic variable. However, most of the previous researchers like Ahmad, Ahmad, Khan and Javaid (2012), Murkerjee and Naka (1998), Robert (2008), Sohail and Hussain (2011), Tangjitprom (2012) and Yu (2011) used symmetric models such as Vector Error Correction Model (VECM), Generalized Autoregressive Conditional Heteroscedasticity (GARCH), and Autoregressive Integrated Moving-Average (ARIMA). As there are many arguments proving the market is not entirely efficient, this paper is using asymmetric model which is Threshold Autoregressive Model (TAR) to examine the stock market and macroeconomic variable integration. TAR has not been used by the previous researchers and therefore it provides a new ways in study the impact of macroeconomic variables on stock prices.

1.6 Chapters Layout

This paper is organized as follows:

- Chapter 1 provides background, problem statement, objective, research questions and significant of this paper.
- Chapter 2 covers the literature reviews of five macroeconomics variables (Inflation Rate, Industrial Production Index, Exchange Rate, Interest Rate and Money Supply).
- Chapter 3 identifies the scope of study and presents the research methodology.
- Chapter 4 interprets the empirical results.
- Chapter 5 discusses on major findings and conclusion.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the critical points by previous researchers. The relationship between five macroeconomic variables (inflation rate, industrial production index, exchange rate, interest rate, money supply) and stock prices will be reviewed. The methods used by previous researchers to conduct their studies as well as major findings will be presented in this chapter.

2.1.1 Inflation Rate

Consumer price index (CPI) is used as a substitute for inflation rate in financial theory which indicates that increasing price of all the goods and services. The correlation between inflation rate and stock prices has been studied thoroughly by many researchers in both emerging and developed countries. The results revealed are vary from each others.

Islam (2003) investigated that inflation rate is statistically significant relative to Kuala Lumpur Stock Exchange (KLSE) Composite Index in both short run and long run. But both of the results revealed by Islam, Watanapalachaikul and Billington (2003) that investigated in Thailand's stock market and Maysami and Koh (2000) who studied in Singapore's stock market only shown the long run correlation with inflation. The consistent outcome asserted by Mukherjee and Naka (1995) examined the co-integration between Japanese Stock Market and inflation rate by applying Johansen's and Vector Error Correction (VECM) Model. Conversely, Gjerde and

Saettem (1999) failed to show the significant correlation between stock price and inflation rate in Norway stock price.

Moreover, stock price will be negatively affected by inflation rate which being supported by Fama and Schwert (1977), Geske and Roll (1983), Gultekin(1983) and Nishat and Shaheen (2004) and Sari and Soytas (2005). Meanwhile, the research on stock price in United States and Japan that has conducted by Humpe and Macmillan (2009) also has the same outcome. Stock prices will go down when there is inflation. As inflation happened it will actually reduce the effective rate of returns on stock as some portions of the return will be offsetted by the inflation. In order to attract investment on stocks from the investors, it must increase the effective rate of returns by increasing dividends or earnings. However, due to difficulty in increasing dividend of the stock as it is paid in fixed amount, stock prices are to be adjusted downward to increase the earnings of investors

Based on Alexakis, Apergis and Xanthakis (1996) stated that stock price will be negatively affected by the inflation rate in both emerging and developed countries. This is because of the emerging countries such as Latin American countries will primarily encounter higher inflation uncertainty as they lack of efficiency and reliability in implementation of fiscal and monetary policy to fight against inflation. As a result, it caused higher anticipated inflation as higher inflation rate and hence trims down the stock price. In contrary, as developed countries execute the monetary policy that opposed the inflation over the years which essentially contribute to lower inflation uncertainty to the countries. Due to lower rate of inflation, it helps to promote the increasing in stock price as the lower of anticipation of inflation.

Also, Kaul (1990) conducted research in United States, Canada, Germany and United Kingdom by using post-war data claimed that the negative relationship between inflation and stock prices is relied on the alternative monetary policy regime that

government conducted in a country. He revealed that the negative relationship will exists between stock prices and inflation rate if there is no change in policy regime. Other than that, Marshall (1992) stated that inflation rate was affected by fluctuation in real economic and monetary variables or by both of these variables will affect stock prices negatively.

However, Kandir (2008) and Maysami, Lee and Hamzah (2004) have found the same result whereby inflation rate is positively related to stock price in long run. Kandir (2008) revealed stock price in Turkey is correlated to consumer price index (CPI) which used as substitute to inflation rate while Maysami et al. (2004) studied stock price in Singapore. Moreover, Mashayekh, Moradkhani and Jafari (2011) also showed the consistent outcome as they employed Vector Autoregressive (VAR) model and Johansen co-integration test to examine the correlation between inflation rate and stock price of Tehran Stock Market transaction volume. The increase of company's stock price is relies on the growth of company's earnings. When inflation occurred, government will actively prevent the growth of price level by lower down the interest rate in order to control the inflation rate. It will lead to business expansion and growth due to lower cost of borrowing. Earnings of company will tend to increase, hence higher dividends will be declared since investors will expect to be paid in higher dividends as earning grows. Company tends to raise the stock price in order to balance up the effect of inflation. Inflation rate positively correlated to stock price also due to the increase in stock demand as it was proven by Firth (1979) in which inflation can be hedged effectively by holding stocks. People will more likely to invest in stocks and bonds instead of saving in the banks due to decrease of interest rate that caused by the inflation. When stock demand increase, the stock price will increase as well.

2.1.2 Industrial Production Index

Besides that, the level of real economic activity is also a crucial determinant in explaining stock prices changes. The gross domestic production (GDP) or industrial production index (IPI) can be used to measure the level of real economic activity. However, data on GDP is usually on quarterly basis instead of monthly basis. Alternatively, previous researchers such as Fama (1981), Abdullah and Hayworth (1993), Ibrahim and Yusoff (2001), Nishat and Shaheen (2004), Ratanapakorn and Sharma (2007), Liu and Sinclair (2008), Humpe and Macmillan (2009), Rahman et al. (2009) and Sohail and Zakir (2010) adopted industrial production index (IPI) as a proxy to measure real economic activity and found that industrial production index is positively correlated to stock prices.

Nishat and Shaheen (2004) examined long term equilibrium relationship between the Kerachi Stock Exchange Index in Pakistan and a group of macroeconomic variables. They used monthly data from 1973 to 2004 to conduct their research by employing a vector error correction model. Their result indicated that industrial production index is the largest positive determinant of Pakistani stock prices. Ratanapakorn and Sharma (2007) investigated the long term and short term relationships between six macroeconomic determinants and the US stock price index (S&P 500) by using monthly data over the period of January 1975 to April 1999. They found that every macroeconomic variable causes the stock prices in the long-run but not in the short-run in the Granger causality sense. They also found a significant positive relationship between industrial production index and S&P 500 in United States.

Humpe and Macmillan (2009) analyzed the relationship between macroeconomic variables and long term stock market movement in both United States and Japan. Their research has been conducted by using monthly data over the last 40 years. They suggested that industrial production index is significantly positive correlated to the

stock prices in both United State and Japanese stock market. Rahman et al. (2009) investigated the interactions between macroeconomic variables and Malaysian stock prices in a VAR framework. Monthly data ranges from January 1986 to March 2008 have been employed to conduct the research. Ultimately, they discovered that industrial production index have a significant long run effects on Malaysia's stock market in a VECM framework.

Sohail and Zakir (2010) examined macroeconomic determinants of stock prices in Pakistan in the long run and short run by applying VECM and Johansen co-integration technique. He used the data of 200 months from November 1991 to Junes 2008 and explored that industrial production index has a positive significant impact on stock prices in Pakistan in long run. The study of Ali (2011) explored the factors that influence the Dhaka Stock Exchange (DSE) from the microeconomic and macroeconomic perspective. He estimated the relationship by using a Multivariate Regression Model computed on Standard OLS Formula. Industrial production index bear positive and favorable information content which induces the demand side and ultimately gives positive pressure in stock price at Dhaka Stock Exchange.

However, Sadorsky (2003) studied the interactions between macroeconomic variables and US technology stock price conditional volatility by exerting daily and monthly data from July 1986 to December 2000. He suggested that there is insignificant relationship between stock prices and industrial production index. It is because he focused on the technology stock price which may contribute to an insignificant result.

Most researchers reveal the industrial production index and stock prices are positively related because increase in index of industrial production lead to higher profit of industries and corporations. A higher profit of industries and corporations will increase the dividends given to the investors. As a result, dividends increase will raise

share prices which lead to positive association between industrial production index and share prices according to economic theory.

2.1.3 Exchange Rate

It has always been the concerns of economist and academics to study and understand the relationship of exchange rate and stock price changes. This is because both are important in influencing the growth of a country's economy. Variety of investment opportunity has broadened nowadays and the involvement of currencies in investment fund's portfolio has been a very common mechanism. Volatility of exchange rate increases and so do the risks of investments.

The study or understanding of the relationship between exchange rate and stock price are crucial for the performance of fund according to Aydemir and Demirhan (2009). It helps domestic and international investors to have a better hedging and diversification of their portfolio. Many studies have been done by researchers to investigate the correlation of exchange rate and stock prices and yet their findings vary from each others.

The study of Fama (1981) and Menike (2006) on stock prices in emerging Sri Lanka stock market implies that the appreciation of currency has a negative relationship on the stock prices. It explains that the relationship of exchange rate movement and stock price are basically based on the increase of domestic interest rate that will cause capital inflow which makes the exchange rate appreciates. Aydemir and Dermirhan (2009) had tested on the causality relationship between exchange rate and stock prices of Turkey. They employed daily data from 2001 to 2008 in conducting their research and have proved that there is a negative relationship between exchange rate and stock price. They claimed that exporters will lose their competitiveness to the importers in

the international market when the local exchange rate appreciates. This is to mean that, the demand for imported goods will increase which is a disadvantage to the exporters because their sales and profit will drop significantly. As a result, stock price of the export firms fall. In this circumstance, importers will have better or higher competitiveness in the domestic market. Hence, their stock price will increase which means appreciation of exchange rate has positive effect on stock price. Conversely, the impact goes the other way round to the exporters and importers when the local exchange rate depreciates.

However, there are a few studies found that exchange rate and stock price are positively correlated. The research of Maysami et al. (2004) which is the evidence from stock exchange of Singapore's all-S Sector indices. It stated that when the Singapore dollar is expected to appreciate, it definitely will attract more investments from foreign investors. Hence the demand of Singapore dollar will rise, causing the stock prices to increase. Study of Mukherjee and Naka (1995) states that the increase of currency demand will basically driven up the stock prices which means that there is positive relationship between exchange rate and stock prices. The study of KSE 100 index in Pakistan by Sohail and Zakir (2010) also showed the same result. Besides, Ho (2011) has done a study on the ASEAN emerging markets where the findings indicate that exchange rate and stock price are positively correlated for Malaysia and Singapore. It shows that when the value of domestic currency increases, it will promote the confidence of investors thus boosting up the stock price.

However, the research of Robert (2008) on four emerging economies which included Brazil, Russia, India and China did not reveal significant relationship between exchange rate and stock price. This may due to the exclusion of other domestic and international macroeconomic variables that might be important in determining the stock prices in the research.

2.1.4 Interest Rate

According to Murherjee and Naka (1995), stock prices and macroeconomics variables have long-run economic equilibrium relationship. Interest rate is one of the economic variables that affect stock prices. This is proven by various studies such as in Singapore by Maysami and Koh (2000), as well as at 29 emerging markets in Asia, Latin, America, Africa, and Middle East by Adjasi and Biekpe (2006) and Eita (2011).

VECM econometric methodology conducted by Eita (2011) showed that Namibian stock market prices are affected by interest rate. Result by using discount rate as proxy of interest rate showed that interest rate and stock prices have negative relationship. Eita (2011) explained that in monetary policy, if the Central Bank implements expansionary monetary policy through the lower interest rates, market liquidity will increase, money will flow into market. Besides, cash flow will be increased after being discounted to the present value. As a result, investment becomes more attractive and stock price increases. This explains when interest rate fall, stock prices raise in Namibia.

Menike (2006) examined the effects of interest rate on stock prices in Sri Lankan stock market. He used monthly data from September 1991 to December 2001 and Treasury bill rate as proxy of interest rate while Colombo Stock Exchange as proxy of stock prices. Multivariate regression showed that there is negative effect of Treasury bill rate on stock prices in the Colombo Stock Exchange (CSE). Menike (2006) explained that whenever the interest rate on Treasure instrument increases, investors will switch from the stock market to purchase bonds, causing stock prices to fall. This is supported by Sohail and Hussain (2011) who investigated relationship between interest rate and stock price in Pakistan by using Johansen co-integration technique and VECM. Their research also conducted by using three months Treasury bill rate as proxy and ranged from November 1991 to June 2008. The result revealed that three

month Treasury bill rate had a negative significant long run impact on stock prices in Pakistan.

Mashayekh et al. (2011) studied the relationship between interest rate and stock prices in Iran. Interest rates are indicated by deposit rate while stock prices are indicated by Tehran Stock Exchange (TSE). They used monthly data from April 1998 to Match 2008 to conduct their VAR model and JOHANSEN co-integration test. The result revealed that there is meaningful and negative relationship between bank deposit rate and stock price. In other words, increase in deposit rate results in a reduction of stock prices. Mashayekh et al. (2011) explained that money market and stock market are competitors. Decline of interest rate in stock market will increase the stock price due to the substitution effects. In hypothesis of substitution effect, a decrease in the interest rate will lower the opportunity cost of holding cash. Other interest-bearing securities such as bonds will be less attractive due to lower yield while stock will be more profitable due to the higher cash flow. This will cause substitution between interest-bearing securities and stock.

However, Kurihara and Nezu (2006) found that interest rate has no relationship with Japanese Stock Prices by using domestic interest rate as the proxy of interest rate. They examined data from March 1992 to March 2005 by unit root test, co-integration test and vector error correction (VEC) models. Commonly, stock prices are negatively correlated with the interest rate as reported by Eita (2011), Mashayekh et al. (2011), Menike (2006) and Sohail and Hussain (2011). However, Japan's interest rate is almost zero due to the zero interest rate policy in 1999 and quantitative monetary easing policy in 2001.

2.1.5 Money Supply

Increasing attention is being paid to relationship between share prices and the money supply. Studies such as Maysami and Koh (2000), Mukherjee and Naka (1995) and Rahman et al. (2009) showed that there is relationship between money supply and stock market return. According to Bagus (2009), money is a collection of liquid assets that is generally accepted as a medium of exchange and for repayment of debt. In that role, it not only serves as medium of exchange but also as store of value and accounting units. Therefore, money supply can affect stock prices through various methods.

Sohail and Hussain (2011) examined relationship between stock prices and money supply in Pakistan in the long run and short run by applying VECM and Johansen co-integration technique. They used monthly data ranged from November 1991 to June 2008 and found that money supply showed negative impact on stock price in Pakistan in the long run. This is because an increase in money supply causes inflation, the Government will raise the discount rate in order to control the inflation. This will reduce the stock price as cash flow fall with higher discount rate. In this case, the impact of money supply on stock market returns is negative.

On the other hand, both Eita (2011) and Maysami et al. (2004) found positive relationship between money supply and stock price. The study by Maysami et al. (2004) on the long term equilibrium relationships between money supply and the Singapore stock market index (STI) is conducted by using Johansen's VECM, a full information maximum likelihood estimation model. Result showed that Singapore stock market formed significant relationships with money supply as money supply gives positive pressure on Singapore stock market index. This is because an increase in money supply leads to economic expansion through higher corporate earnings and

profitability. Therefore, stock prices will rise. This is supported by Eita (2011) who was also studied the relationship between money supply and stock price in Namibia. The empirical model was estimated using a Johansen's (VAR) multivariate co-integration and quarterly data ranged from quarter 1 in year 1998 to Quarter 4 in year 2009 was used by him. He used broad money (M2) as proxy of money supply and Namibian stock Exchange as proxy of stock price. Result showed that there is a positive relationship between stock market prices and money supply. Similarly to Maysami et al. (2004), Eita (2011) explained an increase in money supply leads to economic expansion through increased cash flows and that stock prices would benefit from such expansionary monetary policy. Therefore, stock prices increase when money supply increases.

However, Ahmed and Imam (2007) and Singh et al. (2012) suggested that there is insignificant relationship between stock prices and money supply. Singh et al. (2012) investigated the interactions between money supply and stock price in Taiwan by using Kolmogorov-Smirnov D statistic normality test. Monthly data ranged from year 2003 to 2008 have been employed to conduct the research. As a result, they discovered money supply do not appear to have any significant effect on stock prices. Ahmed and Imam (2007) analyzed the long run and short run relationship between stock market and money supply in Bangladesh. They measured whether money supply in Bangladesh can explain stock price in long run by using co-integration test and in short run by using VECM. Co-integration test and VECM illustrate that stock prices are not significantly affected by money supply. This may be due to Bangladesh has a small and shallow emerging stock market.

2.2 Conclusion

Based on the review, previous researchers studied the macroeconomic variables by assuming the market is symmetric. In reality, the market is not entirely efficient. Based on the figure 1.1 to 1.5 in appendix, the movement of stock price is relatively slow during upturn and relatively fast during the downturn. This explains the market is asymmetric. Therefore, this paper is to examine the macroeconomic variables in the view of asymmetric.

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter, theoretical framework will be introduced in order to discuss and examine the asymmetric impact on the relationship between macroeconomic variables and stock prices. Basically the theoretical framework for this paper will be dealing with several of macroeconomic variables and stock prices. In this paper, time series analysis will be used to examine the asymmetric impact on the relationship of macroeconomic variables and stock prices. Unit root test is a preliminary step to detect or reveal the stationary status of the time series data. Often non-stationary variables will cause invalidation of standard results. Hence, it has been every economist's attempt to determine the stationary status before they proceed to the estimation of time series econometrics models. In this context, Augmented Dickey-Fuller test (ADF) and Kwiatkowski, Phillips, Schmidt and Shin test (KPSS) will be employed in order to determine the integrated level of the time series data. As for the second step, the speed of adjustment of above threshold and below threshold back to the equilibrium will be tested by applying Threshold Autoregressive which was introduced by Ender and Siklos (1998). The last and foremost test is the Asymmetric Error Correction Model estimation, in order to capture the asymmetric effect of macroeconomic variables on stock prices. Furthermore, diagnostic test is another important checking at the very last of all tests to ensure the model employed is correct and the results are robust in this paper.

3.2 SCOPE OF STUDY

This paper examines the macroeconomic determinants of stock prices by using the monthly data of all variable from January 1993 to December 2011. All the data United States, United Kingdom, Japan, South Africa and Philippines are obtained from DataStream.

3.2.1 The Reason of Choosing United States, United Kingdom, Japan, South Africa and Philippines as Countries Studied.

The Richest People (2012) ranked the top 10 world's largest economies 2012. The United States, United Kingdom and Japan are included in the ranking. This paper uses these three developed countries to examine the asymmetric impact of the relationship between stock prices and macroeconomic variables. Wilson and Purushothaman (2003) identified four emerging markets (Brazil, Russia, India, China or BRICs) which together could be larger in U.S. dollar terms than the G6 within the next forty years. South Africa was added into group in 2010 and became BRICS. Furthermore, the countries in Southeast Asia also significantly contributed to the global economy. Chin (2011) described Southeast Asia's economy is immense and vibrant. Its nominal gross domestic product ($1.1 trillion) is comparable to India's ($1.2 trillion), despite having a population about half the size. According to an article published in CNN, Voigt (2012) predicted world's top economies in 2050. He highlighted that the Philippines will leapfrog 27 places to become the world's 16th largest economy by 2050. Therefore, the forces of emerging markets could not be neglected.

3.3 THEORETICAL FRAMEWORK

In this paper, the asymmetric impact on the relationship of macroeconomic variables and stock prices will be examined. This paper would like to see how the result would diverse between the well developed countries and emerging countries. Therefore, a few well developed countries that were chosen are United States, United Kingdom and Japan while the emerging countries consist of South Africa and Philippines. The relevant macroeconomic variables that will be included in this paper are inflation rate, industrial production index, exchange rate, interest rate and money supply.

Model specification:

Asymmetric Error Correction Model

Equation 3.1

$$\Delta SP = \alpha + \beta \, I \, ECM + \beta \, (1\text{-}I) \, ECM + \sum_{i=1}^{n} \beta \Delta SP_{t\text{-}i} + \sum_{i=1}^{n} \beta \Delta CPI_{t\text{-}I} + \sum_{i=1}^{n} \beta \Delta IPI_{t\text{-}i} + \sum_{i=1}^{n} \beta \Delta EXCHANGE_{t\text{-}i} + \sum_{i=1}^{n} \beta \Delta INTEREST_{t\text{-}i} + \sum_{i=1}^{n} \beta \Delta M2_{t\text{-}i} + \mathcal{E}_{t}$$

To achieve the research objective, this paper obtained the research framework from Yu Hsing (2011).

ΔSP = Log of Stock Price

CPI = Inflation rate

IPI = Log of Industrial Production Index

EXCHANGE = Log of Real Exchange Rate

INTEREST = Interest Rate

M2 = Log of Money Supply

α is the constant while β is the coefficients for the five variables that are included in this paper which are inflation rate, industrial production index, exchange rate, interest

rate and money supply. The coefficients could be in positive or negative value. Ɛt is the error term.

The dependent variable of the model is stock price as this paper is examining the asymmetric impact of macroeconomic variables on the stock price. Stock price is defined as the cost of purchasing securities traded on the exchange. Besides, it is also known as the market value of securities where the highs and lows are depends on the highest and lowest trading price of the day.

There are five independent variables included in the model which are inflation rate, industrial production index, exchange rate, interest rate and money supply. Inflation rate refers to the rate of price of goods and services changes in terms of increasing or rising. Consumer price index is the proxy or substitute of inflation rate that will be used in this paper. It is an inflationary indicator that used to measure the cost changes of goods and services purchased by households. Most of the previous researchers also employed consumer price index as the proxy in their studies. According to the expectation sign of the model, inflation rate has a negative sign on stock price. Fama and Schwert (1977), Geske and Roll (1983), Gultekin (1983), Nishat and Shaheen (2004) and Sari and Soytas (2005) proved that inflation rate and stock price are negatively correlated which is tally with the expectation sign of the model.

Industrial production index acts as an economic indicator which measures the level of economic activities of a country. Based on the expectation sign of the model, industrial production index has a positive sign on stock price. Basically it measures the volume of outputs of the manufacturing sectors which includes mining, production and utilities. Industrial production index were employed as the proxy in this paper instead of gross domestic production. This is due to the previous studies such as Fama (1981), Abdullah and Hayworth (1993), Ibrahim and Yusoff (2001), Nishat and Shaheen (2004), Ratanapakorn and Sharma (2007), Liu and Sinclair

(2008), Humpe and Macmillan (2009), Rahman et al. (2009) and Sohail and Hussain (2010) that had been using industrial production index as the proxy and they found positive relationship between industrial production index and stock price which is tally with the model's expectation sign.

Exchange rate is the rate of one currency to convert into another currency. It also can be defined as the current market value of one currency that can be exchanged with another. It is one of the foremost determinants of stock prices where the fluctuation of exchange rate might affect the stock price of countries. Exchange rate is important especially in trading or speculation activities where it involves different type of currencies. Based on the expectation sign of the model, exchange rate and stock price are positively correlated. However, the depreciation or appreciation of currency has different effect on the stock price and it was proven in the study of Aydemir and Dermirhan (2009). Hence, the direction of exchange rate and stock price is uncertain.

Interest rate is defined as the percentage that charged on the borrower for the use of funds or assets from the lender. It is the price or cost of borrowers that need to pay lenders for deferring their consumption. This paper is using lending rate as the proxy. This is because this paper is examining the asymmetric impact in the perspective of the households. Hence, lending rate is a better substitute for the research of the paper. Based on the expectation sign of the model, interest rate has a negative sign on stock price and it is tally with the research's result or finding by Eita (2011) where it showed that the implementation of monetary policy by lowering the interest rate will lead to increases of stock price.

Money supply is the total amount circulation of money in an economy. There are five categories of money supply which are M0, M1, M2, M3 and M4. However, not all of these categories are widely used in every country. This paper had employed M2 because previous researchers used M2 as the proxy in their research and M2 is widely

used as the measurement of money supply in the countries studied. The components of M2 includes of currency held by public, traveler's checks of non-bank issuers, demand deposits, other checkable deposits, saving deposits and time deposits. Based on the expected sign of the model, money supply has a positive sign on stock price which is tally with the findings of Mukherjee and Naka (1995) and Maysami and Koh (2000) where money supply and stock price is positively correlated.

3.4 Econometric Methods

Time series analysis has been used to study the relationship between stock prices and macroeconomic variables. The methodologies employed in this paper are unit root test of Augmented Dickey-Fuller (ADF) test and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test, Threshold Autoregressive (TAR) Models, Asymmetric ECM and diagnostic checking.

3.4.1 Some Properties of Time Series Data, Consequences and Their Treatment

Stationary of time series data is vital according to the assumption of Classical Regression Model (CRM). Therefore, researchers have to examine the stationarity of time series data before preceding other tests as time series data often contains clear trends over the time and inherent a seasonally unadjusted form. This is because many results will be voided if the model contains non-stationary variables. Hence, researchers have the incentive to test the stationary by using the unit roots test.

Assumption of Classical Regression Model will be violated if a model contains non-stationary variables. Besides, non-stationary variables will also lead to spurious regression problem. The series may have high significant t-statistic and high value for coefficient of determination. Consequently, the results will suggest the relationships between the variables in the regression model are statistically significant. However, this is due to evidence of contemporaneous correlations instead of meaningful causal relations.

To solve the problem of spurious regression, researchers are suggested to examine the stationary by first-differencing the time series data. Such method is to remove the non-stationary trend. However, simply differencing the data cannot fully solving the problem because such approach will cause the data to lose much of the long run (low-frequency) characteristics and remain only short run (high-frequency) characteristics of the data.

As low-frequency (long-run) characteristic need to be retained in modeling the time series data, the effects of lag variables must be taken into consideration. This is because most of the macroeconomic time series follow random walk components. If the time series follow random walk, the spurious results will be reported when a regression of one variable against another.

A co-integration test has been constructed to determine the long run relationship between two or more series variables. The economic interpretation of co-integration is that if two or more series are linked to form an equilibrium relationship spanning in the long run, then even though the series themselves may contain non-stationary, they will move closely together over the time and the difference between them is constant which bring a stationary. Then, the series are said to be co-integrated. Thus, the concept of co-integration mimics the existence of a long run equilibrium to which the

economic system converges over time among non-stationary variables which are integrated to the same order.

3.5 Unit Roots

Unit Roots Tests is employed to examine whether the variable of time series is stationary. Stationary can be defined as the mean, variance and covariance of series are the same across the different periods. On the other hand, when variable has mean and variance that are not constant then it can be said that the variable is non-stationary. In other words, when the variable has unit root which means it is non-stationary whereas for the stationary variable which has no unit root. Unit Roots Tests are conducted to ensure the dependent variable and independent variables are in stationary in order to avoid in obtaining the spurious result when in estimated regression. Unit Roots Tests are carried out by conducting the hypothesis testing which has to ensure that there is no structural break exists in the movement of time series variables. Otherwise, the result obtained from the hypothesis testing will be biased. Sometimes, it has to differentiate more than one times in order to obtain the series in stationary.

However, this paper has to ensure there is non-stationary or with one unit root I (1) for all those macroeconomics variables as mentioned earlier. It means that these variables will meet each others in long run as they are in the increasing trend and this indicated that there is a relationship between the variable and stock price. With a significant relationship between stock prices and macroeconomic variables, this paper can examine whether there is an asymmetric impact on stock price due to the effect of macroeconomic variables.

There are two approaches used to detect the stationarity of the time series data which are the Augmented Dickey Fuller (ADF) Unit Root Test and the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) Test.

3.4.2.1 Augmented Dickey Fuller (ADF) Test

The Augmented Dickey Fuller (ADF) test was developed by Dickey and Fuller (1979). It can be used in big sample size which contains large number of time series data. Otherwise, graphical method will be utilized to detect the stationarity of the time series data. The purpose of this test is to examine whether the time series variable is non-stationary or has a unit root.

Given that Y_t has trend and therefore the model with constant and with trend should be employed in this paper as below to conduct the unit root test. The model is constant and with trend whereby the changes of dependent variable is regressed by the independent variables which include the trend variable , β_{2t} , lagged level , γY_{t-1} and the total of lagged changes in variables , $\alpha i \, \Sigma \Delta Y_{t-i}$.

$$\Delta Y_t = \beta_1 + \beta_{2t} + \gamma Y_{t-1} + \alpha i \, \Sigma \Delta Y_{t-i} + \mathcal{E}_t \qquad \text{Equation 3.2}$$

H_o: There is a unit root/non-stationary, I(1)
H_1: There is stationary/ no unit root, I(0)

As mentioned earlier, the result should be in non-stationary therefore in order to obtain the result of non-stationary in the level form of ADF test, the null hypothesis of there is a unit root should not be rejected with the test-statistic greater than α (0.1, 0.05 and 0.01). The larger the test-statistic, the higher the chance that the null hypothesis of a unit root test will not be rejected
.

H_0: Unit roots of 2, I(2)

H_1: There is a unit root/non-stationary, I(1)

In the first difference form of ADF test, this paper needs to obtain the result with 1 unit root as well. As a result, the null hypothesis of unit roots of 2 is rejected when the test-statistic is less than α (0.1, 0.05 and 0.01) at the 1%, 5% and 10% significant level. Otherwise, the null hypothesis of unit roots of 2 will not be rejected. The smaller the test-statistic, the higher the opportunity that the null hypothesis of unit roots of 2 will be rejected. The variable is significant in 10%, 5% and 1% significant level when the test-statistic is less than α (0.1, 0.05 and 0.01). The smaller the test-statistic, the greater the opportunity for the variable to be significant.

3.4.2.2 Kwiatkowski, Phillips, Schmidt and Shin (KPSS) Test

Kwiatkowski, Phillips, Schmidt and Shin (1992) test is one of the methods used to run unit root test. It is used to test if the time series data is stationary or non stationary. The null hypothesis is that a series have no unit root or I (0). The alternative hypothesis is that series is unit root or I (1). The context of the unobserved component model is as follow:

$$y_t = d_t + \mu t + v_t \qquad \text{Equation} \qquad 3.3$$

$$\mu_t = \mu_{t-1} + \varepsilon_t \qquad \text{Equation} \qquad 3.4$$

Where y_t, $t = 1$, 2, 3, …. d_t is a deterministic component, t are observed data, v_t satisfies the strong mixing conditions of Phillips and Perron (1988) with long run variance $\sigma_v^2 \subset i.i.d.(0.\sigma_\varepsilon^2)$, and the initial value μ_0 is treated as fixed and serves the role of the intercept. Thus, the null hypothesis and the alternative hypothesis are as below:

H$_0$: **Yt** is stationary, I(0)

H$_1$: **Yt** is unit root/ non-stationary, I(1)

The rejection of null hypothesis in 10% significance level indicates the data have a unit root of 1. After that, the data are tested again using null hypothesis and alternative hypothesis as below:

H$_0$: There is a unit root/non-stationary, I (1)

H$_1$: Unit roots of 2, I(2)

In order to confirm the data has only a unit root, the result must be "do not reject null hypothesis".

The KPSS test is constructed by using the residual $\{v\}_{t=1}^{T}$ from the regression of y_t on d_t. Moreover, Barassi (2005) focuses on the two cases in KPSS: (i) $d_t = \mu$ a constant; (ii) $d_t = \mu + \tau(t)$ a constant plus a time trend. The KPSS test rejects H$_1$ in favor of H$_0$ for large values of the statistic.

$$\hat{\eta} = \frac{T - 2\sum_{t=1}^{T}(\sum_{i=1}^{t}\hat{v}_i)^2}{\hat{\sigma}_v^2} \qquad\qquad \text{Equation} \qquad 3.5$$

The $\hat{\sigma}_v^2$ is a consistent of σ_v^2 (Kwiatkowski et al. 1992 page 164). The statistic is identified as $\hat{\eta}_\mu$ in the constant case. It will be $\hat{\eta}_\tau$ in the linear trend case. Representation for the limit null distribution of the test statistic in the two cases and the relative critical values are found in Kwiatkowski et al (1992) pp 164-167.

3.4.3 Threshold Autoregressive (TAR) Model

The threshold autoregressive (TAR) model is represented as:

$$\Delta SP = \alpha + \beta\ I\ SP_{t-1} + \beta\ (1-I)\ SP_{t-1} + \sum_{i=1}^{n}\beta\Delta SP_{t-i} + \sum_{i=1}^{n}\beta\Delta IPI_{t-i} +$$

$$\sum_{i=1}^{n}\beta\Delta EXCHANGE_{t-i} + \sum_{i=1}^{n}\beta\Delta INTEREST_{t-i} + \sum_{i=1}^{n}\beta\Delta M2_{t-i}$$

$$+\sum_{i=1}^{n}\beta\Delta CPI_{t-i} + \mathcal{E}_t$$

Where $\acute{\epsilon}t\sim I.I.D\ (0, \sigma^2)$ and the lagged values of ΔSP_t are meant to yield uncorrelated residuals. The heaviside indicator function is denoted as follows:

$$I_t = \begin{cases} 1 & \text{if } \hat{S}_{t-1} \geq \tau \\ 0 & \text{if } \hat{S}_{t-1} < \tau \end{cases}.$$

Siklos (2002) stated the indicator variable in equation above depends on the previous period's SP_{t-1}. The adjustment is modeled by $\rho_1 SP_{t-1}$, if SP_{t-1} is above threshold. If SP_{t-1} is below threshold, the adjustment should be modeled by $\rho_2 SP_{t-1}$. The TAR model is possible to examine whether positive and negative discrepancies have different effects on the behavior of stock price adjustment to positive and negative news. Positive discrepancies from the threshold will be more persistent than negative discrepancies, if $-1 < \rho_2 < \rho_1 < 0$

According to Enders and Siklos (2001), the null hypothesis for TAR model, H_0: $\rho_1 = \rho_2 = 0$ can be tested by using F-statistic. Moreover, the null hypothesis of symmetric adjustment H_0: $\rho_1 = \rho_2$ can be tested using the usual F-statistic.

3.5 Conclusion

Thorough explanations of tests or methods that will be applied in this paper have been introduced earlier in this chapter. Several tests will be conducted systematically to examine the asymmetric impact on stock prices in order to obtain robust results. Data and proxies of macroeconomic variables have been determined for the study of this paper. Most of the prior expectations are tally with the results of previous researchers. Hence, the study of this paper can be carried on efficiently with all the information that are needed and the methods that have been confirmed.

CHAPTER 4: INTEPRETATION

4.1 Introduction

This section reports the individual results of the unit root tests (ADF and KPSS test), Threshold Autoregressive Model (TAR), Asymmetric Error Correction Model (ECM) as well as the diagnostics checking (CUSUM and CUSUM of Squares tests) on the five countries that has mentioned earlier.

4.2 Unit Root Tests

It is prior to carry out the unit root tests to reveal the stationary status of the dependent and independent variables by using , Augmented Dickey-Fuller test (ADF) and Kwiatkowski, Phillips, Schmidt and Shin test (KPSS). This is a preliminary step to prevent any spurious results in the estimated regression later. As for the Augmented Dickey-Fuller test, it is to ensure that the variables are non-stationary or with one unit root I (1) where the null hypothesis for level form should not be rejected and reject null hypothesis for the first difference form. On the other hand, the null hypothesis for Kwiatkowski, Phillips, Schmidt and Shin test indicates that there is stationary or non unit root I (0) where the null hypothesis for level form should be rejected while null hypothesis at first difference form should not be rejected.

The results of ADF test for level and first difference form are reported in Table 4.1 and Table 4.2 while the results of KPSS test for level and first difference form are reported in Table 4.3 and Table 4.4. Based on the results, the test-statistic of all variables for the 5 countries are greater than α even at 10% of significance level. ADF test shows that all the variables are insignificant in rejecting the null hypothesis for the level form. Then the ADF test was carried on to the first difference form in order to test the dynamic stationary of those variables. In the Table 4.2 reported that the test-statistic of the variables is smaller than α at 1%, 5% or 10% significance level where it is significant to reject the null hypothesis. These proved that the dependent and independent variables are non-stationary or with one unit root at their level and first differentiation form.

Besides, the KPSS test was conducted in order to obtain robust results and to test the accuracy of ADF test. The results indicate that all the variables are statistically significant to reject null hypothesis where the test-statistics are greater than the critical values at 1%, 5% or 10% significance level for the level form as shown in Table 4.3. The result shown in Table 4.4 for the first difference form indicates the t-statistics of all the variables are smaller that the critical values at 1%, 5% or 10% significance level. This means that the variables are insignificant to reject the null hypothesis. Hence, the dependent and independent variables of all the countries are non-stationary. In conclusion, all the macroeconomic variables of our study in this paper are integrated of order one I (1) which mean contain 1 unit root.

4.3 Threshold Autoregressive Model (TAR)

TABLE 4.5 : Results of Threshold Autoregressive (TAR) Model

COUNTRIES	US	UK	Japan	South Africa	Philippines
Above threshold	-0.1330***	-0.1259***	-0.1259***	-0.3019***	-0.0899***
Below threshold	-0.0527	-0.0806**	-0.0806*	-0.1368***	-0.1897***
F-equal	1.4148*	0.5319*	0.5319*	3.7695*	1.9788*
F-joint	4.4809*	5.0223*	5.0223*	10.8938*	6.7780*
Threshold value (tau)	-0.0986	-0.0850	-0.0850	0.0907	-0.5076

NOTE: *, **, ** * indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level.

Threshold Autoregressive Model examines whether the market is asymmetric by the speeds of adjustment to positive and negative news. To show the market is asymmetric, F-equal and F-joint have to be significant at 5% significance level.

The hypothesis testing for F-equal is as below:

H_0: $P_0 = P_1$ (there is no dynamic relationship between long run and short run)
H_1: $P_0 \neq P_1$ (there is dynamic relationship between long run and short run)

Results have to reject null hypothesis at significance level of 5% to conclude the market does not have dynamic relationship between long run and short run. From the result, five countries are significant at 5% significance level. Therefore, null hypothesis is rejected and there is enough evidence to show that these five countries' stock markets are asymmetric.

Hypothesis testing for F-joint is as below:

H_0: P_0 = P1 = 0 (there is no dynamic relationship between long run and short run)

H_1: P_0 = P1 $\neq$ 0 (there is dynamic relationship between long run and short run)

Results have to reject null hypothesis at significance level of 5% to conclude the market is asymmetric. From the result, five countries are significant at 5% significance level. Therefore, H null is rejected and there is enough evidence to show that these five countries market is asymmetric.

To determine whether the market is asymmetric, either test-statistic of above and below threshold should significant at minimum 10% significance level. From the result of table 4.5, test-statistics of above threshold for United States, United Kingdom, South Africa, Japan and Philippines are all significant at 1%. On the other hand, test-statistic of below threshold for United States is not significant while United Kingdom, South Africa, Japan and Philippines are significant at 5%, 1%, 10% and 1% significance level. Therefore, there is enough evidence to show that these five country' stock markets are asymmetric.

Threshold value of United States is -0.0986, this shows that when stock prices increase or decrease to -0.0986, investor behaviors will change but the speed of adjustment to equilibrium are different as the market is asymmetric. This is because results show that when stock prices increase to -0.0986, the speed of adjustment to equilibrium is 13.30% while when stock prices decrease to -0.0986, the speed of adjustment to equilibrium is 5.27%.

Threshold value of United Kingdom is -0.0850, this shows that when stock prices increase or decrease to -0.0850, investor behaviors will change but the speed of adjustment to equilibrium are different as the market is asymmetric. This is because

results show that when stock prices increase to -0.0850, the speed of adjustment to equilibrium is 12.59% while when stock prices decrease to -0.0850, the speed of adjustment to equilibrium is 8.06%.

Threshold value of South Africa is 0.0907, this shows that when stock prices increase or decrease to 0.0907, investor behaviors will change but the speed of adjustment to equilibrium are different as the market is asymmetric. This is because results show that when stock prices increase to 0.0907, the speed of adjustment to equilibrium is 30.19% while when stock prices decrease to 0.0907, the speed of adjustment to equilibrium is 13.68%.

Threshold value of Japan is -0.0850, this shows that when stock prices increase or decrease to -0.0850, investor behaviors will change but the speed of adjustment to equilibrium are different as the market is asymmetric. This is because results show that when stock prices increase to -0.0850, the speed of adjustment to equilibrium is 12.59% while when stock prices decrease to -0.0850, the speed of adjustment to equilibrium is 8.06%.

Threshold value of Philippines is -0.5076, this shows that when stock prices increase or decrease to -0.5076, investor behaviors will change but the speed of adjustment to equilibrium are different as the market is asymmetric. This is because results show that when stock prices increase to -0.5076, the speed of adjustment to equilibrium is 8.99% while when stock prices decrease to -0.05076, the speed of adjustment to equilibrium is 18.97%.

4.4 Asymmetric Error Correction Model

Table 4.6: Results of Asymmetric Error Correction Model

	US	UK	JAPAN	S. AFRICA	PHILIPPINE
C	0.0048	0.0184	-0.0061	0.0122	-0.0124
ZPLUS	-0.0052*	0.0013	0.1714	-0.0091**	0.0041
ZMINUS	-0.0033	-0.0065*	-0.4622*	-0.0073**	-0.0211*
ΔSP(-1)	-0.0475	0.1441**	0.1018	0.2269***	-0.2572***
ΔSP(-2)	--	--	--	-0.2587***	--
ΔSP(-3)	0.1555*	--	--	--	--
ΔSP(-4)	--	0.1546**	--	-0.1789***	--
ΔSP(-6)	-0.1934***	--	--	--	--
ΔSP(-8)	--	--	--	0.1952***	--
ΔCPI(-1)	-0.0255*	-1.2721*	-1.5108	0.3054	0.1615
ΔCPI(-3)	--	-1.856**	--	-1.7055**	--
ΔCPI(-4)	-0.0264**	--	-4.0858***	--	--
ΔCPI(-5)	0.0333**	--	--	-1.6408**	--
ΔCPI(-8)	--	--	--	0.7915	--
ΔIPI(-1)	1.1947**	-0.3413	0.1719	0.2807**	-0.1235
ΔIPI(-2)	0.9296*	--	--	--	--
ΔIPI(-4)	--	--	--	--	1.0006***
ΔIPI(-5)	--	--	--	0.0815	0.5679**
ΔIPI(-6)	--	--	--	--	0.5304**
ΔIPI(-7)	--	--	--	-0.176	--
ΔEXCHANGE(-1)	-0.1447	0.4878**	-0.1026	0.0489	1.4360**
ΔEXCHANGE(-4)	--	-0.3581*	--	--	--
ΔEXCHANGE(-6)	--	--	--	-0.1151	--
ΔEXCHANGE(-8)	--	0.2258	--	--	--
ΔM2(-1)	-0.5175	-0.4536	-0.0792	0.2288	1.4318**
ΔM2(-2)	--	-1.4824**	--	0.5609***	--
ΔM2(-7)	--	--	-0.5472	--	--
ΔINTEREST(-1)	-0.0255	0.012	-0.208	0.0027	0.0086
ΔINTEREST(-2)	--	--	0.0399**	-0.0167**	--
ΔINTEREST(-3)	--	--	--	-0.0161**	--
ΔINTEREST(-5)	--	--	-0.047**	--	--
ΔINTEREST(-6)	-0.0324	--	--	-0.0119*	--
ΔINTEREST(-8)	0.0703***	--	--	0.0136**	--

Note: *, **, *** indicated the rejection of the null hypothesis at 10%, 5%, 1% significance levels. Lag selections are based on parsimony. Zplus is indicate positive shock when good news released where zminus is the negative shock response to the bad news. If zplus is not equal to zminus, the positive shock and negative shock are not equal.

The results of this paper are presented in the table 4.6 above. It should be noted that both zplus and zminus are crucial components in asymmetric error correction model (ECM). If either zplus or zminus is negative and significant in the 10% significance level, it indicates that macroeconomic variables is asymmetrically influence the countries' stock price. In order to estimate the long run equilibrium relationship and asymmetric adjustment, the asymmetric error correction model follow the tests of short run dynamics between changes in the stock price and five macroeconomic variables.

Based on result above, the zplus of United States is -0.0052 and it is significant at 10% significance level. This shows that when good news released, the United State's speed of adjustment to long run equilibrium is 0.52%. However, the zminus of -0.0033 is not significant. It proved that asymmetric impacts happened in the US stock market as positive shock bigger than negative shock. This can be shown in Appendix (Table 4.7). The table shows that the change of largest percentage gains is greater than the change of largest percentage losses. It is consistent with the results of this paper.

In the case of United Kingdom, zplus is 0.0013 and it is not significant at 10% significance level. The zminus -0.0065 is significant at the level of 10% which indicate the stock market's speed of adjustment of negative shock to long run equilibrium is 0.65%. Hence, the UK stock market is more responsive to negative announcement than positive announcement. The Figure 1.2 in the Appendix shows there was a drastically drop in stock price in July. It was due to the renewed fears of the eurozone crisis. Oxlade (2012) reported that FTSE 100 hit a low of 4935 on 19 August, a 20% fall from 5900 in July. It is obvious that the negative shock is more than positive shock.

With the zminus -0.4622 significantly reject null hypothesis at 10% significance level, Japan stock market movement is also proved to be asymmetric. Stock market is significantly affected by negative shock. The speed of adjustment back to long run equilibrium is 4.6%. However, the zplus 0.1714 is insignificant. According to BBC News (2011), Japanese shares have dropped 14% within two days, registering its biggest two-day drop in 40 years, due to the massive earthquake and tsunami in Japan on March 11, 2011 and also the fears of radiation leakage at the Fukushima Daiichi nuclear plant.

Moreover, South Africa stock market is asymmetric to the release of good news and bad news. It can be proved by the results in table 4.6. Either zplus -0.0091 or zminus -0.0073 is significant at 5% significance level in this model. South Africa's stock market is significantly influenced by good news and bad news but the speed of adjustment is not the same. The positive speed of adjustment to long run equilibrium is 0.91%. The negative speed of adjustment to long run equilibrium is 0.73%. Since the zplus and zminus is vary, it proves that positive shock is more than negative shock.

Lastly, Philippines' zplus is 0.0041 which is neither negative nor significant at 10% significance level. However, zminus is -0.0211 which is significant at the level of 10%. The results show that investors are more responsive to positive announcements than negative announcements. The negative speed of adjustment to long run equilibrium is 2.11%. The Philippines stock market is not entirely efficient all the time.

4.5 Diagnostics Checking

The two diagnostics checking tests used to examine on the asymmetric ECM model for the five countries that has mentioned earlier in this paper are the:

(1) CUSUM Test
(2) CUSUM of Squares Test

4.5.1 CUSUM Test

The CUSUM test takes the cumulative sum of residuals and plots its value against the upper and lower bounds of the 95% confidence interval at each point. The results for the CUSUM test are shown in the graphical form. This paper has to ensure the cumulative sum of recursive residuals plots in between the upper and lower bound of the 95% confidence interval in order to obtain the significant result for the asymmetric ECM model for the countries studied. The results of CUSUM test for all the five countries are shown from Figure 4.1 to 4.5 as below.

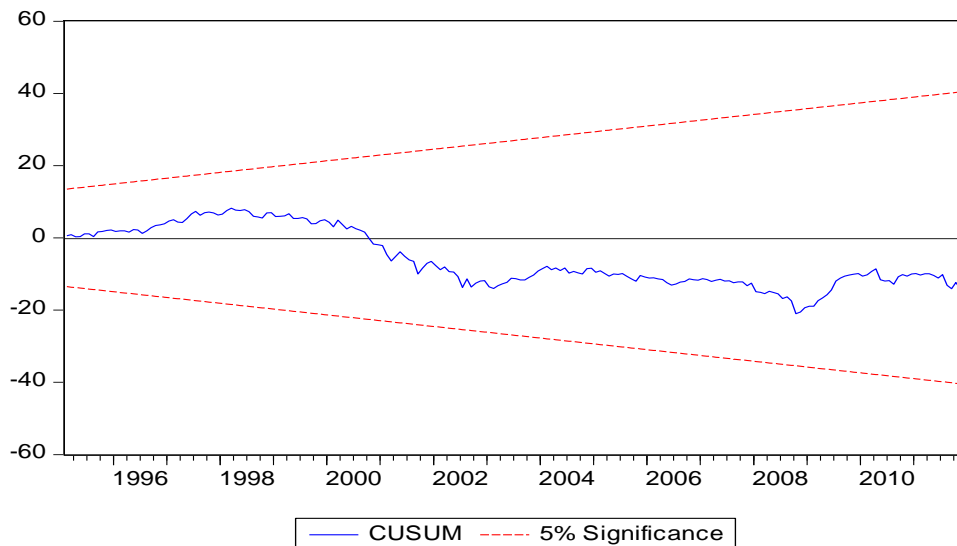Figure 4.1: United States (CUSUM Test)
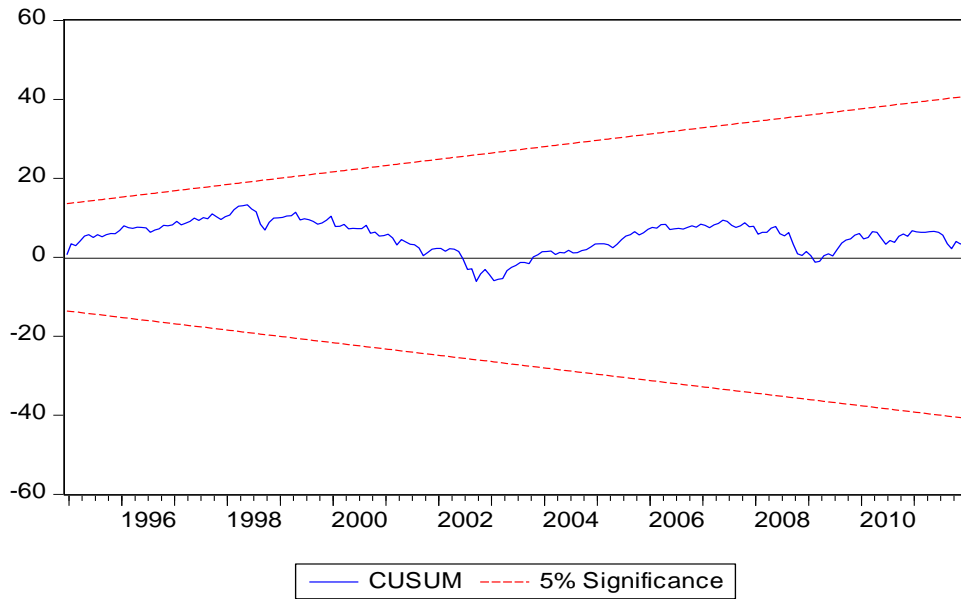
Figure 4.2: United Kingdom (CUSUM Test)
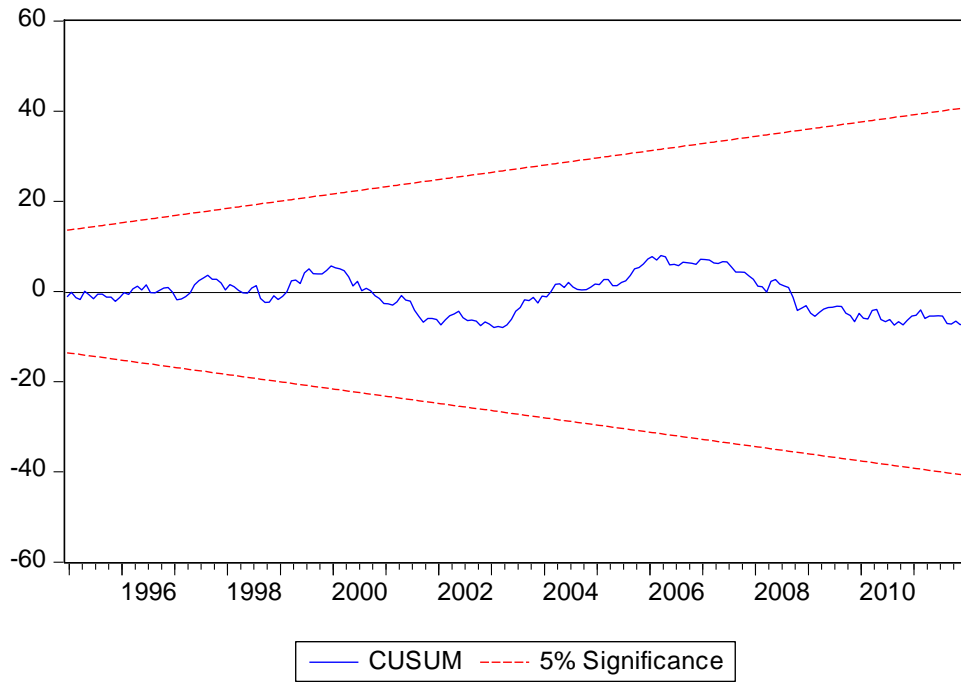

Figure 4.3: Japan (CUSUM Test)

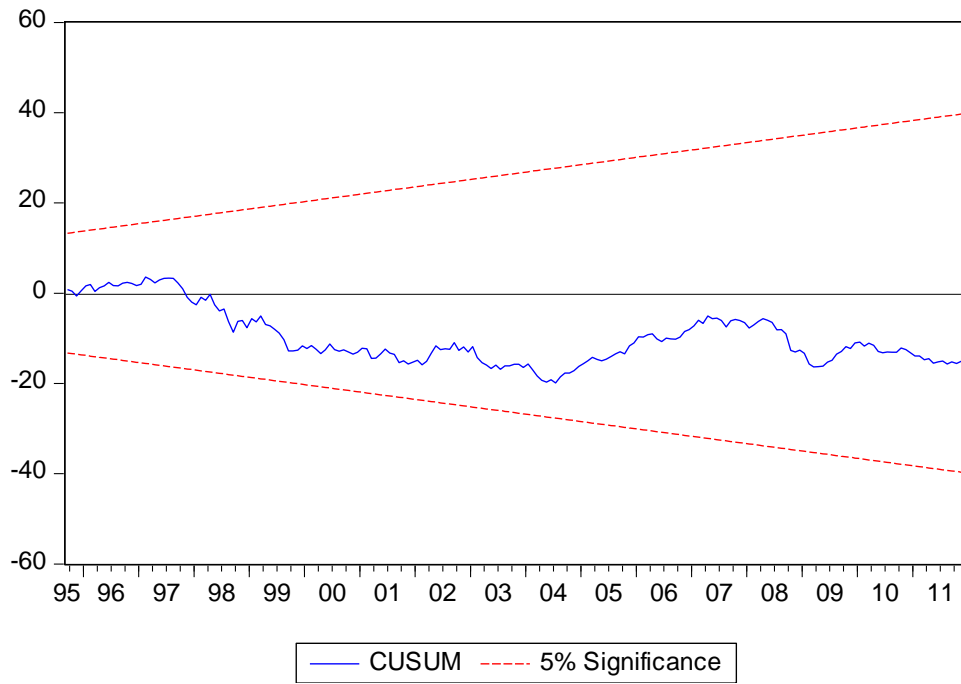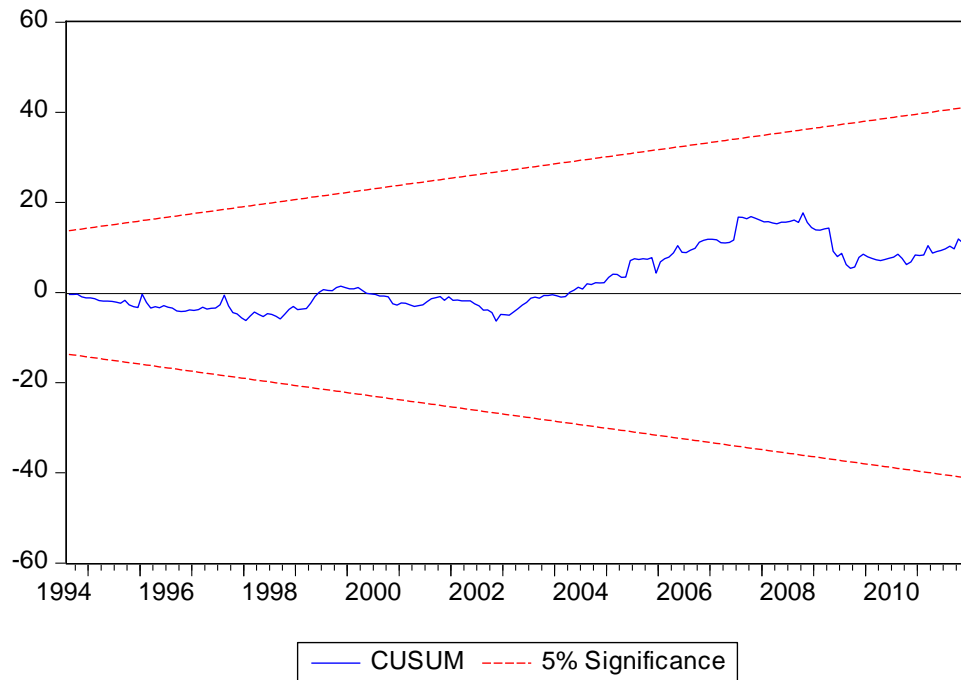Figure 4.4: South Africa (CUSUM Test)

Figure 4.5: Philippines (CUSUM Test)

From the CUSUM test results above, it can be concluded that overall asymmetric ECM models for the developed countries (Figure 4.1 to 4.3) and developing countries (Figure 4.4 and 4.5) in this paper are significant at 5% significance level which indicated that the asymmetric ECM models are correct and in structurally stable.

4.5.2 CUSUM of Squares Test

The CUSUM of Squares test is to ensure the robustness of the result for CUSUM test. It accesses the cumulative variance around the regression. The test is shown in the graphical form whereby the cumulative of variance within the boundaries of 5% of significance level is a must to obtain a significant result.
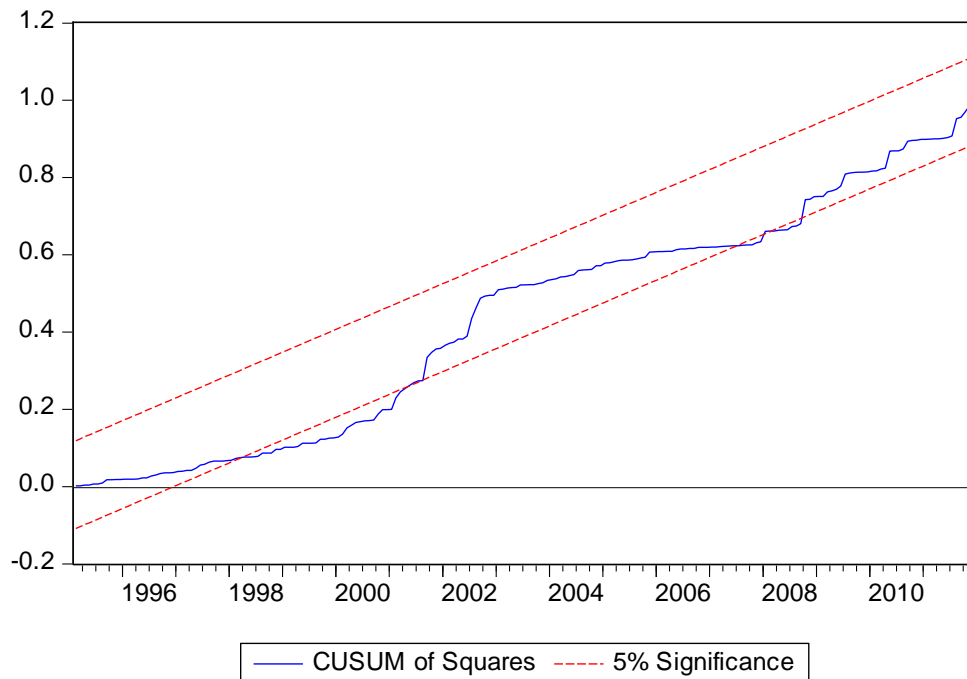
Figure 4.6: United Stated (CUSUM of Squares Test)

Figure 4.7: United Kingdom (CUSUM of Squares Test)
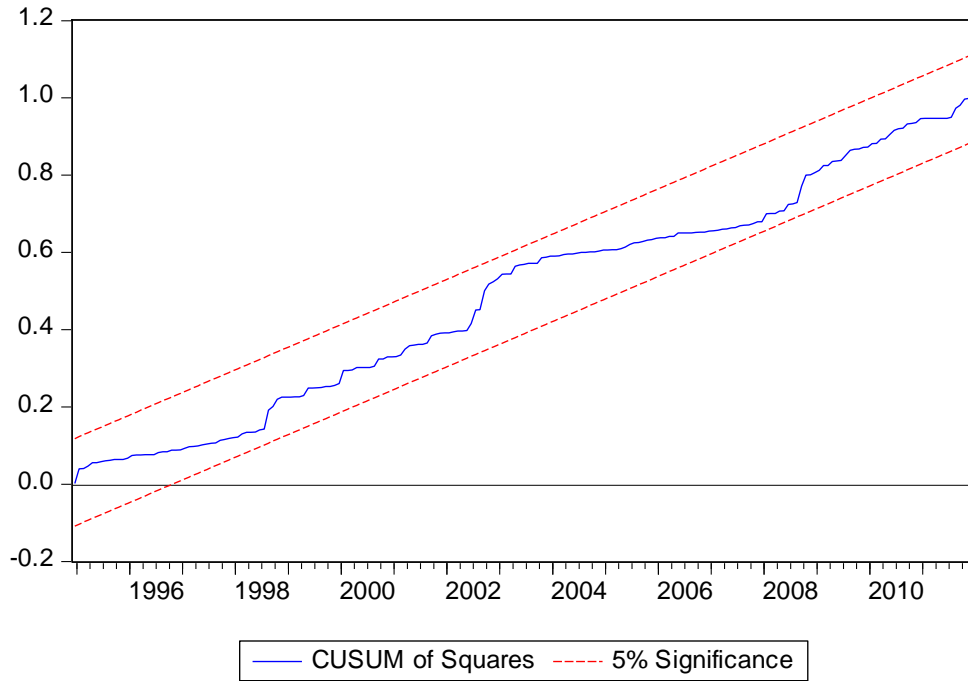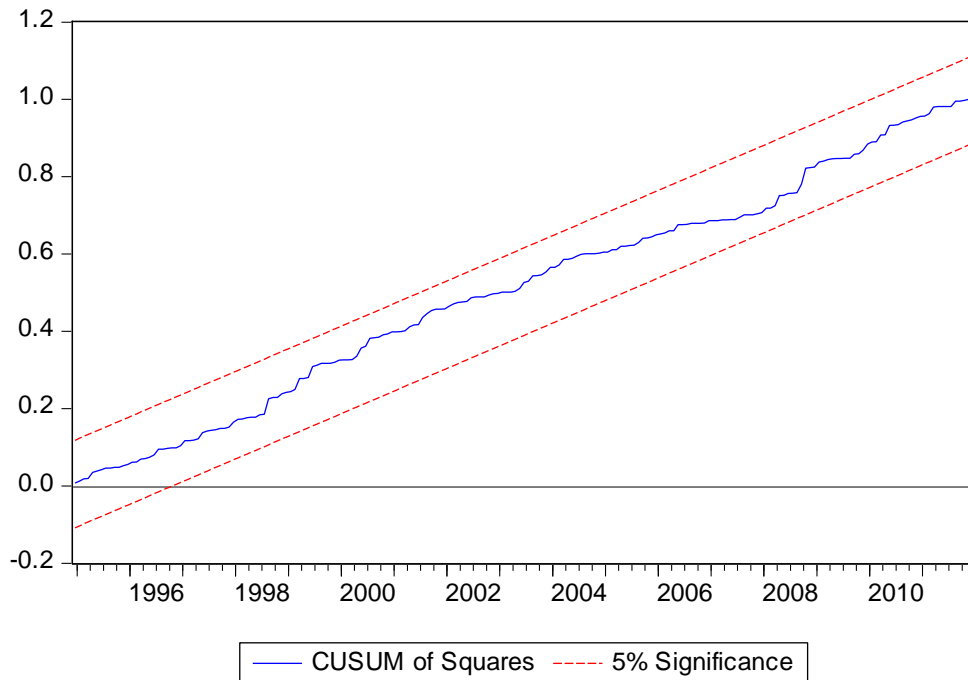

Figure 4.8: Japan (CUSUM of Squares Test)
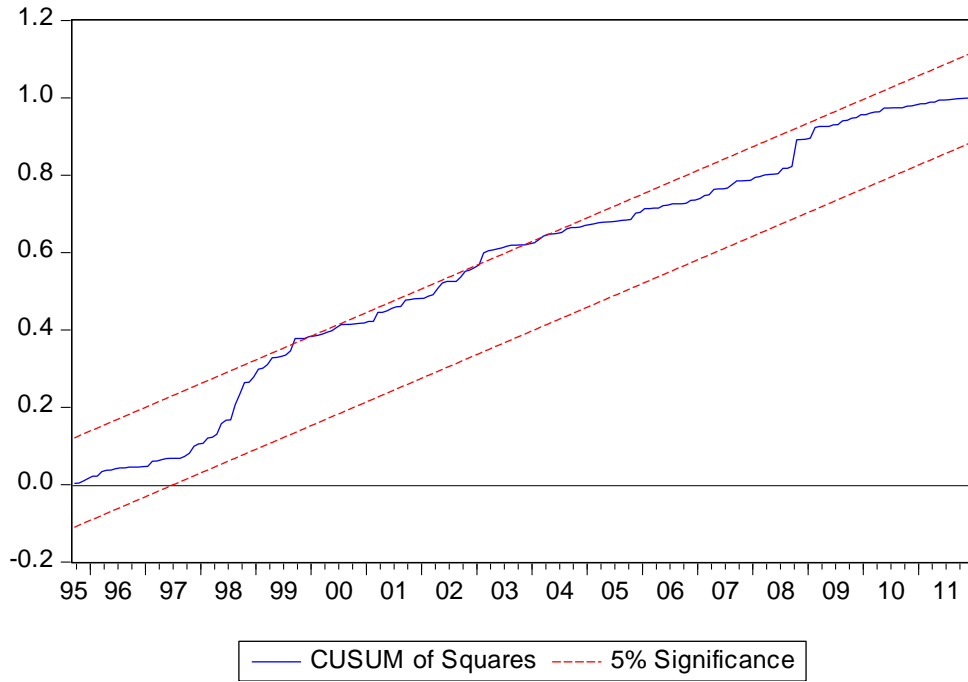
Figure 4.9: South Africa (CUSUM of Squares Test)

CUSUM of Squares ----- 5% Significance

Figure 4.10: Philippines (CUSUM of Squares Test)

CUSUM of Squares ----- 5% Significance
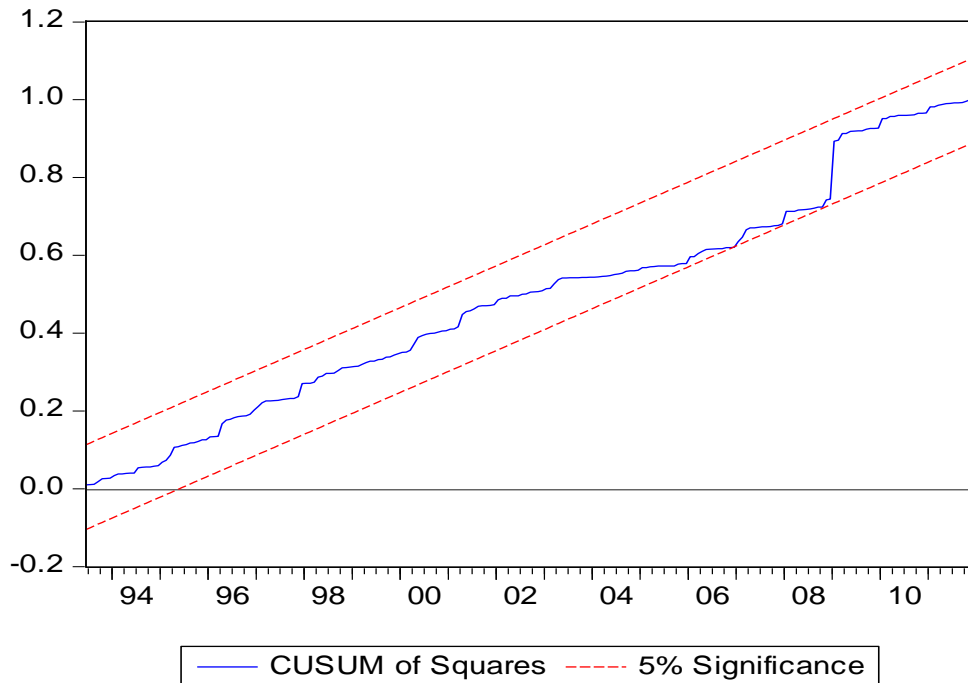
The results of CUSUM of Squares test are shown in the Figure 4.6 to Figure 4.10. It shows the asymmetric ECM model for United State (Figure 4.6) and South Africa (Figure 4.9) are not significant at 5% significance level. However, it still in the acceptable level in which the asymmetric ECM models for both countries (Figure 4.6 and 4.9) are significant at 10% of significance level. On the other hand, United Kingdom (Figure 4.7), Japan (Figure 4.8) and Philippines (Figure 4.10) are significant at the level of 5% significance level for the CUSUM of Squares test which indicated that all the asymmetric ECM models for these countries (Figure 4.7, 4.8 and 4.10) are correct and in structurally stable. Therefore, it can be assured that all the countries' asymmetric ECM models from Figure 4.6 to 4.10 are stable and in correct structure.

4.5 Conclusion

As all the individual asymmetric ECM models for the five countries in this paper are able to pass through both of the diagnostic checking tests (CUSUM and CUSUM of Squares tests), therefore, it can be concluded that there is a correct and stable structure for those asymmetric ECM models. As a result, it is proven that stock prices of the five countries in this paper react asymmetrically to macroeconomic variables.

CHAPTER 5: CONCLUSIONS

5.1 Discussion of Major Findings

Empirical results from the Asymmetric Error Correction Model revealed that the speed of adjustment for the stock prices to increase or decrease back to equilibrium or long run for United States, United Kingdom, Japan, South Africa and Philippines are asymmetric after affected by the macroeconomic variables (inflation rate, industrial production index, exchange rate, interest rate and money supply). This can be proved by the results of Threshold Autoregressive (TAR) model as these five countries are significant in rejecting the null hypothesis of F-equal and F-joint at 5% significance level. Apart from that, either zplus or zminus are significant and with negative signs was shown in the results of asymmetric Error Correction model (ECM) for these countries. Based on the results, stock prices of United Kingdom, Japan and Philippines react excessively to the negative shock whereas stock prices of United States and South Africa are overreact to the positive shock relative to negative shock.

The robust results in the regression models were shown by both of the unit root tests which are the ADF test and KPSS test whereby it revealed that all these countries' stock prices carried a unit root of one or in non-stationary in both level form and first difference at 1%, 5% or 10% significance level. The accuracy of the final results is assured as it had gone through both the diagnostics checking which are the CUSUM test and CUSUM of Squares test. Therefore, this paper can come with a conclusion that there is an asymmetric impact between stock prices and macroeconomic variables in the five countries which had mentioned earlier.

This paper has successfully proved the asymmetric impact on the integration between stock market and macroeconomic variables. Besides, this paper employed other

method that differs from previous researchers called asymmetric Error Correction model. This method actually modified from ECM model in which ECM model was widely applied in the previous studied in symmetric view. This can be shown by the previous researchers such as Abraham (2011) in Nigerian economy, Afzal and Hossain (2011) in Bangladesh, Hassan and Nasir (2008) in Pakistan and Islam (2003) in Malaysia regarding the long run and short run relationship between stock price and macroeconomic variables by using the Error Correction Modeling technique. Also, Omran (2003) has conducted research in Egyptian stock market that using the same method as Abraham (2011), Afzal and Hossain (2011), Hassan and Nasir (2008) and Islam (2003).

Moreover, numerous previous studies solely tested on the long run and short run relationship of stock price related to macroeconomic variables with various approaches that differ from this paper. They assumed that the impact of stock price is symmetric. This can be seen in the researches by Mukherjee and Naka (1995) in Japanese Stock Market and Naka, Mukherjee and Tufte (1998) in Indian stock market which employed the Vector Error Correction model (VECM). Meanwhile, Gan, Lee, Au Yong and Zhang (2006), Singh (2010) and Tripathy (2011) were applied Granger causality test whereas Cheung and Ng (1998), Mayasami and Koh (2000) and Sohail and Hussain (2011) were employed Johansen co-integration model to examine long run and short run relationship between the stock price and macroeconomic variables. Other than that, the multivariate co-integration techniques was applied by Ali (2011) and Hosseini, Ahmad and Yew (2011) who carried on researches at Dhaka Stock Exchange and stock market index in China and India respectively. Furthermore, Rad (2011) and Rahman et al. (2009) who utilized the Vector Autoregressive model (VAR) to investigate the Malaysia stock prices and Tehran Stock exchange in relative to macroeconomic variables correspondingly.

The major findings of this paper actually truly reflect the actual impact of stock price. It is closely related to the real circumstances that happened in the stock market

whereby it is not only react extremely towards the negative shock but also react excessively to the positive shock. Hence, this paper argues that the stock market is not entirely symmetric. It is actually against the assumption of symmetric stock price that was made by the previous researchers when conducting the studies regarding the interaction of stock price and macroeconomics variables as well as the inappropriate used of methodologies. As a result, the findings by the previous researchers might be inaccurate.

5.2 Conclusion

Generally, there is relationship between stock prices and macroeconomic variables in five countries studied. Significance of F-equal and F-joint in Threshold Autoregressive Model shows the stock markets in five countries studied reacts asymmetrically to good news and bad news. This is because speeds of adjustment to positive and negative news are different according to the result in table 4.5. Besides, stock prices and macroeconomic variables in selected five countries are asymmetric in short run and long run integration as result in table 4.6 shows significance in either zplus or zminus at 10% significance level. In short, stock markets in both developed (United States, United Kingdom and Japan) and developing countries (South Africa and Philippines) are asymmetric.

5. 3 Policy Implications

The results in TAR and ECM show that the stock markets in both developed and developing country are asymmetric, which is entirely different from the previous researchers. As research on South Africa is limited and generally based on

assumption that the stock market is symmetric, the government in South Africa should consider the stock market is asymmetric and adjust its implication accordingly. For instances, policymakers should stabilize the domestic macroeconomic if they wish to maintain the financial stability. However, policymakers need to stay vigilant and proactive while facing the international financial crises as market may overreact and increase the severity of these crises.

Besides, investors, hedgers and speculators should pay more attention and adjust their trading strategies all the time. It is important for them to examine all available information in market before making any trading decisions. On the other hand, psychological effect should not be neglected while planning for trading strategies. Investors are risk aversion. They are more concerned about market downturn than market upturn. Stock prices increase in slower motion when the market is in bull. Conversely, stock prices decrease in faster motion when the market is in bear. Therefore, investors and hedgers, who are looking for profit, could invest in more appropriate way to increase their profitability. Hedgers, who are seeking for protection against loss, should aware of this asymmetry in real stock market and enter into favorable position in order to minimize their loss.

Last but not least, there are many arguments that the market is not entirely efficient. Therefore, the government and economists are encouraged to take into the consideration that the market is asymmetric. They should consider using asymmetric model like TAR instead of symmetric models like VECM, GARCH and ARIMA to investigate the relationship between stock prices and macroeconomic variables in order to enhance the accuracy of the results.

5.4 Limitation and Recommendation

Limitation of this paper is the concentration on only three developed countries and two emerging countries in order to examine the asymmetric effect on the relationship between stock prices and macroeconomic variables. The findings of this paper have proved the existence of asymmetric impact on the relationship between stock prices and macroeconomic variables. However, the result obtained from the five countries in this paper does not mean it could be applicable in other countries around the world. The result can not represent that most of the countries in the world would have the same impact on their stock prices. Hence, this paper recommends future researchers to study on more developed and developing countries in order to increase the validity on the existence of asymmetric impact.

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Appendices

Figure 1.1 – United States stock market (Dow Jones Industrial Average)
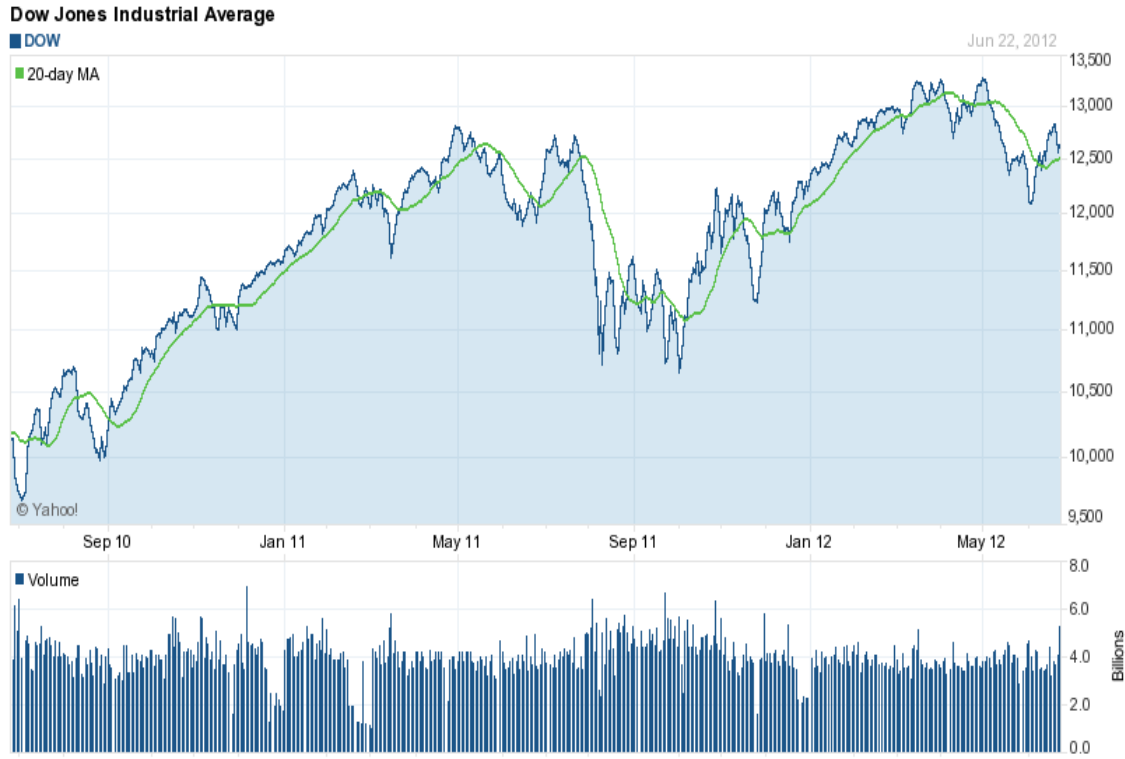
Source: Yahoo Finance. (2012). *Dow Jones Industrial Average.* Retrieved June 22, 2012, from http://finance.yahoo.com/q/ta?s=^DJI&t=2y&l=on&z=l&q=l&p=m 20&a=&c=

Figure 1.2 - United Kingdom stock market (FTSE 100)
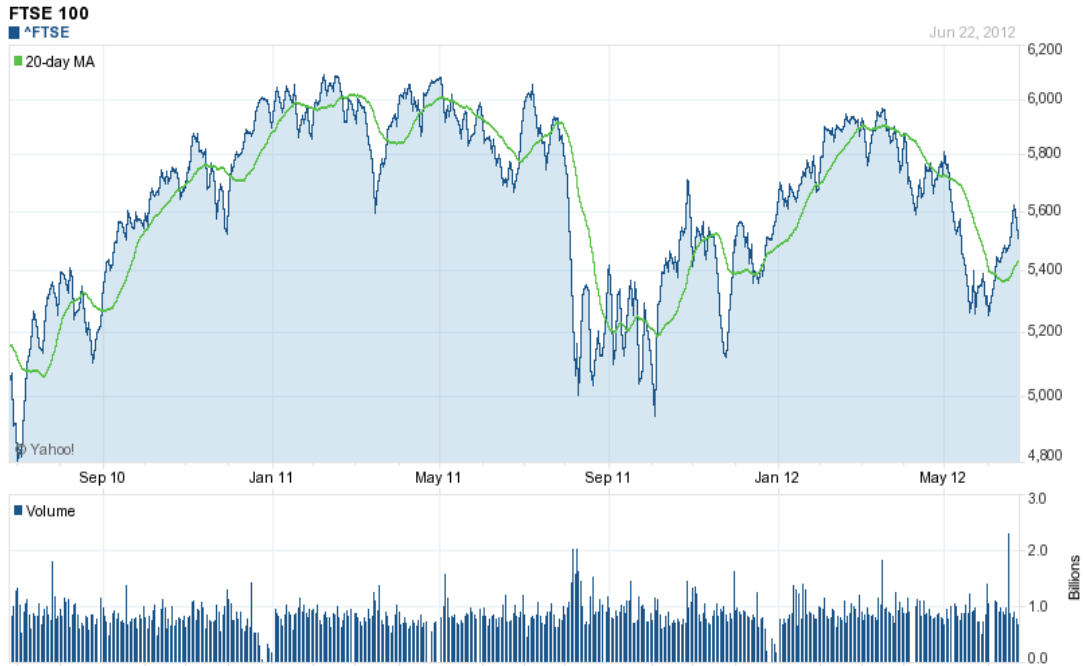
Source: Yahoo Finance. (2012). *FTSE100*. Retrieved June 22, 2012, from
http://finance.yahoo.com/q/ta?s=^FTSE&t=2y&l=on&z=l&q=l&p=m20&a=&c=

Figure 1.3 – Japan stock market (NIKKEI 225)

Source: Yahoo Finance. (2012). Nikkei225. Retrieved June 22, 2012, from

http://finance.yahoo.com/q/ta?s=^N225&t=2y&l=on&z=l&q=l&p=m20&a=&c=

Figure 1.4 – South Africa (Johannesburg Stock Exchange (JSE)

Source: EFT World. (2012). *Technical Analysis: FTSE/JSE top 40 index: The support should generate a bounce.* Retrieved June 22, 2012, from http://www.etfworld.es/index.php?option=com_content&view=article&id=12008:tec hnical-analysis-ftsejse-top-40-index-the-support-should-generate-a-bounce&catid=377:analisis-etf&Itemid=764

Figure 1.5 – Philiphines stock market (Philiphines Stock Exchange Index)

Source: Yahoo Finance. (2012). *PSEI.* Retrieved June 22, 2012, from
http://finance.yahoo.com/q/ta?s=PSEI.PS&t=2y&l=on&z=l&q=l&p=m20&a=&c=

Table 4.7 Dow Jones Industrial Average. All –Time Largest One Day Gains and

Losses

Dow Jones Industrial Average All-Time Largest One Day Gains and Losses (Most recent figures are in bold)									
Largest % Gains					Largest % Losses				
Rank	Date	Close	Net Chg	% Chg	Rank	Date	Close	Net Chg	% Chg
1	03/15/1933	62.10	8.26	15.34	1	10/19/1987	1738.74	-508.00	-22.61
2	10/06/1931	99.34	12.86	14.87	2	10/28/1929	260.64	-38.33	-12.82
3	10/30/1929	258.47	28.4	12.34	3	10/29/1929	230.07	-30.57	-11.73
4	09/21/1932	75.16	7.67	11.36	4	11/06/1929	232.13	-25.55	-9.92
5	10/13/2008	9387.61	936.42	11.08	5	12/18/1899	58.27	-5.57	-8.72
6	10/28/2008	9065.12	889.35	10.88	6	08/12/1932	63.11	-5.79	-8.40
7	10/21/1987	2027.85	186.84	10.15	7	03/14/1907	76.23	-6.89	-8.29
8	08/03/1932	58.22	5.06	9.52	8	10/26/1987	1793.93	-156.83	-8.04
9	02/11/1932	78.60	6.80	9.47	9	10/15/2008	8577.91	-733.08	-7.87
10	11/14/1929	217.28	18.59	9.36	10	07/21/1933	88.71	-7.55	-7.84
11	12/18/1931	80.69	6.90	9.35	11	10/18/1937	125.73	-10.57	-7.75
12	02/13/1932	85.82	7.22	9.19	12	12/01/2008	8149.09	-679.95	-7.70
13	05/06/1932	59.01	4.91	9.08	13	10/09/2008	8579.19	-678.91	-7.33
14	04/19/1933	68.31	5.66	9.03	14	02/01/1917	88.52	-6.91	-7.24
15	10/08/1931	105.79	8.47	8.70	15	10/27/1997	7161.15	-554.26	-7.18
16	06/10/1932	48.94	3.62	7.99	16	10/05/1932	66.07	-5.09	-7.15
17	09/05/1939	148.12	10.03	7.26	17	09/17/2001	8920.7	-684.81	-7.13
18	06/03/1931	130.37	8.67	7.12	18	09/24/1931	107.79	-8.20	-7.07
19	01/06/1932	76.31	5.07	7.12	19	07/20/1933	96.26	-7.32	-7.07
20	03/23/2009	7775.86	497.48	6.84	20	09/29/2008	10365.45	-777.68	-6.98

Source: The Wall Street Journal (2012). *Dow Jones Industrial Average- Market Data Center.* Retrieved August 1, 2012, from
http://online.wsj.com/mdc/public/page/2_3024-djia_alltime.html