UNIVERSITI PUTRA MALAYSIA

ASYMMETRIC EFFECTS OF MONETARY POLICY OVER BULL AND BEAR STOCK MARKET CYCLES IN SELECTED ASEAN COUNTRIES

ROOHOLLAH ZARE

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DOCTOR OF PHILOSOPHY
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By

ROOHOLLAH ZARE

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in fulfillment of the Requirements for the Degree of Doctor of Philosophy.

April 2014

Especially dedicated to:

My wife, Raazieh
My lovely daughter, Elena
Dad and Mum
For their love and support.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirements for the degree of Doctor of Philosophy

ASYMMETRIC EFFECTS OF MONETARY POLICY OVER BULL AND BEAR STOCK MARKET CYCLES IN SELECTED ASEAN COUNTRIES

By
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April 2014

Chairman: Professor Azali Mohamed, PhD
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The asymmetric impact of monetary policy on real economy is widely accepted in recent years and has been an important topic for macroeconomic policy. Asymmetries in the context of monetary policy refer to the situations in which the impact of a given policy is not constant but varies depending on the circumstances. This study examines the asymmetric response of real output, stock returns and volatilities to monetary policy over bull and bear stock market regimes. This investigation is of great interest for monetary policy makers to implement effective policy decisions and for financial markets participants to formulate successful investment and risk management decisions. This study examines asymmetries using the pooled mean group (PMG) technique of Pesaran *et al.* (1999). Bull and bear phases are identified by employing two approaches: the Markov-switching models and the non-parametric approach proposed by Pagan and Sossounov (2003). The empirical results from the panel of the ASEAN5 countries (Malaysia, Indonesia, Singapore, the Philippines and Thailand) for the period 1991:1-2011:12, show that the long-run response of real output, stock returns and volatilities to monetary policy is statistically stronger over bear markets than bulls providing evidences to support the prediction of finance constraints models. Accordingly, policy makers should consider the bull and bear regimes while implementing monetary policies and condition the size of the shifts in policy rate to the specific phase of the stock market at the time of policy implementation. Failing to consider stock market conditions at the time of policy implementation may not have proper impact for stabilizing the stock market. Moreover, stock market investors should not only pay close attention to the development of monetary policy, but also to the specific stock market regime at the time of investment decisions. The empirical results of this study also indicate that increase in the policy rate (restrictive monetary policy) leads to decrease in real output in the long-run, no matter if the stock market is in a bull or bear state. The PMG estimation results also indicate that positive changes in short-term interest rate have negative long-run effect on stock returns as predicted by the asset pricing theories. The empirical results from the PMG estimation of the response of stock market volatility to monetary policy show that increase in the policy rate raises stock market volatility in the long-run. This positive relation can be explained by the "leverage effect" which refers to the asymmetric relationship between stock market returns and volatility.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN ASIMETRIK DASAR MONETARI KE ATAS KITARAN PASARAN SAHAM 'BULL' DAN 'BEAR' DI NEGARA ASEAN TERPILIH

Oleh

ROOHOLLAH ZARE

April 2014

Pengerusi: Profesor Azali Mohamed, PhD
Fakulti: Ekonomi dan Pengurusan

Kesan asimetrik dasar monetari kepada ekonomi telah diterima secara meluas dalam tahun-tahun kebelakangan ini dan menjadi satu topik yang penting bagi dasar makroekonomi. Kesan asimetrik, mengikut konteks dasar monetari, merujuk kepada suatu fenomena di mana kesan bagi sesuatu dasar adalah tidak konstan tetapi berubah mengikut keadaan. Kajian ini mengkaji tindak balas asimetrik output sebenar, pulangan saham dan turun naik dasar monetari kepada rejim pasaran saham 'bull' dan 'bear'. Penyiasatan ini amat menarik bagi pembuat dasar monetari untuk melaksanakan dasar yang berkesan dan juga kepada peserta pasaran kewangan dalam merumuskan pelaburan yang jaya disamping keputusan pengurusan risiko. Kajian ini mengkaji asimetri menggunakan 'pooled mean group' (PMG) iaitu satu teknik yang dicadangkan oleh Pesaran *et al.* (1999). Kitaran pasaran saham 'bull' dan 'bear' telah dikenal pasti dengan menggunakan dua kaedah: model Markov-switching dan juga pendekatan non-parametric yang dicadangkan oleh Pagan dan Sossounov (2003). Hasil kajian panel daripada kalangan negara ASEAN5 (Malaysia, Indonesia, Singapura, Filipina dan Thailand) bagi tempoh 1991:1 hingga 2011:12, menunjukkan bahawa tindak balas jangka panjang output sebenar, pulangan saham dan turun naik pasaran saham bagi dasar monetari adalah lebih kuat di pasaran 'bear' daripada pasaran 'bull' dengan terdapat bukti-bukti untuk menyokong model kekangan kewangan. Oleh itu, pembuat polisi harus mempertimbangkan rejim 'bull' dan 'bear' dalam pelaksanaan dasar monetari dan menghadkan saiz perubahan dasar kepada fasa tertentu dalam pasaran saham pada masa dasar itu dilaksanakan. Kegagalan untuk mengambil kira keadaan pasaran saham yang pada masa pelaksanaan dasar mungkin tidak memberi kesan yang sepatutnya untuk menstabilkan pasaran saham. Selain itu, pelabur-pelabur pasaran saham bukan sahaja perlu memberikan tumpuan kepada pembangunan dasar monetari, malah, kepada rejim pasaran saham yang tertentu pada masa membuat keputusan pelaburan. Hasil kajian ini juga menunjukkan bahawa kenaikan kadar polisi (dasar monetari ketat) membawa kepada pengurangan output sebenar dalam jangka masa panjang, tidak kira jika pasaran saham adalah dalam regim 'bull' atau 'bear'. Keputusan anggaran PMG juga menunjukkan bahawa perubahan positif dalam kadar faedah jangka pendek mempunyai kesan negatif jangka panjang ke atas pulangan saham seperti yang dijangka oleh teori penentuan harga aset. Keputusan anggaran PMG dalam tindak balas turun naik pasaran saham kepada dasar monetari menunjukkan peningkatan pada kadar dasar meningkatkan turun naik pasaran saham dalam jangka masa panjang. Hubungan positif ini dapat dijelaskan oleh kesan 'leverage' yang merujuk kepada hubungan asimetrik antara pulangan pasaran saham dan turun naik pasaran.

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APPROVAL to be replaced

I certify that a Thesis Examination Committee has met on 3rd April 2014 to conduct the final examination of Roohollah Zare on his thesis entitled "Asymmetric effects of monetary policy over bull and bear stock market cycles in selected ASEAN countries" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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Date: 21 April 2014

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DECLARATION

Declaration by graduate student

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Declaration by Members of Supervisory Committee

This is to confirm that:
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LIST OF ABBREVIATIONS

AD	Aggregate demand
ADF	Augmented Dickey-Fuller
AIC	Akaike information criterion
ARCH	Autoregressive conditional heteroskedasticity
ARDL	Autoregressive distributed lag
AS	Aggregate supply
ASEAN	Association of southeast Asian nations
ASEAN5	Indonesia, Malaysia, the Philippines, Singapore and Thailand
BNM	Bank Negara Malaysia
CPI	Consumer price index
DFE	Dynamic fixed effect
DGP	Data generating process
DOLS	Dynamic ordinary least square
FMOLS	Fully modified ordinary least square
FOMC	Federal open market committee
FTP	Fixed transition probability
GARCH	General autoregressive conditional heteroskedasticity
GDP	Gross domestic product
GMM	Generalized method of moments
HQC	Hannan-Quinn criterion
IPS	Im, Pesaran and Shin
JSE	Jakarta stock exchange composite index
KLCI	Kuala Lumpur composite index
LLC	Levin, Lin and Chu
M1	Narrow money aggregate
M2	Broad money
MAS	Monetary Authority of Singapore
MG	Mean group
MS-AR	Markov-switching autoregressive
MW	Maddala and Wu
NBER	National bureau of economic research
NEER	Nominal effective exchange rate
OPR	Overnight Policy Rate
PMG	Pooled mean group
PSE	The Philippines stock exchange composite index
SBC	Schwarz Bayesian criterion
SET	Bangkok stock exchange price index
STI	Straits times stock price index
TVTP	Time varying transition probability
VAR	Vector autoregressive

CHAPTER 1

INTRODUCTION

1.1   Background of the study

It has been of great interest to both macroeconomists and policy-makers of whether monetary policy affects real economic activity. In recent years, it is widely accepted that monetary policy has real effects on the economy, at least over short horizons. However, it is widely accepted that these real effects are asymmetric. The asymmetric effects of monetary policy have been an important topic for macroeconomic policy and have been studied from both theoretical and empirical perspectives. Asymmetric effects, in the context of monetary policy, refer to a situation in which the effects of a given policy are not constant but vary depending on the circumstances.

In recent years, a large and growing body of empirical studies has focused on different kinds of asymmetric real output effects of monetary policy[1]. Numerous studies have attempted to explain the asymmetric effects of monetary policy on stock returns.[2] In this research these two types of asymmetry are combined and contributed to the existing literature by studying the asymmetric effects of monetary policy on real output concerning stock market conditions in the five original members of the ASEAN countries, namely the ASEAN5 including: Malaysia, Singapore, Indonesia, the Philippines and Thailand. More specifically, the main objective of this study is to investigate the asymmetric impact of monetary policy on real output with respect to stock market conditions, as indicated by the market being characterized as a bull or bear market. The empirical approach of this study is open-ended and could lead to a variety of possible results including the possibility that monetary policy has little effects on real output during bull and bear market periods or has strong effects in both phases. Monetary policy may be more effective in bear market periods than bulls or vice versa. However, the finance constraints models developed by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) predict that monetary policy is more effective in bear market periods than bulls. It is stated that when there is asymmetric information in the financial markets, borrowers may behave as if they are constrained financially. The fact that financial constraints are more likely to bind in bear markets affirms that monetary policy has greater effects in bear markets.

The greater effects of monetary policy on real output in bear market periods than bulls can also be explained by higher volatility of stock market in bear market periods than

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[1] Such as: (1) asymmetry associated with the direction of the monetary policy action, (2) asymmetry related to the size of the monetary policy, (3) asymmetry over the business cycle, and (4) asymmetry during different inflation regimes. However, investigating these types of asymmetry is not within the scope of the present research.

[2] Some concentrated on the asymmetric response of stock returns to positive and negative monetary policy shocks (Lobo, 2000; Bernanke and Kuttner, 2005; Chulia *et al.*, 2010). A number of them have looked into the asymmetry over business cycle (Guo, 2004; Andersen *et al.*, 2007; Basistha and Kurov, 2008) and some of them have explored the asymmetry with respect to the aggregate status of the stock market itself, characterized as bull and bear market. Perez-Quiros and Timmermann (2000), Chen (2007), Kurov (2010) and Jansen and Tsai (Jansen and Tsai, 2010) provided evidences that stock returns respond much stronger to monetary shocks in bear markets than bull markets.

bulls[3]. As argued by Berben (2007) when the stock market is very turbulent, investors move part of their assets from the stock market to short-term interest rate bearing securities which are included in M3. Therefore, changes in money holdings are less tightly linked to the transaction motive and hence future inflation. As a result, the effects of monetary policy are more translated in real output while prices remained relatively unchanged. When the stock market is calm, stock price volatility basically does not matter for money demand, and high money growth is generally associated with a rise in future inflation. Consequently, monetary policy is more translated in prices while output remained unchanged.

Studying the asymmetric effects of monetary policy regarding stock market conditions is crucially important because as stated by Bernanke and Kuttner (2005) monetary policy actions affect the ultimate objectives of monetary policy *i.e.* price stability, optimal sustainable output and employment indirectly via financial markets (including stock market). Policy makers recognize that the stock market is an important conduit of money transmission mechanism that can affect the real economy through a number of channels. First, higher equity prices increases the market value of firms relative to the replacement cost of capital, also known as Tobin's Q, spurring their capacity to raise new capital and investment. Another channel is the wealth effect. Increases in stock prices translate into higher financial wealth of households and therefore higher consumption and economic growth.

The importance of the stock market in transmitting the effects of monetary policy is well documented in the context of developed economies. The significant role of financial markets in monetary transmission mechanism is also verified in some of the ASEAN5 countries. For instance Raghavan *et al.* (2012) confirmed the role of asset prices in intensifying the effects of both interest rate and money shocks on output in Malaysia. Sriphayak and Vongsinsirikul (2007) found that asset prices play a central role in transmitting the effects of monetary policy to real output in Thailand. On the other hand, As a result of financial reform undertaken since the early 1980s, the ASEAN5 stock markets have developed significantly. Figure 1.1 shows the development of the market capitalization (defined as the total market value of all listed shares divided by GDP) over the sample period spanned from 1991 to 2011. The average market capitalization for Singapore and Malaysia over the sample period is 168.37% and 167.26% respectively which means that market capitalization value is higher than GDP indicating a large stock market in these countries. Next in order in terms of market capitalization are Thailand, the Philippines and Indonesia with the average of market capitalization 59.06%, 53.32% and 27.60% respectively. However, in recent years (2010-2011) the market capitalization ratio is over 70% for Thailand and the Philippines and around 50% for Indonesia demonstrating the growing role of the stock market in these economies.

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[3]In the Figure 1.4 one may observe spikes in market volatility in bear market periods especially in bearish periods after 1997 Asian financial crisis and then again in the aftermath of global financial crisis in 2007. However, in bull periods the markets are not too volatile and even the volatility is decreased except for the case of the Philippines.
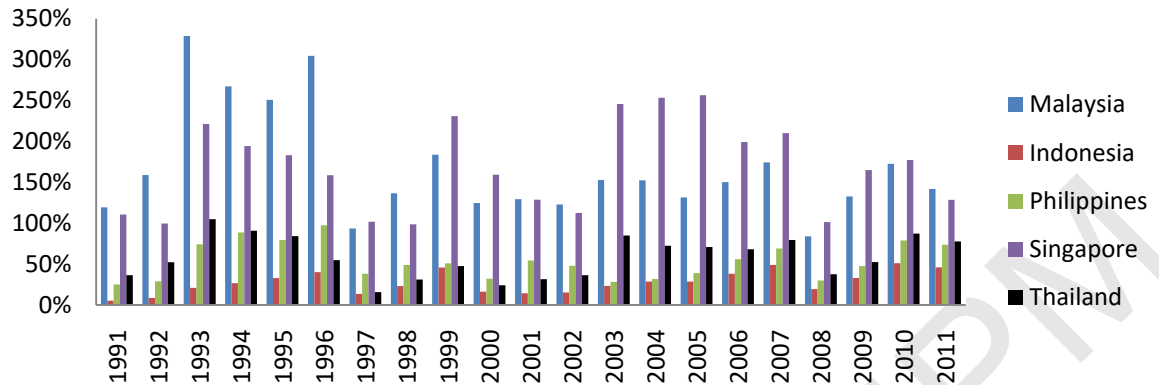
Figure 1.1: The development of market capitalization (%GDP) in the ASEAN5

Due to the development of stock market and the significant role of financial markets in monetary transmission mechanism in these economies policy makers should take stock market into consideration while setting their monetary policies. On the other hand, it is observed from Figure 1.2 that the development of real output (proxied by the manufacturing production index) in bull and bear phases of the ASEAN5 countries is not similar. The shaded areas represent bull market periods. As depicted in the Figure, industrial production is declined in most of the bear market periods, especially in bearish periods after 1997 Asian financial crisis and then again in the aftermath of global financial crisis in 2007 and increased in bull market periods.

The dissimilar movement of Industrial production in bull and bear market periods may signal the possible asymmetric response of output to monetary policy in bullish and bearish periods. If monetary policy asymmetrically affects real output in bull and bear market periods, policy makers should consider not only the overall status of the stock market in their policymaking decisions but also the specific status of the market characterized as bull and bear market periods. Evidences of cyclical variation in the response of real output to monetary policy in the ASEAN5 will help the monetary authorities of these countries to predict correctly the effect of a target rate change on the real economy. Do failure to consider asymmetry result in wrong conclusions concerning the impact of monetary policy?

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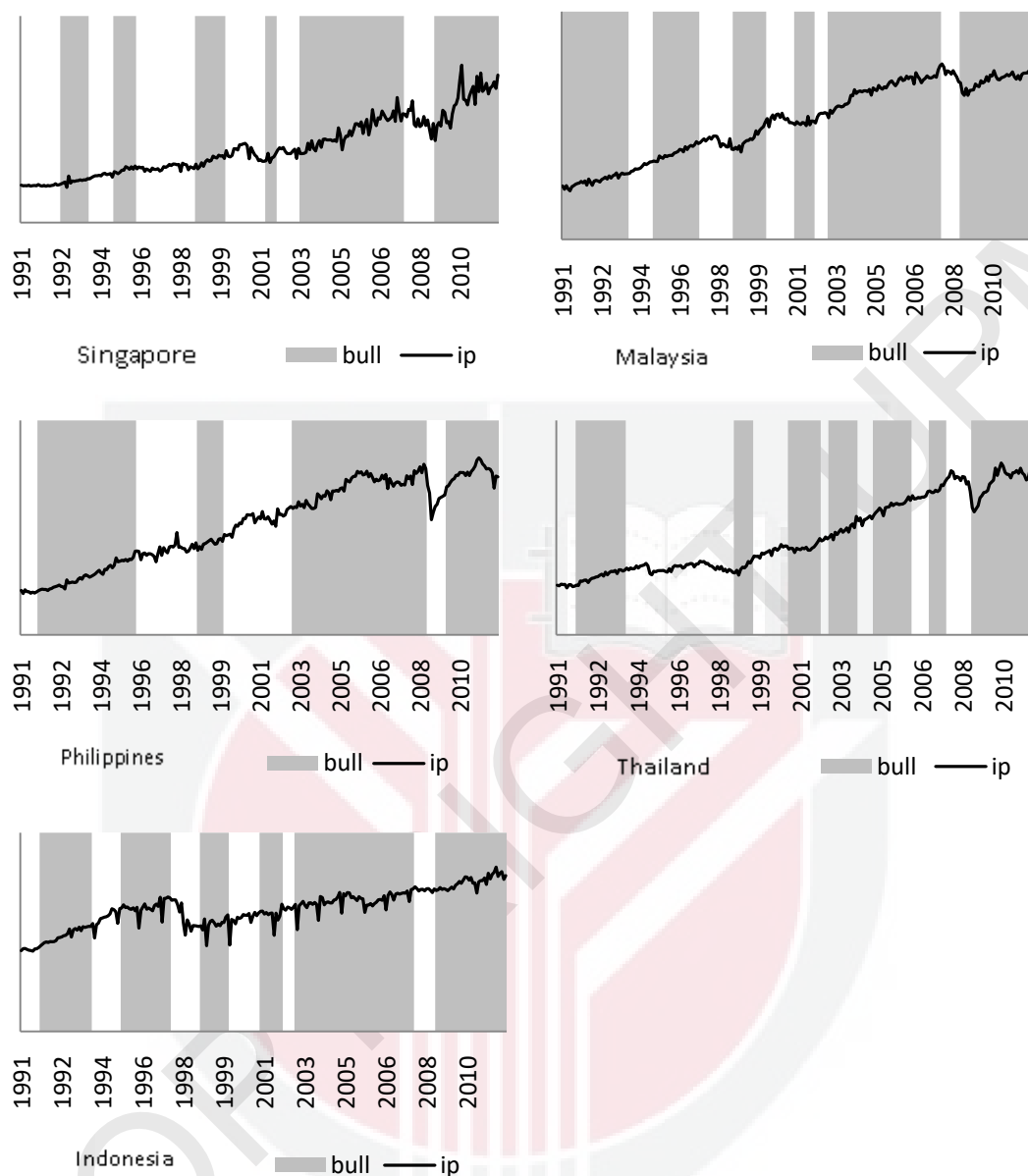
Figure 1.2: The movement of real output (ip) in bull and bear periods
(Note: The shaded and unshaded areas indicate bull and bear market periods, respectively. Bull and bear markets are identified by employing the non-parametric approach of Pagan and Sossounov (2003)).

Although the asymmetric effects of monetary policy in the context of developed countries have been reported extensively in the literature, less empirical evidences have been reported for the developing and small open economies and even less for the ASEAN5 countries.[4] Since the environment in which developing economies operate (for instance degree of financial development) is significantly different with that of developed economies, the findings of asymmetry in developed economies cannot be generalized to developing and small open economies. Owing to the insufficiency of

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[4]See for instance Tan and Habibullah (2007) who studied the asymmetric effects of monetary policy over business cycle in four ASEAN countries comprising Malaysia, Indonesia, the Philippines and Thailand.

empirical literature related to the issue of asymmetry in the ASEAN5 economies, studying the asymmetric behavior in the ASEAN5 economies can clarify does asymmetric monetary policy effects exist across a wider range of economies including developing and small open economies?

This study also examines the asymmetric response of stock returns to monetary policy over bull and bear market periods. The relationship between monetary policy and stock returns has been of great interest to both monetary policy makers and financial markets participants. Estimating the reaction of stock returns to monetary policy is an important step in implementing effective policy decisions and formulating successful investment and risk management decisions. It is also important for understanding the monetary policy transmission mechanism. Monetary policy actions affect its ultimate objectives indirectly through stock market via the wealth effect on consumption, Tobin's Q effect and the financial accelerator effect on investment.

Mishkin (2007) broadly describe two channels though which monetary policy affects the stock prices and returns: the asset pricing channel and the financial leverage channel. In the former, the price of equity at any point in time is equal to the discounted present value of expected future cash flows. According to these models, monetary policy decisions play an important role in determining stock prices. The price of equity at any point in time is equal to the discounted present value of expected future cash flows (including capital gains and dividends) to shareholders:

$$Q_t = E_t\{\sum_{k=1}^{\infty} \frac{C_{t+k}}{(1+r_{t+k})^k}\} \qquad\qquad 1.1$$

Where Q_t is the current price of stock, C denotes the cash flows associated with it, r is the interest rate to discount the future and E_t is the expectations operator based on the information set available at time t. From this simple model, monetary policy decisions (change in policy rate or money supply) can affect stock prices directly through discount rate $(1 + r_{t+k})^k$, and indirectly by influencing expectations of future cash flows. A rise in the interest rate implies a higher cost of investment, which in turn decreases expected future cash flow, leading to lower stock prices.

From the latter channel, monetary policy can influence the cost of firm's financial activities through issuing debt. Mishkin (1996) also elaborated two views through which monetary policy can influence stock prices: the monetarist view and the Keynesian view. From the monetarist view, expansionary monetary policies increase the optimum money balances and hence enhance the demand for equities and raising their prices. Keynesians argue that the fall in interest rates stemming from expansionary monetary policies making bonds less attractive than equities causing the price of equities to rise.

In the last few years, an increasing amount of attention has been paid to investigate the impact of monetary policy on stock returns (see for instance Thorebeck 1997; Rigobon and Sack 2003; Ehrmann and Fratzscher 2004; Guo 2004; Bernanke and kuttner 2005; Farka 2009; Chulia *et al.* 2010 among others). The literature comes to a general consensus that an increase in short-term interest rate is associated with a decline in stock

returns. The studies reviewed so far, examine the impact of monetary policy on stock returns in developed economies especially in the case of US. In the context of developed and small open economies considered in this research, the empirical evidences are limited. See for instance Vithessonthi and Techarongrojwong (2012) who studied the response of stock returns to monetary policy in Thailand. Since the nature of financial markets and economic frameworks in developing countries differs from that of developed countries, the above findings may not be exactly relevant for small and developing economies.

Several studies have revealed that the response of stock returns to monetary policy is asymmetric. Several such asymmetries are reported in the literature. See for instance, Lobo (2000), Bernanke and Kuttner (2005) and Chulia *et al.* (2010) who examined the asymmetries related to the direction of monetary policy shocks. Guo (2004), Andersen *et al.* (2007) and Basistha and Kurov (2008) studied the asymmetries over business cycle. Chen (2007), Kurov (2010) and Jansen and Tsai (2010) provided evidences that monetary policy has greater effects on stock returns in bear markets than bulls. This study investigates the asymmetries over bull and bear market periods in the ASEAN5 countries. Owing to the insufficiency of empirical literature related to the issue of asymmetry in the ASEAN5, the findings of this research can clarify does asymmetric monetary policy effects exist across a wider range of economies including developing and small open economies? Studying this kind of asymmetry is crucially important for central bankers to consider the asymmetric response of stock returns to monetary policy in bull and bear market periods while pursuing the implicit goal of financial stability.

Figure 1.3 depicts the movements of the stock market indices of the ASEAN5 countries in bull and bear market periods. In the Figure the shaded areas give a picture of the periods associated with bull market periods. The bull and bear market periods are identified by employing the non-parametric approach proposed by Pagan and Sossounov (2003). It is evident from the figure that the stock indices of these countries display similar long-swing movements. Specifically, all the stock market indices are declined in the bear markets associated with the 1997-1998 Asian financial crisis, the 2000-2001 economic slowdown and then again after 2007 global financial crisis.
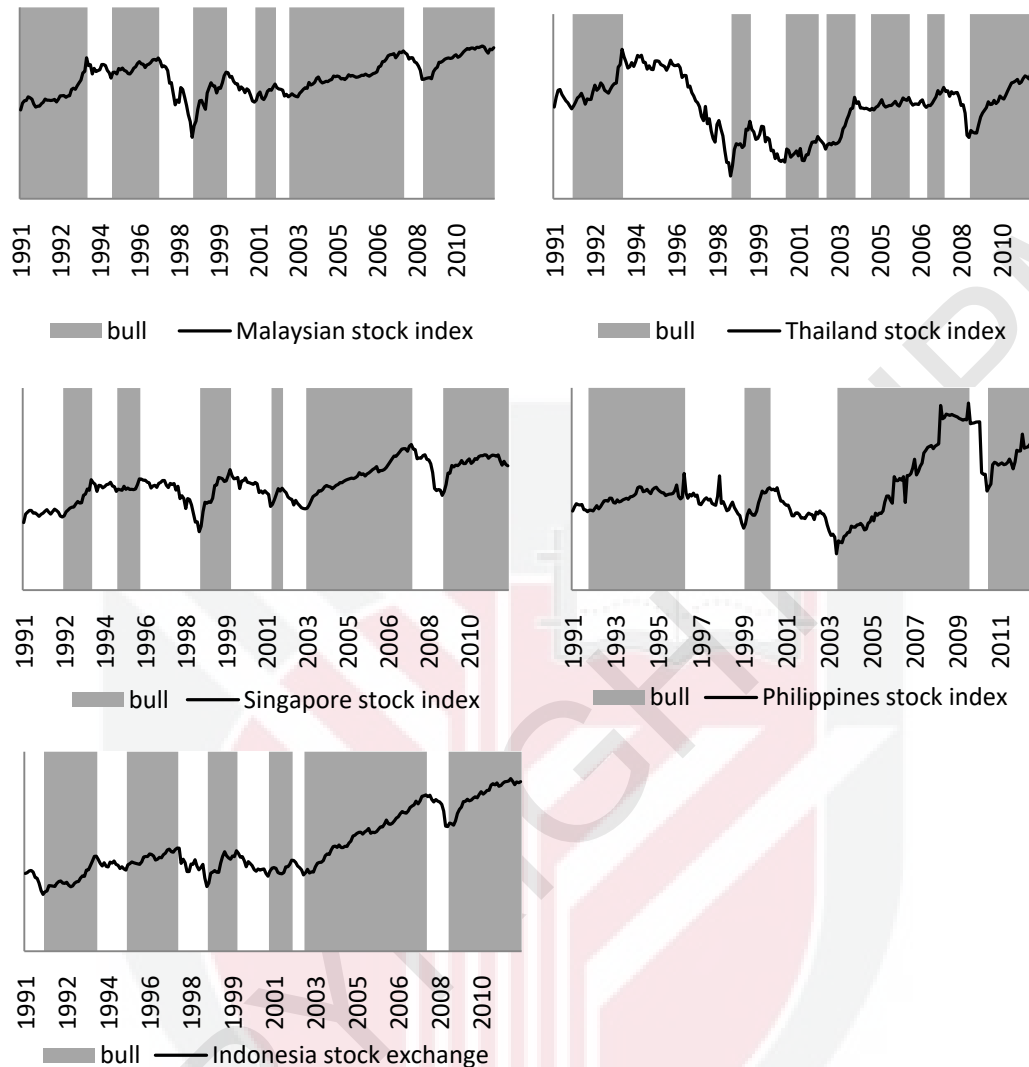
Figure 1.3: Stock market indices of the ASEAN5 and bull and bear markets
(Note: See notes of Figure 1.2).

As a further investigation, the asymmetric effects of monetary policy on stock market volatility over bull and bear markets of the ASEAN5 countries are examined. Stock market volatility has long been of great interest for both policy makers and market participants. Policy makers are interested in the spillover effects of volatility on real activity while the latter are concerned the effects of stock market volatility on asset pricing. However, it is generally believed that stock market volatility has a negative effect on the recovery of the real economy. Bernanke and Gertler (1999) also documented that asset price volatility is an independent source of economic instability of which central bankers should respond in the context of an overall strategy for monetary policy.

Central bank policies are one of the important determinants of stock market volatility. Monetary policy decisions influence various short-term interest rates which in turn, affect the discounted present value of expected future cash flows and may thus increase

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or decrease stock prices. Higher (lower) stock prices and consequently higher (lower) stock returns will lead to lower (higher) stock market volatility as suggested by the "leverage effect". This effect refers to the asymmetric relation between stock market returns and volatility and has been widely documented in the literature (Christie, 1982; Fleming *et al.*, 2006; Gospodinov and Jamali, 2012).

In particular, the flexibility of asset prices and the forward-looking nature of stock markets allow for an almost instantaneous impact of central banks actions on stock returns and volatilities. Therefore, investigating the impact of monetary policy on the volatility of stock market is a critical step in formulating effective policy decisions. Cecchetti *et al.* (2000) and Gilchrist and Saito (2006) believe that it is necessary for central banks to focus on stock market volatility when setting monetary policies. Maintaining a stable financial system is one of the goals of monetary policy in both developed and developing economies as it contributes to a healthy economy and sustainable growth. The ASEAN5 countries also pursue the implicit goal of financial stability. However, the primary objective of monetary policy in these economies is promoting price stability as a sound basis for sustainable economic growth.

The impact of monetary policy on stock return volatility in the context of developed economies has been widely investigated in the previous literature (See for instance Lobo (2002), Bomfim (2003), Chen and Clements (2007), Farka (2009), konrad (2009) and vahama and aijo (2011), among others). The literature has come to a general consensus that stock market volatility is susceptible to monetary policy decisions of central banks. However, the empirical evidences for the presence of asymmetries in bull and bear market periods are scarce. Konrad (2009) discovered that the impact of monetary policy on stock return volatility is much bigger in bearish periods than bullish phases. In the context of developing countries, the empirical evidences for the presence of such asymmetries are limited. Since the nature of financial markets and economic frameworks in developing countries differs from that of developed countries, the above finding may not be exactly relevant for developing and small open economies.

The volatility of the ASEAN5 countries stock market measured by the conditional variances[5] is plotted in Figure 1.4. In the Figure the shaded areas give a picture of the periods associated with the bull periods. From the Figure, the spikes in market volatility in bear market periods is observed, especially in bearish periods after 1997 Asian financial crisis and then again in the aftermath of global financial crisis in 2007. However, in bull periods the markets are not too volatile and even the volatility is decreased except for the case of the Philippines. The dissimilarity of stock market volatility in bull and bear periods of the ASEAN5 stock market may signal the presence of possible asymmetries in the response of stock market volatility to monetary policy in bullish and bearish periods.

This study contributes to the existing literature by focusing on asymmetric response of the ASEAN5 stock market volatility to monetary policy in bull and bear market periods.

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[5]The conditional variances are identified by employing GARCH models.

Studying this kind of asymmetry is crucially important for central bankers to see in which state of the market does monetary policy decisions have more effects on volatility of the market? These findings help policy makers to consider the asymmetric response of stock market volatility to monetary policy in bull and bear market periods while pursuing the implicit goal of financial stability.
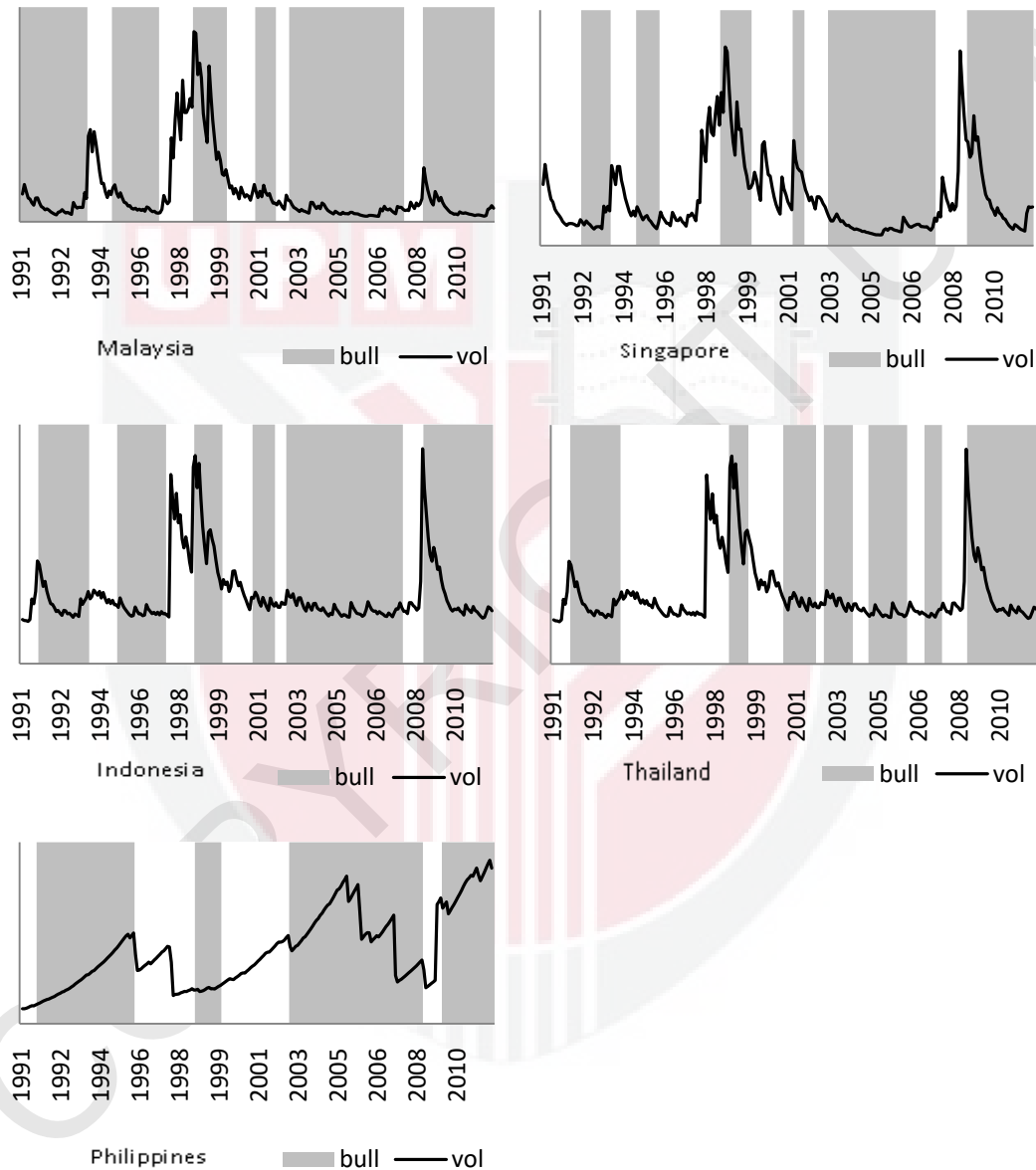
Figure 1.4: Stock market volatility of ASEAN5 in bullish and bearish periods
(Note: See notes of Figure 1.2)

1.2   Problem Statement

It has been of great interest to both macroeconomists and policy-makers of whether monetary policy affects real economic activity. In recent years, it is widely accepted that monetary policy has real effects on the economy, at least over short horizons.

Subsequently, recent analyses on monetary policy have focused on other aspects of monetary policy and its relations to real economic activity. One notable aspect is the possibility of an asymmetric effect of monetary policy which is widely reported in the literature. This includes the asymmetries associated with direction of monetary policy actions, asymmetries related to the size of monetary policy actions and asymmetric effects of monetary policy over business cycle.

This research contributes to the existing literature by investigating the asymmetric effects of monetary policy on real output with respect to stock market conditions, as indicated by the market being characterized as a bull or bear market. In this study the asymmetries are examined in a panel of the ASEAN5 countries comprising: Malaysia, Singapore, Indonesia, the Philippines and Thailand. The empirical approach is open-ended and could lead to a variety of possible results including the possibility that monetary policy has little effects on real output during bull and bear market periods or has strong effects in both phases. Monetary policy may be more effective in bear market periods than bulls or vice versa. However, as explained before in section 1.2 the finance constraints models developed by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) predict that monetary policy is more effective in bear market periods than bulls.

Studying the asymmetric effects of monetary policy concerning stock market is crucially important since stock market is an important channel of monetary policy transmission mechanism. Monetary policy affects its ultimate objectives indirectly via financial markets. Bernanke and Kuttner (2005) argued that the most direct and immediate impact of monetary policy actions is on financial markets by affecting asset prices and returns. The importance of the stock market in transmitting the effects of monetary policy is well documented in the context of developed economies. The significant role of financial markets in monetary transmission mechanism is also verified in the ASEAN5 countries.[6] On the other hand, As a result of financial reform undertaken since the early 1980s the ASEAN5 stock markets have developed significantly. The average of the market capitalization for Singapore and Malaysia over the sample period (1991-2011) is 168.37% and 167.26% respectively which means that market capitalization value is higher than GDP indicating a large stock market in these countries. The average of market capitalization for Thailand, the Philippines and Indonesia is 59.06%, 53.32% and 27.60% respectively. However, in recent years (2010-2011) the market capitalization ratio is over 70% for Thailand and the Philippines and around 50% for Indonesia demonstrating the growing role of the stock market in these economies.

Due to the extensive development of stock market and the significant role of financial markets in monetary transmission mechanism in these economies policy makers should take stock market into consideration while setting their monetary policies. On the other hand, as depicted in Figure 1.2 the movement of real output in bull and bear market periods of the ASEAN5 countries is dissimilar. Output declined in most of the bear

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[6] See for instance Raghavan *et al.,* (2012) who confirmed the role of asset prices in intensifying the effects of both interest rate and money shocks on output in Malaysia. Sriphayak and Vongsinsirikul (2007) found that asset prices play a central role in transmitting the effects of monetary policy to real output in Thailand.

market periods and increased in bull phases which may signal the asymmetric response of output to monetary policy in bull and bear market periods. If monetary policy asymmetrically affects real output in bull and bear market periods, policy makers should consider not only the overall status of the stock market in their policymaking decisions but also the specific status of the market characterized as bull and bear market periods. Evidences of cyclical variation in the response of real output to monetary policy help policy makers to predict correctly the effect of a target rate change on the real economy. When there is asymmetry in the real output effects of monetary policy with respect to stock market conditions, monetary authorities must condition any shifts in policy on the specific status of the stock market. Do failure to consider asymmetry result in wrong conclusions concerning the impact of monetary policy?

Although the asymmetric effects of monetary policy in the context of developed countries have been reported extensively in the literature, less empirical evidences have been reported for the developing economies and even less for the ASEAN5 countries[7]. Since the environment in which developing economies operate (for instance degree of financial development) is significantly different with that of developed economies, the findings of asymmetry in developed economies cannot be generalized to developing economies. Owing to the insufficiency of empirical literature related to the issue of asymmetry in the ASEAN5 economies, studying the asymmetric behavior in the ASEAN5 economies can clarify does asymmetric monetary policy effects exist across a wider range of economies including developing and small open ones?

This research also examines the asymmetric impact of monetary policy on stock market returns and volatilities over bull and bear market periods of the ASEAN5 countries. Having reliable estimates of the reaction of stock returns and volatilities to monetary policy is an important step in implementing effective policy decisions from the perspective of monetary policy makers and an important step in formulating successful investment and risk management decisions from the viewpoint of financial markets participants. Moreover, the response of stock returns and volatilities to monetary policy actions may not be similar over bull and bear market periods. The asymmetric impact of monetary policy actions on stock returns and volatilities over bull and bear periods is widely reported in the literature (See for instance Chen, 2007; Kurov, 2010; Jansen and Tsai, 2010 and Konrad, 2009).

The dissimilarity of the stock market volatility in bull and bear periods of the ASEAN5 countries is evident from the Figure 1.4. From the Figure, it is evident that the volatility in bear market periods is increased while the market is relatively quiet in bullish periods except in the case of the Philippines. It may signal the presence of possible asymmetries in the response of stock market volatility to monetary policy in bullish and bearish periods. If the stock market returns and volatilities respond asymmetrically to monetary policy actions, policy makers and financial market participants should consider not only the overall status of the stock market into their decision making process but also the specific status of the stock market characterized as bull and bear market periods.

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[7] See for instance Tan and Habibullah (2007) who studied the asymmetric effects of monetary policy over business cycle in four ASEAN countries namely Malaysia, Indonesia, the Philippines and Thailand.

One of the main objectives of the central banks is to promote and maintain financial stability as it contributes to a healthy economy and sustainable growth. Financial instability can be very costly due to its contagion or spillover effects to other parts of the economy and may lead to a financial crisis with adverse consequences for the economy. Maintaining financial stability is also very important for the ASEAN5 countries to reduce the negative impact of financial crises such as the 1997 Asian financial crises and the 2007 global financial crisis on other parts of the economy. Monetary policy actions can influence stock returns and volatilities but asymmetrically over bull and bear market periods. Therefore, policy makers who seek to affect stock returns and volatilities should condition any shift in the policy to the specific status of the market characterized as bull and bear market periods.

1.3   Objective

The general objective of this study is to examine empirically asymmetric effects of monetary policy with respect to stock market conditions characterized as bull and bear market periods in the ASEAN5 countries. The specific objectives of this research are as follow:

1- To examine asymmetric effects of monetary policy on real output over bull and bear market periods.

2- To examine asymmetric response of stock returns to monetary policy in bull and bear markets.

3- To test asymmetric impact of monetary policy on stock market volatility in bull and bear markets.

1.4   Significance of study

This study contributes to the existing literature of asymmetric effects of monetary policy in the following ways:

First, most of the existing literature related to issue of asymmetry concentrates on the developed economies. Since the nature of financial markets and economic frameworks in developing countries differs from that of developed countries, the findings of asymmetry in developed economies may not be exactly relevant for developing and small open economies. This study fills the gap in the literature by formally examining asymmetric effects of monetary policy across a wider variety of economies including developing and small open economies. To the best of our knowledge, there are limited empirical studies that explicitly address asymmetric effects of monetary policy in the ASEAN5 economies.

Second, this study investigates the asymmetric effects of monetary policy on real output regarding stock market conditions in the ASEAN5 countries. In recent years, a considerable amount of literature has been published to explore different kinds of

asymmetry (mentioned earlier in section 1.1). However very limited empirical studies clearly looked into the asymmetric real output effects of monetary policy concerning stock market conditions.

Third, several studies have revealed that the response of stock returns to monetary policy is asymmetric over bull and bear market periods in developed economies (see for instance, Chen, 2007; Kurov, 2010; Jansen and Tsai, 2010). This study examines the asymmetric impact of monetary policy on stock returns over bull and bear market periods in the ASEAN5 countries. Owing to the insufficiency of empirical literature related to the issue of asymmetry in the ASEAN5 countries, the findings of this research can clarify does asymmetric monetary policy effects exist across a wider range of economies including developing and small open economies?

Forth, as pointed out earlier in section 1.1, the empirical evidence for the presence of asymmetric effects of monetary policy on stock market volatility over bull and bear markets are scarce. Therefore, this study fills the gap in the literature and investigates the impact of monetary policy on stock market volatility in bullish and bearish periods of the ASEAN5 economies.

Fifth, All the studies reviewed so far investigate the asymmetric effects of monetary policy using time series econometric approaches. Investigating the asymmetries in a panel setting is limited to a few empirical studies (see for instance Karras (1996a,b)). This study contributes to the existing literature by studying the asymmetric effects of monetary policy on real output, stock returns and volatilities in the ASEAN5 countries in a panel setting by employing the well-tested pooled mean group (PMG) estimator proposed by Pesaran *et al.* (1999). The advantages of employing panel data include the followings: (1) Panel data better allows considering interdependencies between countries and hence improves the efficiency of estimation. Time series econometric approaches that do not account for cross-country dependencies may lead to misleading inference. Panel data allows for the correlation of the error terms as long as the spillover effects between countries. (2) Panel data increases the variability of the data, adding more informative data and hence it is less likely that the variables are highly collinear. (3) Panel data suggests that countries are heterogeneous. Not controlling for this heterogeneity run the risk of obtaining biased results.

Sixth, investigating asymmetries over bull and bear markets requires identifying these terms. Bull and bear markets are identified by employing two approaches: the Markov-switching models and the rule-based non-parametric approach proposed by Pagan and Sossounov (2003).

Seventh, an important aspect of the analysis of monetary policy effects is the choice of the monetary policy instrument. Using money aggregates gives rise to an identification problem since the growth rates of monetary aggregates are not purely exogenous and reflect the central banks endogenous responses to economic development and a variety of non-policy influences (Morgan, 1993; Bernanke and Mihov, 1998; Kakes, 1998). Due to these deficiencies Bernanke and Blinder (1992) emphasized the role of the Federal funds rate as monetary policy indicator. Since 1990s monetary authorities in the

ASEAN5 economies have also shifted their policy emphasis from money aggregate towards short-term interest rate. Accordingly, as being in line with many empirical studies in the ASEAN5 economies (Agung, 1998; Ibrahim, 2005; Siregar and Goo, 2010; Raghavan *et al.*, 2012) the short-term interest rate is used as suitable monetary policy indicator.

1.5   Macroeconomics of the ASEAN5 countries

The Association of Southeast Asian Nations (ASEAN) is a geo-political and economic organization of ten countries located in Southeast Asia, which was formed on 8 August 1967 by Indonesia, Malaysia, the Philippines, Singapore and Thailand. Since then, membership has expanded to include Brunei, Burma (Myanmar), Cambodia, Laos, and Vietnam. Its aims include the acceleration of economic growth, social progress, cultural development among its members, the protection of regional peace and stability, and to provide opportunities for member countries to discuss differences peacefully.

Among the developing countries, the ASEAN countries have been growing rapidly and are among the fastest growing countries in the world during the last three decades. Countries like Malaysia, Indonesia, the Philippines, Singapore and Thailand registered sustainable high growth. It was quite impressive that high growth was achieved at low or moderate inflation (Table 1.1). The ASEAN economies transformed successfully from agricultural economies to industrial economies and manufacturing and services sectors became increasingly important in total output. Trade expanded strongly through the export orientation strategy of manufactured products and trade liberalization. The trade liberalization policies together with the robust economic growth and high capital mobility spurred large foreign direct investment into the economies, especially from the United States. The financial market including banking system, Stock and bond markets expanded rapidly and promoted more capital to the business sector. These structural changes in the financial market have significant effects on the transmission mechanisms of monetary policy.

However, maintaining a stable financial environment and high economic growth was a big challenge for the ASEAN economies after Asian financial crisis in 1997. The crisis that was triggered from the Thai baht currency crisis in July 1997 had created turmoil in financial markets and the economies of the ASEAN countries and some other Asian countries. The events in Thailand prompted speculators to attack currencies such as the Philippines peso, the Malaysian ringgit, and the Indonesian rupiah and to a lesser extent, the Singaporean dollar. There was sharp depreciation in the values of the currencies. The stock market collapsed and massive capital flow reversals took place. Except for Singapore, high foreign borrowing by the governments had resulted in excessive debt burden from the sharp depreciation in the currencies and the slowdown of economic growth. The crisis was described as the most intense economic and financial crisis in the region since World War II. Before the crises, the economies were credited by the World Bank as a model for economic development. The remarkable growth of the Asian countries crushed after 1997, shattering the so-called economic miracle of these countries. Until recently some have yet to recover fully. Table 1.1 demonstrates the

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average of some macroeconomic indicators in the ASEAN5 countries since two decades ago.

This study considers examine five original members of ASEAN countries namely Indonesia, Malaysia, the Philippines, Singapore and Thailand (ASEAN5). The countries share almost similar features in terms of economic structure and phases of financial development, except for Singapore. These economies have been growing relatively more rapidly than other ASEAN countries for the past decades. Although, the Philippines developed at a slower pace and has more growth problems. On the contrary, Singapore's economic structure and financial development is quite different from others. As a financial hub, the economy is very open to capital flows and has a per capita income up to the level of most developed countries (Table 1.1). Other ASEAN countries like, Cambodia, Laos, Myanmar and Vietnam are not included in the study because they are less developed and are still at an initial stage of economic development. Lack of a long data span is also another constraint for inclusion of these countries into the models.

Table 1.1: Some macroeconomic indicators in the ASEAN5 countries

	GDP growth	Inflation	Unemployment rate	Interest rate[a]	GDP per capita[b]	M2 growth	Export growth
Malaysia							
1991-1995	9.5	4.0	4.3	2.8	8035.1	29.0	16.2
1996-2000	5.0	3.1	2.9	3.6	9825.0	11.4	8.9
2001-2005	4.8	1.7	3.5	3.3	10753.5	9.2	5.6
2006-2010	4.5	2.7	3.6	3.0	12646.4	9.4	2.4
Indonesia							
1991-1995	7.9	8.9	2.8	4.0	2413.4	21.0	11.3
1996-2000	1.0	19.4	5.4	0.9	2710.3	28.8	4.2
2001-2005	4.7	9.3	9.6	5.3	2877.5	10.0	7.1
2006-2010	5.7	7.8	8.9	5.4	3556.6	15.5	6.5
Thailand							
1991-1995	8.6	4.8	1.7	2.3	4910.6	16.5	14.3
1996-2000	0.6	4.3	2.2	3.7	5547.6	9.8	7.3
2001-2005	5.1	2.3	1.7	4.5	6113.7	7.0	5.7
2006-2010	3.6	3.0	1.2	4.3	7282.9	8.2	4.9
Philippine							
1991-1995	2.2	9.8	8.7	5.1	2464.0	21.9	9.7
1996-2000	3.6	6.5	9.1	4.4	2652.0	16.1	7.1
2001-2005	4.6	5.4	10.7	4.2	2866.2	8.4	4.0
2006-2010	5.0	5.1	7.6	4.8	3352.7	12.5	6.0
Singapore							
1991-1995	8.6	2.6	2.5	3.0	29343.7	10.5	14.7
1996-2000	5.9	0.9	3.7	3.4	35336.9	11.4	7.6
2001-2005	4.8	0.6	4.7	4.6	40617.0	5.2	10.0
2006-2010	6.5	2.6	4.6	5.0	48771.2	13.0	7.1

Notes: [a] Interest rate spread (lending rate minus deposit rate, %), [b] GDP per capita, PPP (constant 2005 international $)

Source: World Development Indicators, World Bank.

1.6 Overview of the monetary policy management

Monetary policy is a central bank's policy on the supply of money in the economy. The ultimate objectives of monetary policy are usually related to price stabilization, high levels of employment, sustainable economic growth and the balance of payment equilibrium. To ensure internal and external stability, the task of monetary policy is to keep money supply growing at an appropriate rate. Excessive money supply would lead to inflation while inadequate money supply hinders growth.

The ultimate objectives of monetary policy are not directly controllable by central banks. Therefore, monetary authorities generally use intermediate target variables (indicators) to affect the ultimate objectives of monetary policy. Interest rate, bank lending, exchange rate and asset prices are important indicators in the transmission of monetary policy. The intermediate targets variables served as the channel through which monetary policy via its instruments affect the economy to attain the desired goals. The choice of monetary policy indicator depends very much on the circumstances facing each economy. Among the indicators, the most popular and frequently used are monetary aggregates and interest rate. Rapid changes in the financial assets led to unstable and unpredictable money demand function in the 1980s and 1990s. Therefore, more attention is given to interest rate in conducting the monetary policy in mid-1990s and the 2000s (Dornbusch et. al., 2004).

Generally, the central bank changes the money supply by using monetary policy instruments such as reserve requirements, discount rate, open market operation and foreign exchange. The central bank has control over the monetary base but indirectly controls the money supply. Monetary base will change with any changes in the monetary instruments. The link between monetary instruments, immediate target, intermediate target and final goals is shown in Figure 1.5. The schematic diagram of monetary policy framework explains that effects of monetary policy are transmitted into the economy with some lags.

1.6.1 Monetary policy management in the ASEAN5 countries

Prior to the mid-1980s, the monetary policy strategy in the ASEAN5 economies had been based on targeting monetary aggregates. The development of this strategy was based on evidences that money aggregates were closely related to the ultimate objectives of monetary policy. However, the financial liberalization undertaken by these economies during the 1980s had significantly changed the environment in which monetary policy operates. The liberalization of interest rates since the 1980s led to a more market oriented interest rate determination and further enhanced the role of the interest rates in announcing the stance of monetary policy.

In Malaysia the emphasis of monetary policy shifted during the 1980s from M1 to M2 and then to M3. The globalization of financial markets in the early 1990s and subsequent large capital mobility caused the monetary aggregates to be extremely volatile and less reliable as indicator of monetary policy. The globalization processes also shifted the financing pattern of the economy from an interest-inelastic market (government

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securities market) to a more interest rate sensitive market (bank credit and capital market). As investors became more interest rate sensitive, the monetary policy framework based on interest rate targeting was seen as an appropriate measure to promote stability in the financial system and to achieve the monetary policy objectives. As a result, in the mid-1990s, Bank Negara Malaysia (BNM) shifted towards interest rate targeting framework and the three-month interbank rate considered as the rate that signals the direction of monetary policy in Malaysia (Raghavan *et al.*, 2010). In April 2004, BNM switched from using the 3-month interbank rate to using the overnight policy rate (OPR) as target rate for managing monetary policy (Ho, 2008).

Instruments

- Open market operations
- Reserve requirements
- Credit ceiling
- Discount rate
- Foreign exchange market **o**perations
- Moral suasion

Immediate Target

- Monetary base
- Bank reserve
- Interest rate (money market)

Intermediate Target

- Money supply
- Bank lending
- Interest rate (loan and deposit)
- Asset Prices
- Exchange rate

Final Objectives

- Inflation
- Growth
- Employment
- Balance of Payments

Figure 1.5: General framework of monetary policy

Similarly the Bank of Thailand has shifted its policy emphasis from M2 towards interest rate. After abandoning the use of direct control measures in late 1980s, the Bank of Thailand began to conduct its monetary policy through money market and credit operations, especially through the repurchase market for government bonds (Fung, 2002). The Bank of Thailand's policy rate is an official repo (the sale and repurchase of government securities) rate. The Bank of Thailand, as part of its operational framework reform moved from the 14-day repo rate to the 1-day repo rate in January 2007, but left all the strategic aspects of its inflation targeting framework unchanged (Ho, 2008).

In Indonesia, owing to the unavailability of government debt securities when direct credit controls were removed in 1983, Bank Indonesia Certificates (SBI) issued by the central bank is used to announce the monetary policy stance. Therefore, the one- and three-month SBI rates can be viewed as policy rates (Fung, 2002; Ho, 2008). The Philippines Central Bank formally adopts an inflation targeting regime and signals monetary policy stance with both the official repo and reverse repo rates. The Philippine

Central Bank does not have formal operating targets. But in practice it operates with some reference to the overnight rate and other short-term interest rates (Ho, 2008).

However, the Monetary Authority of Singapore (MAS) expresses its policy stance with an exchange rate policy and does not target interest rate or money supply. Exchange rate policy is used with the primary objective of controlling inflation. Under Singapore's exchange rate regime, the Monetary Authority expresses its policy stance with a qualitative statement about the centre, width and gradient of its target band for the Singapore dollar nominal effective exchange rate (Ho, 2008). To complement its exchange rate policy, the Monetary Authority of Singapore also conducts money market operations to ensure that there is an appropriate level of liquidity in the banking system. While the policy instrument in Singapore is the NEER, the relevant short-term rate is the three-month Singapore dollar interbank rate (Fung, 2002).

Monetary Authority of Singapore Focuses on exchange rate because as a small open economy with large external and services sectors, Singapore has high access to international capital flow. The large foreign multinational companies get their funds mainly from foreign sources. Any small changes in the interest rates differential bring to rapid and large movement of capital. Therefore, any attempt to raise or lower interest rates would be hampered by movement of capital into and out of the country (Yusof, 2006).

Almost all of the sampled central banks make monetary policy decision announcements at pre-determined dates. The frequency of policy announcement in Malaysia is 6 times a year, while Central Banks of the Philippines and Thailand announce monetary policy decisions every 6 weeks. Indonesia has a monthly policy announcement. The Singaporean authorities hold regular monetary and investment policy meetings, even though it makes monetary policy statements only once every half a year. In any case, central banks typically reserve the right to meet or to announce policy changes in between scheduled dates if deemed necessary (Ho, 2008).

1.7 Descriptive statistics of stock market returns in the ASEAN5 countries

In this research stock market indices of the ASEAN5 economies are utilized: the Jakarta Stock Exchange composite index (JSE) for Indonesia, the Kuala Lumpur Composite Index (KLCI) for Malaysia, the Stock Exchange Composite Index (PSE) for the Philippines, the Straits Times Stock Price Index (STI) for Singapore and the Bangkok Stock Exchange Price Index (SET) for Thailand. All indices are expressed in local currency, and the data points cover the time period 1991:1 to 2011:12 for a total of 252 observations. These data are retrieved from DataStream International. Figure 1.6 depicts the movements of the stock market indices in the ASEAN5 economies. The Figure shows that the stock indices of these markets appear to display similar long-swing movements.

The summary statistics of the monthly return series spanning from 1991:1to 2011:12 are presented in Table 1.2. Monthly returns for each market are computed as the logarithmic difference in its corresponding market index. As depicted in the Table, all markets

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exhibit positive returns over the sample period with the Indonesian market recording the highest monthly return (0.89%) followed by the Philippines market (0.78%). The market of Thailand experiences the lowest return (0.13%) followed by the Singaporean market (0.39%). As reflected by the standard deviation, the markets of the Philippine and Thailand have the highest unconditional volatility while the Singaporean market records the least volatility followed by Malaysian market.
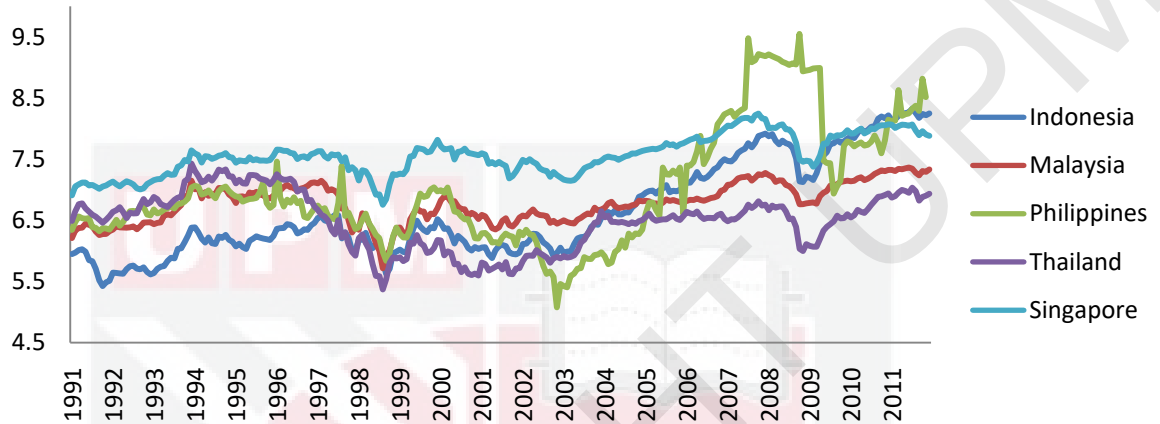

Figure 1.6: Natural logarithm of stock market indices of the ASEAN5 countries

All market returns are negatively skewed except for those in the Malaysian market. The kurtosis statistics, which are substantially higher than 3, indicate excess peakness of the return distribution in all markets. The Jarque-Bera test statistics for normality soundly show deviations from the normal distribution in all ASEAN markets under study, thus justifying the use of GARCH-type models.

Table 1.2: Descriptive statistics of the ASEAN5 stock market returns

	DJSE	DKLCI	DPSE	DSET	DSTI
Mean	0.008977	0.004137	0.007850	0.001332	0.003969
Median	0.015739	0.009094	0.008708	0.003430	0.010332
Maximum	0.250193	0.294421	4.191097	0.284275	0.248412
Minimum	-0.378555	-0.284632	-4.142000	-0.359188	-0.273640
Std. Dev.	0.085997	0.072651	0.435545	0.092315	0.068302
Skewness	-0.987559	0.004644	-0.011463	-0.138764	-0.309436
Kurtosis	6.489763	6.124839	69.19983	4.617798	5.495566
Jarque-Bera	166.1552	100.9020	45284.99	27.84102	68.31215
Probability	0.000000	0.000000	0.000000	0.000001	0.000000

Source: Author's own calculation.

1.8 Chapter summary

The asymmetric effects of monetary policy are widely accepted by the macroeconomics and have been studied from both theoretical and empirical perspectives. It refers to a situation in which the impact of a given policy is not constant but varies depending on the circumstances. In recent years, a large and growing body of empirical studies has focused on different kinds of asymmetric real output effects of monetary policy

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including: asymmetries related to the direction and size of monetary policy actions and asymmetry over business cycle. This study contributes to the existing literature by examining the asymmetric effects of monetary policy on real output with respect to stock market conditions, as indicated by the market being characterized as a bull or bear market. Moreover, the asymmetric impact of monetary policy on stock returns and volatilities over bull and bear market periods is also investigated.

Although the asymmetric effects of monetary policy in the context of developed countries have been reported widely in the literature, less empirical evidences have been reported for the developing and small open economies. This study investigates asymmetries in a panel of the ASEAN5 countries by employing the PMG estimator proposed by Pesaran *et al.* (1999). Investigating asymmetries in a panel setting has the advantage of allowing for cross section dependencies and the spillover effects between the ASEAN5 countries. Investigating asymmetries over bull and bear markets requires identifying these terms. Bull and bear markets are identified by employing two approaches: the Markov-switching models and the non-parametric approach proposed by Pagan and Sossounov (2003).

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