

# Chapter 1

## Introduction

### 1.1 Statement of the Problem and the Significant of the Study

Many financial institutions, government agencies, and investors are investing in the financial market. The returns and risks are used as tools for investment strategies not only in stock markets, but also in bond markets. The risk, or volatility, plays an important role in portfolio and risk management, especially with modern financial theory. Therefore, volatility has become a necessary tool for financial institutions, government agencies, and investors to use while making decisions for investments. Moreover, volatility information is also used to determine the overall risk of a portfolio, to identify hedging strategies that make the portfolio neutral with respect to market moves, and also used in derivatives trading and valuation.

Investors are not only investing in their own country, but also in other countries because, for example, they may wish to decrease their portfolio volatility or diversify their portfolio risk. However, investment across the markets and countries can decrease portfolio volatility differently depending on correlation or covariance of pairs of assets, which is a key point in portfolio and risk management. Moreover, those who are risk averters also move their funds from the markets that have high volatility to the markets that have low volatility to reduce their portfolio risk, while those willing to take more risks do the opposite. They shift their funds to invest in the volatile markets for speculation in order to generate higher expected returns. This

behavior of investors leads to increases or decreases in volatility across the markets and countries. Hence, there are volatility linkages and spillovers across the markets and countries.

An efficient portfolio relies on the correlation or covariance of a pair of assets that may change over time. Investors can make decisions and manage their portfolios to weigh between the expected returns and risks. Therefore, much research in economics and finance are trying to model the variances, covariances, and correlations of pairs of assets to construct efficient portfolios and adjust them over time.

In recent years emerging financial markets have been of considerable interest to investors who have been attracted by the opportunities for further international portfolio diversification and the high expected rates of return offered (Holmes and Wong, 2001). The emerging financial markets react, in terms of returns and volatility, to events such as the crash of October 1987, the September 11, 2001 attack on America, the Asian crisis of 1997, or subprime crises, very quickly and simultaneously (Nikkinen et al., 2008). However, the timing and magnitude of change in stock and bond returns and volatility differ across markets around the world. It is clear that those events and shocks are being transmitted around the global trading system (Steeley, 2006).

This dissertation investigates the volatility linkages or volatility spillovers between markets, stock and bond, because they are important for a variety of investment and risk management decisions. Portfolio managers or institutional investors often move their funds from stocks into bonds when they expect stock market volatility will increase. Risk reduction will be achieved by this shift, but it depends on the volatility linkages between the stock and bond markets. If there are

volatility linkages across these markets that are very highly correlated, then bonds may not provide the efficient portfolio diversification that investors are seeking. However, they still have an alternative choice to reduce portfolio risk by investing across countries, especially between developed and developing countries, because emerging financial markets have different characteristics from developed financial markets (Bekaert and Harvey, 1997).

Furthermore, volatility spillovers should be considered before setting regulatory policy (Fleming et al., 1998). For example, banking regulators have to understand the nature of volatility and volatility spillovers in order to appropriately assess capital adequacy. Similarly, market regulators should consider these linkages to evaluate the effects and launch the appropriate policies such as margin requirements, circuit breakers, supervision signs, or ceiling and floor limits.

Stock markets in South-East Asia are attractive for international investors because the market capitalization has been increasing around 50–350% in last 10 years, as shown in Figure 1.1, which means the stock markets can absorb the capital inflow without a vast change in stock prices. The higher average returns are one reason for investors beginning to invest in emerging markets (Bekaert and Harvey, 1997), and the trend continues in this decade. Figure 1.2 shows that the stock market indices, on average, are continuously increasing in emerging markets, especially the Indonesia stock market, which has increased more than 200% since the year 2000. Moreover, the policies of restrictions for foreign investors being relaxed are becoming apparent in many ways, such as an extension of the allowable percentage for foreign shareholders and more financial instruments.

Bond markets in South-East Asia grew rapidly in terms of market capitalization and trade volume following the Asian financial crisis in 1997, as shown in Figures 1.3 and 1.4. The market size of South-East Asia bond markets has increased around 30–350% since the year 2000, the same as the trade volume that has increased around 64–15,900%. Therefore, bond markets in South-East Asia have become important for private and institutional investors.

Many studies have analysed the returns and volatility in stock markets, but there are fewer analyses of bond markets. The analysis of volatility in bond markets is useful to help investors, especially those who can bear the lower levels of risk, to understand the characteristics and behaviour of volatility and volatility spillovers across countries, and the effects of positive and negative shocks (or news) on volatility. In particular, they can diversify portfolio risk by making efficient asset allocations.

## **1.2 Objectives of the Study**

The objectives of this dissertation are as follows:

1. To model the stock and bond returns and volatility in South-East Asia. In stock markets, six countries in this region that consist of emerging markets and developed markets (Indonesia, The Philippines, Malaysia, Singapore, Thailand, and Vietnam) are examined. For bond markets, we examine only four countries, excluding Malaysia and Vietnam, where bond market data is available.
2. To evaluate the volatility linkages and spillovers across the markets, stock and bond markets, of Indonesia, Philippines, Thailand, and Singapore. Investors tend to move their funds across markets to adjust portfolio risk

and returns. Therefore, volatility in stock and bond markets may be highly correlated.

3. To estimate the volatility linkages and spillovers across the countries. Investors can diversify portfolio risk by increasing the number of securities in their portfolio. Some investors diversify portfolio risk by investing in stock and bond markets within one country, but some invest internationally, especially institutional investors.

### **1.3 Overviews**

International investment is important for risk diversification and portfolio management, especially in stock and bond markets. Investors need to know the volatility in each market to determine their trading strategies, hedging, or speculating. Financial markets, both stock and bond, in South-East Asia have become interesting and are receiving a lot of attention for a number of reasons. For example, the higher average percentage of returns in emerging stock markets, the growth in the economy in this region, and the higher volatility. Therefore, this dissertation studies the areas as follows: Chapter 2 will present the methodology and model specifications. Chapter 3 will study modelling of the stock and bond returns and volatility in South-East Asia; modelling stock volatility in South-East Asia in Chapter 4; and modelling the volatility in bond prices in South-East Asia in Chapter 5.

Chapter 3 examines the volatility and volatility spillovers across markets, both stock and bond, in South-East Asia. It also investigates volatility spillovers across the countries in this region, namely Indonesia, Philippines, Thailand, and Singapore, in which investments are made. Data from 1 April 2004 to 5 November 2008 is used to

model the volatility. A wide range of conditional volatility models have been used to estimate volatility and volatility spillovers with symmetric and asymmetric effects in financial markets. Univariate volatility, namely GARCH, GJR, and EGARCH, and multivariate volatility, namely CCC, VARMA-GARCH, VARMA-AGARCH and DCC are employed to capture the volatility and volatility spillover in financial markets in South-East Asian countries.

The results of a univariate volatility model found that volatility and asymmetric effects coefficients in variance equations are all significant only in the long-run, and GJR and EGARCH are not superior to GARCH. For multivariate volatility, the CCC shows the constant conditional correlation in all series except the Thai bond market and other countries stock market, whereas DCC shows the statistically significant time-varying conditional correlations. Volatility spillovers and asymmetric effects from VARMA-GARCH and VARMA-AGARCH models are found. There are volatility spillovers and asymmetric effects across financial markets in South-East Asia of around 40% and 60% of pair of assets, respectively.

The stock markets in South-East Asia, namely Indonesia, Philippines, Malaysia, Singapore, Thailand, and Vietnam, are more attractive for investors who can bear a higher level of risk. The stock market is preferable to the bond market for investors who expect higher returns and speculation. However, investors can achieve the level of returns that they expect with the lowest risk by knowing the volatility and creating an efficient portfolio. Information in Chapter 4, which is about modelling stock volatility in South-East Asia, can provide this solution. It evaluates the volatility linkages and spillovers across stock markets by using daily returns of stock indices from 31 July 2000 to 12 November 2008.



The univariate volatility models suggest that Indonesia and Singapore markets have asymmetric effects. The CCC model found a constant conditional correlation in most cases. VARMA-GARCH and VARMA-AGARCH models show the volatility spillovers are evident in 8 of 15 for both models. Moreover, the numbers of cases that have significant and insignificant asymmetric effects do not differ much. In addition, DCC shows significant time-varying correlations.

The Chapter 5 is about modelling the volatility in bond prices in South-East Asia. This chapter is useful for understanding the behaviour and characteristics of volatility in the bond market. Some investors would like to invest in the bond market to ensure that they have a certain income in the future, especially elderly people.

The chapter evaluates the volatility linkages and spillovers across bond markets in the South-East Asian countries of Indonesia, Philippines, Singapore and Thailand. Daily returns of bond indexes from 1 April 2004 to 13 March 2009 are used, and univariate and multivariate models are estimated to analyse returns and volatilities. The univariate volatility models suggest that asymmetric effects are present for the Indonesia and Philippines markets, whereas the markets of Singapore and Thailand display symmetric effects. The CCC model shows that the correlations are negative between Thailand and the other countries. The VARMA-GARCH and VARMA-AGARCH models show significant volatility spillovers. As in the case of the univariate model, asymmetry in VARMA-AGARCH also exists for Indonesia and Philippines bonds. Thus, the asymmetric model is superior to its symmetric counterpart for Indonesia and Philippines. However, rolling window estimation and the DCC model suggest that the assumption of constant conditional correlations is too restrictive.

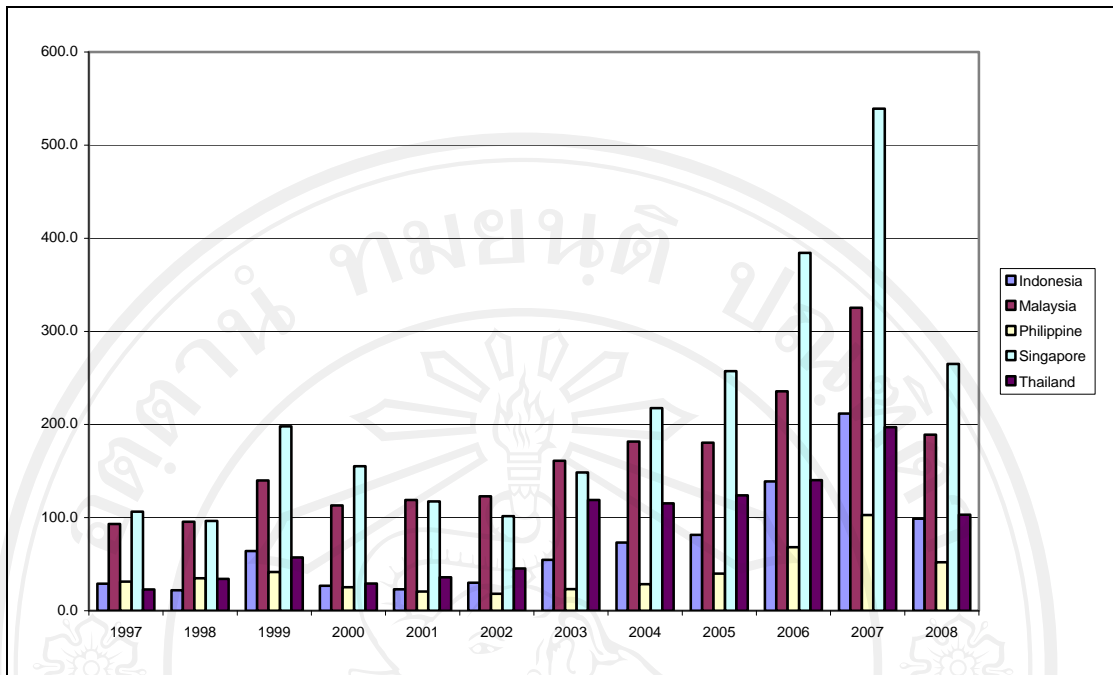


Figure 1.1 Market Size of Stock Markets (USD Billions)

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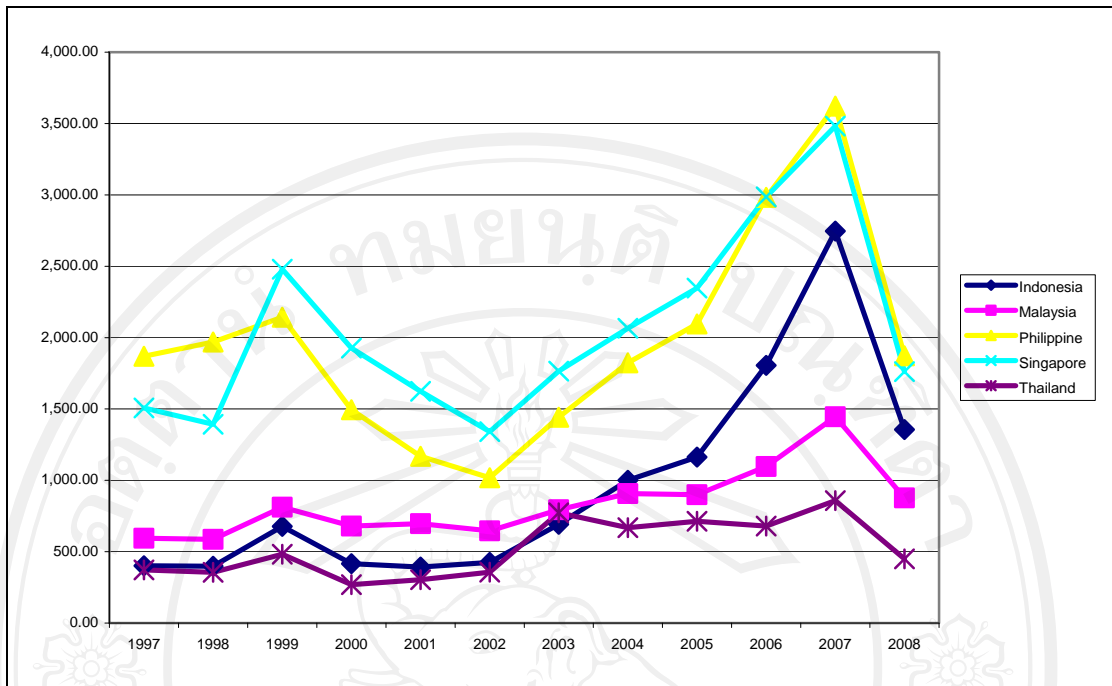


Figure 1.2 Stock Markets Indices

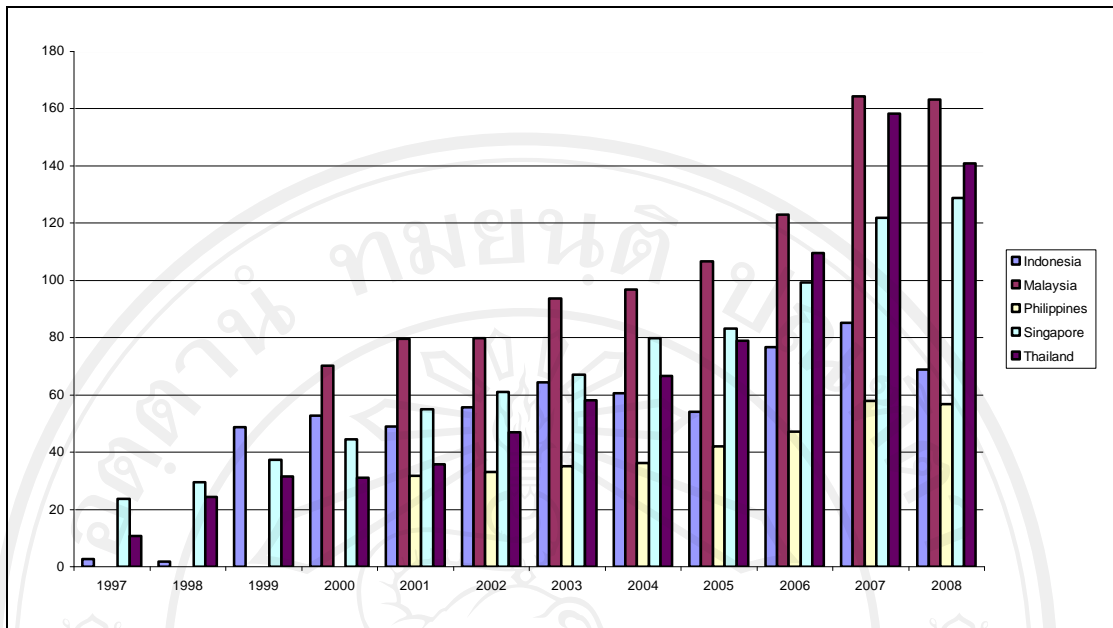


Figure 1.3 Market Size of Bond Markets (USD Billions)

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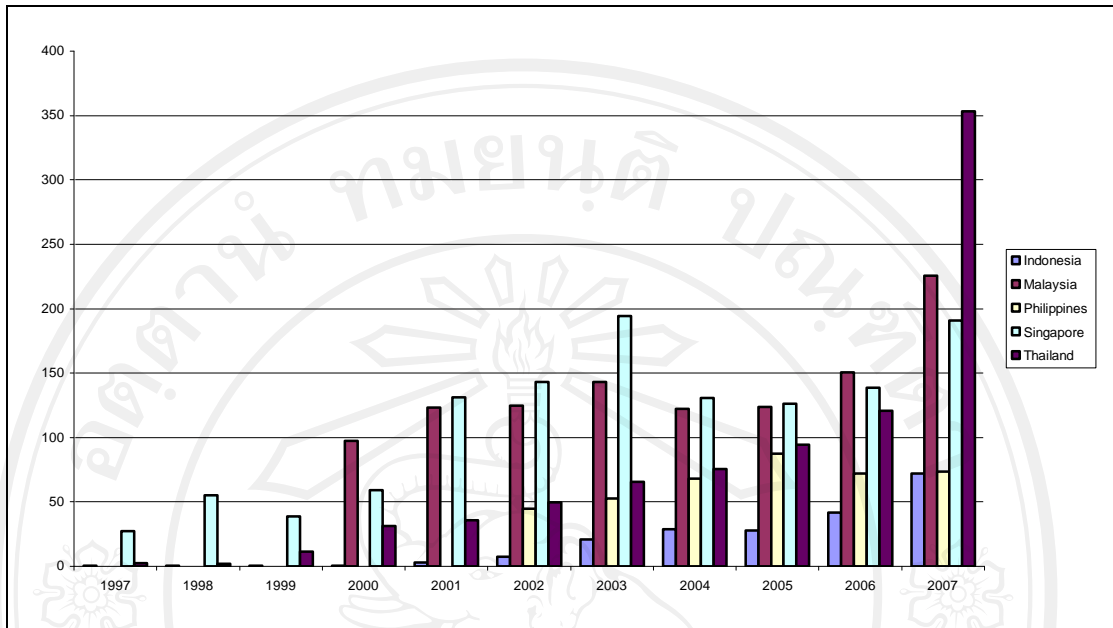


Figure 1.4 Trade Volume of Bond Markets (USD Billions)

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