Chapter 6

Conclusion

6.1 Summary of the Study

This dissertation estimates the volatility and volatility spillovers across the different markets, stock and bond, and across the countries in Southeast Asia. The daily returns of each market are used in evaluation. Volatility and asymmetric effects of positive and negative shocks are estimated by using univariate conditional volatility, namely GARCH, GJR, and EGARCH. To illustrate the volatility spillover and correlation across the markets and countries, multivariate conditional volatility, namely CCC, VARMA-GARCH, VARMA-AGARCH, and DCC, are employed.

For univariate conditional volatility, GARCH(1,1), GJR(1,1), and EGARCH(1,1) are estimated to determine the coefficient of conditional mean equations and conditional variance equations, with three types of conditional mean equations. The results show that the coefficients in the conditional variance equations are significant in both the short- and long-run. This means that the volatility in both markets of every country is changing over time. Moreover, asymmetric effects of positive and negative shocks on conditional volatility in stock markets, that negative shocks give the higher impact on conditional volatility than positive shocks, are found in Indonesia and Singapore stock markets, but without leverage. In contrast, Indonesia and Philippines bond markets show asymmetric effects and leverage, whereby negative shocks increase volatility and positive shocks decrease volatility.

Therefore, investors should be aware of the time-varying risk in South-East Asia financial markets and the different impacts of positive and negative shocks with equal magnitude on conditional volatility on the Indonesia and Singapore stock markets, and on the Indonesia and Philippines bond markets.

The CCC model reports that the estimated correlations of stock markets yield the constant conditional correlation, except with correlation between Vietnam and Indonesia, and between Vietnam and Thailand. Moreover, the correlation between Vietnam and Malaysia is negative. This means a portfolio that is constructed from assets in the Vietnam and Malaysia stock markets can diversify portfolio risk efficiently. However, investors can diversify risk by investing in both stock and bond markets simultaneously because there is no correlation between the Thai bond market and other countries' stock markets. Therefore, Thai bonds should be an asset in the portfolio to reduce the portfolio risk.

For investors who can accept a lower level of risk, bond markets may be considered as the alternative of investment. The results of CCC suggest that correlations between Singapore and other bond markets, except the Thai bond market, are all significant. This means that including only Singapore bonds and Thai bonds in a portfolio can achieve lower risk. However, the negative correlations create the lowest portfolio risk.

The results of VARMA-GARCH and VARMA-AGARCH for each pair of assets between stock and bond markets show that the volatility spillovers are evident in 7 of 16 and 5 of 16 cases for VARMA-GARCH and VARMA-AGARCH, respectively. Asymmetric effects are significant in 8 of 16 cases. The results also report that, for VARMA-GARCH, the Thai stock market and the other bond markets

have volatility spillovers to each other, whereas VARMA-AGARCH gives the results contradictorily. However, the parameters of asymmetric effects, three of four pairs of assets, are not significant. The results of VARMA-AGARCH for Thailand are quite similar to the results of VARMA-GARCH for the Indonesia stock market, which reports no volatility spillovers between the Indonesia stock market and the other countries' bond markets.

For pairs of assets in stock markets, the volatility spillovers between the markets are mixed. Based on the data since year 2000, the results of VARMA-GARCH for the Indonesia market found that there is no volatility spillover between the Indonesia market and the other markets. On the other hand, VARMA-AGARCH gives better results to show that volatility spillovers and asymmetric effects exist in most cases for Indonesia. Asymmetric effects for each pair of assets in every country almost found, which mean that positive and negative shocks have the different impact on conditional volatility. However, we can not conclude that overall VARMA-AGARCH is not clearly superior to VARMA-GARCH.

According to pairs of assets in the bond market, the results suggest that they have no volatility spillovers for the Thai bond market based on VARMA-GARCH and VARMA-AGARCH models. This means that the volatility of the Thai bond market neither affects the volatility of other bond markets, nor is affected by the volatility of other bond markets. Based on Chapter 5, the volatility spillovers in bond markets show that volatility spillovers are evident in both models, VARMA-GARCH and VARMA-AGARCH. It also shows that Singapore bond market volatility has spillovers to the other bond markets, such that the volatility of a developed country affects the volatility of developing countries. Therefore, investors and fund managers

should be aware if they invest in developing countries when the volatility in the developed country is rising, except for Thailand, which has a negative impact.

Speculators may operate in developing countries, particularly Indonesia and Philippines, to earn capital gains from volatile markets. Furthermore, volatility in Thailand is affected by volatility in Indonesia. Asymmetric effects exist in the Indonesia and Philippines bond markets. Therefore, we can conclude that VARMA-AGARCH is superior to VARMA-GARCH for the Indonesia and Philippines bond markets, whereas the reverse holds for the Singapore and Thailand bond markets. The DCC reports that, for both stock and bond, coefficient estimates are significantly different from zero, which means that the conditional correlations are time-varying, so that constant condition correlations do not hold**.**

6.2 Suggestions for Further Study

This dissertation employs the univariate and multivariate conditional volatility to capture the characteristic of volatility and volatility spillovers in financial markets in South-East Asia. It can explain the volatility and volatility spillovers across stock and bond markets, and across the countries. The investors can use these results as guidelines or information if they would like to invest in this region. However, the investor's portfolio is not the same as the markets in this dissertation. Therefore, further study may focus on the indices that are consistent with the investor's portfolio, such as the large market capitalization indices or only the sector indices those investors much more attend. As same as the bond market, different types of investors may be interested in different maturity. The short-term and long-term bond indices or government bonds and corporate bonds may be considered.

To determine the appropriate model, AIC and SIC may used. However, further studies may use Value-at-Risk (VaR) to choose the better or more practical model. VaR can be defined as a worst case scenario on a typical day or over a period of time, and may be used as a tool to measure the appropriate model, see McAleer (2009).

This dissertation employs the univariate conditional volatility, namely GARCH, GJR, and EGARCH, and multivariate conditional volatility, namely CCC, VARMA-GARCH, VARMA-AGARCH, and DCC, to model the volatility and volatility spillover, but there are alternative models that may be examined, such as the Generalize Autoregressive Conditional Correlation (GARCC) of McAleer et al. (2008) and the stochastic volatility, see McAleer (2005). Those models may investigate the volatility and be tested for the appropriate model to model volatility and volatility spillover in South-East Asia.