Chapter 5

Conclusion

5.1 Conclusion

In this section we study the volatility dynamics in exchange rate markets by utilizing GARCH and FIGARCH model under alternative distributions. The data consists of daily nominal spot exchange rates between the Thai Baht versus US Dollar and Thai Baht versus Japanese Yen. The data is the daily close rate obtained from Reuters2007 database supported by Faculty of Economics, Chiang Mai University. The sample period is October 21, 1993 to September 12, 2008, totally 3,879 observations. Therefore, following the standard practice, 3,879 daily exchange rate of returns are constructed as $r_t = \log\left(\frac{S_t}{S_{t-1}}\right)$, where S_t denotes the spot exchange rate at day *t*.

Table 4.3 reports the summary statistics together with the Box-Pierce (1979) statistics tests for up to 22nd-order serial correlation in the returns and squared returns. The reported results indicate that for all series, daily return average about 0.0% with considerable amount of variation. The sample variance of US Dollar return is smaller than Japan Yen. Skewness indicates that Thai Baht – US Dollar exchange rate has negative value and Thai Baht – Japanese Yen exchange rate has positive value. The highest kurtosis value is found from US Dollar exchange return.

Figure 4.1 displays Daily spot exchange rates of returns and squared returns over the sample period. The plot in the figure clearly indicates the occurrence of tranquil and volatile periods.

Figure 4.2 – 4.5 display autocorrelation of transformations of the residuals of US Dollar-Thai Baht and Japanese Yen- Thai Baht respectively. As shown in the autocorrelation graph, both daily return series are uncorrelated through time. Q(22)

values indicates some persistence in the return for both Dollar-Thai Baht and Japanese Yen- Thai Baht. This is also supported by the Box-Pierce statistic for up to 22^{nd}-order serial correlation in daily squared returns.

Parameter estimates, standard error and summary diagnostic statistics for GARCH and FIGARCH models with Normal, student's t and NIG errors from Quasi Maximum Likelihood method are presented in Table 4.4 and 4.5. A comparison of estimated GARCH and FIGARCH models with any given distribution assumption, in term of lowering the kurtosis in residuals and Box-Pierce statistics computed from standardized residuals and squared residuals and likelihood values generally favors a FIGARCH specification for the conditional volatility of daily exchange rate returns. For both exchange rate, the estimates of hyperbolic decay parameter, *d* is significant and greater than 0 but less than unity and are in the range of about 0.3 – 0.7 from FIGARCH model. Quantile Predictions Value-at-Risk for 1 day forecast for FIGARCH models with Normal, student's t, and NIG error Distribution are shown in Table 4.6.

Figure 4.2 and 4.3 show that the FIGACH(1,d,1) model with NIG distribution fits the Thai Baht – Japan Yen quite symmetrically. A statistically significant estimate of parameter *b*, with positive values, indicates presence of symmetry in the distribution of Thai exchange rate daily return. Furthermore, the estimated values for *a* indicate that the Thai Baht – Japanese Yen returns have the most peaked distribution.

In conclusion, this study proposed the FIGARCH – NIG model to study the hyperbolic decay, time varying dynamic in conditional volatility and peakedness, asymmetry and fat tailed distribution of daily Thai Baht – US Dollar and Thai Baht – Japanese Yen rate returns. The estimated GARCH and FIGARCH models, with normal, *t* and the NIG distributions compared in terms of sample fit, distinctly found hyperbolic memory in conditional volatility and asymmetric distribution of US Dollar daily exchange return but symmetric distribution of Japanese Yen daily exchange rate return, both were found with FIGARCH model analysis.

5.2 Suggestion for further study

This research concerns with an extended model, FIGARCH, with a new proposed NIG error distribution which is found out to be more appropriate for financial market. The further study can compare and contrast the GARCH, FIGARCH and alternative models with alternative error distributions in terms of sample forecasting. It will be also useful to apply the model to other financial and commodity returns.