ABSTRACT

In this dissertation, I propose the return distributions and the techniques for measuring risk in financial markets, Value at Risk (VaR) which is defined as the maximum expected loss over a given horizon period at a given level of confidence. I propose a trimodal distribution of returns which combines normal distribution and stochastic jumps, where both the positive and negative jumps are allowed for the presence of possible skewness, fat-tailedness, and discontinuities. I apply the proposed distribution in the VaR analysis. The model is compared with the four competing models including the normal distribution, the Student's t distribution, the extreme value theory, and the bimodal distribution. Using daily returns on S&P500 index from January 2, 1969 to December 31, 2002, I find that the trimodal distribution gives a better VaR forecast for all performance measures.

Furthermore, I extend the proposed trimodal model which combines normal distribution and stochastic jump process to incorporate the conditional heteroskedasticity. Both the GARCH and the asymmetric EGARCH processes are considered. I propose the conditional trimodal distributions for the returns on S&P500 index and apply them with the estimations of the VaRs. The performance tests reveal that both the trimodal-GARCH and the trimodal-EGARCH models perform better than the competing conditional models. However, when comparing with the unconditional trimodal model developed previously, I find that the more complicated conditional models do not always reveal the better performance.

Since there is evidence of structural changes in emerging markets, then the small sample is suggested. To deal with this issue, I propose the application of the technique employing the modified inverse hyperbolic sine transformation (IHST) in

mapping the unknown distribution to normality and then simulating the variables from the estimated parameters to obtain the smooth and continuous distribution. This technique is applied to the VaR analysis of the daily returns on the stock indices of five emerging markets -- Indonesia, Korea, Malaysia, Taiwan, and Thailand. The VaR obtained from this method is then tested and compared with the four competing models including the normal distribution, the Student's t distribution, the kernel density estimation, and the trimodal distribution. The empirical results reveal the superior performance in small sample of the inverse hyperbolic sine transformation than those of the competing models.