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Assessing Tail-Related Risk for Heteroscedastic Return Series of Asian Emerging Equity Markets

A Thesis Presented in Partial Fulfillment of the Requirements for
Master of Business Studies

at

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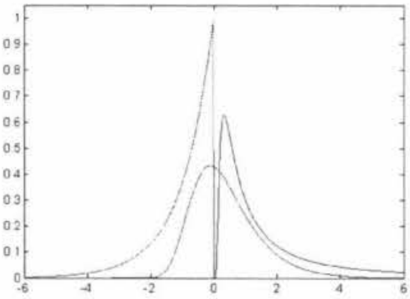

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Abstract

High degrees of leptokurtosis, heteroscedasticity and asymmetries in return series are the common features of Asian emerging equity markets, especially during the financial crisis. Thus, strengthening risk management with improved risk measures becomes increasingly important. According to the Basle Committee on Banking Supervision, the value at risk (VaR) should be calculated at the 99% confidence level or above with daily data. In the context of Asian equity markets, the use of the estimated conditional variance of market returns as the sole measure of market risk may result in serious underestimation of the true risk caused by tail events. Therefore, this research focuses on the tail-related risk measure of nine Asian index returns within the framework of extreme value theory. It employs the generalized extreme value (GEV) and the generalized Pareto distribution (GPD) approaches combined with AR(1)-GARCH(m, s) filtering of the return data. The VaR performances under different distributions with different volatility filtering are compared, and the estimated conditional and unconditional expected shortfalls based on the GPD are reported. The important findings include the following. (1) The nine heteroscedastic index returns indeed follow heavy-tailed distributions rather than the normal distribution. (2) Both the GPD and GEV distributions of daily returns are asymmetric between local maxima (right tail) and local minima (left tail). (3) The results of the GEV approach are somewhat sensitive to the block length chosen, while the GPD approach, with the thresholds determined much less arbitrarily, can avoid equivocalness with the GEV method. (4) The reported results indicate that the VaR based on the extreme value theory at high quantiles (above 99%) is more accurate than the VaR based on the normal distribution.

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Contents

Chapter 1

Introduction 1

Chapter 2

Literature Review 6

Chapter 3

Methodology 10
- 3.1 The Essential of Risk 10
- 3.2 Coherent Risk Measure 11
- 3.3 Value at Risk 11
- 3.4 VaR and Expected Shortfall 14
- 3.5 Dynamical Financial Returns 15
- 3.6 Extreme Value Theory 16
  - 3.6.1 Generalized Extreme Value Theory 17
  - 3.6.2 Generalized Pareto Distribution 21
    - 3.6.2.1 The Choice of Threshold 26
  - 3.6.3 Parametric Modelling 27
  - 3.6.4 Calculating VaR and Expected Shortfall 29

Chapter 4

Data Description 31
- 4.1 Basic Statistics 31
- 4.2 QQ Plots 37

Chapter 5

Empirical Results 41
- 5.1 AR (1)-GARCH (m, s) Process 41
- 5.2 The GEV with AR (1)-GARCH (m, s) Process 60
  - 5.2.1 Determining the Block Length of the GEV 60
  - 5.2.2 Empirical Results of the GEV 60
- 5.3 The GPD with AR (1)-GARCH (m, s) Process 68
  - 5.3.1 Searching the Threshold for the GPD 68
  - 5.3.2 Empirical Results of the GPD 82
- 5.4 VaR and Expected Shortfall 87

Chapter 6

Conclusion and Further Research 101

Reference 104

List of Tables

Table 1: Average Monthly Risk Ratings of Asian Emerging Countries Over the Period April 2002 Through March 2003 2

Table 2: Basic Statistics of Index Returns 36

Table 3: Maximum Likelihood Estimated Parameters of AR (1)-GARCH (m, s) Models 43

Table 4: Basic Statistics of Filtered Innovations 56

Table 5: Maximum Likelihood Estimated Parameters of the GEV with AR (1)-GARCH (m, s) Filtering 62

Table 6: Maximum Likelihood Estimated Parameters of the GEV without AR (1)-GARCH (m, s) Filtering 65

Table 7: Maximum Likelihood Estimated Parameters of the GPD with AR (1)-GARCH (m, s) Filtering 83

Table 8: Maximum Likelihood Estimated Parameters of the GPD without AR (1)-GARCH (m, s) Filtering 85

Table 9: Comparison of the VaR Performance with AR (1)-GARCH (m, s) Filtering 89

Table 10: Comparison of the VaR Performance without AR (1)-GARCH (m, s) Filtering 94

Table 11: Unconditional Expected Shortfall 99

Table 12: Conditional Expected Shortfall 100

List of Figures

Figure 1: VaR with Normally Distributed Data 13

Figure 2: VaR and Expected Shortfall with Normally Distributed Data 15

Figure 3: Plot of Block Maxima and Plot of Peaks Over Threshold 17

Figure 4: Standard GEV Densities 19

Figure 5: 3D Plot of Frechet Distribution 19

Figure 6: Generalized Extreme Value Densities 20

Figure 7: Plot of Peaks Over Threshold 22

Figure 8: Plot of Distribution Function *F* and Plot of Conditional Distribution Function F_u 23

Figure 9: Generalized Pareto Distributions 24

Figure 10: Comparison of GPD Densities with Different xi 25

Figure 11: Comparison of Positive Shape Parameters of GPD Densities 26

Figure 12: Plots of Price Indices and Index Returns 32

Figure 13: QQ Plots of Index Returns 38

Figure 14: Innovations and Conditional Volatility of AR (1)-GARCH (m, s) Model 46

Figure 15: Correlograms of Returns and Innovations 51

Figure 16: QQ Plots of Innovations of AR (1)-GARCH (m, s) Model 57

Figure 17: Mean Excess Plots of Innovations of AR (1)-GARCH (m, s) Model 69

Figure 18: MLE of Shape Parameters, Excess Distributions of the GPD and the Underlying Distributions of the GPD Tails 73

Figure 19: 3D Plot of VaR Based on GPD 87

Figure 20: Comparison of VaR Between Heavy-Tailed and Normal Distributions 97