Preface

The volatility has been one of the cores of the financial theory research, in addition to the stock markets is an important part of modern financial markets. Research on volatility and contagion effect in stock market is an important part of the theory of financial markets research. This book includes the following four parts.

The first part is forecasting the stock market volatility: Do realized skewness and kurtosis help? In this study, we investigate the predictability of the realized skewness (RSK) and realized kurtosis (RKU) to stock market volatility. This issue has not been addressed in the existing studies. Out-of-sample results show that RSK is more powerful than RKU in forecasting, which can significantly improve the forecasting accuracy in mid- and long-term. But in the short term, those variables are useless. The paper also uses the realized kernel (RK) to do the robustness analysis and the conclusions are consistent with the RV measures. Therefore, our results are of great importance for portfolio allocation and financial risk management.

The second part is measuring daily Value-at-Risk of SSEC index: a new approach based on multifractal analysis and extreme value theory. Recent studies in the econophysics literature reveal that price variability has fractal and multifractal characteristics not only in developed financial markets, but also in emerging markets. Taking high-frequency intraday quotes of the Shanghai Stock Exchange Component (SSEC) Index as example, this paper

proposes a new method to measure daily Value-at-Risk (VaR) by combining the newly introduced multifractal volatility (MFV) model and the extreme value theory (EVT) method. Two VaR backtesting techniques are then employed to compare the performance of the model with that of a group of linear and nonlinear generalized autoregressive conditional heteroskedasticity (GARCH) models. The empirical results show the multifractal nature of price volatility in Chinese stock market. VaR measures based on the multifractal volatility model and EVT method outperform many GARCH-type models at high-risk levels.

The third part is financial market volatility and contagion effect: A copula-multifractal volatility approach. In this paper, we propose a new approach based on the multifractal volatility method (MFV) to study the contagion effect between U.S. and Chinese stock market. Recent studies in econophysics literature reveal that multifractal characteristic exists not only in developed financial markets, but also in emerging ones. Firstly we estimate volatility using the multifractal volatility method, and find out that the MFV method performs best among other volatility models, such as GARCH-type and realized volatility models. Secondly, we analyze the tail dependence structure between U.S. and Chinese stock market. The static copulas estimate results for the entire period show that SJC copula performs best, indicating asymmetric characteristics of the tail dependence structure. The dynamic copulas estimate results show that time-varying t copula achieves the best performance, which means symmetry dynamic t copula is also a good choice, for it is easy to estimate and is able to depict both upper and lower tail dependence structure. At last, with the results of

the former two steps, we analyze the contagion effect between U.S. and Chinese stock market during the subprime mortgage crisis. The empirical results show that the subprime mortgage crisis started in U.S. and its stock market has had an obvious contagion effect on Chinese stock market. Our empirical results may be useful for investor to allocate portfolio.

The fourth part is quantitative measurement of the contagion effect between U.S. and Chinese stock market during the financial crisis. In this paper, we study the quantitative measurement of contagion effect between U.S. and Chinese stock market during the financial crisis by combining multifractal volatility (MFV) with the copula method. At first, we employ MFV to filter volatility of the two markets due to the existence of heteroskedasticity. Then we use an improved time-varying Clayton copula to estimate the dynamic lower tail dependence (lower Kendall's τ). After determining crisis and non-crisis periods by Markov regime switching model, we find that the statistical characteristics of lower Kendall's τ during crisis and non-crisis periods are obviously different. Time-varying lower Kendall's τ of the crisis period is about 1.87 times that of in non-crisis period on average, indicating that the contagion effect increased about 87% during the crisis period. It is very drastic that the fluctuations of lower tail dependence during crisis period, so the static measurement of contagion effect may not provide effective suggestions for investors. Thus, we propose a dynamic method to measure the strength of contagion effect.