The Econometrics of Financial Comovement

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Summary

This dissertations presents four articles in four chapters. Each chapter adopts various statistical time series methods to analyze co-movement in financial markets. In particular, the following four questions are answered: 1) What are the statistical properties of GAS (Generalized Autoregressive Score) time series correlation models? 2) How can we model correlations in high-dimensional datasets? 3) How can we adapt dynamic filtering models, if we see that the model does not resemble characteristics of the data? 4) If we monitor financial spillovers, how can we dynamically model its characteristics?

Chapter 2 applies a simulation-based method to answer the first question. We discover that the non-uniquess of matrix square root introduces an additional ingredient to determine the stability of the model. Moreover, we find that the symmetric matrix square root offers the best overall results.

Chapter 3 introduces a model for high-dimensional dynamic correlation data. This model can be estimated by quasi-Gaussian maximum-likelihood methods, which ensures the usual statistical optimality properties. We demonstrate numerical efficiency in evaluation of the model. We also develop a dynamic correlation model which incorporates data from both option markets and equity markets. This enables us to monitor correlation risk premia in real time.

Chapter 4 presents a systematic approach to adopt filtering equations to misspecification of the model. Once we recognize the misfit of the dynamic filtering model with respect to a concrete property of the data, we are able to come up with a new, improved model. We demonstrate the usefulness of our method using various practical examples.

Chapter 5 introduces a dynamic vector autoregressive model to monitor spillover effects in financial markets. So far researchers have used ad hoc rolling windows methods to analyze comovement connectedness networks. The new model provides more accurate predictions and yields different, more reactive, measures of spillovers.