Centre Interfacultaire Bernoulli - CIB

WORKSHOP
Volatility Modeling and Applications

Abstracts

10 to 13 April 2017
CIB conference room

Alexandru Badescu
Non-affine GARCH option pricing models, variance dependent kernels, and diffusion limits

This paper investigates the pricing and weak convergence of an asymmetric non-affine, non-Gaussian GARCH model when the risk-neutralization is based on a variance dependent exponential linear pricing kernel with stochastic risk aversion parameters. The risk-neutral dynamics are obtained for a general setting and its weak limit is derived. We show how several GARCH diffusions, martingalized via well-known pricing kernels, are obtained as special cases and we derive necessary and sufficient conditions for the presence of financial bubbles. An extensive empirical analysis using both historical returns and options data illustrates the advantage of coupling this pricing kernel with non-Gaussian innovations.

Matthias Fengler
Textual sentiment, option information, and stock return predictability

Text mining NASDAQ articles, we extract investor sentiment proxies and examine their relationship to equity option prices. We also study the predictability of equity returns including investor sentiments and option price information. We find that equity options react to investor sentiments distilled from financial news. Stock return predictability is improved using text-based sentiments along with option-implied information and other risk factors. *Coauthored with Cathy Chen, Wolfgang Härdle, and Yanchu Liu.*

Mathieu Fournier
Beta Risk in the Cross-Section of Equities

We develop a bivariate stochastic volatility model that allows for dynamic market exposure. The expected return on a stock depends on beta's co-movement with the stochastic discount factor and deviates from the standard security market line when beta risk is priced. When estimating the model on returns and options for a large number of firms we find that allowing for beta risk helps explain the expected returns on low and high beta stocks that are challenging for standard factor models. Overall, we find strong evidence that accounting for beta risk results in better model fit.

Lyudmila Grigoryeva

Pricing and hedging of non-affine ARSV options using latent factor dependent kernels

New pricing and hedging strategies are proposed for non-affine auto-regressive stochastic volatility (ARSV) models with non-predictable drift which allows to account for leverage effects. We consider a latent factor dependent exponential linear pricing kernel with stochastic risk aversion parameters and implement both pricing and hedging for ARSV models estimated via the hierarchical-likelihood method. This technique proves to outperform standard GARCH and Heston-Nandi based strategies in terms of a variety of considered criteria in an empirical exercise using historical returns and options data. *Co-authors: Alexandru Badescu (University of Calgary), Juan-Pablo Ortega (Universität Sankt Gallen, CNRS)*

Hughes Langlois

Time-varying Integration in Large International Markets

We develop an econometric methodology to test for market integration in large unbalanced panels of international individual stock returns. We derive the no-arbitrage restrictions in a multi-period international economy with or without market integration when assets follow an approximate linear factor structure under exchange risk hedging. We consider both time-invariant and time-varying risk premia, and compare their estimates under market integration and no integration. The empirical analysis on returns for more than 60,000 stocks in 53 countries shows that the equality between risk premia under market integration is rejected for most countries under international four-factor models capturing market, size, value, momentum, profitability, and investment effects. The path of the time-arying risk premia show that integration seems to be pro-cyclical, i.e., larger during economic booms.

Sébastien Laurent

Asymptotics of Cholesky GARCH Models and Time-Varying Conditional Betas

This paper proposes a new observation-driven model with time-varying slope coefficients. Our model, called CHAR, is a Cholesky-GARCH model, based on the Cholesky decomposition of the conditional variance matrix introduced by Pourahmadi (1999) in the context of longitudinal data. We derive stationarity and invertibility conditions and proof consistency and asymptotic normality of the Full and equation-by-equation QML estimators of this model. We then show that this class of models is useful to estimate conditional betas and compare it to the approach proposed by Engle (2016). Finally, we use real data in a portfolio and risk management exercise. We find that the CHAR model outperforms a model with constant betas as well as the dynamic conditional beta model of Engle (2016).

Rogier Quaedvlieg

Modeling and Forecasting (Un) Reliable Realized Covariances For More Reliable Financial Decisions

We propose a new framework for modeling and forecasting common financial risks based on (un) reliable realized covariance measures constructed from high-frequency intraday data. Our new approach explicitly incorporates the effect of measurement errors and time-varying attenuation biases into the covariance forecasts, by allowing the ex-ante predictions to respond more (less) aggressively to changes in the ex-post realized covariance measures when they are more (less) reliable. Applying the new procedures in the construction of minimum variance and minimum tracking error portfolios results in reduced turnover and statistically superior positions compared to existing procedures. Translating these statistical improvements into economic gains, we find that under empirically realistic assumptions a risk-averse investor would be willing to pay up to 170 basis points per year to shift to using the new class of forecasting models. *Joint work with Tim Bollerslev and Andrew Patton.*

Rainer von Sachs

Modelling intraday transactions by locally stationary Hawkes processes

In this talk we present a generalisation of stationary Hawkes processes in order to allow for a time-evolutive second-order analysis. This class of self-exciting point processes has been used, among others, to model intraday transaction data. A formal derivation of a time-frequency analysis via a time-varying Bartlett spectrum is given. This model is most appropriate for the analysis of (potentially very) long stretches of observed self-exciting point processes, as introduced in the stationary case by A. Hawkes (1971), in one dimension (temporal) or in a higher dimensional (i.e. spatial) context. Motivated by the concept of locally stationary autoregressive processes, we apply however inherently different techniques to describe and capture the time-varying dynamics of self-exciting point processes in the frequency domain. We develop some estimators for the local mean density and the Bartlett spectrum. Some insightful simulation studies and the motivating application to transaction data complete our work.