Conference on Copulas and Dependence: Theory and Applications
Organizers: Victor de la Peña and Lorán Chollete

DATE: *October 11-12, 2013*
LOCATION: *303 Mudd Building, Columbia University Main Campus*

DAY 1: Friday, October 11
10:20 – 10:30 Welcome

10:30 – 11:30 **Keynote Speech: Peter Bickel** (University of California, Berkeley)
http://www.stat.berkeley.edu/~bickel/Research.htm

SESSION 1. Chair: *Stefan Ruenzi*
11:30 – 12:30 *Gianfausto Salvadori*

12:30 – 2:00 LUNCH

2:00 – 3:00 *Cathy Ning*

3:00 – 4:00 *Stefan Ruenzi*

4:00 - 4:30 Coffee Break

4:30 – 5:30 **Keynote Speech: Xiaohong Chen** (Yale University)
http://economics.yale.edu/people/xiaohong-chen

5:45 – 7:15 Reception: Statistics Lounge, 10th Floor, School of Social Work Building.
(1255 Amsterdam Avenue between 121 and 122st).

8:00 -- Dinner

DAY 2: Saturday, October 12
10:00 – 11:00 **Keynote Speech: Rustam Ibragimov** (Imperial College)
http://www3.imperial.ac.uk/people/i.rustam

SESSION 2. Chair: *Kris Jacobs*
11:00 – 12:00 *Marius Hofert*

12:00 - 1:30 Lunch

1:30 - 2:30 *Kris Jacobs*

2:30 - 3:30 **Keynote Speech: Johan Segers** (Université catholique de Louvain)
http://www.uclouvain.be/johan.segers

3:30 - 4:00 Coffee

4:00 – 5:00 **PANEL DISCUSSION**
Peter Bickel; Xiaohong Chen; Josh Rosenberg; Gianfausto Salvadori; Johan Segers

ATTENDEES and SPEAKERS

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9. Josh Rosenberg (Federal Reserve Bank of New York) joshua.rosenberg@ny.frb.org
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10. Stefan Ruenzi (University of Mannheim) ruenzi@bwl.uni-mannheim.de
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12. Johan Segers (Université catholique de Louvain) johan.segers@uclouvain.be
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Heuristics for general efficient estimation in copula models and an example

Peter J .Bickel
Statistics
University of California,Berkeley

Copula models are semiparametric models for p variate observations in which each observation is a set of p coordinate by coordinate monotone transformations of an observation from a known parametric model.Equivalently ,we observe the nxp matrix of ranks of the original data,with each coordinate ranked separately.
How to fit such models in general has been known through the work of Genest and others .However the estimates obtained do not ,in general, achieve the semiparametric efficiency bound except in special cases eg. Klaassen and Wellner(1997).Recently, Segers(2013) has exhibited a method achieving this goal for Gaussian copulae.Motivated by an ,as it turns out ,statistically inefficient but computationally rapid method for a copula based on a mixture model of two bivariate Gaussians{Li et al.(2011)) we propose and heuristically justify as efficient a method related to that of Li et al. which we believe will be rapid in general.Work on justifying these heuristics,appropriate simulations and applications to data are in progress with Jorge Banuelos.

Dependence models in high dimensions: Statistical and computational challenges

Marius Hofert

ETH Zurich

Abstract:

In the first part of the talk, we address the statistical challenge of applying likelihood based inference for Archimedean, and nested Archimedean, copulas. Sampling and graphical goodness-of-fit is also briefly covered. In the second part, we then present a new R package which aims at simplifying statistical simulation studies and which carefully deals with important tasks such as parallel computing, seeding, catching of warnings and errors, and measuring run time.

Dependence and heavy-tailedness in economics, finance and econometrics: Modern approaches to modeling and implications for economic and financial decisions

Rustam Ibragimov

Imperial College, London

Abstract: The talk will focus on several modern approaches to modeling dependence, crises, large fluctuations and heavy-tailedness in econometrics, statistics, economics and finance and discuss their applications. In particular, it will discuss copula-based time series models, including higher-order Markov processes, and U-statistics characterizations of joint cdf's, copulas and dependence structures. We will further present several results on the effects of the interplay between heavy-tailedness and dependence on (non-)robustness of

key models in economics and finance, focusing, in particular, on the important problem of diversification (sub-)optimality. The results provide further motivation for development and applications of econometric and statistical inference procedures that are robust to heterogeneity, dependence and heavy-tailedness; and the talk will discuss some of recent developments in this direction.

Modeling asymmetric volatility clusters with copulas and high frequency data

[a]Cathy Ning, [b]Dinahai Xu, and [c]Tony Wirjanto

[a]Ryerson University, Toronto, Ontario, Canada

[bc]University of Waterloo, Waterloo, Ontario, Canada

Abstract

Volatility clustering is a well-known stylized feature of financial asset returns. In this paper, we intend to examine whether the volatility clusters are symmetric by investigating the structure of the clusters of volatilities in both the stock and foreign exchange markets. We employ copula-based semi-parametric univariate time-series models that accommodate the clusters of both high and low volatilities in the analysis. Using daily kernel volatilities constructed from high frequency data, we find that volatility clustering is nonlinear and strongly asymmetric: that is, clusters of high volatilities tend to be much stronger than clusters of low volatilities. Our paper is the first one that addresses and documents the asymmetry in the likelihood of volatility clustering. The finding is consistent with the asymmetric leverage effect and volatility feedback effect documented in the recent studies. In addition, the volatility clusters remain persistent and asymmetric even after forty days. This finding also supports the long memory dependence in volatility documented in the literature.

Extreme Dependence and Cross-Sectional Asset Pricing: Returns and Liquidity

Stefan Ruenzi

University of Mannheim

Abstract: We examine whether investors receive a compensation for holding crash-sensitive stocks. We capture the crash sensitivity of stocks by their lower tail dependence withthe market based on copulas. Stocks with strong contemporaneous crash sensitivity clearly outperform stocks with weak crash sensitivity and a trading strategy based on past crash sensitivity delivers positive abnormal returns of about 4% p.a. This effect cannot be explained by traditional risk factors. Our findings are consistent with results from the empirical option pricing literature and support the notion that stock market investors are crash-averse. Furthermore, we investigate whether investors receive compensation for holding stocks with strong systematic liquidity risk in the form of extreme downside liquidity (EDL) risk. We show that the cross-section of expected stock returns reflects apremium for EDL risk. The average future return on stocks with strong EDL risk exceeds that of stocks with weak EDL risk by more than 4% annually. This premium is different from linear liquidity risk and cannot be explained by other firm characteristics and risk factors. Overall, our results show that investors care about extreme joint realizations in returns and liquidity and that asset pricing models that rely on linear sensitivities alone might be misspecified.

MULTIVARIATE RETURN PERIODS IN EARTH SCIENCES: A COPULA APPROACH

Gianfausto Salvadori
University of Salento

ABSTRACT:

The concept of Return Period is adopted in Earth Sciences (e.g., hydrology, coastal and off-shore engineering, volcanology, seismology, ...) as a common criterion for design purposes and sizing works, and may also provide a means for risk analysis and assessment. According to several Authors, the Return Period is analogous to the Value-at-Risk used in Finance.

The construction of a consistent notion of multivariate Return Period is rather tricky, since many different definitions are possible. Similarly, the identification problem of design events in a multivariate context is of fundamental importance but, at the same time, is of troublesome nature.

This talk will show a possible construction of a coherent notion of multivariate Return Period, exploiting Copulas and the Kendall's measure. In addition, suitable strategies for the identification of multivariate critical occurrences will be presented. Finally, the use of the multivariate Return Period for the real-time assessment of multidimensional problems will be illustrated.

Semiparametric Gaussian copula models: Geometry and rank-based efficient estimation

Johan Segers

Universite Catholique de Louvain

For multivariate Gaussian copula models with unknown margins and structured correlation matrices, a rank-based, semiparametrically efficient estimator is proposed for theEuclidian copula parameter. This estimator is defined as a one-step update of a rank-based pilot estimator in the direction of the efficient influence function, which is calculated explicitly. Moreover, finite-dimensional algebraic conditions are given that completely characterize adaptivity of the model with respect to the unknown marginal distributions and of efficiency of the pseudo-likelihood estimator. For correlation matrices structured according to a factor model, the pseudo-likelihood estimator turns out to be semipara-metrically efficient. On the other hand, for Toeplitz correlation matrices, the asymptotic relative efficiency of the pseudo-likelihood estimator with respect to our one-step estimator can be as low as 20%. These findings are confirmed by Monte Carlo simulations.