DEPARTMENT OF STATISTICS

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Stochastic Correlations for Modelling Joint Behaviour of Asset Prices

October 16, 2019
11:45am – 12:45pm
Light refreshments will be served
110 Frelinghuysen Road
Hill Center, Room 552

Abstract: In 2009 the magazine Wired published "Recipe for Disaster: The Formula That Killed Wall Street" as the cover story written by journalist Felix Salmon. It blames the subprime crisis on the Gaussian copula, which was then used in finance as industry standard to estimate the probability distribution of losses on a pool of loans or bonds or assets. The Gaussian copula cannot, indeed, create tail dependence, crucial in modeling simultaneous defaults, but that was known before the crisis, as were other models, capable to do so. More than 10 years passed by since then, but the various copula and other models in use, going beyond correlation for describing dependence, do not harmonize well with the stochastic differential equation (SDE) description used for single assets. Those models are often evaluated on the basis of their performance in option pricing, putting them to the test by relatively few data and short time period.

In the lecture we build up an approach where interdependence is inherent from the covariations of Brownian motions driving the asset equations. These covariations in turn are integrals of suitable SDE driven stochastic processes called stochastic or eventually rough correlations. We test the goodness of the suggested model on historic asset price data, by using Kendall functions of copulas.

The model may be useful e.g. in CDO pricing, and in Credit Value Adjustment (CVA). A positive correlation/association between exposure and counterparty default risk gives rise to the so called Wrong-Way Risk (WWR) in CVA. Even though roughly two-thirds of the losses in the credit crisis were due to CVA losses, a decade after the crisis addressing WWR in a both sound and tractable way remains challenging. Our suggested model is capable of creating tail dependence, and in a setup currently used by Morgan Stanley produces more realistic CVA premiums than constant correlations.

Bio: Professor László Márkus received his Ph.D. in probability and mathematical statistics from Lomonosov Moscow State University in 1990. He has since then been at the Eötvös Loránd University in Budapest, Hungary, where he is currently a professor of statistics. He has been a visiting fellow at Meijo University, Japan, a TEMPUS grantee at the University of Sheffield, UK, and visiting scholar at Institute of Actuaries in, Oxford UK and the Government Actuary's Department in London, UK. In 2019 he received the Fulbright teaching and research award and is currently visiting the University of Connecticut. He has headed numerous international research projects and collaborated with international insurance companies (ING, AEGON, GENERALI) and Morgan Stanley. He is an elected member of the ISI, Bernoulli Society, INTECOL, ENBIS, ASMDA