Université catholique de Louvain
Institut de statistique

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Time-varying copulas: a survey

Olga Reznikova, Hans Manner*

Abstract. The aim of this paper is to bring together different specifications for copula models with time-varying dependence structure. Copula models are widely used now in financial econometrics and risk management. They are considered to be a competitive alternative to the Gaussian dependence structure. The dynamic structure of the dependence between the data can be modeled by allowing either the copula functions or the dependence parameter to be time-varying. First, we give here a brief description of eight different models, among which there are fully parametric, stochastic, semiparametric and adaptive methods. The purpose of this study is to compare the applicability of each particular model in different cases. Thus, we conduct a simulation study to show the performance of model selection and goodness-of-fit measures in terms of size and power for different set-ups and the ability of the models to estimate the (latent) timevarying dependence parameter. Finally, we provide an illustration example by applying the competing models on the same financial dataset and compare their performance by means of Value-at-Risk.

Keywords. Dynamic copula, Goodness-of-Fit test, Time-varying parameter

How to Reinforce the Stated Preference Methods Using the Potential of Computer Based Questionnaires?

Cedric Taverne

Abstract. Everyday life is punctuated by choices. At home, at work, at lunch, we are choosing. Everyday, everywhere. Some of these choices are conscious and could require a lot of energy to be made. But fortunately most of them are guided by routines, habits, norms, preferences, etc. Sometimes you might even forget that you are making a choice. It is probably the case for the transport mode you use to come to the Institute, the route you choose, the stops you make, and so on. Now, what if something change ? A new route, a new public transport line, a new gas station... Since when or from what would you reconsider the choice you have made maybe for years now? The stated preference methods are a set of embedded statistical tools used to build questionnaires in order to answer that kind of questions. The conjoint analysis (synonymous) is especially useful if things change into something that do not exist yet. Designed scenarios are submitted to the respondents who are asked to make a choice between described options. In marketing, environmental valuation or transportation studies, the stated preference methods have been regularly adapted by users. These adaptations often respond to sociological or psychological critics and attempt to let the scenarios be more faithful to the reality of

choice. Have these adaptations some beneficial effects on the statistical estimations based on conjoint analysis? Is there others suggestions we could make to reinforce the stated preference methods? These are the two key questions of my PhD project. In order to stay focused I am going to concentrate my attention on the potential of dynamic questionnaires which are generally computer based. At the Young Researchers Day I will review my PhD project and some key points of the state of the art.

Statistical challenges in the art market

Fabian Bocart

Abstract. Art as an investment is a topic frequently debated in the literature. Baumol (1986) initially argued that investing in art is a floating crap game. Many authors challenged this statement, such as Buelens and Ginsburgh(1993), Goetzmann(1993), Pesando(1996), Mei and Moses(2002), Hodgson and Vorkink(2004) or Zanola, Scorcu and Collins (2009). To investigate the problem, these authors studied as many submarkets as they developed or improved statistical methodologies. Indeed, as the art market is made of heterogeneous goods, computing returns and indices is not as straightforward as for other commodities. In this context, the markets volatility is rarely measured. In this presentation, we illustrate some differences between measuring volatility in the financial markets and estimating it in the art market. We will explain why financial markets are much more developed in terms of volumes than the art market, and how facing some statistical challenges could unlock new developments in the markets for heterogeneous goods.

Topics on semi-Markov processes and their applications

Julien Hunt

Abstract. While homogeneous Markov processes are well known and enjoy widespread applications, non-homogeneous Markov processes remain less well known. The situation is even worse when it comes to semi-Markov processes. Indeed, many articles often claim some confusing results about semi-Markov processes and their link with Markov processes both homogeneous and non-homogeneous. The most common mistake comes from the duration distribution in each state. A fruitful discussion with one of my supervisors brought my attention to this and motivated the ideas and approach presented here.

Most of the results in this presentation are not original as such. But the approach followed sheds light on many aspects of Markov processes and what differentiates homogeneous Markov, non-homogeneous Markov and semi-Markov processes. The idea is to present these processes as marked point processes. We then discuss all these processes following this approach and explain their specificities. Finally, we discuss why in certain topics (especially interest-rates models) semi-Markov processes seem more adapted to model the "real world".

Tree-Structured Wavelets in Nonparametric Regression

Jean-Marc Freyermuth, Rainer von Sachs*

Abstract. Wavelet thresholding provides a powerful tool for nonparametric function estimation. There exists several thresholding methods but the leading ones are those which incorporate the information from neighbor wavelet coefficients. Among them, we consider the class of tree-structured wavelet estimators (see, e.g., Baraniuk, 1999) and particularly the construction of Engel (1999). We emphasize the ability of the recent theory of maxisets (Kerkyacharian et Picard, 2002) to assess their powerful optimality properties (Autin, 2008).

Extreme-Value Copulas

Gordon Gudendorf, Johan Segers*

Abstract. Being the limits of copulas of componentwise maxima in independent random samples, extreme-value copulas can be considered to provide appropriate models for the dependence structure between rare events. Extreme-value copulas not only arise naturally in the domain of extreme-value theory, they can also be a convenient choice to model general positive dependence structures. The aim of this survey is to present the reader with the state-of-the-art in dependence modeling via extreme-value copulas. Both probabilistic and statistical issues are reviewed, in a nonparametric as well as a parametric context.