

INSTITUTE OF STATISTICS, BIOSTATISTICS AND ACTUARIAL SCIENCES

**ANNUAL REPORT
JANUARY 2009 – AUGUST 2010**

IMMAQ

Université catholique de Louvain

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1. FOREWORD

The Institute of Statistics, Biostatistics and Actuarial Sciences (ISBA) of the Université catholique de Louvain (UCL) is a research centre of high international reputation. It has been created in September 2009 by merging the Institute of Statistics (founded in 1992) and the Institute of Actuarial Sciences (existing since 1939) at UCL and, as such, it promotes, stimulates and coordinates numerous activities related to the three fields it represents at UCL. As a research institute ISBA collaborates with the teaching unit LSBA (Louvain School of Statistics, Biostatistics and Actuarial Sciences) and the technological platform SMCS (Statistical Methodology and Computing Support). A detailed account of all the activities of these partner units can be found in their specific annual reports.

Together with the CORE (Centre for Operations Research and Econometrics) and the IRES (Institut des recherches économiques et sociales), the ISBA forms the IMMAQ (Institute of Multidisciplinary Research for Quantitative Modelling and Analysis), where researchers develop and use in their various fields of expertise a coherent set of tools and methods for quantitative modelling and analysis.

Since its founding in the early 1990s, the UCL Institute of Statistics has undoubtedly become the largest and most comprehensive statistics group within a single department in Belgium, and one of the largest in the EU. The Institute has as its purpose (i) to provide excellent education in probability and statistics (now transferred to its teaching unit LSBA), (ii) to extend the frontiers of knowledge in probability and statistics through pure and applied research, (iii) to collaborate with researchers in other disciplines to investigate important scientific issues, and (iv) to serve the UCL community in all areas related to probability and statistics (in collaboration with the SMCS).

At present, the ISBA counts about 15 professors, 10 of whom are full-time, and about 30 researchers (PhD students, postdocs and scientific collaborators), who can count on the support of a team of administrative staff and computing support, as well as the staff of the SMCS. Several part-time and invited professors broaden the scope of expertise of the Institute in specific topics, such as data mining or Bayesian statistics. The Institute also accommodates a range of post-doc researchers and short-term as well as long-term foreign visiting scholars.

Members of the Institute have a wide variety of research interests, ranging from theoretical to applied topics and over a broad spectrum of methodological topics. The main research areas at the Institute develop along the three following main directions: (i) mathematical statistics (semi- and non-parametric statistics, Bayesian statistics, multivariate analysis, regression, mixture models, survival analysis, extreme value statistics, inverse problems, time series analysis, econometrics ...), (ii) biostatistics, and (iii) quantitative analysis of insurance and finance risks. The different research directions represented by the members of the ISBA can be found at the beginning of Section 3 of this report.

These three research axes are however not pursued one independently from another. On the one hand, research at the ISBA is based on a common methodological foundation, and the fields of application benefit from each other. On the other hand, members of the Institute actively collaborate with scientists from other disciplines on important research investigations. Within the IMMAQ, the ISBA continues to develop its interdisciplinary research stronger than ever before: the Institute has initiated research projects with other UCL units such as econometrics, finance, demography, psychometrics, epidemiology, sample surveys, technometrics, spatial statistics, bioinformatics and machine learning. Moreover, the ISBA maintains a transfer of expertise outside the academic world via several collaborations with the pharmaceutical, financial, insurance or public sector.

Research activity continued to flourish in 2009/10. During that period, members of the Institute published 81 papers in refereed journals. Research to appear soon, or under evaluation, was reported in 80 discussion papers.

ISBA is the coordinator of an IAP research network in statistics (Interuniversity Attraction Pole, Phase VI 2007-2011) on the theme "Statistical Analysis of Association and Dependence in Complex Data". The network involves nine research teams, of which five are Belgian and four are European, non-Belgian partners. The current network is a continuation of the network "Statistical techniques and modelling for complex substantive questions with complex data", financed from 2002 till 2006 by the Belgian Science Policy. In addition to the IAP, several research projects are funded by public and private bodies.

Members of the Institute serve on the editorial boards of several prestigious journals. These editorial activities for international journals provided within the ISBA is a clear mark of international recognition.

There are three regular seminar series held at the Institute. At the Statistics Seminars, invited speakers present their research results. A diversity of subjects is presented at this seminar by foreign visitors of the Institute. From time to time, a joint statistics and econometrics seminar, organised in collaboration with CORE, takes place. The "Atelier de statistique appliquée/Applied Statistics Workshop" is organised by the Institute on a regular basis. It focuses on problem driven statistics, where a real world problem of substantial practical interest is treated. At the "Young Researchers Day - YRD" organized twice a year, PhD students in statistics present their recent research work. These doctoral seminars constitute an extra stimulant for PhD students and other young researchers.

The Graduate School in Statistics and Actuarial Sciences has been created in 2006, under the patronage of the "Fonds National de la Recherche Scientifique (FNRS)". It is associated to the Graduate Colleges in Science and in Agronomy/Bioengineering, but has also links to those in Medicine, Economic Sciences, and Engineering, as Statistics and Actuarial Sciences are related to many other disciplines. The Graduate School gathers students from various French-speaking Belgian universities. It offers various activities, such as short courses, workshops and an annual colloquium, some of which held at UCL under the auspices of the Institute, others in partner universities.

In May 2009, the ISBA organised a well-attended international research workshop on the topic "Exploring research frontiers in contemporary statistics and econometrics", in honour of Léopold Simar who became professor emeritus in September 2009 (more details on this scientific event are given in Section 7 of this report). At this occasion, it is a real pleasure to sincerely thank – once again – Léopold Simar, founder of the Institute in Statistics in 1992, for all his pioneering work he has done in leading the Institute to where it stands today.

Other national and international meetings have been (co-) organised by several members of the Institute, among which a workshop on "Semi-parametric modelling of multivariate economic time series with changing dynamics" in the mathematical research institute MFO in Germany in January 2010 (see again Section 7 for more details).

We would like to thank the members of the Institute for developing a friendly, open and stimulating research environment. In the future, we hope to further increase the strengths of the Institute as a research centre of international reputation.

Louvain-la-Neuve, August 2010

INGRID VAN KEILEGOM

Research Director of the Institute of Statistics, Biostatistics and Actuarial Sciences

RAINER VON SACHS

Chairman of the Institute of Statistics, Biostatistics and Actuarial Sciences

2. **PERSONNEL**

PERMANENT ACADEMIC MEMBERS



MICHEL DENUIT

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Université Libre de Bruxelles, 1997.

Stochastic inequalities; mathematical risk theory; statistics applied to insurance.

Chairman of the Institute of Statistics (2006-2009).
Responsible for the Master Program in Actuarial Science.

► www.uclouvain.be/michel.denuit



DOMINIQUE DEPRINS

Part-time professor, Université catholique de Louvain (IMMAQ/ISBA) ; full-time professor, Facultés Universitaires Saint-Louis, Bruxelles.

Ph. D. Université catholique de Louvain, 1989.

Epistemological work about statistics and probabilities: application in the field of mental health and, more generally, in the field of human sciences.

Academic secretary of Facultés Universitaires Saint-Louis (1999-2005); Pedagogic adviser (since 2004); President of the Committee responsible for internal organization of education in mathematics, statistics, sciences and computer sciences (since 2000) at Facultés Universitaires Saint-Louis; Member of the College of the O.P.P (Observatoire du Principe de Précaution), Paris. (www.o-p-p.fr); Member of the Committee of Orientation of the Institut Diderot, Paris. (www.institutdiderot.fr).

► www.uclouvain.be/dominique.deprins



PIERRE DEVOLDER

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Université Libre de Bruxelles, 1986.

Pension theory; asset and liability management; stochastic finance; solvency and risk measures

President of the Jury for the Master in Actuarial Sciences.

Member of the board of AFIR (International Actuarial Association, section Financial Risks);

Chairman of the board of the spinoff REACFIN.

► www.uclouvain.be/pierre.devolder



ANOUAR EL GHOUC

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Université catholique de Louvain, 2007.

Nonparametric statistical inference for dependent censored data.

Coordinator of the Erasmus program and secretary of the jury of the Master in Statistics programs.

Academic responsible of the CORE/STAT library.

Member of the Belgian Statistical Society; In charge of Prix Quetelet.

► www.uclouvain.be/anouar.elghouch



BERNADETTE GOVAERTS

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Université catholique de Louvain, 1987.

Industrial statistics; chemometrics; experimental design; statistical quality control; pre-clinical biostatistics; development, validation and monitoring of laboratory analytical methods; statistical consulting.

President of the executive committee of the Statistical Methodology and Computing Support service; President of the CORE-ISBA computing commission; Academic secretary of LSBA

► www.uclouvain.be/bernadette.govaerts



CHRISTIAN HAFNER

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph.D. Humboldt-Universität Berlin, Germany, 1996.

Non and semiparametric statistics; time series; volatility models; financial econometrics.

Coordinator for the Statistics Minor program; Pedagogic adviser for the Master program in statistics; President of the jury at the Master in Statistics programs; President of the LSBA.

► www.uclouvain.be/christian.hafner



JAN JOHANNES

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Humboldt-Universität Berlin, Germany, 2002.

Statistical ill-posed inverse problems; spatio-temporal models; nonparametric and semiparametric inference; adaptive estimation; nonparametric Bayesian inference.

Co-coordinator of the IAP research network in statistics.

► www.uclouvain.be/jan.johannes



CATHERINE LEGRAND

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Universiteit Hasselt, 2006.

Biostatistics; design and analysis of clinical trials; survival data and frailty models; competing risks; repeated events.

Responsible for the certificate of Statistics and for the master program in Statistics and Biostatistics.

Board member of the Belgian Statistical Society (since 2008); In charge of Prix Quetelet.

► www.uclouvain.be/catherine.legrand



MICHEL MOUCHART

Professor emeritus, Université catholique de Louvain (IMMAQ/ISBA).

Ph. D. Université catholique de Louvain, 1973.

Causality; structural modelling; econometrics of duration data and of panel data.

Elected member of the International Statistical Institute.

► www.uclouvain.be/michel.mouchart



CHRISTIAN RITTER

Part-time Professor, Université catholique de Louvain (IMMAQ/ISBA).

Ph. D. University of Wisconsin, Madison, USA, 1992.

Industrial statistics, statistical consulting, statistics in spreadsheets.

Creation of Ritter and Danielson Consulting sprl (2007) to provide R&D assistance.

► www.uclouvain.be/christian.ritter



JEAN-MARIE ROLIN

Professor emeritus, Université catholique de Louvain (IMMAQ/ISBA).

Probability theory and stochastic processes; mathematical statistics; nonparametric Bayesian statistics; Bayesian survival analysis; Bayesian analysis of counting processes.

Member of the Bernoulli Society and of the Belgian Statistical Society.

► www.uclouvain.be/jean-marie.rolin



JOHAN SEGERS

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Katholieke Universiteit Leuven, 2001.

Extreme value theory; dependence modelling via copulas; empirical processes; time series; curve estimation under shape constraints.

Coordinator of the seminar series and the doctoral program at the Institute of Statistics, Biostatistics and Actuarial Sciences. Copromotor of the ARC project "Econometric modelling of multivariate financial time series" (2007-2012).

Extramural fellow of CentER, Tilburg University, The Netherlands (2006-2011); Secretary of the Section Mathematical Statistics of the Netherlands Society for Statistics and Operations Research (2005-2008); Treasurer of the Graduate School in Statistics and Actuarial Sciences (FNRS); Member of the Bernoulli Society, the Institute of Mathematical Statistics and the Belgian Statistical Society.

► www.uclouvain.be/johan.segers



LÉOPOLD SIMAR

Professor emeritus, Université catholique de Louvain (IMMAQ/ISBA).

Part-time professor (1974-2008), Facultés Universitaires Saint-Louis, Bruxelles.

Ph. D. Université catholique de Louvain, 1974 (Docteur en Sciences Appliquées).

Frontier estimation, resampling methods, multivariate statistical techniques.

Founder President 1992-2004 of the Institute of Statistics, UCL
Member of the European Network of Excellence Prime (2004-2009); Associate partner of the Scuola Superiore Santa Anna, Pisa, Italy (project AQUAMETH); Dean, Faculté des Sciences Economiques, Sociales et Politiques, FUSL (1978 -1990); President of the Belgian Statistical Society (1999-2002). "Professore di Chiara Fama" 2006 and 2007, (Italian Ministry of Research, Scuola Superiore Santa Anna, Pisa & University of Pisa) and "Chaire d'Excellence Pierre de Fermat", 2008 and 2009, Région Midi-Pyrénées: Université des Sciences Sociales, Toulouse; Honorary Member 2009, Belgian Statistical Society.

► www.uclouvain.be/leopold.simar



INGRID VAN KEILEGOM

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Limburgs Universitair Centrum, 1998.

Non- and semiparametric regression; survival analysis; bootstrap methods; mathematical statistics; empirical likelihood methods; goodness-of-fit problems.

Research Director of the Institute of Statistics, Biostatistics and Actuarial Sciences; Coordinator of the IAP research network in statistics (2007-2011), and responsible for the computing facilities at the Institute.

Holder of an ERC (European Research Council) grant on "M- and Z-estimation in semiparametric statistics: applications in various fields" (2008-2013). Elected Member of the International Statistical Institute since 2004; Fellow of the Institute of Mathematical Statistics (IMS) since 2008, and member of the Council of the IMS (2010-2013).

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RAINER VON SACHS

Professor, Université catholique de Louvain (IMMAQ/ISBA).
Ph. D. Heidelberg, Germany, 1991.

Mathematical statistics; nonparametric curve estimation; analysis of (nonstationary) time series; spectral density estimation; statistical signal processing; biomedical time series; financial time series; Wavelets and related localization methods.

Chairman of the Institute of Statistics, Biostatistics and Actuarial Sciences; Principal coordinator of the ARC project "Econometric modelling of multivariate financial time series" (2007-2012). Fellow of the Institute of Mathematical Statistics; Elected Member of the International Statistical Institute; Member of the Bernoulli Society, Belgian Statistical Society and DMV (Fachgruppe Stochastik).

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PETER HALL, Australian National University, Canberra, Australia (1997)

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COMPUTING STAFF SGI (SERVICE GÉNÉRAL DU SYSTÈME D'INFORMATION)

LAURENT Buset
JEAN-LUC MARRION
RAPHAËL TURSIS
JEAN-MARIE ZÉLIS

3. RESEARCH ACTIVITIES

3.1. PRESENTATION

The research areas in which the members of the Institute of Statistics are working are diverse. The main areas of expertise are non- and semi-parametric regression techniques, time series analysis, survival analysis, medical and industrial statistics, extreme value analysis and statistics for the actuarial sciences, as well as insurance and financial mathematics.

In the context of non- and semi-parametric regression, the Institute is a leading expert in the area of frontier estimation, and particularly in the application of non- and semi-parametric approaches for this problem in the context of efficiency analysis. A lot of research is also carried out in the context of inverse problems in econometrics, and its applications in instrumental regression and deconvolution problems. The study of semi-parametric regression models (e.g. single index models, partial linear models) and of non-parametric location-scale models, is another area in which the Institute is taking a leading role. A lot of activity is also taking place in the development of up-to-date methodology for denoising statistical signals in one and in higher dimensions. Modern non-linear methods, among others based on wavelets, do not only serve to this end but also for the development of functional data and image analyses and clustering.

The analysis of time series is a second cornerstone of the research activities at the Institute. The focus lies on the modelling and analysis of non-stationary time series,

multivariate (high-dimensional) time series, factor models, volatility models, spectral density estimation and goodness-of-fit methods. Moreover, applications in statistical signal processing, and biomedical, economic and financial time series are studied.

The analysis of data coming from medical or industrial studies is a further research topic to which much attention is paid at the Institute. Medical data are often subject to censoring (survival analysis). The non- and semi-parametric modelling of this type of data is studied in detail, both the asymptotics for these models, as the application to medical data. Moreover, the study of clinical trials gives rise to developing models, both frequentist and bayesian, for biological processes, but this applies also to the context of industrial statistics, e.g. in chemometrics, and in quality control. More specifically, the focus lies on experimental design and multicriteria optimisation with applications in drug discovery, and on the analysis and modelling of time intensity curves in sensometrics.

The quantitative analysis of financial and insurance risks is intended to help economic agents to design efficient strategies for managing these risks. The ISBA research team has developed a widely recognized expertise in that field, especially in stochastic orderings and inequalities, financial econometrics, dependence modeling, in particular by means of copulas, actuarial risk theory, mathematical finance, and extreme value theory: modelling of extremes in univariate and multivariate time series, and in particular in Markov chains.

3.2. RESEARCH CONTRACTS

3.2.1.

Research projects under contracts and cooperation projects

This section discusses ongoing research projects and cooperation projects that are financed by outside agencies in the form of grants and contracts.

► **M- and Z-estimation in semiparametric statistics: applications in various fields (2008-2013)**

FINANCING: European Research Council under the European Community's Seventh Framework Programme, 2008 – 2013

GRANT HOLDER: I. Van Keilegom

RESEARCHERS: M. Birke, L. Delsol, A. Sujica

PROJECT DESCRIPTION: The area of semiparametric statistics is, in comparison to the areas of fully parametric or nonparametric statistics, relatively unexplored and still in full development. Semiparametric models offer a valid alternative for purely parametric ones, that are known to be sensitive to incorrect model specification, and completely nonparametric models, which often suffer from lack of precision and power. A drawback of semiparametric models so far is, however, that the development of mathematical properties under these models is often a lot harder than under the other two types of models. The present project tries to solve this difficulty partially,

by presenting and applying a general method to prove the asymptotic properties of estimators for a wide spectrum of semiparametric models.

The objectives of this project are twofold. On one hand a general theory will be applied by Chen, Linton and Van Keilegom (2003) for a class of semiparametric Z-estimation problems, to a number of novel research ideas, coming from a broad range of areas in statistics. On the other hand it will be shown that some estimation problems are not covered by this theory. A more general class of semiparametric estimators (M-estimators called) will be considered and a general theory for this class of estimators will be developed. This theory will open new horizons for a wide variety of problems in semiparametric statistics.

► **Policies for research and innovation in the move towards the European research area (2004-2009)**

[Member of the European Network of Excellence PRIME]

FINANCING: European Commission

GRANT HOLDER: L. Simar, Associate partner of the Scuola Superiore Santa Anna, Pisa, Italy

PROJECT DESCRIPTION: Using advanced quantitative methods for evaluating the performance of Public Sector Research (AQUAMETH). Analysing in particular the system of the European universities and the availability of national data at the microlevel.

► **Feasibility study for creating a European university data collection, EUMIDA (2009-2010)**

FINANCING: European Commission

QUALITY MANAGER FOR THE EUMIDA PROJECT: L. Simar, associated with the Facoltà di Ingegneria, University of Pisa, Pisa, Italy.

PROJECT DESCRIPTION: The European Commission (DG Research, DG Education and Culture and EUROSTAT) has appointed the EUMIDA Consortium led by University of Pisa to explore the feasibility of building a consistent and transparent European statistical infrastructure at the level of individual higher education institutions. The goal is to provide these institutions and policy makers with relevant information for the benchmarking and monitoring of trends for modernisation in higher education institutions.

The analysis will be carried out both at European (EU-27) and at Country level, including Norway and Switzerland as additional case studies.

► **Statistical analysis of association and dependence in complex data. IAP 6/03 (2007-2011)**

FINANCING: Interuniversity Attraction Pole Programme, Belgian Science Policy, Brussels, Belgium

PROMOTORS: I. Van Keilegom

RESEARCHERS: H. Böhm, R. Crujeiras, J. Jaeger, D. Koch, S. Laurent, S. Liu, R. Schenk and A. Sujica

PARTNER INSTITUTIONS:

Katholieke Universiteit Leuven, Belgium

Universiteit Hasselt, Belgium

Universiteit Gent, Belgium

EUROPEAN PARTNERS:

Université Joseph Fourier, Grenoble, France
Universiteit Utrecht, The Netherlands
Universidad de Santiago de Compostela, Spain
London School of Hygiene and Tropical Medicine, United Kingdom

PROJECT DESCRIPTION: One key aim of statistics is to analyse in an appropriate way the dependence and association present in a dataset. The data that are collected nowadays to analyse these dependence structures, are often of a complex nature and also the research questions are of an ever increasing complexity. This requires the construction of new models, or the adaptation of existing models, which is a challenging task. The development of new methods and intensive interaction between experts will also be required to cope with these complex data. The global objective of the network is to develop new models and methodological tools to do inference and to analyse these complex data structures.

WEBSITE: <http://www.stat.ucl.ac.be/IAP/PhaseVI/index.html>

► **Modern risk management models for insurance companies and pension funds (2004-2009)**

FINANCING: Action de Recherche Concertée (ARC), Communauté française de Belgique

PROMOTORS: M. Denuit, P. Devolder, J-M. Rolin and Y. Smeers

RESEARCHERS: J-P. Boucher, C. Courtois, D. Hainaut, A. Miller, J. Trufin and B-L. Yerna

PROJECT DESCRIPTION: The research activities develop along the following lines:

Generalized life insurance policies,

Multistate modelling with emphasis on trends in the transition rates, to determine appropriate pricing and reserving rules,

Risk theory under partial information and dependence including extremal distributions in moment spaces with additional constraints (like DFR or structured support), discretization of insurance risks, dependence generated by actuarial risk models, and statistical methods for dependent data (e.g. copula construction, dependence concepts, test for positive dependence).

Unification of actuarial and financial pricing techniques, combination of financial techniques in incomplete market with insurance theory, and hedging insurance risks.

► **Econometric modelling of multivariate financial time series (2007-2012)**

FINANCING: Action de Recherche Concertée (ARC), Communauté française de Belgique

PROMOTORS: L. Bauwens, C. Hafner, J. Segers, R. von Sachs (main promotor)

RESEARCHERS FINANCED BY THIS CONTRACT: A. Dufays, J-M Freyermuth, G. Gudendorf, O. Reznikova

ASSOCIATE RESEARCHERS: J. Hunt, J. Lahaye, T. Meinguet, D. Pierret, B. Samkharadze, F. Violante

PROJECT DESCRIPTION: This interdisciplinary research project deals with modelling, estimation and prediction of the dynamics and the temporal dependence in the mean and the variance-covariance structure of multivariate time series data arising in economical and financial applications. Particular emphasis is put on questions such as dimension reduction (factor approach, modelling of co-movements), non-stationary

behaviour over time, modelling of structural breaks (regime-switching), volatilities with and without jump behaviour, etc.

These questions are addressed by a number of econometricians and statisticians using and comparing a series of modern approaches in parametric, semi-parametric and non-parametric statistics. Applications to real data shall allow to access the quality of the proposed models and estimation procedures.

► **Adaptative regularization in nonparametric instrumental regression (2007-2009)**

FINANCING: Fonds Spéciaux de Recherche (FSR)

GRANT HOLDER: S. Van Belleghem

RESEARCHER: M. Schwarz

PROJECT DESCRIPTION: We focus on the nonparametric estimation of a regression function in endogenous models.

The regression function is identified through a set of instrumental variables. Stability problems occur in the estimation process, leading to an ill-posed inverse problem.

The general objective is to develop adaptive methods of inversion (of regularization), based on the theory of adaptive, nonparametric, local inference.

► **Adaptive nonparametric Bayesian estimation in inverse problems (2010)**

FINANCING: Fonds Spéciaux de Recherche (FSR)

GRANT HOLDER: J. Johannes

RESEARCHER: R. Schenk

PROJECT DESCRIPTION: The objective of the project is the development of adaptive nonparametric Bayesian models for ill-posed inverse problems with noise in the operator.

More precisely, we intend to study lower bounds for a-posteriori concentration rates, to construct prior distributions allowing to attain those and to compare the results with the minimax theory for adaptive estimation in purely frequentist models for ill-posed inverse problems.

► **The Helga and Wolfgang Gaul Stiftung (2008-2009)**

FINANCING: The Helga and Wolfgang Gaul Stiftung, Fakultät für Wirtschaftswissenschaften, Universität Karlsruhe (TH), Germany

GRANT HOLDER: L. Simar

► **Efficiency and productivity of an industry (2009-2011)**

GRANT HOLDER: L. Simar

PARTNER INSTITUTION: GREMAQ, Toulouse School of Economics, Agence Nationale de la Recherche (ANR), France

► **Pension valuation and solvency (2009 - 2012)**

FINANCING: Chaire AG Insurance

GRANT HOLDER: P. Devolder

RESEARCHER: H. Tassa

PROJECT DESCRIPTION: Development of a coherent and universal model of valuation and solvency requirement of pension liabilities for pension funds and insurance companies in a stochastic environment.

► **Health insurance and longevity (2009-2012)**

FINANCING: Chair DKV Belgium

GRANT HOLDER: Pierre Devolder

PROJECT DESCRIPTION: Development of actuarial and financial techniques for the pricing, hedging and reserving of health , disability and long term care insurances ; analysis of the influence of the longevity risk on these products.

INVITED LECTURES AND SHORT COURSES: Professor Ermanno Pitacco, Raimondo Manca

► **Metodología y Aplicaciones en Estadística Semiparamétrica, Funcional y Espacio Temporal (2009-2013)**

FINANCING: Spanish Ministry of Education and Science

ASSOCIATE PARTNER: I. Van Keilegom (main partner: W. González-Manteiga, Universidad de Santiago de Compostela, Spain)

3.2.2.

Applied research contracts

The Institute is developing many collaborations within the Université catholique de Louvain and with several private firms in the field of applied statistics.

► **Implementation of a quality control plan for the monitoring of blood treatment processes for the Belgian Red Cross (2009-2010)**

FINANCING: Belgian Red Cross

GRANT HOLDER: B. Govaerts

The Belgian Red Cross has to develop quality control procedures to monitor its blood treatment processes in order to be in conformity with the Belgian legislation. This project implies the adaptation of statistical quality control techniques like control charts, capability analysis and reception sampling to the particular problem of blood treatment. The project aims at developing the necessary tools and implementing them in an adapted computing tool.

► **Analyzing the results of a designed experiment when the result is a curve (2008-2009)**

FINANCING: SANOFI-AVENTIS, France

GRANT HOLDER: B. Govaerts

The goal of this collaboration project is to compare and implement different functional models to analyze the results of industrial experiments when the response is a curve. Their application to SANOFI problems of interest like chemical kinetic curves is also examined.

► **GlaxoSmithKline Biologicals: IDMC for a Phase III Clinical Trial in Lung Cancer (2009-2013)**

FINANCING: GlaxoSmithKline Biologicals

GRANT HOLDER: C. Legrand

GlaxoSmithKline Biologicals is currently conducting a large phase III clinical trial in lung cancer aiming to investigate the effect of an antigen-specific cancer immunotherapeutic as adjuvant treatment for patients with resectable non-small cell lung cancer. This clinical trial will enroll more than 2000 patients and to ensure the safety of these patients, this trial is regularly monitored by an independent committee of experts (Independent Data Monitoring Committee). The role of this IDMC is to review, at regular time interval, all the data available to ensure that further continuation of the trial is ethical and eventually to make recommendations with regards to the conduct of the trial. This IDMC is composed of 5 experts; 4 medical doctors and 1 statistician. Catherine Legrand (ISBA) acts as independent statistician in this IDMC.

► **SAS Partnership (2008-2012)**

FINANCING: SAS

GRANT HOLDER: C. Legrand

The SAS software is one of the most used statistical software in the world. Since several years, there exist a partenariat between SAS and ISBA through which courses of programming in SAS and data mining techniques are organized. These courses are open to all master students as well as to PhD students and to all researchers of the UCL. Within the context of this partenariat, SAS also support (financially and logistically) the organisation of short courses within ISBA.

4. PUBLICATIONS

4.1. REPRINTS

RP0901 - LEGRAND C., DUCHATEAU L., JANSSEN P., DUCROCQ V. AND R. SYLVESTER

- Validation of prognostic indices using the frailty model
Lifetime Data Analysis, 15, 59-78, 2009

RP0902 - BÖHM, H. AND R. VON SACHS

- Shrinkage estimation in the frequency domain of multivariate time series
Journal of Multivariate Analysis, 100, 913-935, 2009

RP0903 - BASRAK, B. AND J. SEGERS

- Regularly varying multivariate time series
Stochastic processes and their applications, 119, 1055-1080, 2009

RP0904 - CHARPENTIER, A. AND J. SEGERS

- Tails of multivariate Archimedean copulas
Journal of Multivariate Analysis, 100, 1521-1537, 2009

RP0905 - MOUCHART, M., RUSSO, F. AND G. WUNSCH

- Structural modelling, exogeneity, and causality
Causal Analysis in Population Studies. Concepts, Methods, Applications, Engelhardt, H., Kohler, H-P., Fürnkranz-Prskawetz, A. (eds.), 59-82, Springer, 2009

- RP0906 - SAN MARTIN, E. AND M. MOUCHART
- On joint completeness: sampling and Bayesian versions, and their connections
Sankhya, The Indian Journal of Statistics, 69, 4, 780-807, 2009
- RP0907 - VRIAMONT, N., GOVAERTS, B., GRENOUILLET, P., DE BELLEFON, C. AND O. RIANI
- Design of a genetic algorithm for the simulated evolution of a library of asymmetric transfer hydrogenation catalysts
Chemistry - A European Journal, 15, 6267-6278, 2009
- RP0908 - GENEST, C. AND J. SEGERS
- Rank-based inference for bivariate extreme-value copulas
The Annals of Statistics, 37, 5B, 2990-3022, 2009
- RP0909 - EINMAHL, J.H.J. AND J. SEGERS
- Maximum empirical likelihood estimation of the spectral measure of an extreme-value distribution
The Annals of Statistics, 37, 5B, 2953-2989, 2009
- RP0910 - NEUMEYER, N. AND I. VAN KEILEGOM
- Change-point tests for the error distribution in non-parametric regression
Scandinavian Journal of Statistics, 36, 518-541, 2009
- RP0911 - HJORT, N.L., MCKEAGUE, I.W. AND I. VAN KEILEGOM
- Extending the scope of empirical likelihood
The Annals of Statistics, 37, 3, 1079-1111, 2009
- RP0912 - OJEDA CABRERA, J. L. AND I. VAN KEILEGOM
- Goodness-of-fit tests for parametric regression with selection biased data
Journal of Statistical Planning and Inference, 139, 2836-2850, 2009
- RP0913 - MOLANES LOPEZ, E. M., VAN KEILEGOM, I. AND N. VEREVERBEKE
- Empirical likelihood for non-smooth criterion functions
Scandinavian Journal of Statistics, 36, 413-432, 2009
- RP0914 - HALL, P. AND I. VAN KEILEGOM
- Nonparametric "regression" when errors are positioned at end-points
Bernoulli, 15, 3, 614-633, 2009
- RP0915 - ROBERT C.Y., SEGERS J. AND C.A.T. FERRO
- A sliding blocks estimator for the extremal index
Electronic Journal of Statistics, 3, 993-1020, 2009
- RP0916 - DETTE H., PARDO-FERNANDEZ J.C. AND I. VAN KEILEGOM
- Goodness-of-fit tests for multiplicative models with dependent data
Scandinavian Journal of Statistics, 36, 782-799, 2009

- RP0917 - EL GHOUGH, A. AND I. VAN KEILEGOM
- Local linear quantile regression with dependent censored data
Statistica Sinica, 19, 1621-1640, 2009
- RP0918 - CHEN, S.X. AND I. VAN KEILEGOM
- A review on empirical likelihood methods for regression
Test, 18, 415-447, 2009
- RP0919 - CHEN, S.X. AND I. VAN KEILEGOM
- Rejoinder on: A review on empirical likelihood methods for regression
Test, 18, 468-474, 2009
- RP0920 - BEIRLANT, J., JOOSSENS, E. AND J. SEGERS
- Second-order refined peaks-over-threshold modelling for heavy-tailed distributions
Journal of Statistical Planning and Inference, 139, 2800-2815, 2009
- RP0921 - CHEN, S.X. AND I. VAN KEILEGOM
- A goodness-of-fit test for parametric and semi-parametric models in multiresponse regression
Bernoulli, 15, 4, 955-976, 2009
- RP0922 - LAMBERT, PH. AND P.H.C. EILERS
- Bayesian density estimation from grouped continuous data
Computational Statistics and Data Analysis, 53, 1388-1399, 2009
- RP0923 - JULLION, A., LAMBERT, PH., BECK, B. AND F. VANDENHENDE
- Pharmacokinetic parameters estimation using adaptive Bayesian P-splines models
Pharmaceutical Statistics, 8, 98-112, 2009
- RP0924 - HAFNER, C.M. AND A. PREMINGER
- Asymptotic theory for a factor GARCH model
Econometric Theory, 25, 336-363, 2009
- RP0925 - HAFNER, C. AND A. PREMINGER
- On asymptotic theory of multivariate GARCH models
Journal of Multivariate Analysis, 100, 2044-2054, 2009
- RP0926 - DEBRUS, B., LEBRUN, P., CECCATO, A., GOVAERTS, B., OLSEN, B., ROZET, E., BOULANGER, B. AND P. HUBERT
- A new statistical method for the automated detection of peaks in UV-DAD chromatograms of a sample mixture
Talanta, 79, 77-85, 2009
- RP0927 - BODIN, N., GOVAERTS, B., ABBOUDI, T., DETAVERNIER, C., DE SAEGE, S., LARONDELLE, Y. AND X. ROLLIN
- Diet protein level affects the lysine requirement and retention efficiency at marginal lysine intakes in rainbow trout (*Oncorhynchus mykiss*) fry
British Journal of Nutrition, 102, 37-53, 2009

- RP0928 - BADIN, L. AND L. SIMAR
- A bias corrected nonparametric envelopment estimator of frontiers
Econometric Theory, 25, 5, 1289-1318, 2009
- RP0929 - BRAEKERS, R. AND I. VAN KEILEGOM
- Flexible modeling based on copulas in nonparametric regression
Journal of Multivariate Analysis, 6, 1270-1281, 2009
- RP0930 - FRANCAERT, J., VAES, E., HENRARD, S., LEGRAND, C., BAAS, P., GAAFER, R., VAN MEERBEECK, J.P., SYLVESTER, R. AND A. ROBERT
- A prognostic index for the progression free survival in malignant mesothelioma with application to the design of phase II trial: analysis of 10 combined EORTC trials
European Journal of Cancer, 45, 2304-2311, 2009
- RP0931 - LEGRAND C. AND F. EFFICACE
- Editorial: Implementing patient-reported health-related quality of life data in cancer routine practice to improve accuracy of prognosis. Are we there yet?
Expert review of Pharmacoeconomics and Outcome Research, 9(6), 493-496, 2009
- RP0932 - HAFNER, C. AND H. HERWARTZ
- Testing for linear vector autoregressive dynamics under multivariate generalized autoregressive heteroskedasticity
Statistica Neerlandica, 63, 294-323, 2009
- RP0933 - HAFNER, C. AND P.H. FRANCES
- A generalized dynamic conditional correlation model: Simulation and application to many assets
Econometric Reviews, 28, 612-631, 2009
- RP0934 - HAFNER, C.
- Causality and forecasting of temporally aggregated multivariate GARCH models
The Econometrics Journal, 12, 127-146, 2009
- RP1001 - VAN KEILEGOM, I. AND L. WANG
- Semiparametric modeling and estimation of heteroscedasticity in regression analysis of cross-sectional data
Electronic Journal of Statistics, 4, 133-160, 2010
- RP1002 - LAURENT, S.
- Further comments on the representation problem for stationary processes
Statistics and Probability Letters, 80, 592-596, 2010
- RP1003 - BADIN, M., DARAIO, C. AND L. SIMAR
- Optimal bandwidth selection for conditional efficiency measures: a data-driven approach.
European Journal of Operational Research, 201, 633-640, 2010

- RP1004 - JEONG, S.O. , B. U. PARK AND L. SIMAR
➤ Nonparametric conditional efficiency measures: asymptotic properties
Annals of Operations Research, 173, 105-122, 2010
- RP1005 - SIMAR, L. AND P.W. WILSON
➤ Inference from cross-sectional stochastic frontier models
Econometric Review, 29, 1, 62-98, 2010
- RP1006 - NEUMEYER, N. AND I. VAN KEILEGOM
➤ Estimating the error distribution in nonparametric multiple regression with applications to model testing
Journal of Multivariate Analysis, 101, 1067-1078, 2010
- RP1007 - CRUJEIRAS, R. AND I. VAN KEILEGOM
➤ Least squares estimation of nonlinear spatial trends
Computational Statistics and Data Analysis, 54, 452-465, 2010
- RP1008 - SIMAR, L. AND V. ZELENYUK
➤ Stochastic FDH/DEA estimators for frontier analysis.
Journal of Productivity Analysis, in press, 2010
- RP1009 - MOTTA, G., HAFNER, C. AND R. VON SACHS
➤ Locally stationary factor models: identification and nonparametric estimation
Econometric Theory, to appear, 2010
- RP1010 - DENUIT, M., EECKHOUDT, L. AND B. REY
➤ Some consequences of correlation aversion in decision science
Annals of Operations Research, 176, 259-269, 2010
- RP1011 - DEGEN, M., LAMBRIGGER, D. AND J. SEGERS
➤ Risk concentration and diversification: Second-order properties
Insurance: Mathematics and Economics, 46, 541-546, 2010
- RP1012 - DASKOVSKA, A., SIMAR, L. AND S. VAN BELLEGEM
➤ Forecasting the Malmquist productivity index
Journal of Productivity Analysis, 33, 97-107, 2010
- RP1013 - SCHWARZ, M. AND S. VAN BELLEGEM
➤ Consistent density deconvolution under partially known error distribution
Statistics and Probability Letters, 80, 236-241, 2010
- RP1014 - TEODORESCU, B., CAO, R. AND I. VAN KEILEGOM
➤ Generalized time-dependent conditional linear models under left truncation and right censoring
The Annals of the Institute of Statistical Mathematics, 62, 465-485, 2010

- RP1015 - HEUCHENNE, C. AND I. VAN KEILEGOM
- Estimation in nonparametric location-scale regression models with censored data
The Annals of the Institute of Statistical Mathematics, 62, 439-463, 2010
- RP1016 - WUNSCH, G., RUSSO, F. AND M. MOUCHART
- Do we necessarily need longitudinal data to infer causal relations?
BMS: Bulletin of Sociological Methodology, 106, 5-18, 2010
- RP1017 - GENEST, C. AND J. SEGERS
- On the covariance of the asymptotic empirical copula process
Journal of Multivariate Analysis, 101, 1837-1845, 2010
- RP1018 - FERRATY, F., VAN KEILEGOM, I. AND P. VIEU
- On the validity of the bootstrap in non-parametric functional regression.
Scandinavian Journal of Statistics, 37, 286-306, 2010
- RP1019 - TEODORESCU, B. AND I. VAN KEILEGOM
- Goodness-of-fit test in generalized conditional linear models under left truncation and right censoring.
Journal of Nonparametric Statistics, 22, 547-566, 2010
- RP 1020 - FREYERMUTH, J-M., OMBAO, H. AND R. VON SACHS
- Tree-Structured Wavelet Estimation in a Mixed Effects Model for Spectra of Replicated Time Series.
Journal of the American Statistical Association, 105, 490, 634-646, 2010
- RP 1021 - CAMARGO, C.A., GURNER, D., SMITHLINE, H., CHAPELA, R., FABBRI, L., GREEN, S., MALICE, M.-P., LEGRAND, C., DASS, S.B., KNORR, B. AND T. REISS
- A randomized placebo-controlled study of intravenous montelukast for the treatment of acute asthma
Journal of Allergy and Clinical Immunology, 125(2), 374-380, 2010
- RP 1022 - FORGET, P., VANDENHENDE, J., BERLIERE, M., MACHIELS, J.P., NUSSBAUM, B., LEGRAND, C. AND M. DE KOCK
- Do intraoperative analgesics influence breast cancer recurrence after mastectomy? A retrospective analysis
Anesthesia and Analgesia, 110(6), 1630-1635, 2010
- RP 1023 - HOLLEVOET, K., NACKAERTS, K., THIMPONT, J., GERMONPRÉ, P., BOSQUÉE, L., DE VUYST, P., LEGRAND, C., KELLEN, E., KISHI, Y., DELANGHE, J.R. AND J.P. VAN MEERBEECK
- Diagnostic performance of soluble mesothelin and megakaryocyte potentiating factor in mesothelioma
American Journal of Respiratory and Critical Care Medicine, 181, 620-625, 2010

- RP 1024 - SURMONT, V., AERTS, J.G.J.V., VAN KLAVEREN, R.J., TOURNOY, K., TAN, K.Y., VERNHOUT, R.M., SCHMITZ, P.I.M., LEGRAND, C., HOOGESTEDEN, H.C., AND J.P. VAN MEERBEECK
- A randomized phase II study comparing two schedules of the 21-day regimen of Gemcitabine and carboplatin in advanced Non-Small Cell Lung Cancer
Oncology, 78, 267-270, 2010
- RP 1025 - PARK, B., JEONG, S.-O. AND L. SIMAR
- Asymptotic distribution of conical-hull estimators of directional edges
Annals of Statistics, 38 (6), 1320-1340, 2010
- RP 1026 - DENUIT, M. AND L. EECKHOUDT
- A general index of absolute risk attitude
Management Science, 56, 712-715, 2010
- RP 1027 - DENUIT, M., EECKHOUDT, L. AND B. REY
- Some consequences of correlation aversion in decision science
Annals of Operations Research, 176, 259-269, 2010
- RP 1028 - DENUIT, M., HABERMAN, S. AND A. RENSHAW
- Comonotonic approximations to quantiles of life annuity conditional expected present values: extensions to general ARIMA models and comparison with the bootstrap
ASTIN Bulletin, 40, 331-349, 2010
- RP 1029 - DENUIT, M. AND M. MESFIOUI
- Generalized increasing convex and directionally convex orders
Journal of Applied Probability, 47, 264-276, 2010
- RP 1030 - DEPRINS, D.,
- «Probabilité et Incertitude». Responsabilité et environnement: recherches, débats, actions. Faire face à l'incertitude
Annales des Mines (Ecole des Mines de Paris), Editions Eska, 57, 22-31, 2010
- RP 1031 - DEVOLDER, P.
- Perspectives pour nos régimes de pension légale
Revue Belge de Sécurité Sociale, 1, 2010
- RP 1032 - HAFNER, C. AND A. PREMINGER
- Deciding between GARCH and stochastic volatility via strong decision rules
Journal of Statistical Planning and Inference, 140, 790-805, 2010
- RP 1033 - HAFNER, C. AND O. REZNIKOVA
- Efficient estimation of a semiparametric dynamic copula model
Computational Statistics and Data Analysis, 54, 2609-2627, 2010
- RP 1034 - CARDOT, H. AND J. JOHANNES
- Thresholding projection estimators in functional linear models
Journal of Multivariate Analysis, 101(2), 395-408, 2010

RP 1035 - COMTE, F. AND J. JOHANNES

- Adaptive estimation in circular functional linear models
Mathematical Methods of Statistics, 19, 42-63, 2010

RP1036 - BÖHM, H., OMBAO, H., VON SACHS, R. AND J. SANES

- Classification of multivariate non-stationary signals: the SLEX-shrinkage approach
Journal of Statistical Planning and Inference, 140, 3754-3763, 2010

Reprints published by the Institut des sciences actuarielles in 2009 before merging the Institute of Statistics and the Institute of Actuarial Sciences

BARBARIN, J., DE LAUNOIS, C. AND P. DEVOLDER

- Risk Minimization with inflation and interest rate risk: applications in non life insurance
Scandinavian Actuarial Journal, 2, 119-151, 2009

BOUCHER, J.-PH., DENUIT, M. AND M. GUILLEN

- Number of accidents or number of claims? An approach with zero-inflated Poisson models for panel data
Journal of Risk and Insurance, 76, 821-846, 2009

COURTOIS, C. AND M. DENUIT

- Moment bounds on discrete expected stop-loss transforms, with applications
Methodology and Computing in Applied Probability, 11, 307-338, 2009

DENUIT, M.

- Life annuities with stochastic survival probabilities: A review
Methodology and Computing in Applied probability, 11, 463-489, 2009

DENUIT, M.

- An index for longevity risk transfer
Journal of Computational and Applied Mathematics, 230, 411-417, 2009

DENUIT, M. AND E. FROSTIG

- Life insurance mathematics with random life tables
North American Actuarial Journal, 13, 339-355, 2009

DEVOLDER, P. AND F. DOMINGUEZ

- Equity Risk and Liability Duration: a Solvency point of view Proceedings,
Riesgo, Madrid, 2009

DHAENE, J., DENUIT, M. AND S. VANDUFFEL

- Correlation order, merging and diversification
Insurance: Mathematics and Economics, 45, 325-332, 2009

FROSTIG, E. AND M. DENUIT

- Ruin probabilities and optimal capital allocation for heterogeneous life annuity portfolios
Scandinavian Actuarial Journal, 295-305, 2009

FROSTIG, E. AND M. DENUIT

- Dependence in failure times due to environmental factors
Statistics and Probability Letters, 79, 487 - 495, 2009

LAZAR, D. AND M. DENUIT

- A multivariate time series approach to projected life tables
Applied Stochastic Models in Business and Industry, 25, 806-823, 2009

4.2.

DISCUSSION PAPERS

The abstracts of these discussion papers can be found in the Appendix.

0901 – OMEY, E. AND J. SEGERS

- Generalised regular variation of arbitrary order

0902 – FREYERMUTH, J.-M., OMBAO, H., AND R. VON SACHS

- Tree-structured wavelet estimation in a mixed effects model for spectra of replicated time series

0903 – KNEIP, A., SIMAR, L. AND P. W. WILSON

- A computationally efficient, consistent bootstrap for inference with non-parametric DEA estimators

0904 – HAFNER, C. M. AND P. H. FRANSES

- A generalized dynamic conditional correlation model: simulation and application to many assets

0905 – HAFNER, C. M. AND O. B. LINTON

- Efficient estimation of a multivariate multiplicative volatility model

0906 – GENEST, C. AND J. SEGERS

- On the covariance of the asymptotic empirical copula process

0907 – PARK, B. U., JEONG, S-O. AND L. SIMAR

- Asymptotic distribution of conical-hull estimators of directional edges

0908 – CHEN, S. X. AND I. VAN KEILEGOM

- A review on empirical likelihood methods for regression

- 0909 – BÖHM, H., OUBAO, H., VON SACHS, R. AND J. SANES
► Classification of multivariate non-stationary signals: the SLEX-shrinkage approach
- 0909 – LAZAR, D. AND M. DENUIT
► Multivariate time series modelling for underwriting cycles in P&L insurance
Institut des Sciences Actuarielles
- 0910 – MOLANES LÓPEZ, E. M., CAO, R. AND I. VAN KEILEGOM
► Smoothed empirical likelihood confidence intervals for the relative distribution with left truncated and right censored data
- 0911 – LAURENT, S. AND C. LEGRAND
► A Bayesian framework for the ratio of two Poisson rates in the context of vaccine efficacy trials
- 0912 – HEUCHENNE, C. AND I. VAN KEILEGOM
► Goodness-of-fit tests for the error distribution in nonparametric regression
- 0913 – SCHWARZ, M. AND S. VAN BELLEGEM
► Consistent density deconvolution under partially known error distribution
- 0914 – LAURENT, S.
► On standardness and l-cosiness
- 0915 – LAURENT, S.
► On Vershikian and l-cosy random variables and filtrations
- 0916 – ROUEFF, F. AND R. VON SACHS
► Locally stationary long memory estimation
- 0917 – MANNER, H. AND O. REZNIKOVA
► Time-varying copulas: a survey
- 0918 – LAURENT, S.
► Further comments on the representation problem for stationary processes
- 0919 – WUNSCH, G., RUSSO, F. AND M. MOUCHART
► Do we necessarily need longitudinal data to infer causal relations?
- 0920 – CHEN S.X. AND I. VAN KEILEGOM
► Rejoinder on: a review on empirical likelihood methods for regression
- 0921 – SCHUBERT, T. AND L. SIMAR
► Innovation and export activities in the German mechanical engineering sector: an application of testing restrictions in production analysis
- 0922 – DAOUIA, A., FLORENS, J.-P. AND L. SIMAR
► Regularization of nonparametric frontier estimators

- 0923 – GUDENDORF, G. AND J. SEGERS
- Nonparametric estimation of an extreme-value copula in arbitrary dimensions
- 0924 – HUNT, J.
- Equivalent local martingale measures and market incompleteness in a continuous time semi-Markov regime switching model
- 0925 – DEGEN, M., LAMBRIGGER, D.D. AND J. SEGERS
- Risk concentration and diversification: second-order properties
- 0926 – GUDENDORF, G. AND J. SEGERS
- Extreme-value copulas
- 0927 – SURMONT, V., AERTS J.G.J.V., VAN KLAVEREN R.J., TOURNOY K., TAN K., VERNHOUT R.M., SCHMITZ P.I.M, LEGRAND C., HOOGSTEDEN H.C. AND J.P. VAN MEERBEECK
- A randomized phase II study comparing two schedules of the 21-day regime of Gemcitabine and Carboplatin in advanced NSCLC
- 0928 – HOLLEVOET, K., KELLEN, E., THIMPONT, J., GERMONPRÉ, P., DE VUYST, P., BOSQUÉE, L., LEGRAND, C., KISHI, Y., NACKAERTS, K., DELANGHE, J.R., AND J.P. VAN MEERBEECK
- Diagnostic performance of soluble mesothelin and megakaryocyte potentiating factor as biomarkers of mesothelioma
- 0929 – MEYER, N., LEGRAND, C., AND G. GIACCONE
- Sample size in randomized clinical trials in oncology: useful basic statistical knowledge for the clinician
- 0930 – GUILLOTTE, S., PERRON, F., AND J. SEGERS
- Nonparametric Bayesian inference on bivariate extremes
- 0931 – JOHANNES, J. AND M. SCHWARZ
- Adaptive circular deconvolution by model selection under unknown error distribution
- 0932 – LAURENT, S.
- Some Poisson mixtures distributions with a hyperscale parameter
- 0933 – SIMAR, L. AND P.W. WILSON
- Inference by subsampling in nonparametric frontier models
- 0933A – SIMAR, L. AND P.W. WILSON
- Inference by subsampling in nonparametric frontier models: Appendix
- 0934 – PENG, L., QI, Y. AND I. VAN KEILEGOM
- Jackknife empirical likelihood method for copulas
- 0935 – LAMBERT, PH.
- Smooth semi- and nonparametric Bayesian estimation of bivariate densities from bivariate histogram data

- 0936 – HAFNER, C.M. AND H. MANNER
- Dynamic stochastic copula models: Estimation, inference and applications
- 0937 – DETTE, H. AND C. HEUCHENNE
- Scale checks in censored regression
- 0938 – MANNER, H. AND J. SEGERS
- Tails of correlation mixtures of elliptical copulas
- 0939 – TIMMERMANS, C., VON SACHS, R. AND V. DELOUILLE
- Comparaison et classifications de séries temporelles via leur développement en ondelettes de Haar asymétriques, - Actes des XVI^e rencontres de la société franco-phone de classification, 2009.
- 0940 – CETINYÜREK-YAVUZ, A. AND PH. LAMBERT
- Smooth estimation of survival functions and hazard ratios from interval-censored data using Bayesian penalized B-splines
- 0941 – ROUSSEAU, R., GOVAERTS, B. AND M. VERLEYSEN
- Combination of Independent Component Analysis and statistical modelling for the identification of metabonomic biomarkers in ¹H-NMR spectroscopy
- 1001 – BASRAK, B., KRIZMANI, D. AND J. SEGERS
- A functional limit theorem for partial sums of dependent random variables with infinite variance
- 1002 – MEINGUET, T. AND J. SEGERS
- Regularly varying time series in Banach spaces
- 1003 – Hunt, J.
- A short note on continuous-time Markov and semi-Markov processes
- 1004 – COLLÉE, A., LEGRAND, C., GOVAERTS, B., VAN DER VEKEN, P., DE BOODT, F. AND E. DEGRAVE
- Occupational exposure to noise and the prevalence of hearing loss in a Belgian military population: a cross-sectional study. Military Medicine, under revision
- 1005 – MEYER, N., LEGRAND, C. AND G. GIACCONE
- Samples sizes in oncology trials: a survey
- 1006 – HAFNER, C.M. AND O. REZNIKOVA
- On the estimation of dynamic conditional correlation models
- 1007 – HEUCHENNE, C. AND I. VAN KEILEGOM
- Estimation of a general parametric location in censored regression
- 1008 – DAVYDOV, Y. AND S. LIU
- Transformations of multivariate regularly varying tail distributions

- 1009 – CHRISTIANSEN, M. AND M. DENUIT
- First-order mortality rates and safe-side actuarial calculations in life insurance
- 1010 – EECKHOUDT, L. AND M. DENUIT
- Stronger measures of higher-order risk attitudes
- 1011 – DENUIT, M., HABERMAN, S. AND A. RENSHAW
- Comonotonic approximations to quantiles of life annuity conditional expected present values: extensions to general ARIMA models and comparison with the bootstrap
- 1012 – DENUIT, M. AND M. MESFIOUI
- Generalized increasing convex and directionally convex orders
- 1013 – DENUIT, M. AND L. EECKHOUDT
- A general index of absolute risk attitude
- 1014 – PIGEON, M. AND M. DENUIT
- Composite Lognormal-Pareto model with random threshold
- 1015 – DENUIT, M., EECKHOUDT, L. AND M. MENEGATTI
- Correlated risks, bivariate utility and optimal choices
- 1016 – TRUFIN, J., ALBRECHER, H. AND M. DENUIT
- Ruin problems in presence of underwriting cycles
- 1017 – DENUIT, M., EECKHOUDT, L. AND B. REY
- Some consequences of correlation aversion in decision science
- 1018 – DENUIT, M. AND L. EECKHOUDT
- Bivariate stochastic dominance and common preferences of decision-makers with risk independent utilities
- 1019 – TRUFIN, J., ALBRECHER, H. AND M. DENUIT
- Properties of risk measures derived from ruin theory
- 1020 – DENUIT, M., EECKHOUDT, L. AND M. MENEGATTI
- Adding independent risks in an insurance portfolio: Which shape for the insurer's preferences?
- 1021 – DENUIT, M. AND B. REY
- Prudence, temperance, edginess, and higher degree risk apportionment as decreasing correlation aversion
- 1022 – TRUFIN, J., ALBRECHER, H. AND M. DENUIT
- Ruin problems under IBNR dynamics
- 1023 – DENUIT, M., HABERMAN, S. AND A. RENSHAW
- Longevity-indexed life annuities

- 1024 – DENUIT, M., EECKHOUDT, L. AND O. JOKUNG
- Transformations preserving stochastic dominance: Theory and applications
- 1025 – DENUIT, M.
- Positive dependence of signals
- 1026 – JOHANNES, J. AND M. SCHWARZ
- Adaptive nonparametric instrumental regression by model selection
- 1027 – MEINGUET, T.
- Maxima of moving maxima of continuous functions
- 1028 – SCHWARZ, M., VAN BELLEGEM, S. AND J.P. FLORENS
- Nonparametric frontier estimation from noisy data
- 1029 – RUSSO, F., WUNSCH, G. AND M. MOUCHART
- Inferring causality through counterfactuals in observational studies some epistemological issues
- 1030 – TIMMERMANS, C. AND R. VON SACHS
- BAGIDIS, a new method for statistical analysis of differences between curves with sharp discontinuities
- 1031 – DARAIO, C., SIMAR, L. AND P.W. WILSON
- Testing whether two-stage estimation is meaningful in non-parametric models of production
- 1032 – DAVYDOV, Y. AND S. LIU
- Estimation of parameters of regularly varying distributions on convex cones
- 1033 – WEI, J., CARROLL, R., MÜLLER, U., VAN KEILEGOM, I. AND N. CHATTERJEE
- Robust estimation for homoscedastic regression in the secondary analysis of case-control data
- 1034 – CHRISTIANSEN, M., DENUIT, M. AND D. LAZAR
- The Solvency II square-root formula for systematic biometric risk
- 1035 – DENUIT, M., EECKHOUDT, L., TSETLIN, I. AND R.L. WINKLER
- Multivariate concave and convex stochastic dominance
- 1036 – DENUIT, M., EECKHOUDT, L. AND O. JOKUNG
- Transformations preserving stochastic dominance: Theory and applications
- 1037 – DEVOLDER, P., DOMINGUEZ-FABIAN, I. AND A. MILLER
- NDC dynamic equilibrium model with financial and demographic risks
- 1038 – HUNT, J. AND P. DEVOLDER
- Binomial semi-Markov regime switching interest rate models

4.3. BOOKS

DEVOLDER, P. AND J. BOULET (2009)

- *Défis et perspectives des régimes belges de pension*
La Chartre

FRANKE, J., HÄRDLE, W. AND C. HAFNER, C (2009)

- *Introduction to the Statistics of Financial Markets*
Springer Verlag, third edition

LEGRAND, C. (2009)

- *Assessing Heterogeneity in Clinical Trials Using the Frailty Model. Quantifying, Interpreting and Explaining Heterogeneity over Centers in Multicenter Cancer Clinical Trials*
VDM Verlag Dr. Müller Aktiengesellschaft and Co. KG

PITACCO, E., DENUIT, M., HABERMAN, S., AND A. OLIVIERI (2009)

- *Modelling Longevity Dynamics for Pensions and Annuity Business*
Oxford University Press

4.4. EDITORIAL ACTIVITIES

MICHEL DENUIT

Editor

The Astin Bulletin (since 2007),

Associate editor

Insurance: Mathematics and Economics (since 1999)

Methodology and Computing in Applied Probability (since 2008)

PIERRE DEVOLDER

Co-editor

The Astin Bulletin

CHRISTIAN HAFNER

Associate editor

Banking and Finance Review

Computational Statistics

International Review of Econometrics

Studies in Nonlinear Dynamics and Econometrics

JOHAN SEGERS

Associate editor

Journal of the Royal Statistical Society, Series (2005-2009)

Advances in Applied Probability

Bernoulli

Journal of Applied Probability

Stochastic Processes and Their Applications

LÉOPOLD SIMAR

Associate editor

Journal of Productivity Analysis (since 2003)

INGRID VAN KEILEGOM

Associate editor

Annals of the Institute of Statistical Mathematics

Annals of Statistics

International Journal of Biostatistics

Scandinavian Journal of Statistics

Statistics and Probability Letters

5. SEMINARS AND WORKSHOPS

5.1. IMMAQ ACTIVITIES

05/06/2009 - IMMAQ Day

- ▶ IMMAQ: A natural association within the « Plan de Développement »

15/01/2010 - 1st IMMAQ Lecture on Risk

PAUL EMBRECHTS, D-Math, ETH, Zurich, Switzerland

- ▶ "The financial crisis: warnings, guilt and a mathematical theorem"

11/03/2010 - 2nd IMMAQ Lecture on Risk

CHRISTIAN GOLLIER, Toulouse School of Economics, France

- ▶ "What should we do for the future? The economics of discounting and sustainable development"

30/04/2010

Journée de lancement de la plate-forme technologique du SMCS

(Support en Méthodologie et Calcul Statistique)

- ▶ "What's the place for statistical consulting and computation in the academic world?"

06/05/2010 - 3rd IMMAQ Lecture on Risk

FRANKLIN ALLEN, Wharton School, University of Pennsylvania, USA

- ▶ "Emerging from the crisis"

11-12/05/2010 - Conference in Honour of Jacques Thisse

- ▶ "A Journey through microeconomics"

5.2. STATISTICS SEMINARS

February, 2009

20/02

ADRIAN BOWMAN, University of Glasgow, Glasgow, United Kingdom

- ▶ "Additive models for environmental applications"

ROSA MARIA CRUJEIRAS-CASAS, University of Santiago de Compostela, Spain

- ▶ "Least squares estimation of nonlinear spatial trends"

27/02

TETYANA KADANKOVA, University of Hasselt, Belgium

- ▶ "Busy period, time of the first loss of a customer and the number of the customers in the the $Mu|G\delta|1|B$ queuing system"

March, 2009

11/03

Joint CORE/STAT

SHIN-HUEI WANG, CORE, UCL, Belgium

- ▶ "The real time monitoring tests with its applications"

12/03

JAN JOHANNES, Ruprecht-Karls Universität Heidelberg, Germany

- ▶ "Nonparametric estimation and prediction for spatial panel time series"

13/03

Joint ULB / UCL

RAINER VON SACHS, Institut de Statistique, UCL, Belgium

- ▶ "Tree-structured wavelet estimation with application to mixed effects modelling"

CHRISTINE DE MOL, Dept. of Mathematics and ECARES, ULB, Belgium

- ▶ "Sparsity in regression and learning problems"

18/03

Joint CORE/STAT

JEAN-PIERRE URBAIN, University of Maastricht, The Netherlands

- ▶ "Cross-sectional dependence robust block bootstrap panel unit root tests"

27/03

ANDREAS WIENKE, Institute of Medical Epidemiology, Biostatistics and Informatics, Martin-Luther-University Halle-Wittenberg, Halle, Germany

- "Parametric frailty models for clustered survival data"

STIJN VANSTEELENDT, Ghent University

- "Estimation of marginal structural survival models in the presence of competing risks"

April, 2009

03/04

EDWARD OMEY, HUB, Brussels, Belgium

- "Domains of attraction of the random vector (X, X^2) and applications"

BOJAN BASRAK, University of Zagreb, Croatia

- "Asymptotic behavior of sample mean on trees"

May, 2009

08/05

LAURENT DELSOL, Institut de Statistique, UCL, Belgium

- "M-estimation in semi-parametric models when the criterion function is not smooth"

STÉPHANE LAURENT, Institut de Statistique, UCL, Belgium

- "Objective Bayesian confidence intervals (d'après Bernardo)"

13/05

Joint CORE/STAT

JEROEN ROMBOUITS, HEC, Montreal (QC), Canada

- "A nonparametric copula based test for conditional independence with applications to Granger causality"

OLIVER LINTON, London School of Economics (LSE), United Kingdom

- "Efficient estimation of a multivariate multiplicative volatility model"

October, 2009

02/10

JOSÉE DUPUIS, Boston University School of Public Health, USA

- "Statistical methods for gene mapping in family samples"

PIERRE DUPONT, UCL Machine Learning Group, Polytechnic School of Louvain, Belgium

- "Biomarker selection from microarray data: a transfer learning approach"

07/10

Joint CORE/STAT

MATTEO BARIGOZZI, ECARES, ULB, Belgium

- ▶ "A seminonparametric vector MEM. Desentangling commonness and idiosyncrasy for a large panel of volatilities"

23/10

Joint CORE/STAT

PIOTR FRYZLEWICZ, London School of Economics, London, United Kingdom

- ▶ "Thick-pen transformation for time series"

CLIFFORD LAM, London School of Economics, London, United Kingdom

- ▶ "Large Precision Matrix Estimation for Time Series Data with Latent Factor Model"

November, 2009

06/11

MARCEL RÉMON, FUNDP, Namur, Belgium

- ▶ "Additivity" versus "Maxitivity" at the heart of Statistical Inference"

18/11

Joint CORE/STAT/LSM Finance

MICHAEL ROCKINGER, HEC, Université de Lausanne, Switzerland

- ▶ "Fourth order pseudo maximum likelihood methods"

19 - 20/11

IAP workshop in Leuven

- ▶ "Modeling association and dependence in complex data"

December, 2009

11/12

Joint UCL/ULB

ANOUAR EL GHOUGH, Institut de Statistique, UCL, Belgium

- ▶ "Measuring the discrepancy of a parametric model via local polynomial smoothing"

CATHERINE DEHON, ECARES, ULB, Belgium

- ▶ "How to deal with outliers in regression"

February, 2010

03/02

Joint seminar ISBA/CORE

DIMITRIS KOROBILIS, University of Strathclyde, Glasgow, United Kingdom

- ▶ "Assessing the Transmission of Monetary Policy Shocks Using Dynamic Factor Models"

26/02

Joint seminar ISBA/CORE

MASSIMILIANO CAPORIN, University of Padova, Italy

- "Ranking Multivariate GARCH models by cross-sectional dimension"

MICHAEL McALEER, Erasmus University, Rotterdam, The Netherlands

- "Optimal risk management before, during and after the 2008-09 financial crisis"

12/02

JOHN P. NOLAN, American University, Washington DC, USA

- "A Gentle Introduction to Stable Distributions"

SHUYAN LIU, Université de Lille 1, France

- "Estimation of parameters of regularly varying tail distributions on convex cones"

March, 2010

12/03

SIEGFRIED HÖRMANN, ULB, Belgium

- "Weakly dependent functional data"

JAN JOHANNES, Institut de Statistique, UCL, Belgium

- "Inverse problems with noise in the operator methods, theory and applications"

24/03

Joint seminar ISBA/CORE

RICHARD A. DAVIS, Columbia University, New York, USA

- "The Extremogram: a correlogram for extreme events"

31/03

Joint seminar ISBA/CORE

T. TONY CAI, Wharton School, University of Pennsylvania, USA

- "Robust and generalized nonparametric regression"

April, 2010

23/04/10

GILLES FAÏ, Université de Lille 1, France

- "Wavelet-based isotropy test on the sphere"

LAURENT JACQUES, Communications and Remote Sensing Laboratory, UCL, Belgium

- "An introduction to compressed sensing: combining sparsity and sampling"

May, 2010

07/05/10

DOMINIQUE DEPRINS, ISBA, UCL, Belgium

- “La probabilité sous la logique de précaution”

21/05

USCHI MÜLLER-HARKNETT, Texas A&M University, Texas, USA

- “Nonlinear regression with missing responses”

MELANIE BIRKE, University of Bochum, Germany

- “Testing for monotonicity - an empirical process approach”

5.3.

APPLIED STATISTICS WORKSHOPS

February, 2009

13/02

MATTHIEU DUBOIS, Université Pierre Mendès-France, Grenoble, France

- “Particularités statistiques des études de cas uniques en neuropsychologie”

CÉDRIC TAVERNE, Institut de Statistique, UCL, Belgium

- “Evaluation de choix individuels à l'aide de la méthodologie des préférences déclarées: le point sur la méthode, ses points forts, ses faiblesses”

March, 2009

06/03

FRANÇOIS VANDENHENDE, Clinbay, Belgium

- “Adaptative designs in clinical trials”

JÉRÔME AMBROISE, Laboratoire de télécommunications et télédétection, UCL, Belgium

- “L'utilisation d'outils statistiques pour l'analyse des puces à ADN”

20/03

ANNICK MASSON, Service des Sciences et Technologies Alimentaires, Institut Meurice, Bruxelles, Belgium

- “Les outils statistiques utilisés dans l'analyse de données sensorielles: cas pratiques”

CHRISTIAN RITTER, UCL and R&D Consulting, Belgium and Thomas Costenoble, Vinopres, Belgium

- “Statistical analysis of a wine competition - A sobering experience?”

October, 2009

09/10

CHRISTIAN RITTER, Institut de Statistique UCL, Belgium

- "Presentation of quantitative information"

CHRISTIAN RITTER, Institut de Statistique UCL, Belgium

- "Combining software tools to practise statistics"

30/10

CHRISTIAN MONSEUR, Université de Liège, ULg, Belgium

- "Intérêts de la régression multi-niveaux pour les sciences de l'Education"

DANY JOURDAN, Danalyse, Brussels, Belgium

- "Le poids des chiffres, le choc des graphiques. Quelques illustrations d'intoxication statistique"

November, 2009

13/11

NICO SPEYBROECK, UCL, Belgium

Unité d'épidémiologie, biostatistique et méthodes opérationnelles en santé publique

- "Measuring and understanding socio-economic inequality in health"

HEIDI WOUTERS, Ablynx nv, Ghent, Belgium

- "Design of experiments in the framework of a cell based potency assay"

December, 2009

04/12

SÉBASTIEN DEJEAN, Université de Toulouse III, France

- "Analysing detail coefficients from a wavelet decomposition to improve the discrimination of metabolomics profiles"

TOM BLOEMBERG, Radboud University Nijmegen, The Netherlands

- "Alignment and analysis of complex '-omics' data"

February, 2010

19/02

OLIVIER DE DECKÈRE, HR Finance, ING, Belgium

- "Utilisation des statistiques au sein d'un département HR"

FABIEN VERDICQ, Reacfin, Belgium

- "Méthodes Monte-Carlo appliquées sur le bilan des compagnies d'assurances"

March, 2010

05/03

NIKOLAUS HASELGRUBER, AVL List GmbH, Austria

- "Dynamic design of large-scale system reliability experiments"

THOMAS BAIER, Logi.cals, Kirchner SOFT GmbH, Austria

- "Data analysis and condition monitoring using PLC and embedded systems"

19/03

Joint seminar ISBA and Adolphe Quetelet Society

MIA HUBERT, KULeuven, Belgium

- "Robust multivariate analysis in practice"

ERIC DEPIÉREUX, FUNDP, Namur

- "Challenges in the analysis of high throughput biology data with application to micro-chips data"

26/03

ALEXANDER KUKUSH, University of Kiev, Ukraine

- "Estimation of radiation risk under uncertainty in doses in the Chernobyl accident"

6. DOCTORAL TRAINING

6.1. COMPLETED DOCTORAL DISSERTATIONS

GIOVANNI MOTTA (2009)

- "Evolutionary factor analysis"

SUPERVISOR: RAINER VON SACHS

JULIEN TRUFIN (2010)

- "Ruin problems in non-standard risk models"

SUPERVISORS: MICHEL DENUIT, PIERRE DEVOLDER

6.2. DOCTORAL DISSERTATIONS IN PROGRESS

BORIS DEMESHEV

- "Nonparametric robust regression with power basis"

SUPERVISORS: ANOUAR EL GHOUGH, INGRID VAN KEILEGOM

RACHIDA EL MEHDI

- "L'analyse d'efficience des domaines de développement au Maroc"

SUPERVISOR: CHRISTIAN HAFNER

BERNARD FRANCO

- “Development of statistical tools to test the equivalence between analytical measurement methods”

SUPERVISOR: BERNADETTE GOVAERTS

JEAN-MARC FREYERMUTH

- “Tree-structured wavelet thresholding with applications in nonparametric curve estimation”

SUPERVISOR: RAINER VON SACHS

GORDON GUDENDORF

- “Extreme value analysis: modelling dependence between many variables”

SUPERVISOR: JOHAN SEGERS

JULIEN HUNT

- “Calcul stochastique en univers semi-markovien et applications financières”

SUPERVISOR: PIERRE DEVOLDER

JONATHAN JAEGER

- “Functionnal estimation in system defined by differential equations using Bayesian smoothing methods”

SUPERVISORS: PHILIPPE LAMBERT, CATHERINE LEGRAND

DANIEL KOCH

- “Optimisation de portefeuilles sous contraintes de solvabilité”

SUPERVISOR: RAINER VON SACHS

SASKIA LOMMELEN

- “Improving the transparency and the solvency of the Belgian pension Pay-As-You-Go systems”

SUPERVISOR: PIERRE DEVOLDER

THOMAS MEINGUET

- “Extreme value theory for stochastic processes with continuous time and/or space coordinates”

SUPERVISOR: JOHAN SEGERS

DIANE PIERRET

- “Econometric analysis and risk management in energy markets”

SUPERVISORS: CHRISTIAN HAFNER, LUC BAUWENS

MATHIEU PIGEON

- “Mixed regression models for insurance data with credibility updates and particular forms of censoring”

SUPERVISORS: MICHEL DENUIT

OLGA REZNIKOVA

- “Adaptive modelling of the dependence in multivariate time series”

SUPERVISOR: CHRISTIAN HAFNER

RÉJANE ROUSSEAU

- “Outils statistiques pour identification de biomarqueurs de toxicité métabonomiques”

SUPERVISORS: BERNADETTE GOVAERTS, MICHEL VERLEYSEN

MAIK SCHWARZ

- “Adaptive regularization in nonparametric instrumental regression”

SUPERVISORS: SÉBASTIEN VAN BELLEGEM (Université de Toulouse I), RAINER DAHLHAUS (Heidelberg University), JAN JOHANNES, INGRID VAN KEILEGOM

RUDOLF SCHENK

- “Adaptative nonparametric Bayesian estimation in inverse problems”

SUPERVISORS: JAN JOHANNES, INGRID VAN KEILEGOM

MOHAMMED RIDA SOUMALI

- “Asymptotic study of robustness properties of regression estimators in semiparametric regression models”

SUPERVISOR: INGRID VAN KEILEGOM

ALEKSANDAR SUJICA

- “Modeling and inference for dependent censoring mechanisms via location-scale regression models”

SUPERVISOR: INGRID VAN KEILEGOM

MAJDA TALAMAKROUNI

- “Guided censored regression”

SUPERVISORS: ANOUAR EL GHOUC, INGRID VAN KEILEGOM

HABIBA TASSA

- “Evaluation des fonds de pension et solvabilité”

SUPERVISOR: PIERRE DEVOLDER

CÉDRIC TAVERNE

- “Evaluation of some reinforcements of the stated preference methods using the potential of computer based questionnaires”

SUPERVISOR: BERNADETTE GOVAERTS

CATHERINE TIMMERMANS

- “Analyse des données fonctionnelles appliquées à la physique solaire et à l'étude des relations terre-soleil”

SUPERVISORS: RAINER VON SACHS, VÉRONIQUE DELOUILLE (Observatoire Royal de Belgique)

6.3.

DOCTORAL SEMINARS

September 25, 2009

CATHERINE TIMMERMANS

- “The BAGIDIS method, a new way for measuring distances between curves with sharp variations”

THOMAS MEINGUET

- “Heavy tailed linear functional processes”

MATHIEU PIGEON

- “Individual claim loss reserving”

BERNARD FRANCO

- “Development of statistical tools to test the equivalence between two measurement methods”

MAIK SCHWARZ

- “Adaptive circular deconvolution by model selection under unknown error distribution”

MOHAMMED RIDA SOUMALI

- “The influence function of the LS estimator for the regression parameter under a semiparametric partially linear model”

January 30, 2010

OLGA REZNIKOVA

- “Efficient estimation of a semiparametric dynamic copula model”

GORDON GUDENDORF

- “Nonparametric estimation of extreme value copulas in arbitrary dimensions”

ALEKSANDAR SUJICA

- “The copula-graphic estimator in censored nonparametric location-scale regression models”

JONATHAN JAEGER

- “Functional estimation in systems defined by differential equations using Bayesian smoothing methods”

JULIEN HUNT

- “Semi-Markov switching interest rate models”

RACHIDA EL MEHDI

- “Stochastic frontier analysis of the efficiency of Moroccan municipalities”

February 5, 2010

OLGA REZNIKOVA

- “Time-varying copulas: a survey”

CÉDRIC TAVERNE

- “How to reinforce the stated preference methods using the potential of computer based questionnaires?”

FABIAN BOCART

- “Statistical challenges in the art market”

JULIEN HUNT

- “Topics on semi-Markov processes and their applications”

JEAN-MARC FREYERMUTH

- “Tree-structured wavelets in nonparametric regression”

GORDON GUDENDORF

- “Extreme-value copulas”

7.

ORGANIZATION OF SCIENTIFIC MEETINGS

EXPLORING RESEARCH FRONTIERS IN CONTEMPORARY STATISTICS AND ECONOMETRICS, Conference in honor of Léopold Simar

DATE: May 14 - 15, 2009

LOCATION: Louvain-la-Neuve, Belgium

Workshop in honor of Léopold Simar, who became professor emeritus at the end of the academic year. The conference was held on May 14 and 15, 2009, hosted by the Institute of Statistics of the Université catholique de Louvain.

The conference features talks by internationally recognized researchers engaged in (non)-parametric frontier estimation. Other related topics such as statistical methods for measurement error problems and dimension reduction techniques will also be discussed. The conference will provide an overview of the historical developments and current status of the field, and will provide a platform to discuss emerging issues and future research directions.

ORGANIZING COMMITTEE: MICHEL DENUIT (UCL), CÉDRIC HEUCHENNE (Université de Liège), JOHAN SEGERS (co-Chair) (UCL) and INGRID VAN KEILEGOM (Chair) (UCL)

SECRETARIAT: MARGUERITE-MARIE HANON, SOPHIE MALALI, ISABELLE PETIT and MONIQUE TANGA

SCIENTIFIC COMMITTEE: PHILIPPE LAMBERT (Université de Liège), JOHAN SEGERS (UCL), INGRID VAN KEILEGOM (UCL), RAINER VON SACHS (UCL) and PAUL WILSON (Clemson University)

PROGRAMME

May 14, 2009

PAUL WILSON, Clemson University, USA

- "Asymptotic properties of some non-parametric hyperbolic efficiency estimators"

ABDELAATI DAOUIA, Université de Toulouse 1, France

- "Frontier estimation and extreme values theory"

ALOIS KNEIP, University of Bonn, Germany

- "A new panel data treatment for heterogeneity in time trends"

VALENTIN ZELENYUK, Kyiv School of Economics, Ukraine

- "Categorical variables in non parametric stochastic frontier estimation"

BYEONG PARK, Seoul National University, South Korea

- "Asymptotic distribution of conical-hull estimators of directional edges"

Cocktail and conference dinner

May 15, 2009

LUIZA BADIN, Bucharest University of Economics, Roumania

- "Bias correction for nonparametric conditional and unconditional efficiency estimators: A Monte Carlo study"

JEAN-PIERRE FLORENS, Université de Toulouse 1, France

- "Functional instrumental regression"

IRÈNE GIJBELS, Katholieke Universiteit Leuven, Belgium

- "Nonparametric partial-frontier estimation: robustness and efficiency"

CINZIA DARAIO, University of Bologna, Italy

- "Statistical inference in conditional nonparametric frontier models"

Lunch and posters session

WOLFGANG HÄRDLE, Humboldt University Berlin, Germany

- "Copulae in tempore variantes (applied to CDO valuation)"

ROBIN SICKLES, Rice University, Houston, USA

- "The skewness problem in stochastic frontier models: fact or fiction?"

Closing session

PARIER SUR L'INCERTITUDE

International Conference

DATE: Septembre 4 - 5, 2009

LOCATION: Brussels Stock Exchange, Euronext

ORGANIZING COMMITTEE:

DOMINIQUE DEPRINS, FUSL & UCL

NICOLAS DE SADELEER, FUSL, UCL & Université Paris II

BRUNO COLMANT, Euronext Brussels & FUSL

PATRICIA GHYS, Euronext Brussels

FRANÇOIS EWALD, CNAM Paris

CHRISTIAN GOLLIER, Université de Toulouse 1

SCIENTIFIC COMMITTEE:

DOMINIQUE DEPRINS, FUSL & UCL

NICOLAS DE SADELEER, FUSL, UCL & Université Paris II

FRANÇOIS EWALD, CNAM Paris

CHRISTIAN GOLLIER, Université de Toulouse 1

PROGRAMME

Septembre 4, 2009

L'homme contemporain et l'incertitude

Sous la présidence de: DOMINIQUE LECOURT, Université Paris VII - DENIS DIDEROT

ACCUEIL DES PARTICIPANTS ET INTRODUCTION PAR
DOMINIQUE DEPRINS, FUSL et UCL et
NICOLAS DE SADELEER, FUSL, UCL et Université Paris II

FRANÇOIS EWALD, CNAM Paris

- "Achever le nihilisme"

ROBERT CASTEL, EHESS Paris

- "La montée des incertitudes"

SOPHIE KLIMIS, FUSL & FNRS

- "Ce que les Grecs donnent à penser: la démesure de l'individualisme et le pari sur la prudence"

DISCUSSION

EDGARD GUNZIG, ULB

- "Histoire cosmologique du vide"

DOMINIQUE DEPRINS, FUSL & UCL

- "D'une cause qui ferait acte d'incertitude: quand le probable est supplanté par le vrai..."

DISCUSSION

DÎNER

Septembre 5, 2009

Finance, économie et incertitude

Sous la présidence de PIERRE DEHEZ, UCL (CORE)

CHRISTIAN GOLLIER, Université de Toulouse 1, France

- "Penser le développement durable face aux incertitudes radicales"

PAUL JORION, modélisateur financier (Californie), chroniqueur dans Le Monde

- "Incertitude singulière et incertitude globale: la responsabilité de l'individualisme méthodologique dans la crise actuelle"

DISCUSSION

BRUNO COLMANT, Président d'Euronext Brussels & FUSL

- "Le cours de bourse fournit-il la valeur ?"

DISCUSSION

DÉJEUNER

Responsabilités et incertitude

Sous la présidence de DOMINIQUE LECOURT, Université Paris VII - Denis Diderot

JOSÉ REDING, UCL

- "Vérité de la foi et pari sur l'incertitude: cohérence et pertinence"

PHILIPPE GÉRARD, FUSL

- "Pluralisme, incertitude, autonomie"

DISCUSSION

NICOLAS DE SADELEER, FUSL, UCL & Université Paris II

- "Ecueils juridiques du pari"

CLAUDE-OLIVIER DORON, Université Paris VII/ REHSEIS

- "Les menaces de l'incertitude"

DISCUSSION

Conclusions par CLAUDE D'ASPREMONT, UCL (CORE) & FUSL

SEMIPARAMETRIC MODELLING OF MULTIVARIATE ECONOMIC TIME SERIES WITH CHANGING DYNAMICS

**Mini-workshop organized in the framework of the ARC project
between ISBA and CORE**

DATE: January 17 - 23, 2010

LOCATION: Mathematisches Forschungsinstitut Oberwolfach, Germany

ORGANIZING COMMITTEE:

LUC BAUWENS, UCL

QIWEI YAO, LSE

RAINER VON SACHS, UCL

LIST OF PRESENTATIONS

MATTEO BARIGOZZI (JOINT WITH LUCIA ALESSI, MARCO CAPASSO)

- "Dynamic factor models for forecasting and structural identification"

MANFRED DEISTLER (JOINT WITH BRIAN D.O. ANDERSON, ALEXANDER FILLER, CHRISTIANE ZINNER, WEITIAN CHEN)

- ▶ “Generalized linear dynamic factor models - An approach via singular autoregressions”

SONG SONG (JOINT WITH WOLFGANG HÄRDLE, YAACOV RITOV)

- ▶ “Flexible low dimensional dynamic factor models with applications in weather and neuroeconomics”

GARY KOOP (JOINT WITH DIMITRIS KOROBILIS)

- ▶ “Forecasting inflation using dynamic model averaging”

JEROEN V.K. ROMBOUITS

- ▶ “Time series, breaks and economic forecasting”

CHRISTIAN M. HAFNER (JOINT WITH OLGA REZNIKOVA)

- ▶ “On the estimation of dynamic conditional correlation models”

OILVER LINTON (JOINT WITH BONSOO KOO)

- ▶ “Semiparametric estimation of locally stationary diffusion models”

QIWEI YAO

- ▶ “Factor modelling for multiple time series: A simple approach with simple inference”

PIOTR FRYZLEWICZ (JOINT WITH HEE-SEOK OH)

- ▶ “On the thick-pen transformation for time series”

TIMO TERÄSVIRTA

- ▶ “Modelling changes in the unconditional variance of long stock return series”

FRANZ C. PALM (JOINT WITH ALAIN HECQ, SÉBASTIEN LAURENT)

- ▶ “On the univariate representation of multivariate volatility models with common factors”

JÜRGEN FRANKE (JOINT WITH J.-P. STOCKIS, J. TADJUIDJE-KAMGAING, W. K. LI)

- ▶ “Nonparametric time series with Markov switching dynamics”

8. ACADEMIC VISITS

The members of the Institute visited other institutions and most of them presented seminars.

January 2009

PIERRE DEVOLDER

- Université de Strasbourg, France
SHORT COURSE: "Gestion actuarielle des fonds de pension"

LÉOPOLD SIMAR

- Fakultät für Wirtschaftswissenschaften, University of Karlsruhe, Germany
SEMINAR: "Nonparametric inference in efficiency analysis. Recent developments and new challenges"

February 2009

INGRID VAN KEILEGOM

- Guanghua School of Management, Peking University, China
SEMINAR: "Semiparametric modeling and estimation of the dispersion function in regression"

March 2009

PIERRE DEVOLDER

- EM – Lyon, France
SEMINAR: "Time horizon and equity risk: the solvency puzzle"

BERNADETTE GOVAERTS

- Sanofi-Aventis, Paris, France

CATHERINE LEGRAND

- School of Public Health, UCL, Brussels, Belgium
SEMINAR: "Implementation of interim analyses and Independent data Monitoring Committee (IDMC) in large phase III cancer clinical trials".

LÉOPOLD SIMAR

- Department of Economics, Michigan State University, Lansing, USA
SEMINAR: "Frontier estimation and extreme values theory"
- Department of Economics, Rice University, Houston, USA
SEMINAR: "Frontier estimation and extreme values theory"

INGRID VAN KEILEGOM

- Department of Statistics, Texas A&M University, USA

April 2009

PIERRE DEVOLDER

- Collegio Carlo Alberto, Torino, Italy
- Norwegian Actuarial Society, Oslo, Norway
SEMINAR: "Risk measures and economic capital"

BERNADETTE GOVAERTS

- Sanofi-Pasteur, Lyon, France

CHRISTIAN HAFNER

- University of Maastricht, Maastricht, The Netherlands
SEMINAR: "Efficient estimation of a multivariate multiplicative volatility model"

LÉOPOLD SIMAR

- Department of Statistical Science, University of Bologna, Italy.
- Dipartimento di Scienze Economiche, Università di Lecce, Italy
SEMINAR: "Nonparametric inference in efficiency analysis - recent developments and new challenges"
- Dipartimento di Scienze Economiche, Università di Verona, Italy
SEMINAR: "Bootstrap, panacea for statistical inference?"

INGRID VAN KEILEGOM

- Einaudi Institute for Economics and Finance (EIEF), Rome, Italy
SEMINAR: "Semiparametric modeling and estimation of the dispersion function in regression"

May 2009

PIERRE DEVOLDER

- Universidad de Barcelona, Spain
SHORT COURSE: "Solvency and Insurance"

CATHERINE LEGRAND

- Institute for medical Epidemiology, Biostatistics, and Informatics, Medical Faculty, University Halle-Wittenberg, Halle, Germany.
SEMINAR: "My past experience at EORTC... when life is not what the statistician would like it to be..."

INGRID VAN KEILEGOM

- Department of Statistics, Carlos III University, Madrid, Spain
SEMINAR: "Semiparametric modeling and estimation of the dispersion function in regression"

June 2009

CATHERINE LEGRAND

- Clinical Trials Statistics for Non-Statisticians, European Organisation for Research and Treatment of Cancer, Brussels, Belgium.
COURSE: "Sample size determination in phase III clinical trials".
- MSource - Life Science training Institute. Munich, Germany.
COURSE: "Introduction and advanced in survival analysis. Applications in clinical trials".
"Parametric proportional hazards models with gamma-frailty".

JOHAN SEGERS

- Department of Mathematics, University of Antwerp, Belgium

INGRID VAN KEILEGOM

- Toulouse School of Economics, Université des Sciences Sociales de Toulouse, France
- Department of Statistics, Université Paul Sabatier, Toulouse, France

July 2009

LÉOPOLD SIMAR

- Fakultät für Wirtschaftswissenschaften, University of Karlsruhe, Germany

August 2009

RAINER VON SACHS

- Brown University, Providence, USA

September 2009

PIERRE DEVOLDER

- ALAC – Luxembourg
SEMINAR: "Variable annuities"
- ULB- Summer School ARAB, Brussels, Belgium
SEMINAR: "Risk management of a public pension scheme in a stochastic environment"

LÉOPOLD SIMAR

- Toulouse School of Economics, Région Midi-Pyrénées, Institut d'Economie Industrielle (IDEI/GREMAQ), France
Chaire d'Excellence Pierre de Fermat

INGRID VAN KEILEGOM

- Department of Statistics, University of Vigo, Spain
SEMINAR: "Univariate frontier estimation in the presence of measurement error"

October 2009

INGRID VAN KEILEGOM

- Department of Statistics, University of Paul Sabatier, Toulouse, France

November 2009

PIERRE DEVOLDER

- INSEA, Rabat, Morocco
SHORT COURSE: "Modèles mathématiques de la finance"

CHRISTIAN HAFNER

- European University Institute, Florence, Italy

LÉOPOLD SIMAR - INVITED

- Chaire Pierre de Fermat, Région Midi-Pyrénées, Toulouse School of Economics, Toulouse, France
SEMINAR: "Mesure d'efficacité et innovations en économie de la production"

INGRID VAN KEILEGOM

- Department of Economics, University of Bonn, Germany
- Department of Statistics, Université de Paris VI, France
SEMINAR: "Univariate frontier estimation in the presence of measurement error"

December 2009

PIERRE DEVOLDER

- EM – Lyon, France
SHORT COURSE: "Risk measures and solvency 2"

CATHERINE LEGRAND

- Erasmus University Medical Center, Rotterdam, The Netherlands.
SEMINAR: "On the use of the frailty model to address a new aspect of the statistical validation of prognostic indices for survival endpoints"
- Seminar of the EC-MSc-Radiobiology Course, UCL, Belgium
SEMINAR: "Essais cliniques en oncologie et EORTC"

INGRID VAN KEILEGOM

- Department of Statistics, Oxford University, United Kingdom
SEMINAR: "Univariate frontier estimation in the presence of measurement error"
- Department of Statistics, University of Mannheim, Germany
SEMINAR: "Univariate frontier estimation in the presence of measurement error"

January 2010

JAN JOHANNES

- Katholieke Universiteit Leuven, Belgium
SEMINAR: "Adaptive circular deconvolution by model selection under unknown error distribution"

JOHAN SEGERS

- Norwegian Computing Center, Oslo, Norway
SEMINAR: "Inference on copulas: When ignorance is bliss"

INGRID VAN KEILEGOM

- Toulouse School of Economics, University of Toulouse I, France

February 2010

LÉOPOLD SIMAR

- Toulouse School of Economics, France
Agence Nationale de la Recherche (ANR), GREMAQ

INGRID VAN KEILEGOM

- Department of Statistics, Texas A&M University, USA
SEMINAR: "Univariate frontier estimation in the presence of measurement error"
- Department of Economics, Indiana University, USA
SHORT COURSE: "Inference for semiparametric Z-estimators"
SEMINAR: "Univariate frontier estimation in the presence of measurement error"

March 2010

PIERRE DEVOLDER

- EMI - Rabat, Morocco
SEMINAR: "Structure stochastique de taux d'intérêt"

JAN JOHANNES

- Université Libre de Bruxelles, Belgium
SEMINAR: "Inverse problems with noise in the operator: methods, theory and applications"

LÉOPOLD SIMAR - INVITED

- Department of Economics, Clemson University, Clemson SC, USA

April 2010

LÉOPOLD SIMAR - INVITED

- Kiev School of Economics, Kiev, Ukraine
SEMINAR: "Multivariate tools for data analysis"

INGRID VAN KEILEGOM

- Toulouse School of Economics, University of Toulouse I, France

May 2010

PIERRE DEVOLDER

- Universidad de Barcelona, Spain
SHORT COURSE: "Solvency in insurance and finance"

CHRISTIAN HAFNER

- Stockholm School of Economics, Sweden

CATHERINE LEGRAND

- Medical University of Vienna, Center for Medical Statistics, Informatics and Intelligent Systems, Austria
SEMINAR: "Generalized conditional linear models with time varying coefficients under right censoring: practical implementation and extensions"

LÉOPOLD SIMAR

- Toulouse School of Economics, France
Research Grant, INRA-GREMAQ

INGRID VAN KEILEGOM

- Department of Economics, University of Bonn, Germany

June 2010

JOHAN SEGERS

- Université Paris 1, Paris, France
SEMINAR: «A functional limit theorem for dependent sequences with infinite variance stable limits»

LÉOPOLD SIMAR

- Department of Economics, Clemson University, Clemson SC, USA

INGRID VAN KEILEGOM

- Department of Mathematics and Statistics, University of Cyprus, Nicosia, Cyprus
- Department of Statistics, Université de Paris VI, France

July 2010

CHRISTIAN HAFNER

- Ecole Nationale des Sciences Appliquées, Oujda, Morocco

CATHERINE LEGRAND

- Faculty of Medicine, University of Strasbourg, France
SEMINAR: "Sample size for phase III clinical trials in oncology: who, why, how? "

INGRID VAN KEILEGOM

- Toulouse School of Economics, University of Toulouse I, France
- Department of Statistics and OR, Universidad de Santiago de Compostela, Spain
- Department of Statistics and OR, University of Vigo, Spain
SEMINAR: "Goodness-of-fit tests for multiplicative models with dependent data"

9. PARTICIPATION TO CONFERENCES AND SCIENTIFIC MEETINGS

The members of the Institute attended and/or participated to the following international conferences, in addition to Belgian ones.

January 2009

BERNADETTE GOVAERTS - INVITED WITH RÉJANE ROUSSEAU

- “Metabolo(mo)mics data processing”
First Belgian Symposium on Metabolomics and Metabonomics, Mons, Belgium

February 2009

MICHEL DENUIT - INVITED

- “Actuarial modelling of dynamic mortality”
Actuarial and Financial Mathematics Conference (AFMathConf - 2009), Palais des Académies, Brussels, Belgium

March 2009

CHRISTIAN HAFNER

- Conference on Recent Developments in Financial Econometrics
Humboldt-Universität, Berlin, Germany

JOHAN SEGERS

- ▶ "A functional limit theorem for dependent sequences with infinite variance stable limits"
Conference on Latest Developments in Heavy-Tailed Distributions, Brussels, Belgium

April 2009

CATHERINE LEGRAND

- ▶ Attendance and Member of the Scientific Committee
2nd ISCB Channel Network Conference, Gent, Belgium

INGRID VAN KEILEGOM - INVITED

- ▶ "Semiparametric modeling and estimation of the dispersion function in regression"
Workshop on "Semiparametric and Nonparametric Methods in Econometrics", Banff, Canada

June 2009

PIERRE DEVOLDER

- ▶ Congress IME 2009
Istanbul, Turkey

CHRISTIAN HAFNER

- ▶ Conference of the Society for Financial Econometrics (SoFie)
Geneva, Switzerland

JOHAN SEGERS

- ▶ 6th International Conference on Extreme Value Analysis, Fort Collins, Colorado, USA

LÉOPOLD SIMAR - INVITED

- ▶ "Measuring efficiency in productivity analysis: Choosing a model, implications and challenges"
Keynote speaker and member of the scientific committee of the 11th European workshop on Efficiency and Productivity Analysis, Pisa, Italy

INGRID VAN KEILEGOM - INVITED

- ▶ Short course on "The empirical likelihood method in regression"
Journées Statistiques du Sud 2009, Porquerolles, France
- ▶ "Estimation in semiparametric models with missing data"
First Institute of Mathematical Statistics Asia Pacific Rim Meeting, Seoul, South Korea

July 2009

BERNADETTE GOVAERTS

- ▶ Congrès des utilisateurs R User-R-09
Rennes, France

JOHAN SEGERS

- "Tails of correlation mixtures of elliptical copulas"
International Symposium on Business and Industrial Statistics, Portoroz, Slovenia
27th European Meeting of Statisticians, Toulouse, France

INGRID VAN KEILEGOM, MEMBER OF THE SCIENTIFIC COMMITTEE PROGRAMME

- "Estimation in semiparametric models with missing data"
27 th European Meeting of Statisticians, Toulouse, France

RAINER VON SACHS

- "Tree-structured wavelet spectral estimation of replicated time series"
27th European Meeting of Statisticians, Toulouse, France

August 2009

CATHERINE LEGRAND

- Attendance and member of the scientific committee
30th Annual Conference of the International Society for Clinical Biostatistics (ISCB),
Prague, Czech Republic

INGRID VAN KEILEGOM - INVITED

- "Estimation in semiparametric models with missing data"
The 57th Session of the International Statistical Institute, Durban, South Africa

RAINER VON SACHS (IMS FELLOWSHIP AWARD)

- Joint Statistical Meetings, Washington, DC, USA

September 2009

MICHEL DENUIT - INVITED

- "Dynamic life tables: construction and applications",
3rd International Actuarial Association Life Colloquium, Munich, Germany

DOMINIQUE DEPRINS - INVITED

- "D'une cause qui ferait acte d'incertitude: quand le probable est supplanté par le vrai..."
International conférence "Parier sur l'incertitude", Brussels, Belgium

PIERRE DEVOLDER

- Congress AFIR 2009
Munich, Germany

JAN JOHANNES

- "Optimal global and local estimation in nonparametric instrumental regression"
Conference – Stats, Château de Paris, France

JOHAN SEGERS

- ▶ Workshop on "High-dimensional extremes"
Lausanne, Switzerland

November 2009

PIERRE DEVOLDER

- ▶ Congress PBSS 2009, Tokyo, Japan

CATHERINE LEGRAND

- ▶ "Frailty models"
Herbstworkshop longitudinale und hochdimensionale Daten. RheinAhrCampus
Remagen, Germany

INGRID VAN KEILEGOM

- ▶ "Univariate frontier estimation in the presence of measurement error"
IAP-Workshop 2009, "Modeling Association and Dependence in Complex Data"
Catholic University of Leuven, Belgium

December 2009

BERNADETTE GOVAERTS

- ▶ Chimiométrie 2009, Paris, France

CHRISTIAN HAFNER

- ▶ EC2 Real time econometrics, Aarhus, Denmark

JOHAN SEGERS

- ▶ Joint Meeting of the Belgian and London Mathematical Societies
Leuven, Belgium

January 2010

CHRISTIAN HAFNER

- ▶ Mini-workshop on "Semiparametric Modelling of Multivariate Economic Time Series
with Changing Dynamics", Forschungsinstitut Oberwolfach, Germany

RAINER VON SACHS

- ▶ Mini-Workshop on "Semiparametric Modelling of Multivariate Economic Time Series
with Changing Dynamics", Forschungsinstitut Oberwolfach, Germany

February 2010

BERNADETTE GOVAERTS (MEMBER OF THE SCIENTIFIC COMMITTEE)

- ▶ AGROSTAT2010, Benevento, Italy

March 2010

JAN JOHANNES

- “Minimax-optimal estimation in nonparametric instrumental regression”
9th German Open Conference on Probability and Statistics, Leipzig, Germany

April 2010

PIERRE DEVOLDER

- Congress MAF 2010, Ravello, Italy

June 2010

CHRISTIAN HAFNER

- Netherlands Econometrics Study Group (NESG) meeting
Leuven, Belgium
- Symposium for Computational Finance
National University of Singapore

LÉOPOLD SIMAR

- “Regularization of non-parametric frontier estimators”
North American Productivity Workshop VI, Department of Economics, Rice University, Houston (TX), USA

INGRID VAN KEILEGOM - INVITED

- “Goodness-of-fit tests for the relation between the regression function and the scale function with dependent data”
23rd Nordic Conference on Mathematical Statistics (NORDSTAT), Voss, Norway

RAINER VON SACHS

- SUSTAIN-Workshop on “Sparsity”, Bristol University, United Kingdom

August 2010

INGRID VAN KEILEGOM

- “Goodness-of-fit tests for multiplicative models with dependent data”
28th European Meeting of Statisticians, Piraeus, Greece
- Short course on “Inference for semiparametric Z-estimators”
28th European Meeting of Statisticians, Piraeus, Greece

RAINER VON SACHS - INVITED

- “Tree-structured wavelet estimation of spectral densities”
Annual IMS Meeting, Gothenburg, Sweden

10. APPENDIX

ABSTRACTS OF THE DISCUSSION PAPERS

DP0901 - Generalised regular variation of arbitrary order

- ▶ OMEY, E. AND J. SEGERS (2009)
- ▶ Let f be a measurable, real function defined in a neighbourhood of infinity. The function f is said to be of generalised regular variation if there exist functions $h \neq 0$ and $g > 0$ such that $f(xt) - f(t) = h(x)g(t) + o(g(t))$ as $t \rightarrow \infty$ for all $x \in (0, \infty)$. Zooming in on the remainder term $o(g(t))$ leads eventually to a relation of the form $f(xt) - f(t) = h_1(x)g_1(t) + \dots + h_n(x)g_n(t) + o(g_n(t))$, each g_i being of smaller order than its predecessor g_{i-1} . The function f is said to be generalised regularly varying of order n with rate vector $g = (g_1, \dots, g_n)'$. Under general assumptions, g itself must be regularly varying in the sense that $g(xt) = x^B g(t) + o(g_n(t))$ for some upper triangular matrix $B \in \mathbb{R}^{n \times n}$, and the vector of limit functions $h = (h_1, \dots, h_n)$ is of the form $h(x) = c \int_1^x u^B u^{-1} du$ for some row vector $c \in \mathbb{R}^{1 \times n}$. The usual results in the theory of regular variation such as uniform convergence and Potter bounds continue to hold. An interesting special case arises when all the rate functions g_i are slowly varying, yielding II-variation of order n , the canonical case being that B is equivalent to a single Jordan block with zero diagonal. The theory is applied to a long list of special functions.

DP0902 - Tree-structured wavelet estimation in a mixed effects model for spectra of replicated time series

- FREYERMUTH, J.-M., OUBAO, H., AND R. VON SACHS (2009)
- This paper develops a method for estimating the spectrum of a stationary process using time series traces recorded from experimental designs. Our procedure estimates the “common” log-spectrum and the variability over the traces (or subjects) using a mixed effects model. We combine the use of spatially adaptive smoothing methods with recursive dyadic partitioning to construct a predictive model. The method is easy to implement and can handle large data sets because it uses the discrete wavelet transform which is computationally efficient. Numerical studies confirm that the proposed method performs very well despite its simplicity. The method is also applied to a multi-subject electroencephalogram data set.

DP0903 - A computationally efficient, consistent bootstrap for inference with non-parametric DEA estimators

- KNEIP, A., SIMAR, L. AND P. W. WILSON (2009)
- We develop a tractable, consistent bootstrap algorithm for inference about Farrell-Debreu efficiency scores estimated by non-parametric data envelopment analysis (DEA) methods. The algorithm allows for very general situations where the distribution of the inefficiencies in the input-output space may be heterogeneous. Computational efficiency and tractability are achieved by avoiding the complex double-smoothing procedure in the algorithm proposed by Kneip et al. (2008). In particular, we avoid technical difficulties in the earlier algorithm associated with smoothed estimates of a density with unknown, nonlinear, multivariate bounded support requiring complicated reflection methods. The new procedure described here is relatively simple and easy to implement: for particular values of a pair of smoothing parameters, the computational complexity is the same as the (inconsistent) naive bootstrap. The resulting computational speed allows the bootstrap to be iterated in order to optimize the smoothing parameters. From a practical viewpoint, only standard packages for computing DEA efficiency estimates, i.e., solving linear problems, are required for implementation. The performance of the method in finite samples is illustrated through some simulated examples.

DP0904 - A generalized dynamic conditional correlation model: simulation and application to many assets

- HAFNER, C. M. AND P. H. FRANSES (2009)
- In this paper we put forward a generalization of the Dynamic Conditional Correlation (DCC) Model of Engle (2002). Our model allows for asset-specific correlation sensitivities, which is useful in particular if one aims to summarize a large number of asset returns. We propose two estimation methods, one based on a full likelihood maximization, the other on individual correlation estimates. The resultant GDCC model is considered for daily data on 39 UK stock returns in the FTSE. We find convincing evidence that the GDCC model improves on the DCC model and also on the CCC model of Bollerslev (1990).

DP0905 - Efficient estimation of a multivariate multiplicative volatility model

- HAFNER, C. M. AND O. B. LINTON (2009)
- We propose a multivariate generalization of the multiplicative volatility model of Engle and Rangel (2008), which has a nonparametric long run component and a unit multivariate GARCH short run dynamic component. We suggest various kernel-based estimation procedures for the parametric and nonparametric components, and derive the asymptotic properties thereof. For the parametric part of the model, we obtain the semiparametric efficiency bound. Our method is applied to a bivariate stock index series. We find that the univariate model of Engle and Rangel (2008) appears to be violated in the data whereas our multivariate model is more consistent with data.

DP0906 - On the covariance of the asymptotic empirical copula process

- GENEST, C. AND J. SEGERS (2009)
- Conditions are given under which the empirical copula process associated with a random sample from a bivariate continuous distribution has a smaller asymptotic covariance function than the standard empirical process based on observations from the copula. Illustrations are provided and consequences for inference are outlined.

DP0907 - Asymptotic distribution of conical-hull estimators of directional edges

- PARK, B. U., JEONG, S-O. AND L. SIMAR (2009)
- Non-parametric data envelopment analysis (DEA) estimators have been widely applied in analysis of productive efficiency. Typically they are defined in terms of convex-hulls of the observed combinations of inputs x outputs in a sample of enterprises. The shape of the convex-hull relies on hypothesis on the shape of the technology, defined as the boundary of the set of technically attainable points in the inputs E outputs space. So far, only the statistical properties of the smallest convex polyhedron enveloping the data points has been considered, which corresponds to a situation where the technology presents varying returns-to-scale (VRS). This paper analyzes the case where the most common constant returns-to-scale (CRS) hypothesis is assumed. Here the DEA is defined as the smallest conical-hull with vertex at the origin enveloping the cloud of observed points. In this paper we determine the asymptotic properties of this estimator, showing that the rate of convergence is better than for the VRS estimator. We derive also its asymptotic sampling distribution, with a practical way to simulate it. This allows to define a bias-corrected estimator and to build confidence intervals for the frontier. We compare in a simulated example the bias-corrected estimator with the original conical-hull estimator, and show its superiority in terms of median squared error.

DP0908 - A review on empirical likelihood methods for regression

- CHEN, S. X. AND I. VAN KEILEGOM (2009)
- We provide a review on the empirical likelihood method for regression type inference problems. The regression models considered in this review include parametric, semiparametric and nonparametric models. Both missing data and censored data are accommodated.

DP0909 - Classification of multivariate non-stationary signals: the SLEX-shrinkage approach

- BÖHM, H., OMBAO, H., VON SACHS, R. AND J. SANES (2009)
- We develop a statistical method for discriminating and classifying multivariate non-stationary signals. It is assumed that the processes that generate the signals are characterized by their time-evolving spectral matrix - a description of the dynamic connectivity between the time series components. Here, we address two major challenges: first, data massiveness and second, the poor conditioning that leads to numerically unstable estimates of the spectral matrix. We use the SLEX library (collection bases functions consisting of localized Fourier waveforms) to extract the best set of time-frequency features that best separate classes of time series. The SLEX approach yield readily interpretable results since it is a time-dependent analogue of Fourier approach to stationary time series. Moreover, it uses computationally efficient algorithms to enable handling of large data sets. We estimate the SLEX spectral matrix by shrinking the initial SLEX periodogram matrix estimator towards the identity matrix. The resulting shrinkage estimator has lower mean-squared error than the classical smoothed periodogram matrix. A leave-one out analysis for predicting motor intent (left vs. right movement) using electroencephalograms indicates that the proposed SLEX-Shrinkage method gives robust estimates of the evolutionary spectral matrix and good classification results.

DP0910 - Smoothed empirical likelihood confidence intervals for the relative distribution with left truncated and right censored data

- MOLANES LÓPEZ, E. M., CAO, R. AND I. VAN KEILEGOM (2009)
- The study of differences among groups is an interesting statistical topic in many applied fields. It is very common in this context to have data that are subject to mechanisms of loss of information, such as censoring and truncation. In the setting of a two-sample problem with data subject to left truncation and right censoring, we develop an empirical likelihood method to do inference for the relative distribution. We obtain a nonparametric generalization of Wilks' theorem and construct nonparametric pointwise confidence intervals for the relative distribution. Finally, we analyze the coverage probability of these confidence intervals through a simulation study.

DP0911 - A Bayesian framework for the ratio of two Poisson rates in the context of vaccine efficacy trials

- LAURENT, S. AND C. LEGRAND (2009)
- In many applications, we assume that two random observations x and y are generated according to independent Poisson distributions $P(\lambda S)$ and $P(\mu T)$ and we are interested to perform statistical inference on the ratio $\phi = \lambda/\mu$ of the two incidence rates. In vaccine efficacy trials, x and y are typically the numbers of cases in the vaccine and the control groups respectively, ϕ is called the relative risk and the statistical model is called 'partial immunity model'. In this paper we start by defining a natural semi-conjugate family of prior distributions for this model, allowing straightforward computation of the posterior inference. Following theory on reference priors, we define the reference prior for the partial immunity model when ϕ is the parameter of interest. We also define a family of reference priors with partial information on μ while remaining uninformative about ϕ . We notice that these priors

belong to the semi-conjugate family. We then demonstrate on numerical examples that Bayesian credible intervals for ϕ enjoy attractive frequentist properties when using reference priors, which is recognized as being a typical property of reference priors.

DP0912 - Goodness-of-fit tests for the error distribution in nonparametric regression

- HEUCHENNE, C. AND I. VAN KEILEGOM (2009)
- Suppose the random vector (X, Y) satisfies the regression model $Y=m(X)+\sigma(X)\varepsilon$, where $m(\cdot) = E\{Y|\cdot\}$, $\sigma^2(\cdot) = \text{Var}\{Y|\cdot\}$ and ε is independent of X . The covariate X is d -dimensional ($d \geq 1$), the response Y is one-dimensional, and m and σ are unknown but smooth functions. In this paper we study goodness-of-fit tests for the parametric form of the error distribution under this model, without assuming any parametric form for m or σ . The proposed tests are based on the difference between a non-parametric estimator of the error distribution and an estimator obtained under the null hypothesis of a parametric model. The large sample properties of the proposed test statistics are obtained, as well as those of the estimator of the parameter vector under the null hypothesis. Finally, the finite sample behavior of the proposed statistics, and the selection of the bandwidths for estimating m and σ are extensively studied via simulations.

DP0913 - Consistent density deconvolution under partially known error distribution

- SCHWARZ, M. AND S. VAN BELLEGEM (2009)
- We are interested in estimating the density f^X of a real-valued random variable X based on an i.i.d. sample from $Y = X + \varepsilon$, where ε is an independent additive error. In the literature, the density of the noise is usually supposed to be fully known. In contrast to this, we assume that ε is normally distributed, but with unknown variance $\sigma^2 > 0$. First, we show that $(f^X; \sigma^2)$ can be identified from the observations when f^X vanishes on a set of positive Lebesgue measure. As opposed to standard procedures, this identification condition is not based on properties of the densities' characteristic functions. Deconvolving a density is well-known not to be continuous with respect to the L^2 -norms, that is why it is called an ill-posed inverse problem. However, we show that deconvolution becomes continuous if we choose the topology of weak convergence for the deconvolution density and an appropriate topology for the observations' density. As a consequence, a minimum distance estimator of f^X will be weakly consistent imposing only a slightly stronger assumption than the identification condition. In particular, no further conditions on the densities' characteristic functions are required. The result remains true even if we do not require the involved probability distributions to have densities.

DP0914 - On standardness and l-cosiness

- LAURENT, S. (2009)
- The object of study of this work is the invariant characteristics of filtrations in discrete, negative time, pioneered by Vershik. We prove the equivalence between l-cosiness and standardness without using Vershik's standardness criterion. The equivalence between l-cosiness and productness for homogeneous filtrations is further investigated by showing that the l-cosiness criterion is equivalent to Vershik's

first level criterion separately for each random variable. We also aim to derive the elementary properties of both these criteria, and to give a survey and some complements on the published and unpublished literature.

DP0915 - On Vershikian and I-cosy random variables and filtrations

- LAURENT, S. (2009)
- We prove that the equivalence between Vershik's standardness criterion and the I-cosiness criterion for a filtration in discrete, negative time holds separately for each random variable. This gives a strengthening and a more direct proof of the global equivalence between these two criteria. We also provide more elementary original propositions on Vershik's standardness criterion, while emphasizing that similar statements for I-cosiness are sometimes not so obvious.

DP0916 - Locally stationary long memory estimation

- ROUEFF, F. AND R. VON SACHS (2009)
- Spectral analysis of strongly dependent time series data has a long history in applications in a variety of fields, such as, e.g., telecommunication, meteorology, hydrology or, more recently, financial and economical data analysis. There exists a wide literature on parametrically or semi-parametrically modelling such processes using a long-memory parameter d , including more recent work on wavelet estimation of d . As a generalization of these latter approaches, in this work we allow the long-memory parameter d to be varying over time. Hence, we give up the somewhat restrictive assumption of second-order stationarity of the observed process (or its increments, respectively, after differencing a finite number of times). We embed our approach into the framework of locally stationary processes which, over the past decade, has been developed for weakly dependent time series with a time-varying spectral structure. In this paper we adopt a semi-parametric approach for estimating the time-varying parameter d in order to avoid fitting a parametric model, such as ARFIMA, to the observed data. We show weak consistency and a central limit theorem for our log-regression wavelet estimator of the time-dependent d in a Gaussian context. Both simulations and a real data example complete our work on providing a fairly general approach.

DP0917 - Time-varying copulas: a survey

- MANNER, H. AND O. REZNIKOVA (2009)
- 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 function or the dependence parameter to be time-varying. First, we give a brief description of eight different models, among which there are fully parametric, semiparametric and adaptive methods. The purpose of this study is to compare the applicability of each particular model in different cases. 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 setups and the ability of the models to estimate the (latent) time-varying dependence parameter. Finally, we provide an illustration by applying the competing models on the same financial dataset and compare their performance by means of Value-at-Risk.

DP0918 - Further comments on the representation problem for stationary processes

- LAURENT, S. (2009)
- We comment on some points about the coding of stochastic processes by sequences of independent random variables. The most interesting question has to do with the standardness property of the filtration generated by the process, in the framework of Vershik's theory of filtrations. Non-standardness indicates the presence of long memory in a purely probabilistic sense. We aim to provide a short, non-technical presentation of Vershik's theory of filtrations.

DP0919 - Do we necessarily need longitudinal data to infer causal relations?

- WUNSCH, G., RUSSO, F. AND M. MOUCHART (2009)
- It is quite uncontroversial that causes precede their effects in time. This usually justifies the preference for longitudinal studies over cross-sectional ones, because the former allow modelling the dynamic process generating the outcome, while the latter cannot. Supporters of the longitudinal view make two interrelated claims: (i) causal inference requires following the same individuals over time, and (ii) we cannot make causal inferences from cross-sectional data. In this paper we challenge this view and offer counterarguments to both claims. We also argue that the possibility to establish causal relations does not so much depend upon whether we use longitudinal or cross-sectional data, but rather on whether the modelling strategy is structural or not.

DP0920 - Rejoinder on: a review on empirical likelihood methods for regression

- CHEN, S.X. AND I. VAN KEILEGOM (2009)
- We would first of all like to thank the two editors Ricardo Cao and Domingo Morales for giving us the opportunity to write this review paper. Furthermore, we would also like to take this opportunity to express our thanks to all discussants for their valuable comments, helpful suggestions, insightful ideas and stimulating discussions. We hope and believe that their input will lead to more interest and research in the area.

This rejoinder is organized as follows. In the next section we discuss some computational issues of the empirical likelihood method. The important problem of bandwidth selection, linked to the use of bootstrap procedures and Edgeworth expansions is discussed in Section 3. An often neglected problem is the choice of the criterion function in the construction of the empirical likelihood. This problem is discussed in Section 4. Finally, Sections 5, 6 and 7 are devoted to three types of complexities in the data: dependent data, censored data and high-dimensional data.

DP0921 - Innovation and export activities in the German mechanical engineering sector: an application of testing restrictions in production analysis

- SCHUBERT, T. AND L. SIMAR (2009)
- Since Solow (1956) the economic literature has widely accepted innovation and technological progress as the central drivers of long-term economic growth. From the microeconomic perspective, this has led to the idea that the growth effects on the macroeconomic level should be reflected in greater competitiveness of the firms. Although innovation effort does not always translate into greater competitiveness, it is recognized that innovation, is in an appropriate sense, unique and differs from

other inputs like labor or capital. Nonetheless, often this uniqueness is left unspecified. We analyze two arguments rendering innovation special, the first related to partly nondiscretionary innovation input levels and the second to the induced increase in the firm's competitiveness on the global market. Methodologically the analysis is based on restriction tests in non-parametric frontier models, where we use and extend tests proposed by Simar and Wilson (2001, 2009). The empirical data is taken from the German Community Innovation Survey 2007 (CIS 2007), where we focus on mechanical engineering firms. Our results are consistent with the explanation of the firms' inability to freely choose the level of innovation inputs. However, we do not find significant evidence that increased innovation activities correspond to an increase in the ability to serve the global market.

DP0922 - Regularization of nonparametric frontier estimators

- DAOUIA, A., FLORENS, J.-P. AND L. SIMAR (2009)
- In production theory and efficiency analysis, we are interested in estimating the production frontier which is the locus of the maximal attainable level of an output (the production), given a set of inputs (the production factors). In other setups, we are rather willing to estimate an input (or cost) frontier that is defined as the minimal level of the input (cost) attainable for a given set of outputs (goods or services produced). In both cases the problem can be viewed as estimating a surface under shape constraints (monotonicity, ...). In this paper we derive the theory of an estimator of the frontier having an asymptotic normal distribution. The basic tool is the order- m partial frontier where we let the order m to converge to infinity when $n \rightarrow \infty$ but at a slow rate. The final estimator is then corrected for its inherent bias. We thus can view our estimator as a regularized frontier estimator which, in addition, is more robust to extreme values and outliers than the usual nonparametric frontier estimators, like FDH. The performances of our estimators are evaluated in finite samples through some Monte-Carlo experiments. We illustrate also how to provide, in an easy way, confidence intervals for the frontier function both with a simulated data set and a real data set.

DP0923 - Nonparametric estimation of an extreme-value copula in arbitrary dimensions

- GUDENDORF, G. AND J. SEGERS (2009)
- Inference on an extreme-value copula usually proceeds via its Pickands dependence function, which is a convex function on the unit simplex satisfying certain inequality constraints. In the setting of an iid random sample from a multivariate distribution with known margins and unknown extreme-value copula, an extension of the Capéraà–Fougères–Genest estimator was introduced by D. Zhang, M. T. Wells and L. Peng [Journal of Multivariate Analysis 99 (2008) 577–588]. The joint asymptotic distribution of the estimator as a random function on the simplex was not provided. Moreover, implementation of the estimator requires the choice of a number of weight functions on the simplex, the issue of their optimal selection being left unresolved. A new, simplified representation of the CFG-estimator combined with standard empirical process theory provides the means to uncover its asymptotic distribution in the space of continuous, real-valued functions on the simplex. Moreover, the ordinary least-squares estimator of the intercept in a certain linear regression model provides an adaptive version of the CFG-estimator whose asymptotic behavior is the

same as if the variance-minimizing weight functions were used. As illustrated in a simulation study, the gain in efficiency can be quite sizeable.

DP0924 - Equivalent local martingale measures and market incompleteness in a continuous time semi-Markov regime switching model

- HUNT, J. (2009)
- We present a continuous time semi-Markov regime switching model with discrete state-space. The notion of equivalent local martingale measures is studied in this setting. We go on to prove that this market is incomplete. We then extend our market by adding some assets. In this setting, we derive a condition for uniqueness of the equivalent local martingale measure. Furthermore, we derive a condition for completeness of the market. We show that these two conditions are in fact equivalent but only because we work with a finite state space.

DP0925 - Risk concentration and diversification: second-order properties

- DEGEN, M., LAMBRIGGER, D.D. AND J. SEGERS (2009)
- The quantification of diversification benefits due to risk aggregation plays a prominent role in the (regulatory) capital management of large firms within the financial industry. However, the complexity of today's risk landscape makes a quantifiable reduction of risk concentration a challenging task. In the present paper we discuss some of the issues that may arise. The theory of second-order regular variation and second-order subexponentiality provides the ideal methodological framework to derive second-order approximations for the risk concentration and the diversification benefit.

DP0926 - Extreme-value copulas

- GUDENDORF, G. AND J. SEGERS (2009)
- 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.

DP0927 - A randomized phase II study comparing two schedules of the 21-day regime of Gemcitabine and Carboplatin in advanced NSCLC

- SURMONT, V., AERTS J.G.J.V., VAN KLAVEREN R.J., TOURNOY K., TAN K., VERNHOUT R.M., SCHMITZ P.I.M, LEGRAND C., HOOGSTEDEN H.C. AND J.P. VAN MEERBEECK (2009)
- [No abstract available].

DP0928 - Diagnostic performance of soluble mesothelin and megakaryocyte potentiating factor as biomarkers of mesothelioma

- HOLLEVOET, K., KELLEN, E., THIMPONT, J., GERMONPRÉ, P., DE VUYST, P., BOSQUÉE, L., LEGRAND, C., KISHI, Y., NACKAERTS, K., DELANGHE, J.R., AND J.P. VAN MEERBEECK (2009)
- [No abstract available].

DP0929 - Sample size in randomized clinical trials in oncology:usefull basic statistical knowledge for the clinician

- MEYER, N., LEGRAND, C., AND G. GIACCONE (2009)
- (No abstract available).

DP0930 - Nonparametric Bayesian inference on bivariate extremes

- GUILLOTTE, S., PERRON, F., AND J. SEGERS (2009)
- The tail of a bivariate distribution function in the domain of attraction of a bivariate extreme-value distribution may be approximated by the one of its extreme-value attractor. The extreme-value attractor has margins that belong to a three-parameter family and a dependence structure which is characterised by a spectral measure, that is a probability measure on the unit interval with mean equal to one half. As an alternative to parametric modelling of the spectral measure, we propose an infinite-dimensional model which is at the same time manageable and still dense within the class of spectral measures. Inference is done in a Bayesian framework, using the censored-likelihood approach. In particular, we construct a prior distribution on the class of spectral measures and develop a trans-dimensional Markov chain Monte Carlo algorithm for numerical computations. The method provides a bivariate predictive density which can be used for predicting the extreme outcomes of the bivariate distribution. In a practical perspective, this is useful for computing rare event probabilities and extreme conditional quantiles. The methodology is validated by simulations and applied to a data-set of Danish fire insurance claims.

DP0931 - Adaptive circular deconvolution by model selection under unknown error distribution

- JOHANNES, J. AND M. SCHWARZ (2009)
- We consider a circular deconvolution problem, where the density f of a circular random variable X has to be estimated nonparametrically based on an iid. sample from a noisy observation Y of X . The additive measurement error is supposed to be independent of X . The objective of this paper is the construction of a fully data-driven estimation procedure when the error density ϕ is unknown. However, we suppose that in addition to the iid. sample from Y , we have at our disposal an additional iid. sample independently drawn from the error distribution. First, we develop a minimax theory in terms of both sample sizes. However, the proposed orthogonal series estimator requires an optimal choice of a dimension parameter depending on certain characteristics of f and ϕ , which are not known in practice. The main issue addressed in our work is the adaptive choice of this dimension parameter using a model selection approach. In a first step, we develop a penalized minimum contrast estimator supposing the degree of ill-posedness of the underlying inverse problem to be known, which amounts to assuming partial knowledge of the error distribution. We show that this data-driven estimator can attain the lower risk bound up to a constant in both sample sizes n and m over a wide range of density classes covering in particular ordinary and super smooth densities. Finally, by randomizing the penalty and the collection of models, we modify the estimator such that it does not require any prior knowledge of the error distribution anymore. Even when dispensing with any hypotheses on ϕ this fully data-driven estimator still preserves minimax optimality in almost the same cases as the partially adaptive estimator.

DP0932 - Some Poisson mixtures distributions with a hyperscale parameter

- LAURENT, S. (2009)
- We mainly investigate certain mixtures of Poisson distributions with a scale parameter in the mixing distribution. They help us to derive the bivariate Poisson mixtures arising from the prior and posterior predictive distributions in the semi-conjugate family defined by Laurent and Legrand (2009) for the 'two Poisson samples' model, which contains in particular the reference prior for the ratio of the two Poisson rates. As a by-product, we get a flexible family of priors for the 'one Poisson sample' model whose prior predictive distributions form the Beta-negative binomial family.

DP0933 - Inference by subsampling in nonparametric frontier models

- SIMAR, L. AND P.W. WILSON (2009)
- This paper provides a simple, tractable bootstrap for use with Data Envelopment Analysis (DEA) estimators in nonparametric frontier models. It is well-known that a naive bootstrap yields inconsistent inference in this context. However, subsampling – where for a sample of size n bootstrap pseudo-samples of size $m < n$ are drawn from the empirical distribution of pairs of observed input-output vectors – provides consistent inference, although coverages are quite sensitive to the choice of subsample size m . We show that a simple, data-based rule for selecting m gives confidence interval estimates with good coverage properties. In addition, we show that subsampling performs well for testing hypotheses about returns to scale and other features of the model when a similar data-based rule is used to select m . Our methods (i) allow for heterogeneity in the inefficiency process, and unlike previous methods, (ii) do not require multivariate kernel smoothing, and (iii) avoid the need for solutions of intermediate linear programs.

DP0933a - Inference by subsampling in nonparametric frontier models: Appendix

- SIMAR, L. AND P.W. WILSON (2009)

DP0934 - Jackknife empirical likelihood method for copulas

- PENG, L., QI, Y. AND I. VAN KEILEGOM (2009)
- Copulas are used to depict dependence among several random variables. Both parametric and non-parametric estimation methods have been studied in the literature. Moreover, profile empirical likelihood methods based on either empirical copula estimation or smoothed copula estimation have been proposed to construct confidence intervals of a copula. In this paper, a jackknife empirical likelihood method is proposed to reduce the computation with respect to the existing profile empirical likelihood methods.

DP0935 - Smooth semi- and nonparametric Bayesian estimation of bivariate densities from bivariate histogram data

- LAMBERT, PH. (2009)
- We show how penalized B-splines combined with the composite link model can be used to estimate a bivariate density from histogram data. Two strategies are proposed: the first one is semi-parametric with flexible margins modeled using B-splines and a parametric copula for the dependence structure; the second one is nonparametric and is based on Kronecker products of the marginal B-splines bases.

Frequentist and Bayesian estimations are described. A large simulation study quantifies the performances of both methods under different dependence structures and varying strengths of dependence, sample sizes and amounts of grouping. It suggests that Schwarz's BIC is a good tool for classifying the competing models. The density estimates are used to evaluate conditional quantiles in two applications in social and in medical sciences.

DP0936 - Dynamic stochastic copula models: Estimation, inference and applications

- ▶ HAFNER, C.M. AND H. MANNER, (2009)
- ▶ We propose a new dynamic copula model where the parameter characterizing dependence follows an autoregressive process. As this model class includes the Gaussian copula with stochastic correlation process, it can be viewed as a generalization of multivariate stochastic volatility models. Despite the complexity of the model, the decoupling of marginals and dependence parameters facilitates estimation. We propose estimation in two steps, where first the parameters of the marginal distributions are estimated, and then those of the copula. Parameters of the latent processes (volatilities and dependence) are estimated using efficient importance sampling (EIS). We discuss goodness-of-fit tests and ways to forecast the dependence parameter. For two bivariate stock index series, we show that the proposed model outperforms standard competing models.

DP0937 - Scale checks in censored regression

- ▶ DETTE, H. AND C. HEUCHENNE (2009)
- ▶ Suppose the random vector (X, Y) satisfies the regression model $Y = m(X) + \sigma(X)\epsilon$, where $m(\cdot)$ and $\sigma(\cdot)$ are unknown location and scale functions and ϵ is independent of X . The response Y is subject to random right censoring and the covariate X is completely observed. A new test for a specific parametric form of any scale function $\sigma(\cdot)$ (including the standard deviation function) is proposed. Its statistic is based on the distribution of the residuals obtained from the assumed regression model. Weak convergence of the corresponding process is obtained and its finite sample behaviour is studied via simulations. Finally, characteristics of the test are illustrated in the analysis of a fatigue data set.

DP0938 - Tails of correlation mixtures of elliptical copulas

- ▶ MANNER, H. AND J. SEGERS (2009)
- ▶ Correlation mixtures of elliptical copulas arise when the correlation parameter is driven itself by a latent random process. For such copulas, both penultimate and asymptotic tail dependence are much larger than for ordinary elliptical copulas with the same unconditional correlation. Furthermore, for Gaussian and Student t -copulas, tail dependence at sub-asymptotic levels is generally larger than in the limit, which can have serious consequences for estimation and evaluation of extreme risk. Finally, although correlation mixtures of Gaussian copulas inherit the property of asymptotic independence, at the same time they fall in the newly defined category of near asymptotic dependence. The consequences of these findings for modeling are assessed by means of a simulation study and a case study involving financial time series.

DP0939 - Comparaison et classifications de séries temporelles via leur développement en ondelettes de Haar asymétriques,

Actes des XVI^e rencontres de la société francophone de classification, 2009.

- ▶ TIMMERMANS, C., VON SACHS, R. AND V. DELOUILLE (2009)
- ▶ [No abstract available]

DP0940 - Smooth estimation of survival functions and hazard ratios from interval-censored data using Bayesian penalized B-splines

- ▶ CETINYÜREK-YAVUZ, A. AND PH. LAMBERT (2009)
- ▶ We discuss the use of Bayesian P-spline and of the composite link model to estimate survival functions and hazard-ratios from interval-censored data. If one further assumes proportionality of the hazards, the proposed strategy provides a smoothed estimate of the baseline hazard along with estimates of global covariate effects. The frequentist properties of our Bayesian estimators are assessed by an extensive simulation study. We further illustrate the methodology by three examples showing that the proportionality of the hazards might also be found inappropriate from interval-censored data.

DP0941 - Combination of independent component analysis and statistical modelling for the identification of metabonomics biomarkers in 1H-NMR spectroscopy

- ▶ ROUSSEAU, R., GOVAERTS, B. AND M. VERLEYSEN (2009)
- ▶ In order to maintain life, living organisms produce and transform small molecules called "Metabolites". Metabonomics is a scientific platform, studying the development of biological reactions caused by a contact with a physio-pathological stimulus, through the metabolites. The 1H-NMR spectroscopy is used to describe the metabolites composition on the basis of spectra. Biologists can then confirm the development of a biological reaction if specific spectral regions ("biomarkers") are altered in spectra obtained in given physiological situations. However, this process supposes a preliminary identification in an experimental database of the biomarkers or spectral regions, to examine because of their changes in case of the biological response. Traditionally, this identification is realised with some limitations, by examination of the 2 first components from a Principal Component Analysis.

This paper presents a new methodology in four steps providing two kinds of knowledge on 1H-NMR metabonomics biomarkers: the identification of biomarkers and the visualization of the effects on the biomarkers caused by external changes of interest. A first step employs Independent Component Analysis in order to decompose the spectral data into statistically independent components or sources. The independent pure or composite metabolites contained in the studied biofluid are discovered through the sources and their quantity through the mixing weights. The advantages of independent components to overview the data are described comparatively to the usual PCA analysis. Solutions for questions specific to ICA like the choice of the number of components and their ordering have been developed. The second step consists on a statistical modelling applied to the ICA results. Statistical hypothesis tests on the parameters of the estimated models lead in the third step, to select sources presenting biomarkers or spectral regions changing significantly according to the factor of interest. A panel of various statistical models is considered adaptively to the possible nature of the biomarker question. Finally, the last step

proposes the computation of contrasts to visualize changes on the spectral biomarkers caused by different changes of a factor of interest. The methodology and its efficiency are illustrated on two experimental datasets.

DP1001 - A functional limit theorem for partial sums of dependent random variables with infinite variance

- ▶ BASRAK, B., KRIZMANIC, D. AND J. SEGERS (2010)
- ▶ Under an appropriate regular variation condition, the affine normalized partial sums of a sequence of independent and identically distributed random variables converges weakly to a non-Gaussian stable random variable. A functional version of this is known to be true as well, the limit process being a stable Lévy process. The main result in the paper is that for a stationary, regularly varying sequence for which clusters of high threshold excesses can be broken down into asymptotically independent blocks, the properly centred partial sum process still converges to a stable Lévy process. Due to clustering, the Lévy triple of the limit process can be different from the one in the independent case. The convergence takes place in the space of càdlàg functions endowed with Skorohod's \mathcal{M}_1 topology, the more usual \mathcal{J}_1 topology being inappropriate as the partial sum processes may exhibit rapid successions of jumps within temporal clusters of large values, collapsing in the limit to a single jump. The result rests on a new limit theorem for point processes which is of independent interest. The theory is applied to moving average processes, squared GARCH(1,1) processes, and stochastic volatility models.

DP1002 - Regularly varying time series in Banach spaces

- ▶ MEINGUET, T. AND J. SEGERS (2010)
- ▶ When a spatial process is recorded over time and the observation at a given time instant is viewed as a point in a function space, the result is a time series taking values in a Banach space. To study the spatio-temporal extremal dynamics of such a time series, the latter is assumed to be jointly regularly varying. This assumption is shown to be equivalent to convergence in distribution of the rescaled time series conditionally on the event that at a given moment in time it is far away from the origin. The limit is called the tail process or the spectral process depending on the way of rescaling. These processes provide convenient starting points to study, for instance, joint survival functions, tail dependence coefficients, extremograms, extremal indices, and point processes of extremes. The theory applies to linear processes composed of infinite sums of linearly transformed independent random elements whose common distribution is regularly varying.

DP1003 - A short note on continuous-time Markov and semi-Markov processes

- ▶ HUNT, J. (2010)
- ▶ In this paper, we present some features of jump Markov processes (both homogeneous and non-homogeneous) and semi-Markov processes. We also insist on these processes from the viewpoint of marked point processes. This allows us to highlight differences and convergence points between these processes. Specifically, we recall and show that a Markov process can have a duration distribution that is not exponential. We also show that the form of the compensator associated to these processes can allow us to differentiate between them in terms of the Markov property. Finally, we briefly discuss which process to use when it comes to modelling.

DP1004 - Occupational exposure to noise and the prevalence of hearing loss in a Belgian military population: a cross-sectional study. Military Medicine,

Under revision.

- COLLEE, A., LEGRAND, C., GOVAERTS, B., VAN DER VEKEN, P., DE BOODT, F. AND E. DEGRAVE (2010)
- [No abstract available]

DP1005 - Samples sizes in oncology trials: a survey.

- MEYER, N., LEGRAND, C. AND G. GIACCONE (2010)
- [No abstract available]

DP1006 - On the estimation of dynamic conditional correlation models

- HAFNER, C.M. AND O. REZNIKOVA (2010)
- It is now well recognized that the maximum likelihood estimator applied to the dynamic conditional correlation model is severely biased in high dimensions and, in particular, in cases where the time series dimension is close to the sample size. In this paper, we argue that one of the reasons for the bias lies in an ill-conditioned sample covariance matrix, which is used in the so-called variance targeting technique to match sample and theoretical unconditional covariances. We propose to reduce the bias by using shrinkage to target methods for the sample covariance matrix. As targets we use, alternatively, the identity matrix, a single factor model, and equicorrelation. Since the shrinkage intensity decreases towards zero with increasing sample size, the estimator is asymptotically equivalent to the efficient maximum likelihood estimator. The finite sample performance of the proposed estimator over alternative estimators is demonstrated through a Monte Carlo study. Finally, we provide an illustrative application to financial time series.

DP1007 - Estimation of a general parametric location in censored regression

- HEUCHENNE, C. AND I. VAN KEILEGOM (2010)
- Consider the random vector (X, Y) , where Y represents a response variable and X an explanatory variable. The response Y is subject to random right censoring, whereas X is completely observed. Let $m(x)$ be a conditional location function of Y given $X=x$. In this paper we assume that $m(\cdot)$ belongs to some parametric class $M=\{m_{\theta}; \theta \in \Theta\}$ and we propose a new method for estimating the true unknown value θ_0 . The method is based on nonparametric imputation for the censored observations. The consistency and asymptotic normality of the proposed estimator are established.

DP1008 - Transformations of multivariate regularly varying tail distributions

- DAVYDOV, Y. AND S. LIU (2010)
- Let X be a random vector in \mathbb{R}^d with a regularly varying tail. We consider two transformations
 $\|X\|f(x/\|X\|), f: S^{d-1} \rightarrow S^{d-1}$, and $Xf(x/\|X\|), f: S^{d-1} \rightarrow \mathbb{R}_+$
Some sufficient conditions for preserving the property of regularity of the tail for this kind of transformations are given.

DP1009 - First-order mortality rates and safe-side actuarial calculations in life insurance

- CHRISTIANSEN, M. AND M. DENUIT (2010)
- In this paper, we discuss how to define conservative biometric bases in life insurance. The first approach is based on cumulative hazard (or survival probabilities), the second one on the hazard itself, and the third one on the hazard ascent. The second case has been studied in the literature and the sum-at-risk plays a central role in defining safe-side requirements. The two other cases appear to be new and concepts related to sum-at-risk are defined.

DP1010 - Stronger measures of higher-order risk attitudes

- EECKHOUDT, L. AND M. DENUIT (2010)
- This paper aims to extend the results by Ross [15] and by Modica and Scarsini [13] to stochastic dominance of degree 4 and over. Specifically, it is shown that Ross' approach can be extended to any order of risk attitude beyond the generalization proposed by Modica and Scarsini by means of sth degree increase in risk defined by Ekern [8].

DP1011 - Comonotonic approximations to quantiles of life annuity conditional expected present values: extensions to general ARIMA models and comparison with the bootstrap

- DENUIT, M., HABERMAN, S. AND A. RENSHAW (2010)
- This paper aims to provide accurate approximations for the quantiles of the conditional expected present value of the payments to the annuity provider, given the future path of the Lee-Carter time index. Conditional cohort and period life expectancies are also considered. The paper also addresses some associated simulation issues, which, hitherto, have been unresolved.

DP1012 - Generalized increasing convex and directionally convex orders

- DENUIT, M. AND M. MESFIQUI (2010)
- In this paper, the componentwise increasing convex order, the upper orthant order, the upper orthant convex order and the increasing directionally convex order for random vectors are generalized to hierarchical classes of integral stochastic order relations. The elements of the generating classes of functions possess non-negative partial derivatives up to some given degrees. Some properties of these new stochastic order relations are studied. A particular attention is paid to the comparison of weighted sums of the respective components of ordered random vectors. By providing a unified derivation of standard multivariate stochastic orderings, the present paper shows how some well-known results derive from a common principle.

DP1013 - A general index of absolute risk attitude

- DENUIT, M. AND L. EECKHOUDT (2010)
- Many results involving expected utility theory call upon the notions of absolute risk aversion, prudence and/or temperance. The present paper exploits a representation of the Friedman-Savage utility premium to give a general foundation for such coefficients and for their higher-order extensions.

DP1014 - Composite Lognormal-Pareto model with random threshold

- PIGEON, M. AND M. DENUIT (2010)
- This paper further considers the composite Lognormal-Pareto model proposed by COORAY & ANANDA (2005) and suitably modified by SCOLLNIK (2007). This model is based on a lognormal density up to an unknown threshold value and a Pareto density thereafter. Instead of using a single threshold value applying uniformly to the whole data set, the model proposed in the present paper allows for heterogeneity with respect to the threshold and let it vary among observations. Specifically, the threshold value for a particular observation is seen as the realization of a positive random variable and the mixed composite Lognormal-Pareto model is obtained by averaging over the population of interest. The performance of the composite Lognormal-Pareto model and of its mixed extension is compared using the well-known Danish fire losses data set.

DP1015 - Correlated risks, bivariate utility and optimal choices

- DENUIT, M., EECKHOUDT, L. AND M. MENEGATTI (2010)
- In this paper, we consider a decision-maker facing a financial risk flanked by a background risk, possibly non-financial, such as health or environmental risk. A decision has to be made about the amount of an investment (in the financial dimension) resulting in a future benefit either in the same dimension (savings) or in the other dimension (environmental quality or health improvement). In the first case, we show that the optimal amount of savings decreases as the pair of risks increases in the bivariate increasing concave dominance rules of higher degrees which express the common preferences of all the decision-makers whose two-argument utility function possesses direct and cross derivatives fulfilling some specific requirements. Roughly speaking, the optimal amount of savings decreases as the two risks become "less positively correlated" or marginally improve in univariate stochastic dominance. In the second case, a similar conclusion on optimal investment is reached under alternative conditions on the derivatives of the utility function.

DP1016 - Ruin problems in presence of underwriting cycles

- TRUFIN, J., ALBRECHER, H. AND M. DENUIT (2010)
- [No abstract available]

DP1017 - Some consequences of correlation aversion in decision science

- DENUIT, M., EECKHOUDT, L. AND B. REY (2010)
- [No abstract available]

DP1018 - Bivariate stochastic dominance and common preferences of decision-makers with risk independent utilities

- DENUIT, M. AND L. EECKHOUDT (2010)
- The close link between bivariate stochastic dominance relations and the common preferences of the decision-makers with independent multiattribute utility functions is discussed. Specifically, the common preferences of all the decision-makers with a utility function expressing risk independence are shown to coincide with bivariate stochastic dominance expressing correlation aversion. As an application, portfolios are compared to assess the possible hedging effect between two outcomes.

DP1019 - Properties of risk measures derived from ruin theory

- TRUFIN, J., ALBRECHER, H. AND M. DENUIT (2010)
- This paper studies a risk measure inherited from ruin theory and investigates some of its properties. Specifically, we consider a VaR-type risk measure defined as the smallest initial capital needed to ensure that the ultimate ruin probability is less than a given level. This VaR-type risk measure turns out to be equivalent to the VaR of the maximal deficit of the ruin process in infinite time. A related tail-VaR-type risk measure is also discussed.

DP1020 - Adding independent risks in an insurance portfolio: Which shape for the insurer's preferences?

- DENUIT, M., EECKHOUDT, L. AND M. MENEGATTI (2010)
- Many papers adopted the expected utility paradigm to analyze insurance decisions. Insurance companies manage policies by adding independent risks. However the impact of this on the insurer's expected utility is not completely clear. Indeed, it is not true that risk aversion toward the additional loss generated by a new policy included in an insurance portfolio is a decreasing function of the number of contracts already underwritten (i.e. the "fallacy of large numbers"). This paper shows that most commonly used utility functions do not necessarily positively value the aggregation of independent risks so that they are not eligible for insurers. This casts some doubt about conclusions drawn in the papers postulating such completely monotonic utilities for guiding insurers' choices. Finally, we show that the sufficient conditions for adding risks that can be found in the literature need to be refined by restricting the domain of definition of the insurer's utility function.

DP1021 - Prudence, temperance, edginess, and higher degree risk apportionment as decreasing correlation aversion

- DENUIT, M. AND B. REY (2010)
- This paper shows that the notions of prudence, temperance, edginess, and, more generally, risk apportionment of any degree are the consequences of the natural idea that the sensitivity to detrimental changes should decrease with initial wealth. In the setting of EPSTEIN & TANNY (1980), this turns out to be equivalent to the supermodularity of the expected utility for some specific 4-state lotteries.

DP1022 - Ruin problems under IBNR dynamics

- TRUFIN, J., ALBRECHER, H. AND M. DENUIT (2010)
- (No abstract available)

DP1023 - Longevity-indexed life annuities

- DENUIT, M., HABERMAN, S. AND A. RENSHAW (2010)
- This paper addresses the problem of the sharing of longevity risk between an annuity provider and a group of annuitants. An appropriate longevity index is designed in order to adapt the amount of the periodic payments in life annuity contracts. This accounts for unexpected longevity improvements experienced by a given reference population. The approach described in the present paper is in contrast with Group Self-Annuitization where annuitants bear their own risk. Here, the annuitants only bear the non-diversifiable risk that the future mortality trend departs from that of

the reference forecast. In that respect, the life annuities discussed in this paper are substitutes for reinsurance and securitization of longevity risk.

DP1024 - Transformations preserving stochastic dominance: Theory and applications

- DENUIT, M., EECKHOUDT, L. AND O. JOKUNG (2010)
- [No abstract available]

DP1025 - Positive dependence of signals

- DENUIT, M. (2010)
- [No abstract available]

DP1026 - Adaptive nonparametric instrumental regression by model selection

- JOHANNES, J. AND M. SCHWARZ (2010)
- We consider the problem of estimating the structural function in nonparametric instrumental regression, where in the presence of an instrument W a response Y is modeled in dependence of an endogenous explanatory variable Z . The proposed estimator is based on dimension reduction and additional thresholding. The minimax optimal rate of convergence of the estimator is derived assuming that the structural function belongs to some ellipsoids which are in a certain sense linked to the conditional expectation operator of Z given W . We illustrate these results by considering classical smoothness assumptions. However, the proposed estimator requires an optimal choice of a dimension parameter depending on certain characteristics of the unknown structural function and the conditional expectation operator of Z given W , which are not known in practice. The main issue addressed in our work is a fully adaptive choice of this dimension parameter using a model selection approach under the restriction that the conditional expectation operator of Z given W is smoothing in a certain sense. In this situation we develop a penalized minimum contrast estimator with randomized penalty and collection of models. We show that this data-driven estimator can attain the lower risk bound up to a constant over a wide range of smoothness classes for the structural function.

DP1027 - Maxima of moving maxima of continuous functions

- MEINGUET, T. (2010)
- Maxima of moving maxima of continuous functions (CM3) are max-stable processes aimed at modeling extremes of continuous phenomena over time. They are defined as Smith and Weissman's M4 processes with continuous functions rather than vectors. After standardization of the margins of the observed process into unit-Fréchet, CM3 processes can model the remaining spatio-temporal dependence structure. CM3 processes have the property of joint regular variation. The spectral processes from this class admit particularly simple expressions. Furthermore, depending on the speed with which the parameter functions tend toward zero, CM3 processes fulfil the finite-cluster condition and the strong mixing condition. For instance, these three properties put together have implications for the expression of the extremal index. A method for fitting a CM3 to data is investigated. The first step is to estimate the length of the temporal dependence. Then, by selecting a suitable number of blocks of extremes of this length, clustering algorithms are used to estimate the

total number of different profiles. The number of parameter functions to retrieve is equal to the product of these two numbers. They are estimated thanks to the output of the partitioning algorithms in the previous step. The full procedure only requires one parameter which is the range of variation allowed among the different profiles. The dissimilarity between the original CM3 and the estimated version is evaluated by means of the Hausdorff distance between the graphs of the parameter functions.

DP1028 - Nonparametric frontier estimation from noisy data

- SCHWARZ, M., VAN BELLEGEM, S. AND J.P. FLORENS (2010)
- A new nonparametric estimator of production a frontier is defined and studied when the data set of production units is contaminated by measurement error. The measurement error is assumed to be an additive normal random variable on the input variable, but its variance is unknown. The estimator is a modification of the m-frontier, which necessitates the computation of a consistent estimator of the conditional survival function of the input variable given the output variable. In this paper, the identification and the consistency of a new estimator of the survival function is proved in the presence of additive noise with unknown variance. The performance of the estimator is also studied through simulated data.

DP1029 - Inferring causality through counterfactuals in observational studies some epistemological issues

- RUSSO, F., WUNSCH, G. AND M. MOUCHART (2010)
- This paper contributes to the debate on the virtues and vices of counterfactuals as a basis for causal inference, the general goal being to put the counterfactual approach in perspective. We discuss a number of issues, ranging from its non-observable basis to the parallelisms drawn between the counterfactual approach in statistics and in philosophy. We argue that the question is not to oppose or to endorse the counterfactual approach as a matter of principle, but to decide what modelling framework to adopt depending on the research context.

DP1030 - BAGIDIS, a new method for statistical analysis of differences between curves with sharp discontinuities

- VON SACHS, R. AND C. TIMMERMANS (2010)
- In this paper, we introduce a functional wavelet based semi-distance for comparing curves with sharp patterns that might not be well aligned from one curve to another. This semi-distance is data-driven and highly adaptive to the curves being studied. Its main originality is its ability to consider simultaneously horizontal and vertical variations of patterns, which proves highly useful when used together with clustering algorithms or visualization method. We also develop statistical tools for detecting and localizing differences between groups of curves using this semi-distance. Finally, we apply this methodology to H-NMR spectrometric curves and solar irradiance time series.

DP1031 - Testing whether two-stage estimation is meaningful in non-parametric models of production

- DARAIO, C., SIMAR, L. AND P.W. WILSON (2010)
- Simar and Wilson (*J. Econometrics*, 2007) provided a statistical model that can rationalize two-stage estimation of technical efficiency in non-parametric settings. Two-stage estimation has been widely used, but requires a strong assumption: the second-stage environmental variables cannot affect the support of the input and output variables in the first stage. In this paper, we provide a fully non-parametric test of this assumption; in addition, we provide a theoretical link to results obtained by Politis et al. (*Statistica Sinica*, 2001), allowing us to estimate critical values for our test statistics using bootstrap sub-sampling while optimizing the choice of sub-sample size by minimizing a measure of volatility. Our simulation results indicate that our tests perform well both in terms of size and power. We present a real-world empirical example by updating the analysis performed by Aly et al. (*R. E. Stat.*, 1990) on U.S. commercial banks; our tests easily reject the assumption required for two-stage estimation, calling into question results that appear in hundreds of papers that have been published in recent years.

DP1032 - Estimation of parameters of regularly varying distributions on convex cones

- DAVYDOV, Y. AND S. LIU (2010)
- The objective of this paper is to extend an estimation method of parameters of the stable distributions in \mathbb{R}^d to the regularly varying tails distributions in an arbitrary cone. The consistency and the asymptotic normality of estimators are proved. The sampling method of regrouping is modified to optimize the rate of convergence of estimators.

DP1033 - Robust estimation for homoscedastic regression in the secondary analysis of case-control data

- VAN KEILEGOM, I. AND N. CHATTERJEE (2010)
- Primary analysis of case-control studies focuses on the relationship between disease (D) and a set of covariates of interest (X, Y) . A secondary application of the case-control study, often invoked in modern genetic epidemiologic association studies, is to investigate the interrelationship between the covariates themselves. The task is complicated due to case-control sampling. Previous work has assumed a parametric distribution for Y given X and derived semiparametric efficient estimation and inference without any distributional assumptions about X .

In this paper, we take up the issue of estimation of a regression function when Y given X follows a homoscedastic regression model, but otherwise the distribution of Y is unspecified. The semiparametric efficient approaches can be used to construct semiparametric efficient estimates, but they suffer from a lack of robustness to the assumed model for Y given X . We take an entirely different and novel approach in the case that the disease is rare. We show how to estimate the regression parameters in the rare disease case even if the assumed model for Y given X is incorrect, and thus the estimates are model-robust. Simulations and empirical examples are used to illustrate the approach.

DP1034 - The Solvency II square-root formula for systematic biometric risk

- ▶ CHRISTIANSEN, M., DENUIT, M. AND D. LAZAR (2010)
- ▶ In this paper, we develop a model supporting the so-called square-root formula used in Solvency II to aggregate the modular life SCR. Describing the insurance policy by a Markov jump process, we can obtain expressions similar to the square-root formula in Solvency II by the means of limited expansions around the best estimate. Numerical illustrations are given, based on German population data. Even if the square-root formula can be supported by theoretical considerations, it is shown that the QIS correlation matrix is highly questionable.

DP1035 - Multivariate concave and convex stochastic dominance

- ▶ DENUIT, M., EECKHOUDT, L., TSETLIN, I. AND R.L. WINKLER (2010)
- ▶ Stochastic dominance permits a partial ordering of alternatives (probability distributions on consequences) based only on partial information about a decision maker's utility function. Univariate stochastic dominance has been widely studied and applied, with general agreement on classes of utility functions for dominance of different degrees. Extensions to the multivariate case have received less attention and have used different classes of utility functions, some of which require strong assumptions about utility. We investigate multivariate stochastic dominance using a class of utility functions that is consistent with a basic preference assumption, can be related to well-known characteristics of utility, and is a natural extension of the stochastic order typically used in the univariate case. These utility functions are multivariate risk averse, and reversing the preference assumption allows us to investigate stochastic dominance for utility functions that are multivariate risk seeking. We provide insight into these two contrasting forms of stochastic dominance, develop some criteria to compare probability distributions (hence alternatives) via multivariate stochastic dominance, and illustrate how this dominance could be used in practice to identify inferior alternatives. Connections between our approach and dominance using different stochastic orders are discussed.

DP1037 - NDC Dynamic equilibrium model with financial and demographic risks

- ▶ DEVOLDER P., DOMINGUEZ-FABIAN I. AND A. MILLER (2010)
- ▶ Classical social security pension schemes, combining a defined benefit philosophy and a pay as you go system, are clearly under threat taking into account the general demographic evolution of many countries for the next decades. An interesting attempt to solve this problem is to maintain the pay as you go mechanism but moving to a defined contribution system (notional accounts or NDC schemes). In order to implement such schemes it is necessary to define various parameters such as the notional rate, the annuity conversion price or the indexation procedure. All these choices are not neutral in term of stability of the system. The purpose of this paper is to present a 3 generations-model permitting to model the influence of the dynamic evolution of the financial and the demographic parameters on the equilibrium of a NDC system.

DP1038 - Binomial semi-Markov regime switching interest rate models

- ▶ HUNT, J. AND P. DEVOLDER (2010)
- ▶ In this paper, we present a discrete time regime switching binomial-like model of the term structure where the regime switches are governed by a discrete time

semi-Markov process. We model the evolution of the prices of zero-coupon when given an initial term structure as in the model by Ho and Lee that we aim to extend. We discuss and derive conditions for the model to be arbitrage free and relate this to the notion of martingale measure. We explicitly show that due to the extra source of uncertainty coming from the underlying semi-Markov process, there are an infinite number of equivalent martingale measures. The notion of path independence is also studied in some detail, especially in the presence of regime switches. Finally, we conclude by comparing our model to the model of Ho and Lee.

