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## **INTRODUCTION**

### **Presentation**

The Institute of Statistics is a new Institute created in 1992. It coordinates and organizes all the statistical activities at the Université catholique de Louvain: research, teaching and consulting.

### **Research**

The research activities of the Institute cover a large number of fields. A major part of the activities are centered on mathematical statistics (semi- and non-parametric statistics, bayesian statistics, multivariate analysis, regression estimation, mixtures models, survival analysis, ...) with important implications in various fields of application (econometrics, biostatistics, insurance, industrial statistics, transportation problems, ...).

### **Teaching**

In the field of teaching, the activity of the Institute is as follow:

- basic education
- second cycle education
- third cycle education.

Concerning the first and second cycle studies, the Institute is responsible for the organization of probability and statistics courses offered at the university. Moreover, the Institute organizes second and third cycle studies: the “diplôme d’études complémentaires en statistique” (DEC), the “diplôme d’études spécialisées en statistique” (DES), the “diplôme d’études approfondies en statistique” (DEA) and the “doctorat en statistique”.

### **Consulting**

The Institute offers consulting services to researchers using statistics in their profession. This service includes discussions on statistical problems encountered by researchers working at other departments or laboratories of the Université catholique de Louvain. Consulting services are also offered to business cooperations searching for support in dealing with statistical questions. Furthermore, service courses (continued education) are provided for interested groups.

The following report briefly describes the results of the research activities concerning the academic year 1996-1997.

In January 1997, the Institute of Statistics organized a short course on LISREL in collaboration with METHODOS, multidisciplinary centre of methodology in social sciences at the UCL. The short course was mainly intended for professors and researchers of universities or services working in the field of market research. The success revealed a need for such short courses within our University.

In February 1997, the Institute of Statistics celebrated its fifth anniversary. At this occasion, the Institute organized a ceremony devoted to the promotion to doctor honoris causa of Professor Peter Hall, Department of Statistics, Australian National University, Canberra, as well as an international workshop untitled "The Art of Nonparametric Statistics: Methodologies and Applications". This workshop was a big success and was attended by many Belgian and foreign statisticians.

In November 1997, the Institute of Statistics will organize the XVIIIème Rencontre Franco-Belge de Statisticiens on "Analyse statistique des modèles de mélange".

For more information about the Institute of Statistics, see the World Wide Web site <http://www.stat.ucl.ac.be>

## 1. PERSONNEL

### *Academic Members:*

André BOUCKAERT  
Dominique DEPRINS  
Irène GIJBELS  
Bernadette GOVAERTS  
Alois KNEIP  
Michel MOUCHART  
José PARIS  
Jean-Marie ROLIN (Academic Secretary)  
Léopold SIMAR (Chairman)

### *Associate Academic Members:*

Luc BAUWENS, Faculty of Economical and Social Sciences  
Jean-Marie de KETELE, Faculty of Psychology  
Guy GERARD<sup>†</sup>, Faculty of Agronomy  
Michel GEVERS, Faculty of Applied Sciences  
Robert PEETERS, Faculty of Economical and Social Sciences

### *Doctor honoris causa:*

Peter HALL, Australian National University, Canberra (1997)

### *Visiting Faculty Members and Research Fellows:*

Zudi LU, Academia Sinica, Beijing  
Christian RITTER, Institute of Statistics, Université catholique de Louvain  
Annie ROBERT, Faculty of Medicine, Université catholique de Louvain  
Li-Xing ZHU, Chinese Academy of Sciences, Beijing

*Researchers and Doctoral Students:*

Pierre ARS  
Abdel Aziz BAKHSAS  
Andrea BARBIERI  
Laurence BOQUIA  
Daniela CLIMOV  
Isabelle DE MACQ  
Bernard FRANK  
Anne-Cécile GODERNIAUX  
Bénédicte JUCQUOIS  
Florence NICOL  
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Valentin PATILEA  
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*Computer Scientists:*

Cédric DAVISTER  
Luc JUCQUOIS  
Jean-Luc MARRION (from 01/01/97)  
Christian VAN OUDENHOVE (until 31/12/96)  
Jean-Marie ZELIS (Responsible of the University statistical server)

*Administrative Secretary:*

Dominique ANDRE

*Secretarial Staff:*

Anne BALFROID  
Anne-Marie BELLEMANS  
Maria GLINSCHI  
Doriane VANDERSCHUEREN

*Short Term Visitors:*

Tomás ALCALA NALVAIZ\*\*\*, Zaragoza University.  
Tadeusz BEDNARSKI, Pedagogical University, Zielona Gora and Polish Academy of Sciences, Wroclaw.  
Barbara BOGACKA, London School of Economics.  
Carmen CAPILLA, Polytechnic University of Valencia.  
Olaf GEFELLER\*\*\*, University of Göttingen.  
Raoul GOUET, Universidad de Chile, Santiago.  
Gérard GRÉGOIRE, Université Joseph Fourier, Grenoble.  
Peter HALL, Australian National University, Canberra.  
Wolfgang HÄRDLE, Humboldt Universität, Berlin.  
Nils Lid HJORT\*, University of Oslo.  
Joel L. HOROWITZ, University of Iowa, USA.  
Zhu-Yu LI, University of Bonn.  
Hans-Georg MÜLLER, University of California, Davis.  
Michael H. NEUMANN, Weierstrass Institute, Berlin.  
Michael NEWTON\*\*, University of Wisconsin, Madison.  
Wolfgang POLONIK, University of Heidelberg.  
Jim RAMSAY, Mc Gill University, Montreal.  
Jerome SARACCO, Université des Sciences Sociales de Toulouse.  
Eliana SCHEIHING, Universidad Austral de Chile, Valdivia.  
Burkhardt SEIFERT, University of Zürich.  
Paul SPECKMAN\*, University of Missouri-Columbia, USA.  
Jane-Ling WANG\*, University of California, Davis.  
Paul WILSON\*\*, University of Texas, Austin.

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\* Financed by the Institute of Applied Mathematics (MAPA),  
Université catholique de Louvain.

\*\* Financed jointly with CORE, Université catholique de Louvain.

\*\*\* Financed by the EC network “Human Capital and Mobility”:  
“Non parametric and semiparametric statistical methods” (M. Hallin, ULB).

## 2. RESEARCH ACTIVITIES

The Institute publishes a Discussion Papers series and a Reprint series. The papers in both series are the output from the statistical research activities. Many collaborations (national and international) are going on with researchers from abroad.

### 2.1. Discussion Papers

W. HILDENBRAND and A. KNEIP, Modelling aggregate consumption expenditure and income distribution effects (9606).

The paper is about the economic modelling of aggregate consumption expenditure with particular emphasis on the distribution effect of income. Under certain assumptions on the evolution over time of the population of households (“structural stability”) we shall derive a first order approximation for the change in the aggregate consumption ratio. This approximation allows to analyze whether and how the distribution effect of income affects the aggregate consumption ratio.

A. BOUCKAERT and M. MOUCHART, Latent events in clinical trials: a model with sure outcomes of random events (9607).

A stochastic model of drug versus placebo parallel arms clinical trial with binary outcomes is given in this paper. The model gives probabilistic rules for therapeutic and adverse effects occurrence. These effects are manifest but their dependence on latent effects is studied. The model obtained can be used to discriminate between direct and indirect toxic effects of drug administration. Several hierarchically embedded models are considered and the choice of the best one can be made by the likelihood ratio test. The model can also be designed to accommodate a dose effect relationship.

J.P. FLORENS, J.F. RICHARD and J.M. ROLIN, Bayesian encompassing specification tests of a parametric model against a non parametric alternative (9608).

An encompassing test between two models is based on the idea that the first model is able to explain the inference obtained by the second model. In a Bayesian framework, the posterior distribution of the second model will then be compared to the posterior distribution built in the

first model through a distribution on the parameter of the second model conditionally on the parameter of the first model. Such a strategy is used to test a parametric model against a non parametric one. This strategy is in particular justified by the inadequacy of usual tests as posterior odds. But the implementation of encompassing tests can only be made thanks to simulation techniques which intensively use representations of Dirichlet measures.

I. GIJBELS, P. HALL and A. KNEIP, Interval and band estimation for curves with jumps (9609).

Jump points in curves arise when the conditions under which data are generated change suddenly, for example because of an unplanned change in a treatment. If the size of the jump in the treatment effect exceeds the range of the error distribution then the design interval within which the jump point lies may be determined concisely. In other cases, however, estimators of the jump point are subject to sampling error. This paper suggests bootstrap methods for quantifying that error, and for constructing a confidence interval for the jump point and a confidence band for the curve. These problems have several unusual features. First, confidence intervals and bands, with asymptotically correct coverage, are possible here only if design points are randomly distributed and are not conditioned upon. (Conditioning is arguably the most common approach in problems of regression.) Secondly, the sampling error of the jump-point estimator has a highly non-Normal distribution, which depends intimately on the distribution of regression errors.

A.W. BOWMAN, M.C. JONES and I. GIJBELS, Testing monotonicity of regression (9610).

This paper provides a test of monotonicity of a regression function. The test is based on the size of a ‘critical’ bandwidth, the amount of smoothing necessary to force a nonparametric regression estimate to be monotone. It is analogous to Silverman’s test of multimodality in density estimation. Bootstrapping is used to provide a null distribution for the test statistic. The methodology is particularly simple in regression models in which the variance is a specified function of the mean, but we also discuss in detail the homoscedastic case with unknown variance. Simulation evidence indicates the usefulness of the method. Two examples are given.

I. GIJBELS, E. MAMMEN, B.U. PARK and L. SIMAR, On estimation of monotone and concave frontier functions (9611).

A way for measuring the efficiency of enterprises is via the estimation of the so-called production frontier, which is the upper boundary of the support of the population density in the input and output space. It is reasonable to assume that the production frontier is a concave monotone function. Then, a famous estimator is the data envelopment analysis (DEA) estimator, which is the lowest concave monotone increasing function covering all sample points. This estimator is biased downwards since it never exceeds the true production frontier. In this paper we derive the asymptotic distribution of the DEA estimator, which enables us to assess the asymptotic bias and hence to propose an improved bias corrected estimator. This bias corrected estimator involves consistent estimation of the density function as well as of the second derivative of the production frontier. We also discuss briefly the construction of asymptotic confidence intervals. The finite sample performance of the bias corrected estimator is investigated via a simulation study and the procedure is illustrated for a real data example.

Ch. WEINER, Logarithmic stock returns: leptokurtosis, heteroskedasticity and change-points (9612).

There are serious reasons to assume that logarithmic stock returns  $\log S_{t_i} - \log S_{t_{i-1}}$  are normally distributed, however, it is frequently denoted that the empirical distribution of stock returns characteristically deviates from a normal distribution: It is leptokurtic, it is peaked and it has thick tails. But it is not necessary to reject normality as a model for changing volatility, i. e. heteroskedasticity of logarithmic returns, may explain the phenomenon. The paper deals with a change of volatility in the long term, in this case volatility can be estimated nonparametrically as function in time. Particularly it seems to be fruitful to consider this function as a piecewise constant line, in this model one has to estimate the points where volatility changes.

This model for volatility differs from the two common approaches, Stochastic Volatility (SV) and Autoregressive Conditional Heteroskedasticity (ARCH); both put more emphasis on changes of volatility in the short term.

German stock data from 1990 to 1992 are studied as examples.

L. SIMAR and P.W. WILSON, Estimating and bootstrapping Malmquist indices (9613).

This paper develops a consistent bootstrap estimation procedure for obtaining confidence intervals for Malmquist indices of productivity and their decompositions. Although the exposition is in terms of input-oriented indices, the techniques can be trivially extended to the output orientation. The bootstrap methodology is an extension of earlier work described in Simar and Wilson (1996). Some empirical examples are also given, using data on Swedish pharmacies.

T. SIMAR and J. PARIS, Le nombre de sinistres nécessaires pour en estimer valablement le coût moyen, dans le cas lognormal (9614).

Dans ce travail, nous montrons comment trouver le nombre d'observations nécessaires pour estimer la moyenne d'une variable aléatoire lognormale, avec une précision souhaitée quand on a fait un bon choix d'unités pour exprimer la longueur de l'intervalle de confiance correspondant. Nous comparons deux méthodes approchées avec la méthode exacte et nous montrons que la plus simple fournit d'excellents résultats. Nous étendons les résultats au cas de la variable aléatoire lognormale à trois paramètres. Des résultats numériques sont fournis.

L.X. ZHU, Assessing elliptical symmetry via a computer-assisted test procedure (9615).

The paper presents a conditional test procedure which is a computer-assisted test one (CAT) for assessing elliptical symmetry of a multivariate variable. The resulting CAT is strictly distribution free if the underlying null distribution of variable is elliptical symmetry. Furthermore, the CAT is strictly valid if the symmetric center is known and are asymptotic valid if the center is an unknown point. The equivalence, in the large sample sense, between the CAT and its unconditional counterpart is established. The power behavior of the CAT and its unconditional counterpart under local alternative is investigated. Some simulations are conducted to demonstrate how the CAT works.

Z. LU, Geometric ergodicity of a vector non-linear AR model mixed with an ARCH term (9616).

In this note, the sufficient condition for the geometric ergodicity of a vector-valued nonlinear AR model mixed with an ARCH term (also called CHARN model by Härdle and his coauthors (e.g. Härdle, Tsybakov and Yang (1996))) is investigated. The main result obtained, to some large degree, relaxes the restrictive limitation on the order of the model and improves the result in Ango Nze (1992) for this model, which was adopted by Härdle and his coauthors in a series of papers for the statistical inferences. As an application of the main result, the geometric ergodicity of an additive AR model mixed with multiplicative ARCH is also discussed. The results of this paper ensure that the geometric  $\alpha$ -mixing stationary solution of the model exists under some mild conditions and hence expand the wide applicability of Härdle's (and others') papers.

L.X. ZHU, K.T. FANG and M.I. BHATTI, On estimated projection pursuit type Crámer-von Mises statistics (9701).

This paper addresses the problem of testing for a multivariate distribution, which belongs to a known parametric distribution family. The estimated Crámer-Von Mises type test statistics are constructed using projection pursuit technique. Some interested properties of the test statistics, like asymptotics, bootstrap approximations and the tail behavior of the limits of test statistics are investigated. For computational reasons, an approximation via number theoretic method to extreme value and integral on super sphere surface is considered.

U. GÜRLER and I. GIJBELS, A bivariate distribution function estimator and its variance under left truncation and right censoring (9702).

Left truncated and right censored data can naturally arise in survival analysis besides other fields such as insurance and economics. In this paper we consider the situation of bivariate observations where one of the components is subject to left truncation and right censoring. An estimator for the bivariate distribution function is proposed, and its asymptotic properties are established via a strong i.i.d. representation. An explicit expression for the asymptotic covariance function is provided. The asymptotic variance can either be estimated directly via a plug-in procedure or by relying on bootstrap methods. The asymptotic covariance function is quite complicated and in order to investigate the performance of the direct and the bootstrap estimator we focus on the censoring only case.

I. GIJBELS and U. GÜRLER, Covariance function of a bivariate distribution function estimator for left truncated and right censored data (9703).

In left truncation and right censoring models one observes i.i.d. samples from the triplet  $(T, Z, \delta)$  only if  $T \leq Z$ , where  $Z = \min(Y, C)$  and  $\delta$  is one if  $Z = Y$  and zero otherwise. Here,  $Y$  is the variable of interest,  $T$  is the truncating variable and  $C$  is the censoring variable. Recently, Gürler and Gijbels (1996) proposed a nonparametric estimator for the bivariate distribution function when one of the components is subject to left truncation and right censoring. An asymptotic representation of this estimator as a mean of i.i.d. random variables with a negligible remainder term has been proved. This result establishes the convergence to a two time parameter Gaussian process. The covariance structure of the limiting process is quite complicated however, and is derived in this paper. We also consider the special case of censoring only. In this case the general expression for the variance function reduces to a simpler formula.

J.M. ROLIN, Nonparametric Bayesian survival analysis (9704).

This article is a review of nonparametric Bayesian Survival Analysis and is a part of a contribution to the Encyclopedia of Biostatistics to be published by John Wiley and Sons Ltd. Most of the prior specifications proposed in the literature since Ferguson's seminal paper are presented with a special emphasis on the class of neutral to the right processes and on its subclass introduced by Hjort under the denomination of Beta processes. Berliner-Hill proposal of robust predictive distributions is also discussed. In the simple model with censored observations and without explanatory variables or heterogeneity factors, a complete description of the posterior distribution of the "predictive" hazard function is provided in the conditional model and in the joint model.

Z.Y. LI, Z. LU and G.X. CHAI, Nonparametric estimation of density function for sample process under mixing condition (9705).

Nonparametric density estimation is a useful tool for examining the structure of data, in particular, for the stationary time series, since usually it is really difficult to find the real marginal density of the series. Some papers contributed to this aspect for  $\alpha$ -mixing stationary sequence can be found in the literature, e.g., Robinson (1983), Tran (1989,1990). However, just as Tran et al (1996) stressed, yet there are a great number of processes which may not be  $\alpha$ -mixing. In this paper, we will adopt a nonparametrical method to estimate unknown density function of a sample data process which is based on relaxing  $\phi$ -mixing assumptions (see Billingsley

(1968) and Bierens (1983)). Uniformly weak and strong consistency and the convergence rates of the estimator we adopted will be discussed, and some numerical examples will be given.

Q.H. WANG and L.X. ZHU, Berry-Esséen inequality for Kaplan-Meier L-estimator (9706).

Let  $\widehat{F}_n$  be the Kaplan-Meier estimator of distribution function  $F$ . Let  $J(\cdot)$  be measurable real-valued function. In this paper, U-statistic representation for Kaplan-Meier L-estimator,  $T(\widehat{F}_n) = \int xJ(\widehat{F}_n(x))d\widehat{F}_n(x)$ , is derived. Furthermore the representation is also used to establish a Berry-Esséen inequality for  $T(\widehat{F}_n)$ .

Z. LU, Kernel density estimation for time series under generalized conditions: asymptotic normality and applications (9707).

Motivated by Tran et al (1996, ANN. Statist. 975-991) and Hallin and Tran (1996, ANN. Inst. Statist. Math. 429-449) for linear processes, we consider under a more general context, a stable stationary sequence  $\{X_t\}$  of an (infinite-variate) function of an  $\alpha$ -mixing stationary sequence. In this paper, the asymptotic normality of the kernel estimator of the marginal joint density of  $(X_{t-d+1}, \dots, X_{t-1}, X_t)$  is investigated under some mild conditions on the mixing and stable coefficients. One useful general result is obtained. As an application, two specific theorems are derived by this general result, one covering the context ( $\alpha$ -mixing) considered in Robinson (1983) and another easily deducing a result better than Hallin and Tran (1996)'s (for linear processes). The application for constructing asymptotic confidence intervals for density function with simulation examples is also made. The stationary sequences considered in this paper cover a large number of (linear or nonlinear) time series and Econometric models.

J. FAN and I. GIJBELS, Local polynomial fitting (9708).

This discussion paper contains the chapter on 'Local Polynomial Fitting' which has been prepared for publication in *Smoothing and Regression. Approaches, Computation and Application*, a book edited by M.G. Schimek for Wiley & Sons.

The chapter discusses briefly on various theoretical and practical aspects of local polynomial fitting and illustrates how to apply the methodology in a few applications.

S.D. NAMORO, Using statistical distances to evaluate the concentration of a probability distribution (9709).

Gini coefficient of concentration is characterized through a statistical distance. Thus, the computation of alternative coefficients is made possible by simply using other more common distances. Some other usual measures of inequality turn out to be associated with specific distances, and new measures are obtained. An analysis of the properties of alternative coefficients is provided.

E. GHYSELS, V. PATILEA, E. RENAULT and O. TORRÈS, Nonparametric methods and option pricing (9710).

In this paper, we survey some of the recent nonparametric estimation methods which were developed to price derivative contracts. We focus on equity options and start with a so-called model-free approach which involves very little financial theory. Next we discuss nonparametric and semi-parametric methods of option pricing and illustrate the different approaches.

Z. LU and P. CHENG, Strong consistency of nearest neighbor kernel regression estimation for stationary dependent samples (9711).

Under quite mild conditions on  $k_n$ , the strong consistency is proved for the nearest neighbor density, the nearest neighbor kernel regression and the modified nearest neighbor kernel regression of an  $\alpha$ -mixing stationary sequence in time series context. The condition imposed on the mixing coefficients is  $\sum_{j=1}^{\infty} j^{a-1} \alpha(j)^{1-1/\nu} < \infty$  ( $a > 1, \nu > 1$ ) or  $\sum_{j=1}^{\infty} j^{a-1} \alpha(j) < \infty$  ( $a > 1$ ), which is simple and weak.

L. SIMAR and P.W. WILSON, Some problems with the Ferrier/Hirschberg bootstrap idea (9712).

This paper demonstrates that the bootstrap procedure suggested by Ferrier and Hirschberg (1997) gives inconsistent estimates. A very simple example is given to illustrate the statistical issues underlying nonparametric efficiency measurement and the problems with the Ferrier/Hirschberg approach, and may serve as a primer on bootstrapping in nonparametric models of production processes.

M. MOUCHART, J.-M. ROLIN and E. SCHEIHING, Bayesian identification of semi-parametric binary response models (9713).

In this paper, minimal conditions under which a semi-parametric binary response model is identified in a Bayesian framework are presented and compared to the conditions usually required in a sampling theory framework.

I. GIJBELS, A. POPE and M.P. WAND, Automatic forecasting via exponential smoothing: asymptotic properties (9714).

Exponential smoothing is the most common model-free means of forecasting a future realisation of a time series. It requires the specification of a smoothing factor which is usually chosen from the data to minimise the average squared residual of previous one-step ahead forecasts. Despite the popularity of the method, little or no theory exists for the choice of smoothing parameter. In this article we show that exponential smoothing can be put into a nonparametric regression framework and use theoretical developments from this field to derive asymptotic properties of exponential smoothing forecasters. In particular, we derive the asymptotic distribution of the minimum average squared residual smoothing factor choice and gain some interesting insights into its performance.

B.U. PARK, L. SIMAR and Ch. WEINER, FDH efficiency scores from a stochastic point of view (9715).

The Free Disposal Hull (FDH) is a nonparametric estimator for the production set. In Productivity Analysis one derives the production frontier and efficiency scores from the FDH. In the literature the method is considered to be deterministic. However, assuming that individuals are drawn independently from a distribution, where the support is the true production set, FDH efficiency scores are random variables. The paper investigates its stochastic properties.

A. ANTONIADIS and I. GIJBELS, Detecting abrupt changes by wavelet methods (9716).

The objective of this paper is to contribute to the methodology available for dealing with the detection and the estimation of the location of discontinuities in one dimensional piecewise smooth regression functions observed in white Gaussian noise over an interval.

Our approach is nonparametric in nature because the unknown function is not assumed to have any specific form. Our method relies upon a wavelet analysis of the observed signal and belongs to the class of “indirect” methods, where one detects and locates the change points prior to fitting the curve, and then uses one’s favorite function estimation technique on each segment to recover the curve. We show that, provided discontinuities can be detected and located with sufficient accuracy, detection followed by wavelet smoothing enjoys optimal rates of convergence.

V. PATILEA and E. RENAULT, Continuously updated extremum estimators (9717).

Many structural econometric models (option pricing, nonlinear rational expectations, auction models, ...) characterize observable variables as highly nonlinear transformations of some latent variables. We have in mind the case where the transformations are one-to-one, but they depend on the unknown distribution of the latent variables. The complexity of the one-to-one transformations generates substantial obstacles for the direct implementation of maximum likelihood inference based on the specification of the dynamics of the latent variables. Motivated by the fact that the law of motion of the latent variables is often defined in a fairly simpler way, we propose herein estimation procedures based on iterative and recursive learning on the latent variables in order to perform estimation inside the simpler latent world.

V. PATILEA, Convex models, NPMLE and misspecification (9718).

We analyze the asymptotic behavior of maximum likelihood estimators (MLE) in convex dominated models when the true distribution generating the independent data does not necessarily belong to the model. Inspired by the Hellinger distance and its properties, we introduce a family of divergences (contrast functions) which allow a unified treatment of well- and misspecified convex models. The divergences we consider verify certain inequalities, some of them extensions of those satisfied by the Hellinger distance. The convergence and the rates of convergence of the MLE with respect to our divergences are obtained from inequalities verified by these divergences and results from empirical process theory (uniform laws of large numbers and maximal inequalities). As a particular case we recover existing results on the Hellinger convergence of MLE in well-specified convex models. Four examples are considered : mixtures of discrete distributions, monotone densities, decreasing failure rate distributions and a finite-dimensional parametric model.

## 2.2. Publications

65. P. ARS and J. JANSSEN. Opérationnalité d'un modèle pour la gestion actif-passif. *Proceedings of the AFIR 4th Session*, Orlando, 878-905, 1994.
66. P. ARS and J. JANSSEN. Stochastic model with possibility of ruin and dividend repartition for insurance and bank. *Proceedings of the AFIR 5th Session*, Bruxelles, 281-310, 1995.
67. Ü. GÜRLER. Bivariate estimation with right-truncated data. *Journal of the American Statistical Association*, 91(435), 1152-1165, 1996.
68. I. BERTSCHEK and H. ENTORF. On nonparametric estimation of the Schumpeterian link between innovation and firm size: evidence from Belgium, France and Germany. *Empirical Economics*, 21, 401-426, 1996.
69. A. KNEIP and J. ENGEL. A remedy for kernel estimation under random design. *Statistics*, 28, 201-225, 1996.
70. U. GÜRLER. Bivariate distribution and hazard functions when a component is randomly truncated. *Journal of Multivariate Analysis*, 60, 20-47, 1997.
71. A. BOUCKAERT. Le docteur John Arbuthnot, inventeur des tests statistiques. *Histoire des Sciences Médicales*, Tome XXX, 4, 459-466, 1996.
72. J. FAN, T. GASSER, I. GIJBELS, M. BROCKMANN and J. ENGEL. Local polynomial regression: optimal kernels and asymptotic minimax efficiency. *Ann. Inst. Statist. Math.*, 49(1), 79-99, 1997.
73. A. BOUCKAERT and R. CROTT. The difference in mean costs as a pharmaco-economic outcome variable: power considerations. *Controlled clinical trials*, 18, 58-64, 1997.
74. C. RITTER, J.A. GILLIARD, J. CUMPS and B. TILQUIN. Corrections for heteroscedasticity in window evolving factor analysis. *Analytica Chimica Acta*, 318, 125-136, 1996.
75. J.A. GILLIARD and C. RITTER. Simulations of liquid chromatography-diode array detector data including instrumental artefacts for the evaluation of mixture analysis techniques. *Journal of Chromatography*, A(758), 1-18, 1997.
76. R.J. CAROLL, J. FAN, I. GIJBELS and M.P. WAND. Generalized partially linear single-index models. *Journal of the American Statistical Association*, 92(438), 477-489, 1997.

77. T. SIMAR and J. PARIS. Le nombre de sinistres nécessaires pour en estimer valablement le coût moyen, dans le cas lognormal. *Aktuarvereinigung*, 1, 49-61, 1997.
78. C. RITTER and L. SIMAR. Pitfalls of Normal-Gamma stochastic frontier models. *Journal of Productivity Analysis*, 8, 167-182, 1997.

### **2.3. Books published by members of the Institute**

J.P. FLORENS, M. MOUCHART and J.M. ROLIN. *Elements of Bayesian Statistics*, 544 pp, New York: Marcel Dekker, 1990.

W. HÄRDLE and L. SIMAR (editors). *Computer Intensive Methods in Statistics*, 175 pp, (*Statistics and Computing*, I). Berlin: Physica-Verlag, 1993.

W. HÄRDLE, S. KLINKE and B.A. TURLACH. *XploRe: An Interactive Statistical Computing Environment*, 387 pp, *Statistics and Computing*, Springer-Verlag: New York, 1995.

J. FAN and I. GIJBELS. *Local Polynomial Modelling and its Applications*, 341 pp, Chapman and Hall: London, 1996.

### 3. SEMINARS AND WORKSHOPS

A statistics seminar is organized each week. A diversity of subjects is presented at this seminar. Speakers are mainly coming from outside the university and visitors of the Institute are among the contributors.

From time to time, a joint statistics and econometrics seminar, organized in collaboration with CORE, takes place. At those occasions statisticians and econometricians meet and have extra opportunities to discuss on common research interests and elaborate joint research.

Further, an applied statistics workshop is organized by the Institute on a regular basis. At this applied statistics workshop, emphasis is on talks in which an applied statistical problem is presented.

There is also the doctoral seminar which is an extra stimulant for Ph.D students and other young researchers.

#### 3.1. Statistics seminars

1. September 18, 1996, Jim RAMSAY, Mc Gill University, Montreal.  
Beyond polynomial splines: customizing the spline basis.
2. October 2, 1996, Jean-Marie ROLIN, Institute of Statistics, Université catholique de Louvain.  
Bayesian encompassing specification tests of a parametric model against a non parametric alternative.
3. October 9, 1996, Gérard GREGOIRE, Université Joseph Fourier, Grenoble.  
Estimation of a discontinuous regression function with local polynomial smoothing.
4. October 30, 1996, Tomás ALCALA NALVAIZ, Zaragoza University.  
Bandwidth matrix in local linear regression.
5. November 6, 1996, Olaf GEFELLER, University of Göttingen.  
Kernel estimation of the hazard rate from censored data.
6. November 13, 1996, Zhu-Yu LI, University of Bonn.  
Nonparametric estimation of the error distribution in a statistical model.
7. November 27, 1996, Li-Xing ZHU, Institute of Statistics, Université catholique de Louvain.  
Permutation tests for reflected symmetry.

8. December 4, 1996, Michael H. NEUMANN, Weierstrass Institute, Berlin.  
Strong approximations in time series models.
9. December 11, 1996, André BOUCKAERT, Institute of Statistics, Université catholique de Louvain.  
Latent events in clinical trials: a model with sure outcomes of random events.
10. February 5, 1997, Zudi LU, Institute of Statistics, Université catholique de Louvain.  
Some results on geometric ergodicity for nonlinear time series.
11. February 12, 1997, Léopold SIMAR, Institute of Statistics, Université catholique de Louvain.  
A statistical model for DEA estimators.
12. March 19, 1997, Pierre van MOERBEKE, Department of Mathematics, Université catholique de Louvain.  
Spectral rigidity of stochastic matrices.
13. March 26, 1997, Jerome SARACCO, GREMAQ, Université des Sciences Sociales de Toulouse.  
Sliced inverse regression (SIR): general presentation.
14. April 16, 1997, Marc AERTS, Limburgs Universitair Centrum, Diepenbeek.  
Parametric bootstrap for pseudolikelihood models.
15. April 23, 1997, Wolfgang POLONIK, University of Heidelberg.  
Minimum volume sets as generalized quantiles: theory and applications.
16. April 30, 1997, Burkhardt SEIFERT, University of Zürich.  
Smooth ridge regression estimation.
17. June 18, 1997, Tadeusz BEDNARSKI, Institute of Mathematics, Pedagogical University, Zielona Gora and Institute of Mathematics, Polish Academy of Sciences, Wrocław.  
On a robust inference in the proportional hazards regression model.

### **3.2. Joint statistics and econometrics seminars**

1. September 25, 1996, Michel MOUCHART, Institute of Statistics, Université catholique de Louvain.  
Semi- and non-parametric Bayesian analysis of duration models.
2. October 23, 1996, Christian ROBERT, CREST, INSEE, Paris.  
Discretizations of continuous state space Markov chains.

3. December 18, 1996, Marcia SCHAFGANS, London School of Economics.  
Semiparametric estimation of the intercept of a sample selection model: theory and applications.
4. March 12, 1997, Bas J.M. WERKER, Université Libre de Bruxelles.  
Adaptive estimation in time series.
5. May 7, 1997, Nobuhiko TERUI, Faculty of Economics, Tohoku University.  
Estimation and inference on continuous time nonlinear business cycle models.
6. May 14, 1997, Frank KLEIBERGEN and Richard PAAP, Econometric Institute, Erasmus University Rotterdam.  
Priors, posterior odds and Lagrange multiplier statistics in Bayesian analyses of cointegration.

### **3.3. Seminars organized by the Institute of Statistics and the Institute of Applied Mathematics**

1. October 23, 1996, Nils Lid HJORT, University of Oslo.  
Local Bayesian regression.
2. February 26, 1997, Jane-Ling WANG, Division of Statistics, University of California, Davis.  
Statistical modelling via dimension reduction methods.
3. March 5, 1997, Paul SPECKMAN, University of Missouri-Columbia.  
Nonparametric estimation of a gravity model for spatial interaction behavior.

### **3.4. Applied statistics workshop**

1. October 18, 1996, Anne De FRENNE, Math-X, Brussels.  
Quand une souris peut cacher un éléphant...
2. October 25, 1996, Pierre GOOVAERTS, Faculty of Agronomy, Université catholique de Louvain.  
La géostatistique appliquée aux sciences de l'environnement.
3. November 15, 1996, Willy LEJONG, SOLVAY s.a., Brussels.  
Limite inférieure de confiance d'une contrainte d'exploitation.
4. November 29, 1996, Jan BEIRLANT, Universitair Centrum voor Statistiek, KUL.  
Statistics of extreme values. Recent methods and industrial applications.
5. December 13, 1996, Michel VERLEYSEN, Faculty of Applied Sciences, Univer-

sité catholique de Louvain and Eric De BODT, Institut d'administration et de gestion, Université catholique de Louvain.

Réseaux de neurones. Introduction et étude d'une application.

6. February 7, 1997, Harry GOYVAERTS, JANSSEN Pharmaceutica, Belgium.  
Design and analysis of parallel dose-response clinical trials.
7. February 14, 1997, Marie-Paule KESTEMONT, Institut d'administration et de gestion, Université catholique de Louvain.  
Le consommateur et l'environnement: un problème de marketing européen.
8. March 7, 1997, Ivan LANGHANS, CQ Consultancy, Belgium.  
Model validation methods.
9. March 21, 1997, Carmen CAPILLA, Polytechnic University of Valencia.  
Integration of statistical and engineering process control in a continuous polymerization process.
10. April 18, 1997, Barbara BOGACKA, Statistical Department, London School of Economics.  
Optimum experimental designs for non linear models with applications to chemical kinetics.
11. April 25, 1997, Bruno BOULANGER, Eli Lilly Development Centre, Belgium.  
Design and analysis of bioequivalence studies.

### **3.5. Doctoral seminars**

1. October 4, 1996, Christian WEINER, Institute of Statistics, Université catholique de Louvain.  
On the distribution of the FDH estimator.
2. November 8, 1996, Bernard FRANK, Institute of Statistics, Université catholique de Louvain.  
Non linear parametric regression model: consistency and asymptotic normality of at least square estimator.
3. December 6, 1996, Maria PAZ MORAL, University of Basque Country.  
Non sample information in structural time series models: a Bayesian approach.
4. January 31, 1997, Abdel Aziz BAKHSAS, Institute of Statistics, Université catholique de Louvain.  
Quelques aspects de la complémentarité de l'analyse des correspondances et les modèles log-linéaires.

## **4. DOCTORATES**

### **4.1. Doctor honoris causa**

On 18th February 1997, the Institute of Statistics organized a ceremony devoted to the promotion to doctor honoris causa of Professor Peter HALL, Australian National University, Canberra.

On that occasion, Professor Peter HALL presented a seminar on: “Estimating a boundary in an image”.

Professor Peter HALL has established a remarkable academic career, and is one of the leading statisticians of the last decades. Many of his contributions led to breakthroughs in the understanding of a subject. His scientific spirit and great personality is an illuminating example for all statisticians and probabilists.

Moreover, Professor Peter HALL visited the Institute of Statistics at several occasions since its creation in 1992. Many scientific collaborations have been developed with members of the Institute.

### **4.2. Ph.D thesis in progress**

Pierre ARS

“Optimal strategies and implications on the ruin probability”

Promoters: Jacques JANSSEN and Pierre VAN MOERBEKE

We study existence and representation of optimal strategies when asset processes admit both continuous component and discontinuous component. This allows to get new results on the ruin probability.

Abdel Aziz BAKHSAS

“Modelization contingency tables probabilities”

Promoter: Léopold SIMAR

The aim of this thesis is to point out some aspects of the complementarity of correspondence analysis type methods and of modelling methods such that log linear analysis, generalized linear models.

Claire BEGUIN

“Outliers detection by frontier efficiency method applied to expenses by pathology”

Promoter: Léopold SIMAR

By using nonparametric methods for estimating supports, we analyse robust techniques for identifying outliers in a multivariate framework. The aim is to detect too large expenses in hospitals for particular pathologies, taking into account the individual characteristics of patients. We try also to modelize the duration of stays of patients in hospitals.

Daniela CLIMOV

“Semiparametric regression analysis”

Promoter: Léopold SIMAR

In the framework of multivariate regression, single index models represent a way to overcome the curse of dimensionality problem. In this context, two semiparametric methods of estimation are applied to a Poisson generalized linear model.

Daniela COCCHI

“Least squares approximations of Bayesian solutions models in finite populations”

Promoter: Michel MOUCHART

The work deals with model based inference in finite populations within the Bayesian framework. A hierarchical specification of an ANOVA type model is developed and solved using least squares approximations. A comparison with the existing literature on the same model is performed together with simulations to check the robustness of the solution.

Bernard FRANK

“Applying bootstrap resampling methods to latent variables models”

Promoter: Alois KNEIP

Construction of confidence intervals for parameters of latent variables models, using resampling methods. Study of identification problems that arise in these models, also using resampling methods.

Bénédicte JUCQUOIS

“Statistical modelling of transport flows”

Promoter: Michel MOUCHART

The work is concerned with the modelling of the traffic flows. It contains the construction of a coherent framework of aggregated and disaggregated data. The approach is microeconomic and is based on the behaviour of the passengers as a function of the observable characteristics of individuals.

Florence NICOL

“Semi-parametric analysis of a sample of curves: theory and applications”

Promoter: Alois KNEIP

Analysis of a sample of different, but related, regression curves is most frequently based on low-dimensional linear model: each individual regression curve is considered as a linear combination of a small number of common functions. In a semiparametric approach, a method is developed which allows the estimation of the dimension and some appropriate common functions. Moreover, a way of treating individual variations is proposed in order to better compare the dynamics of the curves.

Valentin PATILEA

“Convex models, NPMLE and misspecification and multivariate time series analysis of derivative assets prices”

Promoter: Jean-Marie ROLIN

The dissertation contains two parts. In the first one we study the properties of the nonparametric maximum likelihood in (possibly) misspecified convex models. The asymptotic properties are obtained using results on the empirical process. Several examples are examined. In the second part we present two statistical methodologies for analysing derivative prices time series.

Ernesto SAN MARTIN

“Problems of modelling structural equation systems, in particular problems of identification and robustness”

Promoter: Michel MOUCHART

The first part of this work concerns the modelling of the structural equation systems in the spirit of the LISREL model. A main objective of this part is to

improve the understanding of the different assumptions. Particular attention is given to the exogeneity assumption.

The second part handles the identification problem. In this context, the exogeneity assumption also appears as a condition of identification of the latent model. Conditions of identifiability are established.

The third part concerns to the generalization of the normality assumption, in the direction of an elliptical assumption. In this context, invariance problems are studied.

Christian WEINER

“Frontier analysis and edge estimation”

Promoter: Alois KNEIP

In this thesis, we analyse the stochastic properties for nonparametric estimators proposed in the literature. We make the connection with the related problem of estimating the support of a multivariate distribution.

## **5. MEETINGS HELD AT THE INSTITUTE OF STATISTICS**

### **5.1. LISREL Workshop**

Louvain-la-Neuve, January 21-24, 1997

Organizer: Michel MOUCHART

Speakers: Anne-Marie AISH, Bernard FRANK, Michel MOUCHART, A. NOUMBISSI and Guillaume WUNSCH. A. ELAHMADI was responsible of the computer training.

This workshop was organized in order to provide an introduction to methodological problems caused by the practical use of LISREL type models and analysis of structures of covariances.

#### **PROGRAM**

##### **January 21, 1997**

*Les outils matriciels du modèle LISREL (I) et (II).*

##### **January 22, 1997**

*L'analyse de cheminement, comme introduction aux modèles à variables latentes.*

*Modèle LISREL et modèle à variables latentes: une introduction générale.*

*Spécification formelle du modèle: système d'équations structurelles et hypothèses.*

*Relation entre les paramètres du modèle et les variances et covariances des variables observées: déduction des équations de covariance.*

##### **January 23, 1997**

*Problèmes d'identification.*

*Méthodes d'estimation.*

*Evaluation de l'ajustement.*

*Evaluation et critique du modèle: validation croisée.*

##### **January 24, 1997**

*Présentation et interprétation des résultats.*

*Présentation et discussion d'une application. Conclusions générales.*

*Entraînement sur ordinateurs (travail en petits groupes).*

## **5.2. Workshop “The Art of Nonparametric Statistics: Methodologies and Applications”**

Louvain-la-Neuve, February 19-21, 1997

Organizers: Irène GIJBELS, Alois KNEIP and Léopold SIMAR

### **PROGRAM**

#### **February 19, 1997**

9:00 - 10:30

Bernard SILVERMAN, University of Bristol, *Some recent developments in wavelet methods*

Anestis ANTONIADIS, Université Joseph Fourier, Grenoble, *Detecting abrupt changes by wavelet methods*

10:55 - 12:25

Steve MARRON, University of North Carolina, Chapel Hill, *Bayesian wavelet shrinkage*

Stephen WALKER, Imperial College, London, *Interpreting the parameters of a neutral to the right process*

2:30 - 4:00

Paul SPECKMAN, University of Missouri-Columbia, *Covariate-matched one-sided tests for the difference between functional means*

Jana JUREČKOVÁ, Charles University, Prague, *Partially adaptive inference in linear model based on regression rank scores*

4:25 - 6:00

Piet GROENEBOOM, Delft University of Technology, *Estimation of smooth functionals in inverse problems*

Alexander TSYBAKOV, University of Paris VI, *Asymptotically sharp adaptive regression and density estimation in sup-norm on the Sobolev classes*

#### **February 20, 1997**

9:00 - 10:30

Nils Lid HJORT, University of Oslo, *Recent developments in semiparametric density estimation - overview and evaluation*

Luc DEVROYE, McGill University, Montreal, *Non-asymptotics and very robust smoothing in density estimation*

10:55 - 12:25

David SCOTT, Rice University, Houston, *Locally adaptive density estimation: theory and application*

Jeffrey HART, Texas A&M University, College Station, *One-sided cross-validation*

2:30 - 4:00

Jianqing FAN, University of North Carolina, Chapel Hill, *Test of significance when data are curves*

Jane-Ling WANG, University of California, Davis, *Analyzing associations for curve data*

4:25 - 6:00

James RAMSAY, McGill University, Montreal, *Smart smoothing with L-splines*

Philippe VIEU, Université Paul Sabatier, Toulouse, *A nonparametric approach for mixed effects longitudinal data models*

## **February 21, 1997**

9:00 - 10:30

John RICE, University of California, Berkeley, *Accurate estimation of travel times from single-loop detectors*

Howell TONG, University of Kent, Canterbury, *A bootstrap detection for operational determinism*

10:55 - 12:25

Chris JONES, The Open University, Milton Keynes, *Two separate topics: semi-parametric discrete smoothing and local dependence*

Enno MAMMEN, University of Heidelberg, *Some problems of testing and estimation in semiparametric additive models*

2:30 - 4:00

Michael NUSSBAUM, Weierstrass Institute, Berlin, *Asymptotic equivalence of counting process experiments and Gaussian white noise*

Winfried STUTE, University of Giessen, *The approximate F-test in censored linear regression*

4:25 - 6:00

Hans-Georg MÜLLER, University of California, Davis, *Accelerated time models for response curves*

Richard GILL, University of Utrecht, *Coarsening at Random*

The Institute of Statistics thanks the National Science Foundation (FNRS Belgium) and the “Communauté française” for their financial support in organizing the workshop.

### **5.3. Workshop of the 'Belgian Chemiometrics Society'**

Louvain-la-Neuve, March 6, 1997

Organizer: Bernadette GOVAERTS

#### **PROGRAM**

Thomas DONNELLY, ECHIP Inc, Hockessin, USA, *Experimental designs for mixture problems - The concepts*

Thomas DONNELLY, ECHIP Inc, Hockessin, USA, *Experimental designs for mixture problems - Real life applications*

Paula FERNANDES DE AGUIAR, Brussels, *Study of different criteria for the selection of a rugged optimum in High Performance Liquid Chromatography optimisation*

## **6. ACADEMIC VISITS**

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

### **September 1996**

Pierre ARS, Universidad de Chile, Santiago

Michel MOUCHART, “Sure outcomes of random events: application to clinical trials”, Pontifica Universidad Catolica, Santiago

### **October 1996**

Michel MOUCHART, Universidad de Chile, Santiago

Michel MOUCHART, Pontifica Universidad Catolica, Santiago

Michel MOUCHART, “Sure outcomes of random events: application to clinical trials”, Universidad Austral de Chile, Valdivia

### **November 1996**

Michel MOUCHART, “Bayesian identification of the semi-parametric binary choice model”, Universidad de Chile, Santiago

Léopold SIMAR, University of Texas, Austin

Léopold SIMAR, Rice University, Houston

### **December 1996**

Valentin PATILEA, “Maximum de vraisemblance non-paramétrique dans des modèles convexes mal spécifiés”, Université des Sciences Sociales de Toulouse

Jean-Marie ROLIN, “Bayesian encompassing specification tests of a parametric model against a non parametric alternative”, Universidad de Chile, Santiago

Jean-Marie ROLIN, “Bayesian encompassing specification tests of a parametric model against a non parametric alternative”, Universidad Austral de Chile, Valdivia

### **January 1997**

Irène GIJBELS, “Estimation of jump points in smooth curves”, The Chinese University of Hong Kong, Shatin

Léopold SIMAR, Humboldt Universität, Berlin

Léopold SIMAR, “A statistical model for DEA estimators”, Weierstrass Institute, Berlin

#### **April 1997**

Irène GIJBELS, “Nonparametric inference for curves with jumps points”, Bilkent University, Ankara

Alois KNEIP, “Bootstrap und nichtparametrische regression”, Schloss Glienicke, Berlin

Valentin PATILEA, CREST, Paris

Jean-Marie ROLIN, Institut National de Statistique et d’Economie Appliquée, Rabat

Jean-Marie ROLIN, “Analyse Bayésienne non paramétrique des données de survie”, ENSAI, Rennes

#### **May 1997**

Irène GIJBELS, “Estimation and construction of confidence intervals for curves with jumps”, Université Joseph Fourier, Grenoble

Alois KNEIP, Université Joseph Fourier, Grenoble

Alois KNEIP, Université de Toulouse III

Michel MOUCHART, “Sure outcomes of random events: application to clinical trials”, University of Munich

Valentin PATILEA, “Maximum de vraisemblance non-paramétrique dans des modèles convexes mal spécifiés”, ENSAI, Rennes

Valentin PATILEA, Université des Sciences Sociales de Toulouse

#### **June 1997**

Irène GIJBELS, “Local maximum likelihood estimation and inference”, University of Oslo

Irène GIJBELS, “Automatic forecasting via exponential smoothing: asymptotic properties”, University of Oslo

Alois KNEIP, University of Heidelberg

Michel MOUCHART, “Sure outcomes of random events: application to clinical trials”, University of Kassel

Michel MOUCHART, Université Jean Monnet, “Sure outcomes of random events: application to clinical trials”, Saint-Etienne

Valentin PATILEA, CREST, Paris

## 7. CONFERENCES AND MEETINGS

The members of the Institute assisted and/or participated to the following conferences.

### September 1996

Irène GIJBELS, *Asymptotic Methods in Stochastic Dynamics and Nonparametric Statistics*, Berlin

Bernadette GOVAERTS, *3ème Journée de l'Informatique: Multimédia et Enseignement*, Louvain-la-Neuve

Alois KNEIP, *Asymptotic Methods in Stochastic Dynamics and Nonparametric Statistics*, Discussion on "Curve estimation from gridded data", by Peter Hall, invited paper, Berlin

Valentin PATILEA, *Belgian Probability Contact Day*, Brussels

Christian WEINER, *Belgian Probability Contact Day*, Brussels

### October 1996

Pierre ARS, *Scientific Meeting FNRS - Risk Studies for the Portfolio Management*, Brussels

Bernadette GOVAERTS, *Second Chemiometrics Symposium*, Member of the organizing committee, Leuven

Alois KNEIP, *Seminar Paris-Berlin*, "A new class of adaptive smoothers", invited paper, Garchy

Michel MOUCHART, *Latinamerican Congress of Statistical Societies (CLATSE III)*, "Semi- and non-parametric Bayesian analysis of duration models: a survey", invited paper, Santiago

José PARIS, *Fourth Annual Meeting of the Belgian Statistical Society*, La Roche-en-Ardenne

José PARIS, *6th AFIR International Colloquium*, Chairman of the session, Nürnberg

Léopold SIMAR, *Fourth Annual Meeting of the Belgian Statistical Society*, Chairman of the session, La Roche-en-Ardenne

Christian WEINER, *Fourth Annual Meeting of the Belgian Statistical Society*, La Roche-en-Ardenne

## **November 1996**

Pierre ARS, *Studiendag Financiële Wiskunde*, Brussels

Pierre ARS, *Scientific Meeting FNRS - Risk Management for Finance and Insurance*, “Sensibilité de stratégies de couverture d’actifs financiers”, Brussels

Irène GIJBELS, *XVIIème Rencontre Franco-Belge de Statisticiens*, Marne-la-Vallée

Michel MOUCHART, *XVIIème Rencontre Franco-Belge de Statisticiens*, Member of the Permanent Committee, Marne-la-Vallée

Jean-Marie ROLIN, *XVIIème Rencontre Franco-Belge de Statisticiens*, “Analyse Bayésienne non paramétrique des risques concurrents”, invited paper, Marne-la-Vallée

Léopold SIMAR, *The University of Georgia Productivity Workshop*, “Estimating and bootstrapping Malmquist indices”, Athens, Georgia

Léopold SIMAR, *Fall 1996 INFORMS Meeting*, “A statistical model for DEA estimators”, invited paper, Atlanta, Georgia

Léopold SIMAR, *XVIIème Rencontre Franco-Belge de Statisticiens*, Member of the Permanent Committee, Chairman of the session, Marne-la-Vallée

Jean-François WALHIN et José PARIS, *Scientific Meeting FNRS - Risk Management for Finance and Insurance*, “Distance de Kolmogorov et distributions de sinistres dans les compagnies d’assurances”, Brussels

Christian WEINER, *Studiendag Financiële Wiskunde*, Brussels

Christian WEINER, *Scientific Meeting FNRS - Risk Management for Finance and Insurance*, “Logarithmic stock returns: leptokurtosis, heteroskedasticity and change points”, Brussels

## **December 1996**

Dominique DEPRINS, *Fourth Workshop on Financial Modeling and Econometric Analysis*, “Multivariate modeling of interest rates with cointegrated VAR-GARCH model”, Tilburg

Dominique DEPRINS, *Journées de Méthodologie Statistique*, INSEE, Paris

Valentin PATILEA and Eric RENAULT, *Fourth Workshop on Financial Modeling and Econometric Analysis*, “Multivariate time series analysis of option prices”, Tilburg

### **February 1997**

Bernadette GOVAERTS and Léopold SIMAR, *Société Royale de Chimie*, “Méthodes statistiques pour l’assurance qualité”, invited paper, Brussels

Valentin PATILEA, *The Art of Nonparametric Statistics*, “NPMLE for (possibly) misspecified convex models”, Louvain-la-Neuve

Christian WEINER, *The Art of Nonparametric Statistics*, “Monotone regression with a half sided error term”, Louvain-la-Neuve

### **March 1997**

Alois KNEIP, *Tagung des Ausschusses für Ökonometrie des Vereins für Socialpolitik*, Rauschholzhausen

### **April 1997**

Léopold SIMAR, *Colloquium MAPA*, “Le Bootstrap: panacée universelle pour l’inférence statistique?”, Louvain-la-Neuve

Christian WEINER, *Bootstrap and Nonparametric Regression*, “On the distribution of the FDH estimator”, Berlin

### **May 1997**

Laurence BOQUIA, *Journée de contact FNRS - Maîtrise Statistique de la qualité: de la théorie à la pratique*, Gembloux

Bernadette GOVAERTS and Léopold SIMAR, *Test Methodology for Multi-parametric Investigations*, invited lecture, von Karman Institute for fluid dynamics, Brussels

Alois KNEIP, *XXIXème Journée de Statistique*, “Interval and band estimation for curves with jumps”, invited paper, Carcassonne

Michel MOUCHART, *International Conference on Transport Survey*, Grainau

Valentin PATILEA, *XXIXème Journée de Statistique*, “Estimation par maximum de vraisemblance non-paramétrique dans les modèles convexes mal spécifiés”, Carcassonne

Jean-Marie ROLIN, *XXIXème Journée de Statistique*, “Simulation des distributions a posteriori en analyse des données censurées”, Carcassonne

Léopold SIMAR, *XXIXème Journée de Statistique*, “Propriétés statistiques des estimateurs non-paramétriques de frontières”, Chairman of the session, Carcassonne

### **June 1997**

Pierre ARS, *Workshop of the European Association for Population Studies*, “Comment appréhender le problème statistique des petits nombres en démographie? Propositions d’estimation par intervalles de confiance”, Cracovie  
Alois KNEIP, *Workshop on Aggregation*, “Behavioral heterogeneity and structural properties of aggregate demand”, invited paper, Bonn

### **July 1997**

Alois KNEIP, *IMS Asian and Pacific Regional Meeting*, “Semiparametric and non-parametric methods for analyzing samples of curves”, invited paper, Taipei

### **August 1997**

Michel MOUCHART, *European Meeting of the Econometric Society*, “Bayesian identification of the semi-parametric binary choice model”, Toulouse  
Florence NICOL, *European Meeting of the Econometric Society*, Toulouse  
Valentin PATILEA and Eric RENAULT, *European Meeting of the Econometric Society*, “Learning on latent variables for estimating nonlinear structural econometric models”, Toulouse  
Christian WEINER, *European Young Statistician Meeting*, “Logarithmic stock returns: leptokurtosis, heteroskedasticity and change points”, Varsovie

## 8. RESEARCH PROJECTS UNDER CONTRACTS

This section discusses ongoing research projects at the Institute of Statistics that are financed by outside agencies in the form of grants or contracts.

### **“Projet d’Actions de Recherche Concertées”: “Semi-and non-parametric methods: computational problems and applications” (1993-1998)**

Financing: Ministry of Research and Education of the “Communauté française” of Belgium in collaboration with the Fonds de Développement Scientifique (FDS), Université catholique de Louvain

Promoters: L. SIMAR and M. MOUCHART

Researchers: Z. LU, F. NICOL, V. PATILEA, Ch. WEINER and L.-X. ZHU

The aim is to develop some aspects of semi- and non-parametric models in order to improve the operational techniques involved in those models and also to test their validity in various fields of application (survival analysis, discrete choice models, frontier estimation, mixtures models). All the problems involve both theoretical and analytical methods as well as numerical analysis.

An annual report is available to the secretariat of the Institute.

### **“Non-parametric and semi-parametric estimation by local polynomial fitting” (1994-1997)**

Financing: National Science Foundation (FNRS - Belgium)

Promoter: I. GIJBELS

This project concerns non- and semi-parametric estimation of functions, such as hazard functions and regression functions, using local polynomial fitting techniques. The problem of choosing appropriate data-driven band with parameters will be investigated. The main aim is to explore the association between dependent and independent variables.

### **Departmental grant: “Stochastic modelling and applied statistics” (1995-1997)**

Financing: Université catholique de Louvain

Promoter: M. MOUCHART in collaboration with the Universidad de Chile, Santiago (Professors: J. AMAYA and R. GOUET)

Researchers: P. ARS and B. JUCQUOIS

The aim is to stimulate scientific collaborations with research centers from Chili and to develop teaching relations in applied mathematics, especially in statistics and in stochastic modelling.

**“Human Capital and Mobility” - Network: “Nonparametric and semi-parametric statistical methods” (1995-1997)**

Financing: European Community

Coordinator: M. HALLIN, Université Libre de Bruxelles

STAT promoter: L. SIMAR

Bringing together aspects from various domains in probability and statistics is the main objective of this project, to be achieved mainly through postdoctoral fellowships and mutual short visits.

**“Nonparametric and semiparametric estimation with incomplete data: censoring and truncation” (1995-1997)**

Financing: NATO

Promoters: U. GÜRLER (Bilkent University, Ankara) and I. GIJBELS

Nonparametric estimation of functions, such as the distribution function, the density function and the hazard function, is investigated in the case of bivariate observations where the observations are possibly subject to truncation and/or censoring.

**“Structural equation models and modelling of covariances” (1996-1998)**

Financing: Fonds de Développement Scientifique (FDS), Université catholique de Louvain

Promoters: I. GIJBELS and A. KNEIP

Researcher: E. SAN MARTIN

Structural equation models are used to investigate the relationship between a set of dependent variables and a set of independent variables. The problem of these models is investigated via simulation studies and by applying resampling techniques. A second issue is that the usual assumptions in structural equation models are quite restrictive. Nonparametric smoothing techniques can be helpful here, and the use of them in these models will be developed.

**“Use of statistical tools to monitor and improve the quality of the analytical methods in the AIDS reference analytical laboratories” (1996-1998)**

Financing: Ministère de la Santé Publique, Belgium

Promoter: A. BURTONBOY, Université catholique de Louvain

STAT responsible: B. GOVAERTS

Researchers: L. BOQUIA and D. CLIMOV

The aim of this project is to test and to implement a series of statistical tools to monitor and improve the quality of the analytical methods used to detect and quantify HIV infection. The pilot laboratory is the ‘Unité de virologie’, UCL. The tools are namely control charts, experimental designs and calibration tools.

**“Cooperation agreement between the Université Libre de Bruxelles, the Université catholique de Louvain and the Institut National de Statistique et d’Economie appliquée (I.N.S.E.A.) at Rabat” (1996-2001)**

Financing: Administration Générale de la Coopération au Développement de Belgique (A.G.C.D.)

Coordinator: M. Hallin, Université Libre de Bruxelles

STAT promoter: L. SIMAR

In order to help the “Institut National de Statistique et d’Economie Appliquée” (I.N.S.E.A.) in completing the reorganization, which started in 1995, concerning its teachings in particular the third cycle and doctoral programs, a collaboration between the ULB, the UCL and the I.N.S.E.A. has been established. Part of the financing is provided by the A.G.C.D. within the context of the own initiatives of the universities in matters of cooperation in development.

**“Sustainable Mobility” Program: “Preparation of a pilot-survey for an in-depth survey on mobility behaviour” (1997)**

Financing: Services Fédéraux des Affaires Scientifiques, Techniques et Culturelles (SSTC)

Promoter: M. MOUCHART

Researchers: A. BARBIERI and F. NICOL

The topic of the project is the sustainable mobility of the households in Belgium. The aim is to carry out a pilot survey which prepares to a national survey of individual behaviours in matters of mobility in Belgium. The team of the Institute of Statistics is particularly responsible for the elaboration of the statistical methods underlying the design of the survey.

## **9. RESEARCH PROJECTS FINANCED BY INDIVIDUALS FUNDS**

**“A model of adverse reactions to rugs, using a model with mutually exclusive causes”**, (1993-1997)

Promoter: A. BOUCKAERT in collaboration with M. MOUCHART

Researcher: M. DONNELLY.

**“Estimation of the time of death by measuring potassium concentration in the eyes”**, (1994-1996)

Promoters: A. BOUCKAERT, M. MOUCHART and Ch. RITTER

Researchers: A. GILLES and A.F. HERBEUVAL.

**“Thyroglobulin as a marker of thyroid cancer. Comparison with scintigraphy”**, (1995-1996)

Promoters: Ch. BECKERS and A. BOUCKAERT

Researchers: S. BOUCART and V. ROELANDS.

**“Prediction of adverse cardiac events after surgery. Validation of the logistic model”**, (1995-1996)

Promoter: A. BOUCKAERT

Researcher: A. MAKANDA.

**“Mortality and quality of life after leone marrow transplantation”**, (1995-1997)

Promoter: A. BOUCKAERT

Researcher: C. BAIANA.

**“SORE model and compliance”**, (1996-1997)

Promoters: A. BOUCKAERT and M. MOUCHART.

**“Sensitivity and specificity of the assay of VIH seropositivity”**, (1996-1998)

Promoter: A. BOUCKAERT

Researcher: B. POLL.

**“Smoking during pregnancy: fetal growth retardation and other risks for the newborn”**, (1996-1998)

Promoter: A. BOUCKAERT.

## 10. CONTINUED EDUCATION AND CONSULTING

The Institute of Statistics offers three modules of continued education as part of the “Formations Continues pour Ingénieurs” (FCI) organized by the Faculty of Applied Sciences, Université catholique de Louvain:

1. Statistics in industry: foundation and prospectives (2 days since 1997);
2. Quality control methods (2 days since 1994);
3. Experimental design: a tool of progress for the productivity and the research (3 days since 1992).

Courses on “Statistical Methods in Industry” have been given at several firms. Consulting services are also offered to business cooperations searching for support in dealing with statistical questions. Examples of visited firms: Lilly, Glaverbel, ECHIP Inc., Banque Nationale, SmithKline Beecham.

The Institute is developing its consulting service offered at other departments and institutions of the University. Many colleagues received advice concerning appropriate methodologies and suitable statistical packages for their specific problems.

The creation of a new students room for statistical computations and the localisation of the statistical server at the Institute of Statistics have motivated the development of an advice service for the software use. In addition, a four-hours problem solving session is offered each week during the academic year. In collaboration with the “Service de formation” of the UCL, the Institute organizes short courses for the software use and provides, on demand, systematic tests of software use in specific domains of application.

The Institute of Statistics has been invited by the von Karman Institute for fluid dynamics, Brussels, to give a four-days course in May 1997 on “Test methodology for multi-parametric investigations”.