

Alois Kneip



Academic career

1988	Dr. rer. nat., University of Heidelberg
1988 - 1990	Postdoc, ZI Mannheim
1990 - 1994	Postdoc, Institute of Economics, University of Bonn
1994	Habilitation (Economics), University of Bonn
1994 - 2000	Professor, Université Catholique de Louvain, Belgium
2000 - 2005	Professor (C4), University of Mainz
Since 2005	Professor (W3), University of Bonn

Honours

2003	Elected Member, International Statistical Institute
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Offers

2011	Chair in Statistics, University of Dortmund
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Invited Lectures

2006	Workshop on Knowledge Extraction and Modeling, Capri, Italy
2006	ENSAI workshop on Nonparametric Statistics, Rennes, France
2006	COMPSTAT, Rome, Italy
2006	BIRS workshop on Statistics at the Frontiers of Science, Banff, AB, Canada
2006	4èmes Journées STAPH, Grenoble, France
2007	Workshop on Semiparametric and Nonparametric Methods in Econometrics, Oberwolfach
2007	ISI 2007, Lisbon, Portugal
2008	WIAS workshop on Sparsity and Inverse Problems in Statistical Theory and Econometrics, Berlin
2008	1st International Workshop on Functional and Operational Statistics, Toulouse, France
2009	BIRS workshop on Semiparametric and Nonparametric Methods in Econometrics, Banff, AB, Canada
2009	Congress S.Co. 2009: complex models and computational methods for estimation and prediction, Milan, Italy
2010	BIRS workshop on Functional Data Analysis: Future Directions, Banff, AB, Canada
2010	17th Meeting of AiOs in Stochastics, Hilversum, Netherlands
2010	73rd Annual Meeting of the Institute of Mathematical Statistics, Gothenburg, Sweden
2010	SAMSI workshop on Analysis of Object Data, Research Triangle, NC, USA
2011	Workshop “Efficiency measurement: new methods and application to the food sector”, Toulouse, France
2011	ISI world statistics conference, Dublin, Ireland
2011	CFE-ERCIM conference, London, England, UK
2012	International Society of Nonparametric Statistics conference, Haldikiki, Greece
2012	Workshop “Meeting the challenges of high dimension: statistical methodology, theory and applications”, Institute for Mathematical Sciences, NUS, Singapore
2012	Workshop on statistics of time warping and phase variations, Mathematical Biosciences Institute, Ohio State University, USA
2013	Workshop “Dependent functional data”, Courant Research Center, Göttingen
2013	Workshop “Applicable semiparametrics”, HU Berlin
2013	CFE-ERCIM conference, London, England, UK
2014	International Society of Nonparametric Statistics conference, Cadiz, Spain
2014	CFE-ERCIM conference, Pisa, Italy
2015	BIRS workshop on frontiers of functional data analysis, Banff, AB, Canada
2015	Workshop on recent developments in statistics for complex dependent data, Loccum
2015	CFE-ERCIM conference, London, England, UK
2016	Oberwolfach workshop “New developments in functional and highly multivariate statistical methodology”, Oberwolfach
2016	CRONOS workshop on functional data analysis, Oviedo, Spain

Research Projects and Activities

Research Project H

Principal Investigator, since 2006

Research Area Econometrics/Statistics of the Bonn Graduate School of Economics

Principal Investigator, since 2006

DFG Cluster of Excellence “Hausdorff Center for Mathematics”

Principal Investigator

DFG project “Some current topics in conditional moment equations models: generated regressors, unknown nuisance functions and panel data”

since 2017

Research profile

A substantial part of my research focuses on nonparametric statistics and functional data analysis. The scientific approach incorporates the development of new methods, a study of resulting theoretical properties, and real data analysis. Important applications in economics are the study of the development of income distributions, Engel curves, and implied volatility surfaces over time or under different conditions. Biomedical applications include the analysis of human growth curves or gene expression data. Major recent contributions to this area are given in [1], [10] and [9]. A second line of my research aims at quantifying individual heterogeneity in economic panel data. In [6] it has been shown that nonparametric smoothing procedures may serve as a tool to improve efficiency of estimation of unknown factors in factor models. A third line of research considers the econometric analysis of production efficiencies based on frontier models. In a number of papers (e.g. [2], [3], [4] and [7]) we have developed a non-standard, general methodology for statistical inference of DEA and FDH estimators.

In the coming years I plan to study some important open problems in functional data analysis. New techniques have to be developed for the analysis of dependent data and, in particular, for time series of functions, which are important for analyzing financial data. Conventional methods for smooth functions have to be adapted in the context of non-smooth economic processes.

A major challenge is to overcome the limitations of standard Hilbert space analysis. Some important applications lead to samples of density functions which lie a nonlinear subspace of L^2 . Experiments in biomedicine frequently yield functional data possessing a common structure in terms of typical successions of peaks and valleys. The challenge then consists in identifying low-dimensional, nonlinear manifolds characterizing the data.

Crucial theoretical and methodological questions will have to be resolved. In the context of panel data I plan to consider problems of time varying and individually heterogeneous regression coefficients.

Editorships

- Computational Statistics (2005 – 2010)
- Annals of Statistics (2008 - 2012)
- Bernoulli (2008 – 2010)

Research Area H My major focus has been the development of statistical/econometrical methods for dealing with heterogeneous populations and corresponding aggregation problems. In [5], we analyze budget elasticities of demand. It is shown that there are significant differences between properly defined aggregate elasticities and mean individual elasticities on the micro level. A rigorous microeconomic theory is developed and the empirical analysis is based on nonparametric statistical methods. When dealing with heterogeneous populations, a major task is to model the time evolutions of the distributions of important characteristics, or of their corresponding density and regression functions. In the last decades functional data analysis has been a very active field of international statistical research. The aim is to develop methods for analyzing data representing samples or time series of related functions. In [6], we combine econometric factor models and methods of functional data analysis in order to analyze heterogeneity in time trends. Functional regression problems are studied [10], while in [11], we present a new approach to the so-called registration problem. Functional principal components analysis is used in [9] to analyze implied volatility surfaces of European options.

Supervised theses

Master theses: 7
Diplom theses: 35
PhD theses: 5

Selected PhD students

Florence Nicole (2002): “Registration and Functional Data Analysis”,
now Associate Professor, École Nationale de l’Aviation Civile, Toulouse, France

Selected publications

- [1] Alois Kneip, Dominik Poss, and Pascal Sarda. Functional linear regression with points of impact. *Ann. Statist.*, 44(1):1–30, 2016.
- [2] Alois Kneip, L'eopold Simar, and Paul W. Wilson. Testing hypotheses in nonparametric models of production. *J. Bus. Econom. Statist.*, 34(3):435–456, 2016.
- [3] Alois Kneip, L'eopold Simar, and Ingrid Van Keilegom. Frontier estimation in the presence of measurement error with unknown variance. *J. Econometrics*, 184(2):379–393, 2015.
- [4] Alois Kneip, L'eopold Simar, and Paul W. Wilson. When bias kills the variance: central limit theorems for dea and fdh efficiency scores. *Econometric Theory*, 31(2):394–422, 2015.
- [5] Werner Hildenbrand, Alois Kneip, and Michal Paluch. Individual versus aggregate income elasticities for heterogeneous populations. *J. Appl. Econometrics*, 27(5):847–869, 2012.
- [6] Alois Kneip, Robin C. Sickles, and Wonho Song. A new panel data treatment for heterogeneity in time trends. *Econometric Theory*, 28(3):590–628, 2012.
- [7] A. Kneip, L. Simar, and P. Wilson. A computationally efficient, consistent bootstrap for inference with non-parametric dea estimators. *Computational Economics*, 2011. to appear.
- [8] Alois Kneip and Pascal Sarda. Factor models and variable selection in high-dimensional regression analysis. *Ann. Statist.*, 39(5):2410–2447, 2011.
- [9] Michal Benko, Wolfgang Härdle, and Alois Kneip. Common functional principal components. *Ann. Statist.*, 37(1):1–34, 2009.
- [10] Christophe Crambes, Alois Kneip, and Pascal Sarda. Smoothing splines estimators for functional linear regression. *Ann. Statist.*, 37(1):35–72, 2009.
- [11] Alois Kneip and James O. Ramsay. Combining registration and fitting for functional models. *J. Amer. Statist. Assoc.*, 103(483):1155–1165, 2008.
- [12] Alois Kneip and Klaus J. Utikal. Inference for density families using functional principal component analysis. *J. Amer. Statist. Assoc.*, 96(454):519–542, 2001. With comments and a rejoinder by the authors.
- [13] Alois Kneip. Ordered linear smoothers. *Ann. Statist.*, 22(2):835–866, 1994.
- [14] Theo Gasser and Alois Kneip. Statistical tools to analyze data representing a sample of curves. *Ann. Statist.*, 20(3):1266–1305, 1992.