

Annual Report 2004

Econometric Institute

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Econometric Institute
Erasmus University Rotterdam
www.econometric-institute.com

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This report was prepared with $\text{\LaTeX}2_{\epsilon}$.

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Econometric Institute

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Preface

The year 2004 has been a year of extremes. The Erasmus School of Economics faced large deficits, and also the Econometric Institute had its share. For the first time in many years, temporary contracts could not be continued. Even some full time positions were cancelled or their requirements were changed. The new focus of the School (starting from 2005 onwards) dismissed a strong emphasis on mathematics and statistics as research areas, and it embraced areas as finance, marketing and economics in general. Much to our relief, it turned out that the focus of our Institute had already been diversified to these areas, so for many of us only few changes were required.

On the other hand, our Institute kept its high level of teaching, culminating in being awarded the best programme in the country, and also many of its members kept their substantial research achievements at the usual top level. We had many visitors, reports and publications, and our conference participation was high. We also saw our first successful entries in the leading business and management journals, while maintaining a high level of contributions to the core journals in management science and econometrics.

The year 2004 has been tough, for all of us, but without any doubt, I can say that we made it through. We have seen that even in hard times, the members of our Institute stand together, and there are many reasons to believe that we will continue to do so.

Philip Hans Franses
Chair, Econometric Institute

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Part I

Econometric Institute

Chapter 1

Introduction to the Institute

In the year 1954 Jan Tinbergen and Henri Theil decided to modernize and intensify the academic teaching of econometrics at the Netherlands School of Economics, the predecessor of the Erasmus University Rotterdam. They proposed to establish econometrics as a special field of study and in that same year their request was honoured by the Senate of the School.

In order to stimulate a widening and a deepening of the possibility of teaching an econometrics programme on the one hand and the econometric research programme on the other hand, Jan Tinbergen and Henri Theil founded the Econometric Institute on September 1, 1956. It was the first Institute in this field in the Netherlands and in fact in the world.

The Institute started in a small classroom, with a research staff of 6. Nowadays the Institute has a research staff of 35, 300 students (at the BSc and MSc level) and 28 PhD students. Members of the Institute have always been active in econometric research with a large number of publications in leading international scientific journals. Alumni from the Master and PhD programmes hold leading positions in industry, banking, the government and universities at a national and an international level. Since 1956 the Institute has a report series and a reprint series, which accumulates to 1337 reprints and 1802 reports in 2004.

Directors Econometric Institute, 1956 – *present*

1956 – 1956	Jan Tinbergen	1982 – 1992	Teun Kloek
1956 – 1966	Henri Theil	1987 – 1996	Harm Bart
1966 – 1971	Jan Sandee	1992 – 1998	Anton Vorst
1966 – 1982	Willem Somermeyer	1998 – 2003	Herman van Dijk
1982 – 1987	Alexander Rinnooy Kan	2004 – present	Philip Hans Franses

Chapter 2

Management

2.1 Mission

The mission of the Econometric Institute is to give students a high quality educational programme leading to the Bachelor's or Master's degree in Econometrics & Management Science, and to enable the faculty to do fundamental and applied research in econometrics.

The two components of the mission are strongly connected. On the one hand, during workshop courses students are introduced to, and take part in, research projects supervised by the faculty. They can also take part in special applied research projects with companies, the government, international agencies, and foreign universities. On the other hand, faculty members of the Econometric Institute introduce the results of recent research very quickly in the senior level courses. This holds in particular for the developments in the fields of finance, logistics, and marketing. Also, recent developments in economic theory and econometrics like auction processes and simulation techniques are studied. Within the teaching programme there is much attention given to learning quantitative economic analysis by an intensive training project of (applied) mathematics and statistics in small work groups supervised by staff and senior students.

2.2 Management Team Econometric Institute

Board of directors

Prof. dr. P.H.B.F. Franses (Director)

Prof. dr. A.P.M. Wagelmans (Director Bachelor & Master programme)

T. Kurtz-Wierenga MSc (Office Manager)

Faculty representatives

Dr. H.M. Mulder

B.L.K. Vroomen MSc (PhD representative until Augustus 31)

R.P. Nicolai MSc (PhD representative as of September 1)

2.3 Management Team Bachelor & Master Programme in Econometrics & Management Science

Prof. dr. A.P.M. Wagelmans (Director)

E.E.V. Taconis-Haantjes MSc (Associate Director)

V.H.M. Beerkens MSc

H.Y. Tse (Student member until Augustus 31)

F. El Habti (Student member as of September 1)

P.L. Hoek van Dijke (Secretary)

Chapter 3

Research and Teaching Awards

In 2004 the educational programme of the Econometric Institute is rated the best among the Econometrics and Operations Research programmes in the Netherlands (Elsevier/ITS Faculty Rating, 2004).

Moreover, the following members of the Econometric Institute were rewarded for their excellent research activities. As an acknowledgement of their excellence, they received several awards or were appointed as member of the editorial board of a leading scientific journal.

Dr. Florin Barb

- Appointed Fellow of the Thomas Stieltjes Institute of Mathematics, 2004

Prof. dr. Harm Bart

- Dutch Royal Decoration: “Officier in de Orde van Oranje Nassau”, 2004

Dr. Govert Bijwaard

- Received a VENI-grant from NWO (Netherlands Organization for Scientific Research) for 3 years, 2004

Prof. dr. ir. Rommert Dekker

- Awarded ‘Top Researcher’, Erasmus School of Economics, 2004
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2004
- Ranked second among the full-time faculty members of the Erasmus School of Economics in the Top-40 of Dutch Economists 2004 (position 14 in the overall ranking)

Dr. Dick van Dijk

- Appointed as member of the editorial board of *International Journal of Forecasting*
- Appointed as member of the editorial board of *Studies in Nonlinear Dynamics and Econometrics*

Dr. Dennis Fok

- Awarded EUR fellowship for the period 2005-2008
- Awarded ‘Best Thesis Award’, Erasmus Research Institute of Management, 2004

Prof. dr. Philip Hans Franses

- Awarded ‘Top Researcher’, Erasmus School of Economics, 2004
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2004
- Entry in *Who’s Who in the World, 21th Edition* published by Marquis Publishing (2004)
- Ranked first among the full-time faculty members of the Erasmus School of Economics in the Top-40 of Dutch Economists 2004 (position 2 in the overall ranking)

Dr. Ruud Teunter

- Ranked fifth among the full-time faculty members of the Erasmus School of Economics in the Top-40 of Dutch Economists 2004 (position 26 in the overall ranking)

Prof. dr. Albert Wagelmans

- Awarded ‘Top Researcher’, Erasmus School of Economics, 2004
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2004
- Ranked fourth among the full-time faculty members of the Erasmus School of Economics in the Top-40 of Dutch Economists 2004 (position 23 in the overall ranking)

Part II
Research

Chapter 4

Research Topics

The Econometric Institute participates in the research programme of the Erasmus School of Economics. In 2004 five of these programmes are directly linked to the Econometric Institute. These are:

- Econometrics (research director prof. dr. H.K. van Dijk)
- Mathematics (research director dr. R.J. Stroecker)
- Operations Research and Decision Analysis (research director prof. dr. ir. R. Dekker)
- Quantitative Finance (research director prof. dr. A.A.J. Pelsser)
- Quantitative Marketing (research director prof. dr. P.H.B.F. Franses)

Furthermore, members of the Econometric Institute also participate in the following programmes:

- Application Oriented Computer Science (research director prof. dr. A de Bruin)
- Corporate Finance and the Market for Risk (research director prof. dr. J. Spronk)
- Incentives and Efficiency (research director prof. dr. M.C.W. Janssen)

4.1 Econometrics

The deregulation of western economic systems, external shocks like sudden, substantial changes in the oil price and the enormous increase in the availability of large data sets in finance and marketing are three major factors that have greatly influenced dynamic econometrics in the past fifteen years. As a consequence, the question how to model dynamic economic systems plays a central role in present day econometrics.

There are several schools that each emphasize certain aspects. Certain authors stress the importance of structural models while others use reduced forms as a starting point of their analysis. Other choice problems include the choice between vector autoregressive models and mixed models (which also make use of moving averages), between deterministic and stochastic approaches to describing trends and seasons, between linear and nonlinear models, between the time domain and the frequency domain, between fixed and variable parameters, between classical statistics and systems theory, between the sampling theory approach and the Bayesian approach, and between parametric, semiparametric and nonparametric approaches.

The goal of this programme is to contribute to the insight that is necessary to make several of these choices. In particular, extensions of traditional models are to be explored, proper inferential procedures are to be developed and the forecasting properties of the models are to be investigated. We distinguish a number of themes.

Flexible Dynamic Econometric Models

Linear vector autoregressive models are in many cases too restrictive to describe complex dynamic relationships among economic variables. Several extensions of this class of models are considered, including regime-switching models to allow for nonlinear features, and time-varying parameter models to allow for gradually evolving dynamic properties. In addition to the theoretical aspects of such models, much attention is given to evaluating their empirical usefulness, in terms of describing the observed patterns in economic data and in terms of forecasting. Typical applications are in business cycle analysis and in empirical finance.

Bayesian Econometrics

An important aim is the further development of operational Bayesian methods for the analysis of dynamic econometric models with possibly nonstationary and nonlinear variables. Applications are in the field of stochastic trends and growth, business cycle analysis and in empirical finance.

Robust Econometric Methods

Anomalous observations may have a large influence on the results of econometric model building and inference. New approaches to deal with such ‘outliers’ are developed. In particular, extensions of existing methods to nonlinear models and to volatility models are considered.

Another part of the econometrics research programme focuses on statistics and data analysis. In this subprogramme, the emphasis is on exploratory methods for the analysis of economic data.

Visualization of Multivariate Data

In empirical data analysis, visualization techniques are often used to explore the relations between different variables or observations. This project hence emphasizes the visualization of multivariate data. The main visualization techniques used are multidimensional scaling, unfolding, correspondence analysis, and principal components analysis. This project aims to extend, adapt, and apply these techniques to particular data analysis situations in marketing and economics.

Applications and Extensions of Support Vector Machines

Prediction of numerical or categorical variables is one of the most common analysis situations in economics and marketing. Recently, support vector machines and support vector regression have been proposed to deal with these situations. These techniques seem to perform particularly well in the presence of outliers. In addition, they are very flexible and have a provision against overfitting. In this project, extensions of these methods are proposed to deal with issues such as confidence intervals, interpretation of the solution, and applications in marketing and finance.

Low-Dimensional Visualization of Interactions

In consumer research and marketing, linear models such as multiple regression, analysis of variance, and conjoint analysis are dominant techniques for the prediction of an outcome variable of interest. In the practice of empirical research, interactions between the predictor variables are often omitted, even though they contribute to the substantive theory and improve predictions. One of the reasons is that interactions are difficult to interpret and, with many predictor variables, there are too many interaction terms. This project aims to develop prediction models that visualize the interactions allowing for easy interpretation of these interactions in low dimensional space.

4.2 Mathematics

This programme unifies a large part of the mathematically oriented research that is presently carried out by members of the Econometric Institute. A large portion of the work is carried out jointly with colleagues from all over the world, in particular with those participating in research programmes of the Stieltjes Institute for Mathematics. Most research activities brought together in this programme can be classified as fundamental.

The programme is divided into five subprogrammes of related topics, and each subprogramme consists of one or more projects. Although most of these research projects are purely mathematical in nature, some of them produce applications with an economic content.

Functional Analysis, Operator Theory and Matrix Analysis

This subprogramme focuses on the further development of the state space in analysis, which happens to be extremely fruitful in dealing with factorization problems, the simultaneous reduction to complementary triangular forms for pairs of matrices, and the analysis of the structure of the set of logarithmic residues in Banach Algebras. Furthermore, this programme also focuses on the application of concepts taken from the field of non-linear dynamics to analyze economic time series and spatial economic processes.

Mathematical Analysis, Probability Theory and Mathematical Statistics

Within this subprogramme there is a focus on the development of multivariate extremes and goodness-of-fit tests based on Lagrange multiplier processes. In addition, also work is done on the asymptotics of heavy tailed random variables

Algebra and Geometry

Research activities of this subprogramme are concentrated in three main areas: Galois modules and Euler systems, diophantine equations and elliptic curves, and general topology. All activities of this subprogramme can be classified as fundamental research.

Discrete Mathematics

The main focus of this subprogramme is to develop a structure theory for classes of graphs using metric properties. The structure theory usually enables an algebraic and/or geometric interpretation of the graphs involved and provides applications in e.g. location theory and consensus theory. Related topics such as representation of graphs, and transit functions are also studied.

Mathematical Techniques with Relevance to Economic Theory

Research activities focus on a newly unified approach to duality theory and to the necessary conditions of optimization theory.

4.3 Operations Research and Decision Analysis

4.3.1 Operations Research in Transportation, Logistics, Health, and Marketing

This subprogramme aims at the development, analysis and application of operations research models in transportation, logistics, health, and marketing. The idea is to use

operations research as part of the management decision making theory in those areas. The main focus lies on logistics. The research on marketing focuses on revenue management and is in a start-up phase. Typical for the research is the tackling of large complex management decision problems by decomposition and by integrating several traditional and newly developed OR methods. On one hand the research is method driven: tackling larger and more complex problems, while on the other hand case studies are done and published to get insight into the real management problems and to get new ideas for interesting models. For example in a case study on spare parts inventory control at a refinery it was found that parts customers could be classified into three groups of high, medium and low importance. The inventory control rule in use, however, did not differentiate between them. In the subsequent research several papers were written with new models taking these differences into account. The term “applied OR” could be used for this topic, but is misleading since in most decision problems much more complex issues should be addressed than existing tools can handle and almost always new research methods need to be developed.

Within the logistics programme a number of themes are studied in more detail, viz. reverse logistics, maintenance optimization, inventory control, scheduling and timetabling, distribution optimization and container logistics.

4.3.2 Design and Analysis of Optimization Algorithms

In this subprogramme we design and analyze algorithms to solve different types of mathematical optimization problems. The emphasis is on obtaining theoretical results. Sometimes numerical experiments are carried out to gain additional insight. Optimization problems can be distinguished according to their level of abstraction. The problems studied in this subprogramme are typically cast in more abstract terms than in the previous subprogramme, where the problems are directly inspired by specific practical situations. The most abstract structures (such as the generic linear programming model) are studied to obtain general results which are valid for any optimization problem that fits into the structure. Besides these general structures, we also study models which arise in such areas as spatial economics, marketing, management science and engineering. They include location problems, routing problems, packing problems, scheduling problems, production planning problems and network design problems. Although these problems may be special cases of the more abstract models mentioned before, their additional structure often allows stronger results. The two most important characteristics of a solution method for an optimization problem are its effectiveness (“how well does it solve the optimization problem?”) and its efficiency (“how much computational effort does it require?”). Both characteristics can be measured in several ways. The solution methods that we design and analyze in this programme can be classified in one of the following categories:

- Exact solution methods
- Approximation methods
- Methods to carry out sensitivity analysis
- Duality in optimization

4.4 Quantitative Finance

In this research area we look for applications of derivatives valuation theory (e.g. Black and Scholes option pricing model) and econometrics to research questions in finance. An example of the former would be the valuation of optionalities in life insurance contracts, whereas an example of the latter is the prediction of risk needed for example for risk and portfolio management. Below are some examples of research questions that our staff work on.

Financial Mathematics

This area concerns new theoretical work on / applications of existing theory to the valuation of complex financial products. For example life insurers often promise customers a guaranteed return, which effectively provides them with an option that is exercised if the interest rate drops below the guaranteed return level. On January 1st 2006 all pension funds and life insurers are obliged to put all liabilities on the balance sheet at market value. This obviously includes all optionalities as well, including the already mentioned guaranteed return products. The long life span of such options and the incompleteness of the market (absence of perfect hedge opportunities for all the liabilities) imply that the standard Black and Scholes framework is no longer applicable due to model risk that cannot be ignored in this case.

Multivariate Volatility

Many extensions of the popular univariate GARCH model to the multivariate case have been proposed recently. Modelling all elements of a covariance matrix in a flexible yet parsimonious way is still a difficult problem. Approaches include factor models, dynamic conditional correlation models, and models including exogenous factors. Applications such as finding the minimum variance portfolio or Value-at-Risk should reveal something about the preferred model.

The Econometrics of High-Frequency Data

Recently transaction and quoted prices from financial markets have become available on a large scale. These can be used to construct superior measures of volatility

and covariances. Whereas for example the daily squared return is an unbiased estimate of ex-post volatility, it is also extremely noisy (think for example about a zero daily return after the market going up and down again). High-frequency data provide estimates that have lower variance. However, these estimates may be biased downwards or upwards due to market microstructure noise such as non-synchronous trading and bid-ask bounce. Several studies have already shown the economic gains from the use of high-frequency data, but the optimal sampling frequency and the optimal way of dealing with market microstructure noise is still ongoing research.

Price Discovery

Assets linked by arbitrage (e.g. an IBM share traded simultaneously in two North-American exchanges; or a futures contract and the underlying index) should be cointegrated. This stipulates an error correction model for the asset returns, which includes the deviation from the equilibrium. Such models can for example be used to investigate which market or asset contributes most to the price discovery, discerning transitory (short-term) and permanent (long-term) price changes. In an ongoing project it is investigated what we can learn from the bid and ask prices in a limit order book, especially those beyond the best bid and ask. For example, can we learn from the second to tenth best bid and ask whether the price will move up or down in the next few minutes?

4.5 Quantitative Marketing

To answer modern research questions in marketing the use of econometric models is often indispensable. The typical research questions in marketing and the typical properties of marketing data nowadays require the use of advanced econometric models. This research programme concerns the development and implementation of these advanced models. The specific form of the models depends on the problem and data at hand.

The marketing research at our department can be classified with respect to two dimensions, the type of model and the type of data. The first classification distinguishes between descriptive and predictive models. The effectiveness of marketing efforts are analyzed using models with a descriptive character. Such a model can help us to understand the determinants of the marketing effort effectiveness. To predict the effect of marketing efforts, we consider models with a predictive character. The latter type of model can, for example, be implemented in decision support systems.

The second classification is based on the aggregation level of the data. Data may be observed at the aggregated level, like sales of a product category or the market share of a brand. These data are analyzed using multivariate time series models. To describe the

behaviour of individuals, like, households, consumers and firms, we use models with a microeconomic foundation.

The quantitative marketing research contributes to the development and implementation of descriptive and predictive econometric models for aggregated as well as individual data. Furthermore, our contribution also concerns the development of estimation techniques and simulation methods for the statistical analysis of these advanced econometric models. The research of the marketing group at the Institute can roughly be summarized in four specific research topics.

Diffusion Models

Diffusion models are used to describe the penetration of a new product on the market. Research in this area concerns predicting market penetration shortly after the introduction of the product. Furthermore, our research focuses on parameter estimation of diffusion models.

Models for Sales and Market Shares

The analysis of sales and market shares is an important issue in modern marketing. Multivariate time series models are used to analyze the dynamic effects of promotions. We focus on analyzing the long- and short-run effects of promotions on sales and market shares using error-correction models.

Choice Behaviour

A consumer who purchases frequently in a product category has to answer three important questions: when to buy, which brand to buy, and how much to buy. To describe these purchase decisions we consider econometric models based on a microeconomic theory. Important research topics in this field are the description of unobserved heterogeneity in the choice behaviour of individuals and the dynamics in the behaviour of the individuals. The models are used to analyze and predict the (dynamic) effects of promotions on individual choice behaviour.

Unobserved Heterogeneity

The description of unobserved heterogeneity is an important issue in modern marketing research. We deal with describing and estimating heterogeneity in preferences and in decision processes. Unobserved heterogeneity is analyzed using latent class approaches and hierarchical Bayes techniques. The research focuses on improving current estimation techniques. The techniques are applied in consumer choice models and time series models.

Chapter 5

PhD Theses

An important task of the Econometric Institute is to educate and train top-researchers in the field of econometrics and operations research. During 2004 four PhD candidates, affiliated with the Econometric Institute, successfully defended their PhD thesis at the Erasmus University:

M.P. de Brito

Title: Managing Reverse Logistics or Reversing Logistics Management?
Institute: Erasmus University Rotterdam
Date: February 12, 2004
Promotor: Prof. dr. ir. R. Dekker
Publisher: ERIM PhD Series Research in Management, Rotterdam
Pages: 316
Research school: Erasmus Research Institute of Management

D. Huisman

Title: Integrated and Dynamic Crew Scheduling
Institute: Erasmus University Rotterdam
Date: February 20, 2004
Promotors: Prof. dr. A.P.M. Wagelmans & prof. dr. ir. R. Dekker
Publisher: Thela Thesis Publishers Amsterdam
Pages: 163
Research school: Tinbergen Institute

J. Kippers

Title: Empirical Studies on Cash Payments
Institute: Erasmus University Rotterdam
Date: September 9, 2004
Promotor: Prof. dr. P.H.B.F. Franses
Publisher: ERIM PhD Series Research in Management, Rotterdam
Pages: 133
Research school: Erasmus Research Institute of Management

D. Li

Title: On Extreme Value Approximation to Tails of Distribution Functions
Institute: Erasmus University Rotterdam
Date: October 14, 2004
Promotor: Prof. dr. C.G. de Vries
Publisher: Thela Thesis Publishers Amsterdam
Pages: 131
Research school: Tinbergen Institute

Chapter 6

Publications

6.1 Econometric Institute Reports

- EI 2004-01** Herman K. van Dijk (2004). *Twentieth Century Shocks, Trends and Cycles in Industrialized Nations*, 19 pp.
- EI 2004-02** Dennis Huisman & Albert P.M. Wagelmans (2004). *A Solution Approach for Dynamic Vehicle and Crew Scheduling*, 26 pp.
- EI 2004-03** S. Ilker Birbil, Gül Gürkan & Ovidiu Listeş (2004). *Simulation-Based Solution of Stochastic Mathematical Programs with Complementary Constraints: Sample-Path Analysis*, 25 pp.
- EI 2004-04** Ruud Teunter (2004). *A Note on “Khouja and Park, Optimal Lot Sizing under Continuous Price Decrease, Omega 31 (2003)”*, 11 pp.
- EI 2004-05** Patrick J.F. Groenen & Alex J. Koning (2004). *Generalized Bi-Additive Modelling for Categorical Data*, 8 pp.
- EI 2004-06** Patrick J.F. Groenen & Alex J. Koning (2004). *A New Model for Visualizing Interactions in Analysis of Variance*, 17 pp.
- EI 2004-07** Philip Hans Franses & Rutger van Oest (2004). *On the Econometrics of the Koyck Model*, 11 pp.
- EI 2004-08** Z. Pelin Bayindir, Rommert Dekker & Eric Porras (2004). *Determination of Recovery Effort for a Probabilistic Recovery System under Various Inventory Control Policies*, 32 pp.
- EI 2004-09** Ruud Teunter (2004). *Determining Optimal Disassembly and Recovery Strategies*, 14 pp.

- EI 2004-10** Linda Teunter & Ruud Teunter (2004). *Profitability of Price Promotions if Stockpiling Increases Consumption*, 12 pp.
- EI 2004-11** Raoul Pietersz & Patrick J.F. Groenen (2004). *Rank Reduction of Correlation Matrices by Majorization*, 21 pp.
- EI 2004-12** Zsolt Sándor & Philip Hans Franses (2004). *Experimental Investigation of Consumer Price Evaluations*, 38 pp.
- EI 2004-13** Sebastiaan W. de Groot & Dennis Huisman (2004). *Vehicle and Crew Scheduling: Solving Large Real-World Instances with an Integrated Approach*, 15 pp.
- EI 2004-14** Hans (J.B.G.) Frenk, P. Kas & G. Kassay (2004). *On Linear Programming Duality and Necessary and Sufficient Conditions in Minimax Theory*, 27 pp.
- EI 2004-15** Patrick J.F. Groenen & Michel van de Velden (2004). *Multidimensional Scaling*, 14 pp.
- EI 2004-16** Eelco van Asperen, Rommert Dekker, Mark Polman & Henk de Swaan Arons (2004). *Arrival Processes in Port Modeling: Insights from a Case Study*, 15 pp.
- EI 2004-17** Geerten Ochtman, Rommert Dekker, Eelco van Asperen & Walter Kusters (2004). *Floating Stocks in FMCG Supply Chains*, 18 pp.
- EI 2004-18** Rodney W. Strachan & Herman K. van Dijk (2004). *Improper Priors with Well Defined Bayes Factors*, 24 pp.
- EI 2004-19** Lennart F. Hoogerheide, Johan F. Kaashoek & Herman K. van Dijk (2004). *Neural Network Based Approximations to Posterior Densities: a Class of Flexible Sampling Methods with Applications to Reduced Rank Models*, 42 pp.
- EI 2004-20** Christian M. Hafner & Helmut Herwartz (2004). *Testing for Causality in Variance Using Multivariate Garch Models*, 24 pp.
- EI 2004-21** Christian M. Hafner & Jeroen V.K. Rombouts (2004). *Semiparametric Multivariate Volatility Models*, 35 pp.
- EI 2004-22** Ilker Birbil, Hans (J.B.G.) Frenk & Shuzhong Zhang (2004). *Generalized Fractional Programming with User Interaction*, 27 pp.
- EI 2004-23** Rodney W. Strachan & Herman K. van Dijk (2004). *Valuing Structure, Model Uncertainty and Model Averaging in Vector Autoregressive Processes*, 47 pp.
- EI 2004-24** Michael E. Ketzenberg, Erwin van der Laan & Ruud H. Teunter (2004). *The Value of Information in Reverse Logistics*, 37 pp.

- EI 2004-25** Z. Pelin Bayindir, S. Ilkir Birbil & Hans (J.B.G.) Frenk (2004). *A Multi-Item Inventory Model with Joint Setup and Concave Production Costs*, 20 pp.
- EI 2004-26** Kevin Pak & Rommert Dekker (2004). *Cargo Revenue Management: Bid-Prices for a 0-1 Multi Knapsack Problem*, 23 pp.
- EI 2004-27** Dennis Fok, Csilla Horváth, Richard Paap & Philip Hans Franses (2004). *A Hierarchical Bayes Error Correction Model to Explain Dynamic Effects of Promotions on Sales*, 39 pp.
- EI 2004-28** Z. Pelin Bayindir, S. Ilker Birbil & Hans (J.B.G.) Frenk (2004). *A Deterministic Inventory/Production Model with General Inventory Cost Rate Function and Concave Production Costs*, 13 pp.
- EI 2004-29** Christian M. Hafner (2004). *Temporal Aggregation of Multivariate Garch Processes*, 43 pp.
- EI 2004-30** Christian M. Hafner & Jeroen V.K. Rombouts (2004). *Estimation of Temporally Aggregated Multivariate Garch Models*, 28 pp.
- EI 2004-31** Michiel J.C.M. Vromans, Rommert Dekker & Leo G. Kroon (2004). *Reliability and Heterogeneity of Railway Services*, 23 pp.
- EI 2004-32** Eelco van Asperen, Rommert Dekker, Mark Polman & Henk de Swaan Arons (2004). *On the Effect of Ship Arrival Processes on Jetty and Storage Capacity*, 16 pp.
- EI 2004-33** Eric Porras Musalem & Rommert Dekker (2004). *On the Efficiency of Optimal Algorithms for the Joint Replenishment Problem: a Comparative Study*, 9 pp.
- EI 2004-34** Erwin A. van der Laan & Ruud H. Teunter. (2004). *Simple Heuristics for Push and Pull Remanufacturing Policies*, 27 pp.
- EI 2004-35** Hans (J.B.G.) Frenk & S. Schaible (2004). *Fractional Programming*, 55 pp.
- EI 2004-36** Rutger van Oest & Richard Paap (2004). *Analyzing the Effects of Past Prices on Reference Price Formation*, 35 pp.
- EI 2004-38** Michiel de Pooter & Dick van Dijk (2004). *Testing for Changes in Volatility in Heteroskedastic Time Series - a Further Examination*, 40 pp.
- EI 2004-39** Florin Dan Barb (2004). *A Robust Semi-Definite Optimization Based Solution to the Robust Order Reduction Problem for Parametric Uncertain Dissipative Linear Systems*, 15 pp.

- EI 2004-40** Philip Hans Franses (2004). *Forecasting in Marketing*, 38 pp.
- EI 2004-41** Gabriella Budai, Dennis Huisman & Rommert Dekker (2004). *Scheduling Preventive Railway Maintenance Activities*, 15 pp.
- EI 2004-42** Dick K. Leegwater & John D. de Groot (2004). *Optimization of Connections to a Fibre Network*, 17 pp.
- EI 2004-43** Wilco van den Heuvel, Peter Borm & Herbert Hamers (2004). *Economic Lot-Sizing Games*, 18 pp.
- EI 2004-44** Dennis Fok, Dick van Dijk & Philip Hans Franses (2004). *Forecasting Aggregates Using Panels of Nonlinear Time Series*, 21 pp.
- EI 2004-45** Andrew C. Harvey, Thomas M. Trimbur & Herman K. van Dijk (2004). *Bayes Estimates of the Cyclical Component in Twentieth Century US Gross Domestic Product*, 14 pp.
- EI 2004-46** Wilco van den Heuvel (2004). *On the Complexity of the Economic Lot-Sizing Problem with Remanufacturing Options*, 6 pp.
- EI 2004-47** Jaap L. Geluk & Casper G. de Vries (2004). *Weighted Sums of Subexponential Random Variables and Asymptotic Dependence between Returns on Reinsurance Equities*, 25 pp.
- EI 2004-48** Dick van Dijk, Denise R. Osborn & Marianne Sensier (2004). *Testing for Causality in Variance in the Presence of Breaks*, 13 pp.
- EI 2004-49** Henry Martyn Mulder & Ladislav Nebeský (2004). *Leaps: an Approach to the Block Structure of a Graph*, 11 pp.
- EI 2004-50** Zsolt Sándor (2004). *On Price Equilibrium with Multi-Product Firms*, 18 pp.
- EI 2004-51** Zsolt Sándor & Kenneth Train (2004). *Quasi-Random Simulation of Discrete Choice Models*, 29 pp.
- EI 2004-52** Marga Trimp, Suzanne Sinnema, Rommert Dekker & Ruud Teunter (2004). *Optimise Initial Spare Parts Inventories: an Analysis and Improvement of an Electronic Decision Tool*, 79 pp.
- EI 2004-53** Marco Missaglia & Paul de Boer (2004). *A Guestimate of the 2002 SAM of Palestine: a General Equilibrium Approach*, 22 pp.

6.2 Econometric Institute Reprints

- EI-1291** Philip Hans Franses, Dick van Dijk & Andre Lucas (2004). Short Patches of Outliers, ARCH and Volatility Modelling. *Applied Financial Economics*, 14, 221-231.
- EI-1292** Sven Axsäter, Marcel Kleijn & Ton G. de Kok (2004). Stock Rationing in a Continuous Review Two-Echelon Inventory Model. *Annals of Operations Research*, 126, 177-194.
- EI-1293** Simme Douwe Flapper & Ruud H. Teunter (2004). Logistic Planning of Rework with Deteriorating Work-in-Process. *International Journal of Production Economics*, 88, 51-59.
- EI-1294** Björn Vroomen, Philip Hans Franses & Erjen van Nierop (2004). Modeling Consideration Sets and Brand Choice Using Artificial Neural Networks. *European Journal of Operational Research*, 154, 206-217.
- EI-1295** Patrick J.F. Groenen (2004). Visualisatie met Dynamische Meerdimensionele Schaling. In A.E. Bronner, P. Dekker, J.C. Hoekstra, E. de Leeuw, Th. Poiesz, K. de Ruyter & A. Smidts (Eds.), *Ontwikkelingen in Het Marktonderzoek - Jaarboek 2004 Marktonderzoekassociatie* (pp. 183-196). Haarlem: De Vrieseborch.
- EI-1296** Laurens de Haan, Deyuan Li, Liang Peng & Helena Iglesias Pereira (2002). Alternative Conditions for Attraction to Stable Vectors. *Probability and Mathematical Statistics*, 22(2), 303-317.
- EI-1297** M. Ivette Gomes, Laurens de Haan & Liang Peng (2002). Semi-Parametric Estimation of the Second Order Parameter in Statistics of Extremes. *Extremes*, 5, 387-414.
- EI-1298** Raoul Pietersz & Antoon Pelsser (2004). Risk-Managing Bermudan Swaptions in a Libor Model. *Journal of Derivatives*, 11(3), 51-62.
- EI-1299** Patrick Houweling, Albert Mentink & Ton Vorst (2004). Valuing Euro Rating-Triggered Step-Up Telecom Bonds. *Journal of Derivatives*, 11(3), 63-80.
- EI-1300** Laurens de Haan & Tao Lin (2003). Weak Consistency of Extreme Value Estimators in $C[0,1]$. *Annals of Statistics*, 31(6), 1996-2012.
- EI-1301** Richard Freling & Ramon M. Lentink (2004). A Decision Support System for Crew Planning in Passenger Transportation Using a Flexible Branch-and-Price Algorithm. *Annals of Operations Research*, 127, 203-222.

- EI-1302** Hans (J.B.G.) Frenk, Kassay, G. & J. Kolumban (2004). On Equivalent Results in Minimax Theory. *European Journal of Operational Research*, 157, 46-58.
- EI-1303** Yoshinori Kawasaki & Philip Hans Franses (2004). Do Seasonal Unit Roots Matter for Forecasting Monthly Industrial Production? *Journal of Forecasting*, 23, 77-88.
- EI-1304** Herman K. van Dijk (2004). Twentieth Century Shocks, Trends and Cycles in Industrialized Nations. *De Economist*, 152(2), 211-232.
- EI-1305** Philip Hans Franses, Richard Paap & Björn Vroomen (2004). Forecasting Unemployment Using an Autoregression with Censored Latent Effects Parameters. *International Journal of Forecasting*, 20, 255-271.
- EI-1306** Ruud Teunter (2004). Lot-Sizing for Inventory Systems with Product Recovery. *Computers & Industrial Engineering*, 46, 431-441.
- EI-1307** Sanjeev Goyal & Klaas Staal (2004). The Political Economy of Regionalism. *European Economic Review*, 48(3), 563-563.
- EI-1308** Ruud H. Teunter, Erwin A. van der Laan & Dimitrios Vlachos (2004). Inventory Strategies for Systems with Fast Remanufacturing. *Journal of the Operational Research Society*, 55, 475-484.
- EI-1309** S. Ilker Birbil, Shu-Cherng Fang & Jiye Han (2004). An Entropic Regularization Approach for Mathematical Programs with Equilibrium Constraints. *Computers & Operations Research*, 31, 2249-2262.
- EI-1310** Nanda Piersma & Jedid-Jah Jonker (2004). Determining the Optimal Direct Mailing Frequency. *European Journal of Operational Research*, 158, 173-182.
- EI-1311** Michiel J.C.M. Vromans, Rommert Dekker & Leo G. Kroon (2004). Simulation and Railway Timetabling Norms. In J. Allan, C.A. Brebbia, R.J. Hill, G. Sciutto & S. Sone (Eds.), *Computers in Railways IX* (pp. 685-694). South Hampton: WIT Press.
- EI-1312** Gabriella Budai & Rommert Dekker (2004). A Dynamic Approach for Planning Preventive Railway Maintenance Activities. In J. Allan, C.A. Brebbia, R.J. Hill, G. Sciutto & S. Sone (Eds.), *Computers in Railways IX* (pp. 323-332). South Hampton: WIT Press.
- EI-1313** Rommert Dekker & Z. Pelin Bayindir (2004). Spare Parts Inventory Control - An Overview of Issues for a Large Industrial Complex. In M. Taisch, E. Filos, P.

- Garello, K. Lewis & M. Montorio (Eds.), *International IMS Forum 2004 - Global Challenges in Manufacturing Part I* (pp. 180-187). Milano: Grafica Sovico Srl - Biassono.
- EI-1314** Ruud H. Teunter & Simme Douwe Flapper (2003). Lot-Sizing for a Single-Stage Single-Product Production System with Rework of Perishable Production Defectives. *OR Spektrum*, 25, 85-96.
- EI-1315** Patrick J.F. Groenen & Michel van de Velden (2004). Inverse Correspondence Analysis. *Linear Algebra and its Applications*, 388, 221-238.
- EI-1316** Harm Bart, Torsten Ehrhardt & Bernd Silbermann (2004). Logarithmic Residues in the Banach Algebra Generated by the Compact Operators and the Identity. *Mathematische Nachrichten*, 268, 3-30.
- EI-1317** Jaap Geluk (2004). Asymptotics in the Symmetrization Inequality. *Statistics & Probability Letters*, 69, 63-68.
- EI-1318** Marianne Sensier & Dick van Dijk (2004). Testing for Volatility Changes in US Macroeconomic Time Series. *Review of Economics and Statistics*, 86(3), 833-839.
- EI-1319** Rommert Dekker, Rene de Koster, Kees Jan Roodbergen & H. van Kalleveen (2004). Improving Order-Picking Response Time at Ankor's Warehouse. *Interfaces*, 34(4), 303-313.
- EI-1320** Ovidiu Listes & Rommert Dekker (2005). A Stochastic Approach to a Case Study for Product Recovery Network Design. *European Journal of Operational Research*, 160, 268-287.
- EI-1321** Marisa P. de Brito, Rommert Dekker & Simme Douwe Flapper (2005). Reverse Logistics: a Review of Case Studies. In B. Fleischmann & A. Klose (Eds.), *Distribution Logistics - Advanced Solutions to Practical Problems* (pp. 234-281). Berlin/Heidelberg/New York: Springer-Verlag.
- EI-1322** Dennis Fok & Philip Hans Franses (2004). Analyzing the Effects of a Brand Introduction on Competitive Structure Using a Market Share Attraction Model. *International Journal of Research in Marketing*, 21(2), 159-177.
- EI-1323** Luc Bauwens, Charles S. Bos, Herman K. van Dijk & Rutger D. van Oest, (2004). Adaptive Radial-Based Direction Sampling: Some Flexible and Robust Monte Carlo Integration Methods. *Journal of Econometrics*, 123(2), 201-225.

- EI-1324** Dennis Huisman, Richard Freling & Albert P.M. Wagelmans (2004). A Robust Solution Approach to the Dynamic Vehicle Scheduling Problem. *Transportation Science*, 38(4), 447-458.
- EI-1325** Yoshinori Kawasaki & Philip Hans Franses (2004). Do Seasonal Unit Roots Matter for Forecasting Monthly Industrial Production? *Journal of Forecasting*, 23, 77-88.
- EI-1326** Zsolt Sándor & Kenneth Train (2004). Quasi-Random Simulation of Discrete Choice Models. *Transportation Research Part B: Methodological*, 38, 313-327.
- EI-1327** Zsolt Sándor & Peter András (2004). Alternative Sampling Methods for Estimating Multivariate Normal Probabilities. *Journal of Econometrics*, 120(2), 207-234.
- EI-1328** Raoul Pietersz, Antoon Pelsser & Marcel van Regenmortel (2004). Fast Drift-Approximated Pricing in the BGM Model. *Journal of Computational Finance*, 8(1), 93-124.
- EI-1329** Antoon Pelsser (2004). Market Models. In J.L. Teugels & B. Sundt (Eds.), *Encyclopedia of Actuarial Science* (pp. 1068-1075). Chichester: John Wiley & Sons.
- EI-1330** Raoul Pietersz & Antoon Pelsser (2004). Risk-Managing Bermudan Swaptions in a Libor Model. *Journal of Derivatives*, 11(3), 51-62.
- EI-1331** Frank de Jong, Joost Driessen & Antoon Pelsser (2004). On the Information in the Interest Rate Term Structure and Option Prices. *Review of Derivatives Research*, 7, 99-127.
- EI-1332** Patrick J.F. Groenen & Jacqueline J. Meulman (2004). A Comparison of the Ratio of Variances in Distance-Based and Classical Multivariate Analysis. *Statistica Neerlandica*, 58(4), 428-439.
- EI-1333** Philip Hans Franses (2004). Fifty Years since Koyck (1954). *Statistica Neerlandica*, 58(4), 381-387.
- EI-1334** Endre Boros, Robert E. Jamison, Renu Laskar & Henry Martyn Mulder (2004). On 3-Simplicial Vertices in Planar Graphs. *Discussiones Mathematicae. Graph Theory*, 24, 413-421.
- EI-1335** Marco Missaglia & Paul de Boer (2004). Food-for-Work Versus Cash-for-Work: Emergency Assistance in Palestine. *Economic Systems Research. Journal of the International Input-Output Association*, 16(4), 367-390.

EI-1336 Philip Hans Franses (2004). Do we Think we Make Better Forecasts than in the Past? A Survey of Academics. *Interfaces*, 34(6), 466-468.

EI-1337 David F. Schrager & Antoon A.J. Pelsser (2004). Pricing Rate of Return Guarantees in Regular Premium Unit Linked Insurance. *Insurance Mathematics & Economics*, 35, 369-398.

6.3 Books

The following books were published by members of the Institute in 2004:

Philip Hans Franses & Richard Paap (2004). *Periodic Time Series Models*. Oxford: Oxford University Press.

Christiaan Heij, Paul de Boer, Philip Hans Franses, Teun Kloek & Herman K. van Dijk (2004). *Econometric Methods with Applications in Business and Economics*. Oxford: Oxford University Press.

Marno Verbeek (2004). *A Guide to Modern Econometrics, Second Edition*. Chichester: John Wiley & Sons.

6.4 Special Issues of Journals

The following special issues of scientific journals were edited by members of the Econometric Institute in 2004:

Luc Bauwens, Michel Lubrano & Herman K. van Dijk (2004). Recent Advances in Bayesian Econometrics. *Journal of Econometrics*, 123(2).

Peter Cornelisse, Herman K. van Dijk & Henk Don (2004). Economics with a Purpose. Tinbergen Centennial Issue. *De Economist*, 152(2).

Part III

Conferences & Seminars

Chapter 7

Marketing Science Conference

The Econometric Institute and the Marketing Department of both the Erasmus School of Economics and the Rotterdam School of Management organized the:

2004 Marketing Science Conference

June 24–26, 2004

Erasmus University Rotterdam

History

The Marketing Science Conference has a strong history of outstanding scholarship and was first organized by Stanford University in the US in 1979. It is organized every year by renowned institutions. So far the list of organizing universities includes NYU (1981), University of Pennsylvania (1982), University of Chicago (1984), Duke University (1989), London Business School (1992), Berkeley (1997), INSEAD (1998), and UCLA (2000). The conference is hosted by a non-American institution only once every three years.

Scope

The conference covers a broad set of topics, going from marketing strategy, over marketing models to consumer behaviour. As the name of the conference already states, these marketing topics are approached from a scientific viewpoint, often building on advanced econometric techniques. The paper presentations were all of high quality and many of the presented papers will end up in the most prestigious journals such as *Journal of Marketing*, *Journal of Marketing Research*, and *Marketing Science*.

Social events

Besides the serious part during the many presentations, there were also very successful social events with a visit to and dinner in St. John's Church in Gouda and a dinner in Cruise Terminal Rotterdam. To underline the importance of practical relevance of the

research done on marketing, at this dinner the 2004 ISMS practice prize was awarded to the best cooperation between marketing academics and practitioners.

Keynote address

The keynote address of the 2004 Marketing Science Conference was given by Anthony Simon, President of Marketing for Unilever Bestfoods.

Following Unilever's acquisition of Bestfoods and the creation of Unilever Bestfoods in October 2000, Anthony Simon was appointed president of marketing for Unilever Bestfoods in January 2001 and member of the Unilever Bestfoods Board. Prior to this appointment, he had been Corporate Vice President of world-wide Strategy and Core Businesses for Bestfoods and a member of the corporation's Corporate Strategy Council or Executive Committee. Anthony Simon joined Bestfoods in 1968 at its European headquarters in Brussels. He held various marketing positions in Scandinavia before returning to headquarters in 1972 as new business development coordinator. In 1973, he was appointed assistant to the divisional president. In 1980, Anthony Simon was appointed deputy consumer operations manager for Bestfoods in Switzerland and two years later, he became general manager of Bestfoods Ireland. In 1985, he became executive assistant to the divisional president and the following year, a divisional vice president and member of the European Executive Committee and the Bestfoods Europe Board. Anthony Simon was named vice president, Northern European Region in 1987 and became senior vice president - business development, planning and operations - for Bestfoods Europe in 1991. He was elected a Corporate Vice President of Bestfoods in March 1997 and is a board member of Huhtamaki, a leading global packaging company.

An academic's perspective on the keynote address was given by John D.C. Little, Institute Professor at MIT.

Professor Little is best known in Operations Research (OR) for his proof of the queuing formula $L = \lambda W$, commonly called Little's Law. He is also considered a founder of marketing science. He graduated from MIT in 1948 with an S.B. in physics. After working two years at General Electric, he returned for graduate work but gradually switched to operations research, studying with OR pioneer, Philip Morse, and graduating in 1955 as the first PhD in OR. From 1957-62 he taught at Case Western Reserve. Professor Little early recognized the power of combining optimization and computation. His research in marketing encompasses a broad set of modelling and decision support issues that have led naturally to his current interest in e-commerce and marketing automation. Professor Little has long been active in professional societies, having been president of both ORSA and TIMS, and chairing the committee that merged these two organizations, after which he became the first president of INFORMS. He also co-founded a marketing models firm, Management Decision Systems, which was later acquired by Information Resources, and,

more recently, an internet company that is now part of Kana Software.

Programme

An outline of the conference programme is given below:

Date	Morning	Afternoon	Evening
Wednesday, June 23		Doctoral Consortium	Reception Doctoral Consortium
Thursday, June 24	Doctoral Consortium	Start Conference Practice Plenary Parallel Sessions	Reception at Conference Centre
Friday, June 25	Parallel Sessions	Parallel Sessions	Dinner at St. John's church in Gouda
Saturday, June 26	Parallel Sessions	Parallel Sessions	Dinner at Cruise Terminal Rotterdam

Organization

The conference was organized by Stefan Stremersch, Berend Wierenga, Philip Hans Franses, Gerard Tellis, Bas Donkers, Peter Verhoef and Stefan Wuyts. Looking back, the conference has been a great success.

Chapter 8

Journal of Applied Econometrics Lectures

8.1 Erasmus Center for Financial Research Seminar

Journal of Applied Econometrics and Erasmus Center for Financial Research organized the seminar:

“On Theory and Practice of Forecasting”

May 6, 2004

Erasmus University Rotterdam

Speakers

Guus Boender (ORTEC)

Tim Bollerslev (Duke University)

David F. Hendry (Nuffield College, Oxford University)

Aad Jacobs (ING, Shell)

Programme

10.00 – 10.30 Registration and coffee

10.30 – 11.00 Aad Jacobs *A New Golden Age for the Stock Market?*

11.00 – 11.30 Guus Boender *The Future of Pension Systems*

11.30 – 11.45 Coffee & tea

11.45 – 12.30 Tim Bollerslev *Some Like it Smooth, and Some Like it Rough in Forecasting Volatility*

12.30 – 14.00 Lunch break

14.00 – 16.00 David F. Hendry *Unpredictability and the Foundations of Forecasting (1)*

16.00 Drinks

About the speakers

Aad Jacobs, former chairman of the board of ING Groep, now member of the Supervisory Board of ING and Shell. He is a graduate from Erasmus University Rotterdam.

Guus Boender, co-founder of ORTEC consultancy company, received his PhD in Operations Research at Erasmus University Rotterdam. He is president of ORTEC's Finance Division. He has held full professor positions at Erasmus University Rotterdam and at Vrije Universiteit (Amsterdam). His expertise has given ORTEC its leadership position in the area of Asset Liability Management in Europe. Guus Boender has published extensively in leading international journals and is a frequent speaker at ALM and Risk Management conferences.

Tim Bollerslev is especially known for the Generalized Autoregressive Conditionally Heteroscedasticity (GARCH) model. The Nobel prize in Economics 2003 went to Clive Granger and Robert Engle, the latter in particular for his ARCH model. We dare to say that without popularizing the ARCH model through GARCH Engle would not have received the Nobel prize. Recently Tim Bollerslev, with Torben Andersen, has brought new life into volatility forecasting by using high-frequency data (e.g. 30-minute returns). This resulted in remarkable improvements in both measuring volatility as well as forecasting volatility, improving over the GARCH approach as well as showing GARCH models work really well. It was on this exiting new development in risk forecasting that Bollerslev provided a talk.

David Hendry was at Erasmus University to provide the annual Journal of Applied Econometrics lecture series on May 6 and 7. David Hendry is at Oxford but is also well known in political circles having advised prime ministers Thatcher and Blair on economic issues as well as the central bank. David Hendry has developed his own approach in search of the optimal economic forecasting model given the data. Needless to say that

for many finance applications it is very useful to know how the economy will develop. David Hendry has written several books on economic forecasting. He presented a lecture on Unpredictability and the Foundations of Economic Forecasting.

8.2 Annual Research Seminar of the Netherlands Econometric Study Group

Journal of Applied Econometrics and the Netherlands Econometric Study Group organized the seminar:

“Macroeconomic Forecasting”

May 7, 2004

Erasmus University Rotterdam

Speakers

Peter Vlaar (De Nederlandsche Bank)

Jan Jacobs (University of Groningen)

Marius Ooms (Free University Amsterdam)

Dennis Fok (Econometric Institute)

David F. Hendry (Nuffield College, Oxford University)

Programme

10.00 – 10.35 Peter Vlaar *Forecasting Inflation: an Art as Well as a Science*

10.30 – 11.10 Jan Jacobs *Real-Time Forecasting with Leading Indexes: the Ragged-Edge Problem and Data Revisions*

11.10 – 11.40 Coffee & tea

11.40 – 12.15 Marius Ooms *Forecasting Daily Time Series Using Periodic Unobserved Component Time Series Models*

12.15 – 12.40 Dennis Fok *Forecasting Aggregate Output Using Nonlinear Multi-Level Models for Disaggregated Data*

12.40 – 14.00 Lunch

14.00 – 16.00 David F. Hendry *Unpredictability and the Foundations of Forecasting (2)*

16.00 Drinks

Chapter 9

Econometric Institute Lecture Series

The Econometric Institute and Princeton University Press organized the intensive PhD-course:

“Analysis of Treatment Response for Decision Making”

Prof. Charles F. Manski
(Northwestern University)

June 2-4, 2004

Erasmus University Rotterdam

9.1 Introduction

This intensive three-day PhD-course provided an in-depth overview of the analysis of treatment response with a special focus on providing the information required by decision/policy makers. An important practical objective of empirical studies of treatment response is to provide decision makers with information useful in choosing treatments. Often the decision maker is a planner who must choose treatments for a heterogeneous population. The planner might, for example, be a physician choosing medical treatments for a population of patients or a judge choosing sentences for convicted offenders.

It is unrealistic to think that studies of treatment response can provide all the information that planners would like to have as they choose treatments. However, researchers can aim to improve treatment choice by addressing several questions:

- How should studies be designed in order to be most informative?
- How should studies report their findings so as to be most useful in decision making?
- How should planners utilize the information that studies provide?

The complete course consisted of 6 lectures of 2 hours, a morning and an afternoon session on each of the days. The 3 major lectures were given by professor Manski. In order to make these lectures accessible for a large, interested group of students, two introductory lectures and a lecture on topics related to Manski's work were given. A more extensive outline of the lectures is given below.

Lecturers

Prof. Charles F. Manski (Northwestern University)

Prof. dr. Jaap Abbring (Free University Amsterdam)

Dr. Bas Donkers (Econometric Institute, Erasmus University Rotterdam)

Dr. Richard Paap (Econometric Institute, Erasmus University Rotterdam)

Dr. Bas van der Klaauw (Free University Amsterdam)

9.2 Course outline

1. Introduction to the analysis of treatment response (dr. Richard Paap)
 - Measures of treatment effects
 - Identification issues
2. Utilitarian treatment of heterogeneous populations (prof. Charles Manski)
 - Studying treatment response to inform treatment choice
 - The planning problem
 - Practices that limit the usefulness of research on treatment response
3. Statistical Decision Theory (dr. Bas Donkers)
 - Decision making with parameter uncertainty
4. The selection problem and treatment choice (prof. Charles Manski)
 - Treatment choice using the empirical evidence alone
 - Monotone treatment response
 - Exclusion restrictions

- Incomplete observation of the study population
5. Treatment effect analysis (prof. dr. Jaap Abbring, dr. Bas van der Klaauw)
- Social experiments in real time
 - The effects of financial rewards on students' achievement: evidence from a randomized experiment
6. Treatment choice with experimental data (prof. Charles Manski)
- The expected welfare (risk) of a statistical treatment rule
 - Using a randomized experiment to evaluate an innovation
 - Using covariate information with data from a randomized experiment

Chapter 10

Symposium and Farewell Lecture Professor Harm Bart

On Friday April 23, professor Harm Bart delivered his Farewell Lecture. This lecture was preceded by a symposium consisting of two sessions. The first session, a Prelude of Mathematical Lectures, took place in the afternoon of Thursday April 22. A more general session was scheduled on Friday, preceding professor Bart's lecture. An outline of the programmes is given below:

Prelude of Mathematical Lectures

April 22, 2004

Erasmus University Rotterdam

Speakers

T.J. Laffey (University Dublin)

P. Lancaster (University of Calgary)

T. Ehrhardt (Universität Chemnitz)

W. Kabbalo (Universität Dortmund)

M.A. Kaashoek (Free University Amsterdam)

Programme

Chair: Dr. H.M. Mulder (Econometric Institute)

13.30-13.45 Opening address: P.H.B.F. Franses (Econometric Institute)

13.45-14.15 T.J. Laffey *Simultaneous Reduction of Idempotent Matrices*

14.15-14.45 P. Lancaster *On Pseudospectra of Matrix Polynomials*

14.45-15.30 Coffee break

15.30-16.00 T. Ehrhardt *Logarithmic Residues in Banach Algebras*

16.00-16.30 W. Kabbalo *Generalized Resolvents*

16.30-17.00 M.A. Kaashoek *The State Space Method and Ellis-Gohberg Orthogonal Matrix Functions*

17.00 Reception

General Session and Farewell Lecture

April 23, 2004

Erasmus University Rotterdam

Speakers

R. Zuidwijk (Erasmus University Rotterdam)

I. Gohberg (Tel-Aviv University)

L.G. Kroon (Erasmus University Rotterdam)

B. Silbermann (Universität Chemnitz)

A.P.M. Wagelmans (Econometric Institute)

Programme

Chair: E.E.V. Taconis-Haantjes MSc (Econometric Institute)

09.00 Welcome

9.30-10.15 R. Zuidwijk *Connections*

10.15-11.00 I. Gohberg *The State Space Method and Problems of Factorization*

11.00-11.30 Coffee/tea break

11.30-12.15 L.G. Kroon *Math at a Rail Operator*

12.15-13.30 Lunch break

13.30-14.15 B. Silbermann *Fredholm Properties and Numerical Linear Algebra*

14.15-15.00 A.P.M. Wagelmans *Correct, But Not Necessarily Good*

16.00 Farewell Lecture by professor Harm Bart

Chapter 11

Seminars

11.1 Econometric Institute Seminars

January 20 Robert G. Tompkins (Hochschule für Bankwirtschaft, Frankfurt) *Unconditional Return Disturbances: a Non Parametric Simulation Approach*

February 26 Dick van Dijk (Erasmus University Rotterdam) *Forecasting Inflation Using Model Averaging*

March 15 Jan Groen (Bank of England) *Real Exchange Rate Persistence and Systematic Monetary Policy Behaviour*

March 18 Ana-Maria Fuertes (Cass Business School, London) *Panel Time Series Modelling Issues*

March 25 Jeroen Rombouts (CORE, Louvain-la-Neuve) *Bayesian Clustering of Many GARCH Models*

April 1 Peter Robinson (London School of Economics) *Modified Whittle Estimation of Multilateral Spatial Models*

April 26 Claus Brand (European Central Bank) *An Application of Optimal Control in a Structural Cointegrated VAR for the Euro Area*

April 29 Ben Tims (Erasmus University Rotterdam) *A Range-Based Multivariate Model for Exchange Rate Volatility*

May 26 Simon van Norden (HEC, Montréal) *Optimal Band-Pass Filtering and the Reliability of Current Analysis*

- August 30** Bart Hobijn (Federal Reserve Bank of New York) *Menu Costs at work: Restaurant Prices and the Introduction of the Euro*
- September 23** Robert Kunst (University of Vienna) *Toward a Theory of Evaluating Predictive Accuracy*
- October 4** Kees Jan van Garderen (University of Amsterdam) *Conditional Inference in Cointegrating Vector Autoregressive Models*
- October 21** Bram van Dijk (Erasmus University Rotterdam) *Treatment Effect of Job Training Programs on Unemployment Duration*
- November 4** Gary Koop (University of Leicester) *Forecasting and Estimating Multiple Change-Point Models with an Unknown Number of Change-Points*
- November 11** Andrew Patton (London School of Economics) *Volatility Forecast Evaluation and Comparison Using Imperfect Volatility Proxies*
- November 18** Georgi Nalbantov (Erasmus University Rotterdam) *Support Vector Machines in Marketing*
- November 23** Marieke van Onna (Erasmus University Rotterdam) *Ins and Outs of Ordered Latent Class Models*
- December 2** Jean-Pierre Urbain (University of Maastricht) *Spurious Regression in Nonstationary Panels with Cross-Member Cointegration*
- December 6** Rolf Tschernig (University of Maastricht) *Nonparametric Time Series Computing for Everybody - Everywhere*
- December 9** Sophocles Mavroeidis (University of Amsterdam) *Efficiency Wages, Matching, and Unemployment: an Analysis for Four OECD Countries*

11.2 Operations Research Meetings and Seminars

- March 18** Michael Pinedo (Stern School of Business) *An Overview of Order Scheduling Models with Applications in Practise*
- March 30** Nico van Dijk (University of Amsterdam) *To Pool or Not to Pool: That Is the Question*
- June 8** Kampan Mukherjee (Indian School of Mines) *Analysis of Economic Factors Affecting the Acquisition Decision of Returns*

June 29 Nelly Litvak (Universiteit Twente) *Travel Time in Carousel Systems*

July 12 Awi Federgruen (Graduate School of Business, Columbia University) *Effective Heuristics for Multi-Item Capacitated Lot-sizing Problems*

11.3 Mathematical Meetings and Seminars

June 21 Vladimir Protasov (Moscow State University) *Multifractal Model of Asset Returns and Convex Analysis*

Part IV

Education & Training

Chapter 12

Bachelor & Master Programme

12.1 Introduction

The Econometric Institute plays a major role in the Bachelor and Master programmes in Econometrics & Management Science offered by the Erasmus University Rotterdam. The main characteristic of these programmes is the interaction between theory and practice, which is guaranteed by the fact that most staff members are active researchers and by the close contacts the institute has with many companies and other organizations.

Staff members also teach in other programmes at Erasmus University, such as the Bachelor and Master programmes in:

- Economics & Business
- Informatics & Economics
- International Business Administration
- Maritime Economics and Logistics

and the research Master and PhD programme of the research schools:

- Erasmus Research Institute of Management (ERIM)
- Tinbergen Institute (TI)

In the following two sections we will elaborate on the Bachelor and Master programmes in Econometrics & Management Science.

12.2 Bachelor Programme

The aim of this three-year programme is to teach students the necessary economic theory and quantitative skills to tackle problems faced by government and business. Courses are mainly taught in Dutch and students are expected to have a talent for and interest in quantitative analysis. In the academic year 2004-2005 about 75 students entered the programme. Since the programme was started recently in this form, the first graduates are expected at the end of the academic year 2004-2005.

The first two years of the programme consist of basic courses and special courses in which students learn to integrate the knowledge and skills acquired in the basic courses. In the third year, students choose a major in which they specialize. The options for the majors mirror the four disciplines in the Master programme:

1. Operations Research and Quantitative Logistics
2. Quantitative Finance
3. Quantitative Marketing
4. Econometrics

We refer to the next section for a detailed description of these disciplines.

In the final year, students spend a significant part of their time on case studies. These case studies are often derived from real life problems and are typical for the programme. Students conclude their Bachelor studies with writing a short thesis.

Graduates from this programme may immediately pursue a career in business or government or enter a graduate programme. It is expected that in the coming years many students will choose to enter the Master programme in Econometrics & Management Science.

12.3 Master Programme

The work of econometricians and management scientists consists of doing quantitative analyses for solving problems faced by government and business. Economic aspects usually play a major role in such problems. This study programme is mainly geared towards teaching students the necessary economic theory and quantitative skills.

The aim is to provide high-quality academic training to enable graduates to pursue careers in business and government, or to excel in science. Graduates should be able to apply existing econometric and management science techniques independently to complex real-world problems (including execution and/or implementation in computer programs). Furthermore, graduates must be able to develop and apply new models for new problems.

The standard Master programme, Econometrics & Management Science, is a one-year programme with four optional disciplines: *Operations Research and Quantitative Logistics*, *Quantitative Finance*, *Quantitative Marketing*, and *Econometrics*.

Students may choose to follow the dual variant of the programme, which concludes with a six months working period at a company or another organization. This variant takes about 18 months in total.

The Master programme also provides an excellent preparation for a PhD programme at one of the research schools at Erasmus University or elsewhere.

12.3.1 Operations Research and Quantitative Logistics Objectives

This programme unit intends to generate high-level staff in Operations Research and Quantitative Logistics, which master the advanced optimization software available for logistics and other operations today. However, their abstract knowledge also allows them to master other problem areas like finance and marketing quickly. To this end, they have to follow courses on subjects like location, distribution and transport problems, production planning and scheduling, queuing and stochastic models, advanced mathematical programming and ICT in logistics.

An important aspect in the programme unit is the ability to apply the methods successfully. To train this, two courses are dedicated to modelling and solving real life problems. In these courses students not only obtain more practical knowledge but also improve their social skills by working together in groups and presenting the results both in writing and orally. The programme unit is finished with a short thesis.

There is the option to extend the thesis while working with a company. Recently projects were carried out with major multinationals like Shell, TPG Post, KLM, the Schiphol Group, Europe Combined Terminals. Similar projects took place at national transport companies, like Dutch Railways, Rotterdam Transport and with small innovative software companies, like Ortec Consultants, PointLogic, and research companies like KPN Research, TNO Research.

Almost the whole staff contributing to the programme has a PhD and is active in research. Several had positions in industry. The research group was very well evaluated in the national research ranking, doing both high level research as well as innovative logistical applications.

The lecturers and theses-supervisors include:

- prof. dr. ir. R. Dekker
- dr. J.B.G. Frenk

- dr. D. Huisman
- W.M. van Sonderen MSc
- dr. R.H. Teunter
- prof. dr. A.P.M. Wagelmans

12.3.2 Quantitative Finance Objectives

To acquire their degrees, students have to successfully complete a number of courses on option pricing, risk management, portfolio management, and financial econometrics (e.g. volatility forecasting). Whereas some of these courses are mainstream finance topics, there will be a clear focus on quantitative methods that are used in practice in these topic areas, including the actual implementation of option pricing models, risk management, portfolio construction and investment decisions. In addition there is a course in which students work on a large practical problem.

Completion of the degree will entail writing a thesis on a specific individual topic, usually in collaboration with a (financial) company and executed at the company. Recent students conducted such projects at e.g. Robeco, ORTEC Consultants, KPMG, ING, ABN AMRO, AEGON, and Deutsche Bank (London). This year, for example, several groups looked at different aspects of the (market) valuation of the liabilities of pension funds and (life) insurers due to the coming new accounting standards effective by January 1, 2006. ORTEC consultants and Deutsche Bank in London were two companies involved with setting up the problems for the students.

To underscore the practicality as well as the quantitative focus of the programme unit, it is illustrative that all our teaching staff has PhD's in Econometrics, Finance or Mathematics. The Econometric Institute is renowned worldwide for producing excellent research output. Also, some of our staff teaches at Erasmus University on a part-time basis, working mostly as practitioner. For example, professor Vorst works at the ABN AMRO, and professor Pelsser works at Nationale Nederlanden, the largest insurer in The Netherlands and part of ING.

The lecturers and theses-supervisors include:

- dr. D.J.C. van Dijk
- dr. ir. C.M. Hafner
- dr. W.G.P.M. Hallerbach
- dr. G.A.P. Kindervater

- dr. ir. M.P.E. Martens
- prof. dr. A.A.J. Pelsser
- prof. dr. M.J.C.M. Verbeek
- prof. dr. A.C.F. Vorst

12.3.3 Quantitative Marketing Objectives

This programme unit contains courses on Statistics in Marketing Research, Basic Models and Advanced Models, Multivariate Statistics and Large Data Sets. We emphasize the active practical experience of students, also by considering these topics in the light of present-day research topics and practical questions. These topics will also be delivered by our contacts in business.

There are full-audience lectures, and there are also interactive lectures for smaller sized groups, where the students get intensive supervision. Students shall become acquainted with the process of posing research questions in a clear-cut manner, translating these questions into econometric models, which require specific empirical data, to analyze these models, and finally, to translate the results from these models back to the original question.

The concluding thesis can be about a theoretical topic, but most likely it will be about a marketing question from either one of the associated firms, like Unilever, FBTO, ROBEKO, Spaarbeleg, PWC, Shell, Heinz, Wegener, Claritas, IRI, VNU, and various charities.

Members of the faculty regularly publish their scholarly research in leading academic journals, like the Journal of Marketing Research and the Journal of Econometrics. They also address relevant topics in practitioners' magazines, like Marketing News. The faculty members often collaborate with their colleagues in leading US schools, like those of Yale, Chicago, Carnegie Mellon, and Los Angeles (UC and USC). This establishes the possibility of an exchange of students and faculty.

The lecturers and thesis-supervisors include:

- dr. A.C.D. Donkers
- dr. D. Fok
- prof. dr. P.H.B.F. Franses
- prof. dr. P.J.F. Groenen
- dr. A.J. Koning
- dr. R. Paap

- prof. dr. S. Stremersch
- dr. P.C. Verhoef

12.3.4 Econometrics Objectives

The Master programme in Econometrics builds on and extends the econometric tradition established in Rotterdam by professors Tinbergen and Theil. This programme is geared towards teaching students econometric techniques and quantitative skills to perform theoretical and empirical econometric analyses. The aim is to provide high-quality academic training that enables graduates to pursue careers in business and government, or to excel in science. New developments are explained and applied in assignments and workshops. A thorough analysis of modern econometric methods and models serves to help in preparing a high level Master thesis, topics for which are found in the fields of international finance and international economics, labour, insurance, and health economics.

All instructors are active researchers who incorporate their most recent research findings in their lectures. They belong to the faculty of the Econometric Institute, which has an excellent reputation in the international academic world. Exchanges with leading European and American universities (Cambridge, Oxford, Harvard, Chicago, UC Los Angeles) are possible for talented students.

The lecturers and thesis-supervisors include:

- dr. D.J.C. van Dijk
- prof. dr. H.K. van Dijk
- dr. D. Fok
- prof. dr. P.H.B.F. Franses
- prof. dr. P.J.F. Groenen
- dr. ir. M. Martens
- dr. R. Paap
- prof. dr. M.J.C.M. Verbeek

Chapter 13

Master Theses

The following students obtained their master's degree at the Econometric Institute in 2004:

R. Alblas (September 2, 2004) *Initial public offerings*

Supervision: dr. N.L. van der Sar

S. Benaouda (September 2, 2004) *Direct mail en de consument*

Supervision: prof. dr. P.H.B.F. Franses

J.E.M. Brittijn (January 22, 2004) *Efficiëntie door differentiatie?*

Supervision: W. van Sonderen-Huisman MSc

R.E. van den Broek (October 7, 2004) *Swaptions used for risk reduction*

Supervision: prof. dr. A.A.J. Pelsser

R. de Bruijn (January 22, 2004) *The Dutch monthly macro economic process*

Supervision: dr. D.J.C. van Dijk

D.J. Buijs (February 5, 2004) *De gevolgen van de MKZ-crisis op de vleessector*

Supervision: dr. R. Paap

S.R.D. Dielbandhoesing (October 21, 2004) *Cross-selling strategies and potential value based on future product portfolia*

Supervision: dr. A.J. Koning

M. van Diepen (January 22, 2004) *Evaluating CHAID*

Supervision: prof. dr. P.H.B.F. Franses

A. van Dijk (September 16, 2004) *Treatment effect of job training programs on unemployment duration in Slovakia*

Supervision: dr. R. Paap

P.P. Füss (December 16, 2004) *Bid premiums of going - private transactions in the United Kingdom*

Supervision: dr. D.J. van Dijk

L.L. Gastelaars (December 2, 2004) *Beleggingsbeleid van geïndexeerde pensioenen*

Supervision: prof. dr. A.A.J. Pelsser

V. Gatta (September 9, 2004) *Does the price encourage music piracy?*

Supervision: prof. dr. P.H.B.F. Franses

W.A. Gille (June 9, 2004) *It's all in the game*

Supervision: prof. dr. A.A.J. Pelsser

P.C.H. Heijen (February 19, 2004) *Private equity cash flow modeling*

Supervision: dr. D.J.C. van Dijk

J.R. Heirath (September 27, 2004) *Een algemeen evenwichtsmodel voor evaluatie van 27 maanden intifada: een vergelijking met schattingen van wereldbank en IMF*

Supervision: dr. P.M.C. de Boer

X.J. Huang (February 5, 2004) *Quantitative analysis of market power in UK electricity market*

Supervision: prof. dr. H.K. van Dijk & dr. ir. C.M. Hafner

H. Huyssen van Kattendijke (March 23, 2004) *Hedge fund performance persistence and determinants thereof*

Supervision: dr. D.J.C. van Dijk

S.M. Jansen (September 2, 2004) *The functional and dysfunctional effects of first and second order embedded resources on the performance of employees*

Supervision: prof. dr. ir. W.J.M.I. Verbeke & dr. S.H.K. Wuyts

J. de Jong (November 18, 2004) *Vasicek modeling and Martingale pricing conditional indexation*

Supervision: prof. dr. A.A.J. Pelsser

P. de Jong (April 29, 2004) *Medewerkersonderzoek gezocht*

Supervision: prof. dr. P.J.F. Groenen

M.H. Kemink (November 4, 2004) *Verwachte doorlooptijd van hypotheekaanvragen voorstellen en beloven aan tussenpersonen*

Supervision: prof. dr. ir. R. Dekker

H.Y. Khee (May 13, 2004) *The internal validity of choice-based conjoint analysis*

Supervision: dr. R. Paap

J.S. Kromhout (December 16, 2004) *Explaining changes in credit spreads*

Supervision: prof. dr. A.A.J. Pelsser

C. Laheij (May 13, 2004) *Verandering van consumentenvertrouwen, wat is dat eigenlijk?*

Supervision: prof. dr. P.H.B.F. Franses

C. Lems (June 10, 2004) *Succes is voorspelbaar. Het modelleren van het succes van productintroducties in de markt voor fast moving consumer goods*

Supervision: dr. R. Paap

T. Meister (February 19, 2004) *Optimalisering van het verkoopproces*

Supervision: dr. A.C.D. Donkers

S. Miljoen (February 19, 2004) *Seizoenfluctuaties in marketing*

Supervision: prof. dr. P.H.B.F. Franses

E.M. ten Napel (September 16, 2004) *Trading volatility and its delta risk*

Supervision: dr. ir. M.P.E. Martens

M.C. Non (January 22, 2004) *Response styles: occurrence and correction methods*

Supervision: dr. D.J.C. van Dijk

R. Olthof (February 19, 2004) *Huis houden*

Supervision: prof. dr. ir. R. Dekker

P.F. Rijn (September 9, 2004) *Het waarderen en afdekken van pensioenverplichtingen*

Supervision: prof. dr. A.A.J. Pelsser

J.M. van Rosmalen (October 21, 2004) *Global optimization strategies for two-mode clustering*

Supervision: prof. dr. P.J.F. Groenen

C.A. Santosa (December 16, 2004) *A Bayesian analysis of loss reserves and credibility theory in actuarial science*

Supervision: prof. dr. H.K. van Dijk

K. Schuit (October 7, 2004) *Cyclicalities in the tanker industry*

Supervision: dr. R.H. Teunter

R. Segers (June 10, 2004) *Modelling twentieth century economic growth in industrialized nations: Exploiting cross-country similarities*

Supervision: prof. dr. H.K. van Dijk & dr. R. Paap

S. Skobic (May 13, 2004) *Forecasting inflation in EU with linear and nonlinear models*

Supervision: dr. D.J. van Dijk

K. Stapper (September 2, 2004) *Van Coil tot Ring - Reductie van slitaafval*

Supervision: W. van Sonderen-Huisman MSc

B.C.L.M. de Theije (January 22, 2004) *Hedonic models for televisions: semiparametric versus parametric*

Supervision: dr. A.J. Koning

N. Tromp (September 2, 2004) *Modelling advertising effectiveness*

Supervision: dr. A.C.D. Donkers

L. Xu (March 4, 2004) *Herverzekering leven*

Supervision: prof. dr. A.C.F. Vorst

M.P. van de Werken (November 4, 2004) *Promotie effecten in consumenten- en retail-data: een vergelijking*

Supervision: dr. R. Paap

R. Zwaneveldt (April 15, 2004) *Een exacte en heuristische methode voor een voertuig-routeringsprobleem met tijdrestricties en full-truck loads*

Supervision: dr. J.B.G. Frenk

Part V

Members of the Institute

Chapter 14

Faculty

F.P.J. (Fransje) Akveld MSc, *akveld@few.eur.nl*

Fransje Akveld is Lecturer in Mathematics and Statistics.

Dr. ir. F.D. (Florin) Barb, *barb@few.eur.nl*

Florin Barb has been involved both in teaching undergraduate mathematics (Analysis II, Mathematics for Business and Mathematics for Economists) as well as continuing the line of research in applied robust convex optimization started in 2003. A recent paper “The Robust Order Reduction Problem For Parametric Uncertain Dissipative Linear Systems - a Robust Semi-definite Optimization Based Solution” has been accepted for publication in *IMA Journal of Mathematical Control and Information*. Two other submitted manuscripts are under revision. Florin Barb is finishing his appointment at the Econometric Institute in August 2005.

Prof. dr. H. (Harm) Bart, *bart@few.eur.nl*

Harm Bart is Professor of Mathematics. His research interests are in Wiener-Hopf factorization, complementary triangular forms of matrices and vector-valued logarithmic residues. His most recent papers are on the latter topic. He served two terms on the board of the International Linear Algebra Society, has been chairman of the international jury for the Hans Schneider Prize in Linear Algebra and is an editor of *Electronic Journal of Linear Algebra*. For many years he served the Erasmus School of Economics in administrative functions, in the period 1996-2000 as dean. In 2003 he formally retired but is still active as an Emeritus Professor.

Dr. Z.P. (Pelin) Bayindir, *bayindir@ise.ufl.edu*

Pelin Bayindir was a post-doctoral researcher in Operational Research in 2002-2004. Her main research areas are inventory theory and supply chain management. In 2004, her papers have been published (or accepted for publication) in *Journal of the Operational Research Society*, *Computers & Operations Research*, and *Omega - The International Journal of Management Science*. Currently, she is a visiting Assistant Professor at Department of Industrial and Systems Engineering in University of Florida.

Dr. G.E. (Govert) Bijwaard, *bijwaard@few.eur.nl*

Govert Bijwaard is a post-doctoral researcher in Applied Econometrics. His research interests are micro-econometrics with an emphasis on duration models and correcting for selectivity. Recently, his empirical research contributed to the marketing literature (interpurchase times) and the timing of migration moves. He has published in *Journal of Econometrics*.

Dr. S. (Ilker) Birbil, *sibirbil@sabanciuniv.edu*

S. Ilker Birbil has received his PhD degree from North Carolina State University, Raleigh, USA. He was a post-doctoral research fellow of Erasmus Research Institute of Management, Rotterdam, The Netherlands. His research interests include nonlinear programming, global optimization, equilibrium constrained optimization problems, approximation methods for min-max problems, and multi-echelon inventory systems. In the last two years he has been actively working with several researchers from USA, China, Turkey and the Netherlands. His papers are accepted for publication in *Operations Research Letters*, *International Journal of Production Economics*, *European Journal of Operational Research* and *Computers & Operations Research*. Currently, he is working as an Assistant Professor in Sabanci University, Istanbul, Turkey, where he teaches courses on operations research and management science.

Dr. P.M.C. (Paul) de Boer, *pmdeboer@few.eur.nl*

Paul de Boer is Assistant Professor of Econometrics. His teaching is in statistics and econometrics. His research interest is the application of economic models to study policy-relevant issues of developing countries. In 2004 he contributed to the Food-for-Work versus Cash-for-Work debate in the framework of emergency assistance to Palestine. He is the managing editor of *Statistica Neerlandica*.

Dr. J. (Jan) Brinkhuis, *brinkhuis@few.eur.nl*

Jan Brinkhuis is Associate Professor in Mathematics. His research interests are in - dynamic - optimization methods and applications in finance and economics. In 2004 he finished - with professor V. Tikhomirov - a book: *Optimization: Insights and Applications*. This will be published by Princeton University Press in August 2005. An educational paper on optimization methods and applications - with V. Protasov - was accepted by *Mathematical Education* (Russian). During a visit to Hong Kong research on a new barrier function for SDP-problems was started - with professors S. Zhang and T. Luo - and a first draft was written. He teaches courses for students in econometrics, TI PhD-students, students in economics, and students in Maritime Economics and Logistics.

Prof. dr. ir. R. (Rommert) Dekker, *rdekker@few.eur.nl*

Rommert Dekker is a full Professor of Operations Research. His research interests include logistics, transportation and maintenance optimization in general. In particular he studies reverse logistics, (spare parts) inventory control, robust timetables and revenue management. In 2004 research with Robin Nicolai and Gabriella Budai on an intelligent maintenance management system was finished with delivering single and multi-component optimization routines to be included in a prototype. Research on robust timetables with Michiel Vromans and Leo Kroon led to new methods to take care of delays. This earned Michiel two prizes. With Kevin Pak a new method was developed for cargo revenue management. Together with Eric Porras theory for the joint replenishment problem was perfected and the correction factor was successfully tackled. Finally a lot of work was spent in setting up a research cooperation on service logistics with several companies.

Dr. D.J.C. (Dick) van Dijk, *djvandijk@few.eur.nl*

Dick van Dijk is Associate Professor in Econometrics, and Associate Director of Erasmus Research Institute of Management (ERIM). His research interests include nonlinear time series analysis, business cycle analysis, and financial econometrics. He has published on these topics in *Journal of Econometrics*, *Journal of Business and Economic Statistics*, *Journal of Applied Econometrics*, *Journal of Empirical Finance*, and *Review of Economics and Statistics*, among others. He co-authored the book *Nonlinear Time Series Models in Empirical Finance* (with Philip Hans Franses), published by Cambridge University Press in the year 2000.

Prof. dr. H.K. (Herman) van Dijk, *hkvandijk@few.eur.nl*

Herman K. van Dijk is Professor of Econometrics; former director of the Econometric Institute and former chairperson of the Tinbergen Institute. He is a member of the Erasmus Institute of Research in Management and fellow of the Tinbergen Institute. He has been a visiting fellow and visiting Professor at, among other institutions, Cambridge University, Corpus Christi College, Harvard University, Catholique University of Louvain, Duke University, Cornell University, and University of New South Wales. His research areas are: Bayesian inference and decision processes, dynamic econometrics and neural network models. His recent publications appeared in *Journal of Forecasting*, *Journal of Business and Economic Statistics*, *Journal of Econometrics*, *De Economist*, and *Oxford Bulletin of Economics and Statistics*. He is co-editor of *Journal of Applied Econometrics* and Associate Editor of *Journal of Econometrics*, *Econometric Reviews*, and *Computational Economics*. He is a member of the European Standing Committee of the Econometric Society. In 2004 he was co-author of the textbook of econometrics written by five members of the Econometric Institute and published by Oxford University Press.

Dr. B. (Bas) Donkers, *donkers@few.eur.nl*

Bas Donkers is post-doctoral researcher in Marketing and Econometrics. His research interests include applied econometrics and consumer behaviour. In particular, the modelling of consumer behaviour with econometric models that are well grounded in economic theory or psychology is one of his main areas of interest. He has published in journals such as *Journal of Marketing Research*, *Journal of International Business Studies*, and *Journal of Risk and Uncertainty*.

Dr. A.J.M. (Fons) van Engelen, *vanengelen@few.eur.nl*

Fons van Engelen is Lecturer in Mathematics. His research interests are in general topology and descriptive set theory, with publications in various international journals. His teaching is in mathematics, with a special interest in applications of ICT in education. Together with J.F. Kaashoek, he has developed the interactive system for education “gSCALE” (formerly “eWISE”), for which he obtained the University Education Prize in 2003. The further development of gSCALE is embedded in the SURF-project “Webspijkereen” (2004-2006), the objective of which is to develop effective teaching practices to remedy deficiencies in mathematics of (prospective) students. The project is conducted together with the University of Amsterdam and the University Maastricht.

Dr. D. (Dennis) Fok, *dfok@few.eur.nl*

Dennis Fok is a post-doctoral researcher in Applied Econometrics. His research interests include non-linear models for panel data and the combination of marketing and econometrics, this includes modelling brand choice, market shares and interpurchase times. He is also experienced with estimation methods based on simulation, both in the classical as the Bayesian framework. Papers of him have been published in *Journal of Econometrics*, *International Journal of Forecasting* and *International Journal of Research in Marketing*.

Prof. dr. P.H.B.F. (Philip Hans) Franses, *franses@few.eur.nl*

Philip Hans Franses is Professor of Applied Econometrics and Professor of Marketing Research. His research interests are econometrics, forecasting, marketing research and empirical finance. He has published various books and articles on these topics in international journals. His most recent book is *Periodic time series models* (with Richard Paap) (Oxford), and his recent articles appeared in for example *Journal of Marketing Research* and *Journal of Econometrics*. He is an associate editor of nine journals, and the editor in chief of *Statistica Neerlandica*. Additionally, he is an occasional reviewer for various other journals.

Dr. J.B.G. (Hans) Frenk, *frenk@few.eur.nl*

Hans Frenk is Associate Professor in Operations Research. His teaching is in simulation, applied stochastic processes, linear and integer programming and applied statistics. His research started in stochastic processes and probabilistic analysis of algorithms. At the moment his research is focused on convex and quasiconvex optimization with applications to inventory control, applied stochastic models, game theory and equilibrium models. He has published extensively both theoretical and applied papers in journals on optimization and operations research.

Dr. J. (Jaap) Geluk, *jjgeluk@few.eur.nl*

Jaap Geluk is Associate Professor in the area of probability and statistics. The focus of his current research is on tail properties of random variables. Recent joint work with prof. Casper de Vries resulted in applications in economics, more specifically on systemic risk in financial markets. He is referee for several journals on applied probability and wrote a book on Regular Variation joint with prof. Laurens de Haan. Until now he published over 30 papers in international journals and had visiting positions at UCLA and three universities in the middle east.

Prof. dr. S. (Sanjeev) Goyal, *sgoyal@essex.ac.uk*

Sanjeev Goyal is Professor of Economics at the University of Essex and Honorary Professor of Mathematical Economics at Erasmus University Rotterdam. His field of research is economic theory. He has done research on problems of coordination, social learning, political economy, and industrial organization. In recent years, he has been working on the economics of networks. His work has appeared in *Econometrica*, *Review of Economics Studies*, *Rand Journal of Economics* and *Journal of Economic Theory*.

Prof. dr. P.J.F. (Patrick) Groenen, *groenen@few.eur.nl*

Patrick Groenen is Professor of Statistics. His research interests include multivariate analysis, multidimensional scaling, exploratory data analysis, visualization, optimization, and classification. He has published a textbook on multidimensional scaling and has written several articles in international journals, such as *Psychometrika*, *Journal of Classification*, *British Journal of Mathematical and Statistical Psychology*, and *Journal of Empirical Finance*. He is associate editor of two journals and serves regularly as referee for various journals.

Dr. C.M. (Christian) Hafner, *chafner@few.eur.nl*

Christian Hafner is a post-doctoral researcher in Applied Econometrics. His research interest is in the field of financial econometrics. He has published two books (both with Springer Verlag) and various articles in international journals, including *Finance and Stochastics* and *Journal of International Money and Finance*. He is associate editor of *Computational Statistics*.

Dr. C. (Christiaan) Heij, *heij@few.eur.nl*

Christiaan Heij is Associate Professor of Statistics and Econometrics. His research background is in time series analysis, econometrics, and system identification. Over the last years his main activities were concentrated on setting up various new courses in the programs of economics, econometrics, and international business administration, and in writing (together with colleagues of the Econometric Institute) a core textbook on Econometrics that appeared in 2004 with Oxford University Press.

Dr. C.S. (Csilla) Horváth, *horvath@few.eur.nl*

Csilla Horváth is a post-doctoral researcher at the Econometric Institute. Her research interests include modelling competitive responses, measuring immediate and dynamic effects of promotions, panel and time series cross sectional data, vector autoregressive models.

Dr. D. (Dennis) Huisman, *huisman@few.eur.nl*

Dennis Huisman is a part-time Assistant Professor at the Econometric Institute. Furthermore, he is a logistic consultant within the Department of Logistics of NS Reizigers. In February 2004, he successfully defended his PhD thesis *Integrated and Dynamic Vehicle and Crew Scheduling*. His research interests are in the area of public transport optimization which includes vehicle scheduling, crew scheduling and railway optimization. His papers have been published (or accepted for publication) in *Transportation Science* and *Journal of Scheduling*.

Dr. J.F. (Johan) Kaashoek, *kaashoek@few.eur.nl*

Johan Kaashoek has retired from the Econometric Institute as of August 1, 2004. He was Associate Professor of Mathematics. His research interests are nonlinear modelling, pattern formation and nonlinear dynamics and its applications in spatial economics and economics in general. He has published in *Acta Applicanda Mathematica*, *Annals of Regional Science* and *Econometric Reviews*.

Prof. dr. T. (Teun) Kloek, *kloek@few.eur.nl*

Teun Kloek is Professor Emeritus of Econometrics. He used to be teaching econometric methods and applied econometrics. He published about fifty articles in several econometric journals. Most recently he was a co-author of Heij et al., *Econometric methods with applications in business and economics*. His current research interests include nonparametric and robust methods in econometrics. He is a fellow of the Econometric Society and of *Journal of Econometrics* and a honorary fellow of the Tinbergen Institute.

Dr. A.J. (Alex) Koning, *koning@few.eur.nl*

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Peter Kooiman is part-time Professor in economic statistics. For many years he was head of the Department of Statistical Methods of Statistics Netherlands, where he got involved in the area of survey methodology. His current main job is at the Netherlands Bureau of Economic Policy Analysis, where he is involved in the economic analysis of ageing problems and the sustainability of the pension system and other welfare state institutions, using applied general equilibrium models. His research interests are both in the area of survey methods (imputation, sampling design), micro-econometrics (analysis of complex survey data) and applied welfare economics.

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Robin Lumsdaine is a Visiting Professor in Financial Econometrics. She has just accepted a position at the Federal Reserve Board of Governors as Chief of Quantitative Risk Management and Associate Director, Division of Banking Supervision and Regulation. The primary focus of her group will be implementation of Basel II.

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Martin Martens is Associate Professor in Finance. His research interests are volatility forecasting using high-frequency data, interaction between financial markets, and market microstructure. He has published on these topics in *Journal of Banking and Finance*, *Journal of International Money and Finance*, and *Journal of Futures Markets*. In 2004 he presented his most recent work on estimating covariances using high-frequency data at the European Finance Association meeting in Maastricht.

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Martyn Mulder is Associate Professor in Mathematics. His teaching is in mathematics and operations research. His research interests are in graph theory and its applications in problems of location theory, transportation science and optimization. Recently the focus of his research has shifted more and more onto these applications. He has published extensively in journals on discrete mathematics and applied discrete mathematics.

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Richard Paap is post-doctoral researcher in Applied Econometrics. His research interests are choice models, duration models, time series analysis and simulation methods with applications in marketing and macroeconomics. He has published in several econometric and economic journals, co-authored a textbook on Quantitative Models in Marketing Research (Cambridge), and co-authored a textbook on Periodic Time Series Models (Oxford). He is occasional reviewer for econometric and economic journals and is Associate Editor of *Statistica Neerlandica*.

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Zsolt Sandor is a post-doctoral researcher in Econometrics. His research interests include estimation of market equilibrium models, estimation of consumer search models, quasi-random simulations and optimal designs for choice experiments. He has also written a paper on equilibrium existence and uniqueness in oligopolistic games. He has published in *Journal of Econometrics*, *Journal of Marketing Research*, *Marketing Science* and *Transportation Research B*.

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Sharon Schalk is Lecturer in Mathematics. Her research interests are in functional analysis, convex analysis and topology, combined with equilibrium theory. In December 1999 she successfully defended her PhD thesis titled *Equilibrium Theory: a Salient Approach*.

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Marno Verbeek is Professor of Finance. His teaching is in econometrics and empirical finance and he is author of the book *A Guide to Modern Econometrics*, which had its second edition published in 2004 (Wiley). His research interests include: asset pricing, predictability, mutual funds, hedge funds, selection bias, survival bias, panel data, repeated cross-sections, portfolio choice and risk management. He has published in a wide range of international journals, including *Journal of Econometrics*, *Journal of Financial and Quantitative Analysis*, *Journal of Empirical Finance* and *Review of Economics and Statistics*.

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Ton Vorst is Global Head Modelling and Product Analysis at ABN AMRO Bank. He also holds a chair in Finance and Econometrics at the Erasmus University Rotterdam. He has extensively published on derivatives in international academic journals. He is Associate Editor of among others *Journal of Derivatives*, *Review of Derivatives Research*, *European Financial Management* and *European Financial Review*.

Dr. M. (Michel) van de Velden, *vandevelden@few.eur.nl*

Michel van de Velden is post-doctoral researcher at the Econometric Institute. He obtained his PhD degree in econometrics from the University of Amsterdam for his thesis: *Topics in Correspondence Analysis*. After research positions in Groningen and Barcelona, Michel joined the Econometric Institute in February 2004. His research interests concern visualization methods for multivariate data; in particular, correspondence analysis, principal component analysis and (generalized) canonical correlation analysis. Recent articles appeared in *Journal of Classification* and *Linear Algebra and its Applications*.

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Albert P.M. Wagelmans is Professor of Operations Research and the director of the Bachelor and Master programme in Econometrics & Management Science. His current research focuses on the analysis and development of models and techniques to solve planning problems in logistics and public transportation. He has published articles in academic journals such as *Management Science*, *Operations Research*, *Transportation Science* and *Mathematics of Operations Research*. In 2004 he was recognized as one of the most productive researchers in Erasmus School of Economics.

Chapter 15

Visitors

Prof. dr. L. (Laurens) de Haan, *ldehaan@few.eur.nl*

Laurens de Haan is a retired professor and permanent visitor of the Institute. He is full time researcher.

Dr. B. (Bart) Hobijn, *Bart.Hobijn@ny.frb.org*

Bart Hobijn is affiliated with the Federal Reserve Bank of New York. He is a Senior Economist in the Domestic Research Function of the Research and Statistics Group. He is an applied macroeconomist, whose special interests are the extent and consequences of technological progress and economic growth. His current research focuses on the measurement of quality improvements of equipment and structures used in production, and the speed and impact of the adoption of new technologies. He has published in *American Economic Review*, *Journal of Applied Econometrics* and *Journal of Monetary Economics*. During his visit in 2004 he worked together with Philip Hans Franses (and Marius Ooms of Free University Amsterdam) on the final version of the paper “Generalizations of the KPSS test for stationarity”, which appeared in *Statistica Neerlandica*.

Prof. dr. R.M.K. (Robert) Kunst, *kunst@ihs.ac.at*

Robert Mauritius Kunst is Professor of Economics at the University of Vienna and a Consultant and Lecturer at the Institute for Advanced Studies Vienna. His main research interest is time-series econometrics, particularly with a focus on seasonality, forecasting, and statistical decisions. He has published several articles on these topics in international journals. He is the coordinating editor of *Empirical Economics*.

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Sotiris Papachristos is an Associate Professor in the Department of Agricultural Farm Organization and Management of the University of Ioannina Greece. He is teaching courses in operations research, mathematical programming, operations management statistics and mathematical economics. His research interests are inventory control, dynamic programming, optimization. He has published articles in *Operations Research*, *International Journal of Productions Economics*, *Computers & Operations Research*, *Management Science*, *Optimal Control and Applications Methods*. He is referee for many journals and he is an Associate Editor of *International Journal of Systems Science*.

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Vladimir Protasov is an Associate Professor at the Department of Mechanics and Mathematics at Moscow State University. His research interests are optimization, convex analysis and functional analysis. Every year he visits the Econometric Institute to give lectures and to do research in collaboration with Jan Brinkhuis, Hans Frenk and Alex Koning. His papers have been published in *Optimization*, *Mathematical Notes* and *Mathematical Education* (Russian). He is also an occasional reviewer for various mathematical journals and books.

Prof. dr. V.K. (Jeroen) Rombouts, *jeroen.rombouts@hec.ca*

Jeroen Rombouts is Assistant Professor at HEC Montréal. He holds a PhD from Université catholique de Louvain (at CORE). His current research interests focus on quantitative methods in econometrics with applications in finance, Bayesian inference, simulation and numerical methods. He has also consultancy experiences with private companies.

Prof. dr. S. (Suzanne) Winsberg, *suzanne.Winsberg@ircam.fr*

Suzanne Winsberg is a researcher at IRCAM (Paris, France). She visited the Econometric Institute in November 2004. In collaboration with professor Patrick Groenen she conducted research on multidimensional scaling for symbolic data. The resulting research report has been submitted to an international journal on computational statistics.

Chapter 16

PhD Candidates

R.P. (Reimer) Bener MSc, *bener@few.eur.nl*

Reimer Bener is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His research field is option pricing theory with special interest in volatility smile modelling for FX options. His PhD supervisor is professor Ton Vorst. Until now, he published one paper “Options on Dividend Paying Stocks”, which appeared in the book *Recent Developments in Mathematical Finance* (2002).

Dr. M.P. (Marisa) de Brito, *mpd33@cam.ac.uk*

Marisa P. de Brito was a Research Assistant at the Econometric Institute until 2004, where she carried out her PhD research under supervision of professor Rommert Dekker, and professor René de Koster from RSM, Erasmus University. Her research interests are on Closed-Loop, Sustainable, and Ethical Supply Chains. She defended and obtained her PhD in February 2004, with a thesis entitled *Managing Reverse Logistics or Reversing Logistics Management*. She continued associated with the Econometric Institute, and she had an active role in the yearly overseas research project of Econometrisch Dispuut, together with Paul de Boer. In the end of 2004 she joined the Institute for Manufacturing of the University of Cambridge in England, to work on a project about the sustainability of the UK Textile and Clothing sector, co-financed by Marks & Spencer.

G. (Gabriella) Budai MSc, *budai@few.eur.nl*

Gabriella Budai is a PhD candidate at the Tinbergen Institute Rotterdam, affiliated with the Econometric Institute. Her supervisors are professor Rommert Dekker and dr. Dennis Huisman. Her research topics are optimization of maintenance - focusing on railway infrastructure maintenance, and rescheduling of the railway rolling stock during a track maintenance. Her papers have been published in proceedings of four international conferences. One of her papers has been submitted to *Journal of Quality in Maintenance Engineering*, another one to *Journal of the Operational Research Society* (JORS).

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Merel van Diepen is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. Her supervisors are professor Philip Hans Franses and dr. Bas Donkers. Her research focuses on modelling charitable donating behaviour and competition amongst charities.

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Bram van Dijk started September 2004 as a PhD candidate at Tinbergen Institute, affiliated with the Econometric Institute. His promotor is Philip Hans Franses, with dr. Richard Paap as a daily supervisor.

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Anna Gutkowska is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. Her supervisor is professor Ton Vorst and her research interest is asset-liability management.

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Andrea Galeotti is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is professor Sanjeev Goyal and his research interests are game theory, network economics, and industrial organization. Recently, Andrea has successfully defended his thesis *On Social and Economical Networks*.

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Wilco van den Heuvel is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. His supervisor is professor Albert Wagelmans and his research interests are in deterministic production scheduling, in particular extensions of the single item economic lot-sizing problem. He has papers accepted for publication in *European Journal of Operational Research*, *Operations Research Letters* and *Computers & Operations Research*.

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Lennart Hoogerheide is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is professor Herman van Dijk. His research is focused on Bayesian inference, reduced rank models (e.g. instrumental variable regression, cointegration), Monte Carlo integration methods and neural networks.

R.H. (Richard) Kleijn MSc, *rkleijn@gmail.com*

Richard Kleijn is a PhD candidate in Econometrics. His research interests are in Bayesian time series analysis with a focus on unobserved components models and its applications in international macro models. His supervisor is professor Herman van Dijk. He has been working on his PhD thesis which is currently nearing completion.

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Marco van der Leij is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His thesis project is on Theory and Applications in Network Economics, and he is supervised by professor Sanjeev Goyal (University of Essex) and Marcel Fafchamps (University of Oxford).

Dr. D. (Deyuan) Li, *dli@few.eur.nl*

Deyuan Li is a PhD candidate at Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is professor Laurens de Haan and his research interest is extreme value theory. In 2004 he has finished two papers which will appear in *Annals of Statistics* and *Journal of Statistical Planning and Inference*. He has successfully defended his thesis at Erasmus University Rotterdam on October 14, 2004.

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Roger Lord is a PhD candidate at the Tinbergen Institute. He holds Masters degrees in Applied Mathematics from the Eindhoven University of Technology and in Econometrics from Tilburg University. His PhD research, supervised by professor Antoon Pelsser, focuses on efficient pricing techniques for exotic derivatives, in particular in the area of interest rate derivatives. He also holds a part-time position as a quantitative analyst at Rabobank International.

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Georgi Nalbantov is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. His supervisors are professor Patrick Groenen and dr. Cor Bioch. His research interests are marketing research, support vector machines, and the method of concept hierarchies. He has presented his papers at INFORMS Marketing Science Conference in Rotterdam (2004) and in a workshop at European Conference on Machine Learning in Pisa (2004).

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Robin Nicolai is a PhD candidate at the Tinbergen Institute affiliated with the Econometric Institute. His supervisor is professor Rommert Dekker. His research interests are simulation optimization and decision support systems for maintenance optimization. He has presented his work at conferences in Salford (MIMAR 2004) and Washington DC (WSC'04).

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Mariëlle Non is a PhD candidate at the Tinbergen Institute and affiliated with the Econometric Institute. In her PhD project she hopes to apply micro-economic (game-theoretic) and econometric techniques in the field of network economics. Her supervisor at the Econometric Institute is professor Philip Hans Franses.

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Rutger van Oest (1977) has successfully defended his PhD thesis *Essays on Quantitative Marketing Models and Monte Carlo Integration Methods*, written under the supervision of professors Philip Hans Franses and Herman van Dijk. He is currently employed at the Marketing Department of Tilburg University. His research interests include quantitative marketing research and Monte Carlo integration methods. He has a publication in *Journal of Econometrics* and one forthcoming publication in *Quantitative Marketing and Economics*.

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Kevin Pak is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. His supervisor is professor Rommert Dekker and his research is in the field of Revenue Management. He has published papers in *Journal of Revenue and Pricing Management* and in *Statistica Neerlandica*.

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Raoul Pietersz is a PhD-candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. His supervisor is professor Antoon Pelsser and his research interest is the valuation and risk management of interest rate derivatives. He has published in *Journal of Computational Finance*, *Journal of Derivatives*, *Quantitative Finance*, *Risk Magazine*, and *Wilmott Magazine*.

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Eric Porras is a PhD candidate affiliated with the Tinbergen Institute and the Econometric Institute. His supervisor is professor Rommert Dekker. His main research topics are inventory modelling and supply chain management. In 2004 he published a paper in *International Journal of Production Economics* entitled “Controlling inventories in a supply chain: a case study”.

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Klaas Staal finished his PhD thesis at the Tinbergen Institute in 2004. He was also affiliated with the Econometric Institute, but since July he has a post-doctoral fellowship at the University of Bonn. His supervisor was professor Sanjeev Goyal and his research interests are in political economics, public economics and applied game theory. One of his papers appeared in *European Economic Review*. Before writing his thesis, he was a consultant for Baan Development (a software company).

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Chapter 17

Staff

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Tineke Kurtz is the Office-Manager of the Institute. She is the head of the administrative unit and takes care of the administrative tasks on the level of personnel, finance and research. She is permanent member of the management team of the Econometric Institute.

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