

Annual Report 2003

Econometric Institute

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

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Annual Report 2003

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Preface

It is often heard that the world around us is changing rapidly. New technologies, new institutions, and new policies; they all affect our day-to-day life. And, somewhat closer to us, new teaching methods, new academic programs (like bachelor and master), and new academic governance structures; they all affect our working conditions, also here at the Econometric Institute.

Of course, the Econometric Institute, being on its way to its 50-th anniversary in 2006, has witnessed many turbulent developments in the last half a century. It is therefore prepared for facing many more. Indeed, its basics are solid and constant. There is a steady enrollment of first year undergraduates, a steady outflow of excellent students into graduate programs, and top-level academic research by its members, and last but not least, a comradely atmosphere.

There has been one change though by the end of 2003. The 8-th director of the Institute, Herman K. van Dijk, handed over the chair, after 6 years of dutiful and charming service. We all thank him for his inspiring endeavor.

This annual report will tell the reader who we are and what we do. Basically, it is about what we always did, and we always will do, that is, top-level academic research combined with personalized and intensive teaching.

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 honored by the Senate of the School.

In order to stimulate a widening and a deepening of the possibility of teaching an econometrics program on the one hand and the econometric research program 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 20 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 1250 reprints and 1750 reports in 2003.

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 program leading to the bachelor's or master's degree in Econometrics or 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 financing, 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. H.K. van Dijk (Director –2003)

Prof. dr. A.P.M. Wagelmans (Director Bachelor and Master program)

T. Kurtz-Wierenga MSc (Office Manager)

Faculty representatives

Dr. H.M. Mulder

M.P. de Brito MSc (PhD representative)

2.3 Management Team Bachelor & Master program 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)

P.L. Hoek van Dijke (Secretary)

Chapter 3

Research and Teaching Awards

During the year 2003 the following members of the Econometric Institute were rewarded for their excellent research and teaching activities. As an acknowledgement of their excellence, they received several awards and were appointed as member of an editorial board or as associate editor of leading scientific journals. Furthermore, two prestigious European projects were completed during 2003.

Prof. dr. ir. Rommert Dekker

- Awarded ‘Top Researcher’, Rotterdam School of Economics, 2003
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2003
- Ranked second among the full-time faculty members of the Rotterdam School of Economics in the Top-40 of Dutch Economists 2003 (position 6 in the overall ranking)
- The European networking project on Reverse Logistics, called REVLOG, of which Rommert was coordinating scientist, finished in 2003. A book containing its results appeared with Springer-Verlag at the end of 2003.
- An EU integrated research project to establish the state-of-affairs in railway infrastructure management, called IMPROVERAIL, finished in 2003. The resulting reports were offered to the European Commission.

Dr. Fons van Engelen

- Awarded the ‘Erasmus University Education Prize’ for the ‘eWISE’-project

Prof. dr. Philip Hans Franses

- Appointed as associate editor of *Quantitative Marketing and Economics*

- Appointed as associate editor of *Empirical Economics*
- Awarded ‘Journal of Applied Econometrics Distinguished Author’
- Awarded ‘Top Researcher’, Rotterdam School of Economics, 2003
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2003
- Awarded ‘ERIM Best Book Award’ for the book “Quantitative Models in Marketing Research” (together with dr. Richard Paap)
- Entry in the “Who’s Who in Economics, 4th Edition” published by Edward Elgar Publishing Ltd (2003)
- Ranked first among the full-time faculty members of the Rotterdam School of Economics in the Top-40 of Dutch Economists 2003 (position 3 in the overall ranking)

Dr. ir. Christian Hafner

- Appointed as member of the editorial board of *Computational Statistics*

Dr. Richard Paap

- Awarded ‘ERIM Best Book Award’ for the book “Quantitative Models in Marketing Research” (together with prof. dr. Philip Hans Franses)

Prof. dr. Albert Wagelmans

- Appointed as member of the editorial board of *Naval Research Logistics*
- Awarded ‘Top Researcher’, Rotterdam School of Economics, 2003
- Awarded ‘High Performance Researcher’, Erasmus Research Institute of Management, 2003
- Ranked third among the full-time faculty members of the Rotterdam School of Economics in the Top-40 of Dutch Economists 2003 (position 28 in the overall ranking)

Part II
Research

Chapter 4

Research Topics

The Econometric Institute participates in the research program of the Rotterdam School of Economics. Three of these programs are directly linked to the Econometric Institute, these are

- Econometric analysis of dynamic models (research director prof. dr. H.K. van Dijk)
- Operations research and decision analysis (research director prof. dr. ir. R. Dekker)
- Mathematics (research director dr. R.J. Stroecker)

Furthermore, members of the Econometric Institute also participate in the following programs.

- Marketing (research director prof. dr. P.H.B.F. Franses)
- Incentives and efficiency (research director prof. dr. M.C.W. Janssen)
- Corporate finance and the market for risk (research director prof. dr. J. Spronk)
- Application oriented computer science (research director prof. dr. A de Bruin)

4.1 Econometric analysis of dynamic models

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 program 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.

Bayesian econometrics

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

Estimation of large systems

Using an earlier developed procedure for restricting the covariance matrix of the data generating process, it turns out that several large systems of equations in the fields of demand analysis, production theory, international trade and marketing can be estimated in an relatively standard way: also in cases where the dynamic characteristics of these equation systems can be described by means of a small number of adjustment parameters.

System theoretic methods in econometrics

This research project is concerned with the structure and estimation of dynamic models with special attention for concepts and techniques developed in linear system theory. The central issue is the determination of a linear dynamic model from observed time series, when there is little prior knowledge (e.g. on noise properties; lag structures; endogenous and exogenous variables).

Flexible dynamic econometric models

Linear vector models are in most cases too restrictive to describe varying long term trends in economic variables. This class of models can be made more general by

including nonlinear relationships; by allowing varying parameters and/or by assuming a more general error structure than the Gaussian process, e.g. moving average disturbances and/or fat tailed distributions of the error process.

Seasonality and nonlinearity in economic time series

This project concerns the development of new models for economic time series, which include explicit descriptions of seasonal variation and of nonlinear features. These models can be used for forecasting, but also for better understanding the patterns in economic data.

Robust methods

Anomalous observations may have a large influence on the results of econometric model building and inference. In this project attention is paid to the behavior of tests to detect nonstationarity in multivariate time series.

Analysis of longitudinal data

There are two projects on longitudinal econometrics. One of them studies to what extent we can find empirical support for theories of capital structure. The other deals with common trends and common cycles in multivariate time series. The approach is applied in an investigation on the change and mobility of the wealth of nations.

4.2 Operations research and decision analysis

4.2.1 ‘Operations Research in Logistics, Health, Finance and Marketing’

This subprogram aims at the development, analysis and application of operations research models in logistics, health, finance 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. Research in the finance and health areas is done together with other departments within the university and has a supporting role. 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 program a number of themes are studied in more detail, viz. reverse logistics, maintenance optimization, inventory control, rostering and timetabling, distribution optimization and container logistics.

4.2.2 'Design and Analysis of Optimization Algorithms'

In this subprogram 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 subprogram are typically cast in more abstract terms than in the previous subprogram, 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 program can be classified in one of the following categories.

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

4.3 Mathematics

This program 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 programs of the Stieltjes Institute for Mathematics. Most research activities brought together in this program can be classified as fundamental.

The program is divided into five subprograms of related topics, and each subprogram 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 subprogram 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 program 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 subprogram 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 asymptotic of heavy tailed random variables

Algebra and Geometry

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

Discrete Mathematics

The main focus of this subprogram 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.

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 2003 five PhD candidates, affiliated with the Econometric Institute, successfully defended their PhD thesis at the Erasmus University.

D. Fok

Title: Advanced econometric marketing models
Institute: Erasmus University Rotterdam
Date: November 6, 2003
Promotor: Prof. dr. P.H.B.F. Franses
Publisher: ERIM Ph.D. Series research in Management, Rotterdam
Pages: 186
Research school: Erasmus Research Institute of Management

P. Houweling

Title: Empirical studies on credit markets
Institute: Erasmus University Rotterdam
Date: October 3, 2003
Promotor: Prof. dr. A.C.F. Vorst
Publisher: Thela thesis publishers Amsterdam
Pages: 163
Research school: Tinbergen Institute

O.L. Listes

Title: Stochastic programming approaches for strategic logistics problems
Institute: Erasmus University Rotterdam
Date: June 12, 2003
Promotor: Prof. dr. ir. R. Dekker
Publisher: Thela thesis publishers Amsterdam
Pages: 179
Research school: Tinbergen Institute

Y.V. Veld-Merkoulova

Title: Essays on futures markets and corporate spin-offs
Institute: Erasmus University Rotterdam
Date: October 2, 2003
Promotor: Prof. dr. A.C.F. Vorst, Prof. dr. F.A. de Roon
Publisher: Thela thesis publishers Amsterdam
Pages: 154
Research school: Tinbergen Institute

A.G. de Waal

Title: Processing of Erroneous and Unsafe Data
Institute: Erasmus University Rotterdam
Date: June 19, 2003
Promotor: Prof. dr. ir. R. Dekker
Publisher: ERIM Ph.D. Series research in Management, Rotterdam
Pages: 413
Research school: Erasmus Research Institute of Management

Chapter 6

Econometric Institute Reports 2003

- EI 2003-01** Frank R. Kleibergen, & Richard Paap (2003). *Generalized reduced rank tests using the singular value decomposition*, 25 pp.
- EI 2003-02** Dennis Huisman, Richard Freling, & Albert P.M. Wagelmans (2003). *Multiple-depot integrated vehicle and crew scheduling*, 26 pp.
- EI 2003-03** Hans (J.B.G.) Frenk, & Gabor Kassay (2003). *The level set method of Joó and its use in minimax theory*, 9 pp.
- EI 2003-04** S. Ilker Birbil, Shu-Cherng Fang, Hans (J.B.G.) Frenk, & Shuzhong Zhang (2003). *Recursive approximation of the high dimensional max function*, 12 pp.
- EI 2003-05** Zsolt Sándor, & Peter Andrs (2003). *Alternative sampling methods for estimating multivariate normal probabilities*, 50 pp.
- EI 2003-06** Philip Hans Franses (2003). *Do we make better forecasts these days? A survey amongst academics*, 18 pp.
- EI 2003-07** Richard Paap, Philip Hans Franses & Dick van Dijk (2003). *Does Africa grow slower than Asia and Latin America?*, 17 pp.
- EI 2003-08** Bas Donkers, & Marcia Schafgans (2003). *A derivative based estimator for semiparametric index models*, 57 pp.
- EI 2003-09** Patrick J.F. Groenen, Patrizia Giaquinto & Henk A.L. Kiers (2003). *Weighted majorization algorithms for weighted least squares decomposition models*, 29 pp.
- EI 2003-10** Dick van Dijk & Philip Hans Franses (2003). *Selecting a nonlinear time series model using weighted tests of equal forecast accuracy*, 18 pp.

- EI 2003-11** Beril Toktay, Erwin A. van der Laan & Marisa P. de Brito (2003). *Managing product returns: the role of forecasting*, 27 pp.
- EI 2003-12** Rodney W. Strachan & Herman K. van Dijk (2003). *Bayesian model selection for a sharp null and a diffuse alternative with econometric applications*, 23 pp.
- EI 2003-13** Alex J. Koning & Philip Hans Franses (2003). *Did the incidence of high precipitation levels increase? Statistical evidence for the Netherlands*, 39 pp.
- EI 2003-14** Paulo M.M. Rodrigues & Philip Hans Franses (2003). *A sequential approach to testing seasonal unit roots in high frequency data*, 22 pp.
- EI 2003-15** Dennis Fok & Richard Paap (2003). *Modeling category-level purchase timing with brand-level marketing variables*, 23 pp.
- EI 2003-16** Boriss Siliverstovs & Dick J.C. van Dijk (2003). *Forecasting industrial production with linear, nonlinear, and structural change models*, 27 pp.
- EI 2003-17** Rodney W. Strachan & Herman K. van Dijk (2003). *The value of structural information in the VAR model*, 38 pp.
- EI 2003-18** Christian Hafner, & Philip Hans Franses (2003). *A generalized dynamic conditional correlation model for many asset returns*, 18 pp.
- EI 2003-19** Z. Pelin Bayindir, Nesim Erkip & Refik Güllü (2003). *Assessing the benefits of remanufacturing option under one-way substitution and capacity constraint*, 34 pp.
- EI 2003-20** Christian Hafner (2003). *Simple approximations for option pricing under mean reversion and stochastic volatility*, 15 pp.
- EI 2003-21** Christian M. Hafner, & Helmut Herwartz (2003). *Analytical quasi maximum likelihood inference in multivariate volatility models*, 13 pp.
- EI 2003-22** Luc Bauwens, Charles S. Bos, Herman K. van Dijk, & Rutger D. van Oest (2003). *Adaptive radial-based direction sampling - Some flexible and robust Monte Carlo integration methods*, 26 pp.
- EI 2003-23** Wilco van den Heuvel, & Albert P.M. Wagelmans (2003). *A polynomial time algorithm for a deterministic joint pricing and inventory model*, 21 pp.
- EI 2003-24** Wilco van den Heuvel, & Albert P.M. Wagelmans (2003). *A geometric algorithm to solve the NI/G/NI/ND capacitated lot-sizing problem in $O(T^2)$ time*, 21 pp.

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- EI 2003-25** Jeanine Kippers, & Philip Hans Franses (2003). *An empirical analysis of euro cash payments*, 27 pp.
- EI 2003-26** Ruud H. Teunter & Simme Douwe P. Flapper (2003). *Rework and postponement: A comparison of bottling strategies*, 18 pp.
- EI 2003-27** Julien Mostard & Ruud H. Teunter (2003). *The newsboy problem with resalable returns*, 29 pp.
- EI 2003-28** Ruud H. Teunter (2003). *Lot-sizing for inventory systems with product recovery*, 16 pp.
- EI 2003-29** Ruud H. Teunter & Erwin van der Laan (2003). *Valuation of inventories in systems with product recovery*, 18 pp.
- EI 2003-30** Ruud H. Teunter, Karl Inderfurth, Stefan Minner & Rainer Kleber (2003). *Reverse logistics in a pharmaceutical company: a case study*, 10 pp.
- EI 2003-31** Ruud H. Teunter (2003). *The multiple-job repair kit problem*, 18 pp.
- EI 2003-32** Philip Hans Franses, & Jeanine Kippers (2003). *How do we pay with euro notes? Empirical evidence from monopoly[®] experiments*, 26 pp.
- EI 2003-33** Raoul Pietersz & Antoon Pelsser (2003). *Risk managing Bermudan swaptions in the libor BGM model*, 24 pp.
- EI 2003-34** Sanjeev Goyal, Alexander Konovalov & Jose Luis Moraga-Gonzalez (2003). *Hybrid R&D*, 32 pp.
- EI 2003-35** Katrijn van Deun & Patrick J.F. Groenen (2003). *Majorization algorithms for inspecting circles, ellipses, squares, rectangles, and rhombi*, 24 pp.
- EI 2003-36** Wilco van den Heuvel & Albert P.M. Wagelmans (2003). *A note on a multi-period profit maximizing model for retail supply chain management*, 7 pp.
- EI 2003-37** Luc Bauwens, Charles S. Bos, Herman K. van Dijk, & Rutger D. van Oest, (2003). *Explaining adaptive radial-based direction sampling*, 5 pp.
- EI 2003-38** Lennart F. Hoogerheide, Johan F. Kaashoek, & Herman K. van Dijk (2003). *Neural network approximations to posterior densities: an analytical approach*, 6 pp.
- EI 2003-39** Jeanine Kippers & Philip Hans Franses (2003). *Do we need all euro denominations?* 10 pp.

- EI 2003-40** Albert W. Veenstra, Henry Martyn Mulder & R. Alexander Sels (2003). *Network analysis in the Caribbean*, 19 pp.
- EI 2003-41** Birbil, S.I., Bouza, G., Frenk, J.B.G., & Still, G. (2003). *Equilibrium constrained optimization problems*, 20 pp.
- EI 2003-42** Jan Brinkhuis & Shuzhong Zhang (2003). *A D-induced duality and its applications*, 34 pp.
- EI 2003-43** Dennis Fok, Dick J.C. van Dijk & Philip Hans Franses (2003). *A multi-level panel smooth transition autoregression for US sectoral production*, 22 pp.
- EI 2003-44** Jaap L. Geluk (2003). *Asymptotics in the symmetrization inequality*, 7 pp.
- EI 2003-45** Govert E. Bijwaard, Philip Hans Franses & Richard Paap (2003). *Modeling purchases as repeated events*, 25 pp.
- EI 2003-46** Kevin Pak, Rommert Dekker, & Gerard Kindervater (2003). *Airline revenue management with shifting capacity*, 24 pp.
- EI 2003-47** Dennis Huisman, Raf Jans, Marc Peeters, & Albert P.M. Wagelmans (2003). *Combining column generation and lagrangian relaxation*, 23 pp.
- EI 2003-48** Richard Kleijn & Herman K. van Dijk (2003). *Bayes model averaging of cyclical decompositions in economic time series*, 34 pp.
- EI 2003-49** Patrick Houweling, Albert Mentink, & Ton Vorst (2003). *Comparing possible proxies of corporate bond liquidity*, 37 pp.
- EI 2003-50** Patrick Houweling, Albert Mentink & Ton Vorst (2003). *Valuing Euro rating-triggered step-up telecom bonds*, 45 pp.
- EI 2003-51** Patrick Houweling & Ton Vorst (2003). *Pricing default swaps: empirical evidence*, 48 pp.
- EI 2003-52** Eric Porras & Rommert Dekker (2003). *An efficient optimal solution method for the joint replenishment problem with minimum order quantities*, 20 pp.
- EI 2003-53** Robert Dur & Klaas Staal (2003). *National interference in local public good provision*, 16 pp.

Chapter 7

Econometric Institute Reprints 2003

- EI-1218** Jan Brinkhuis (2001). On the Fermat-Lagrange principle for mixed smooth convex extremal problems. *Sbornik. Mathematics (USSR)*, 192(5), 641-649.
- EI-1219** Roy Kluitman & Philip Hans Franses (2002). Estimating volatility on overlapping returns when returns are autocorrelated. *Applied Mathematical Finance*, 9, 179-188.
- EI-1220** Daniel Dietrich, Laurens de Haan & Jurg Hüsler (2002). Testing extreme value conditions. *Extremes*, 5(1), 71-85.
- EI-1221** Hans (J.B.G.) Frenk & Gabor Kassay (2002). Technical note - Minimax results and finite - dimensional separation. *Journal of Optimization Theory and Applications*, 113(2), 409-421.
- EI-1222** Richard Freling, Dennis Huisman & Albert P.M. Wagelmans (2003). Models and algorithms for integration of vehicle and crew scheduling. *Journal of Scheduling*, 6, 63-85.
- EI-1223** Marisa P. de Brito & Rommert Dekker (2003). Modelling product returns in inventory control - exploring the validity of general assumptions. *International Journal of Production Economics*, 81-82, 225-241.
- EI-1224** Yoshinori Kawasaki & Philip Hans Franses (2003). Detecting seasonal unit roots in a structural time series model. *Journal of Applied Statistics*, 30(4), 373-387.
- EI-1225** Philip Hans Franses (2003). The diffusion of scientific publications: the case of Econometrica, 1987. *Scientometrics*, 56(1), 29-42.
- EI-1226** Kevin Pak & Nanda Piersma (2002). Overview of OR techniques for airline revenue management. *Statistica Neerlandica*, 56(4), 480-496.

- EI-1227** Paul Goldman, Richard Freling, Kevin Pak & Nanda Piersma (2002). Models and techniques for hotel revenue management using a rolling horizon. *Journal of Revenue and Pricing Management*, 1(3), 207-219.
- EI-1228** Moritz Fleischmann, Roelof Kuik & Rommert Dekker (2002). Controlling inventories with stochastic item returns: a basis model. *European Journal of Operational Research*, 138, 63-75.
- EI-1229** Angelika I. Kokkinaki, Rommert Dekker, Nikos Karacapilidis & Costas Pappis (2002). A web-based recommender system for end-use ICT products. In J.L. Montero, P.M.C. Swatman, & L.V. eds. Tavares (Eds.), *Towards the knowledge society, e-Commerce, e-Business, e-Government* (pp. 601-613). Lisbon, Portugal: Kluwer Academic Publishers.
- EI-1230** Rommert Dekker & Gabriella Budai (2002). An overview of techniques used in planning railway infrastructure maintenance. In W.M.J. Geraerds & D. Sherwin (Eds.), *Proceedings of the IFRIMmmm (maintenance management & modelling conference)* (pp. 1-8). Sweden: Vxj University.
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- EI-1233** Jaap van der Hart, Erica Slagter & Dick van Dijk (2003). Stock selection strategies in emerging markets. *Journal of Empirical Finance*, 10, 105-132.
- EI-1234** Frederic Carsoule & Philip Hans Franses (2003). A note on monitoring time-varying parameters in an autoregression. *Metrika*, 57, 51-62.
- EI-1235** Marisa P. de Brito & Rene de Koster (2002). Return handling: the mapping of decisions. In J. Crespo de Carvalho (Ed.), *Proceedings of the Fourth International Meeting for Research in Logistics* (pp. 102-111). Lisbon: IMRL 2002.
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- EI-1239** Marielle Non, Philip Hans Franses, Claudia Laheij & Tijs Rokers (2003). Yet another look at temporal aggregation in diffusion models of first-time purchase. *Technological Forecasting and Social Change*, 70, 467-471.
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- EI-1241** Johan F. Kaashoek, & Herman K. van Dijk (2003). Neural networks: an econometric tool. In D.E.A. Giles (Ed.), *Computer-aided econometrics* (pp. 351-384). New York - Basel: Marcel Dekker, Inc.
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- EI-1243** Rommert Dekker, & Erwin A. van der Laan (2003). Inventory control in reverse logistics. In V.D.R. Guide, Jr. & L.N.J.L. van Wassenhove (Eds.), *Business aspects of closed-loop supply chains* (pp. 175-200). Pittsburgh, Pennsylvania: Carnegie Mellon University Press.
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- EI-1245** Karl Inderfurth, Otto von Guericke, & Ruud H. Teunter (2003). Production planning and control of closed-loop supply chains. In V. Daniel, R. Guide, Jr., & L.N.J.L. van Wassenhove (Eds.), *Business aspects of closed-loop supply chains* (pp. 149-174). Pittsburgh, Pennsylvania: Carnegie Mellon University Press.
- EI-1246** Henry Martyn Mulder, & Ladislav Nebesk (2003). Modular and median signpost systems and their underlying graphs. *Discussiones Mathematicae. Graph Theory*, 23, 309-324.

- EI-1247** Abdelhafid Berrachedi, Ivan Havel, & Henry Martyn Mulder (2003). Spherical and clockwise spherical graphs. *Czechoslovak Mathematical Journal*, 53(128), 295-309.
- EI-1248** Dimitrios Vlachos, & Rommert Dekker (2003). Return handling options and order quantities for single period products. *European Journal of Operational Research*, 151(Issue 1), 38-52.
- EI-1249** Michael P. Clements, Philip Hans Franses, Jeremy Smith, & Dick van Dijk (2003). On SETAR non-linearity and forecasting. *Journal of Forecasting*, 22(5), 359-376.
- EI-1250** Herman K. van Dijk (2003). On Bayesian structural inference in a simultaneous equation model. In B.P. Stigum (Ed.), *Econometrics and the philosophy of economics* (pp. 642-682). Princeton, New Jersey: Princeton University Press.

Part III

Conferences & Seminars

Chapter 8

Tinbergen Week

In cooperation with the Erasmus University and the Rotterdam School of Economics the Econometric Institute organized a conference to honor Prof. dr. J. Tinbergen.

April 7–11, 2003
Erasmus University Rotterdam

On April 12, 2003 it was hundred years ago that Jan Tinbergen was born. He was, together with Ragnar Frisch, the first Nobel laureate in economics. During forty years (from 1933 till 1973) Tinbergen worked at the Netherlands School of Economics which merged with the Medical School Rotterdam to become the Erasmus University Rotterdam, in his retirement year 1973. The Tinbergen week contained a wide variety of activities directed at different groups, including an international conference co-hosted by the Econometric Institute.

8.1 On the Wealth of Nations - Extending the Tinbergen Heritage

From April 7 till 11, 2003 the Econometric Institute co-hosted the international conference in honor of Jan Tinbergen, featuring the connection between economic science and policy. The conference consisted of three major themes:

1. The dynamics of business cycles and the relevance of economic policy
2. Policy effectiveness in economic growth, education, income distribution, and the labor market
3. Globalization and poverty

In addition, part of this conference was a Nobel Laureate session titled *Progress in Economic Science since Tinbergen*, with chairpersons Mark Blaug and Herman K. van Dijk, and with an introduction provided by Mrs. Maria J.A. van der Hoeven, Minister of Education of the Netherlands. Session speakers were

James Heckman (University of Chicago)

Lawrence R. Klein (University of Pennsylvania)

Sir James Mirrlees (Trinity College, University of Cambridge)

Robert Mundell (Columbia University)

Paul Samuelson (MIT, video presentation)

Robert Solow (MIT, paper read in absence)

8.1.1 The dynamics of business cycles and the relevance of economic policy

Ever since the seminal work on the statistical testing of business cycles by Jan Tinbergen (1938-1939) and the empirical analysis by Burns and Mitchell (1946), the cyclical behavior of many economic variables has been measured and modeled at the international level, the national level, the industry level and in the financial sector. The so-called business cycle is a concept of key interest for all economic actors and policy makers alike. Consumption, savings and production decisions of the private sector and monetary and fiscal policy decisions of the banking and government sector are based on forecasts of the future developments of economic variables, which to a large extent depend on the state of the business cycle. The characterization of the business cycle and the analysis of its properties have been the subject of innumerable studies.

Despite the abundance of theoretical and applied research on business cycles, there are many questions for which no definite answer has yet been found. Some open issues are:

1. Is there a common ("world") business cycle across countries, how can it be measured, and what is its importance? Is there a convergence of cycles of EMU countries?
2. Are business cycles "contagious", that is, are business cycles transmitted across countries, regions and industries?
3. Is the recent reduction in the amplitude of the US business cycle observed in other countries? What are the underlying causes for the recent changes in the amplitude

of business cycles? Is it due to improvements in monetary policy or to technological changes in the real economy?

4. What is the role of economic policy in causing or countering asymmetries in business cycles?
5. What is the role of leading indicators in, for example, forecast business cycle turning points?

A carefully refereed set of papers from this theme of the conference will be published in a special issue of the *Journal of Applied Econometrics*, with as guest editors: Dick J.C. van Dijk, Herman K. van Dijk and Philip Hans Franses.

8.1.2 Policy effectiveness in economic growth, education, income distribution, and the labor market

Jan Tinbergen was keenly interested in the use of economic policy in order to affect wealth and income distributions. Seminal contributions to the economics of education and the theory of income distributions are his 1956 paper in *Weltwirtschaftliches Archiv* and his 1975 book. These studies are still much cited in modern work on these topics.

In recent decades labor economists have devoted a lot of effort in order to establish the possible causal effect of human capital on individual productivity and wages. Much work has been done in order to assess the effectiveness of training and other programs aimed at raising the educational achievements of individuals.

More recently, attention has been given to the general equilibrium effects which the above-mentioned interventions may have on income distributions. Several researchers have also analyzed aggregate data suggesting a strong interrelation between growth rates, income distributions and the different levels of education of the national workforce.

Although education has been one of the main topics of empirical research in the discipline, many questions remain to be answered. Some leading issues are:

1. What is the connection between the micro-evidence on the so-called Mincer equation and the macro-relation between Gross Domestic Product (GDP) and the mean level of education?
2. Are there externalities of human capital accumulation affecting the evolution of GDP? And if so, what is their nature and size?
3. What is the interrelation between income distribution, education, and GDP?
4. What type of policies can affect the accumulation of human capital?

8.1.3 Globalization and poverty

Since the birth of modern development economics in the mid- 20th Century, the economics profession has cycled through pessimism, optimism, and skepticism on the relevance of international market forces in promoting economic development. Jan Tinbergen, Harry Johnson, and other economists from that period grappled with many of the questions still confronting the profession today. These questions link the international economy also to the issues of poverty and equity.

While the set of policies stressed by international aid agencies has in recent history included pro-market and rule-of-law policies, support for this generic policy prescription has been taxed by recent political and financial events. The dramatic and heterogeneous patterns of recent crises and backsliding episodes (most recently the Argentine crisis and the East Asian crisis) have served to highlight the importance of institutional context and political economy constraints in the economic reform process. The status of openness as a keystone in the good policy set is under attack on the analytical front as well. Since the early 1990s, there has been an explosion of work on these issues, ranging from the theoretical underpinnings of the new economic geography to empirical evidence on openness and growth and to policy modeling of poverty impacts of trade liberalization.

The list of issues that confronts us in this area is important, as they lurk behind the periodic public protests at international meetings, behind the anti-globalization movement in general, and also behind the repeated failure of economic growth to take root in Africa and Latin America. They are also complex, posing a challenging mix of analytical, empirical, and institutional quandaries. Relevant questions include the following:

1. Does international trade, and more broadly openness to the international economy, promote an improvement or worsening of economic conditions for the poor? Can we really draw policy lesson from cross-country empirical studies?
2. What role does size, openness, and the forces of economic agglomeration play in patterns of economic growth and development?
3. What role does financial sector openness play in the process of growth and economic development? Does it encourage excess volatility, or does it instead promote efficiency?
4. What impact do OECD trade policies, ranging from the Common Agricultural Policy to North-South trade agreements, have on developing countries?
5. Does the current international economic architecture, including the WTO, IMF, and World Bank, benefit or hinder the process of economic development? What impact does the current world economic architecture have on the international distribution of income?

8.2 Features of the conference

8.2.1 Invited speakers

Daron Acemoglu, MIT

Roland Benabou, Princeton University

Richard Blundell, University College London

Fabio Canova, University of Pompeu Fabra

James Heckman, University of Chicago

Dale Jorgensen, Harvard University

Adrian Pagan, Oxford University and University of New South Wales

Hashem Pesaran, Cambridge University

Danny Quah, London School of Economics

Robert Shimer, Princeton University

Chris Sims, Princeton University

T.N. Srinivasan, Yale University

James Stock, Harvard University

Allan Timmermann, University of California San Diego

8.2.2 Honourary committee

HRH Prince Claus of the Netherlands¹

Prof. L.R. Klein, Nobel Laureate, Wharton School

Prof. E. Malinvaud, INSEE

Prof. A. Sen, Nobel Laureate, Cambridge University

Prof. D. Jorgenson, Harvard University

Dr. R.F.M. Lubbers, UN-HCR

¹Deceased October 6, 2002

Prof. J.K. Galbraith, Harvard University

Dr. W. Duisenberg, European Central Bank

Dr. H. Don, CPB Netherlands Bureau for Economic Policy Analysis

Dr. J.P. Pronk, Special ambassador for the UN

Prof. C. Herkströter, Erasmus University Rotterdam, Tinbergen Institute

Mr. I. Opstelten, Mayor of the municipality of Rotterdam

Dr. H.H.F. Wijffels, Social and economic council of the Netherlands

Prof. W.T.M. Molle, ECORYS-NEI research and consulting

R.B.J.C. van Noort, MSc MA, Statistics Netherlands (CBS)

8.2.3 Scientific committee

Prof. H.K. van Dijk, chairman, Erasmus University Rotterdam, Econometric Institute

Prof. G. van den Berg, Free University, Tinbergen Institute

Prof. A.L. Bovenberg, OCFEB, Erasmus University, Tilburg University

Dr. D.J.C. van Dijk, Erasmus University Rotterdam, Econometric Institute

Prof. J. Francois, Erasmus University Rotterdam, Tinbergen Institute

Prof. P.H.B.F. Franses, Erasmus University Rotterdam, Econometric Institute

Prof. J.W. Gunning, Free University

Dr. B. Hoekman, World Bank

Prof. C.N. Teulings, Erasmus University Rotterdam, Tinbergen Institute

Dr. A. Venables, London School of Economics

Chapter 9

Econometric Institute Lecture Series

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

“Multivariate Volatility Modeling with Dynamic Correlations”

Prof. R.F. Engle

(Stern School of Business, New York University)

May 21-23, 2003

Erasmus University Rotterdam

9.1 Introduction

This intensive three-day PhD-course provided an in-depth overview of modeling volatility of financial assets, with a strong emphasis on recent developments concerning multivariate models with time-varying (dynamic) correlations. Obtaining accurate measures and forecasts of time-varying correlations is of utmost importance for funds management, risk management, and pricing derivatives. Popular (multivariate) volatility models include time-series models, factor models, and correlations implied from market instruments.

The most popular time-series model is the Autoregressive Conditionally Heteroskedasticity (ARCH) model, introduced by Professor Robert Engle in 1982. Since then Generalized ARCH (GARCH) models have become popular in practice. Obviously, multivariate GARCH models are required to model the dependence between stocks, stock markets or the factor returns in a factor model for asset prices. Recently Professor Engle introduced a new multivariate GARCH model, the Dynamic Conditional Correlation model, which

solves some of the difficulties surrounding the estimation of multivariate GARCH models whilst maintaining the desired property of time-varying correlations.

Professor Engle personally provided 3 lectures on his new model, from an introduction into multivariate GARCH modeling to illustrating applications for portfolio construction and dynamic hedging. The complete course consisted of 5 lectures of 2 hours, given on 21 May (full day), 22 May (full day) and 23 May (morning). A more extensive outline of the lectures on the Dynamic Conditional Correlation model is given below.

Lecturers: Prof. Robert F. Engle (Stern School of Business, New York University), Dr. Martin Martens (Econometric Institute, Erasmus University Rotterdam), Dr. Dick van Dijk (Econometric Institute, Erasmus University Rotterdam)

Course outline

1. Introduction to volatility modeling and univariate GARCH models (Dick van Dijk)
 - Univariate GARCH and stochastic volatility models
 - Testing for GARCH effects
 - Estimation, diagnostic checking, forecasting
2. Introduction to multivariate GARCH models (Robert Engle)
 - Survey of the multivariate GARCH literature
 - Introduction of the Dynamic Conditional Correlation (DCC) model
 - Specifications allowing downside risk
3. The Econometrics of the DCC Estimator (Robert Engle)
 - Standard errors
 - Variance targeting
 - Diagnostic testing
 - Monte Carlo evidence
 - Empirical results
4. Alternative models for time-varying correlations (Martin Martens)
 - Sample covariance matrix with equal or exponentially declining weights

- Factor models, including estimating the factor returns using a Principal Component Analysis, using observable factors, and using observable factor exposures to estimate unobservable factor returns
- Theoretical (dis)advantages of each model and empirical comparisons

5. A Factor Model (Robert Engle)

- Formulation of factor model with unobservable factor returns
- Attribute of individual assets
- Empirical results
- Applications to portfolio construction and dynamic hedging

9.2 Symposium

Twelfth Symposium Erasmus Center for Financial Research in cooperation with the
Econometric Institute and Princeton University Press

“Time-varying correlations for asset prices, defaults and interest rates”

May 21-23, 2003

Erasmus University Rotterdam

Programme

10.00 – 10.30 Registration and coffee

10.30 – 11.30 Robert Engle (Stern Business School at New York University) *Dynamic correlations (1)*

11.45 – 12.30 Robert Engle (Stern Business School at New York University) *Dynamic correlations (2)*

12.30 – 14.00 Lunch

14.00 – 15.00 Kay Giesecke (ORIE School at Cornell University) *Default correlations*

15.00 – 16.00 Antoon Pelsser (Nationale Nederlanden & Erasmus University) *Interest rate correlations*

16.00 – 17.00 Drinks

Time-varying correlations for asset prices, defaults and interest rates

Obtaining accurate measures and forecasts of time-varying (dynamic) correlations is of utmost importance for funds management, market risk management, credit risk and pricing interest rate derivatives. Popular approaches include time-series models, factor models, copula functions and correlations implied from market instruments.

One very popular time-series model is the Autoregressive Conditionally Heteroscedasticity (ARCH) model, introduced by Robert Engle in 1982. Since then Generalized ARCH (GARCH) models have become very popular in practice. Obviously multivariate GARCH models are required to model the dependence between stocks, stock markets or the factor returns in a factor model for asset prices. Recently Robert Engle introduced a new multivariate GARCH model, the Dynamic Conditional Correlation model, which solves some of the difficulties surrounding the estimation of multivariate GARCH models whilst maintaining the desired property of time-varying correlations.

Correlation between defaults is currently a hot topic. A popular approach is to use copula functions to model the dependence between defaults, either in the structural framework of Merton or in (intensity based) reduced form models. One of the experts in this area is Kay Giesecke, who recently joined the prestigious ORIE school at Cornell University, also home to Jarrow and Turnbull.

Kay Giesecke provided both an overview of the existing literature on correlations between defaults, as well as insights into his own work on the so-called compensator based reduced form models that generalize the intensity based reduced form models. In addition he discussed furnishing an intensity based model with structural interpretation in a multi-firm case with correlated defaults.

Cap and swaption prices contain information on interest rate volatilities and correlations. Antoon Pelsser, author of the book “Efficient methods for valuing interest rate derivatives” illustrated how to obtain these market-implied interest rate correlations, and answered the question whether these correlations are consistent with subsequent realized movements of the interest rate term structure. It turns out that significant differences arise between the implied correlations and the realized correlations. Using realized correlations one would significantly underprice caps and swaptions. Various explanations were provided for these findings.

Chapter 10

Symposium on Mathematics and Economics

A special event of the Stieltjes Theme Group on Mathematics and Economics.

Peter Boswijk, Jan Brinkhuis and Peter Spreij
The Thomas Stieltjes Institute for Mathematics¹ & Tinbergen Institute².

September 19, 2003
Tinbergen Institute Amsterdam

Speakers

- Erik Balder (UU)
- Cars Hommes (UvA)
- Aad van der Vaart (VU)
- Casper de Vries (EUR)

¹Dutch research institute in mathematics, in which participate Universiteit van Amsterdam (UvA) Vrije Universiteit Amsterdam (VUA) Delft University of Technology (TUD) Eindhoven University of Technology (TUE) University of Leiden (UL) Erasmus University Rotterdam (EUR)

²Research Institute and Graduate School in economics of the Erasmus University, the Universiteit van Amsterdam and the Vrije Universiteit

Programme

- 13.30-13.35** Opening by Herman van Dijk (EUR)
- 13.35-14.20** Aad van der Vaart, *Bayesian procedures for infinite-dimensional parameters*
- 14.20-15.05** Casper de Vries, *Weak and strong currency crisis linkages*
- 15.00-15.30** Coffee break
- 15.30-16.15** Cars Hommes, *Evolutionary dynamics in markets with many trader types*
- 16.15-17.00** Erik Balder, *Existence of Competitive Equilibria in Economies with a Measure Space of Consumers and Price and Consumption Externalities*
- 17.00-17.05** Closing by Rob Tijdeman (UL, scientific director of the Stieltjes Institute)
- 17.05** Reception

Abstracts

Aad van der Vaart *Bayesian procedures for infinite-dimensional parameters* We consider Bayesian inference using prior distributions for (typically) infinite-dimensional parameters. We characterize the rate of convergence of posterior distributions relative to global metrics on the parameter in terms of the size of the model and the amount of prior mass close to the true parameter. After describing such results in an abstract set-up we specialize to more concrete types of models, such as independent observations, (Gaussian) time series and Markov chains. Our (asymptotic) results are obtained under a frequentist sampling scheme, and give insight in which priors lead to sound statistical procedures. One of the attractions of the Bayesian approach is the possibility of incorporating model selection, leading to procedures that adapt to a "best" model in given list.

Casper de Vries *Weak and strong currency crisis linkages* In this talk we demonstrate that in affine models of foreign exchange rate returns, the nature of the interdependency between different exchange rate returns in times of crisis hinges fundamentally on the univariate properties of the distribution of the risk drivers. Given the univariate properties, the interdependency is either strong or weak, in the sense that it remains or vanishes asymptotically. Different exchange rates against the same base currency are correlated if the fundamentals are normally distributed. Nevertheless, one shows that if one currency return reaches crisis levels, the probability that the other currency breaks down as well vanishes asymptotically. If the marginal distributions have heavier tails than the normal, the probability that the other currency breaks down as well may remain strictly positive even in the limit.

Cars Hommes *Evolutionary dynamics in markets with many trader types* We discuss the notion of a Large Type Limit (LTL) describing the dynamical behavior of heterogeneous market systems with many trader types. It is shown that generic and persistent features of adaptive evolutionary systems with many trader types are well described by the large type limit. Stability and bifurcation routes to instability and strange attractors in a simple evolutionary financial market model are studied. An increase in the "intensity of adaption" or in the diversity of beliefs may lead to deviations from an unstable RE fundamental benchmark and excess volatility. A large evolutionary system may thus become unstable and complicated dynamics may arise when agents become sensitive to small differences in fitness. (joint work with W.A. Brock and F.O.O. Wagener)

Erik Balder *Existence of Competitive Equilibria in Economies with a Measure Space of Consumers and Price and Consumption Externalities* We consider Aumann's celebrated model of an exchange economy with a continuum of consumers, but we add price and consumption externalities. The new model also captures Schmeidler's game with a measure space of players. Equilibrium existence results will be presented which generalize both Aumann's and Schmeidler's original results. This solves a long-standing open problem in the area.

Chapter 11

Seminars

11.1 Econometric Institute Seminars

- January 23** Siem Jan Koopman (Free University) *A Non-Gaussian Airline Model for Seasonal Adjustment*
- February 13** Francesca Cornelli (London Business School) *Donations*
- February 20** Simone Manganelli (European Central Bank) *The Central Banker as a Risk Manager: Quantifying and Forecasting Inflation Risks*
- March 5** Dawit Zerom (Iowa State University and University of Amsterdam) *On Additive Conditional Quantiles with High-Dimensional Covariates*
- March 6** Nikolaus Hautsch (University of Konstanz) *Stochastic Conditional Intensity Processes*
- March 10** Rocus van Opstal (CPB) *Charting Choices: Economic Effects of Election Platforms*
- March 17** Sébastien Laurent (ENSAE, CREST) *Central Bank Interventions in the Foreign Exchange Market: New Stylized Facts*
- March 20** Jörg Breitung (University of Bonn) *A Parametric Approach to the Estimation of Cointegration Vectors in Panel Data*
- March 27** Marcelo Moreira (Harvard University) *A General Theory of Hypothesis Testing in the Simultaneous Equations Model*
- April 2** Stanislav Anatolyev (New Economic School) *Nonlinear Rational Expectation Models, Asymptotic Variance vs Asymptotic Bias, and Choice of Instruments*

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- April 24** Lennart Hoogerheide (Tinbergen Institute) *Efficient Sampling from Non-Standard Distributions using Neural Network Approximations*
- May 1** Michiel de Pooter (Tinbergen Institute) *Modeling and Forecasting FOREX Realized Volatility*
- May 8** Angeles Carnero (Universidad Carlos III de Madrid) *Outliers and Conditional Heteroskedasticity in Time Series*
- May 15** George Kapetanios (Queen Mary, University of London) *Nonlinear Unit Root Tests Using GLS Detrending*
- May 19** Tom Rothenberg (UC Berkeley) *Robust Tests in the Linear Model*
- October 2** Zsolt Sandor (Erasmus University Rotterdam) *FIML Estimation of Market Equilibrium Models*
- October 9** Bas Donkers (Erasmus University Rotterdam) *A Derivative Based Estimator for Semiparametric Index Models*
- October 16** Michel van de Velden (Universitat Pompeu Fabra) *Generalized Canonical Correlation Analysis of Matrices with Different Row and Column Orders*
- October 30** Frédérique Bec (ENSAE) *Vector Equilibrium Correction Models with Non-linear Discontinuous Adjustments*
- November 13** David Bock (University of Göteborg) *Statistical Surveillance with Applications to Business Cycle and Finance*
- November 20** Cheti Nicoletti (University of Essex) *Correcting for Sample Selection: Alternative Estimators Compared*
- November 27** Sylvia Kaufmann (Oesterreichische Nationalbank) *The Business Cycle of European Countries. Bayesian Clustering of Country-individual IP Growth Series*
- December 1** Jeanine Kippers (De Nederlandsche Bank) *Empirical Studies of Cash Payments*
- December 4** Helmut Herwartz (University of Kiel) *A Bootstrap Approach to Specification Testing in Stationary Panel Data Models - The Case of the Breusch-Pagan Test*
- December 18** Paolo Paruolo (University of Insubria) *Common Trends and Cycles in $I(2)$ VAR Systems*

December 22 Xavier Gabaix (MIT) *Application of Extreme Value Theory to Finance and Industrial Organization*

11.2 Operations Research Meetings and Seminars

February 11 Kevin Pak (Erasmus Research Institute of Management) *Airline Revenue Management with Convertible Seats*

March 4 Ruud Teunter (Econometric Institute) *Multiple-job repair kit problems*

April 8 Peter Den Iseger (Econometric Institute) *A new methodology for the inversion of Laplace transforms and the computation of expressions involving convolutions*

April 29 Eric Porras Musalem (Tinbergen Institute) *Controlling inventories in a supply chain: a case study*

May 20 Z. Pelin Bayindir (Econometric Institute) *Comparison of alternative inventory control policies for a probabilistic recovery system*

June 3 Ildikó Fodor Birtalan (Econometric Institute) *Matching arrivals to departures in the train unit shunting problem*

November 11 Nesim Erkip (Middle East Technical University) *Value of information in a two-echelon supply chain with limited capacity*

December 15 Sotiris Papachristos (University of Ioannina) *An inventory model with random yield in a fluctuating environment*

October 21 Gabriella Budai (Tinbergen Institute) *A dynamic approach for planning routine railway maintenance activities*

11.3 Mathematical Meetings and Seminars

November 3 Vladimir Protassov (Moscow State University) *Geodesic lines, Euler-Lagrange equations and candy-box wrapping*

Part IV

Education & Training

Chapter 12

Bachelor & Master Program

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, 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 Bachelors and Masters programmes in Econometrics & Management Science.

12.2 Bachelor Program

The aim of this three-year program 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 2003-2004 about 65 students entered the program. Since the program was started recently in this form, the first graduates are only expected at the end of the academic year 2004-2005.

The first two years of the program 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, student choose a major in which they specialize. The options for the majors mirror the four disciplines in the master program:

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 program. Students conclude their bachelor studies with writing a short thesis.

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

12.3 Master program

The work of econometricians and management scientists consists of doing quantitative analyzes 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's programme,

Econometrics & Management Science, is a one-year programme with four optional disciplines: 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.

Furthermore, a one-year research variant is offered in cooperation with several research schools. This variant is an excellent preparation for those students who would like to enter a PhD programme.

12.3.1 Operations Research and Quantitative Logistics Objectives

The 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 modeling 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, the Schiphol Group, KLM, 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

- prof. dr. A.P.M. Wagelmans
- dr. J.B.G. Frenk
- dr. D.K. Leegwater
- W. van Sonderen-Huisman MSc
- dr. D. Huisman
- dr. R.H. Teunter

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, corporate finance, 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).

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 Maths. 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 bank, and Professor Pelsser works at Nationale Nederlanden, the largest insurer in The Netherlands and part of ING.

The lecturers and theses-supervisors include:

- 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. A.C.F. Vorst

12.3.3 Quantitative Marketing Objectives

The 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. For you?

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. Required prior knowledge

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

This econometrics programme builds on and extends the econometric tradition established in Rotterdam by professors Tinbergen and Theil. New developments are explained and applied in assignments and workshops. A thorough analysis of modern methods and models serves to help in preparing a high level master thesis. Topics for a master thesis have been found in e.g. the fields of international finance and international economics, labor, insurance, and health economics.

All instructors are active researchers who incorporate their research findings in their lectures. They belong to the staff 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) is possible for staff and talented students.

The lectures 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 2003

The following students obtained their master's degree at the Econometric Institute during 2003.

J.C. van Anandel (11-June-2003) *Contractselectie op de afvalmarkt*

Supervision: prof. dr. ir. R. Dekker

D.J. Boersma (03-April-2003) *Global sector allocation and pre-trade risk models*

Supervision: dr. D.J.C. van Dijk & dr. ir. M.P.E. Martens

P.D.H. Boswinkel (27-November-2003) *Traffic assignment models*

Supervision: prof. dr. A.P.M. Wagelmans & dr. S.I. Birbil

B.A. Buijtendijk (18-September-2003) *Margin management at KLM cargo*

Supervision: prof. dr. ir. R. Dekker & K. Pak MSc

D. Dam (11-September-2003) *Productieplanning in een metaalgieterij*

Supervision: prof. dr. A.P.M. Wagelmans

E. Demirel (11-June-2003) *Interest-free home finance: sharing risks and returns*

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

A. van Dijk (11-September-2003) *De correlatie tussen de risicopremie op aandelen en de credit spread van bedrijfsobligaties*

Supervision: dr. C. Heij

S. van den Dries (20-March-2003) *Outliers, structural breaks & nonlinearity: do they matter for forecasting Dutch macro-economic time series?*

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

J. Ebben (11-December-2003) *The regional explorer: a system dynamics model for spatial development*

Supervision: prof. dr. A.P.M. Wagelmans

B.J.L. Eijgenraam (30-October-2003) *What to do with the drums?*

Supervision: prof. dr. ir. R. Dekker

S. El Harbachi (17-September-2003) *Het effect van het comprimeren van databestanden op de benadering van de verzekeringspremie voor motorvoertuigen*

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

M.J. Ende (11-December-2003) *Kantoren in perspectief*

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

P. Engelberts (05-June-2003) *Sojourn times in a queuing network with feedback*

Supervision: prof. dr. ir. R. Dekker

P.J. Fioole (04-September-2003) *RINTEL, Het automatisch genereren en verbeteren van een rangeerplanning*

Supervision: dr. D. Huisman

F.A. van Gastel (03-September-2003) *Vergrijzing in Europa*

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

M.A.J. Gerts (18-September-2003) *Optimalisatie van robotvervoer binnen een tuinbedrijf*

Supervision: prof. dr. ir. R. Dekker

N.K. Gopal (18-September-2003) *APX: A predictable X-factor*

Supervision: dr. ir. C.M. Hafner

M.M.L. de Groot (13-November-2003) *Lot sizing at a brewery*

Supervision: dr. R.H. Teunter

S.W. Groot (13-October-2003) *Een geïntegreerde aanpak van voertuig- en personeelsplanning toegepast op grote probleeminstanties*

Supervision: dr. D. Huisman & prof. dr. A.P.M. Wagelmans

J.D. Grooten (12-June-2003) *Segmentation and classification of the Dutch telecommunication and financial consumer markets*

Supervision: dr. A.J. Koning

M.F. van der Gugten (30-October-2003) *Capaciteitsplanning op de luchthaven; evalueren en optimaliseren van wachtprocessen*

Supervision: dr. A.J. Koning

N. Hodzic (05-June-2003) *Modelling credit risk in the transportation sector*

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

A.W. Hogendoorn (04-September-2003) *Estimating Beta-Adjustments for the TMT boom and non-trading*

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

M.F. van der Horst (11-June-2003) *Aandelen portefeuille constructie met tracking error optimalisatie*

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

G. Keskin (11-June-2003) *Risk/return characteristics and performance measurement of protective structures*

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

P.M. Koot (17-September-2003) *Helder water. Een empirische onderzoek naar de efficiëntie van de bedrijven in de drinkwatersector*

Supervision: dr. A.J. Koning

P. van Laar (27-November-2003) *De betere huishoudens en de goede vragen*

Supervision: dr. A.J. Koning

K. Lansdorp (06-February-2003) *Van taak tot dienst*

Supervision: prof. dr. ir. R. Dekker

M.R.A.F. van de Loo (11-June-2003) *Approaches to approximating credit default swap rates*

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

W.Y. Man (13-November-2003) *The development of credit risk models for private firms*

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

H.T.C. Nagtegaal (20-February-2003) *Quasi-Monte Carlo methods for option pricing*

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

Z.S. Nihtianova (23-January-2003) *Maturity guarantees of a unit-linked portfolio*

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

H.G. Ochtend (20-March-2003) *ARCH-IE: A time series model that adds innovation effects to an ARCH model*

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

G.A. Ochtman (11-December-2003) *De mogelijkheden van floating stock in een fmcg-supply chain*

Supervision: prof. dr. ir. R. Dekker

M.S. Peekstok (12-June-2003) *Algoritmekeuze binnen een ritplanningssysteem*

Supervision: prof. dr. A.P.M. Wagelmans

M.D. de Pooter (03-April-2003) *Guaranteed products in a defined contribution framework*

Supervision: dr. K.P.B. Oldenkamp & W. van Sonderen-Huisman MSc

P.J. Roes (12-June-2003) *Planning marine officers of P&O Nedlloyd*

Supervision: prof. dr. A.P.M. Wagelmans

M. Snelder (30-October-2003) *ROADnet: optimalisatiealgoritme voor het ontwerpen van wegennetwerken*

Supervision: prof. dr. A.P.M. Wagelmans

J. van Staalduin (18-September-2003) *Stapelwagen onbalans*

Supervision: prof. dr. ir. R. Dekker

J.S. Steenbergen (11-December-2003) *Verklaring van retentie bij mobiele telefonie klanten*

Supervision: dr. P.C. Verhoef

J. Steeneken (27-November-2003) *Container transport optimisation*

Supervision: prof. dr. ir. R. Dekker & E. van Asperen MSc

L.B. Steveninck (23-January-2003) *Changes in the distribution of rating transitions between banks*

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

J.A.J. Taal (13-November-2003) *Market value margins for life insurance liabilities*

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

F. Verhage (18-September-2003) *De plaats en effectiviteit van online adverteren ten opzichte van offline media*

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

V. van der Wagt (11-December-2003) *Materieelplanning ten behoeve van een buitendi-
enstregeling*

Supervision: dr. D. Huisman

A.W.M. Zevenbergen (15-May-2003) *Nieuw handelssysteem van Euronext Amsterdam*

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

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 is Assistant Professor in Mathematics. His main scientific interest includes robust optimization and its applications mainly in system theory. A recent paper (together with A. Ben-Tal and A. Nemirovski) on this subject has been published in SIAM Journal on Control and Optimization (2003). He is currently serving as reviewer for Automatica. He has taught Analysis I and II for undergraduate students in econometrics and mathematics for economist. He is an IEEE member since 1993.

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 and has been chairman of the international jury for the Hans Schneider Prize in linear algebra. For many years he served the Rotterdam 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@few.eur.nl*

Pelin Bayindir is a post-doctoral researcher in Operational Research. Her main research areas are inventory theory and supply chain management. In 2003, she published several technical reports and one of the papers has been appeared in International Journal of Production Economics.

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

Govert Bijwaard is researcher in Applied Econometrics. In June 2001 he successfully defended his PhD thesis (at the Free University Amsterdam). His research interests are micro-econometrics with an emphasis on duration models and correcting for selectivity. In his thesis the focus was on evaluation of labor market policies. Recently, his empirical research contributed to the marketing literature (interpurchase times) and the evaluation of migration policies (time till (re)-migration). He has published in the Journal of Econometrics. He also works as an applied researcher for SEOR doing research on evaluation of Dutch labour market and social policies.

Dr. S. (Ilker) Birbil, *sibirbil@few.eur.nl*

S. Ilker Birbil is a post-doctoral research fellow at the Erasmus Research Institute of Management. His main research interests lie within Operations Research; such as nonlinear and non-smooth optimization, equilibrium constrained optimization problems, global optimization, and approximation methods for min-max problems. His publications appeared in European Journal of Operations Research, Journal of Global Optimization, Computers and Operations Research. In the last two years he has been actively working with several researchers from USA, China, Turkey, France and the Netherlands.

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 2003 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 Referee in Mathematics. His research interests are in optimization methods: necessary conditions, algorithms and applications. In 2003 he finished - with Professor Tikhomirov - a book "Optimization: insight and applications" which will be published by Princeton University Press. Moreover, he published the solution of a problem of Nesterov on self-concordant barrier algorithms. Furthermore, he wrote - with Professor Zhang - a preprint on D-duality and applications to robust analysis and multi-criteria optimization. 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 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 and revenue management. He was project coordinator of the EU working group on reverse logistics, REVLOG. At the end of 2003 the network published a book with Springer-Verlag entitled "Reverse Logistics: Quantitative models for closed-loop supply chains". In 2003 he finished work on the IMPROVERAIL project for railway management and continued working on the DYNAFORM project which aims at making an intelligent maintenance management system. Ovidiu Listes and Ton de Waal received their PhD degrees with him in 2003.

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

Dick van Dijk is Associate Professor in Econometrics, and Associate Director of the 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 the 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 Koene van Dijk is Professor of Econometrics. His research areas are: Bayesian inference, dynamic econometrics and neural network models. His recent publications appeared in Journal of Forecasting, Journal of Business and Economic Statistics, Journal of Econometrics and Oxford Bulletin of Economics and Statistics. He is co-editor of the Journal of Applied Econometrics and Associate Editor of several journals, e.g. the Journal of Econometrics. He is a member of the European Standing Committee of the Econometric Society. In 2003 he was programme chairperson of the Conference: On the Wealth of Nations; Extending the Tinbergen Heritage.

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 behavior. In particular, the modeling of consumer behavior 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 “eWISE”, which is based on the idea of “Discovery Learning”. For his work on “eWISE” he obtained the University Education Prize in 2003.

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 “A Concise Introduction to Econometrics” (Cambridge), and his recent articles appeared in for example the *Journal of Marketing Research* and the *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. In 2003 he became a *Journal of Applied Econometrics Distinguished Author*.

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 location theory, 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, *goyal@few.eur.nl*

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*, *The Journal of Classification*, *British Journal of Mathematical and Statistical Psychology*, and *Journal of Empirical Finance*. He is associate editor of two journals and serves as regularly as referee for various journals.

Prof. dr. L.F.M. (Laurens) de Haan, *ldhaan@few.eur.nl*

Laurens de Haan is Professor Emeritus of Statistics and Applied Probability specialized in extreme value theory.

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

Christian Hafner is a postdoctoral 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 will appear in 2004 with Oxford University Press.

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

Csilla Horváth is a post-doctoral researcher at the Econometric Institute. In September 2003 she successfully defended her PhD thesis entitled “Dynamic Analysis of Marketing Systems”, at the university of Groningen. Her research interests include modeling competitive responses, measuring immediate and dynamic effects of promotions, panel and time series cross sectional data, vector autoregressive models.

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

Johan Kaashoek is Associate Professor of Mathematics. His research interest are nonlinear modeling, pattern formation and nonlinear dynamics and its applications in spatial economics and economics in general. He has published in Acta Applicanda Mathematica, The Annals of Regional Science and Econometric Reviews. Recently, he has developed an web-based learning system, called eWISE.

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.

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

Alex Koning is Associate Professor of Statistics. His research interest is goodness-of-fit of statistical models, and especially the theoretical as well as practical aspects of testing the constancy of a statistical model over time. He was Secretary of the Netherlands Society for Statistics and Operations Research, is Associate Editor of Statistica Neerlandica, and has published in a variety of journals including Applied Statistics, Journal of Applied Probability, the Annals of Statistics, Journal of Quality Technology, Journal of Multivariate Analysis, and the Journal of Nonparametric Statistics.

Dr. A. (Alexander) Konovalov, *konovalov@few.eur.nl*

Alexander Konovalov is a post-doctoral researcher in Microeconomics. In December 2001 he successfully defended his PhD thesis. His research interests include general equilibrium theory, industrial organization and game theoretical models of network formation, this includes modeling social networks and industrial networks of R&D collaboration. He has published in the Journal of Economic Theory and is an occasional reviewer for Theory and Decision.

Prof. dr. ir. P. (Peter) Kooiman, *kooiman@few.eur.nl*

Peter Kooiman is part-time professor in economic statistics. For many years he was the 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.

Dr. D.K. (Dick) Leegwater, *leegwater@few.eur.nl*

Dick Leegwater is Lecturer in Operations Research.

Prof. dr. R.L. (Robin) Lumsdaine, *robin.lumsdaine@db.com*

Robin Lumsdaine is a Visiting Professor in Financial Econometrics. Currently, she is affiliated with the Deutsche Bank.

Dr. ir. M.P.E. (Martin) Martens, *mmartens@few.eur.nl*

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 the Journal of Banking and Finance, Journal of International Money and Finance, and the Journal of Futures Markets. Highlight of 2003 was a conference in Montreal on forecasting volatility with all the international experts present, where he presented a joint work on non-linear models and on realized covariances.

Dr. H.M. (Martyn) Mulder, *hmmulder@few.eur.nl*

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.

Dr. R. (Richard) Paap, *paap@few.eur.nl*

Richard Paap is Postdoctoral 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 and co-authored a textbook on Quantitative Models in Marketing Research (Cambridge). He is occasional reviewer for econometric and economic journals and is Associate Editor of *Statistica Neerlandica*.

Prof. dr. A.A.J. (Antoon) Pelsser, *pelsser@few.eur.nl*

Antoon Pelsser is Head of the Asset-Liability Matching Department of ING-Insurance Risk Management-NL. The ALM Department advises on the optimal asset allocation to cover the insurance liabilities. The department is also responsible for the calculation of market values and risk measures of (life-)insurance contracts. He also holds a part-time position as Professor of Mathematical Finance at the Econometric Institute at the Erasmus University in Rotterdam. His research interests focus on pricing models for interest rate derivatives, the pricing of insurance contracts and Asset-Liability Management of insurance contracts.

Dr. Z. (Zsolt) Sandor, *sandor@few.eur.nl*

Zsolt Sandor is a post-doctoral researcher in econometrics. His research interests include estimation of market equilibrium 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 the *Journal of Marketing Research* and *Marketing Science*, and other papers will appear in the *Journal of Econometrics* and *Transportation Research B*.

Dr. ir. S (Sharon) Schalk, *schalk@few.eur.nl*

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".

W.M. (Willie) van Sonderen MSc, *vansonderen@few.eur.nl*

Willie van Sonderen coordinates the dual master program in Econometrics & Management Science.

Dr. R.J. (Roel) Stroeker, *stroeker@few.eur.nl*

Roel Stroeker is Associate Professor of Mathematics. The courses he teaches are in Mathematics, often with a strong computational flavor. He has published a book on Computer Algebra (Birkhäuser), and many articles in the field of Computational Number Theory and Arithmetic Geometry. Recent articles appeared in Mathematics of Computation, Acta Arithmetica, Experimental Mathematics, and Journal of Number Theory. Additionally, he is a regular reviewer and occasional referee for these and other international journals. He is a member of the board of the Dutch Research School “The Thomas Stieltjes Institute for Mathematics”.

E.E.V. (Elselien) Taconis-Haantjes MSc, *taconis@few.eur.nl*

Elselien Taconis is Associate Professor of Mathematics. Her teaching is in mathematics. She is also manager of the bachelor-master program in Econometrics and Management Science

Dr. R.H. (Ruud) Teunter, *teunter@few.eur.nl*

Ruud Teunter is a Research Fellow of the Royal Dutch Academy of Sciences (Dutch abbreviation: KNAW). His main research interests are reverse logistics, spare parts logistics, inventory control, and demand forecasting. He has published extensively in journals on operations research and logistics.

Prof. dr. M.J.C.M. (Marno) Verbeek, *verbeek@few.eur.nl*

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 will have 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 the Review of Economics and Statistics.

Prof. dr. A.C.F. (Ton) Vorst, *vorst@few.eur.nl*

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 the Journal of Derivatives, the Review of Derivatives Research, European Financial Management and the European Financial Review.

Prof. dr. A.P.M. (Albert) Wagelmans, *wagelmans@few.eur.nl*

Albert P.M. Wagelmans is Professor of Operations Research and the director of the bachelor-master program in Econometrics and 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 2003 he was recognized as one of the most productive researchers in the Rotterdam School of Economics and he joined the editorial board of Naval Research Logistics.

Chapter 15

Visitors

D.B. (David) Bock MSc, *david.bock@statistics.gu.se*

David Bock is a PhD candidate in statistics at the Statistical Research Unit, Gteborg University, Sweden. His research interest is statistical surveillance with application to business cycles, finance and public health. He has published in Journal of the Royal Statistical Society, series A, and Journal of Business Cycle Measurement and Analysis.

K.V.D. (Katrijn) van Deun MSc, *katrijn.vandeun@psy.kuleuven.ac.be*

Katrijn Van Deun is a PhD candidate at the Department of Psychology of the Catholic University of Leuven. Under the supervision of Professors Delbeke, Groenen and Heiser she investigates the problem of degenerate solutions in multidimensional unfolding. In collaboration with professor Patrick Groenen, she prepared a manuscript on the use of iterative majorization as an optimization tool for fitting shapes. Soon, a paper of her will be published in Psychometrika.

Dr. T. (Torsten) Ehrhardt

Torsten Ehrhardt has been a visiting researcher in Mathematics for three months in 2003. The research conducted at the Econometric Institute was a collaboration project with Prof.dr. Harm Bart about “Logarithmic Residues in Banach algebras”. A publication will appear in the journal “Mathematische Nachrichten”.

Dr. S.P (Sotiris) Papachristos, *papachri@few.eur.nl*

Sotiris Papachristos is a Lecturer in the Department of Mathematics at the University of Ioannina Greece and has recently been elected as an Associate Professor of the Department of Agricultural Farm Organization and Management at the same university. He is teaching courses in Operations Research, Mathematical programming, Operations Management and Statistics. His research interest are, inventory control, dynamic programming, optimization. He has published articles in Operations research, International Journal of Productions Economics, Computers and Operations Research, Management Science, Optimal Control and Applications Methods. He is referee for many journals and he is Associate Editor in the International Journal of Systems Science, (IJSS)

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 modeling for FX and equity 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).

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 supervisor is Professor Rommert Dekker and her research topic is optimization of maintenance, focusing on railway infrastructure maintenance. Her papers have been published in proceedings of three international conferences and one paper has been submitted to the Journal of Quality in Maintenance Engineering.

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

Dennis Fok is a post-doctoral researcher in Applied Econometrics. In November 2003 he successfully defended his PhD thesis. His research interests include non-linear models for panel data and the combination of marketing and econometrics, this includes modeling 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 the Journal of Econometrics, International Journal of Forecasting and the International Journal of Research in Marketing

A.G. (Andrea) Galeotti MSc, *galeotti@few.eur.nl*

Andrea Galeotti is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is Professor Sanjeev Goyal and his research interest are game theory, network economics, and industrial organization.

P.G. (Patrizia) Giaquinto MSc, *patrizia_giaquinto@yahoo.it*

Patrizia Giaquinto is a PhD candidate of Statistics and researcher for the methodological studies of the Italian National Institute of Statistics in Rome. Her research interests concern multivariate analysis and databases. She is consultant for statistical applications in the field of medicine, forestry and ecology at the university of Bari (Italy).

A.B. (Anna) Gutkowska MSc, *gutkowska@few.eur.nl*

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.

W. (Wilco) van den Heuvel MSc, *wvandenheuvel@few.eur.nl*

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 lot-sizing models in reversed logistics and supply chains. The focus of the research is on developing efficient algorithms to solve the models.

L.F. (Lennart Frank) Hoogerheide MSc, *lhoogerheide@few.eur.nl*

Lennart Hoogerheide is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is Professor Herman K. 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.

Dr. P. (Patrick) Houweling, *p.houweling@robeco.nl*

Patrick Houweling defended his PhD thesis in October 2003. His thesis, entitled “Empirical Studies on Credit Markets”, contains several studies on credit risk, credit derivatives and liquidity risk. His work has been published in international academic journals, including the Journal of Derivatives, the Journal of International Money and Finance and the Journal of Empirical Finance. Patrick is currently employed as researcher at the Quantitative Research department of Robeco Asset Management.

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

Dennis Huisman is a part-time postdoctoral researcher since March 1, 2004. 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*.

R.H. (Richard) Kleijn MSc, *rkleijn@few.eur.nl*

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 prof.dr. Herman K. van Dijk. He has been working on his PhD thesis which is currently nearing completion.

M.J. (Marco) van der Leij MSc, *mvanderleij@few.eur.nl*

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.

D. (Deyuan) Li MSc, *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 2003 he has published two papers in *Statistics and Probability Letters*, and in *Probability and Mathematical Statistics*.

Dr. O.L. (Ovidiu) Listes, *O.L.Listes@wt.nl*

Ovidiu Listes is a post-doctoral researcher in Operations Research at the Tilburg University. Until June 2003 he was affiliated with the Econometric Institute as a PhD candidate. He conducted research on methods which support decision making under uncertainty. He successfully defended his thesis, with the title “Stochastic Programming Approaches for Strategic Logistics Problems”, in 2003 at the Erasmus University.

R. (Roger) Lord MSc, *lord@few.eur.nl*

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

E. P. (Eric) Porras Musalem MSc, *porrasmusalem@few.eur.nl*

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 modeling and supply chain management.

R.P. (Robin) Nicolai MSc, *rnicolai@few.eur.nl*

Robin Nicolai is a PhD candidate at the Tinbergen Institute affiliated with the Econometric Institute. His supervisor is professor Rommert Dekker and his research interests are simulation optimization and decision support systems for maintenance optimization.

R.D. (Rutger) van Oest MSc, *vanoest@few.eur.nl*

Rutger van Oest is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisors are professors Philip Hans Franses and Herman K. van Dijk. His research is focused on quantitative models in marketing (specifically, market share models and choice models for the "whether to buy", "which brand to buy" and "how much to buy" decisions of households) and Monte Carlo integration methods. He has a publication in the Journal of Econometrics.

K. (Kevin) Pak MSc, *kpak@few.eur.nl*

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 the Journal of Revenue and Pricing Management and in Statistica Neerlandica.

R. (Raoul) Pietersz MSc, *pietersz@few.eur.nl*

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 the Journal of Derivatives and Risk Magazine.

M.D. (Michiel) de Pooter MSc, *depooter@few.eur.nl*

Michiel de Pooter is a PhD candidate at the Tinbergen Institute Rotterdam, affiliated with the Econometric Institute. His supervisors are professor Philip Hans Franses and dr. Dick van Dijk. His research interests include time series analysis, volatility modeling and option pricing.

F. (Francesco) Ravazzolo MSc, *ravazzolo@few.eur.nl*

Francesco Ravazzolo is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisors are professor Herman K. van Dijk and professor Marno Verbeek, and his research interests are Bayesian econometrics and finance, with a focus on modeling.

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Klaas Staal is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is professor Sanjeev Goyal and his research interests are in political economics, public economics and applied game theory. One of his papers is forthcoming in the *European Economic Review*. Before becoming a PhD candidate, he was a consultant for Baan Development (a software company).

Dr. Y.V. (Yulia) Veld-Merkoulova, *yveld@few.eur.nl*

Yulia Veld-Merkoulova is an Assistant Professor at the Rotterdam School of Management. In October 2003 she defended her PhD thesis at the Tinbergen Institute Rotterdam. Her research interests include futures markets and empirical corporate finance. She has published in the *Journal of Banking and Finance*, *Journal of Futures Markets*, and *International Review of Financial Analysis*.

M.F.A. (Martijn) van der Voort MSc, *vandervoort@few.eur.nl*

Martijn van der Voort is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. His supervisor is professor Ton Vorst and his research interests are credit risk and credit risk derivatives, mainly focusing on multi-name credit derivatives. He spends two days a week at the product development department of ABN Amro in Amsterdam as a credit derivatives researcher.

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Björn Vroomen is a PhD candidate at the Erasmus Research Institute of Management, affiliated with the Econometric Institute. His supervisor is professor Philip Hans Franses and his research interests are marketing research, consumer behavior, e-commerce and decision support systems, with a focus on modeling. He has published in the European Journal of Operational Research and the International Journal of Forecasting

A.S.K. (Amy Wong) Wong MSc, *awong@few.eur.nl*

Amy Wong is a PhD candidate at the Tinbergen Institute, affiliated with the Econometric Institute. Her supervisor is Professor Ton Vorst and her co-supervisor is Dr Martin Martens. Her research interests are financial risk management and portfolio management.

Chapter 17

Staff

O.F.J.M. (Olga) Gilissen, *gilissen@few.eur.nl*

Olga Gilissen is Administrative Assistant, mainly for the mathematics faculty.

A.J. (Aletta) Henderiks-Bezemer, *ahenderiks@few.eur.nl*

Aletta Henderiks is Administrative Assistant, mainly for the econometrics faculty. She is also the main assistant to professor Herman van Dijk, concerning his editorial duties.

P.L. (Elli) Hoek van Dijke, *hoekvandijke@few.eur.nl*

Elli Hoek van Dijke is the secretary of the Program Director of the Econometric Institute as well as Associate Managing Editor of *Statistica Neerlandica*. Amongst other things she organizes conferences and lecture series.

T. (Tineke) Kurtz MSc, *kurtz@few.eur.nl*

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

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Esma Sevdi is Administrative Assistant

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Hil Ying Tse is student member of the management team of the Bachelor & Master program in Econometrics & Management Science.

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