Institut für Statistik und Decision Support Systems
Department of Statistics and Decision Support Systems

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ANNUAL REPORT 2009

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Contents

1 Foreword

I am pleased to present the annual report of the Department of Statistics and Decision Support Systems, which highlights some of the many achievements in 2009. The Department of Statistics and Decision Support Systems is part of the Faculty of Business, Economics and Statistics of the University of Vienna. Faculty members are active in research in various fields of Statistics, Econometrics, Operations Research, Mathematics, and Computer Science. The department offers degree programs in Statistics at the bachelor, master, and PhD-level. During the academic year 2008/09 the department taught also many undergraduate and graduate courses for programs run by other departments, including the Department of Business Administration and the Department of Economics.

In 2009, our department has been strengthened by the arrival of Hannes Leeb from Yale University as a professor of Applied Statistics and Nina Huber, Alois Pichler, and Philipp Thoma as assistants. Michael Jünger and Petra Mutzel joined the department as guest professors for one semester.

Regrettably, there were also several departures. Robert Kotal, Yu Li, Ulrike Schneider, David Wozabal, and Hildegard Zelle left the department to pursue new professional opportunities. We wish them well in their new posts.

I would like to express special thanks to Vera Lehmwald for editing this Annual Report 2009.

With best wishes

Erhard Reschenhofer (HoD)

Vienna, September 2010

2 Faculty and Staff

2.1 Regular Faculty (with Research Interests)

Immanuel M. Bomze (Prof.)	Operations Research and Quantitative Decision Support, Game Theory and Modelling of Behaviour, Optimization Theory and Application, Asymptotic Statistics, Stochastic Modelling, Dynamical Systems
Florian Frommlet (Dr.)	Applied Mathematics and Statistics
Andreas Futschik (Assoc. Prof.)	Asymptotic Statistics, Applied Statistics, Bioinformatics
Florian Gach (Mag.)	Mathematical Statistics
Andrea Gaunersdorfer (Assoc. Prof.)	Nonlinear Economic Dynamics, Dynamic Interaction in Markets
Walter J. Gutjahr (Assoc. Prof.)	Operations Research, Evolutionary Computation, Software Engineering
Nina Huber (Mag.)	Mathematical Statistics, Predictive Inference, Shrinkage Estimation in High Dimensions, Nonparametric Regression
Irene Klein (Assoc. Prof.)	Stochastic Finance
Hannes Leeb (Prof.)	Model Selection, Regularization, and Shrinkage, Statistical Analysis of High-Dimensional Data, Spectral Analysis of Large Random Matrices
Yu Li (Dipl.-Math.)	MPEC, Bilevel Optimization
Richard Nickl (Dr.)	Probability and Statistics in Infinite Dimensions
Georg C. Pflug (Prof.)	Mathematical Statistics, Stochastic Optimization, Risk Management
Alois Pichler (Mag., Dipl.-Ing.)	Stochastic Optimization, Risk Management
Benedikt M. Pötscher (Prof.)	Econometrics, Statistics, Time Series Analysis
Erhard Reschenhofer (Assoc. Prof.)	Time Series Analysis, Financial Econometrics, Automatic Model Selection, Chronobiology
Werner Schachinger (Assoc. Prof.)	Optimization, Probabilistic Analysis of Algorithms
Ulrike Schneider (PhD)	Statistics and Combinatorial Optimization

2.2 Externally Funded Faculty (with Research Interests)

Ronald Hochreiter (Dr.)	Optimization under Uncertainty, Stochastic Programming, Financial Risk Management, Service Oriented Computing
Raimund Kovacevic (Dr.)	Stochastic Optimization, Quantitative Risk Management, Stochastic Processes in Finance and Insurance
Ivana Ljubic (Dr.)	Algorithmic Operations Research, Algorithm Engineering
Philipp Thoma (Dipl.-Ing.)	Stochastic Processes and Optimization, Stochastic Finance
Peter Putz (Dipl.-Ing.)	Combinatorial Optimization, Network Design
Stefan Rath (Mag.)	Operations Research
Peter Reiter (Mag.)	Operations Research (Algorithms for Deterministic and Stochastic Combinatorial Optimization Problems)
Alessandro Tomazic (Dipl.-Math.)	Combinatorial Optimization (Graph Algorithms)
David Wozabal (Dr.)	Stochastic Optimization, Non-Convex Optimization, Robust Optimization
Hildegard Zelle (Mag.)	Stochastic Optimization

2.3 External Lecturers (Acadamic Year 2008/09)

Andreas Baierl (Dr.), Peter Bauer (Prof., Medical University Vienna), Johann Brandstetter (Dr.), Stela-Liana Brannath (Mag.), Werner Brannath (Assoc. Prof., Medical University Vienna), Reinhard Bürger (Prof., Dept. of Theoretical Biology, University of Vienna), Manfred Deistler (Prof., Technical University of Vienna), Wilfried Grossmann (Prof., Dept. of Scientific Computing, University of Vienna), Georg Heinze (Assoc. Prof., Medical University Vienna), Joachim Hermisson (Prof., Dept. of Theoretical Biology, University of Vienna), Stefan Hochrainer (Dr., International Institute for Applied Systems Analysis, Laxenburg), Ronald Hochreiter (Dr.), Dirk Holste (Dr.), Marcus Hudec (Assoc. Prof., Dept. of Scientific Computing, University of Vienna), Christoph Krall (Dr.), Thomas Ledl (Dr., Dept. of Scientific Computing, University of Vienna), Reinhard Mechler (Dr., International Institute for Applied Systems Analysis, Laxenburg), Thomas Micheler (Mag.), Herbert Nagel (Dr.), Karl Moder (Assoc. Prof., University of Natural Resources and Applied Life Sciences, Vienna), Martin Posch (Assoc. Prof., Medical University Vienna), Radoslava Mirkov (Dr.), Dieter Rasch (Prof., University of Natural Resources and Applied Life Sciences, Vienna), Christian Schlötterer (Dr., Dept. of Evolutionary Biology, University of Vienna), Kristan Schneider (Dr., Dept. of Mathematics, University of Vienna), Harald Schwab (Dr.), Mathias Staudigl (PhD, Dept. of Economics, University of Vienna), Gabriele Uchida (Assoc. Prof., Dept. of Scientific Computing, University of Vienna), Felisa Vázquez-Abad (Prof., University of Melbourne), Claus Vogl (Dr., University of Veterinary Medicine Vienna), Bertram Wassermann (Mag.), Nancy Wozabal (Dr.), Sonja Zehetmayer (Dr.)

2.4 Teaching Assistants (Academic Year 2008/09)

Karl Ewald, Martin Grasslober, Nina Huber, Dana Mináriková, Lukas Steinberger, Christina Zauner

2.5 Tutors (Acadamic Year 2008/09)

Buket Aydemir, Johanna Bertl, Stefan Dangubic, Aysegül Engin, Andreas Gulyas, Martin Hermann, Georg Lehecka, Thomas Dietmar Hille, Michael Gregor Miess, Daniel Obszelka, David Preinerstorfer, Reinhard Ullrich

2.6 Administrative Assistants

Birgit Ewald, Simone Hackl, Gerald Kamhuber, Vera Lehmwald, Manuela Nicham-Zorn

2.7 Systems Administrators

Georg Fochler, Stefan Geißler, Robert Kotal, Svetlana Mihajlovic, Sharif Purhassan

3 Visitors

István Berkes (TU Graz, Austria), Paula Brito (University of Porto, Portugal), P. Laurie Davies (University of Duisburg-Essen, Germany), José Fajardo (IBMEC Business School, Rio de Janeiro, Brazil), Sjur Flåm (University of Bergen, Norway), Hong Gu (Dalhousie University, Halifax, Canada), Christoph Helmberg (TU Chemnitz, Germany), Michael Jünger (University of Cologne, Germany), Paul Kabaila (La Trobe University, Australia), Mika Meitz (Koç University, Istanbul, Turkey), Petra Mutzel (TU Dortmund, Germany) Wolfgang Polonik (University of California, Davis, USA) Jakob Puchinger (Arsenal Research, Vienna, Austria), S. Raghavan (University of Maryland, College Park, USA), Daniel Sevcovic (Comenius University, Bratislava, Czech Republic), Hidetoshi Shimodaira (Tokyo Institute of Technology, Japan), Anthony Man-Cho So (The Chinese University of Hong Kong, China), Josef Teichmann (TU Vienna, Austria), Felisa J. Vásquez-Abad (University of Melbourne, Australia), Andreas Weingessel (Erste Bank Vienna, Austria), Roger J-B Wets (University of California, Davis, USA)

4 Teaching

4.1 Courses Taught (Academic Year 2008/09)

Winter Term 2008/09

Lecturer	Course Title
Andreas Baierl	PR Statistics for PhD students
Andreas Baierl/Sonja Zehetmayer	UK Biostatistics
Johann Brandstetter	UK Introduction to Business Mathematics VK Introduction to Business Mathematics FK WMS: Business Mathematics 1
Stela-Liana Brannath	VK Introduction to Business Mathematics (2 sections)
Immanuel Bomze	SE Colloquium in Stochastics VO Linear Algebra UK Principles of Machine Learning
Immanuel Bomze/Werner Schachinger	SE Research Privatissimum in Applied Optimization
Florian Frommlet	UE Exercises in Markov Processes VO Exercises in Probability
Andreas Futschik	SE Statistical Inference in Biostatistics and Genetics UK Case Studies in Statistics SE Seminar in Statistics for Master Studies PR Practical Course in Biostatistics
Andreas Futschik/Raimund Kovacevic/Kristan Schneider	UK Mathematical Statistics
Andreas Futschik/Reinhard Bürger/Joachim Hermisson/Christian Schlötterer	SE Seminar (Mathematical population genetics)
Florian Gach	UE Exercises in Probability UE Linear Models (2 sections)
Andrea Gaunersdorfer	EK Quantitative Methods for Business Decisions
Walter Gutjahr	UK Decision Support VO+UE Network Analysis
Walter Gutjahr/Peter Reiter	EK KFK OR: Operations Research I VU PG.STW.CT.VU Computational Techniques
Walter Gutjahr/Stefan Rath	EK KFK CTR/OR/ORGA/PÖ: Game Theory
Ronald Hochreiter	UK Computational Statistics
Marcus Hudec	UK Multivariate Statistics
Irene Klein	VO Markov Processes UK Financial and Insurance Mathematics

Lecturer	Course Title
Christoph Krall	FK WMS: Business Statistics 1 (3 sections)
Ivana Ljubic	FK WMS: Business Mathematics 2 (2 sections)
Herbert Nagel	FK WMS: Business Statistics 1 FK WMS: Business Statistics 2 (2 sections)
Georg Pflug	UK Introduction to Financial Mathematics VO AW-DRS: Advanced Optimization (Stochastic Optimization)
Georg Pflug/Raimund Kovacevic/Thomas Ledl	UK Basic Principles of Statistics
Benedikt Pötscher	VO Linear Models
Benedikt Pötscher/Manfred Deistler	SE Research Privatissimum in Econometrics
Benedikt Pötscher/Ulrike Schneider	UK Probability Theory
Peter Putz	VK Introduction to Business Mathematics (2 sections)
Erhard Reschenhofer	UK Time Series Analysis UK Financial Econometrics and Forecasting
Werner Schachinger	VO Analysis and Practical Mathematics UE Exercises in Analysis and Practical Mathematics
Ulrike Schneider	UE Linear Algebra
Harald Schwab	VK Introduction to Business Mathematics FK WMS: Business Mathematics 1 (2 sections)
Mathias Staudigl	UE Linear Algebra (2 sections)
Alessandro Tomazic	FK WMS: Business Mathematics 1 FK WMS: Business Mathematics 2
Bertram Wassermann	FK WMS: Business Statistics 2
David Wozabal	UE Exercises in Probability (2 sections)
Nancy Wozabal	UE Exercises in Probability UK Selected Topics in Statistics
Hildegard Zelle	UE Linear Algebra

Summer Term 2009

Andreas Baierl	UK Programming in Statistics
Immanuel Bomze	SE Colloquium in Stochastics VO Analysis UK Applied Optimization
Immanuel Bomze/Werner Schachinger	UK AW-DRS: Advanced Optimization
Johann Brandstetter	UK Introduction to Business Mathematics VK Introduction to Business Mathematics FK WMS: Business Mathematics 1

Lecturer	Course Title
Stela-Liana Brannath	UE Exercises in Analysis (2 sections)
Werner Brannath/Georg Heinze/Karl Moder	PR Statistical Consulting
Florian Frommlet	UK Linear Multivariate Statistics UK Advanced Biostatistics
Andreas Futschik	VO Introduction to Statistical Inference SE Seminar in Statistics PR Advanced Biostatistics
Andreas Futschik/Andreas Baierl	VO Introduction to Biostatistics
Andreas Futschik/Martin Posch/Werner Brannath/Peter Bauer	SE Research Seminar in Biostatistics and Genetics
Andreas Futschik/Reinhard Bürger/Joachim Hermisson/Christian Schlötterer	SE Seminar (Mathematical population genetics)
Florian Gach	UE Exercises in Statistical Inference
Andrea Gaunersdorfer	EK Quantitative Methods for Business Decisions
Wilfried Grossmann	FK nBWM INF: Applied Multivariate Statistics for Business Students
Wilfried Grossmann/Marcus Hudec	UK Generalized Linear Model
Walter Gutjahr	UK Advanced Machine Learning SE KFK OR: Computational Operations Research VU Game Theory
Walter Gutjahr/Stefan Rath	UK Decision Support
Walter Gutjahr/Peter Reiter	VK nBWM: OR Methods in Production and Logistics 1
Dirk Holste/Thomas Micheler	UK Statistical Genetics and Bioinformatics
Irene Klein	UK Stochastic Processes UE Exercises in Statistical Inference (2 sections)
Raimund Kovacevic	PR Practical Course (Financial and Insurance Mathematics)
Christoph Krall	FK WMS: Business Statistics 1 (3 sections)
Ivana Ljubic	FK WMS: Business Mathematics 2 (2 sections)
Radoslava Mirkov/Peter Reiter	UK KFK OR: Operations Research II
Herbert Nagel	FK WMS: Business Statistics 1 FK WMS: Business Statistics 2 (2 sections)
Georg Pflug	UK Introduction to Insurance Mathematics
Georg Pflug/Felisa Vazquez-Abad	VO AW-DRS: Advanced Stochastic Processes: Modeling and Approximation
Georg Pflug/David Wozabal	UK Nonparametric Inference and Resampling

Lecturer	Course Title
Benedikt Pötscher	UK Introduction to Econometrics
Benedikt Pötscher/Manfred Deistler	SE Research Privatissimum in Econometrics
Benedikt Pötscher/Ulrike Schneider	UK Asymptotic Statistics UK Econometrics
Peter Putz	VK Introduction to Business Mathematics FK WMS: Business Mathematics 1
Stefan Rath	VK Introduction to Business Mathematics
Erhard Reschenhofer	UK Multivariate Time Series Analysis FK nBWM IA, FE: Financial Econometrics
Erhard Reschenhofer	UE Exercises in Quantitative Methods for Business Sciences for Historians
Erhard Reschenhofer/Markus Cerman	VO Quantitative Methods for Business Sciences for Historians
Erhard Reschenhofer/Stefan Hochrainer/Reinhard Mechler	SE Seminar in Statistics
Werner Schachinger	UK Stochastic Models
Ulrike Schneider	UE Exercises in Analysis
Harald Schwab	VK Introduction to Business Mathematics FK WMS: Business Mathematics 1 (2 sections)
Mathias Staudigl	UE Exercises in Analysis
Alessandro Tomazic	FK WMS: Business Mathematics 2 (2 sections)
Gabriele Uchida	PR KFK OR: Software Applications in Operations Research
Claus Vogl	UK Biometrics
Bertram Wassermann	FK WMS: Business Statistics 2
Nancy Wozabal	UE Exercises in Statistical Inference

4.2 Theses Supervised

4.2.1 PhD Theses

Supervisor	Author	Title
Walter J. Gutjahr*	Sophie Parragh	Ambulance routing problems with rich constraints and multiple objectives
Walter J. Gutjahr*	Christian Heimerl (TU Munich, Germany)	Quantitative approaches to the management of human resources in IT-projects
Hannes Leeb*	David Farchione (La Trobe University, Australia)	Interval estimators that utilize uncertain prior information
Benedikt M. Pötscher	Florian Gach	Efficiency in indirect inference

4.2.2 Diploma Theses

Supervisor	Author	Title
Immanuel M. Bomze and Ivana Ljubic*	Stefan Gollowitzer	MIP models for (hop-constrained) connected facility location
Andreas Futschik	Nina Huber	Analyse von Werbedaten in Österreich
Andrea Gaunersdorfer	Martin Grasslober	Valuing interest rate derivatives using MonteCarlo simulation
Andrea Gaunersdorfer	Karin Eckmair	Finanzierungschancen und -risiken für Österreichs kleine und mittelständische Unternehmen durch Basel II
Walter J. Gutjahr	Christian Strobach	Kombinierte Standort-Touren-Planung in der Produktneueinführung
Walter J. Gutjahr	Jasmine Yagmur-Holik	Optimierung der bikriteriellen Liegeplatzzuordnung am Containerterminal mit genetischem Algorithmus
Georg C. Pflug	Markus Cozowicz	Large vocabulary continuous speech recognition systems, maximum mutual information estimation and switching regimes

* second supervisor

4.2.3 Bachelor Theses

Walter J. Gutjahr (7[1]), Georg C. Pflug (2), Erhard Reschenhofer (12)

5 Publications

5.1 Journal Articles

Addis, Bernardetta, **Schachinger**, **Werner**: Improved bounds for interatomic distance in Morse clusters. *Operations Research Letters* **37**, 290–294, 2009.

Bianchi, Leonora, Dorigo, Marco, Gambardella, Luca M., **Gutjahr**, **Walter J**.: A survey on metaheuristics for stochastic combinatorial optimization. *Natural Computing* **8**, 239-287, 2009.

Boitard, Simon, Schlötterer, Christian, **Futschik**, **Andreas**: Detecting Selective Sweeps: A New Approach Based on Hidden Markov Models. *Genetics* **181**, 1567-1578, 2009.

Broussev, Nikola, **Pflug**, **Georg C**.: Electricity Swing Options: Behavioral Models and Pricing. *European Journal of Operational Research* **197**, 1041-1050, 2009.

Chen, Si, **Ljubić**, **Ivana**, Rhagavan, S.: The Regenerator Location Problem. *Networks* (available online since 22nd December 2009)

Chimani, Markus, Kandyba, Maria, **Ljubic**, **Ivana**, **Mutzel**, **Petra**: Obtaining Optimal k-Cardinality Trees Fast. *ACM Journal on Experimental Algorithmics* **14**, 5.1-5.23, 2009.

Doerner, Karl F., Nolz, Pamela, **Gutjahr**, **Walter J**.: Multi-criteria location planning for public facilities in tsunami-prone coastal areas. *OR Spectrum* **31**, 651-678, 2009.

Guntuboyina, Adityanand, **Leeb**, **Hannes**: Concentration of the spectral measure of large Wishart matrices with dependent entries. *Electronic Communications in Probability* **14**, 334-342, 2009.

Gutjahr, **Walter J**.: A provably convergent heuristic for stochastic bicriteria integer programming. *Journal of Heuristics* **5**, 227-258, 2009.

Hochrainer, Stefan, Mechler, Reinhard, **Pflug**, **Georg C**.: Climate change and financial adaptation in Africa. Investigating the impact of climate change on the robustness of index-based microinsurance in Malawi. *Mitigation and Adaption Strategies for Global Change* **14**, 231-260, 2009.

Hochrainer, Stefan, **Pflug**, **Georg C**.: Natural Disaster Risk Bearing Ability of Governments: Consequences of Kinked Utility. *Journal of Natural Disaster Science* **31**, 11-21, 2009.

Kilianova, Sona, **Pflug**, **Georg C**.: Optimal pension fund management under multi-period risk minimization. *Annals of Operations Research* **166**, 261-270, 2009.

Leeb, **Hannes**: Conditional predictive inference. *Annals of Statistics* **37**, 2838-2876, 2009.

Ljubic, **Ivana**: A Branch-and-Cut-and-Price Algorithm for Vertex Biconnectivity Augmentation. *Networks* (available online since 18th December 2009)

[1] indicates the number of bachelor theses supervised in 2009

Pötscher, **Benedikt M.**, **Leeb**, **Hannes**: On the Distribution of Penalized Maximum Likelihood Estimators: The LASSO, SCAD, and Thresholding. *Journal of Multivariate Analysis* **100**, 2065-2082, 2009.

Pötscher, **Benedikt M.**, **Schneider**, **Ulrike**: On the Distribution of the Adaptive LASSO Estimator. *Journal of Statistical Planning and Inference* **139**, 2775-2790, 2009.

Pötscher, **Benedikt M.**: Confidence Sets Based on Sparse Estimators are Necessarily Large. *Sankhya* **71**, 1-16, 2009.

Reschenhofer, **Erhard**: Frequency domain modeling with piecewise constant spectra. *Journal of Modern Applied Statistical Methods*, 2009.

Reschenhofer, **Erhard**: Super-whiteness of returns spectra. *Journal of Data Science* **7**, 423-431, 2009.

Schachinger, **Werner**, **Bomze**, **Immanuel**: A Conic Frank-Wolfe Type Theorem via Exact Penalization in Quadratic Optimization. *Mathematics of Operations Research* **34**, 83–91, 2009.

Stummer, Christian, Kiesling, Elmar, **Gutjahr**, **Walter J**.: A multicriteria decision support system for competence-driven project portfolio selection. *International Journal of Information Technology and Decision Making* **8**, 379-401, 2009.

Tseng, Paul, **Bomze**, **Immanuel M.**, **Schachinger**, **Werner**: A first-order interior-point method for linearly constrained smooth optimization. *Mathematical Programming* (available online since 3rd June 2009)

5.2 Contributions to Proceedings and Edited Books

Bomze, **Immanuel**: Copositive Optimization. In: Floudas, C. A., Pardalos, P. M. (Eds.): *Encyclopedia of Optimization*. Springer, New York, 561-564, 2009.

Bomze, **Immanuel**: Standard Quadratic Optimization Problems: Algorithms. In: Floudas, C. A., Pardalos, P. M. (Eds.): *Encyclopedia of Optimization*. Springer, New York, 3688-3690, 2009.

Bomze, **Immanuel**: Standard Quadratic Optimization Problems: Applications. In: Floudas, C. A., Pardalos, P. M. (Eds.): *Encyclopedia of Optimization*. Springer, New York, 3690-3692, 2009.

Bomze, **Immanuel**: Standard Quadratic Optimization Problems: Theory. In: Floudas, C. A., Pardalos, P. M. (Eds.): *Encyclopedia of Optimization*. Springer, New York, 3692-3693, 2009.

Chen, Si, **Ljubic**, **Ivana**, Raghavan S.: The Generalized Regenerator Location Problem. In: *Proceedings of the International Network Optimization Conference* (INOC 2009)

Gutjahr, **Walter J**.: Convergence Analysis of Metaheuristics. In: Maniezzo, Vittorio et al. (Eds.): *Matheuristics: Hybridizing Metaheuristics and Mathematical Programming. Annals of Information Systems* **10**. Springer, 159-187, 2009.

Kovacevic, **Raimund**, **Pflug**, **Georg C**.: Time Consistency and Information Monotonicity of Multiperiod Acceptability Functionals. In: Albrecher, Hansjörg et al. (Eds.): *Advanced Financial Modelling*. *Radon Series on Computational and Applied Mathematics* **8**, 347-370, 2009.

Ljubic, **Ivana**, **Putz**, **Peter**, Salazar, José J.: Exact Approaches to the Single-Source Network Loading Problem. In: *Proceedings of the International Network Optimization Conference* (INOC 2009)

5.3 Technical Reports and Working Papers

Arhant, Christine, Bubna-Littitz, Hermann, Bartels, Angela, **Futschik**, **Andreas**, Troxler, Josef: Behaviour of smaller and larger dogs: effects of training methods, inconsistency of owner behaviour and level of engagement in activities with the dog.

Bogdan, Małgorzata, Chakrabarti, Arijit, **Frommlet**, **Florian**, Ghosh, Jayantha K.: Bayes oracle and asymptotic optimality of multiple testing procedures under sparsity. Submitted to: *Annals of Statistics*.

Bomze, **Immanuel**, Jarre, Florian, Rendl, Franz: Quadratic factorization heuristics for copositive programming. *TR 2009-08*.

Bomze, **Immanuel**, Jarre, Florian: A note on Burer's copositive representation of mixed-binary QPs. To appear in: *Optimization Letters*.

Bomze, **Immanuel**, Lemaréchal, Claude: Necessary conditions for local optimality in difference-of-convex programming. To appear in: *Journal of Convex Analysis* **17**, 2010.

Bomze, **Immanuel**, Ling, Cheng, Qi, Liqun, Zhang, Xinzhen: Standard bi-quadratic optimization. *TR 2009-03*.

Bomze, **Immanuel**, Rota Buló, Samuel: Infection and immunization: a new class of evolutionary game dynamics. *TR 2009-01*.

Bomze, **Immanuel**, **Schachinger**, **Werner**: Multi-Standard Quadratic optimization problems: interior point methods and cone programming reformulation. To appear in: *Computational Optimization and Applications*, 2010.

Bomze, **Immanuel**: Building a completely positive factorization. *TR 2009-06*.

Dockner, Engelbert J., **Gaunersdorfer**, **Andrea**: Dynamic Investment Strategies with Demand-Side and Cost-Side Risks.

Froeschl, Karl A., Denk, Michaela, **Gutjahr**, **Walter J**., Jerusalem, Alexander, Riedmann, Harald, Stummer, Christian: Training on the project: a quantifying approach to project development.

Frommlet, **Florian**: Some properties of a recently introduced approach to ordinal regression. To appear in: *Austrian Journal of Statistics*.

Futschik, **Andreas**, Schlötterer, Christian: Massively parallel sequencing of pooled DNA samples-the next generation of molecular markers.

Gollowitzer, **Stefan**, **Ljubic**, **Ivana***:* MIP Models for Connected Facility Location*:* A Theoretical and Computational Study. To appear in: *Computers & Operations Research*, 2010.

Guntuboyina, Adityanand, **Leeb**, **Hannes**: Shrinkage estimation of a univariate normal mean.

Gutjahr, **Walter J**.: Ant colony optimization: recent developments in theoretical analysis.

Heidergott, Bernd, Vasquez-Abad, Felisa, **Pflug**, **Georg C**., Taoying, Farenhorst-Yuan: Gradient estimation by measure valued differentiation. To appear in: *ACM Transactions on Modeling and Computer Simulation* **20**, 2010.

Hochrainer, Stefan, Mechler, Reinhard, **Pflug**, **Georg C**.: Assessing Current and Future Risks due to Climate-related Extreme Events and Global Change. The Case of Bangladesh. To appear in: *Risk Analysis*.

Isogai, Eiichi, **Futschik**, **Andreas**: Sequential estimation of a linear function of location parameters of two negative exponential distributions.

Kabaila, Paul, Giri, Khageswor, **Leeb**, **Hannes**: Admissibility of the usual confidence interval in linear regression. To appear in: *Electronic Journal of Statistics* **4**, 300-312, 2010.

Kovacevic, **Raimund**, **Pflug**, **Georg C**.: Does insurance help to escape the poverty trap? To appear in: *Journal of Risk and Insurance*, 2010.

Lin, Kao, Li, H., Schlötterer, Christian, **Futschik**, **Andreas**: Distinguishing Positive Selection from Neutral Evolution with the Boosting Algorithm.

Ljubic, **Ivana**, **Putz**, **Peter**, Salazar, José J.: Exact Approaches to the Single-Source Network Loading Problem. *TR 2009-05* (submitted)

Nickl, **Richard**, **Pötscher**, **Benedikt M**.: Efficient Simulation-Based Minimum-Distance Estimation and Indirect Inference.

Nolz, Pamela C., Doerner, Karl F., **Gutjahr**, **Walter J**., Hartl, Richard F.: Heuristics for disaster relief operations with multiple objectives and a heterogeneous fleet.

Pflug, **Georg C**., Schaller, Peter: A note on pivotal Value-at-Risk estimates. To appear in: *Statistics and Decisions* **27**, 201-203, 2010.

Pflug, **Georg C**., **Wozabal**, **Nancy**: On the Asymptotic distribution of coherent risk functionals. To appear in: *Finance and Stochastics* **14**, 397-418, 2010.

Pflug, **Georg C**.: Version-independence and nested distributions in multistage stochastic optimization. To appear in: *SIAM Journal on Optimization* **20**, 2010.

Ploberger, Werner, **Reschenhofer**, **Erhard**: Testing for cycles in multiple time series. To appear in: *Journal of Time Series Analysis*.

Rath, **Stefan**, Doerner Karl F., **Gutjahr**, **Walter J**.: Warehouse Location Routing Problem for Disaster Relief (MIC 2009 post-conference volume, accepted for publication)

Rath, **Stefan**, Doerner, Karl F., **Gutjahr**, **Walter J**.: Multiobjective location routing for disaster relief.

Reschenhofer, **Erhard**, Cerman, Markus, Gulyas, Andreas, Mauerhofer, Jonathan, Stefan, Leopold: Can price-earnings ratios really forecast stock returns? Evidence from historical U.S. data 1871-2009. To appear in: *Global Journal of Finance and Management*.

Reschenhofer, **Erhard**, Schilde, Michael, Oberecker, Eva, Payr, Ellen, Tandogan, Hasan T., Wakolbinger, Lea M.: Identifying the determinants of foreign direct investment: a data-specific model selection approach.

Schachinger, **Werner**: On a conjecture of Ben-Tal, Nemirovski, and Roos.

Yao, Xiao-Guang, **Frommlet**, **Florian**, Zhou, Ling, Zu, Feiya, Wang, Hong-Mei, Yan, Zhi-Tao, Luo, Wen-Li, Hong, Jing, Wang, Xin-Ling, Li, Nan-Fang: The prevalence of hypertension, obesity and dyslipidemia in individuals of over 30 years of age belonging to minorities from the pasture area of Xinjiang. *BMC Public Health* (conditionally accepted).

6 Presentations

6.1 Conference Presentations

	Conference	Title of Presentation
Immanuel M. Bomze	13th Combinatorial Optimization Workshop, Aussois, France (invited)	A new MIP procedure for supervised classification
Immanuel M. Bomze	IFCS (International Federation of Classification Societies) 2009 Conference, Dresden, Germany	A mixed-integer programming procedure for detecting clusters in supervised classification
Immanuel M. Bomze	7th EUROPT Workshop “Advances in Continuous Optimization 2009”, Remagen, Germany (invited stream organizer)	Generating challenging instances for copositive optimization
Immanuel M. Bomze	AIRO (40th Annual Conference of the Italian Operational Research Society) 2009, Siena, Italy	A normal form for copositivity detection
Florian Frommlet	ROES Seminar 2009, Linz, Austria	Tag SNP selection based on clustering with dominant sets and the replicator dynamic
Andreas Futschik	EMS (European Meetings of Statisticians) 2009, Toulouse, France	On the inadmissibility of Watterson’s estimator
Andreas Futschik	ROES Seminar 2009, Linz, Austria	Statistical approaches to search for candidate regions involving quantitative traits
Florian Gach	Symposium on “New Directions in Asymptotic Statistics”, Athens, Georgia, USA	Efficiency in indirect inference
Andrea Gaunersdorfer	Second Workshop on Dynamic Games in Management Science, University of Valladolid, Spain	Dynamic investment strategies with demand-side and cost-side risks
Walter J. Gutjahr	EURO ’09, Bonn, Germany	Solving a multi-objective covering tour model with stochastic demands for disaster relief
Raimund Kovacevic	EURO ’09, Bonn, Germany (invited)	Time consistency and information monotonicity of multiperiod risk measures
Raimund Kovacevic	CARIPLO Stochastic Programming School, Bergamo, Italy (invited)	Maximum-Loss, Minimum-Win and the Esscher pricing principle
Hannes Leeb	Joint Statistical Meeting 2009, Washingon, DC, USA (invited)	Inference post model selection: the good, the bad, and the ugly

	Conference	Title of Presentation
Hannes Leeb	The 57th Session of the International Statistical Institute, Durban, South Africa (invited discussion)	Discussion of talks on complex data analysis, dimension reduction and sparsity
Hannes Leeb	Conference on Resampling Methods and High Dimensional Data, College Station, TX, USA (invited)	Conditional predictive inference post model selection
Ivana Ljubic	13th Combinatorial Optimization Workshop, Aussois, France (invited)	Exact approaches to the single-source network loading problem
Ivana Ljubic	INOC (International Network Optimization Conference) 2009, Pisa, Italy	The generalized regenerator location problem
Ivana Ljubic	ISMP (International Symposium of Mathematical Programming) 2009, Chicago, Illinois, USA (invited)	A branch-and-cut-and-price algorithm for vertex-biconnectivity augmentation
Alois Pichler	CARIPLO Stochastic Programming School, Bergamo, Italy	Quantization by unit cubes in high dimensions
Georg C. Pflug	MMEI (16th International Conference on Mathematical Methods in Economy and Industry), Budweis, Czech Republic (invited)	Time consistency and information monotonicity
Georg C. Pflug	Wissenschaftstag der Versicherungen, Berlin, Germany (invited)	Does insurance help to escape the poverty trap?
Georg C. Pflug	EURO ‘09, Bonn, Germany (stream organizer)	Approximation and optimal scenario generation for stochastic programs
Georg C. Pflug	ISMP (20th International Symposium on Mathematical Programming), Chicago, USA	Stochastic Stackelberg games and the pricing of flexible energy delivery contracts
Benedikt M. Pötscher	European Research Network System Identification, Workshop 2009, Vorau, Austria (invited)	Model selection and inference
Stefan Rath	Metaheuristic International Conference (MIC 2009), Hamburg, Germany	Multiobjective location routing for disaster relief
Peter Reiter and Walter J. Gutjahr	AIRO (40th Annual Conference of the Italian Operational Research Society) 2009, Siena, Italy	An exact and a matheuristic algorithm for the vehicle routing problem with route balancing

	Conference	Title of Presentation
Ulrike Schneider	Econometrics, Time Series Analysis and Systems Theory (A Conference in Honor of Manfred Deistler), Vienna, Austria	On the distribution of the adaptive LASSO estimator
Ulrike Schneider	EMS (European Meetings of Statisticians) 2009, Toulouse, France	Confidence sets based on penalized maximum likelihood estimators
Ulrike Schneider	European Meeting of the Econometric Society 2009, Barcelona, Spain	Confidence sets based on penalized maximum likelihood estimators

6.2 Outside Seminar Presentations

	Institution	Title
Immanuel M. Bomze	University of Groningen, The Netherlands	Optimization of posynomials under l^p constraints
Immanuel M. Bomze	PhD Seminar, University of Coimbra, Portugal	Thrill and challenge of imperfection – combinatorial optimization interfaces and test instances for copositive programming
Immanuel M. Bomze	University of Coimbra, Portugal	Optimization of posynomials under l^p constraints
Florian Frommlet	Biometrical Colloquium, Dept. for Medical Statistics, Medical University Vienna, Austria	Asymptotic optimality of multiple testing and model selection procedures under sparsity
Florian Gach	University of Goettingen, Germany	Efficiency in indirect inference
Walter J. Gutjahr	Technical University Munich, Germany	Metaheuristics for stochastic combinatorial optimization: an overview and an application to project management
Raimund Kovacevic	Finance Academy, Moscow, Russia	Optimization models in portfolio management
Hannes Leeb	University of Goettingen, Germany	Shrinkage estimation of a univariate normal mean
Hannes Leeb	Cambridge University, USA	Conditional predictive inference post model selection
Hannes Leeb	Tilburg University, The Netherlands	Conditional predictive inference post model selection
Hannes Leeb	Columbia University, USA	Conditional predictive inference post model selection

	Institution	Title
Hannes Leeb	University of Chicago, USA	Conditional predictive inference post model selection
Hannes Leeb	Harvard University, Boston, USA	Conditional predictive inference post model selection
Alois Pichler	Finance Academy, Moscow, Russia	Scenario generation based on quantization
Georg C. Pflug	Lomonossov University, Moscow, Russia	Time consistency and information monotonicity
Georg C. Pflug	Institute of Automatic Control, Moscow, Russia	Ambiguity, minimaxity and DC algorithms in stochastic optimization
Georg C. Pflug	FH Vorarlberg, Austria	Risk measures
Benedikt M. Pötscher	Department of Statistics, Charles University, Prague, Czech Republic	Efficient simulation-based minimum-distance estimation and indirect inference
Benedikt M. Pötscher	Department of Economics, Queen Mary College, London, UK	Efficient simulation-based minimum-distance estimation and indirect inference
Benedikt M. Pötscher	Department of Economics, University of Mannheim, Germany	Efficient simulation-based minimum-distance estimation and indirect inference
Ulrike Schneider	Institute for Mathematical Stochastics, University of Goettingen, Germany	On the distribution of the adaptive LASSO estimator I
Ulrike Schneider	Institute for Mathematical Stochastics, University of Goettingen, Germany	On the distribution of the adaptive LASSO estimator II

6.3 Departmental Seminars

José Fajardo (IBMEC, Rio de Janeiro): Symmetry and option price monotonicity with Lévy processes (January, 15)

Sjur Flåm (University of Bergen): Portfolio management without probabilities or statistics (January, 26)

S. Raghavan (University of Maryland): Practical public sector combinatorial auctions (March, 2)

Hong Gu (Dalhousie University): Partial generalized additive models: an information-theoretic approach for selecting variables and avoiding concurvity (March, 16)

Hidetoshi Shimodaira (Tokyo Institute of Technology): Measuring the randomness of data via multiscale bootstrap with applications to evolutionary tree inference (March, 16)

Jakob Puchinger (Arsenal Research, Vienna): From high-level model to branch-and-price solution in G12 (March, 23)

Istvan Berkes (TU Graz): Permutation and bootstrap statistics under heavy tails (March, 30)

Josef Teichmann (TU Vienna): A new approach to scenario generation in risk management (April, 20)

Roger Wets (UC Davis): On the stability of equilibrium points (May, 4)

Felisa J. Vasquez-Abad (University of Melbourne): Bias reduction in stochastic approximation using concurrent estimation and optimization (May, 18)

P. Laurie Davies (University of Duisburg-Essen): Die Modellierung von Langzeit-Finanzdaten (May, 25)

Daniel Sevcovic (Comenius University of Bratislava): Dynamic stochastic accumulation model with application to pension savings management (June, 8)

Paula Brito (University of Porto): Model-based analysis of interval data (June, 15)

Anthony Man-Cho So (The Chinese University of Hong Kong): Khintchine-type inequalities and their applications in optimization (June, 29)

Peter Putz (University of Vienna): Exact approaches to the single source network loading problem (October, 5)

Wolfgang Polonik (UC Davis): Der Exzessmassen-Ansatz und verwandte statistische Methoden (October, 12)

Andreas Weingessel (Erste Bank Vienna): Current challenges for strategic risk management (October, 19)

Christoph Helmberg (TU Chemnitz): Graph realizations corresponding to optimized extremal eigenvalues of the Laplacian (November, 9)

Florian Frommlet (University of Vienna): Asymptotic optimality of multiple testing and model selection procedures under sparsity (November, 16)

Mika Meitz (Koç University Istanbul): Parameter estimation in nonlinear AR-GARCH models (November, 23)

Michael Jünger (University of Cologne): GEODUAL - fun with geometric duality and combinatorial optimization (November, 30)

Peter Reiter (University of Vienna): Two exact hybrid algorithms for solving a bi-objective vehicle routing problem (December, 7)

Petra Mutzel (TU Dortmund): Recent approximation results for crossing minimization (December, 14)

7 Grants and Projects

Immanuel M. Bomze and Ivana Ljubic (Project-Coordinators) Research Associates: Peter Putz, Alessandro Tomazic	Algorithmic Solutions for Optimal Design of Telecommunication Networks, funded by FFG, 2007-2010
Florian Frommlet (Project-Coordinator)	Statistical issues in data mining – optimal rules for high dimensional model selection and multiple testing, funded by ÖAD – WTZ, 2009-2010
Andreas Futschik (Principal Investigator) Research Associates: Frank Cersovsky, Kao Lin, Ha Quang Minh	Mathematics and Evolution – Mathematical and Statistical Analysis of Ecological and Genetic Diversity, funded by WWTF, 2005-2009
Walter J. Gutjahr (Sub-Project Coordinator) Research Associate: Peter Reiter	Matheuristics – Hybrid Algorithms for Transportation Problems with Multiple Visits, funded by FWF, 2008-2010
Walter J. Gutjahr (Sub-Project Coordinator) Research Associate: Stefan Rath	Disaster Relief Operations Planning, funded by FWF, 2007-2010
Ronald Hochreiter (Project-Coordinator) Research Associate: David Wozabal	Models for valuating credit portfolios using coupled Markov chains, funded by Jubiläumsfond of the Austrian National Bank, 2007-2009
Ivana Ljubic	Algorithmische Lösungen für Last-Mile Netzwerke – Hertha Firnberg-Nachwuchsstelle, funded by FWF, 2007-2010
Georg C. Pflug (Project-Coordinator) Research Associates: Ronald Hochreiter, Hildegard Zelle	ALMPEK – Modernes Asset Liability Management für österreichische Pensionskassen, funded by FFG, 2007-2009
Georg C. Pflug (Project-Coordinator) Research Associate: Raimund Kovacevic	Multiperiod risks in portfolio selection, funded by FWF, 2008-2010
Georg C. Pflug (Project-Coordinator) Research Associate: Philipp Thoma	Gradient estimation by measure valued differentiation-calculation of “the Greeks”, funded by Austrian National Bank, 2009-2011

8 Research Stays at Other Institutions

	Institution	Research Topic	Weeks
Immanuel M. Bomze	University of Coimbra, Portugal	Fractional and copositive programming	2
Immanuel M. Bomze	University of Venice, Italy	Referee of a PhD-Defensio	1
Immanuel M. Bomze	University of Rome (La Sapienza), Italy	Copositive formulation of maximum cut problems	1
Immanuel M. Bomze	University of Groningen, The Netherlands	A normal form for copositive matrices	1
Florian Frommlet	TU Wrocław, Poland	Optimal rules for multiple testing and sparse multiple regression	2
Andreas Futschik	Tamkang University, Taiwan	Biostatistics	1
Ivana Ljubic	Department of Computer Science, TU Dortmund, Germany	Polyhedral study of the connected facility location polytope	1
Georg C. Pflug	Winter School on Financial Mathematics, Lunteren, The Netherlands	Lecture series on measuring risk and information	1
Georg C. Pflug	Suranaree University, Thailand	Lecture series on financial mathematics	1
Georg C. Pflug	University of Bergamo, Italy	Lecture series in risk management	2
Georg C. Pflug	University of Bergamo, CARIPLO Stochastic Programming School, Italy	Lecture series in risk management	1
Georg C. Pflug	Finance Academy, Moscow, Russia	Lecture series in risk management	1

9 Other Faculty Activities

9.1 Editorial Activities

Immanuel M. Bomze	• Central European Journal of Operations Research (Associate Editor) • Journal of Global Optimization (Member of Editorial Board) • Optimization Letters (Member of Editorial Board) • TOP. An Official Journal of the Spanish Society of Statistics and Operations Research (Member of Editorial Board) • Advances in Data Analysis and Classification (Member of Editorial Board)
Andreas Futschik	• International Journal of Information and Management Sciences (Associate Editor)
Walter J. Gutjahr	• Advances in Operations Research (Member of Editorial Board) • Swarm Intelligence (Member of Editorial Board)
Georg C. Pflug	• Statistics and Decisions (Editor in Chief) • Stochastic Programming Electronic Publication Series (Associate Editor) • Central European Journal of Operations Research (Associate Editor) • Austrian Journal of Statistics (Associate Editor) • Mathematical Methods of OR (Associate Editor) • Computational Optimization and Applications (Associate Editor) • Computational Management Science (Associate Editor) • Energy Systems: Optimization, Modeling, Simulation and Economic Aspects (Associate Editor) • Vestnik of the Finacademy (Associate Editor) • Journal of Stochastic Analysis (Associate Editor) • Financial Mathematics and Applications (Associate Editor)
Benedikt M. Pötscher	• Econometric Theory (Co-Editor) • Journal of Econometrics (Associate Editor)

9.2 Refereeing[2]

Immanuel M. Bomze	• Econometrica • Optimization • SIAM Journal on Optimization • Journal of Global Optimization • Optimization Letters • Advanced Data Analysis and Computation • European Journal of Operational Research • Discrete Optimization • Central European Journal of Operations Research • SIAM Review
Florian Frommlet	• Optimization Letters (1)

[2] incomplete list

Andreas Futschik	• Applications in Genetics and Molecular Biology (1) • Journal of Mathematical Biology (1) • Mathematical Reviews (2)
Andrea Gaunersdorfer	• Journal of Economic Behavior and Organization • Journal of Economic Dynamics and Control
Walter J. Gutjahr	• Applied Mathematics and Computation (1) • Central European Journal of Operations Research (1) • Computers and Industrial Engineering (1) • European Journal of Operational Research (1) • IEEE Transactions on Evolutionary Computation (2) • IEEE Transactions on Software Engineering (1) • INFOR (1) • International Journal of Production Research (1) • Software: Practice and Experience (1) • Swarm Intelligence (2) • Theoretical Computer Science (1) • Wiley Encyclopedia of Operations Research and Management Science (1)
Hannes Leeb	• Annals of Statistics (1) • Austrian Journal of Statistics (1) • Biometrika (1) • Canadian Journal of Statistics (1) • Communications in Statistics (1) • Econometric Theory (1) • FWF (1) • International Statistical Review (1) • Journal of Multivariate Analysis (1) • Journal of Econometrics (3) • Scandinavian Journal of Statistics (1)
Irene Klein	• Finance and Stochastics (1)
Raimund Kovacevic	• Mathematical Programming, Series A (1) • OR Spectrum (1) • Statistics and Decisions (1)
Ivana Ljubic	• Annals of Operations Research (1) • INFOR (1) • INFORMS Journal on Computing (1) • Discrete Optimization (1) • Operations Research (1)
Benedikt M. Pötscher	• Journal of Mathematical and Statistical Psychology • Empirical Economics • Journal of Multivariate Analysis • Journal of Econometrics
Werner Schachinger	• Annals of Operations Research

Ulrike Schneider	• Biometrika • Journal of Econometrics • Journal of Multivariate Analysis • ACM Transactions on Modeling and Computer Simulation

9.3 Other Professional Activities

Immanuel M. Bomze	• Member of Program Committee, LION3 2009, Trento
Florian Frommlet	• Member of Executive Board, ÖGOR
Andreas Futschik	• Member of Executive Board, ÖSG
Andrea Gaunersdorfer	• Director of the Studies Programme Business, Economics and Statistics
Walter J. Gutjahr	• Member of Program Committee, EvoCOP 2010 • Member of Program Committee, GECCO 2009 • Member of Program Committee, LION 2010 • Member of Program Committee, MIC 2009 • Member of Program Committee, MoTes 2009 (Workshop on Informatik) • Member of Program Committee, SAGA 2009 • Member of Program Committee, SLS 2009 • Member of Program Committee, SSBSE 2009
Irene Klein	• Deputy Director of the Studies Programme Business, Economics and Statistics
Ivana Ljubic	• Member of Executive Board, ÖGOR
Georg C. Pflug	• Member of Executive Board (INFORM) • Dean of Faculty of Business, Economics and Statistics
Benedikt M. Pötscher	• Co-organizer of conference “Econometrics, Time Series Analysis and Systems Theory: A Conference in Honor of Manfred Deistler” • Co-organizer of minisymposium “Statistical Inverse Problems” at the Conference on Applied Inverse Problems (AIP 2009)
Erhard Reschenhofer	• Head of Department
Werner Schachinger	• Deputy Head of Department