

Mariya Naumova

CONTACT INFORMATION	<p>Rutgers Business School Rutgers University 100 Rockafeller Rd. Piscataway New Jersey, 08854, USA</p> <p>(+1) 848-445-7794 mnaumova@business.rutgers.edu</p>
RESEARCH INTERESTS	<p>My research is within the broad area of mathematical optimization, motivated primarily by decision making problems in game theory, statistics and mathematical finance.</p> <p>On the methodology side, my current focus is on convex programming and optimization under uncertainty. From the applications' side, my interests are primarily in data collection, data mining, experimental design, and statistical estimation with constraints.</p>
PROFESSIONAL EXPERIENCE	<p>Rutgers Business School, Rutgers University Assistant Professor of Professional Practice, Fall 2018 - current</p> <p>Department of Mathematics, Rutgers University Assistant Teaching Professor, Fall 2017 - Spring 2018 Teaching Instructor, Fall 2014 - Spring 2017 Teaching Assistant, Fall 2009 - Spring 2014</p>
EDUCATION	<p>Rutgers Center for Operations Research, Rutgers University Ph.D., Operations Research</p> <ul style="list-style-type: none">• Dissertation Topic: Application of the discrete moment problem for numerical integration and solution of a special type of moment problems• Advisor: András Prékopa <p>Perm State University, Russia M.S. in Finance, with Distinction M.S. in Mathematics, with Distinction</p> <ul style="list-style-type: none">• Dissertation Topic: Group choice procedure in estimation of sample characteristics of the Burr distribution• Advisor: Rakip A. Abusev <p>B.S. in Mathematics, with Distinction</p>
PUBLICATIONS	<p>V. Gurvich, M. Naumova, <i>Screw discrete dynamical systems and their applications to exact slow NIM</i>. Discrete Appl. Math., 358 (15), 2024, 382–394.</p> <p>V. Gurvich, M. Naumova, <i>Lexicographically maximal edges of dual hypergraphs and Nash-solvability of tight game forms</i>. Annals of Mathematics and Artificial Intelligence, 92 (1), 2024, 49–57 (published online: 19 October 2022).</p> <p>V. Gurvich, M. Naumova, <i>On Nash-solvability of n-person graphical games under Markov and a-priori realizations</i>. Annals of Operations Research, 336 (3), 2024, 1905–1927 (published online: 16 November 2023).</p> <p>V. Gurvich, M. Naumova, <i>Polynomial algorithms computing two lexicographically safe</i></p>

Nash equilibria in finite two-person games with tight game forms given by oracles. Discrete Appl. Math., 340, 2023, 53–68.

V. Gurvich, M. Naumova, *Supercentenarian paradox*. Notices of the American Mathematical Society, 69 (9), 2022, 1472–1475.

M. Naumova, A. Prékopa, *Bounding the values of financial derivatives by the use of the moment problem*. Annals of Operations Research, 305, 2021, issue 1-2, 211–225.

V. Gurvich, M. Naumova, *Logical contradictions in the One-way ANOVA and Tukey-Kramer multiple comparisons tests with more than two groups of observations*. Symmetry 13, 2021, 1387.

A. Prékopa, M. Naumova, *The discrete moment method for the numerical integration of piecewise higher order convex functions*, Discrete Appl. Math., 202, 2016, 151–162.

PAPERS UNDER
REVIEW

M. Naumova, *Finding the bounds for Value-at-Risk by the use of the Discrete moment problem*. Under review.

N. Bašič, B. Butyrin, V. Gurvich, M. Krnc, A. Lutsenko, M. Naumova, M. Peskin, *A counterexample to conjecture "Catch 22" with 3 players and 5 outcomes: 2 terminal and 3 cyclic*. Available at <https://arxiv.org/abs/2406.14587>. Under review.

V. Gurvich, M. Naumova, *More on discrete convexity*. Available at <https://arxiv.org/abs/2306.10948>. Under review.

V. Gurvich, M. Naumova, *GM-rule and its applications to impartial games*. Available at <https://arxiv.org/abs/2311.03257>. Under review.

V. Gurvich, M. Naumova, *On pet n -dimensional subtraction games*. Available at <https://arxiv.org/abs/2311.03257>. Under review.

WORKING PAPERS

V. Gurvich, V. Maximchuk, M. Naumova, *On Remoteness Functions of Exact Slow NIM, $NIM_{=}^1(4, 2)$ and $NIM_{=}^1(5, 2)$* . Available at SSRN: <https://ssrn.com/abstract=4647107> or <http://dx.doi.org/10.2139/ssrn.4647107>.

V. Gurvich, V. Maximchuk, G. Miheenkoy, M. Naumova, *On remoteness functions of exact slow k -NIM with $k+1$ piles in the normal and misère versions*. Available at <https://arxiv.org/abs/2311.13511>.

V. Gurvich, M. Naumova, *Pairs of intervals of successive integers with equal sums of squares*. In the final stage of preparation.

M. Naumova, *Single commodity stochastic network design under probabilistic constraints in case of heavy-tail continuous distributions*. In preparation.

M. Naumova, M. Balasubramanian, D. Coit, *Layout optimization of offshore wind farms under environmental impact constraints*. In preparation.

M. Naumova, M. Balasubramanian, M. Schreider, *Small data machine learning for bird population studies*. In preparation.

M. Naumova, A. Prékopa, A. Ninh, *The use of decomposition principle for discrete*

conditional moment problems. In preparation.

M. Naumova, *Group classification methods & logical analysis of data.* In preparation.

CONFERENCE
TALKS

On Nash-solvability of n -person graphical games under Markov and a-priori realizations. (Joint work with V. Gurvich). Optimization and Algorithms Conference (OPAL), Veszprém, Hungary, June 5 - 9, 2023.

On Nash-solvability of finite two-person tight vector game forms. (Joint work with V. Gurvich). "Games, Graphs, Generation, Duality" conference in honor of Vladimir Gurvich's 70th birthday, Laboratory of Theoretical Computer Science of the Higher School of Economics, Moscow, Russia, September 24 - 25, 2022.

Supercentenarian paradox. (Joint work with V. Gurvich). "Games, Graphs, Generation, Duality" conference in honor of Vladimir Gurvich's 70th birthday, Laboratory of Theoretical Computer Science of the Higher School of Economics, Moscow, Russia, September 24 - 25, 2022.

On Nash-solvability of finite two-person tight vector game forms. (Joint work with V. Gurvich). The Eleventh International Symposium of Quantitative Economics, Jilin University, Changchun, China, July 8 - 10, 2022.

Logical analysis of data: Estimation of cause-effect relationship under noise with applications in classification of natural water springs. (Joint work with A. Prékopa). ISAIM 2022, Fort Lauderdale, FL, January 3 - 5, 2022.

Non-modellable risk factors in the trading book. Developing strategies for the Canadian Imperial Bank of Commerce (CIBC). Fields-CFI-CQAM Industrial Problem-Solving Workshop, The Fields Institute for Research in Mathematical Sciences, Toronto, Ontario, July 19 - 30, 2021.

Bounding the values of financial derivatives by the use of the moment problem. The Tenth International Symposium of Quantitative Economics, Jilin University, Changchun, China, July 9-11, 2021.

Mathematical techniques to ensure privacy in large-scale travel behavior datasets. The 37th Annual Workshop on Mathematical Problems in Industry, The University of Vermont, Burlington, VT, June 14-18, 2021.

Physical trading strategies for wheat futures developed for MALINVEST/MALSENA PLIUS. Workshop of Mathematical Solutions in Business and Industry, Palanga, Lithuania, June 10-14, 2019.

Group classification methods for SAR imagery data, INFORMS Annual Meeting 2017, Houston, TX, October 22-25, 2017.

Distance-based methods for classification of groups of objects, INFORMS Annual Meeting 2016, Nashville, TN, November 13-16, 2016.

Distance-based methods of group classification, 28th European Conference on Operational Research 2016, Poznan, Poland, July 3-6, 2016.

Some Aspects of Discrete Moment Problem from the Linear Programming Perspective: Numerical Approach, INFORMS Annual Meeting 2015, Philadelphia, PA, November

01-04, 2015.

Numerical Methods for Solving Discrete Conditional Moment Problems, 22nd International Symposium on Mathematical Programming (ISMP), Pittsburgh, PA, July 12-17, 2015.

Application of the Discrete Moment Problem in Option Valuations, INFORMS Annual Meeting 2014, San Francisco, CA, November 09-12, 2014.

The use of the decomposition principle for discrete conditional moment problems, INFORMS Annual Meeting 2013, Minneapolis, MN, October 6-9, 2013.

Distance based methods of group classification, Classification Society 2013 Annual Meeting, Milwaukee, WI, June 13-15, 2013.

Solution of the univariate discrete moment problem for new classes of functions, INFORMS Annual Meeting 2012, Phoenix, AZ, October 14-17, 2012.

Univariate discrete moment problem for new classes of objective function and its applications, 21st International Symposium on Mathematical Programming (ISMP), Berlin, Germany, August 19-24, 2012.

Bounding piecewise higher order convex functions of random variables and their application, INFORMS Annual Meeting 2011, Charlotte, NC, November 13-16, 2011.

On the analytical-numerical valuation of the American option using a discrete moment problem and binomial trees, ASMDA 2011 Conference, Rome, Italy, June 7-10, 2011.

Integration of univariate and bivariate piecewise higher order convex functions by bounding, SIAM Conference on Optimization, Darmstadt, Germany, May 16-19, 2011.

A new method for the valuation of Bermuda options using univariate numerical integration and bounding, 24th European Conference on Operational Research 2010, Lisbon, Portugal, July 11-14, 2010.

Bounding the values of financial derivatives using a combination of the discrete moment problem and binomial tree calculation. 23rd European Conference on Operational Research 2009, Bonn, Germany, July 5-8, 2009.

TEACHING EXPERIENCE

Graduate courses, Rutgers Business School, Rutgers University

(2018 - 2023)

Econometrics I - Cross Sectional Data (26:223:554, PhD)

Econometrics II - Time Series (26:223:655, PhD)

Econometrics (22:839:654, Masters of Quantitative Finance)

Numerical Analysis (22:839:510, Masters of Quantitative Finance)

Risk Management (22:839:670, Masters of Quantitative Finance)

Research in Asset Management (22:430:658, Masters in Financial Analysis)

Analysis of Fixed income (22:390:611, MBA)

Graduate courses, Department of Industrial Engineering, Rutgers University

(2017 - 2023)

Planning and Operations Engineering (16:540:501, Masters/PhD)
Advanced Stochastic Modeling and Simulation (16:540:694, PhD)
Decision Making under Uncertainty (16:540:505, Masters/PhD)
Simulation of Production Systems with ARENA (16:540:555, Masters/PhD)

**Graduate courses, Rutgers Center for Operations Research (RUTCOR),
Rutgers University**

Lecturer (Fall 2011, Spring 2013)

Theory of Linear Optimization (16:711:614, Masters)
Integer Programming (16:711:612, Masters/PhD)

Teaching assistant (Fall 2012, Spring 2013)

Financial Mathematics (16:711:631, PhD)
Stochastic Programming (16:711:555, PhD)

Undergraduate courses, Rutgers Business School, Rutgers University

(2016 – 2017, 2018 – 2023)

Asset Pricing, Portfolio Analysis (29:390:410)
Derivatives (33:390:420, 29:390:386)
Financial Analysis, Planning and Forecasting (33:390:450)
Financial Econometrics (29:390:300)
Fixed Income (29:390:468)
Operations Management (33:136:386)
Statistical Methods in Business (33:136:385)

**Undergraduate courses, Rutgers University Newark Institute at Northeast
Normal University (RUNIN), Changchun, China**

(2020)

Financial Econometrics (29:390:300)

Undergraduate courses, Department of Mathematics, Rutgers University

(2010 – 2023)

Calculus I (01:640:135)
Calculus II (01:640:136)
Calculus II for the Mathematical and Physical Sciences (01:640:152)
Introduction to Linear Algebra (01:640:250)
Multivariable Calculus (01:640:251)
Elementary Differential Equations for the Mathematical Sciences (01:640:252)
Introduction to Mathematical Reasoning (01:640:300)
Linear Optimization (01:640:354)
Advanced Calculus for Engineering (01:640:421)
Theory of Linear Optimization (01:640:453)
Mathematical Theory of Probability (01:640:477)
Introduction to Stochastic Processes (01:640:478)

Mathematical Theory of Statistics (01:640:481)
 Introduction to Mathematical Finance (01:640:485)

Undergraduate courses, Department of Mathematics, Perm State University, Russia

Teaching Assistant (Fall 2002 - Spring 2003)

Mathematical Analysis
 Probability Theory
 Regression Analysis

MENTORING Supervised 14 independent studies and research projects of undergraduate and graduate (MQF) students.

SERVICE AND
 OUTREACH

Elected Newark Faculty Council member, Rutgers-Newark
 since Fall 2023 – current

Faculty representative, The Rutgers University-Newark's Student Belonging Institute
 since Fall 2023 – current

Campus advisor, Rutgers-Newark
 since Fall 2020 – current

Campus Appeals Committee, Rutgers-Newark
 since Fall 2020 – current

Honors Living-Learning Community (HLLC) faculty evaluator, Rutgers-Newark
 since Fall 2020 – current

*Academic department (Finance & Economics) representation,
 Rutgers Business Forum, Rutgers-New Brunswick*
 Spring 2023, Fall 2023

*Academic department (Finance & Economics) representation,
 Rutgers Business School Open House, Rutgers-New Brunswick*
 Spring 2023, Fall 2023

*Johnson & Johnson Case Competition, Coach of the student teams,
 Rutgers-New Brunswick (two teams to date)*
 since Fall 2023 – current

Finance Mentorship Program advisor, Rutgers Business Governing Association (RBGA)
 since Fall 2021 – current

Diagnostic Math Test for Introductory Finance Classes: designing and providing technical support (single-handedly) for 1,200+ students, Rutgers Business School
 Fall 2021

	<i>Special Programs Policy Committee</i> , Rutgers Business School 2020-2021
	Operations Research Graduate Student Association, Rutgers University <i>President</i> 2013-2015
	Aresty Research Center for Undergraduates, Rutgers University <i>Undergraduate Research Symposium Judge</i> 2012-2014
	Young Scholars Program in Discrete Mathematics, DIMACS, Rutgers University (Summer program for mathematically talented high school children, with highly selective admission) <i>Coordinator and instructor for the Number Theory course</i> Summer 2012
	Volunteer educational projects for disadvantaged rural communities in Uzbekistan, Ukraine, Moldova, Serbia (with focus on activities for Middle/High school students) Summers, 2009-2016
	University project "Equal access to higher education for high school seniors in remote villages of Perm Region" Kishert high school, Kishert (rural locality in Perm Region, Russia) <i>Curriculum developer and instructor of Mathematics</i> 2002-2003
REFEREING	Invited to provide peer-review for the International Journal of Game Theory, Annals of Operations Research, Mathematical Reviews (American Mathematical Society).
HONORS AND AWARDS	Faculty Fellowship, Honors College, Rutgers University - New Brunswick (declined due to the US immigration status limitations) Excellence Fellowship for graduate studies, Rutgers University - New Brunswick Rutgers University Graduate School Travel Awards (annually, over the period of study) Perm State University Academic Merit Scholarship
INDUSTRIAL EXPERIENCE	New Jersey Economic Development Authority (NJEDA), Wind institute Trenton, NJ since May 2023 Rutgers faculty supervisor Supervising a group working on the construction and solution of a mixed-integer linear programming model for an optimal layout of an offshore wind farm, taking into account environmental and financial constraints. Canadian Imperial Bank of Commerce (CIBC) Toronto, Ontario July 2021 Invited consultant Working on developing statistical models for the decomposition of changes of non- modelable risk factors that pass statistical tests specified by the Basel Committee on Banking Supervision.

RSG, Inc.
White River Junction, Vermont
Invited consultant

June 2021

Working with large data sets of personal data of research participants obtained by smartphone-based applications for travel/transportation planning and forecasting within the 37th Annual Workshop on Mathematical Problems in Industry held at the University of Vermont, USA. Quantifying the trade-off between different privacy protecting techniques for improving participants' privacy while maintaining the usability, accuracy, and precision of data products for end users. Creating of new differentially private mechanisms that are needed for transportation-specific data.

UAB MALINVEST/MALSENA PLIUS
Vievis, Lithuania
Invited consultant

June 2019

Consulted the company on physical trading strategies for wheat futures within a workshop of Mathematical Solutions in Business and Industry held in Palanga, Lithuania. Collaborated in the development of programs to analyze market trends, perform statistical modeling, generate new signals, and develop original trading strategies.

ECONT LTD, Perm, Russia
Co-founder

2004-2009

Consulted regional industries on air pollution estimation, optimization and control. Projects involved the use of numerous ecological evaluation techniques, optimization methods, and development of effective strategic recommendations based on sound science and state regulatory requirements. Primary responsibilities included managing teams of field environmental engineers, research support, preparation of governmental approval applications, and participating in client and firm interactions.

BANK PERM, Perm, Russia
Credit Risk Analyst

2003-2006

Developed credit risk models related to portfolio analytics, credit limit setting and loss reserve. Worked closely with various groups within the Bank in evaluating credit rating model performance. Developed and enhanced the credit testing methodology to satisfy various state regulatory requirements as well as accounting standards. Performed thorough statistical analysis of the underlying data, such as regression and time series forecasting, involving analysis of various macroeconomic factors and risk factors that impact the credit quality of portfolios. Wrote model documentation to satisfy the Bank's internal model approval functions and audit requirements. Closely worked with other teams within Credit Department to provide regular ongoing model performance assessments, rating analysis and override monitoring. Reviewed analysis results with senior management and provided recommendations.

RELEVANT
SKILLS

Computer skills: Python, C++, MATLAB, Maple, R, AMPL, CPLEX, ARENA
Languages: Fluent in Russian, English and French
Intermediate Spanish and Italian