Nestor Parolya

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Languages: Ukrainian - native, German and English - fluent (C1), Dutch - intermed. (B1)

PROFILE

I am a mathematical statistician working on high-dimensional statistics, random matrix methods, and shrinkage and regularization techniques. My research develops rigorous statistical methodology for modern high-dimensional problems, combining asymptotic analysis with applications in finance and healthcare. Recent work focuses on covariance and precision matrix estimation, pseudo-inverses, and related questions at the interface of random matrix theory and statistical learning.

CURRENT POSITION

Associate Professor in Statistics
Delft Institute of Applied Mathematics, Delft University of Technology

RESEARCH PROFILE

High-Dimensional Statistics
Random Matrix Theory
Shrinkage and Regularization
Statistical Learning

ACADEMIC CAREER

Since June 2026	Associate Professor (UHD2) in Statistics, Delft Institute of Applied Mathematics, Delft University of Technology
2022–2026	Assistant Professor (UD1) in Statistics (tenured), Delft Institute of Applied Mathematics, Delft University of Technology
2019–2022	Assistant Professor (UD2) in Statistics (tenure track), Delft Institute of Applied Mathematics, Delft University of Technology
2014–2019	Assistant Professor (W1) in Financial Econometrics, Institute of Statistics Leibniz University Hannover
2017–2018	Stand-in Professor (W3) in Econometrics and Statistics, Heidelberg University and University of Mannheim
2013–2014	Postdoc, Department of Statistics and Econometrics, Ruhr University Bochum
2010–2013	PhD Studies, Department of Statistics, European University Viadrina, Germany

EDUCATION

2010–2013	PhD in Economics (major Statistics and Math Finance, summa cum laude), European University Viadrina, Germany

2009–2010 MSc in Mathematical Statistics (distinction), National University of Lviv/Lemberg, Ukraine
2005–2009 BSc in Mathematics (distinction), National University of Lviv/Lemberg, Ukraine

CERTIFICATIONS

2021 University Teaching Qualification (UTQ), TU Delft
2019 English test C1 level, TU Delft
2017 Habilitation equivalent (venia legendi), Leibniz University Hannover (Germany)

ORGANIZATIONAL ACTIVITIES

2026– Chair of the section "Mathematical Statistics" by VVSOR
2022– Programme Director and Coordinator of "Minor Finance", DIAM, TU Delft

April 2025– Contributor to Mathematical and Statistical education/curriculum in new Health & Technology Bachelor program (TU Delft, Campus Rotterdam)

Nov 2024– Member of Curriculum Committee at Delft Institute of Applied Mathematics (DIAM)

2022–2024 MSc internship coordinator for "Financial Engineering" specialization, DIAM, TU Delft

March 2024 Co-organization of Workshop "Stochastic Models, Statistics and their Applications" (SMSA 2024), ca. 120 participants, TU Delft

2020–2022 Co-organizer of the "Statistics and Probability Seminar" at TU Delft, seminar webpage

EXTERNAL FUNDING, GRANTS, HONORS AND AWARDS

2024 NWO ENW WBO grant (21203), funding support of SMSA 2024 workshop, ca. 8500 EUR
2021–2027 Van Rijn grant, TU Delft, one PhD position on statistical optimization in high dimensions
2014 DFG-funded project, European University Viadrina (Frankfurt (Oder)), on Bayesian estimation of multi-period portfolio weights and risk measures, project number 244925108. Contributed to proposal development and co-supervised two PhD students.
2019 Wolfgang Wetzel Award of the German Statistical Society for young scientist with an outstanding contribution to a statistical methodology and its applications, 1000 EUR
2010 Doctoral Scholarship from DFG (Deutsche Forschungsgemeinschaft) on statistical analysis of portfolio characteristics for different risk measures, project number 168804898

PROJECTS IN PROGRESS

2026 NWO M1 `RESCUE`: Resurrecting Pseudo-Inverses for Singular Covariance Matrices in High Dimensions under Dependence, planned submission in August 2026

2026/27 NWO OTP `DART`: Dependence-Aware Regularisation Technology for Robust Allocation and Risk Analytics, with Ortec Finance and Prof. Marc Francke (University of Amsterdam), planned submission in late 2026 or early 2027

2027/28 NWO-DFG M1 WEAVE: High-Dimensional Survival Analysis via Random Matrix Theory, with Dennis Dobler (RWTH Aachen University), in preparation for the 2027/28 round

PUBLICATIONS AND TALKS

SELECTED PUBLICATIONS

2026 Reviving pseudo-inverses: Asymptotic properties of large Moore-Penrose and Ridge-type inverses with applications, with T. Bodnar. Annals of Statistics link

2024 Two is better than one: Regularized shrinkage of large minimum variance portfolio, with T. Bodnar and E. Thorsén. Journal of Machine Learning Research link

2024 Logarithmic law for large random correlation matrix, with J. Heiny and D. Kurowicka. Bernoulli link

2023 Dynamic shrinkage estimation of the high-dimensional minimum-variance portfolio, with T. Bodnar and E. Thorsén. IEEE - Transactions of Signal Processing link

2022 Optimal shrinkage-based portfolio selection in high dimensions, with T. Bodnar and Y. Okhrin, Journal of Business and Economic Statistics. link

2019 Testing for Independence of Large Dimensional Vectors, with T. Bodnar and H. Dette, the Annals of Statistics, link

FULL PUBLICATION LIST

2026 Reviving pseudo-inverses: Asymptotic properties of large Moore-Penrose and Ridge-type inverses with applications, with T. Bodnar. Annals of Statistics 54(2), 1053-1079, link

2026 Consistent Estimation of the High-Dimensional Efficient Frontier, with T. Bodnar, N. Hautsch and Y. Okhrin. European Journal of Finance 32, 4-6, 482-509, link

2026 High-Dimensional Portfolio Selection with HDShOP Package, with T. Bodnar, S. Dmytriv, Y. Okhrin and D. Otryakhin. European Journal of Finance 32, 4-6, 427-449, link

2025 Higher-order nonlinear shrinkage estimator of large dimensional precision matrix, with T. Bodnar. Theor. Probability and Math. Statist. 113, 23-38, link

2025 Nonlinear shrinkage test on a large-dimensional covariance matrix, with T. Bodnar and F. Veldman. Statistica Neerlandica 79(1), link

2024 Two is better than one: Regularized shrinkage of large minimum variance portfolio, with T. Bodnar and E. Thorsen. Journal of Machine Learning Research 25, 1-32, link

2024 Logarithmic law for large random correlation matrix, with J. Heiny and D. Kurowicka. Bernoulli 30(1), 346-370, journal version, preprint

2023 Log-determinant of large correlation matrices under infinite fourth moment, with J. Heiny. Annales de l'Institut Henri Poincaré - Probabilités et Statistiques 60(2), 1048-1076, link

2023 Dynamic shrinkage estimation of the high-dimensional minimum-variance portfolio, with T. Bodnar and E. Thorsén. IEEE - Transactions of Signal Processing 71, 1334-1349 link

2023 Is the empirical out-of-sample variance an informative risk measure for the high-dimensional portfolios? Taras Bodnar, Nestor Parolya and Erik Thorsén, Finance Research Letters, link

2022 Multi-period power utility optimization under stock return predictability T. Bodnar, D. Ivasiuk, N. Parolya and W. Schmid Computational Management Science 20(4), link

2022 Optimal shrinkage-based portfolio selection in high dimensions, with T. Bodnar and Y. Okhrin, Journal of Business and Economic Statistics 41(1), 140-156, link.

2022 Recent advances in shrinkage-based high-dimensional inference, with O. Bodnar and T. Bodnar, Journal of Multivariate Analysis,188, 104826, link

2021 Sampling Distributions of Optimal Portfolio Weights and Characteristics in Small and Large Dimensions, with T. Bodnar, H. Dette and E. Thorsen, accepted by Random Matrices: Theory and Applications, 11(1), 2250008, link

2021 Statistical Inference for the Expected Utility Portfolio in High Dimensions, with T. Bodnar, S. Dmytriv, Y. Okhrin and W. Schmid, IEEE Transactions on Signal Processing 69, 1-14. link

2020 Mean-variance efficiency of optimal power and logarithmic utility portfolios, with T. Bodnar, D. Ivasiuk and W. Schmid, Mathematics and Financial Economics 14, 675-698. link

2020 Bayesian mean-variance analysis: Optimal portfolio selection under parameter uncertainty, with D. Bauder, T. Bodnar, W. Schmid, Quantitative Finance 21:2, 221-242. link.

2020 Bayesian Inference of the Multi-Period Optimal Portfolio for an Exponential Utility, with D. Bauder, T. Bodnar, W. Schmid, Journal of Multivariate Analysis. link

2019 Testing for Independence of Large Dimensional Vectors, with T. Bodnar and H. Dette, the Annals of Statistics, 47, 2977-3008. link

2019 Tests for weights of GMV portfolio in a high-dimensional setting, with T. Bodnar, S. Dmytriv, W. Schmid, IEEE Transactions on Signal Processing 67, 4479-4493. link

2019 Central limit theorems for functionals of large sample covariance matrix and mean vector in matrix-variate location mixture of normal distributions, with T. Bodnar and S. Mazur, Scandinavian Journal of Statistics, 46, 636-660. link

2019 Discriminant analysis in small and large dimensions, with T. Bodnar, S. Mazur and E. Ngailo, Theory of Probability and Mathematical Statistics 100, 24-42. link

2019 Optimal linear shrinkage estimation of high-dimensional mean vector, with T. Bodnar and O. Okhrin, Journal of Multivariate Analysis, 170, 63-79. link

2018 On the product of a singular Wishart matrix and a singular Gaussian vector in high dimension, with T. Bodnar, S. Mazur, S. Muhinyuza, Theory of Probability and Mathematical Statistics 2(99), 37-50 link

2018 Estimation of the Global Minimum Variance Portfolio in High Dimensions, with T. Bodnar and W. Schmid. European Journal of Operational Research, 266, 371-390. link

2017 'To Have What They are Having': Portfolio Choice for Mimicking Mean-Variance Savers, with V. Golosnoy, Quantitative Finance, 11, 1645-1653. link

2016 Spectral analysis of the Moore-Penrose inverse of a large dimensional sample covariance matrix, with T. Bodnar and H. Dette. Journal of Multivariate Analysis 148: 160-172. link

2016 Direct Shrinkage Estimation of Large Dimensional Precision Matrix, with T. Bodnar and A. K. Gupta, Journal of Multivariate Analysis 146: 223-236. link

2015 On the exact solution of the multi-period portfolio choice problem for an exponential utility under return predictability, with T. Bodnar and W. Schmid. European Journal of Operational Research 246: 528-542. link

2015 A closed-form solution of the multi-period portfolio choice problem for a quadratic utility function, with T. Bodnar, W. Schmid. Annals of Operations Research 229: 121-158. link

2014 On the strong convergence of the optimal linear shrinkage estimator for the large dimensional covariance matrix, with T. Bodnar, A. K. Gupta. Journal of Multivariate Analysis 132: 215-228. link

2013 On the equivalence of quadratic optimization problems commonly used in portfolio theory, with T. Bodnar, W. Schmid. European Journal of Operational Research 229: 637-644. link

OTHER REFEREED PUBLICATIONS (PROCEEDINGS AND BOOK CHAPTERS)

2024 Linear shrinkage-based hypothesis test for large-dimensional covariance matrix, with T. Bodnar, F. Veldman. Advanced Statistical Methods in Process Monitoring, Finance, and Environmental Science. Festschrift in honor of Professor Wolfgang Schmid, 239-257. link

2020 Spectral analysis of large reflexive generalized inverse and Moore-Penrose inverse matrices, with T. Bodnar. Recent Developments in Multivariate and Random Matrix Analysis. Festschrift in honor of Professor Dietrich von Rosen, 1-16. link

2016 The Exact Solution of Multi-Period Portfolio Choice Problem with Exponential Utility, in: Lübbecke, M., Koster, A., Letmathe, P., Madlener, R., Peis, B., Walther, G. (Eds.), Operations Research Proceedings 2014, Selected Papers of the Annual International Conference of the German Operations Research Society, Springer, 2016, (with T. Bodnar and W. Schmid).

2014 Optimal linear shrinkage estimator for the large dimensional precision matrix, in: Bongiorno, Salinelli, Goia and Vieu (eds.), IWFOS 2014 - Contributions in infinite-dimensional statistics and related topics, Societa Editrice Esculapio, with T. Bodnar, A.K. Gupta.

2010 Killed Markov Decision Processes on Finite Time Interval for Countable Models (with Y. Yeleyko), Transactions of the NAS of Azerbaijan: Mathematics series of Physical-Technical and Mathematical science, (2010), vol. XXX, No 4, 141-152.

WORKING PAPERS

Linear quasi-shrinkage estimator for high-dimensional optimization with linear constraints, with T. van Essen and N. Huang. submitted for publication to Operations Research.
Development and validation of a scoring system based on random forest for predicting antibiotic exposure in critically ill patients, with R. Gangapersad and A. Abdulla. Journal of Applied Statistics (revise & resubmit).

CURRENT RESEARCH PROJECTS

Shrinking the eigenvectors of high-dimensional covariance matrices, with Alex Shkolnik (UC Santa Barbara).
Testing for compound symmetry in high dimensions, with M. Drton (TU Munich).
Estimation of the high-dimensional Cox-regression, with D. Dobler (RWTH Aachen) and E. Massa (Radboud UMC).
CLTs for high-dimensional weighted Moore-Penrose and Ridge-type matrices, with J. Yao (The Chinese University of Hong Kong (Shenzhen), China)
Nonlinear shrinkage of large covariance matrices with mean effects, with J. Söhl (TU Delft)
`UniversalShrink`: Regularized Shrinkage (R package), with A. Derumigny (TU Delft)
CLTs for large Maronna's M-estimators, with R. Lopuhaa (TUD).

Statistical SOFTWARE (R packages)

2021 "`DOSPortfolio`: Dynamic Optimal Shrinkage Portfolio" CRAN
2021 "`HDShOP`: High-Dimensional Shrinkage Optimal Portfolios" CRAN
2026 "`UniversalShrink`: Universal shrinkage methods for covariance and precision matrices" (forthcoming, see GitHub)

Current PhD supervision

- Naqi Huang, PhD-Thesis "Statistical Integer Linear Programming in High Dimensions", TU Delft (2021 - 2027, 6 years PhD position)

Graduated PhDs (co-supervision):

- Dr. Erik Thorsén (defence June 2022), award winning PhD-Thesis (Cramér prize 2023), "Optimal portfolios in the high-dimensional setting: Estimation and assessment of uncertainty", Stockholm University. Erik is currently Senior Data Scientist at Validio (Stockholm).
- Dr. Dmytro Ivasiuk (defence Feb 2022), PhD-Thesis "Multi-Period Portfolio Choice with Power Utility Function", Europa-Universität Viadrina, Frankfurt (O), Germany. Dmytro is currently Data Scientist at Deutsche Rentenversicherung Bund (Berlin).
- Dr. Solomiia Dmytriv (defence July 2020), PhD-Thesis "Random Matrix Theory for Portfolio Optimization", Europa-Universität Viadrina, Frankfurt (O), Germany. Solomiia is currently PostDoc at University of Vienna.

Graduated PhDs (mentoring):

- Dr. Michael Stollenwerk (defence June 2023), PhD-Thesis: "Modelling and Forecasting of Realized Covariance Matrices ", Heidelberg University. Michael is currently Investment Risk Manager at Pictet Assest Management (Lausanne).

At TU Delft I have served as a supervisor for a list of Bachelor and Master students (> 20).

SELECTED INVITED TALKS AND CONFERENCE PRESENTATIONS

2026 Organizer and speaker, High-Dimensional Modeling and Statistical Analysis, NordStat 2026, Helsinki, Finland; Random Matrix Theory session, SMSA 2026, Würzburg, Germany; Invited talk, TRR 391 TC02 Workshop on Spatio-Temporal Statistics in High Dimensions, TU Dortmund, Germany

2025 Invited talk, SIAM Conference on Financial Mathematics and Engineering (FM25), Miami, USA

2024 Invited talks at Bernoulli-IMS Congress in Probability and Statistics, Bochum, Germany; Joint Conference on Statistics and Data Science, Kunming, China; ECOSta 2024, Beijing, China; VU Campus Statistics Seminar, Amsterdam, the Netherlands

2023 Invited or special-session talks at CMStatistics 2023, Berlin, Germany; Conference on Matrix Analysis and its Applications, Bedlewo, Poland; LiU Seminar Series in Statistics and Mathematical Statistics, Linköping University, Sweden; Louvain Finance Seminar, UCLouvain, Belgium; German Probability and Statistics Days, Duisburg-Essen, Germany

2022–2017 Presentations at Statistical Week 2022, Münster University; Econometrics Seminars and Workshop Series, University of Amsterdam; European Meeting of Statisticians (2019, 2017); European Meeting of the Econometric Society 2018; German Probability and Statistics Days; and invited workshops and seminars in Berlin, Hannover, Mannheim and elsewhere

2016–2010 Earlier presentations at international conferences and invited seminars in Germany, the Netherlands, Poland, Italy, Canada, Austria, Finland, and Ukraine

RESEARCH STAYS

2025 Linköping University, Sweden (host: Martin Singull);
TU Dortmund, Germany (host: Dennis Dobler)

2019, 2017 Stockholm University, Sweden (host: Taras Bodnar)

2018, 2013 University of Augsburg, Germany (host: Yarema Okhrin); Ruhr University Bochum, Germany (host: Holger Dette)

2015 Karlsruhe Institute of Technology, Germany (host: Melanie Schienle); Lund University, Sweden (host: Krzysztof Podgorski)

TEACHING COURSES

RP stands for RESPONSIBLE professor of the course.

MasterMath

Spring 2027 Random Matrix Methods for Statistics and Machine Learning, M2, Utrecht University, RP

Delft University of Technology (2019 onwards)

5 times Introduction to Mathematical Finance (BSc. students of Finance Minor, RP)

5 times Advanced Statistics (BSc. Math students, RP)

2 times Mathematical Data Science (MSc. Math and Computer Science students, RP)

6 times Probability and Statistics (English) for BSc. in Comp. Sc. and Aerosp. Eng. (1 time RP)

1 time Linear Algebra (English) for BSc. in Computer Science,

1 time Mathematics Seminar (BSc. Math students, RP)

University of Mannheim (summer term 2018)

1 time Financial Econometrics (English) for BSc. students, RP

1 time Multiple Time Series Analysis (English) for MSc. students, RP

Heidelberg University (winter term 2017/18)

1 time Advanced Econometrics (English) for MSc. students, RP
1 time Multivariate Statistics (German) for BSc. students, RP

Leibniz University Hannover (2014 - 2017)

1 time Econometrics I (Introduction) (German), lectures + exercises (core course, ca. 500 students) for BSc. students, RP
2 times Econometrics II (Linear Models) (German) for BSc. students, RP
2 times Multivariate Statistics (German) for BSc. students, RP
2 times Applied Econometrics (English), lectures + tutorials in R for PhD students, RP

Viadrina University & Ruhr University Bochum (2011 - 2013)

4 times Statistics I, II (German), tutorials
1 time Quantitative Risk Management (English), seminar for MSc. students, RP

SERVICE TO THE PROFESSION

Referee of Annals of Statistics, Bernoulli, Biometrika, Memoirs of the AMS, Journal of Multivariate Analysis, Random Matrices: Theory and Applications, Stochastic Processes and their Applications, IEEE Transactions on Signal Processing, Journal of Business and Economic Statistics, Statistics and Computing, Quantitative Finance, Journal of Banking and Finance, European Journal of Operational Research, Management Science, Advances of Statistical Analysis, Computational Statistics

2023 – Associate Editor of Statistica Neerlandica
2025 – 2026 Guest Editor of Journal of Multivariate Analysis (Special Issue)