

JAKUB MIKOŁAJCZAK

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Academic CV ◇ Actuarial Modelling ◇ Econometrics ◇ Quantitative Risk

ACADEMIC PROFILE

Quantitative economist and actuarial analyst interested in applied mathematical and statistical methods for insurance, finance and economic systems. My work connects actuarial model validation, financial econometrics, risk forecasting, optimisation, survival analysis and insurance analytics. I am particularly interested in model behaviour under regime changes, structural uncertainty, behavioural heterogeneity and complex-system dynamics, with emphasis on applications that can be implemented and backtested reproducibly.

EDUCATION

SGH Warsaw School of Economics

Oct 2025–Jul 2027

MSc, Advanced Analytics - Big Data and Machine Learning

in progress

- Quantitative profile covering stochastic processes, mathematical modelling, Bayesian methods, credit scoring, survival analysis, data mining, Python, R, SAS, SQL, big data analytics and cloud computing.

SGH Warsaw School of Economics

Oct 2022–Jun 2025

BSc, Quantitative Methods in Economics and Information Systems

quantitative methods in finance

- Thesis on investment-fund portfolio risk forecasting and backtesting with Markov-switching models; defended with grade 5.0 / highest grade.
- Coursework included econometrics in R, financial econometrics in MATLAB, financial and actuarial mathematics, probability theory, risk models, actuarial statistics, statistical methods, game theory and SQL databases.

PROFESSIONAL ACTUARIAL QUALIFICATION

KNF actuarial exams: passed the actuarial examination in Economics - 1 of 9 actuarial exams completed.

RESEARCH INTERESTS

- Actuarial modelling and model validation in Life & Health insurance.
- Financial econometrics, volatility modelling and portfolio risk forecasting.
- Backtesting, model risk and uncertainty quantification.
- Machine learning and explainable models in insurance and structured-data modelling.
- Telematics, usage-based insurance and real-time risk-feature construction.
- Survival analysis, actuarial statistics and time-to-event modelling.
- Optimisation heuristics, simulation-based risk analysis, agent-based modelling and complex economic systems.

THESIS

Effectiveness of GARCH and Markov-switching GARCH Models in Risk Assessment of Investment Fund Portfolios. The thesis constructed conservative and aggressive fund portfolios, analysed daily returns, estimated conditional-volatility models and produced portfolio risk forecasts in R. The empirical part compared classical GARCH-family models with Markov-switching specifications and evaluated VaR / Expected Shortfall forecasts through backtesting. A key finding was that theoretically attractive regime-switching models did not automatically outperform classical GARCH models in practical risk-forecasting tasks. [GitHub](#)

RESEARCH AND QUANTITATIVE PROJECTS

Investment-fund portfolio risk modelling. Bachelor thesis project focused on portfolio construction, volatility modelling, risk-measure forecasting and backtesting. The project produced a reproducible empirical workflow in R and connected financial econometrics with practical portfolio-risk assessment. [GitHub](#)

Portfolio optimisation with cardinality constraint. Analysed a non-convex Markowitz optimisation problem with a limit on the number of assets in the portfolio. Implemented simulated annealing, genetic algorithm and particle swarm optimisation; compared solutions and evaluated portfolio risk in Monte Carlo scenarios. [GitHub](#)

Telematics insurance and usage-based pricing. Designed a demonstrational insurance analytics pipeline using synthetic telematics events, Kafka/Spark-style data processing, risk flags, aggregated driver features and an interpretable Poisson GLM with exposure offset. The project separates real-time operational decisions from periodic premium updates. [GitHub](#)

Airline passenger satisfaction classification. Data-mining project on binary classification of passenger satisfaction. Built preprocessing pipelines, compared logistic regression, Random Forest, HistGradientBoosting and MLP, and evaluated models using ROC/PR curves, classification metrics and feature-importance analysis. [GitHub](#)

Survival analysis and actuarial time-to-event modelling. Applied Kaplan-Meier and Nelson-Aalen estimators, subgroup comparisons, parametric AFT models, a Bayesian extension, Cox proportional hazards modelling and diagnostics using Schoenfeld residuals, influence analysis and time interactions. [GitHub](#)

Credit scoring and model diagnostics. Built classification models for structured business datasets using logistic regression, probit/logit models, random forest and gradient boosting. Analysed Gini, KS, lift/gains, PSI, VIF, p-values and stability measures, with emphasis on validation and interpretability.

MANUSCRIPTS AND ACADEMIC TEXTS

- Co-authored academic chapter on selected aspects of the theory and philosophy of economic development, including GDP and its alternatives.
- Data Driven Magazine article on forest-fire prediction and cellular automata, prepared within SKN Data Science activity.

ACADEMIC AND STUDENT RESEARCH ACTIVITY

SKN Data Science

Nov 2023–Jul 2025

Member

SGH Warsaw School of Economics

- Participated in student research and interdisciplinary applications of data science and quantitative methods.
- Published an article on forest-fire prediction and cellular automata; built a logit model in Gretl for Amazon bestseller-status analysis.

SKN BNK

Oct 2023–Jul 2025

Member

SGH Warsaw School of Economics

- Co-authored a quantitative monograph on democracy, economic freedom and long-term economic growth.
- Contributed to an R-based econometric model using cross-country panel data.

Investor's Club

Oct 2022–Jul 2025

Operations Team Member

SGH Warsaw School of Economics

- Participated in finance and technology events and prepared a fundamental valuation of Cognor S.A. using multiplier analysis and macro-sector assessment.

PROFESSIONAL EXPERIENCE SUMMARY

ERGO Technology & Services

Jan 2026–present

Junior Actuarial Consultant (Life & Health Insurance)

Warsaw

- Testing and validation of Prophet actuarial models used for cash-flow projections; analysis of model outputs, inconsistency checks and documentation of validation results in a German-speaking international environment.

Mercer

May 2025–Dec 2025

Junior Actuarial Analyst with German (Pensions)

Warsaw

- Actuarial valuation of employee benefits and pension obligations under HGB/IFRS; calculations based on plan documentation; data reconciliation; Retirement Studio, Excel/VBA and German-language documentation.

EY

Sep 2024–May 2025

Global Financial Services Audit Intern

Warsaw

- Financial-services audit of banks, insurers and investment funds; Excel/Alteryx automation for trial-balance transformation and data consolidation.

TECHNICAL RESEARCH SKILLS

Econometrics and risk modelling: time-series econometrics, volatility modelling, portfolio risk forecasting, model validation and backtesting, panel data econometrics, Bayesian econometrics

Actuarial and statistical methods: Life & Health insurance modelling context, actuarial statistics, survival analysis, claim-frequency modelling, credit scoring, GLM, classification models

Optimisation and simulation: Monte Carlo simulation, constrained portfolio optimisation, genetic algorithms, simulated annealing, particle swarm optimisation, cellular automata

Programming and reproducibility: R, Python, MATLAB, SQL, SAS, Gretl, Stata, pandas, numpy, scikit-learn, statsmodels, lifelines, PySpark, Kafka-style workflows, Git/GitHub, Jupyter, LaTeX, Typst, Beamer

Languages: Polish – native; English – fluent; German – professional working proficiency

CURRENT RESEARCH DIRECTION

Developing applied insurance and risk-modelling projects into research-oriented work, especially in insurance telematics, explainable risk models, survival analysis, regime-sensitive risk forecasting, optimisation under constraints and agent-based economic modelling.