



MADS HEBSGAARD

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PhD Fellow in Statistics & Quantitative Finance
Department of Finance, Copenhagen Business School

EDUCATION

2025 - 2028	PhD Statistics Researching my Bayesian covariance shrinkage framework at Center for Statistics in Department of Finance. Focus: Statistics, machine learning and quantitative finance	Copenhagen Business School
2023 - 2025 GPA: 11.3/12	MSc Quantitative Finance and Mathematics Thesis: <i>Variance and Correlation Risk Premia: Cross Asset-Class, Period, Variance, and Cost Analysis</i> Focus: Mathematics, statistics, empirical and analytical asset pricing, credit risk and quantitative finance	Copenhagen Business School
2020 - 2023 GPA: 9.6/12	BSc Finance and Mathematics Thesis: <i>Betting Against Beta in the US Stock Market</i> Focus: Mathematics, statistics, finance, machine learning and programming	Copenhagen Business School

EXPERIENCE

Jul 2023 - Jul 2025	Research Assistant Assisted CBS professors Henrik Ramlau-Hansen (<i>former Danica Pension CEO and Danske Bank CFO</i>) and Jesper Rangvid (<i>Director of PeRCent</i>) with research and calculations, including: Co-authoring Finans/Invest articles. Collecting, cleaning, and analysing Statistics Denmark datasets in Stata. Simulating stochastic ATP models in Python and analysing risk-return trade-offs under different assumptions. Reporting methodology and communicating and discussing results and direction for articles.	Copenhagen Business School
Jan 2023 - Jun 2025	Instructor Taught <i>Numerical Algorithms</i> and <i>Introduction to programming</i> to classes of 50. Covered numerical algorithms e.g. Gauss elimination, Gram-Schmidt process and gradient descent in C++. Teaching reports link.	Copenhagen Business School
Jun 2022 - Apr 2023	Junior Consultant Managed forecasting for Royal Unibrew's operations, monthly KPI reporting, and associated meetings. Optimized sales forecasts through data analysis. Programmed in VBA and C#, while utilizing SQL.	Sophub

SELECTED PROJECTS

2025	Improved ex ante correlation estimates Revisited how correlation is defined and estimated, as well as assumptions such as no autocorrelation. Theorized, formulated and empirically block-bootstrap backtested my proposed correlation estimation methodology based on Bayes' theorem (e.g. priors), using the CRSP database and Python.	private repo
2025	Variance and Correlation Risk Premia Applied a model-free replication framework (Carr and Wu (2009)) in Python to synthesize daily variance swap rates for 236 instruments across equities, bonds, commodities, currencies, and VIX (utilizing 185 million option quotes). Empirically verified that (i) expected variance persistently exceeds realized variance (negative variance premium), (ii) this premium is unspanned by standard factor models despite a negative market beta, (iii) trading strategies shorting variance risk remain profitable after transaction costs, and (iv) broad market indices exhibit the largest variance risk premiums implying a negative correlation premium that is further tested using S&P100 index constituents. Results hold globally across asset classes, time periods, and volatility regimes and is ~99% correlated with published VIX benchmarks.	volpy repo
2023	Betting Against Beta Developed a C++ program to analyse daily and monthly returns and market cap of ~37k stocks from 1926-2022 in the CRSP database, creating the BAB factor (and UMD factor). The program cleaned multiple CRSP data files, processed, and saved compressed versions. Using the processed data, it could efficiently create multiple files to analyse, showing the alpha of the BAB strategy while also showing e.g. alpha of momentum. It found identical returns to the Pedersen and Frazzini (2014) BAB portfolio. The BAB portfolio was further improved by using a positive ex-ante beta and consistent leveraging.	BAB repo
2022	WizardWars Developed a game about strategic spellcasting to learn C# and have fun.	WizardWars repo

PUBLICATIONS

Aug. 2024	The total savings of Danes how large a pension is really possible? We analyse Danes' savings with register data from Statistics Denmark. By converting free assets (real estate, investments, and bank balances) into life annuities, we show that total pension income can reach replacement rates of 90–100% for many households, though disparities remain. Led empirical and visualization work.	FINANS/INVEST Hebsgaard, Ramlau-Hansen and Rangvid
Feb. 2025	New model for the ATP-pension We propose a lifecycle investment strategy for ATP, shifting from a diversified portfolio to bonds near retirement. The model delivers 15–30% higher pensions while preserving guarantees and inflation protection. Developed models in Python, documented assumptions, and simulated alternative scenarios.	FINANS/INVEST Hebsgaard, Ramlau-Hansen and Rangvid
Feb. 2025	First, second and third best advice: 10 recommendations to solve ATP's challenges Contributed empirical analysis (Statistics Denmark calculations and Python simulations) supporting the article's policy recommendations. Not listed as co-author given the political focus.	FINANS/INVEST Ramlau-Hansen and Rangvid
Oct. 2025	There is still a need for a better ATP pension a reply to ATP We address ATP's concerns with our model in <i>New model for the ATP-pension</i> . The article reviews their six main critique points and incorporates ATP's own modelling assumptions to show that our original conclusions remain valid.	FINANS/INVEST Hebsgaard, Ramlau-Hansen and Rangvid
Languages	C++, Python, R, C#, Stata, L ^A T _E X, Wolfram Language, VBA, MATLAB, SQL, Git	
Databases	WRDS (CRSP, OptionMetrics), Statistics Denmark, Bloomberg	
Exercises	Squat, Bench Press, Deadlift, Pullup, Covariance Estimation	