

Hanna Sophia Wutte

PH.D. IN MATHEMATICS · M.SC. IN FINANCIAL MATHEMATICS · M.SC. IN QUANTITATIVE FINANCE

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Personal Profile

Quantitative Analyst at UBS Zurich. Quantitative Risk Modeling for Lombard Lending. **PhD in Mathematics** from ETH Zurich. My research focused on deep learning and its use in mathematical finance, with an emphasis on understanding deep learning algorithms and leveraging them in pricing and hedging complex derivatives, and in portfolio management. Prior to that, I completed **two M.Sc. programs in Financial Mathematics** and **Quantitative Finance**. I have worked as a **junior data scientist** in the Department of Advanced Analytics of Raiffeisen Bank International AG.

RESEARCH FIELDS

Deep Learning, Reinforcement Learning, Uncertainty Quantification of Neural Networks, Deep Portfolio Optimization, Deep Pricing of Passport Options, Deep Hedging.

Experience

Apr 2024 - now	UBS , Quantitative Analyst, Associate Director <ul style="list-style-type: none">Quantitative Risk Modelling for Lombard Lending ModelsProgramming Languages: Python, R, SQL	Zurich, Switzerland
Jul 2023 - Mar 2024	ETH Zurich , Postdoctoral Research Assistant <ul style="list-style-type: none">Stochastic Finance Research GroupProgramming Languages: Python	Zurich, Switzerland
Jul 2023	Financial Mathematics Team Challenge at University of Cape Town , Team Leader <ul style="list-style-type: none">Leading a team of 3 master students to develop a research project on <i>Physics-Informed Neural Networks for Option Pricing and Hedging</i>Winner of the team challenge.Programming Languages: Julia	Cape Town, South Africa (link)
Sep 2017 - Jun 2018	Raiffeisen Bank International AG , Junior Data Scientist <ul style="list-style-type: none">Department of Advanced AnalyticsDevelopment of ML-powered loan-sale-signal-system (Random Forest, Elastic Net, NN)Programming Languages: R, Python	Vienna, Austria
Dec 2015 - Mar 2017	Raiffeisen Bank International AG , Freelancer <ul style="list-style-type: none">Department of Investment FinanceMaintenance and development of VBA applications for the European Recovery ProgramProgramming Languages: VBA	Vienna, Austria
Aug 2014	Valida Industrie Pensionskasse AG , Internship <ul style="list-style-type: none">Actuarial DepartmentData synchronization and data editing for the calculations of reserves for pensions	Vienna, Austria

Education

ETH Zurich

Ph.D. in Mathematics

- [Stochastic Finance Research Group](#)
- Advisor: Prof. Josef Teichmann, Ph.D.
- Thesis: A Take on Deep Learning in Finance: Uncertainty Quantification and Dynamic Decision Making

Zurich, Switzerland

Oct 2018 - June 2023

[\(pdf\)](#)

Vienna University of Economics and Business

M.Sc. in Quantitative Finance | passed with distinction

- Top student of the 2016–2018 cohort
- Grade point average weighted by ECTS credits **1.00** (scale 1=best, 5>worst)

Vienna, Austria

Sept 2016 - Sept 2018

Technical University of Vienna

M.Sc. in Mathematics | passed with distinction

- Specialised in [Financial Mathematics](#)
- Grade point average weighted by ECTS credits **1.06** (scale 1=best, 5>worst)

Vienna, Austria

Oct 2015 - Jan 2018

Technical University of Vienna

B.Sc. in Mathematics | passed with distinction

- Specialised in [Financial and Insurance Mathematics](#)
- Grade point average weighted by ECTS credits **1.34** (scale 1=best, 5>worst)

Vienna, Austria

Oct 2012 - Sept 2015

Technical Skills

Programming languages

Python (advanced), R (advanced), Julia (familiar), SQL (familiar)

Professional Activities, Leadership, and Non-profit

CONFERENCE ORGANIZATION

Sep 2022

EPFL-ETHZ joint summer school MLSTATS 2022, Co-organizer

Saignelegier,
Switzerland

- Summer school on theory, methodology, and practice in statistical machine learning
- Responsibilities: scholarship application review, event organization

NETWORKING

Sep 2021 - now

ETH AI Center, Associated PhD Student

Zurich, Switzerland

- Presentation of research at yearly ETH + X AI summit

NON-PROFIT

2018 - 2022

Club Alpbach Zurich, President (2020), Vice President (2018-2019, 2021-2022)

Zurich, Switzerland

- Non-profit association; granting scholarships to attend the [European Forum Alpbach](#)
- Responsibilities: scholarship application review, sponsor acquisition, event organization

PEER REVIEW

2022

International Conference on AI in Finance (ICAI 2022), Reviewer

2022

Quantitative Finance, Reviewer

2019

Journal of Machine Learning Research (JMLR), Reviewer

2019

Neural Networks, Reviewer

Publications

For a full updated list of my publications see [Google Scholar](#). *These authors contributed equally to the paper.

JOURNAL PUBLICATIONS

A deep learning model for gas storage optimization

(pdf)

Nicolas Curin, Michael Kettler, Xi Kleisinger-Yu*, Vlatka Komaric, Thomas Krabichler*, Josef Teichmann, **Hanna Wutte***

Decisions in Economics and Finance pp. 1021–1037. 2021

CONFERENCE PUBLICATIONS

NOMU: Neural Optimization-based Model Uncertainty

(pdf) (Git)

Jakob M Heiss*, Jakob Weissteiner*, **Hanna Wutte***, Sven Seuken, Josef Teichmann

Proceedings of the 39th International Conference on Machine Learning, ICML'22, Baltimore, USA, 2022

PRE-PRINTS UNDER SUBMISSION

Machine Learning-powered Pricing of the Multidimensional Passport Option

(pdf) (Git)

Josef Teichmann, **Hanna Wutte***

arXiv preprint arXiv:2307.14887. 2023

How (Implicit) Regularization of ReLU Neural Networks Characterizes the Learned Function – Part II: the Multi-D Case of Two Layers with Random First Layer

(pdf)

Jakob Heiss*, Josef Teichmann, **Hanna Wutte***

arXiv preprint arXiv:2303.11454. 2023

How Infinitely Wide Neural Networks Can Benefit from Multi-task Learning – an Exact Macroscopic Characterization
Jakob Heiss*, Josef Teichmann, **Hanna Wutte***
arXiv preprint arXiv:2112.15577. 2021

(pdf)

How Implicit Regularization of ReLU Neural Networks Characterizes the Learned Function – Part I: the 1-D Case of Two Layers with Random First Layer
Jakob Heiss*, Josef Teichmann, **Hanna Wutte***
arXiv preprint arXiv:1911.02903. 2019

(pdf)

Presentations

CONFERENCE AND WORKSHOP TALKS

Dec 2023	Invited Talk , Deep Dynamic Decision Making in Mathematical Finance <ul style="list-style-type: none">Seminar in Data Science and Mathematical Modelling	Zurich, Switzerland
Sep 2023	Invited Talk , Deep Dynamic Decision Making in Mathematical Finance <ul style="list-style-type: none">WPI-Workshop: Stochastics, Statistics, Machine Learning and their Applications to Sustainable Finance and Energy Markets	Vienna, Austria
Aug 2023	Invited Talk , Robust Utility via a GAN Approach <ul style="list-style-type: none">10th International Congress on Industrial and Applied Mathematics (ICIAM23)	Tokyo, Japan
Jul 2022	Contributed Talk , NOMU: Neural Optimization-based Model Uncertainty <ul style="list-style-type: none">International Conference on Machine Learning (ICML'22)	Baltimore, USA (talk)
Jun 2022	Contributed Talk , NOMU: Neural Optimization-based Model Uncertainty <ul style="list-style-type: none">Oxford ETH Workshop 2022	Zurich, Switzerland
May 2022	Invited Talk , Machine Learning-powered Pricing of the Multidimensional Passport Option <ul style="list-style-type: none">World Online Seminars on Machine Learning in Finance	Virtual
Oct 2020	Invited Talk , Uncertainty Bounds For Neural Networks <ul style="list-style-type: none">New Challenges in the Interplay between Finance and Insurance	Virtual
Nov 2019	Invited Talk , Learning from Random Strategies in Stochastic Optimal Control - An Approach to Price the Multidimensional Passport Option <ul style="list-style-type: none">Vienna-Zurich symposium for young researchers in Financial Mathematics and related fields	Vienna, Austria
Sep 2019	Contributed Talk , Randomized Shallow Neural Networks and their Use in Understanding Gradient Descent <ul style="list-style-type: none">Vienna Congress on Mathematical Finance (VCMF 2019)	Vienna, Austria
Sep 2019	Contributed Talk , Randomized Shallow Neural Networks and their Use in Understanding Gradient Descent <ul style="list-style-type: none">OEMG Conference 2019	Dornbirn, Austria

SEMINARS AT UNIVERSITIES

Dec 2019	Invited Talk , How Implicit Regularization of Neural Networks Affects the Learned Function <ul style="list-style-type: none">Seminar on “Data Analysis and Modeling”	Freiburg, Germany
Apr 2019	Invited Talk , Randomized Shallow Neural Networks and their Use in Understanding Gradient Descent <ul style="list-style-type: none">Vienna Seminar in Mathematical Finance and Probability	Vienna, Austria

EVENTS

Oct 2021	Invited Booth + Poster , Implicit Regularization <ul style="list-style-type: none">ETH AI+X Summit 2021	Zurich, Switzerland
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Scholarships and Awards

2018	Scholarship for participation at the European Forum Alpbach 2018
	Awarded by the Austrian Federal Ministry of Transport, Innovation and Technology
2018	Excellence scholarship Vienna University of Economics and Business
	Awarded by the Austrian Federal Ministry of Science and Research
2017	Excellence scholarship Vienna University of Economics and Business
	Awarded by the Austrian Federal Ministry of Science and Research
2016	Excellence scholarship Technical University of Vienna
	Awarded by the Austrian Federal Ministry of Science and Research
2015	Excellence scholarship Technical University of Vienna
	Awarded by the Austrian Federal Ministry of Science and Research

Theses

2018	Master Thesis , On Variable Selection of the Elastic Net in Presence of Multicollinearity	(pdf)
	• Advisor: Prof. Kurt Hornik, Ph.D.	
2017	Master Thesis , Energy Futures	(pdf)
	• Advisors: Prof. Thorsten Rheinländer, Ph.D., Univ. Ass. Paul Krühner, Ph.D.	
2015	Bachelor Thesis , Calculating the Value at Risk using Copulas	
	• Advisor: Martin Predota, Ph.D.	

Teaching

UNIVERSITY COURSES

2023	Head Teaching Assistant , Wahrscheinlichkeitstheorie und Statistik	ETH Zurich
2021	Head Teaching Assistant , Stochastik	ETH Zurich
2020	Project Supervision , Machine Learning in Finance	ETH Zurich
2019	Teaching Assistant , Mathematical Foundations of Finance	ETH Zurich
2019	Head Teaching Assistant , Wahrscheinlichkeit und Statistik	ETH Zurich
2018	Teaching Assistant , Stochastik	ETH Zurich
2018	Teaching Assistant , Optimization	WU Vienna
2017	Teaching Assistant , Statistics I	WU Vienna
2016	Teaching Assistant , Risk Management in Finance and Insurance	TU Vienna

(Co-)SUPERVISED THESES

2022	Master Thesis of Sebastian Schein , Feature Learning in Infinite-Width Neural Networks	ETH Zurich
2022	Master Thesis of Sven Rosenthal , On the Inductive Bias Towards Multi-Task Learning of L2-Regularized ReLU Networks	ETH Zurich and University of Zurich
2022	Semester Thesis of Aurelio Dolfini , ML-based Uncertainty Quantification on Real World Data	ETH Zurich
2020	Master Thesis of Marius Högger , Bayesian Optimization with Neural Networks	University of Zurich

Languages

German	Native
English	Business fluent
French	Fluent