Hirbod Assa

Curriculum Vitae

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Qualifications

2016 **Fellow of higher Education Academy**, *University of Liverpool.*

2013 **Ph.D. in Financial Economics**, *Concordia University.*

2011 **Ph.D. in Financial Mathematics**, *Université de Montréal.*

Current and Past Positions

Now **Co-founder and Head of Research**, *Edge Technologies Parametric MGA*, (full time).

Now **Director**, *Model library, Risk management consultancy*, (part time).

2023-2024 **Reader in risk and data science**, *School of mathematics, statistics and actuarial sciences.*

2020-2023 **Senior lecturer FinTech**, *Kent Business School.*

2013-2020 **Lecturer in risk and financial mathematics**, *Institute for financial and actuarial mathematics (IFAM).*

Administrative Roles

2023-2024 **Program Director, MSc Applied Data Sciences**, *School of mathematics, statistics and actuarial sciences, University of Essex.*

2020-2023 **Founding Program Director, MSc FinTech**, *Kent Business School.*

2020-2023 **Program director, MSc Finance and Management**, *Kent Business School.*

2020-2020 **Program director**, BSc in Mathematics and Economics, *University of Liverpool.*

2016-2017 **Program Director**, M.Sc. Financial Mathematics, University of Liverpool

Industrial Engagement

Mitsubishi Bank (MUFG) *Machine Learning Applications in Swaption risk management.* I am leading two MSc projects, using Auto-encoders on Swaption data and hedging Swaptions using linear instruments.

Longline Environment Ltd *Feasibility of shrimp insurances in Indonesia.* I am leading a team-project to introduce insurances on a large area in Indonesia and make relevant recommendations to the insurance regulators in Indonesia.

Lloyds Bank — *Machine Learning Applications in Front Office Quant Finance.* I am leading a team-project to assess the extent to which Machine Learning can be applied to the Front Office Quant Finance.

Azur Under-Writing — *Underwriting beyond data enrichment and machine learning.* Azur UW Ltd is a data driven insurance company on high-net-worth property insurance. I am leading a Machine Learning project on identifying the drivers of conversion rate and scoring.

Stable Group — *Pricing "Stable" and providing consultancy service.* As a InsurTech risk management platform, Stable group is a UK-based company which aims to develop a product called "Stable" to protect the UK commodity businesses against agricultural market price volatility. I have contributed in designing their models and data science platform.

SOCODEVI — *data science work on studying agricultural re-insurances (former name FADQDI).* Working with La Financière Agricole du Quebec, Développement International (FADQDI). This project includes pricing yield insurances and exploring the possibility of introducing reinsurance contracts for their products.

MAXIS GBN — *Placement.* 6 paid internship in *Reinsurance & Reporting* and *Underwriting* was secured for the students at the University of Liverpool at MAXIS Global Benefits Network.

AlgoLib — *Acting as the Chief Scientific Adviser (CSA).* On machine learning and pricing.

Grants and Industry Incomes (as PI)

2024 — *Edge Tech. Parametric insurance on commodity index prices.* Co-founder, **2,600,000 $ US** in pre-seed funding.

2023-2024 — The Pandemic Institute Aviva-Sponsored Funding Call, with Hossein Sharifi (Liverpool U.), Andy Lyons (Liverpool U.) and Atousa Khodadadian (JMLU) , (**30,000 pound**).

2019-2020 — HEIF (Higher Education Innovation Fund, to develop an impact case) , (**700 pound**).

2019-2020 — Feasibility of shrimp insurances in Indonesia, Longline Environment Ltd, (**36,000 pound**).

2018 — Underwriting beyond data enrichment and machine learning. Azur UW Ltd,(**15,500 pound**).

2017-2018 — HEIF (Higher Education Innovation Fund, to develop an impact case with Stablegroup) (**1,000 pound**).

2016-2018 — **CDI** (Canadian derivative institute) *"How do economic variables affect the pricing of agricultural commodity derivatives and insurance?"* (Co-PI: Gabriel Power (Laval University), Philippe Grégoire (Laval University), Financière agricole du Québec- Développement international) (**$50,000**).

2017 — Underwriting beyond data enrichment and machine learning. Stable Ltd,(**4,800 pound**).

2015-2017 **SOA** (Society of Actuaries 2015 Individual Grant), *"Agricultural Insurance and Reinsurance"* (Co-PI: Athanasios Panthelous) (**$15000**).

Awards

2017 **Head of Consultancy in Financial Mathematics,** University of Liverpool, In recognition of the excellent work in relation to consultancy and external engagement including placements

2014 **Balvir Singh Medal,** Concordia University, For outstanding achievement in PhD thesis, Economics.

1999 **Best student award in mathematics,** Sharif University of Technology.

Sample of Teaching

Technology:

Data analytics and quantitative business analysis, SOAS, University of London (**CS1**).

Financial Technologies, Kent Business School

Python Programming for finance, Kent Business School

Economics and Finance:

Futures and option markets, Kent Business School (**CM1, CM2**).

Quantitative Risk Management, University of Liverpool (**CM1, CM2**).

Intermediate macroeconomics II, Concordia University.

Introduction to microeconomics, Concordia University.

Quantitative Finance:

Mathematics of Portfolios, University of Essex (**CM1, CM2**).

Statistical Methods in Actuarial Science, University of Liverpool (**CS1, CS2**).

Stochastic Modeling in Finance, University of Liverpool (**CS1, CS2**).

Numerical Analysis for Financial mathematics, University of Liverpool.

Stochastic analysis and its applications, University of Liverpool (**CS1, CS2**).

Extra curriculum:

Mathematics Careers and Employability, University of Essex (**Carrier and Employability).**

Maths Summer Industrial Research Project. University of Liverpool (**Carrier and Employability).**

Supervision

Main supervisor, MSc

2023-2024 *Exceeding 30 students, SMSAS, Essex*

2020-2023 *Exceeding 20 students, KBS, Kent*

2013-2020 *Exceeding 40 students, IFAM, Liverpool*

Main supervisor, PhD

Current *Romina Hashami*, News analysis in Oil Market *SMSAS, Essex*

Current *Navid Parvini*, News analysis in agricultural market *Kent Business School*

Current *Rhys Johns*, Tokenization of Risk *SMSAS, Essex*

Graduated *Atousa Khodadadian*, Living and Future Tools for Risk Assessment: An Examination of the Possibilities for Fusion *currently Senior Lecturer (associate professor), John Moores Liverpool University*

Graduated *Simon Wang*, University of Liverpool, Topic: On some aspects of quantitative risk management: theoretical and empirical implications for agricultural goods, *currently Chief Data Officer at Stable*

Graduated *Luís Portugal*, University of Liverpool, Topic: Stochastic Claim Reserving in Insurance with Regression Model, *currently Managing Director of Grupo ACTUARIAL*

Graduated *Natalie Chen*, University of Liverpool, Optimal Reinsurance Strategies under Distortion Risk Measures

Graduated *Tianyuan Ni*, Time series and machine learning: analysis of commodity and insurance, currently Reinsurance Analyst at MAXIS Global Benefits Network

Co-supervisor, PhD

Graduated *Lin Yang*, University of Liverpool, Co-supervision, *currently assistant professor at Xi'an Jiaotong-Liverpool University*

Graduated *Nader Karimi*, Amirkabir University of Technology, Co-supervision, *Currently at Minsitry of Education, Iran*

Graduated *Juan Du*, Xi'an Jiaotong-Liverpool University, Theory and applications of statistical arbitrage

Graduated *Mostafa Pour-Alizadeh*, Co-supervision, *in ATU, Tehran, Iran*

Graduated *Ali Panahi* , Co-supervision, *in SBU, Tehran, Iran*

Book and Editorial

2024 **Special issue Co-editor, European Actuarial Journal,** *Climate change and insurance*

2024 **Co-editor Springer actuaries series**, *Quantitative risk management and insurance in agricultural business*

2014-now **Agriculture finance review**, *Advisory board*

Publications

2025 *Optimal reinsurance maximisng dividends: an infinite-dimensional optimisation approach and numerical results,* **Insurance: Mathematics and Economics (Revised and Resubmitted)**

2025 *How do economic variables affect the pricing of commodity derivatives and insurance?*, in **Forthcoming: Springer actuarial,** Quantitative Risk Management and Insurance in Agricultural Business, Edited by Hirbod Assa and Simon Wang, (*with Philippe Grégoire, Gabriel J. Power, and Djerry Charli Tandja-M.)*

2025 *Examining the impact of weather factors on agricultural market price risk: an XAI approach*, in **Forthcoming: Springer actuarial,** Quantitative Risk Management and Insurance in Agricultural Business, Edited by Hirbod Assa and Simon Wang, (*with Muhathaz Gaffoor)*

2025 *Avocado Production Index Insurance: An Application of Credibility Theory on Heterogeneous Data*, in **Forthcoming: Springer actuarial,** Quantitative Risk Management and Insurance in Agricultural Business, Edited by Hirbod Assa and Simon Wang

2024 *Static risk measures in a frequency-severity with systematic risk: application in reinsurance,* **North American Actuarial Journal (Forthcoming)**

2024 *Assessing Climate's Influence on Agricultural Production Risk Relative to Socioeconomic and Spillover Effect: A Random Forest Approach with XAI,* **Climate Data Science (Forthcoming)**, (*with Ruhallah Daftari Besheli)*

2024 *A stochastic optimal stopping model for storable commodity prices,* **Statistics & Probability Letters** , (*with N Karimi, E Salavati, H Adibi)*

2023 *Calibrating Distribution Models from PELVE,* **North American Actuarial Journal** , (*with L. Lin, R. Wang)*

2022 *Calibration of Storage Model by Multi-Stage Statistical and Machine Learning Methods,* **Computational Economics** , (*with N Karimi, E Salavati, H Adibi)*

2022 *Risk-Sharing and Contingent Premia in the Presence of Systematic Risk: The Case Study of the UK COVID19 Economic Losses, in Pandemics: Insurance and Social Protection,* **Springer Actuarial,** Editors: Boado-Penas, Maria del Carmen, Eisenberg, Julia, Sahin, Sule, Volume 136, September 2021, Pages 86-109, (*with Tim Boonen) Published online: 8 April 2021*

2021 *Grasping the nettle? Considering the contemporary challenges of risk assessment,* **Journal of Risk Research**, Volume 136, September 2021, Pages 86-109, (*with Atousa Khodadadyan, Gabe Mythen, Beverly Bishop)*

2021 *On the risk consistency and monotonicity of ruin theory,* **European Actuarial Journal**, Volume 136, September 2021, Pages 86-109, (*with Corina Constantinescu) Published online: 8 April 2021*

2021 *When a combination of convexity and continuity forces monotonicity of preferences,* **International Journal of Approximate Reasoning**, Volume 136, September 2021, Pages 86-109, (*with Alex Zimper)*

2021 *An examination of the role of price insurance products in stimulating investment in agriculture supply chains for sustained productivity.* **European Journal of Operation Research**, (*with Hossien Sharifi and Andrew Lyons)*

2021 *Price index insurances in the agriculture markets,* **North American Actuarial Journal**, (*with Simon Wang)*

- *2020* *Preferences over rich sets of random variables: On the incompatibility of convexity and semicontinuity in measure*, forthcoming, **Mathematics and Financial Economics** (*with Alexander Zimper)*
- *2020* *Cap & trap and alternatives in price discrimination,* forthcoming, **Spanish Annals of Actuarial Science**, (*with Imogen Hirsh)*
- *2019* *Sound deposit insurance pricing using a machine learning approach.*, **Risks** , (*with Mostafa Pouralizadeh and Abdolrahim Badamchizadeh)*
- *2018* *Market consistent valuations in imperfect markets.*, **Decision in Economics and Finance**, (*with Nikolay Gospodinov)*
- *2018* *Designing sound deposit insurances* **Journal of Computational and Applied Mathematics**, (*with Ramin Okhrati)*
- *2018* *Preferences over all random variables: Incompatibility of convexity and continuity,* **Journal of Mathematical Economics**, (*with Alexander Zimper)*
- *2017* *Claims reserving with a stochastic vector projection*, **The North American Actuarial Journal**, (*with Luis Portugal L., Athanasios Pantelous)*
- *2017* *Modeling frost losses: application to pricing frost insurances*, **The North American Actuarial Journal**, (*with Simon Wang, and Athasios Pantelous)*
- *2017* *Representation and approximation of convex dynamic risk measures with respect to strong-weak topologies*, **Stochastic Analysis and Applications**, (*with Ramin Okhrati)*
- *2017* *Robust approach to hedging and pricing in imperfect markets*, **Risks**, (*with Nikolay Gospodinov)*
- *2016* *Robust stability, stabilization and H-infinity control for premium-reserve models in a Markovian regime switching discrete time framework*, **ASTIN Bulletin**, (*with Athanasios Pantelous, Lin Yang)*
- *2016* *Natural risk measures.* **Mathematics and Financial Economics**
- *2016* *Financial engineering in pricing agricultural derivatives based on demand and volatility.* **Agricultural Finance Review**
- *2016* *On the capital allocation problem for a new coherent risk measure in collective risk theory*, **Risks**, (*with Hassan Omidi Firouzi and Manuel Morales)*
- *2016* *Joint game and compatibility,* **Economic Theory**, (*with Sheridon Eliston and Ehud Lehrer)*
- *2016* *Modeling and pricing of catastrophe risk bonds with a temperature-based agricultural application.* **Quantitative Finance**, (*with Nikolaos Karagiannis, Athanasios Pantelous, and Calum Turvey)*
- *2016* *Marginal indemnification formulation for optimal reinsurances*, **Insurance: Mathematics and Economics**, (*with Chengguo Weng, Sheng Chao Shengchao, Ken Seng Tan)*
- *2015* *On optimal reinsurance policy with distortion risk measures and premiums*, **Insurance: Mathematics and Economics**
- *2015* *Trade-off between robust risk measurement and market principles.* **Journal of Optimization Theory and Application**

2015 *A financial engineering approach to pricing agricultural insurances*, **Agricultural Finance Review**

2015 *Risk management under a prudential policy* **Decisions in Economics and Finance**

2013 *Hedging, Pareto optimality, and good deals,* **Journal of Optimization Theory and Applications** (*with Keivan Mallahi Karai)*

2011 *Good deals and compatible modification of risk and pricing rules a regulatory treatment.* **Mathematics and Financial Economics** (*with Alejandro Balbás, A.)*

2011 *Lebesgue property of risk measures for bounded Càdlàg processes and applications* **Methods and Applications of Analysis**

2010 *Risk measures on the space of infinite sequences.* **Mathematics and Financial Economics** (*with Manuel Morales)*

2006 *Blow-Up and Non-global Solution for a Family of Nonlinear Higher Ordered Evolution Problems* **Iranian Journal of Mathematical Sciences and Informatics** (*with Mahmoud Hessaraki and Abbas Moameni)*

2005 *Nonexistence of solution for higher order evolution equations and inequalities* **Methods and Applications of Analysis** (*with Mahmoud Hessaraki, M.)*

Federal Reserve Working Papers

2014 *Hedging and pricing in imperfect markets under non-convexity*, Federal Reserve Bank of Atlanta Research Paper Series, Working Paper 2014-13 August 2014s (*with Nikolay Gospodinov)*

2013 *A Staggered pricing approach to modeling speculative storage: implications for commodity prices dynamics.*, Federal Reserve Bank of Atlanta Research Paper Series, Working Paper 2013-8 September 2013 (*with Amal Dobouse and Nikolay Gospodinov)*

Preprints

Preprint *Factor Risk Measures (with Peng Liu)*

Preprint *Pooling and systematic risk*

Preprint *Macro risk management: an insurance perspective*

Preprint *Learning delta hedging using reinforcement learning* (*with Haodong Zhang and Chris Kenyon)*

Preprint *How efficient is efficient hedging?* (*with Keivan Mallahi Mallahi and Ramin Okhrati)*

Selected Invited Talks and Panels

2024 *Systematic risk in pools*, London Mathematical Finance Seminar Series.

2024 *The Emergence of Parametric Insurance in the Age of AI*, Cardiff University, Cardiff.

2022 *Pooling and Systematic Risk*, LSE Risk and Insurance Day, LSE.

2022 *How machine learning can change the finance world*, CIBC Bank, Canada.

2021 *Data Science in Finance*, MENA AI and Data Science event, PhazeRo - the University of Berkeley MENA joint event, Oman.

2021 *COVID 19, how it would change the insurance, the way we know it,* , University of Waterloo risk management talks, Canada.

2021 *COVID-19, the Mother of All Catastrophes: the technical and risk management consequences?*, University of Amsterdam, Netherlands.

2021 *Macro risk management: an insurance perspective with application to supply chain finance*, University of Liverpool, Netherlands.

2019 *No hedging market consistent valuation*, CASS business school, UK.

2019 *Market consistent valuation without hedging*, KU Leuven, Belgium.

2018 *Price index insurances in the agriculture markets*, Monash Business School, Australia.

2018 *Insurance on agricultural prices indexes*, Mathematics Colloquium, Swansea University, UK.

2018 *Monetary preferences on large spaces*, MAF 2018, Madrid, Spain.

2018 *Risk management on large spaces*, University of Manchester, Manchester, UK.

2017 *Panel organizer and moderator on big data in agricultural insurances.* SCOR headquarter, Paris, France.

2017 *Insurance and finance: new problems, new directions.* Earth Science Department, Western University, Canada.

2017 *Insurances on commodities.* Actuarial Science Department Seminars, University of Waterloo, Canada.

2016 *Market consistent valuation in imperfect markets.* HEC Lausanne, Switzerland.

2015 *Market sub-consistent valuation* S3RI, University of Southampton, UK.

2015 *Pricing catastrophe bonds: application to agricultural risk management* Concordia University, Montreal, Canada

2015 *Market sub-consistent valuation* Quantact, University of Montreal, Canada

2015 *Market consistent and sub-consistent valuation* WatRISQ Seminar, University of Waterloo, Canada

Professional Activities, Experiences and Organizing

2024 **Organizing Committee**, Climate Change and Insurance, TU Wien, Vienna, Austria

2014-now **Advisory Board**, Agricultural Finance Review

2014-now **Founder and Chair**, FINACT-IRAN

2022 **External reviewer**, New Frontiers in Research Fund – Exploration 2022 competition (NFRFE 2022), Chair funding in systemic risk, Canada

2020 **Organizer**, COVID-19 and insurance

2020 **Organizer**, COVID-19 and modeling in management science

2019 **External reviewer NERC**, Reviewing grants on agricultural pricing and land-use in the UK

2017 **Scientific Committee**, International Agricultural Risk, Finance and Insurance Conference (IARFIC), 2017, SCOR headquarter, Paris.

2017 **Conference Chair**, Forth, FINACT-IRAN Workshop in Financial Mathematics and Actuarial Sciences, IPM, Tehran, Iran.

2017 **External reviewer**, European post-doc grant on agricultural businesses

2016 **Conference Chair**, Third FINACT-IRAN Workshop in Financial Mathematics and Actuarial Sciences, IPM, Tehran, Iran.

2016 **Management Chair Committee**, QFRA Workshop in Quantitative Finance and Risk Analysis, Rhodos, Greece.

2015 **Conference Chair**, Second FINACT-IRAN Workshop in Financial Mathematics and Actuarial Sciences, IPM, Tehran, Iran.

2015 **Organizing Committee**, IME 2015, Insurance: Mathematics and Economics Congress, Liverpool, The United Kingdom.

2015 **Management Chair Committee**, QFRA Workshop in Quantitative Finance and Risk Analysis, Santorini, Greece.

2014 **Conference Chair**,First FINACT-IRAN Workshop in Financial Mathematics and Actuarial Sciences, IPM, Tehran, Iran.

Professional Computer Skills

Working with Matlab, Python, Latex.

Language Skills

Persian Mother tongue

English Fluent

French Intermediate