

Fredrik Armerin

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Swedish citizen

Education

2025 PhD in Economics, Uppsala University.

2016 PhLic in Real Estate and Construction Management, KTH Royal Institute of Technology.

2005 PhD in Mathematical Statistics, KTH Royal Institute of Technology.

1999 MSc in Engineering Physics with a specialization in Applied Mathematics, KTH Royal Institute of Technology.

1997 BA in Economics, Uppsala University.

Employment

2026 Senior lecturer, Department of Economics, Uppsala University.

2018–2026 Lecturer, Department of Real Estate and Construction Management, KTH Royal Institute of Technology.

2025 Senior lecturer, Department of Economics, Uppsala University.

2017–2018 Researcher, KTH Royal Institute of Technology.

2016–2017 Independent consultant.

2015–2016 Teacher in financial mathematics, KTH Royal Institute of Technology.

2013–2015 Independent consultant.

2007–2013 Senior quantitative analyst at Realtime Pricing Algorithm.

2005–2007 Quantitative analyst at Skandia Life.

2005 Actuary at LF Life.

1999–2004 PhD student at the Department of Mathematics, KTH Royal Institute of Technology.

1998–1999 Quantitative analyst at Hagströmer & Qviberg.

1997–1998 PhD student at the Department of Finance, Stockholm School of Economics.

Research affiliations

2007–2017 Affiliated researcher at Centre for Banking and Finance (CEFIN), KTH Royal Institute of Technology.

2025– Affiliated researcher at the Department of Economics, Uppsala University.

References

Associate professor Mikael Bask (mikael.bask@nek.uu.se)
Department of Economics
Uppsala University

Professor Chuan-Zhong Li (Chuanzhong.Li@nek.uu.se)
Department of Economics
Uppsala University

Professor Ola Andersson (ola.andersson@nek.uu.se)
Department of Economics
Uppsala University

Publications

Published peer-reviewed articles

(2025) Fredrik Armerin: 'The moment generating function of a reflected Brownian motion with drift', *Results in Applied Mathematics*, vol. 27,

DOI: 10.1016/j.rinam.2025.100614.

(2024) Fredrik Armerin: 'A Comment on "The effectiveness of carbon pricing: The role of diversification in a firm's investment decision"', *Energy Economics*, Vol. 132.

DOI: 10.1016/j.eneco.2024.107487.

(2023) Fredrik Armerin: 'Investments with declining cost following a Lévy process', *European Journal of Operational Research*,

DOI: 10.1016/j.ejor.2022.05.001.

(2021) Fredrik Armerin and Han-Suck Song: 'A framework for modelling cash flow lags', *SN Bus Econ* **1**, 130 (2021),

DOI: 10.1007/s43546-021-00137-7.

(2019) Fredrik Armerin: 'American perpetual options with random start', *Results in Applied Mathematics*, Vol. 3,

DOI: 10.1016/j.rinam.2019.100017.

(2019) Fredrik Armerin: 'Optimal stopping of a killed exponentially growing process', *Applied Mathematics and Computation*, 353, p. 208-214,

DOI: 10.1016/j.amc.2019.02.006.

(2019) Fredrik Armerin, Jonas Hallgren and Timo Koski: 'Forecasting Ranking in Harness Racing Using Probabilities Induced by Expected Positions', *Applied Artificial Intelligence*, 33:2, p. 171-189,

DOI: 10.1080/08839514.2018.1536105.

(2018) James R. Watson, Fredrik Armerin, Dane H. Klinger and Ben Belton: 'Resilience through risk management: cooperative insurance in small-holder aquaculture systems', *Heliyon*, Vol. 4, Issue 9, e00799,

DOI: 10.1016/j.heliyon.2018.e00799.

(2018) Fredrik Armerin and Han-Suck Song: 'Valuation of real options in incomplete models – an implied yield approach', *Fuzzy Economic Review*, Vol. 23, No. 1, p. 19-32,

DOI: 10.25102/fer.2018.01.02.

(2014) Fredrik Armerin: 'An Axiomatic Approach to the Valuation of Cash Flows', *Scandinavian Actuarial Journal*, Vol. 2014, Issue 1, p. 32-40.

(2007) Fredrik Armerin, Tomas Björk and Bjarne Astrup Jensen: 'Term Structure Models with Parallel and Proportional Shifts', *Applied Mathematical Finance*, Volume 4, Issue 3, p. 243-260.

Conference papers

(2019) Mo Zheng, Han-Suck Song and Fredrik Armerin: 'Backtesting Value-at-Risk and expected shortfall: an empirical comparison using non-parametric and parametric models', presented at the *26th Annual Conference of the European Real Estate Society*, Cergy-Pontoise, France.

(2019) Fredrik Armerin, Jonas Hallgren and Han-Suck Song: 'Predicting house prices – a review of the current state of knowledge and methods', presented at the *8th Real Estate Research Conference*, Malmö, Sweden.

Submitted papers

(2026) Fredrik Armerin: 'Robustness revisited: the multiplier and constrained approaches towards ambiguity'.

Under review at *Journal of Mathematical Economics*.

(2026) Fredrik Armerin: 'On arbitrage-free dynamic Nelson-Siegel models'.

Revise and resubmit to *Quantitative Finance*.

Papers in the PhD thesis

'Optimal timing of an irreversible investment under ambiguity' (Job Market Paper)

I solve the classical problem of finding the optimal time to make an irreversible investment when there is ambiguity. Ambiguity is modelled by considering alternative models close to a baseline model, where the distance between models is measured by the relative entropy (also known as the Kullback-Leibler divergence). The results of the model are first that if the investment is done, then it is done earlier than in the case of only risk, and second that there exists a level of the value of the investment where the value of the investment is equal to zero and the project should be abandoned. The latter property is in contrast to standard models where there is always a non-zero "option value" even for low levels of the value of the investment. In order to calibrate the level of ambiguity, a one period optimal consumption model under ambiguity is constructed and fitted to aggregated macro data. The results show that the model can be calibrated to the equity risk premium without having a unrealistic value on the subjective discount factor.

'Robustness revisited: the multiplier and constrained approaches towards ambiguity'

This is the second paper in my PhD thesis. I look at the difference between two approaches to ambiguity. The two approaches are connected through Lagrangian duality, but the solutions are different not only qualitatively, but also quantitatively. I look at several examples from economics and finance, including an example with an Arrow-Debreu market model. At the end I suggest ways of measuring the level of ambiguity for an individual with a given utility function. It turns out that there is first-order ambiguity aversion in one of the approaches, while the other has second-order ambiguity aversion.

'A measure-theoretic approach towards risk, ambiguity and model misspecification in economics and finance'

This is the third paper in my PhD thesis, and in it I look at a mathematical definition of the different types of uncertainty. "Risk" is the case when the probabilistic law of the data generating process is known, but there is yet no consensus on the difference between "ambiguity" and "model misspecification". By using measure theory I suggest a precise mathematical definition that clearly distinguishes between ambiguity and model misspecification. I also compare my definition with other definitions previously suggested.

Research in progress (tentative title)

'Principal geodesic analysis of the covariance matrix of stock returns'

'Optimal stopping of the difference of sums of exponential Lévy processes – theory and applications'

'Adapted GVaR estimation of real estate indices'

'Modelling and pricing of conservation derivatives'

'Non-Markovian semigroups in the valuation of cash flows'

'Envelope theorems for non-differentiable functions'

'Measuring the level of ambiguity in optimal timing of an irreversible investment through experiments'
(with Ola Andersson)

Other academic work

- (2025) Fredrik Armerin 'Studies on Uncertainties in Economics', *PhD dissertation in Economics*, Uppsala University.
- (2021) Fredrik Armerin, Han-Suck Song and Mo Zheng: 'Estimating VaR for house price indices – one suit doesn't fit all', in *Essays on Empirical applications of Real Estate Economics and Finance*, DiVA.org:kth-310441.
- (2019) Fredrik Armerin and Åke Gunnelin: 'Competitive Investment with Varying Risk Premia', *Working Paper Series, Royal Institute of Technology, Department of Real Estate and Construction Management & Banking and Finance*, No. 19/12.
- (2019) Fredrik Armerin: 'Stochastic discount factors and the optimal timing of irreversible investments', *Working Paper Series, Royal Institute of Technology, Department of Real Estate and Construction Management & Banking and Finance*, No. 19/11.
- (2017) Fredrik Armerin: 'On some properties of elliptical distributions', *Working Paper Series, Royal Institute of Technology, Department of Real Estate and Construction Management & Banking and Finance*, No. 17/1.
- (2016) Fredrik Armerin: 'Waiting in real options with applications to real estate development valuation', *Licentiate thesis in Real estate and construction management*, KTH Royal Institute of Technology, Stockholm.
- (2014) Fredrik Armerin: 'The Conditional Quantile as a Minimizer', *Working Paper Series, Royal Institute of Technology, Department of Real Estate and Construction Management & Banking and Finance*, No. 14/8.
- (2013) Fredrik Armerin: 'Robust immunization', *Working Paper Series, Royal Institute of Technology, Department of Real Estate and Construction Management & Banking and Finance*, No. 13/16.
- (2009) Fredrik Armerin and Han-Suck Song: 'Valuing the Housing Cooperative Conversion Option', in *Essays on risk and housing*, Trita-BFE, ISSN 1104-4101; 2009:87.
- (2005) Fredrik Armerin: 'A Note on Immunized Portfolios, Arbitrage Opportunities and Yield Curve Modelling', *Working paper*.
- (2005) Fredrik Armerin: 'Aspects of Cash Flow Valuation', *PhD dissertation in Mathematical statistics*, KTH Royal Institute of Technology, Stockholm.
- (2004) Fredrik Armerin: 'Immunization of deterministic and stochastic general cash flows', *Working paper, Trita-MAT. MS. 2004:01*.

(2002) Fredrik Armerin: 'On Cash Flow Valuation', *Licentiate thesis in Mathematical statistics*, KTH Royal Institute of Technology, Stockholm.

Contribution to anthologies

(2017) Fredrik Armerin: 'Realloptionsvärdering av mark med bygglov', in *Bostad 2.0 En bostadsmarknad för alla*, Hullgren M. and Wilhelmsson, M. (Editors), TRITA-FOB-RAPPORT-2017:4, ISBN 978-97-85783-79-3.

Books

(2023) Fredrik Armerin and Madeleine Hoeft: 'Information Economics with Real Estate Applications', *Routledge*, ISBN 9781032287744.

(2014) Fredrik Armerin and Han-Suck Song: 'Investeringsbedömningens grunder – från traditionella metoder till realoptioner', *Studentlitteratur*, ISBN 9789144094694.

Title in English: 'Investment appraisal – from traditional methods to real options'.

Lecture notes

(2019) Fredrik Armerin: 'An Introduction to Asset Pricing with Macro-Finance'.

(2004) Fredrik Armerin: 'An Introduction to the Theory of Risky Investments'.

(2000) Fredrik Armerin: 'Stochastic Volatility. A Gentle Introduction'.

Fellowships and memberships

Fellow of the Institute of Mathematics and its Applications (FIMA).

Member of The Econometric Society.

Member of Society for the Advancement of Economic Theory.

Member of The Swedish Society of Financial Analysts (Sveriges Finansanalytikers förening).

Teaching

Courses

At Uppsala university:

- Mathematical Methods (a PhD course), main lecturer and course responsible, 2025.
- Microeconomic Theory, partial lecturer, 2025.
- Financial Theory, main lecturer and course responsible: 2022–2024.
- Industrial Engineering and Management IV: The Company and its Environment, partial lecturer: 2022.

At KTH Royal Institute of Technology:

- Basic Statistics for Economists, main lecturer: 2025.
- Applied Mathematics and Statistics for Economists, main lecturer: 2026.
- Economics of the Built Environment, main lecturer and course responsible: 2019–2022.
- Fundamentals of Residential Real Estate Finance, main lecturer and course responsible: 2019 and 2021.
- An Introduction to Asset Pricing with Macro-Finance (a PhD course), main lecturer and course responsible: 2019.
- Fundamentals of Residential Real Estate Finance, partial lecturer: 2018.
- Economics of the Built Environment, teaching assistant: 2018.
- Financial mathematics, Business and Management, supervisor, 2017–2019 and 2021.
- Basic Statistics for Economists, partial lecturer: 2017.
- Financial Economics with Real Estate Applications, partial lecturer: 2017–2018.

- Financial Econometrics, partial lecturer: 2017.
- Contract Theory with Applications to Property Management, main lecturer and course responsible: 2017–2021.
- Time Series Analysis, main lecturer and course responsible: 2016.
- Portfolio Theory and Risk Management, main lecturer and course responsible: 2014–2015.
- Financial Derivatives, main lecturer and course responsible: 2012 and 2014–2016.
- Portfolio Theory, Advanced Course, lecturer and course responsible: 2003–2004.
- Stochastic Calculus and the Theory of Capital Markets, main lecturer and course responsible: 2002.
- Mathematical Statistics (a beginners course), teaching assistant: 1999–2003
- Martingales and Stochastic Calculus, teaching assistant: 1999–2000, 2003–2004.
- Portfolio Theory and Risk Management, teaching assistant: 2000–2004.
- Linear Algebra, teaching assistant: 1994, 1996.
- Calculus, teaching assistant, 1993.

At other universities:

- Financial Mathematics (PhD course at Makerere University, Uganda), main lecturer and course responsible: 2018.
- Financial and Insurance Mathematics (master course at University of Rwanda, Rwanda), main lecturer and course responsible: 2015.

Undergraduate supervision

Main supervision at bachelor and advanced/master level (first and second cycle level):

- Supervision of 17 bachelor theses in mathematical statistics at KTH Royal Institute of Technology during 2015 and 2016.
- Supervision of 7 master theses in mathematical finance at KTH Royal Institute of Technology during 2015 and 2016.
- Supervision of 4 master theses in business administration at Linköping University 2018.
- Supervision of 8 bachelor theses in economics at Uppsala University during 2023–2025.
- Supervision of 5 master theses in economics at Uppsala University during 2023–2025.

Doctoral student supervision

Appointed assistant supervisor to Mo Zheng in 2019. Thesis defended 22 April 2022.

Appointed assistant supervisor to Suna Akis Gülümser in November 2025.

Training in teaching and learning in higher education

2024 Academic Teacher Training Course, 5 weeks (equivalent to 7.5 credits), Uppsala University.

2021 Develop the Learning by Using Grading Criteria, 1.5 credits, LH216V, KTH Royal Institute of Technology.

2019 Doctoral Supervision, 3.0 credits, LH207V, KTH Royal Institute of Technology.

Other courses

2025 Mastering Academic Writing, Uppsala University.

Programming experience

Good knowledge: Matlab.

Beginner: Python, R.