



Mesias Alfeus

Education

2016–2018 **Doctor of Philosophy–Quantitative Finance**, *University of Technology, Sydney (UTS)*, Finance Discipline Group, NSW, Sydney, Australia.

Supervisor: Professor Erik Schlögl

2014–2015 **Master of Science–Financial Mathematics**, *Stellenbosch University*, Stellenbosch 7600, South Africa.

Supervisor: Professor Peter Ouwehand

2013–2013 **Bachelor of Science (Hons)–Financial Mathematics**, *Stellenbosch University and AIMS*, Stellenbosch 7600, South Africa.

Supervisor: Professor Peter Ouwehand

2009–2012 **Bachelor of Science (Hons)–Mathematics and Physics**, *University of Namibia*, Windhoek, Namibia.

Supervisor: Dr. Martin Mugochi

Research Experience

University of Wollongong (UOW)

2019 **Regularisation effect on model calibration.**

The goal of this paper is to understand and give an answer to a question concerning the pricing accuracy using the parameters resulted from correctly posed calibration problem in comparison to the ones inferred from a relaxed calibration. Our empirical findings indicate that regularized calibration is only recommended when considering out-of-sample pricing in a long time horizon (submitted to European Journal of Operational Research). Joint work with Dr Xin-Jiang He and Prof Song-Ping Zhu; full paper available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3515199

2019 **An Empirical Study of the Option Pricing Formula with the Underlying being banned from Short Sell.**

During the Global Financial Crisis (GFC) some financial institutions were banned from short selling. This is shown to have had impact on market efficiency and market volatility. The present study analyses the impact of short sell to the price of an option (submitted to the Journal of Empirical Finance). Joint work with Dr Xin-Jiang He and Prof Song-Ping Zhu and the full paper is available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3478355

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Northfields Ave, Wollongong NSW 2522, Australia
☎ (+61) 424943640 • ☎ (+61) (02) 703729
✉ mesiasalfeus@gmail.com

- 2019 **Spread Option Pricing on Single-Core and Parallel Computing Architectures.**
 This paper introduces parallel computation for spread options using two-dimensional Fourier transform. Spread options are multi-asset options whose payoffs depend on the difference of two underlying financial securities. Pricing these securities, however, cannot be done using closed-form methods; as such, we propose an algorithm which employs the fast Fourier Transform (FFT) method to numerically solve spread option prices in a reasonable amount of short time while preserving the pricing accuracy. Joint work with Shiam Kannan and full paper is available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3457036
- 2019 **Forecasting commodity markets volatility: HAR or Rough?.**
 This paper has two goals, one to show that realised volatility from the commodity market is rough and to compare HAR and Rough forecasting methodology for the log-realised volatility (submitted to the Journal of Futures Markets). Joint work with Dr Christina Nikitopoulos from UTS Business School
[University of Technology Sydney \(UTS\)](#)
- 2016–2018 **PhD Thesis: Stochastic Modeling of New Phenomena in Financial Markets.**
 The Global Financial Crisis (GFC) has revealed a number of new phenomena in financial markets, to which stochastic models have to be adapted. The present study presents two new methodologies for modeling the “basis spread” and “rough volatility“. The former gained prominence during the GFC and continues to persist, while the latter has become increasingly evident since 2014.
- 2016–2019 **A Consistent Stochastic Model of the Term Structure of Interest Rates for Multiple Tenors.**
 Explicitly taking into account the risk incurred when borrowing at a shorter tenor versus lending at a longer tenor ("roll-over risk"), we construct a stochastic model framework for the term structure of interest rates in which a frequency basis (i.e. a spread applied to one leg of a swap to exchange one floating interest rate for another of a different tenor in the same currency) arises endogenously. Joint work with Martino Grasselli and Erik Schlögl. Full paper available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2972428
- 2017 **Regime Switching Rough Heston Model.**
 We consider the implementation and pricing under a regime switching rough Heston model which incorporates two important features. The regime switching is motivated by fundamental economic changes, and a Markov chain to model the switches in the long-term mean of the volatility is proposed. The rough behaviour is a more local property and is motivated by the stylized fact that volatility is less regular than a standard Brownian motion. The instantaneous volatility process is endowed with a kernel that induces rough behaviour in the model. Pricing formulae are derived and implemented for call and put options using the Fourier-inversion formula. Joint work with Ludger Overbeck and Erik Schlögl. Full paper available here: <https://onlinelibrary.wiley.com/doi/abs/10.1002/fut.21993>

- 2016–2018 **On Spread Option Pricing Using Two–Dimensional Fourier Transform** .
 Investigate numerical method for the valuation of financial derivatives with a two-dimensional underlying risk is considered, in particular as applied to the problem of pricing spread options. As is common, analytically closed-form solutions for pricing these payoffs are unavailable, and numerical pricing methods turn out to be non-trivial. We price spread options in a model where asset prices are driven by a multivariate normal inverse Gaussian (NIG) process. We consider a pricing problem in the fixed-income market, specifically, on cross-currency interest rate spreads and on LIBOR-OIS spreads. Joint work with Erik Schlögl. Full paper available here: <https://www.worldscientific.com/doi/10.1142/S0219024919500237>
- 2018–present **A Consistent Polynomial Factor Model of the Term Structure of Roll-Over Risk.**
 The model of roll-over risk is constructed using polynomial processes. Instead of pricing options through closed-form expressions for conditional moments with respect to observed process, the price of a zero-coupon bond is expressed as a polynomial of a finite degree. A formula for discrete-tenor benchmark interest rates (e.g., LIBOR) under roll-over risk is constructed, which depends on the quotient of polynomial processes. It is shown how such a model can be calibrated to market data for the discount factor bootstrapped from the overnight index swap (OIS) rate curve.
[Stellenbosch University, South Africa](#)
- 2014 **Valuation methods for the Lévy HJM models.**
 We investigate numerical methods for pricing options on zero-coupon bonds under the Lévy HJM. This framework is computationally demanding because the characteristic function of the driving stochastic process involves the integral. We consider Fourier based methods such as the FFT, the FrFT, the cosine method. Joint work with Peter Ouwehand
- 2013 **Fast pricing of barrier options under Lévy processes.**
 The main aims was to investigate the fast method of pricing barrier options where the models are driven by Normal inverse Gaussian process. It compares between Monte Carlo method and cosine method. Joint work with Peter Ouwehand
[University of Namibia, Namibia](#)
- 2012 **Approximations of real-valued functions.**
 The main objectives of this study was to investigate the possibilities of extending Weierstrass Approximation Theorem (WAT) to \mathbb{R} . The abstract of this study was accepted at an international conference at III Jaen Conference on Approximation Theory, Ubeda, Spain. Joint work with Martin Mugochi
[Research Visit I, University of Padova, Italy](#)
- 01 Feb - 15 Mar 2018 **Separating Funding Liquidity Risk and Credit Risk Using CDS.**
 I was hosted by Professor Martino Grasselli and I was doing model calibration to OIS, CDS and Basis Swaps Spreads

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Research Visit II, University of Cape Town, South Africa

- 18 -29 July **Rough Volatility.**
2017 Participated at the annual Financial Mathematics Team Challenge. Our main responsibility was to implement and reproduce results in the paper "Volatility is rough" by Gatheral, J. Jaisson, T. and Rosenbaum, T. (2014)

Working Experience

- 2019- present **Lecturer**, *School of Mathematics and Applied Statistics*, School of Engineering and Information Sciences, University of Wollongong, Wollongong, Australia.
Teaching undergraduate courses in Mathematics and postgraduate courses such as stochastic volatility and computational finance. I was also hired by Prof. Song-Ping to work on his ARC research grant project.
- 2018–Present **Research Assistant**, *Finance Discipline Group*, UTS Business School.
Calibration of forward rate models to crude oil data both futures and options, and empirical analysis
- 2016–2018 **Casual Academic**, *Finance Discipline Group*, UTS Business School.
Teaching assistance and exam supervision
- 2015 **Risk Analyst–in training**, *Research, Policy and Statistics (RPS) department*, Namibia Financial Institutions Supervisory Authority (NAMFISA).
Participate in the formulation, design and implementation of a consistent risk-related methodology across the non-banking financial sector.
- 2015 **Part-time Lecturer**, *Pure and applied Mathematics department*, University of Namibia (UNAM).
Teaching undergraduate Financial Mathematics

Awards and Scholarships

- 2018 Young Investigator Training Program Prize–Quantitative Finance Workshop 2018, Italy
- 2016 International Research Scholarship and UTS President Award
- 2014 Merit bursary award from Stellenbosch University
- 2014 Awarded a bursary by NAMFISA to study MSc. in Financial Mathematics at University of Stellenbosch
- 2013 Merit bursary award from Stellenbosch University
- 2013 Commonwealth Scholarship to study M.Sc Actuarial Science
- 2013 Awarded a bursary by NAMFISA to study Honours in Financial Mathematics at University of Stellenbosch and AIMS
- 2012 Awarded a bursary by NAMFISA to study Mathematics and Physics at University of Namibia
- 2012 Best graduate student in the Faculty of Science, University of Namibia

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- 2011 Best Science student in the non-final year, University of Namibia
- 2010 Best first year Science student, University of Namibia
- 2009 Awarded a bursary by mineral development funds to study Mathematics at University of Namibia
- 2008 Awarded a bursary by Petrofund to study Power Engineering at the Polytechnic of Namibia

Computer skills

- Basic MySQL
- Fluent MATLAB, C++, \LaTeX , OpenOffice, Linux, Microsoft Windows
- Advanced Excel-VBA

Leadership skills

- 2017 - 2019 PhD students captain for Finance Discipline Group, UTS Business School
- 2010-2012 President of the UNAM Science Student Society (USSS)
- 2006-2007 Headboy of Mweshipandaka High School

Seminar and Conferences

- 27 November 2019 **Internal Seminar**, CENTRE FOR FINANCIAL MATHEMATICS, Wollongong, University of Wollongong (UOW).
Presented a talk on Commodity market volatility estimators
- 25 September 2019 **Seminar**, UNIVERSITY OF TECHNOLOGY SYDNEY MATHEMATICS COLLOQUIUM, Sydney, University of Technology Sydney (UTS).
Presented a talk on the impact of short sell ban on option prices
- 14 May 2019 **Seminar**, STOCHASTIC METHODS IN QUANTITATIVE FINANCE AND STATISTICS, SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES, Sydney, University of Technology Sydney (UTS).
Presented a talk on Term Structure of roll-over risk
- 23 April 2019 **Seminar**, AIFMRM, Cape Town, University of Cape Town (UCT).
Presented a talk on Regime Switching Rough Heston Model
- 19 February 2019 **Invited Speaker**, RESERVE BANK OF AUSTRALIA, Sydney, Australia.
Term Structure of interest rate models
- 14 February 2019 **Internal Seminar**, CENTRE FOR FINANCIAL MATHEMATICS, Wollongong, University of Wollongong (UOW).
Presented a talk on Term Structure of interest rate models
- 23 October 2018 **Invited Speaker**, COMMONWEALTH BANK OF AUSTRALIA, Sydney, Australia.
Term Structure of interest rate models

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- 25 August 2018 **Seminar**, MATHEMATICS DEPARTMENT, Newcastle, University of Newcastle.
Presented a talk on calibration for the Term Structure of roll-over risks
- 16 July 2018 **Conference**, BACHELIER FINANCE SOCIETY, 10th WORLD CONGRESS, Dublin, Trinity College.
A talk on Regime Switching Rough Heston Model
- 18-22 June 2018 **Conferences**, AMSI OPTIMISE 2018, Melbourne, University of Melbourne (UoM).
Presented a talk on Numerical methods for Spread Options
- 11 May 2018 **Seminar**, CENTRE FOR FINANCIAL MATHEMATICS, Wollongong, University of Wollongong (UOW).
Presented a talk on Term Structure of interest rate models
- 11 April 2018 **Seminar**, STOCHASTIC METHODS IN QUANTITATIVE FINANCE AND STATISTICS, SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES, Sydney, University of Technology Sydney (UTS).
Presented a talk on Regime Switching Rough Heston Model
- 11 March 2018 **Seminar**, PROBABILITY GROUP, DEPARTMENT OF MATHEMATICS, Padova, University of Padova.
Presented a talk on Regime Switching Rough Heston Model
- 23-25 January 2018 **Conferences**, QUANTITATIVE FINANCE WORKSHOP(QFW 2018), Rome, University of Rome Tre.
Presented a talk on Regime Switching Rough Heston Model
- 12-15 Dec 2017 **Conferences**, QUANTITATIVE METHODS IN FINANCE (QMF 2017), Sydney, University of Technology Sydney (UTS).
Presented a talk on Numerical methods for Spread Options
- 14 Nov 2017 **Conferences**, UTS BUSINESS PHD CONFERENCE, Sydney, University of Technology Sydney (UTS).
Presented a talk on Term Structure of interest rate models
- 08-12 August 2017 **Conferences**, SIXTH INTERNATIONAL CONFERENCE MATHEMATICS IN FINANCE, Skukuza, Kruger National park South Africa.
Term Structure of interest rate models
- 04 August 2017 **Invited Speaker**, UNIVERSITY OF NAMIBIA, Windhoek, Namibia.
Spread Option pricing models
- 03 August 2017 **Invited Speaker**, BANK OF NAMIBIA, Windhoek, Namibia.
Term Structure of interest rate models
- 17-29 July 2017 **Financial Mathematics Team Challenge**, UNIVERSITY OF CAPE TOWN, Western Cape, South Africa.
Presented a report on Rough Volatility

- 24-29 August 2014 **Conferences**, FIFTH INTERNATIONAL CONFERENCE MATHEMATICS IN FINANCE, Skukuza, Kruger National park South Africa.
Lévy HJM models
- 05 May 2014 **Seminar**, POSTGRADUATE SEMINAR, Mathematics department Stellenbosch University.
Presented a talk on interest rate modelling
- 20-22 Feb 2014 **Summer School**, THE 7TH SUMMER SCHOOL IN MATHEMATICAL FINANCE, African Institute for Mathematical Sciences, 6 Melrose Road, Muizenberg.
Attended
- 27-28 Jan 2014 **Workshops - ACQuFRR**, ACQUFRR MASTERCLASS: A BENCHMARK APPROACH TO INVESTING, PRICING AND HEDGING, University of Cape Town, Rondebosch, Cape Town, 7700, South Africa.
Attended
- 21-23 Feb 2013 **Summer School**, THE 6TH SUMMER SCHOOL IN MATHEMATICAL FINANCE, African Institute for Mathematical Sciences, 6 Melrose Road, Muizenberg.
Attended
- 10 - 12 Sep 2012 **Conference**, TOPOLOGY, ALGEBRA AND CATEGORY THEORY TACT2012, University of South Africa (UNISA),Pretoria .
Present a talk on approximation of real-valued functions.
- 15-20 July 2012 **Conference**, III JAEN CONFERENCE ON APPROXIMATION THEORY, University of Jaen,Úbeda, Jaén, Spain,.
Present a poster talk on approximation of real-valued functions.
- 09 - 12 Sep 2011 **Conference**, TOPOLOGY, ALGEBRA AND CATEGORY THEORY TACT2011, University of Namibia, Windhoek, Namibia.
Present a talk on Eigenvalues.
- 01 Oct 2012 **Seminar**, FACULTY OF SCIENCE TALKS , University of Namibia, Windhoek, Namibia.
Present a talk on simulation of Laplacian and Fourierian transform.

Accepted Papers

- November 2019 **Article**, (*with Ludger Overbeck and Erik Schlögl*) , A Consistent Stochastic Model of the Term Structure of Interest Rates for Multiple Tenors.
Forthcoming Journal of Economic Dynamics and Control
- May 2019 **Article**, (*with Erik Schlögl*) , On Spread Option Pricing Using Two-Dimensional Fourier Transform.
Accepted for publication by International Journal of Theoretical and Applied Finance

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- May 2019 **Article**, (with Ludger Overbeck and Erik Schlögl) , Regime Switching Rough Heston Model.
Accepted for publication by Journal of Futures Market
- 20 Nov 2017 **Article**, (with Korula, F., Lopes, M., Soane, A. and McWalter, T.) , Rough Volatility.
- 22 May 2017 **Article**, (with Martino Grasselli and Erik Schlögl) A CONSISTENT STOCHASTIC MODEL OF THE TERM STRUCTURE OF INTEREST RATES FOR MULTIPLE TENORS, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2972428.
- 4 Dec 2013 **Honours Thesis**, FAST PRICING OF BARRIER OPTIONS, AIMS and Stellenbosch University .
South Africa
- 14 Feb 2015 **Master Thesis**, HEATH–JARROW–MORTON MODELS WITH JUMPS, Sun-Scholar, Stellenbosch University .
South Africa, <http://scholar.sun.ac.za/handle/10019.1/96783>
- 30 Sept 2014 **Working paper**, VALUATION METHODS FOR THE LÉVY HJM MODELS.
- 4 Dec 2013 **Honours Thesis**, FAST PRICING OF BARRIER OPTIONS, AIMS and Stellenbosch University .
South Africa
- 30 Apr 2013 **Essay**, THE ROLE OF QUANTITATIVE ANALYSTS IN THE CREDIT CRUNCH OF 2007-2009, Stellenbosch University.
- 2 Nov 2012 **Honours Thesis**, APPROXIMATION OF REAL-VALUED FUNCTIONS, University of Namibia.
Namibia
- 30 Oct 2010 **Essay**, SIMULATION OF LAPLACIAN AND FOURIERIAN , University of Namibia.

Languages

Oshiwambo **Mothertongue**

English **Fluent**

Afrikaans **Basic**

Con conversationally fluent

Interests

- Financial modelling
- Mathematics
- Actuarial Science
- Gyming
- Financial risk management
- Teaching
- Economics
- Quantitative Finance

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Professional body

2015-Present **Student member**, ACTUARIAL SOCIETY FOR SOUTH AFRICA.

References

Professor Erik Schlögl

PhD Supervisor

University of Technology Sydney
(UTS)

NSW, 2007, Broadway

E-mail: Erik.Schlögl@uts.edu.au

Professor Deborah Edwards

Director of Postgraduate Research
University of Technology Sydney
(UTS)

NSW, 2007, Broadway

E-mail: Deborah.Edwards-
1@uts.edu.au

Professor Song-Ping Zhu

Senior Professor of Mathematics
University of Wollongong (UOW)

NSW, 2522, Northfields Ave

E-mail: spz@uow.edu.au