ACQuFRR

AFRICAN COLLABORATION FOR QUANTITATIVE FINANCE AND RISK RESEARCH

ACQuFRR Report for 2018

The purpose of ACQuFRR is to integrate postgraduate teaching and research in quantitative and mathematical finance and some of its allied disciplines in the Faculty of Commerce at UCT. ACQuFRR houses the research students and academic members of the African Institute of Financial Markets and Risk Management (AIFMRM). Our website contains comprehensive information about our activities, events, projects, and interests; as well as details of our Executive, Research Associates, Postdoctoral Research Fellows and Postgraduate Students. ACQuFRR received full accreditation by the University Research Committee in February 2016.

The unit also coordinates the minor research dissertations for the MPhil in Mathematical Finance and the projects for Research Master's and PhD students in quantitative finance and areas of economic risk, which includes AIFMRM PhD and Postdoctoral Research Fellows. ACQuFRR provides a forum for collaboration and discussion between its academic members, students, and industry associates, visiting academics, and collaborators through weekly seminars and a series of special seminars.

Publications

In addition to various conference presentations and seminars, ACQuFRR members produced five research publications this year. The titles and publication details appear on our website.

Seminars, Workshops & Conferences

Hosting and attending research events forms part of the ongoing activities of a research unit. However, the industry alignment of ACQuFRR means that we have an obligation to offer our research and discussion to a wider audience. These events help to create awareness of the unit and to publicise its contribution to the broader conversation.

ACQuFRR held a weekly seminar series throughout 2018 during term-time. The MPhil in Mathematical Finance and the PhD students and Postdoctoral Research Fellows affiliated with the unit and AIFMRM are required to attend these. We also invite Johannesburg and Cape Town-based practitioners. The series brings together research-minded academics in AIFMRM, Finance and Actuarial Science with students and industry participants. Students are also expected to present dissertation and thesis work in this forum. We often include seminars from visitors in this series.

ACQuFRR hosted two special seminars outside of the above series in 2018.

Dr Jesper Andreasen from **Danske Bank, Copenhagen** presented a seminar entitled *Tough Volatility* in which he considered a stochastic volatility model where the stochastic volatility is driven by a fractional Brownian motion. This type of model has received considerable attention recently, primarily among academics. He motivated the model with empirical findings, analysed short-term behaviour for skew and minimum-variance delta, investigated intriguing links with market micro-structure models driven by Hawkes processes, and discussed numerical implementation.

Professor Emanuel Derman from **Columbia University** presented a seminar entitled *A Stylized History of Quantitative Finance.* Quantitative finance has evolved through many small but significant steps and some large breakthroughs. This talk outlined how, over the past 70 years, the field has quantified the concepts of diffusion, risk, volatility, the riskless rate, diversification, hedging, replication, and the principle of riskless no arbitrage, and explores their consequences for valuing financial securities.

One of our industry partners, Avior Capital Markets, collaborates with ACQuFRR in hosting **research seminars for their industry clients**. We co-organised one of these in 2018.

Dr Michael Wong from **City University of Hong Kong** presented a seminar on *Machine Learning and Fund Strategies: Another Case of Irrational Exuberance?* This seminar concentrated on:

- Building AI strategies: Support Vector Machines versus Deep Learning
- Are AI strategies better than other hedge fund strategies?
- How does Warren Buffett make superior investments? Implications for building AI strategies
- The downside of AI strategies in 2018

ACQuFRR is involved in the annual **Summer School in Mathematical Finance** held at the African Institute for Mathematical Sciences (AIMS) in Muizenberg. This year saw the eleventh edition of the Summer School. The Director of ACQuFRR plays a key role in inviting the three speakers for this event and uses this opportunity to create and strengthen ties with leading international academic figures.

2018's Summer School took place from 21 to 23 February. Our presenters this year were Dr Roger Lord (Cardano), Prof Tom McWalter (AIFMRM) and Dr Ralph Rudd (AIFMRM).

ACQuFRR research students are encouraged to attend the Summer School. The Summer School is free for full-time students at South African universities and AIMS. There were 52 students, academics and practitioners registered this year.

The Factory

ACQuFRR hosted a pioneering event in July this year. *The Factory* is an initiative that fosters and supports teams of researchers to advance knowledge in mathematical sciences on a topic of their choice. The teams consist of established, mid-career and young scientists. An important aim of this endeavour is collaboration among researchers across career stages and the enhancement of the mutual benefit team members derive.

Research is truly an exciting endeavour and discoveries made in collaboration can produce great satisfaction and a strong sense of friendship. Research co-operations are enriching and often lead to horizons extending in unexpected directions. Research partnerships bring people together irrespective of background. Passion for research and genuine curiosity is what binds them.

The international teams begin their research work several months before they travel to *The Factory*, often collaborating remotely through regular conference calls. At *The Factory*, a taxing work schedule awaits the teams: they have a few days to advance their working papers before undergoing two rounds of expert scrutiny and presentations to all participants on *The Factory*. The goal is the completion of a manuscript ready to be submitted for publication in a leading peer-reviewed journal.

In addition to encouraging research collaboration and contribution to scientific advancement, *The Factory* promotes knowledge exchange with developing and less established research communities worldwide. Other purposes are the transmission of skills from experienced to early-career scientists and the establishment of lasting links across the research profession.

Team Multicurve summary report: From 2 to 13 July 2018, "Team Multicurve" assembled at the University of Cape Town (UCT) for an intensive two weeks of research collaboration, dubbed *The Factory*. The objective was to accelerate a joint research project initiated over several months of Skype discussions during the first half of the year. This project was to be academically ambitious and relevant to financial industry practice.

The project revolved around the "multicurve" phenomenon which has been an established feature of markets ever since the financial crises of 2007/2008. In the context of a fixed income market in a single currency, this manifests itself in the form of distinct term structures of interest rates (i.e., discount curves) for different tenors: There is a spread between the discount curve implied by overnight index swaps (OIS) and the discount curve implied by vanilla interest rate swaps (IRS), where the floating leg of OIS references overnight rates (i.e., a daily rolling tenor) and the floating leg of IRS references a rate of longer tenor (e.g., three months in vanilla USD swaps). Similarly, there are single currency "basis swaps" swapping, say, a floating leg referencing a one–month rate plus a fixed spread against a floating leg referencing a three–month rate.

Starting from the observation that the multicurve phenomenon naturally arises from the impact of the risk of being unable to refinance short-term borrowing (which may be funding longer-term liabilities) at the market–quoted reference rate (perhaps due to having suffered a downgrade in

credit quality, or due to liquidity in the market freezing up to the extent that one is unable to find a counterparty willing to lend at the market–quoted rate), Team Multicurve developed a consistent framework in which this impact is expressed via conversion factors linking borrowing at different roll–over frequencies. In addition to contributing to a more thorough theoretical understanding of the multicurve phenomenon, this approach provides a consistent model of discount curves of *all* tenors - unlike the more *ad hoc* modelling currently used widely in the industry, which needs to introduce an additional spread dynamic for each new tenor frequency, and is silent on any "bespoke" tenor not directly observable in the market.

While the core paper describing the consistent multicurve framework is now in the process of being finalised, during the intense discussions at UCT it became clear that the scope of the project extends beyond a single research paper, and therefore two spin-off papers are also currently under development.

The first of these is highly relevant to the South African market, as it concerns inferring an OIS discount curve in an emerging economy lacking an active OIS market, but requiring an OIS discount curve to price collateralised derivative transactions appropriately. The framework described above enables us to construct, and estimate on time series data, a model of the joint dynamics of the South African Futures Exchange (SAFEX) overnight rate and the Johannesburg Interbank Agreed Rate (JIBAR), using all available data, i.e., SAFEX overnight, JIBAR, and JIBAR–based IRS. OIS discount factor dynamics can then be inferred in a manner consistent with the thus estimated roll–over risk dynamics.

The second spin-off paper builds on the observation that the modelling of a risk linking different tenors is akin to modelling a stochastic exchange rate linking term structures in domestic and foreign currency. This FX analogy has previously been applied to model inflation (i.e., stochastic real and nominal interest rates), commodities (i.e., stochastic interest rates and convenience yields), equities (i.e., stochastic interest rates and dividend yields), and credit risk. This can be exploited to develop a modular approach in which multiple sources of risk are easily combined and stochastic models easily reused for different purposes, reducing the overhead in model development, implementation and practical deployment.

Although work continues remotely via e-mail and Skype, this project would not have progressed to the point it has (with the core research paper being in the process of completion, and two related spin-off papers initiated) without the intense two weeks of undistracted face-to-face collaboration during *The Factory,* where this was augmented by the critical feedback of a dedicated expert in the field attending in the capacity of a reviewer, and additional collegial discussions with other academics and practitioners present at UCT for *The Factory* and for the Financial Mathematics Team Challenge.

"Team Multicurve" are Alex Backwell (University of Cape Town), Andrea Macrina (University College London and University of Cape Town), Erik Schlögl (University of Technology Sydney), and David Skovmand (University of Copenhagen). They are joined by Obeid Mahomed (University of Cape Town) and Mesias Alfeus (University of Technology Sydney) for the spin-off project on inferring a South African OIS discount curve.

The Fifth Financial Mathematics Team Challenge (FMTC)

One of the key aims of the FMTC is for South African postgraduate students in Financial and Insurance Mathematics to have the opportunity to focus on a topical, industry-relevant research project, while simultaneously developing links with international students and academics in the field. An allied purpose is to bring a variety of international researchers to South Africa to give them a glimpse of the dynamic environment that is developing at UCT in the African Institute of Financial Markets and Risk Management. The primary goal, however, is for students to learn to work in diverse teams and to be exposed to a healthy dose of fair competition.

The Fifth Financial Mathematics Team Challenge was held from the 26th of June to the 6th of July 2018. The challenge brought together four teams of Masters and PhD students from France, Germany, China, Ireland, South Africa and the UK to pursue intensive research in Financial Mathematics. Each team worked on a distinct research problem over the twelve days. Professional and academic experts from Switzerland, South Africa, and the UK individually mentored the teams; fostering teamwork and providing guidance. As they have in the past, the students applied themselves with remarkable commitment and energy.

This year's research included topical projects on (a) South African interest rate dynamics, (b) commitment scheduling for private equity investments, (c) portfolio optimisation under uncertainty, and on (d) the appropriateness of the LFMM model in South African interest rate markets. These were either proposed directly by our industry partners or chosen from areas of current relevance to the finance and insurance industry. In order to prepare the teams, guidance and preliminary reading was given to them a month before the meeting in Cape Town. During the final two days of the challenge, the teams presented their conclusions and solutions in extended seminar talks. The team whose research findings were adjudged to be the best was awarded a floating trophy.

Each team wrote a report containing a critical analysis of their research problem and the results that they obtained. These are collated in one volume that is available to future FMTC participants. It may also be of use and inspiration to Masters and PhD students in Financial and Insurance Mathematics. FMTC V was a great success, so 2019 and FMTC VI is already in the pipeline!

FMTC Brazil

This year we finally "exported" the FMTC idea to the rest of the world!

One of the key aims of the FMTC-BR is for Brazilian postgraduate students in Financial and Insurance Mathematics to have the opportunity to focus on a topical, industry-relevant research project, while simultaneously developing links with international students and academics in the field. An allied purpose is to bring a variety of international researchers to Brazil to give them a glimpse of the dynamic environment at the School of Applied Mathematics (EMAp) of the Fundac¸ ˜ao Getulio Vargas (FGV). The primary goal, however, is for students to learn to work in diverse teams and to be exposed to a healthy dose of fair competition.

Inspired by the success of the FMTC pioneered at the African Institute of Financial Markets and Risk Management (AIFMRM), University of Cape Town, in collaboration with University College London, EMAp/FGV was pleased to hold the first FMTC Brazil in Rio de Janeiro from 8th to 18th August 2018.

The Challenge brought together four teams of Masters and PhD students from Australia, Brazil, Canada and the USA to pursue intensive research in Financial Mathematics. Each team worked on a distinct research project for seven days and then presented their findings on the final two days in extended seminar talks. The teams were mentored by expert academics from Brazil, Canada, South Africa and the USA. Each research problem was proposed by the mentors and selected in topical research areas. In order to prepare each team for the Challenge, initial guidance and preliminary reading was given at the beginning of July. The team recognised for the highest-quality solution was awarded a floating trophy.

The research pursued by the four teams included projects on (a) Solving Challenging PDEs in Finance and Economics using Deep Learning, (b) (Machine) Learning the Greeks, (c) The LIBOR Forward Market Model and Emerging Market Swaption Implied Volatility Term Structures, and on (d) Machine Learning and Stochastic Control in Algorithmic Trading.

Each team wrote a report containing a critical analysis of their research problem and the results that they obtained. These are collated in one volume that is available to future FMTC participants. It may also be of use and inspiration to Masters and PhD students in Financial and Insurance Mathematics. FMTC V was a great success, so 2019 and FMTC VI is already in the pipeline!

Each team of students wrote a report on their findings. These are collated in one volume that is available to future FMTC-BR participants. It may also be of use and inspiration to Masters and PhD students in Financial and Insurance Mathematics.

The teams enjoyed a welcoming, well-equipped and motivating work environment. Our gaze is set on organising the next FMTC-BR!

Postdoctoral Research Fellows

ACQuFRR/AIFMRM has five, full-time, postdoctoral research fellows – Dr Suraj Shekar, Dr Daniel Opolot, Dr Jesper Riedler, Dr Ralph Rudd and Dr Alex Backwell.

Dr Shekhar's research includes both theoretical and empirical Microeconomics, with a focus on the former. His work on theoretical Microeconomics studies models of asymmetric information, Spinoffs, and the impact of regulatory change on incentives and welfare. His empirical work looks at the social networks and issues in Development Economics. Dr Shekhar's work on signalling in firm formation - "Signalling, Reputation and Spinoffs" was published in the Journal of Economic Behaviour and Organization in May 2018. In March-April 2018, Dr Shekhar taught one-third of the Econometrics course offered to the MCom class. His co-authored paper on the importance of academic networks for student placement with a former PhD student from AIFMRM (Michael Rose) was accepted for a poster presentation at the 7th Workshop on Networks in Economics and Finance which was held at the IMT School for Advanced Studies, Lucca. His other internal collaboration involves a paper highlighting a new channel through which increased regulatory activity can be welfare reducing (with Co-Pierre Georg). Additionally, he has research projects which study Self Help Groups in India (empirical, with Souvik Dutta and Abhirup Sarkar), and another paper in which he looks at the impact of a spinoff on its parent firm. While at AIFMRM, Dr Shekhar submitted his theoretical work on the US audit market and his work on ethnic conflicts for publication. In 2018, Dr Shekhar presented his

research at Stellenbosch University, and at two international conferences - the 71st Econometric Society European Meetings held at the University of Cologne, and the XXXIII Jornadas de Economía Industrial held at the University of Barcelona.

Dr Opolot's primary research interests are in Game Theory (evolutionary game theory and models of social learning), Social Network Analysis and Economics of Science. His research involves both theoretical and empirical analysis. In the former, he combines models of game theory and social network analysis to study how different structures in which people interact affect diffusion of products and behavior. The empirical part of his research uses data on co-authorship and acknowledgements to examine how collaboration among scientists impacts knowledge sharing and productivity. Dr Opolot has written five research papers in total since joining AIFMRM in Sept. 2016 (two were completed within 2018 academic year). Three of these papers (on product diffusion and opinion formation in social networks) are currently under review in academic journals and one has a Revise & Resubmit status in Mathematical Social Sciences journal. Of the five papers, three are single authored, one is co-authored with Pof. Azomahou Theophile from Maastricth University, and the other is co-authored with Co-Pierre Georg and Michael Rose (both are affiliated to AIFMRM). In the past year alone, Dr Opolot has presented his work in seminars: Stellenbosch University Economics Department, School of Economics UCT, and two AIFMRM internal seminars. His paper on "Word of mouth leaning in social networks" was accepted for presentation at Asian Econometric Society conference in Seoul, Korea. Besides conducting research activities, he has helped with tutoring a course (Market Risk) for the MCom class.

Dr Riedler's research focuses on the impact of regulation and monetary policy on financial markets and the real sector. He is currently involved in an international research collaboration studying the effects of unconventional monetary policy on financial markets. The project is funded by the Volkswagen Stiftung and includes researchers from Goethe University (Germany), New York University (USA), Xiamen University (China) and Waseda University (Japan). Dr Riedler's part of the project involves developing a multi-country model of financial markets in order to analyze the effects of large scale asset purchases by central banks on asset prices, exchange rates and the yield curve. In other work, Dr Riedler analyzes the impact of liquidity regulation on the banking sector. His findings suggest that the liquidity coverage ratio will reduce the loan supply to the real sector, decrease the average maturity of banks' assets and adversely affect the functioning of the short-term interbank market. Furthermore, the liquidity coverage ratio has an ambiguous effect on financial stability. While commercial banks are stabilized, liquidity risk shifts into the less regulated shadow banking sector, which leads to an increases systemic risk in the financial system.

Dr Rudd began his post-doctoral work at the institute in July 2018. His research is focused on numerical methods in finance, specifically the numerical solutions to stochastic differential equations. In 2018 he co-authored a chapter entitled "Quantization Methods for Stochastic Differential Equations" for a new Springer book. His work with Prof Eric Schlögl from the 2016 FMTC was turned into a paper and submitted to the Review of Finance in October.
His latest paper, "Quantizing Stochastic Volatility Models" is already available online and is currently being finalized for submission. He is presenting this work at the Quantitative Methods in Finance conference in Sydney in December.

Dr Backwell took up his Postdoctoral Fellowship with AIFMRM in July 2018. His first research goal has been to continue his PhD work, with a focus on submitting papers to high-quality journals. His PhD

work has been significantly improved during the Fellowship, and has been accepted for presentation at the Quantitative Methods in Finance Conference in Sydney in December 2018. His first journal submission will take place in early 2019. His second research goal has been to broaden his research areas; to this end, Dr Backwell participated in the first instance of *The Factory* in July 2018, a collaborative research event lasting about ten days. His Factory team was led by Prof Erik Schlögl, and tackled the topical problem non-zero tenor spreads (i.e., multiple interest rate curves). The team collaborated throughout the year, both before and after the intensive work done in Cape Town in July, and are close to completing the first of two papers expected to result from their work on the problem.

PhD Students

ACQuFRR had twelve full-time and part-time PhD students this year – Mr Obeid Mahomed, Mr Alex Backwell, Mr Ralph Rudd, Mr Mario Giuricich, Mr Andrew Soane, Mr Michael Rose, Miss Tina Koziol, Mr Allan Davids, Mrs Esti Kemp, Mr Qobolwakhe Dube, Ms Nolwazi Hlophe and Ms Sabine Bertram.

Mr Mahomed was appointed as a full-time lecturer in AIFMRM in January 2015 and confirmed as a tenured member of staff in April 2018. He lectures on all three of AIFMRM's degrees, and is registered as a full-time PhD student since 2015, having upgraded his Master's degree in 2014. His thesis is entitled Alternative Asset Pricing: Information and Calibration, and he is supervised by Associate Professor David Taylor. His research has resulted in three potential research papers: Consistent Valuation Across Curves using Pricing Kernels (published in Risks in February 2018); A General Libor Model using Pricing Kernels; and Asset Pricing in Emerging Markets. The results from these papers will constitute his thesis. During 2018 he presented his research at the 10th World Congress of the Bachelier Finance Society, while also assisting in various other projects and events undertaken by AIFMRM.

Dr Backwell submitted and finalised his PhD in 2018. He graduated from the MPhil in Mathematical Finance in 2013, and shortly after began his doctorate. He submitted his thesis approximately four years later, which addresses stochastic volatility in the context of interest-rate markets, from both empirical and theoretical perspectives. Dr Backwell presented his work several times during his PhD, including at the 9th World Congress of the Bachelier Finance Society in New York, and at the 6th Mathematics in Finance Conference in the Kruger Park. His supervisors were **Associate Profs David Taylor and Peter Ouwehand and Adjunct Associate Prof Andrea Macrina**. During the PhD, Dr Backwell was involved in teaching – both assisting in the MPhil in Mathematical Finance and lecturing undergraduates in Actuarial Science – and the supervision of several minor dissertations. He was financially supported by AIFMRM, UCT and the NRF. **Dr Backwell will graduate in December 2018.**

Dr Rudd graduated from the MPhil in Mathematical Finance in 2013 and obtained his PhD in Quantitative Finance in 2018. He was co-supervised by **Adjunct Associate Profs Thomas McWalter (UCT) and Jörg Kienitz (Quaternion Risk Management, University of Wuppertal and UCT) and Honorary Prof Eckhard Platen (University of Technology Sydney (UTS) and UCT)**.
In 2016, Dr Rudd presented the first part of his thesis work at the 9th World Congress of the Bachelier Finance Society in New York. He then led his to team to victory at the third annual Financial Mathematics Team Challenge (FMTC) under the supervision of Prof Eric Schlögl from UTS. The project concerned determining an optimal calibration frequency using a model risk criterion. In 2017, he presented the further developments of his thesis work at the Global Derivatives Trading and Risk

Management conference in Barcelona as well as at the 13th WBS Fixed Income Conference in Florence. He also became the first team leader to win two FMTC trophies. The project investigated the efficiency and stability of risk parity portfolios and was supervised by Prof Rodrigo Targino from the Getulio Vargas Foundation in Brazil. The first paper of his PhD thesis was published in Quantitative Finance in January 2018, the same month he submitted his PhD thesis, "Recursive Marginal Quantization: Extensions and Applications in Finance". He was awarded the degree in June. He has been lecturing the Mathematical Computing Skills pre-course for the MPhil in Mathematical Finance since 2015. He has been financially supported by AIFMRM, BANKSETA, and RMB. **Dr Rudd graduated in June 2018.**

Dr Giuricich was awarded his PhD in Quantitative Finance in October 2018. He was co-supervised by **Associate Professor Peter Ouwehand (University of Cape Town, South Africa), Professor Krzysztof Burnecki (Wroclaw University of Science and Technology, Poland) and Professor Eckhard Platen (University of Technology Sydney, Australia)**. Hi key research areas are broad, but principally centres on topics lying within the intersection of the two fields of insurance mathematics and quantitative finance. His PhD thesis concerns itself with index-linked catastrophe instrument valuation, a topic lying at the heart of his research area of interest. His thesis treated the question as to how one could value such instruments on the basis of real-world catastrophe loss data. However, the highlight of his work concerned the introduction of a new catastrophe-risk securitisation based on traditional contingent convertible bonds issued by banks. Despite his research, Mr Giuricich is also a passionate teacher and enjoys actively engaging with his students. **Dr Giuricich will graduate in December 2018.**

Dr Rose joined ACQuFRR in April 2015. He holds an MSc in Quantitative Economics from Kiel University and visited the Kiel Institute for the World Economy's Advanced Studies Program before joining UCT. Under the supervision of **Dr Co-Pierre Georg**, he works on Collaboration Networks in Economics Science. In 2018, he ended his research stay at Scheller College of Business where he conducted research on the Economics of Science with his colleague Alex Oettl. For this research stay, he won a Murray-Jelks Scholarship for International Travel from UCT. Since June 2018, Michael Rose is Post-Doctoral Researcher at the Max Planck Institute for Innovation and Competition in Munich, Germany. He will receive his PhD in fall 2018. **Dr Rose will graduate in December 2018.**

Mrs Kemp joined ACQuFRR in April 2016. She holds an MCom in Econometrics from the University of Pretoria and is currently an employee in the Financial Stability Department of the South Africa Reserve Bank. Under the supervision of **Dr Co-Pierre Georg**, she works on Shadow banking in South Africa. She has presented her work at UCT's School of Economics, as well as the Southern African Finance Association Conference. She is financially supported by ACQuFRR.

Miss Koziol pursues a PhD in Economics under the supervision of **Dr Co-Pierre Georg** since April 2016. She is writing her thesis as part of a project on Quantitative Easing and Financial (In)stability, investigating spillover effects associated with unconventional monetary policy. The project forms part of an international collaboration with academics from universities in Germany, the US, China and Japan. Miss Koziol's work also includes research on stress amplification mechanisms in the banking system. She presented her work on modelling fire-sale externalities in the South African banking sector at the SARB's workshop for financial stability in October last year. She is supported by ACQuFRR and is expected to graduate in Q2 2019.

Mr Davids joined ACQuFRR in August 2016. He holds a MCom (Cum Laude) in Economics and is currently in the second year of his PhD, which focusses on various aspects of housing finance in South Africa. During 2018, Allan was awarded a financial stability research grant from the South African Reserve Bank to study the relationship between international capital flows and house prices, work which he has already presented at a Financial Stability workshop at Waseda University in Tokyo. In 2019, Allan will spend a semester at the Brevan Howard Centre for Financial Analysis at Imperial College to further his research. Allan is financially supported by the Volkswagen Institute and ACQuFRR.

Mr Dube joined ACQuFRR in February 2017. He holds an MCom in Risk Management of Financial Markets from UCT. His research focuses on topics relating to systemic risk and market microstructure. This research is being conducted in collaboration with the Capital Markets Cooperative Research Centre in Sydney, Australia.

Ms Hlophe joined ACQuFRR in March this year. She holds an MCom in Economics from the University of Pretoria and is currently an employee in the Financial Stability Unit of the Central Bank of Swaziland. Under the supervision of **Dr Co-Pierre Georg**, she works on Shadow Banking and the Future of Financial Intermediation. She is financially supported by ACQuFRR.

Mr Soane joined ACQuFRR in June this year. He holds an MPhil in Financial Mathematics from UCT. Under the supervision of **Assoc. Prof. Peter Ouwehand** he has been working in the field of enlargement of filtrations and its impact on quantitative finance, in particular, the impact that enlarged filtrations have on optimal stopping problems.

Miss Bertram joined us in January of this year and is studying privacy in distributed systems under the supervision of **Dr Co-Pierre Georg**. In her first paper, she is developing a privacy-preserving system for data ownership using blockchain and distributed databases, together with Dr Georg. Starting in November 2018, she will intern with Coil, a start-up based in San Francisco that is creating a new way to monetize web content using fiat and cryptocurrencies. She is pursuing her PhD in Quantitative Finance, being financially supported by AIFMRM & ACQuFRR.

All of our Master's and PhD students are housed in the RMB Loft on the 6th floor of the Leslie Commerce Building at UCT.

Research Funding

Beneficiary	Source	Value
ACQuFRR	AIFMRM Annual Funding	R450,000
ACQuFRR	Colourfield	R 75,000

Visitors

Honorary Professor Peter Ritchken spent an extended period with us in February and March.

Adjunct and Honorary Positions

One of the ways to strengthen quantitative finance at UCT is through appointing adjunct staff. This is a process where candidates are nominated and selected in a rigorous fashion for (usually unpaid) academic posts that hold all the benefits of rank. Payment and support of adjunct staff is normally funded through external sources. Adjunct staff are allowed to access UCT research funding and often perform the usual duties of a member of staff including research supervision and teaching.

Dr Tom McWalter, Dr Jörg Kienitz, Mrs Tanja Tippett and Dr Andrea Macrina are all Adjunct Associate Professors in AIFMRM and carry the title of Associate Professor while they are working at UCT. Prof Eckhard Platen and Prof Peter Ritchken are Honorary Professors.

Quantitative finance and risk research at UCT is in a strong position. The MPhil in Mathematical Finance and the MCom in Risk Management of Financial Markets attract some outstanding students each year, bearing testament to our reputation for quality and rigour.

The addition of staff members through honorary, adjunct and full-time appointments in AIFMRM, and the variety of visitors that we host augments the profile of the area in the university and (South) Africa and inspires the students. We have a strong presence on the Commerce Faculty Facebook page. Additional staff and research students help create a "critical mass" that allows the programme to expand and flourish in its activities.

A/Prof David R Taylor
Director – ACQuFRR

5 November 2018