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EDUCATION

- 2001 **Awarded Lindemann's Research Fellowship**, a competitive fellowship open to all postdoctoral scientists researching in natural sciences under 30 across the UK.
- 1998 – 2000 University of Cambridge
Post Doctoral Research Associate
- 1994 – 1998 Optoelectronics Group, Physics Department, University of Cambridge.
Ph.D. Thesis title: Electrodynamics of Mesoscopically Structured Systems.
- 1993 – 1994 St. John's College, University of Cambridge.
Part III Mathematics: Courses in Theoretical Physics — Quantum Field Theory, Statistical Field Theory and Lie Algebras.
- 1990 – 1993 St. John's College, University of Cambridge.
B.A. Honours Natural Sciences (Physics) 2:1. Thesis on Applications of Clifford Algebras to General Relativity. Class: 1
- 1983 – 1990 Wolverhampton Grammar School, Wolverhampton.
STEP: Mathematics, Physics – both at S (Outstanding.)
A Levels: Mathematics(A), Further Mathematics(A), Physics(A), Chemistry(A) & Biology(A)
GCSE: Maths, Physics, Biology, Chemistry, History, Geography, English Lit., English Lang., French, Maths, Maths(AO) – all at grade A.

PROFESSIONAL EXPERIENCE

- 09/2021 **Senior Quantitative Research Engineer**
 EDHEC-Risk Institute
- 05/18 – 06/21 **Senior Technical Specialist, Supervisory Risk Specialists**
 PRA, Bank of England
 Focus on Libor RFR transition, FRTB, Model Risk Management, Algorithmic Trading and review / approval of trading book models.

- Developed supervisory approach to industry wide Libor RFR transition including quantification, assessment and tracking of firms' progress. Also responsible for developing PRA approach to approving model changes required in light of Libor transition.
- Review/approvals of risk management and modelling practice across a number of PRA regulated Tier 1 firms.

09/14 – 03/18 **Head of Model Risk Management**

Royal Bank of Scotland

Manage team of 40 – 50, based in London, Edinburgh, Gurgaon and Stamford.

- Responsible for design and implementation of model risk management across all parts of RBS. This entails ensuring all models are identified, appropriate business ownership, oversight committees are in place & specific procedures (aligned by business area) detailing requirements for managing model lifecycles are agreed and documented. Attend the senior meetings providing approval and feedback on limitations and missing risks, model applicability. Faced off to heads of lines of business, desk heads as well as senior Finance and Risk personnel.
- Responsible for independent validation of models including:
 - o all models used for the trading book (derivative valuation, XVA, algorithmic trading, risk models e.g., VaR, SIMM, counterparty credit)
 - o banking book credit IRB (PD, LGD, EAD) and provisioning (IFRS9) models
 - o Pillar 2 capitalisation approaches i.e., models used for PBIL, stress testing, economic capital and treasury risk modelling.
 - o Manage the Model Risk relationship with the external auditors in respect of modelled valuations for the investment bank and also provisioning (both IFRS9 and IAS39).
 - o Extensive and regular engagement with Internal Audit and Regulators (UK, US and European) as part of their reviews of valuation, risk measurement, capital adequacy and stress testing processes.

Key Achievements

1- In response to a S166 investigation into RBS stress testing capabilities:

- I was responsible for remediating approximately 50% of all identified issues. We did this by designing and implementing a model risk framework for all stress testing models.
- All models with a material impact on the BoE ST were validated in advance of the 2017 ST exercise — highlighting to the business weaknesses, and positions of particular vulnerability.
- Presentations to RBS board on key underlying risk factors as well as required enhancements to modelling infrastructure.
- The remediation efforts were approved by BoE with the capital multiplier on models successfully removed.

2- Developed the firms approach for computing IRRBB, remediating issues with the current approach which would have led to additional capital requirements of 700MM.

- 3- Led review and creation of governance for the Standard Initial Margin Model (mid 2016). Rep- resented RBS to the NY Federal Reserve successfully — review work, risk identification, control processes all deemed to be high quality. Development of approach for computation of SIMM into IM.
- 4- Responded to cost challenges — offshored to India by hiring a team of 15 in Gurgaon / Mumbai over the course of 2016/7 replacing onshore attritional losses. Developed specific training programs, established a management structure in India as well as carefully designed offshore activities to most effectively support the onshore team.
- 5- Extensive collaboration with a number of areas to implement a control framework as machine learning / algorithmic approaches (used e.g., to benchmark Libor submissions, swap trading, FX hedging) become more prevalent to assess modelling and data infrastructure.
- 6- Revised firms approach for assessing all risks associated with non standard deals in Markets. Further development & embedding of product taxonomy (originally developed as part of model review process by Model Risk in 2008) in Markets.
- 7- Developed RBS approach for Significant Risk Transfer for securitisations, gaining regulatory ap- proval in 2016.

01/12 – 09/14 **Head of Pricing Model Review & Development of Market Risk Models**

Royal Bank of Scotland

Led a team of 30 individuals based in London, Amsterdam and Stamford.

Responsible for validating the models used for pricing and risk managing derivative products — across all asset classes including equities, fixed income, credit and commodities, XVA, counterparty credit risk models and from 2013 the review of market risk models.

Prior to this (2011 - 3), responsible for development of market risk models such as VaR & RNIV's.

Key Achievements

- 1- Developed & implemented approach for ensuring SR11/7 compliance for RBS US investment bank over the course of 2014. Approved by Boston Federal Reserve.
- 2- Over 2012—4, headed up the development and implementation of a revised credit VaR model — used to capitalise traded credit risk (CDS and bonds) as well as CVA risk.
- 3- 2010/1 — in reviewing CLN pricing, we demonstrated the impact of contingent funding on the valuation of derivatives later entitled FVA. Demonstrated its importance to Markets business (across a range of products e.g., Equity Linked & CLN as well as other MTN) prior to widespread market recognition of these effects. Whether and how FVA was incorporated into RBS accounts was escalated to the board. Through our early identification of the issues and close work with the desk, the investment bank was better able to manage its positions, FBA and the accounting volatility.

- 4- 2011 — designed significant updates of RBSs interest rate VaR model, better modelling empirical behaviour (models perform well in current low flat yield curves scenarios) and allows for the possibility of (realistic) negative rates. Revised models enable the firm to carry out stress testing meaningfully.
- 5- 2010/1 — Development of the CRM (Comprehensive Risk Model), a regulatory capital charge associated with corporate CDOs involving computation of 99.9% risk at a 1 year horizon. Model successfully developed and approved by regulator.
- 6- Over the course of 2008/9, responsible for reviewing and highlighting the shortcomings associated with the models used for the valuation of CDO of subprime mortgage backed ABS, as well as issues with the way in which monoline positions were marked. Communicated the shortcomings to the IB board and the Group CRO and CFO. Developed models for valuing CDO of ABS and monoline insurance.

5/05 – 01/12 **Head of QuaRC (Pricing Model Review)**

Royal Bank of Scotland

- Head of team responsible for the review of pricing models across RBS Group.

2001 – 04/05 **Deputy Head of QuaRC**

Royal Bank of Scotland

- Promoted to senior manager in 2004, and deputy head of the team around this time.
- Joined RBS Group Market Risk in 2001 reporting into Riccardo Rebonato, Head of M.

2000 – 2001 **Quant**

Five Tree Capital

Key Achievements

- 1- In 2009 / 10 I designed and built the pricing model governance framework in RBS. Created policies and established a database of modelled products capturing specifics of products traded & status of model approval. In conjunction with the business established processes to report on materiality of modelled products as well as quantum of valuation uncertainty.
- 2- Responsible for review of pricing models across a variety of asset classes, including rates, equities, long dated FX, structured credit and physical commodities. Responsible for independent model validation library (C++ with excel interface). Coded all major models used — including e.g., Hull White, dual currency Hull White, Gaussian copula, stochastic and local volatility for equities, FX, rights to manage power stations and gas storage.

PRESENTATIONS AND PRIZES

- Regular speaker at Global Derivatives, Risk training, Valuation & Model Validation conferences.
- Represent RBS at industry working groups — e.g., on securitisation, treatment of XVA, risk capital.

- Authored a number of research papers in mathematical Finance / banking.
 - Discounting Uncollateralised Derivatives
 - Inflation-Linked Derivatives
 - Analysis of new Regulatory Proposals for Capitalisation of Securitisations
 - Rapid computation of prices and deltas of nth to default swaps in the Li Model
 - An approach to computing the Comprehensive Risk Measure
 - Modelling the FX Skew
 - An arbitrage-free method for smile extrapolation
 - Enhancements to the Longstaff-Schwartz Algorithm for bounding Callable Libor Exotics
 - A two-regime stochastic-volatility extension of the LMM
 - Pricing Closely Correlated CDS
 - Credit VaR
- Shortlisted for / awarded a number of research fellowships during academic research career:
 - Awarded a Lindemann's Research Fellowship, 2000
 - Shortlisted for a Royal Society Advanced Research Fellowship (early in my academic career) and St. John's College Junior Research Fellowship, 1999
- Academic research published in several international journals & presented work at international conferences.
- College prizes for University exam results (first/second year); academic and sporting prizes throughout school including a silver medal at the British Physics Olympiad.