Financial Engineering Workshops @ Bayes Business School (formerly Cass)
Autumn 2022

https://www.bayes.city.ac.uk/faculties-and-research/finance/education-and-events/financial-engineering-workshops

9/11/22: Nicholas Burgess, XP Investments

Title: Interest Rate Markets - Theory, Pricing & Practice

Abstract

Throughout the discussion we aim to expose the audience to interest rate markets, both the theory and practice. The primary function of interest rate markets is to bring together borrowers and lenders to facilitate the finance of government and corporate projects. It is a market that facilitates more than USD 370 trillion of loan, mortgage and other rates transactions globally. The financing of large-scale projects bears many risks. We explain these risks and introduce the wide variety of swap instruments available in the financial marketplace created to manage them. Secondary to this, interest rate markets are undergoing notable change and reform and we discuss the current state of interest rate markets to understand the impact of these changes on existing market protocols.

An overview of linear interest rate products will be presented, including interest rate swaps, overnight indexed swaps, risk-free indexed swaps, tenor basis and cross currency basis swaps, asset swaps as well as credit default swaps to complete the picture. We will touch upon yield curve modelling as it is an essential requirement to be able to price interest rate products. We will also introduce advanced topics and hot industry trends, such as the use of Automatic Adjoint Differentiation (AAD) for ultra-fast curve construction and efficient risk calculations. Whilst presenting products and models we endeavour to reflect upon the impact of ongoing market changes being brought about by LIBOR benchmark reform.

Bio

Nicholas has a breadth of practitioner experience accumulated from having worked on trading floors internationally as a Quant for many large investment banks, hedge funds and financial institutions including Citigroup, UBS, Credit Suisse, Bank of America, CQS Hedge Fund, Deutsche Bank, Commerzbank, Société Générale, ANZ, MUFG, Mizuho, HSBC and currently XP Investments. This has allowed the author to gain broad insight and exposure to the trading, pricing and risk management of interest rates, fixed income, equities, credit, commodities, FX, hybrids & exotics, inflation and XVA. Recently he worked as the Head of Quant Research and Analytics for Mizuho specializing in electronic swaps trading, low latency pricing and risk analytics. Currently he manages the core Quant teams covering FICC, Equities and XVA at XP Inc in Brazil.

He is well-qualified having read financial strategy at Saïd Business School, University of Oxford with post-graduate research in machine learning and algorithmic trading strategies. He also read quant finance at Henley Business School and Mathematics at the University of Manchester. He enjoys researching the latest trends in financial markets. Over the course of his professional and academic

career the author has written and published many quantitative and finance research papers, see https://ssrn.com/author=1728976 for more information

16/11/22: Lech Grzelak, Front Office Quantitative Analyst at Rabobank, and Assistant Professor at Utrecht University

Title: On Randomization of Affine Diffusion Processes, with Application to Pricing of Options on VIX and S&P 500

Abstract - TBC

Bio- TBC

23/11/22: Jörg Kienitz, Partner – Quaternion Risk Management

Title: Semi-Analytic Conditional Expectations

Abstract

We introduce a data driven and model free approach for computing conditional expectations. The new method combines Gaussian Mean Mixture models with classic analytic techniques based on the properties of the Gaussian distribution. We can also incorporate a proxy hedge that leads to analytic expressions for a hedge with respect to the chosen proxy. We apply our method to the calibration of pricing within stochastic local volatility models and Bermudan options and briefly mention other applications.

Bio

Jörg Kienitz is a partner at Quaternion, Acadia's Quant Services division. He owns the finciraptor.de website - an educational platform for Quantitative Finance and Machine Learning. Jörg consults on the development, implementation, and validation of quantitative models. He is an Assistant Professor at the University of Wuppertal and an Adjunct Associate Professor in AIFMRM at the University of Cape Town. He regularly addresses major conferences, including Quant Minds, RISK or the WBS Quant Conference. Jörg has authored four books, Monte Carlo Frameworks (with Daniel J. Duffy), Financial Modelling (with Daniel Wetterau), and Interest Rate Derivatives Explained I and II (with Peter Caspers). He also co-authored research articles that appeared in leading journals like Quantitative Finance, RISK or Mathematics in Industry.

30/11/2022: Roberto Baviera, Professor of Financial Engineering, Politecnico di Milano

Title: A fast Monte Carlo scheme for additive processes and option pricing

Abstract

In this paper, we present a fast Monte Carlo scheme for additive processes. We analyze in detail numerical error sources and propose a technique that reduces the two major sources of error. We also compare our results with a benchmark method: the jump simulation with Gaussian approximation. We show an application to additive normal tempered stable processes, a class of additive processes that calibrates "exactly" the implied volatility surface. Numerical results are relevant. The algorithm is an accurate tool for pricing path-dependent discretely-monitoring options with errors of one bp or below. The scheme is also fast: the computational time is of the same order of magnitude of standard algorithms for Brownian motions.

Bio - TBC

7/12/2022: Emanuele Nastasi, Quant Engineer at swissQuant

Title: Pricing Commodity Swing Options

Abstract

Swing options are a fairly common type of contract in energy markets, such as gas or electricity. These contracts allow the buyer to choose, on a typically daily basis and during a certain time window, the quantity of energy to be delivered within daily and global volume constraints. The delivery price can be decided at inception or can be determined on the basis of a market index, before the delivery period. From a modeling point of view, the pricing of these contracts presents two problems: on the one hand, the definition of a volatility model that is consistent with the liquid hedge instruments, such as the Forwards and Plain Vanillas on them and on the other hand, the solution of the stochastic control problem for the optimal delivery strategies. In this presentation, taking the natural gas market as an example, we describe a new model efficiently calibrated on the liquid market quotes and able to imply volatility smiles for different delivery tenors in a parsimonious way. Furthermore, for the solution of the control problem, we compare a new approach based on Reinforcement Learning techniques with the classic Least Squares Monte Carlo approach and we discuss possible future developments based on the new approach.

Bio

Born and raised in Rome, Emanuele earned a master's degree in Theoretical Physics with full marks at Sapienza Univeristà di Roma and then a PhD in Mathematical Engineering at Politecnico di Milano. His doctoral course is focused on mathematical finance topics and on the pricing of derivative contracts as well as his thesis where he addressed the problem of the pricing of derivatives written on multiple underlying assets. Six months before the thesis defense he begins his career in the financial industry by joining the Financial Engineering group of Banca IMI. During this experience he developed production models for the evaluation of exotic derivatives for the Equity, FX and Commodity desks. After four years at Banca IMI, Emanuele joins the gas shipper ENOI as head of the risk desk where he remains for a year, and then the consultancy company swissQuant Group in the role of Quant Engineer.