Marco Marchioro, Ph.D.

E-mail: marco at marchioro dot org
Linked-in: linkedin.com
Web: www.marchioro.org

PROFILE SUMMARY

Crypto quant, Blockchain, Algo Trading, Algorand, QuantLib founder

Crypto-quant, expert both in traditional financial engineering and blockchain technologies (smart contracts), time-series modeling for alpha generation, Algorand (PyTeal and Reach), and academic education.

Short BIO

Marco is currently the Chief Quant Analyst at Quant Island and advisor to a number of blockchain startups. He designed and developed a number of quant models for crypto trading such as the Christina model, available at https://dev.cryptoaidashboard.com, and the private Helena model. Formerly he was the Chief Scientist of the DeFi project DEXTF where he worked directly on the development of the most critical smart contracts. He can design and write smart contracts on multiple blockchains and in multiple languages. On the Algorand blockchain he has written smart contracts both in PyTeal and Reach.

Marco started his career as a Quant in traditional finance: derivative pricing, risk management, performance measurement, stochastic processes, and in quant research. During his career he created a new method to combine risk and performance measurements, which is still being used today to manage billions of dollars across multiple firms. He is also fluent in several natural and programming languages; has many years of professional experience in software development, agile programming, and test-driven development.

Academically, he was an adjunct professor both in Italy and in Singapore. He received his Master of Science and Doctor of Philosophy from The Johns Hopkins University in Baltimore, Maryland, and the title of Doctor in Physics from the University of Milan, Italy.

Job Experience

Chief Quantitative Analyst, Quant Island Pte. Ltd, Singapore **2013-Present**

Quant Island is a fintech-certified quantitative-finance consulting firm in Singapore. The firm is currently developing the public Christina model: https://dev.cryptoaidashboard.com/ aimed to the general public, as well as the more sophisticated private version: the Helena model. Marco is the creator of both the above projects, however, also writes smart contracts for the Algorand blockchain both in PyTeal and Reach.

Protocol Scientist, Memento Blockchain Pte. Ltd., Singapore **2019-Present**

DeFi protocol leader, responsible for the smart contracts and the analytics of the DOMANI project. Works on both the Algorand and the Ethereum blockchains to develop fully decentralized solutions for Digital Asset Management (native-digital funds). Builds links with many other DeFi projects such as Uniswap, Opyn, UMA, SetProtocol, AAVE, Compound and others. Develops and deploys Solidity smart contracts with Truffle and Hardhat. Uses the Reach and the PyTeal languages to write formally-verified Dapps on the Algorand blockchain.

Data Scientist, Poseidon, Malta **2018-2019**

Applied data-science techniques and quantitative finance to the field of crypto Carbon Credits tok-enized on the Stellar blockchain.

Lecturer, ESSEC Business School, Singapore **2018-2019**

Lecturer of *Stochastic Processes in Continuous Time* for the *Master in Finance 2018-2019*. The class covered the basic definition of stochastic processes with an emphasis on Martingales, no-arbitrage theory, stochastic calculus, and the basis of asset pricing according to the standard model.

Chief Analytics Officer, Hottab, Hanoi (Vietnam) and Singapore **2016-2019**

Responsible for the company data-science team and the research and development of the hospitality analytics.

Chief Research Advisor, the StatPro Group, Worldwide **2013-2018**
Cooperates with the quantitative-research team to create original and innovative research in the field of liquidity risk (especially applied to the bond market) and other financial topics. Independently carries out model validation for pricing functions and risk analytics. Performs in-person and web training on advanced topics in quantitative analytics: risk modeling, fundamentals of derivative pricing, fixed-income attribution for both performance and risk.

Adjunct Professor, Università degli Studi di Milano-Bicocca, Milan, Italy **2010-2014**
Lectured *Interest-Rate Derivatives* (providing 5 course credits) for the *Advanced Derivatives* class of the Master Program in Economics and Finance (*Laurea Magistrale in Economia e Finanza*). Class slides and papers are available at www.marchioro.org. Served as thesis advisor for master and Ph.D. students.

Head of Quantitative Research, StatPro, Milan, Italy **2010-2013**
Managed the quantitative research group of StatPro—the cutting-edge innovation arm of the whole company. Liaised with universities and the academic world in order to maintain the highest quality for the StatPro analytics. Responsible for the creation of new models for pricing functions, risk analytics, and performance measurements. Was responsible for the validation of quantitative models used by the StatPro analytics (including StatPro Revolution). Conducted training on quantitative finance both internally for StatPro personnel, and externally for clients. Supervised the maintenance and the documentation of a library with over two hundred pricing functions.

Head of the Quantitative Analysis Group, StatPro, Milan, Italy **2006-2010**
Managed the quantitative-analysis group that performed R&D of pricing functions and risk analytics. Was responsible for the overall quality of prices and risk figures computed by the StatPro suite. Conducted the internal and external training on quantitative finance.

Head of Risk Development, StatPro, Milan, Italy **2003-2006**
Managed a group of financial engineers, software developers, and software architects, developing and maintaining the StatPro Risk Suite: Risk API (SRM API), Risk Service (SRS), StatPro Pricing Library (SPL), Risk Management Product (SRM). Conducted research on pricing models and risk management applications. Coordinated with other development groups of StatPro worldwide.

Quant Developer, StatPro Italia (formerly known as RiskMap), Milan, Italy **2000-2003**
Cofounded RiskMap, a risk-management software firm. Researched and developed the software, the database, and the risk engine used by the RiskMap suite. Was one of the three cofounders of QuantLib, the leading open-source project for quantitative finance.

Research Associate, City College of New York, New York City, New York, USA **1998-2000**
Conducted original research in computational fluid dynamics. Developed software to evaluate the particle diffusivity of suspensions using Monte Carlo simulations. Advisor: Andreas Acrivos

Research Assistant, Johns Hopkins University, Baltimore, Maryland, USA **1994-1999**
Conducted original research in computational fluid dynamics, computational heat transfer, and applied statistical mechanics. The research work resulted in the publication of several papers on the subject of multiphase flows in leading refereed journals, of several papers on the subject of multiphase flows.

Teaching Assistant, Johns Hopkins University, Baltimore, Maryland, USA **1995-1999**
Lectured, graded papers, and supervised laboratory experiments for both graduate and undergraduate students on courses including graduate-level mathematics and fluid dynamics.

Education

Ph.D., Johns Hopkins University, Baltimore, Maryland, USA **1999**
Focus: computational fluid dynamics (CFD) and multiphase flows. Advisor: Andrea Prosperetti

M.S.E., Johns Hopkins University, Baltimore, Maryland, USA **1996**
Focus: computational fluid dynamics (CFD) and heat transfer. Advisor: Andrea Prosperetti

Laurea in Fisica (M.S.E. in Physics), Universita di Milano, Milano, Italia **1994**
Summa cum laude (110 e lode).Thesis subject: connections between high-energy particle physics and fluid-dynamics turbulence. Advisor: Carlo Cercignani

Experience, Skills, and Achievements

Blockchains, smart contracts, Decentralized Finance and Applications (DeFi and Dapps)
Instrumental in creating the DEXTF protocol model for Decentralized Asset Management, from the design stage, to mainnet deployment on the Ethereum blockchain. The project was able to receive two separate grants from the Singapore MAS resulting in funding of more than 400,000 S$. Instrumental in the design of the tokenomics and deployed the DEXTF token on the maninnet. The DEXTF token at one point was traded at 4US$ with a total supply of 400,000,000. Deployed the UMA -DEXTF-$ which provides weekly income in excess of 10,000 US$/week. Developed a DEXTF prototype on the Algorand blockchain that resulted in a grant of 150,000 US$. Currently working on various DeFi projects, including the use of the blockchain-independent Reach Dapp language which ensures formal verification of smart contracts.

Data science, quantitative finance, and risk management
Experienced risk-management quant with a focus on numerical risk simulations. Created original quantitative models to numerically compute risk measures, risk contributions, stress tests, sensitivity analysis, and liquidity risk (liquidity score and market impact). Oversaw the software implementation of quantitative models in software (*StatPro Risk Factory*) and their link with market data. Designed and implemented the risk engine currently used by the StatPro analytics (StatPro Risk API used by Revolution).
Personal accomplishments in this field include the research and development of the following projects:
Created several robot-trading portfolio to take advantage of certain statistical-arbitrage opportunities in the crypto-currency markets
Revised and improve a model for the computation of the time-to-liquidate and the market impact of bonds, used to comply with US regulation.
Created a quantitative model for the distribution of arrivals restaurant customers by weekday and time, factorizing important independent drivers.
Created a general framework to consistently compute performance and risk contributions. The framework generalizes the standard-market method and provides an elegant split of risk contributions. It relies on an accounting base, that can be chosen to match the performance contributions, and a statistical base.
Created an innovative model to compute the *Standard Risk Measure* mandatory for superannuation funds in Australia
The creation of a market-factor performance contribution model to split portfolio performance in components coming from identifiable market factors (credit, equity, interest rates, and so on)
A factor risk decomposition method applicable to any type of simulations (Monte Carlo or historical). This method allows the computation of, for example, the risk contribution in a convertible bond *attributable* to interest rates, credit risk, or equity risk, respectively
A liquidity-risk framework to compute the market bid/ask spread induced by the bid/ask spread of the underlying risk factors
A model to simulate the market expectation of credit risk in the historical-simulation method, using the latest credit-default-swap quotes
A modification of the Kalotay-Fabozzi model allowing the stability of risk-figures for mortgage-backed securities

Quantitative analysis, model validation, bond pricing and derivative pricing
Quantitative analyst with experience in no-arbitrage derivative evaluations. Knowledgeable of the most widely-used quantitative models to evaluate derivative pricing for all major asset classes: equity derivatives, fixed-income securities, credit derivatives, inflation-linked products, exchange-rate

derivatives, vix futures, commodity derivatives, and mortgage-backed securities (MBS), and more. Able to create new models as well as enhance existing ones optimizing the computation time.
Example of successful projects in no-arbitrage evaluations include:

- The creation of a fast quantitative model to estimate the price of subordinated fixed-to-floater convertible bonds (e.g., perpetual fixed-to-floater bonds)
- Pricing of exotic equity derivatives (e.g., bonds with embedded exotic options)
- Validation of models used by clients to internally evaluate exotic-instrument value
- A unique price-challenge process for complex-asset pricing: this process allows to reproduce exactly on a spreadsheet the same results obtained with a super-cluster computer
- Bootstrap, interpolation, and extrapolation of smiled implied-volatility surfaces for equities and foreign-exchange rates
- Solving partial-differential equations (PDE) with multiple methods: semi-analytic methods (asymptotic methods), Monte Carlo simulations, multi-pole expansion, finite differences, finite elements, fast Fourier transform, and other spectral methods
- Pricing of portfolio credit derivatives such as CDO and first-to-default baskets

Teaching quantitative finance
Engaging lecturer in derivative pricing and quantitative risk-management techniques. Experienced in teaching quantitative topics to audience of all backgrounds. Ability to extract, synthesize and communicate the underlying ideas from the most sophisticated and complex quantitative models.
Experience in teaching quantitative finance includes:

- The creation of line of lectures, based on the QuantLib library, very effective in presenting the basic concepts of quantitative finance in a natural language
- The mastering of an original spreadsheet-presentation technique (as opposed to the common slide presentation) to enhance the audience understanding of complex topics

Team leadership and project management
Experienced in successfully managing complex projects with stake-holders from different teams and backgrounds. Able to gain efficiency by advocating teamwork, inspiring and motivating collaboration. Managed groups up to twelve people.
Specific instances where management skills mattered are:

- Interfacing and mediating between the business management and the technical team, translating business requirements into working implementations
- Leadership to build a team based on the talents of the single elements so that knowledge and work are efficiently shared in the group
- The ability to manage top-skilled, Ph.D. level, personnel: their expectations and motivations
- A well-navigated hiring-process method: search for candidates, interviews, and hiring negotiations

Technology, software design and development
Instrumental in creating one of the most sophisticated risk-management software/service available on the market. Experienced in the implementation of numerical software for derivative pricing and risk management and the choice of the most appropriate technology. Coordinated the evolution and merge of diverse legacy software and developing teams. Expert in lean software development where the delivery of good-quality maintainable software takes the precedence. Well-versed with test-driven development, continuous delivery, and continuous integration. Responsible for handling the versioning system and the release-management workflow. Designed and administered several relational databases. Experienced with object-oriented and JSON databases. Worked on several projects where a multi-tier distribute architecture was the key ingredient to success. Experienced with web technology and decentralized servers (e.g. more servers in different continents working together).
Experience in software and development includes:

- Managing different team programming styles such as extreme programming and agile programming
- Creator of a multi-tier RESTful-API based web apps both exposing financial data and for restaurant analytics
- Experience with environments for distributed objects such as CORBA, COM, and .NET

- Parallel programming both in fluid dynamics and finance on multi-processors and computer clusters
- Knowledge of different coding techniques such as object-oriented programming, modular programing, or functional programming
- Programming languages used: C++, C, Python, Ruby, Fortran, Visual Basic (including advanced Excel programming), SWIG, Perl, tcsh, Mathematica, and many others.
- Operating systems used: MS-Windows, Unix, Linux, Free BSD, VMS, MacOs (formerly OS X), Aegis (Apollo), SGI Iris, iOS, Android, Symbian, and others
- Database servers: SQL-Lite, MS-SQL server, PostgreSQL, MySQL, and ZODB
- Development of smartphone apps on the Symbian platform using the python language
- Designed, developed, and deployed several projects linking external data from data provider to the internal database
- Worked with the following protocols and standards: HTML, XML, RelaxNG, Java Script, and SOAP
- Experience with Apache web server, Zope,/Plone, and Ruby on Rails

Open Source
In November 2000 co-launched the most-popular open-source C++ library in quantitative finance: The QuantLib Project (currently retired senior developer of QuantLib). Designed and developed the first QuantLib Monte Carlo engine and the finite-difference framework for option pricing.

Publications

Published several original articles on Journals and websites. Some papers are available on my website. (Also, a number of internal papers at StatPro have been written, however, they cannot be disclosed)
Selected publications as part of the Statpro Quantitative Research Series:

A risk decomposition framework consistent with performance measurements, January 2017
Projection performance contributions of non-linear portfolios, January 2017
Non perturbative key-rate contributions to bond returns, November 2016
Sensitivities for fixed-income attribution, July 2014
Fast computation of fixed-to-floater bonds, June 2014
Portfolio risk management with efficiently simulated scenarios, March 2013
Relative Portfolio Risk Portfolio Decomposition and Attribution, April 2011
Risk Decomposition for Portfolio Simulations, April 2011
Average-maturity model for asset backed securities, March 2009
Pricing simple credit derivatives, March 2009
During the financial crisis of 2008 was the reference contact of the most-read Italian financial newspaper for consulting on default probabilities
Pricing Simple Interest-Rate Derivatives, July 2008
Integrating default risk in the historical simulation model (with Dario Cintioli), June 2007 (published on the AIFIRM journal)
Foundations of the StatPro Simulation model (with Dario Cintioli), October 2007 (published on the AIFIRM journal)

Thesis and dissertation advisor:
(For the full documents and a summary, please, refer to my website)

Alex Molteni, master candidate, *Performance attribution for a portfolio of linear commodity derivatives*, graduated summa cum laude (110 e lode) on March 29th, 2012
Andrea Boschetto, master candidate, *Risk attribution for linear commodity derivatives*, graduated summa cum laude (110 e lode) on March 29th, 2012
Leonardo D'Auria, master candidate, *Historical-simulation model for VIX derivatives*, graduated summa cum laude (110 e lode) on July 17th, 2013

Edit Rroji, Ph.D. candidate*, Risk attribution and semi-heavy tailed distributions*, graduated with honors on December 17th, 2013

Conferences, Seminars, and Lectures

Speaker, lecturer, and course teacher: Presented financial and scientific works at numerous international events. Recent presentations:

Crypto currencies as consensual peer-to-peer networks, Essec Business School, Singapore **2019**

6th Workshop on Machine Learning and FinTech, Center for Quant. Finance NUS, Singapore **2018**

Understanding Machine Learning, A workshop with prof. Don McNeil **2017**

iPARM Australia 2016, A risk decomposition framework consistent with performance **2016**

Risk measure, XVA Analysis, Cost of Capital and Central Counterparties Workshop 2016

Superannuation Fund Investment Operations & Member Administration Services 2015 Forum, Sydney. Setting the SRM Market Standard for Superannuation trustee **2015**

Berlin-Princeton-Singapore Workshop on Quantitative Finance, Singapore. Risk contribution framework for non-linear portfolios **2015**

PRMIA Singapore—Risk Modelling—Applications, Simplicity or Complexity, Singapore. Computation of risk components for derivative portfolios **2014**

Stanford Workshop in Quantitative Finance: Statistical Issues, Singapore. Numerical Computation of VIX-Futures Risk Components **2014**

Second NUS—Stanford Workshop in Quantitative Finance: Statistical Issues, Singapore. Numerical Computation of VIX-Futures Risk Components **2014**

Second NUS Workshop on Risk and Regulation, Singapore. Risk contribution of commodity derivatives **2014**

NUS-UTokyo Workshop on Quantitative Finance, Singapore. Seminar on risk of VIX futures **2013**

First StatPro Cloud Summit on Revolution, London. Presented a work on risk attribution **2012**

Guest lecturer at The Master of Quantitative Finance, University of Bologna, 2012

The First QuantLib Forum. Seminar on the used of QuantLib for Monte Carlo Risk **2011**

Quantitative Asset Management Workshop, Milan, Italy 2010

LANGUAGES

Fluent in English and Italian. Intermediate Spanish and Bahasa Indonesia. Minimal Bahasa Melayu