

# Marco Marchioro. Ph.D.

Contacts: [marco@marchioro.org](mailto:marco@marchioro.org) | [marchioro.org](http://marchioro.org) | [LinkedIN](#) | [Quant Island](#)

## PROFILE SUMMARY

**Crypto Quant | Algorand Architect | Algo Trader | QuantLib Founder**  
Quantitative analyst, experienced in no-arbitrage derivative evaluations and expert in both traditional financial engineering and blockchain technology; (smart contracts), time-series modeling for alpha generation, Algorand (PyTeal and Reach). Skilled in the design and writing of smart contracts on multiple blockchains and in multiple languages with more than 5 years of experience as crypto quant, and has served in various academic capacities worldwide.

## WORK EXPERIENCES

**Chief Quantitative Analyst, Quant Island Pte. Ltd, Singapore** **2013 till date**

Worked with the firm to create crypto analysis models for both human and robot traders. He created the Christina public model and the more sophisticated Helena model for crypto analysis: <https://dev.cryptoaidashboard.com/>. Quant Island is a fintech-certified quantitative-finance consulting firm in Singapore.

**Protocol Scientist, Memento Blockchain Pte. Ltd., Singapore** **2019—2022**

- Functioned as the DeFi protocol leader and was responsible for the smart contracts and the analytics of the DOMANI project.
- Worked on both the Algorand and the Ethereum blockchains to develop fully decentralized solutions for Digital Asset Management (native-digital funds).
- Built links with many other DeFi projects such as Uniswap, Opyn, UMA, SetProtocol, AAVE, Compound and others.
- Developed and deployed Solidity smart contracts with Truffle and Hardhat.
- Engaged 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 Tokenized Carbon Credits on the Stellar blockchain.

**Lecturer, ESSEC Business School, Singapore**

**2018—2019**

- Served as lecturer of Stochastic Processes in Continuous Time for the Master in Finance 2018/2019 session.
- Tutored students on 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**

- Was responsible for the company's data-science team and the research and development of the hospitality analytics.

**Chief Research Advisor, the StatPro Group, Worldwide**

**2013—2018**

- Cooperated 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 carried out model validations for pricing functions and risk analytics.
- Performed 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's Program in Economics and Finance (Laurea Magistrale in Economia e Finanza).
- 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 to maintain the highest quality for the StatPro analytics.
- Was 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 in 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.
- Collaborated 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 a 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.

**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.

**EDUCATIONAL QUALIFICATIONS**

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**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), Università 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

## EXPERIENCES | SKILLS | 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 USD.
- Instrumental in the design of the tokenomics, and deployed the DEXTF token on the mainnet. The DEXTF token at one point was traded at 4USD with a total supply of 100,000,000.
- Deployed the UMA -DEXTF-\$ which provided weekly income in excess of 10,000 USD/week.
- Developed a DEXTF prototype on the Algorand blockchain that resulted in a grant of 150,000 USD.
- 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).
- Created several robot-trading portfolio to take advantage of certain statistical-arbitrage opportunities in the crypto-currency markets.
- Revised and improved a model for the computation of the time-to-liquidate and the market impact of bonds, in compliance with US regulation.
- In the early stages of the COVID19 pandemic, created a model that was able to predicts the early peaks of the virus diffusion in both Singapore and many Italian regions.
- Created a quantitative model for the distribution of arrivals of 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 using 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.
- Created a market-factor performance contribution model to split portfolio performance in components coming from identifiable market factors (credit, equity, interest rates, and so on).
- Created a factor risk decomposition method applicable to most 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. The model has been used in production for more than 8 years.
- Created a liquidity-risk framework to compute the market bid/ask spread induced by the bid/ask spread of the underlying risk factors.
- Created a model to simulate the market expectation of credit risk in the historical-simulation method, using the latest credit-default-swap quotes.

- Created 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**

### **Achievements:**

- A novel technique, the Helena model, to compute the current market trends using trading data at multiple time scales.
- 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**

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's understanding of complex topics.

## **Team Leadership and Project Management**

- Experienced in managing complex projects with stake-holders from different teams and backgrounds.
- Ability to gain efficiency by advocating teamwork, inspiring and motivating collaboration.
- Interfacing and mediating between the business management and the technical team; translating business requirements into working implementations.
- Ability to manage top-skilled, Ph.D. level, personnel: their expectations and motivations.

## **Technology, Software Design and Development**

- Instrumental in creating one of the most sophisticated risk-management softwares/services 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 merging 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).
- Managing different teams' 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 programming, and 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, MariaDB, 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

- Co-launched the most-popular open-source C++ library in quantitative finance: The QuantLib Project (currently retired senior developer of QuantLib) in November 2000
- 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: [www.marchioro.org](http://www.marchioro.org))

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

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

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

## REFEREES

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Available on request