Marco Marchioro

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PROFILE

Fifteen years of experience in quantitative risk management, financial engineering, software development, creation of original quantitative models, model validation, team leadership, and quantitative education.

SUMMARY OF QUALIFICATIONS

Extensive knowledge of numerical risk simulations and derivative pricing with experience in most asset classes: equity derivatives, fixed-income securities, credit derivatives, inflation-linked products, exchange-rate derivatives, vix futures, commodity derivatives, and mortgage-backed securities (MBS). Ability to produce original quantitative models: derivative pricing, risk computation and attribution, stress tests, bid/ask liquidity risk, performance attribution. Engaging lecturer of quantitative finance to students of all levels. Eclectic personality oriented to teamwork, versatile in problem solving, and detail oriented. Cofounder of *QuantLib*, the open-source financial library. Technologically savvy, proficient in software life cycle, continuous delivery and deployment, object-oriented design, web applications, and database design.

JOB EXPERIENCE

Head of Quantitative Analytics, Quant Island Pte. Ltd, Singapore **2013-Present**

Founded "*Quant Island*" a quantitative-analysis consulting firm providing expertise to companies worldwide. Creates new original models for pricing functions, risk analytics, and performance measurement. 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, and fixed-income attribution for both performance and risk.
In this role also acts as **Chief Research Advisor** of the StatPro Group.

Adjunct Professor, Università degli Studi di Milano-Bicocca, Milan, Italy **2010-2014**

Lectured "*Interest-Rate Derivatives*" (providing 5 course credits) for the "Advanced Derivative" 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. Is an active member of the Editorial Board of the Int. J. of Portfolio Analysis and Management (link).

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. 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 research and developed 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

Teaching Assistant, Department of Mechanical Engineering,
The 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.

Research Assistant, Department of Mechanical Engineering,
The 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.

EDUCATION

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

M.S.E, Department of Mechanical Engineering,
The Johns Hopkins University, Baltimore, Maryland, USA **1996**
Focus: computational fluid dynamics (CFD) and heat transfer

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

EXPERIENCE, SKILLS, AND ACHIEVEMENTS

Quantitative risk management and performance 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 bid/ask liquidity risk. 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:

- Defined 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.
- Integration of performance and risk for unfunded OTC products (such as interest-rate swaps, credit-default swaps, and so on)
- 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 version-

ing system and the release-management workflow. Designed and administered several relational databases. Experienced with object-oriented 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 app that delivers forward curves based on actual market data
- 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, Mac 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 website. 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:

- *Risk contribution framework for non-linear portfolios*, expected December 2015
- *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
- *Exact Risk-Factor Decomposition of Portfolio Performance*, June 2012
- *Relative Portfolio Risk Portfolio Decomposition and Attribution*, April 2011
- *Risk Decomposition for Portfolio Simulations*, April 2011
- *Introduction to 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
- *Credit risk in the StatPro 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)
- *A Simple Model for Asset Backed Securities*, March 2007

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, LECTURES

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

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

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

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

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

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

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

First StatPro Cloud Summit on Revolution. 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. Basic Spanish and French. Minimal Mandarin