

Damiano Brigo - Curriculum Vitae

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Education

Post Doctoral: November 1996 - February 1997. French Institute for Research in Computer Science and Stochastic Systems (IRISA) in Rennes, France.

Ph.D.: September 1993 - October 1996. Department of Econometrics of the Free University of Amsterdam, Institute for Mathematics and Computer Science (CWI) of Amsterdam, and Dutch Institute of Systems and Control (DISC). The doctoral studies concerned stochastic systems and nonlinear filtering theory.

More details on the Ph.D.: The Ph.D. program led to the PhD thesis "Filtering By Projection on the Manifold of Exponential Densities" that was successfully defended against an international committee featuring among others Prof. O.E. Barndorff-Nielsen (Theoretical Statistics, University of Aarhus, Denmark), Prof. G.B. Di Masi (Mathematics, Padua), Prof. J. Schumacher (CWI, Amsterdam), Dr. F. LeGland (IRISA, Rennes), Dr. P.J.C. Spreij (VU, Amsterdam). The research carried out during the PhD program led to several scientific results that were later published on journals of the Systems and Control Theoretical community and of the Mathematical Finance community. The project was financed and supported by several institutions, including:

- European Union:
 - SCIENCE Project System Identification (contract number SC1*-CT92-0779);
 - HCM Network Statistical Inference for Stochastic Processes (contract number SC1*-CT92-0779);
- Individual fellowship of the program Training and Mobility of Researchers (contract number FMBICT960791);
- U.S. Army (contract number DAAH04-95-1-0164);

Education (continued)

- The Italian Institute for Advanced Mathematics, with a Senior fellowship;
- The University of Padua, with an individual fellowship of the foreign-studies program.

Undergraduate studies ("Laurea" degree): November 1985-November 1990. Laurea degree in Mathematics at the University of Padua. Final grade: 110/110 with honors.

Work experiences

King's College, London, Department of Mathematics. Aug 2010 on. Gilbert Professor of Financial Mathematics.

Fitch Solutions. Jan 2008 - July 2010. **Managing Director and Global Head of the Quantitative Analytics team**, comprising 9 quantitative analysts in London and New York.

- Refining the design of a trading liquidity scoring model for the CDS pricing service, based on the CDS contributors data, using inactivity, bid offer and dispersion measures.
- Design of a trading liquidity model for extracting a liquidity spread in basis points from CDS contribution, consistently with the liquidity scores.
- Pricing of multi-currency CDS. Relationship between CDS spreads on the same name when protection is offered in different currencies.
- Pricing of first to default baskets in emerging markets.
- Bond-CDS basis analysis, sovereign CDS analysis.
- Pricing prototypes for bilateral counterparty risk in Interest Rates and Credit Default swap payoffs.
- Pricing of Contingent CDS and counterparty risk for interest rate, credit and commodity products under correlation between default and the underlying assets.
- Analysis of wrong way risk profiles.
- Pricing of Credit Index Options and analysis during the subprime crisis.
- Inflation, FX and hybrids modeling for both valuation and risk management.
- Valuation of deals involving Collateralized Obligations (CDO) on corporates, residential mortgages (RMBS), commercial mortgages (CMBS), and corporate loans (CLOs).
- Development of a new dynamic loss model for correlation products and CDOs on corporates with consistent calibration of index tranches across maturities and consistency with single names and cluster defaults.
- Research defending the quantitative analysts work before and during the crisis, culminating in a monograph for Wiley entitled "Credit Models and the Crisis".
- Recruiting new team members from Analyst to Director level, to replace team analysts on leave.

Work experiences (continued)

DerivativeFitch, July 2007 - Dec 2007 (company converted in Fitch Solutions in 2008).
Managing Director and Global Head of Quantitative Innovation, comprising 15 quantitative analysts in London, New York and Hong Kong.

- Quantitative analysis of deals involving Collateralized Obligations on Credit (CDO), commodities (CCO), funds (CFO), exchange rates (CFXO), equity (CDO of EDS), Constant Proportion Debt Obligations CPDO, CPDO's on tranche spreads, CMS CPDO.
- Quantitative analysis of waterfall structures, CLO's and Cash Flow CDO's
- Analysis of quantitative strategies for pension funds, FX carry trades, Credit Fund Notes
- Investigation of alternative dependence structures for the ratings framework changes project, analysis of stochastic recovery rates, alternative copula functions, stochastic intensity models, dynamic loss models

Banca IMI, Milano. From October 1998 to June 2007. Head of Credit Models. Active participation also in derivatives modeling, in particular for interest rate modelling, smile modelling, exotic option pricing etc.

- Generalized Poisson Loss (GPL) dynamical model for Calibration and pricing of correlation products in the credit derivatives world. Consistent Calibration of CDO tranches and index across maturities.
- Stochastic intensity/interest-rate models and calibration to Credit Default Swaps (CDS). Closed form formulas for CDS options. Market models for CDS options and defaultable floaters. First to default, CDO, CDO squared and Basket credit derivatives valuation with copulas and deterministic intensities.
- Tractable structural model calibrated to the CDS term structure and pricing of hybrid products such as equity swaps with counterparty risk.
- Counterparty risk for portfolios of swaps in presence of netting and for non-standard swaps: derivation of an analytical approximation.
- Development and implementations of proprietary and standard short-rate models.
- Study of several parameterizations of the industry Libor market model, test of analytical approximations through Monte Carlo simulation, and feasibility of different possible implementations.
- Monte Carlo pricing of Quanto Constant maturity swaps with optional features and of other derivatives.
- Development of proprietary asset price diffusion models for smile modelling.
- Basket options and exotic options on equities, also with smile
- Academic research on advanced mathematical finance with publications in journals.
- "Professore a contratto" at Bocconi University in Milan, Fixed Income course teaching, from 2005 on.
- Book "Interest-Rate Models: Theory and Practice" for Springer-Verlag. This book has become an international standard reference for Interest rate derivatives

pricing, and is used for PhD courses and in trading floors all over the world. The second edition includes credit derivatives, inflation and extensive smile modeling.

- Presentation of research results to international conferences and seminars.
- Scientific committees of Conferences at MIT and other academic institutions
- Teaching of Training courses for professionals in London and Italy (Risk, Marcus Evans, WBS, Bank of Italy, ABI, Concentric, etc.)

Banca Intesa, Milano. February 1997-October 1998. Quantitative analyst for both risk management and derivatives pricing.

- Computations of Value at Risk measures corresponding to preassigned trading limits.
- Volatility estimation.
- Development and implementations of interest rate models for derivatives, mostly Bermudan swaptions, ratchet-like payoffs, and average rate swaps with optional features.
- Basket options and exotic options on equities.
- Academic research on advanced mathematical finance with publications in journals.

High school teaching: (Several periods in-between 1987 and 1993) Teacher of mathematics, physics and computer science at several high schools in the Venetian area during and immediately after the undergraduate studies.

Obligatory military service: June 1991 - June 1992. Missile artillery division of the Italian Army. Computer programming and armed services.

Professorship, Academic Experiences and Teaching of Training Courses

Gilbart Professor of Financial Mathematics, King's College, London, from August 2010

Visiting Professor at the Department of Mathematics, Imperial College, London, from December 2007 on

Managing Editor of the International Journal of Theoretical & Applied Finance, May 2007 on.

Member of the Fitch Academic Advisory Board from July 2007 to July 2010.

"Professore a contratto" at Bocconi University in Milan, Fixed Income course teaching, from 2005-2007

Scientific Committee of the FEA 2004 and 2006 conferences at MIT, Massachusetts.

Scientific Committee of the Italian congress on mathematical finance, 2003 (Turin), 2004 (Siena), 2005 (Milan), 2006 (Perugia).

Scientific Committee of the "Numerical Methods in Finance" Conference, INCA, Dublin, 2006, 2008.

Scientific Committee of the 2nd International Financial Research Forum, "Risk Management and Financial Crisis", Paris, March 19 -20, 2009

Scientific Committee of the conference "Recent Advancements in the Theory and Practice of Credit Derivatives", Sept. 28-30, 2009, Nice, France.

Advisory Board for the Quant Congress Europe 2010

Scientific Committee for the 2010 C.R.E.D.I.T. Conference in Venice, 2010.

Lectures on Calibration at the "quantitative finance" Master of the Bocconi University of Milan, 2004;

Lectures on interest-rate models at the "FINARM" Master on Finance and Risk Management of the University of Milan, 2002, 2003, 2004, 2005, 2006;

Teaching of Professional Training Courses on interest rate, credit and counterparty risk models for Risk Magazine, Marcus Evans, WBS and other companies in London

Several reviews for scientific journals on mathematical finance and stochastic models

Tutor of several PhD students from NY University, Stanford etc. at the bank

More than 60 Invited talks, Seminars and Lectures at Conferences/Workshops/Universities/Research Institutes/Training Companies all over the world

Honors and Awards. Most cited author Worldwide in Risk Magazine in 2006.

The following number of citations table appeared in Risk Magazine in December 2006.

Brigo D	8
Hull J	7
Martin R.	7
Mercurio F	7
Piterbarg V	6
Andersen L	5
Black F	5
Frye J	5
Litterman R	5
Thompson K	5

Risk Who's Who, 2005-on, Chartered Member.

Publications:

Book: D. Brigo and F. Mercurio. Interest-Rate Models: Theory and Practice, 2001, Springer Finance. This book has quickly become the main international reference for interest rate derivatives pricing and is being used in PhD courses and teaching, as well as in trading floors, all over the world. The second edition (2006) with 400 more pages includes credit derivatives, counterparty risk, inflation and extensive smile modeling.

Book: D. Brigo, A. Pallavicini and R. Torresetti: Credit Models and the Crisis: A journey into CDOs, Copulas, Correlations and Dynamic Models, Wiley, 2010.

Book (as Editor): T. Bielecki, D. Brigo, and F. Patras (Editors) (2010). Credit Risk Frontiers: Subprime crisis, Pricing and Hedging, CVA, MBS, Ratings and Liquidity. Wiley, forthcoming.

D. Brigo, and Capponi, A. (2010). Bilateral Counterparty Risk with application to CDSs. Risk Magazine, March 2010 issue, pp. 85-90.

D. Brigo, and El-Bachir, N. (2010). An exact formula for default swaptions' pricing in the SSRJD stochastic intensity model. Mathematical Finance, Volume 20, Issue 3, July 2010, Pages: 365-382.

Brigo, D., Predescu, M., and Capponi, A. (2010). Liquidity modeling for Credit Default Swaps: an overview. In: Bielecki, Brigo and Patras (Editors), Credit Risk Frontiers: Subprime crisis, Pricing and Hedging, CVA, MBS, Ratings and Liquidity, forthcoming.

Brigo, D., Morini, M., and Tarenghi, M. (2010). Credit Calibration with Structural Models and Equity Return Swap valuation under Counterparty Risk. In: Bielecki, Brigo and Patras (Editors), Credit Risk Frontiers: Subprime crisis, Pricing and Hedging, CVA, MBS, Ratings and Liquidity, forthcoming.

Morini, M., and Brigo, D. (2010). No-Armageddon Arbitrage-free Equivalent Measure for Index options in a credit crisis. Accepted for publication in Mathematical Finance.

D. Brigo, J. Beumee, G. Stoye (2010). Charting a course through the CDS big bang. In: Wigan, D. (Editor), Credit Derivatives: The March to Maturity, Thomson Reuters.

Brigo, D., Neugebauer, M., Dalessandro, A., and Triki, F. (2009). A stochastic processes toolkit for risk management. Mean reverting processes and jumps. Journal of Risk Management in Financial Institutions, Vol. 3, 1.

Brigo, D. and Morini, M. (2009). Last option before the armageddon. Risk Magazine, Sept 2009

Brigo, D. and Chourdakis, K. (2009). Counterparty Risk for Credit Default Swaps: Impact of spread volatility and default correlation. International Journal of Theoretical and Applied Finance, vol. 12 (07), pages 1007-1026.

Brigo, D., and Bakkar, I. (2009). Accurate counterparty risk valuation for energycommodities swaps. *Energy Risk*, March 2009 issue

Brigo, D., Neugebauer, M., Dalessandro, A., and Triki, F. (2009). A stochastic processes toolkit for risk management. Geometric Brownian Motion, jumps, GARCH and Variance Gamma models. *Journal of Risk Management in Financial Institutions*, Vol. 2, 4 365-393.

Torresetti, R., Brigo, D., and Pallavicini, A. (2009). Risk-neutral versus objective loss distribution and CDO tranche valuation. *Journal of Risk Management in Financial Institutions*. Vol. 2, 2 175-192

D, Brigo, N. El-Bachir (2008). An exact formula for default swaptions' pricing in the SSRJD stochastic intensity model. Accepted for publication in *Mathematical Finance*.

D. Brigo, E. Errais, and H. Ben Ameer (2008). Pricing Credit Default Swaps Bermudan Options: An Approximate Dynamic Programming Approach. Accepted for publication in *Quantitative Finance*.

D. Brigo, A. Pallavicini (2008). Counterparty Risk and Contingent CDS under correlation, *Risk Magazine*, February issue.

Brigo, D. (2008). CDS Options through Candidate Market Models and the CDS-Calibrated CIR++ Stochastic Intensity Model. In: Wagner, N. (Editor), "Credit Risk: Models, Derivatives and Management", Chapman & Hall/CRC Financial Mathematics Series

D. Brigo, A. Pallavicini, R. Torresetti (2007). CDO calibration with the dynamical Generalized Poisson Loss model. *Risk Magazine*, June issue.

D. Brigo, A. Pallavicini, R. Torresetti (2007). Cluster-based extension of the generalized poisson loss dynamics and consistency with single names. *International Journal of Theoretical and Applied Finance*, Vol 10, n. 4. Also in: A. Lipton and Rennie (Editors), *Credit Correlation - Life After Copulas*, World Scientific, 2007.

D. Brigo, A. Pallavicini (2007). Counterparty Risk under Correlation between Default and Interest Rates. In: Miller, J., Edelman, D., and Appleby, J. (Editors), *Numerical Methods for Finance*, Chapman Hall.

D. Brigo, Constant Maturity CDS valuation with market models (2006). *Risk Magazine*, June issue.

D. Brigo, L. Cousot. A Comparison between the SSRD Model and the Market Model for CDS Options Pricing, *International Journal of Theoretical and Applied Finance*, Vol. 9, n. 3, 2006.

D. Brigo, M. Morini, Efficient Analytical Cascade Calibration of the LIBOR market model with Endogenous Interpolation. Accepted for publication in the *Journal of Derivatives*, 2006.

D. Brigo, M. Morini, Structural credit calibration, 2006, *Risk Magazine*, April issue.

Brigo, D., and Masetti, M., Risk Neutral Pricing of Counterparty Risk. In: Pykhtin, M. (Editor), Counterparty Credit Risk Modeling: Risk Management, Pricing and Regulation. Risk Books, 2006, London.

Brigo D., and Liinev J., On the distributional difference between the Libor and the Swap market models. Quantitative Finance (2005), Vol 5, n. 5, 433-442.

Alfonsi, A., and Brigo, D. New Families of Copulas Based on Periodic Functions. Communications in Statistics: Theory and Methods (2005), Vol 34, N. 7

Brigo, D., Market Models for CDS Options and Callable Floaters, Risk, (2005), January issue

Brigo, D., Modelli di Mercato per opzioni CDS e obbligazioni a tasso variabile defaultabili "callable". Risk Italia, (2005), October issue. Italian version of the preceding paper.

Brigo, D., Alfonsi, A., Credit Default Swap Calibration and Derivatives Pricing with the SSRD Stochastic Intensity Model, Finance and Stochastic (2005), Vol 9, N. 1.

D. Brigo, F. Mercurio, and M. Morini, The Libor Model Dynamics: Approximations, Calibration and Diagnostics, European Journal of Operation Research 163, pp 30-51

Brigo, D., Mercurio, F., Rapisarda, F., Smile at Uncertainty, Risk, (2004), May issue.

Brigo, D., Mercurio, F., Rapisarda, F., and Scotti, R., Approximated moment-matching dynamics for basket-options pricing, Quantitative Finance, vol 4 N. 1 (2003) pp. 1-16.

Brigo, D., Mercurio, F., and Sartorelli, G., Alternative Asset Price Dynamics and Volatility Smile, Quantitative Finance, Vol 3, N. 3. (2003) pp. 173-183

D. Brigo and F. Mercurio, Analytical pricing of the smile in a forward LIBOR market model, Quantitative Finance, Vol. 3, No. 1 (2003).

D. Brigo, F. Mercurio, A mixed-up smile, in: Lipton, A. (Editor), Exotic Options: The cutting edge collection, Risk Books

D. Brigo and F. Mercurio, Lognormal-mixture dynamics and calibration to market volatility smiles, International Journal of Theoretical and Applied Finance, Vol. 5, No. 4 (2002), 427-446.

D. Brigo and F. Mercurio, Calibrating LIBOR. Risk Magazine, January 2002.

D. Brigo, F. Mercurio, Displaced and Mixture Diffusions for Analytically-Tractable Smile Models, to appear in: Geman, H., Madan, D.B., Pliska, S.R., Vorst, A.C.F. (Editors), Mathematical Finance - Bachelier Congress 2000, Springer, Berlin, 2001

D. Brigo and F. Mercurio, A deterministic-shift extension of analytically tractable and time-homogeneous short rate models, Finance and Stochastics, Vol. 5, N. 3 (2001), pp. 369--388.

D. Brigo and F. Mercurio, Implied Volatility: A mixed up smile. Risk Magazine, September 2000.

D. Brigo and F. Mercurio, Option pricing impact of alternative continuous time dynamics for discretely observed stock prices, Finance and Stochastics, Vol. 4, N. 2 (2000), pp. 147--160.

D. Brigo and F. Mercurio, Correction: Is Ito calculus oversold? Risk Magazine, Vol. 12, N. 4 (1999), p. 67.

D. Brigo, B. Hanzon, On some filtering problems arising in mathematical finance, Insurance: Mathematics and Economics, 22(1) (1998) pp. 53-64.

Publications: Stochastic nonlinear filtering, stochastic differential equations and exponential families

D. Brigo, On SDEs with marginal laws evolving in finite--dimensional exponential families, Statistics and Probability letters 49 (2000), pp. 127--134.

D. Brigo, Diffusion Processes, Manifolds of Exponential Densities, and Nonlinear Filtering, in: Ole E Barndorff-Nielsen and Eva B Vedel Jensen (Editors), Geometry in Present Day Science, World Scientific (1999).

D. Brigo, B. Hanzon, F. Le Gland, Approximate Nonlinear Filtering by Projection on Exponential Manifolds of Densities, Bernoulli, Vol. 5, N. 3 (1999), pp. 495--534

D. Brigo, B. Hanzon, F. LeGland, A Differential Geometric approach to nonlinear filtering: the Projection Filter, in Proceedings of the Conference of Decision and Control, New Orleans, 1995, pp. 4006--4011, and later published on IEEE Transactions on Automatic Control Vol. 43, 2 (1998), pp 247--252.

D. Brigo, On nonlinear SDE's whose densities evolve in a finite dimensional family, in: I. Csiszar and Gy. Michaletzky (Editors), Stochastic Differential and Difference Equations, Birkhauser, Boston (1997).

D. Brigo, New results on the Gaussian projection filter with small observation noise, Systems and Control Letters, Vol. 28 (1996), pp. 273--279

D. Brigo, On the nice behaviour of the Gaussian Projection Filter with small observation noise, in Proceedings of the third European Control Conference (Roma, 1995), and in Systems and Control Letters, Vol. 26, N. 5 (1995), pp. 363--370

Some more publications are available in conference proceedings.

Computer languages. Matlab, Maple, Gauss. Past experiences with Fortran, Pascal, C.
