Gianluca Fusai

BIO AND EDUCATION

Gianluca is Full Professor in Mathematical Finance. He holds a PhD in Finance from Warwick Business School, an MSc in Statistics and Operational Research from the University of Essex and a BSc in Economics from Bocconi University. His research interests focus on Financial Engineering, Numerical Methods for Finance, Portfolio Selection, and Energy Markets. He has published extensively on these topics in top-tier international journals. Gianluca has co-authored the books *Implementing Models in Quantitative Finance*, Springer Finance, and *Handbook of Multi-Commodity Markets and Products: Structuring, Trading and Risk Management*, Wiley Finance. He has worked as a consultant in the public and private sectors.

UNIVERSITY CAREER

2006-	Full Professor in Financial Mathematics, Università del Piemonte Orientale
2000-2006	Associate Professor, Università del Piemonte Orientale
1997-2000	Lecturer, University of Florence

UNIVERSITY POSITIONS

2016-	Director of the MSc in Management and Finance, Università del Piemonte Orientale
2007-2011	Dean, Dipartimento di Scienze Economiche e Metodi Quantitativi, Università del Piemonte Orientale
2008-2001	Vice-Dean, Dipartimento di Scienze Economiche e Metodi Quantitativi, Università del Piemonte Orientale

SCIENTIFIC POSITIONS

2016	Associate Editor “Finance”, The Journal of French Business Schools
2014-	PT Reader in Mathematical Finance at Cass Business School, City University of London, UK
2008-	Member of the Board of the PhD in Mathematics for Finance, University of Milano Bicocca
2002-2010	Research Fellow at Financial Options Research Centre, Warwick Business School, University of Warwick (UK)
2009	Invited Visiting Professor at Department of IEOR, Columbia University, New York (May-June)

MAIN FIELDS OF INTEREST

1. Financial Engineering
2. Commodity Markets
3. Counterparty Credit Risk
4. Risk Management
5. Numerical Methods in Finance

CURRENT ISSUES OF RESEARCH

1. **Electricity Forward Curves with Thin Granularity**

We put forward a constructive definition of electricity forward price curve with cross-sectional timescale encompassing hourly frequency upward. The curve is jointly consistent to both risk-neutral market information, as represented by base load and peak load futures quotes, and historical market information, as mirrored by periodical patterns exhibited by time series of day-ahead prices. On a methodological ground, we combine non-parametric filtering with monotone convex interpolation in a way that the resulting forward curve is path wise smooth and monotonic, cross-sectionally stable, and time local. On an empirical ground, we exhibit these features in the joint context of EPEX Spot and EEX Derivative markets. A back testing analysis assesses the relative quality of our forward curve estimate compared to the benchmark market model of Benth et al. (2007). Available at SSRN: http://ssrn.com/abstract=2777990

2. **Integrated Structural Approach to Counterparty Credit Risk with Dependent Jumps**

This paper proposes an integrated pricing framework for CVA: the model is based on a structural approach which uses correlated Lévy processes with idiosyncratic and systematic components; the numerical scheme, instead, efficiently combines Monte Carlo simulation and Fourier transform based methods. The framework is sufficiently flexible in incorporating a number of mitigating clauses, such as netting and collateral provisions. We illustrate the tractability and the performance of the proposed numerical scheme, and analyse the effects originated by right-way and wrong-way risk under different assumptions related to the parameters controlling collateral and netting agreements. Available at SSRN: http://ssrn.com/abstract=2706416

3. **Default Risk Premium in Credit and Equity Market: A New Approach for Structural Model Estimation**

We propose a novel methodological approach to estimate a corporate structural model, by using data from credit and stock market, and we reconstruct the dynamics of the market value of assets and debt, and the default boundary, for a sample of non-financial firms. We exploit our results to extract the default risk premium, which combines the risk-neutral and the real-world measure of default probability. We show that the equity and the credit market exhibit a relationship with the default risk premium which is opposite to each other, by implementing a long-short portfolio strategy based on the default risk premium, which generates significant performance. Therefore,

we argue that the 'distress puzzle', that is the counterintuitive negative relationship between default risk and stock return, can be solved, if the credit and the equity market securities are related through a default risk indicator, resulting from an appropriate structural model estimation, using only market data. Available at SSRN: http://ssrn.com/abstract=2611984

4. **Approximated Pricing of Swaptions in General Interest Rate Models Title**

We propose new bounds on the prices of European-style swaptions for a wide class of interest rate models. These bounds are computable whenever the joint characteristic function of the state variables is known in closed form or can be obtained numerically via some efficient procedure. In particular our lower bound involves the computation of one dimensional Fourier transform independently from the swap length. We also show that methods put forward by Singleton and Umantsev (2002) and Kim (2012) are particular cases of our general framework. In addition, we control the error of our method by providing a new upper bound on swaption price applicable to all linear-quadratic models. Finally the lower bound can be used as a control variable to reduce the confidence interval of the Monte Carlo technique. We test our bounds on different affine models, also allowing for jumps, and on a 2-factors quadratic Gaussian model. The bound are found to be accurate and computationally efficient. Available at SSRN: http://ssrn.com/abstract=2660696

RCENT FUNDED PROJECTS

PROGRAMME	FUNDED PROJECT
SmartFASI Financial Advisory Smart Services Infrastructure	SPONSORED BY POLO ICT, REGIONE PIEMONTE, ITALY (GOVERNMENT). Non-academic partner(s) ORS (http://www.ors.it) and emagine.it (http://www.a-e-g.it/)
Joint Research Project with Deloitte Consulting	QUANTITATIVE ASSESSMENTS OF COMMON PRACTICES IN THE INSURANCE INDUSTRY
Carefin Research Centre, Bocconi University (Research Council)	NEW EFFICIENT FRONTIER: CAN STRUCTURED PRODUCTS REALLY IMPROVE THE RISK RETURN PROFILE? JOINT WITH G. ZANOTTI (U. OF BERGAMO)
Technological Innovation in Finance	Fondazione CRT (www.fondazionecrt.it) (Research Council)

TOP FIVE PAPERS

1. Fusai G., Germano, G., Marazzina, D. (2016), '**Spitzer identity, Wiener-Hopf factorization and pricing of discretely monitored exotic options.** ', *European Journal of Operational Research*, 251(1), p.124-134; keywords: Wiener-Hopf, Hilbert Transform, Spitzer Identity, Exotic Options. [Peer Reviewed]
2. Fusai G., I. Kyriakou (2016 Forthcoming), '**General Optimized Lower and Upper Bounds for Discrete and Continuous Arithmetic Asian Options**', *Mathematics of Operations Research*; [Peer Reviewed]
3. Sesana D., Marazzina, D. , Fusai, G. (2014), '**Pricing exotic derivatives exploiting structure**', *European Journal of Operations Research*, 236(1), p.369-381; keywords: CEV process; Discrete monitoring; Exotic derivatives; Matrix Factorization; Numerical quadrature; Option pricing; [Peer Reviewed]

4. Caldana R., Fusai, G. (2013), '**A general closed-form spread option pricing formula** ', *Journal of Banking and Finance*, 37(12), p.4893-4906; keywords: Spread option; Exchange option; Stochastic process; Characteristic function; Fourier inversion; Control variate; [Prize Winning]; [Peer Reviewed]
5. Goia A., May, C. , Fusai, G. (2010), '**Functional clustering and linear regression for peak load forecasting** ', *International Journal of Forecasting* , 26(4), p.700-711; keywords: Short-term forecasting; Out-of-sample; Load curve; Seasonality; Functional regression; Functional clustering; Functional linear discriminant analysis; [Peer Reviewed]

FURTHER INFORMATION

Gianluca has also acted as: Ph.D. Supervisor and Examiner, Referee for international journals.