Taylor & Francis
Online

International Journal of Computer Mathematics ›
Volume 93, 2016 - Issue 3

186 Views | 15 CrossRef citations to date | 0 Altmetric

Articles

A versatile approach for stochastic correlation using hyperbolic functions

L. Teng, C. Van Emmerich, M. Ehrhardt & M. Günther

Pages 524-539 | Received 06 Aug 2013, Accepted 22 Dec 2014, Accepted author version posted online: 06 Jan 2015, Published online: 29 Jan 2015

Cite this article https://doi.org/10.1080/00207160.2014.1002779 Check for updates

Sample our Computer Science Journals
>> Sign in here to start your access to the latest two volumes for 14 days

Full Article Figures & data References Citations Metrics
Reprints & Permissions Read this article Share

Abstract

It is well known that the correlation between financial products or financial institutions, e.g. plays an essential role in pricing and evaluation of financial derivatives. Using simply a constant or deterministic correlation may lead to correlation risk, since market observations give evidence that correlation is not a deterministic quantity. In this work, we propose a new approach to model the correlation as a hyperbolic function of a stochastic process. Our general approach provides a stochastic correlation which is much more realistic to model real- world phenomena and could be used in many financial application fields. Furthermore, it is very flexible: any mean-reverting process (with positive and negative values) can be regarded and no additional parameter restrictions appear which simplifies the calibration procedure. As an example, we compute the price of a Quanto applying our new approach. Using our numerical results

we discuss concisely the effect of considering stochastic correlation on pricing the Quanto.

Keywords:

correlation risk | stochastic correlation | hyperbolic functions | stochastic process | Ornstein–Uhlenbeck process | Quanto | Fokker–Planck equation | stochastic correlation process

2010 AMS Subject Classifications:

39A50 | 62M10 | 91G60 | 91G80 | 97M30

Acknowledgements

We are very grateful to the anonymous referee and the associate editor for a number of valuable comments and suggestions that has lead to a significantly improved manuscript.

The work of the first, third and fourth author was partially supported by the European Union in the FP7-PEOPLE-2012-ITN Program under Grant Agreement Number 304617 (FP7 Marie Curie Action, Project Multi-ITN STRIKE – Novel Methods in Computational Finance). Further the authors acknowledge partial support from the bilateral German–Spanish Project (HiPeCa – High Performance Calibration and Computation in Finance), Programme Acciones Conjuntas Hispano-Alemanas financed by DAAD.

Disclosure statement

No potential conflict of interest was reported by the authors.

Related research

People also read | Recommended articles | Cited by 15

Stochastic Correlation and Volatility Mean-reversion – Empirical Motivation and Derivatives Pricing via Perturbation Theory >

Marcos Escobar et al.
Applied Mathematical Finance
Published online: 14 Apr 2014

Information for

Authors
R&D professionals
Editors
Librarians
Societies

Open access

Overview
Open journals
Open Select
Dove Medical Press
F1000Research

Opportunities

Reprints and e-prints
Advertising solutions
Accelerated publication
Corporate access solutions

Help and information

Help and contact
Newsroom
All journals
Books

Keep up to date

Register to receive personalised research and resources by email

Sign me up

Copyright © 2026 Informa UK Limited Privacy policy

Cookies Terms & conditions Accessibility

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG