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# A versatile approach for stochastic correlation using hyperbolic functions

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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>



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## 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.

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