



Quantitative Finance >

Volume 14, 2014 - [Issue 8: Themed Issue on Financial Models with Jumps](#)

201	1	0
Views	CrossRef citations to date	Altmetric

Features

Asian options on the harmonic average

Jan Vecer

Pages 1315-1322 | Received 23 Jan 2013, Accepted 12 Sep 2013, Published online: 15 Jul 2014

Cite this article <https://doi.org/10.1080/14697688.2013.847281>



Sample our
Economics, Finance,
Business & Industry 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



© 2014 iStockphoto LP

Asian options on the harmonic average

JAN VECER*

Frankfurt School of Finance and Management, Sonnemannstrasse 9–11, Frankfurt, 60314, Germany

(Received 23 January 2013; accepted 12 September 2013)

1. Introduction

The contracts written on the harmonic average of the underlying price are quite popular in the foreign exchange market. If X denotes the foreign currency and Y denotes the domestic currency, the pay-off of the contract is a function of a price of an asset H which is defined as

$$H(T) = \left[\int_0^T [X_Y(t)]^{-1} \eta(t) dt \right]^{-1} Y(T) \left[\frac{1}{\int_0^T X_Y(t) \eta(t) dt} \right] Y(T).$$

The harmonic average resembles a quanto option: the price $YX(t)$ is monitored with respect to the foreign currency X , but the pay-off is settled in the domestic currency Y . Although the pricing problem appears to be rather complex, it can be ultimately simplified to a partial differential equation in one spatial variable after a numeraire change and using the time reversal argument.

Let us first introduce notation that we use more generally in this article. By X or Y we mean an asset rather than the price of the asset. One can think about X or Y as names of the assets that have no numerical meaning. We write $X(t)$ or $Y(t)$

in the situation when the asset is required at time t for trading, hedging or settling a financial contract. The price of an asset is a pairwise relationship of two assets, which we denote by $X_Y(t)$: the number of assets Y required to obtain a unit of an asset X . The asset Y is known as a reference asset or as a numeraire. We will also use the relationship

$$X_Z(t) = X_Y(t) \cdot Y_Z(t),$$

known as the change of numeraire formula. We will write $X(t) = Y(t)$ in terms of the assets if X and Y have the same price (numeraire independent result). Similarly $X(t) > Y(t)$ means that the asset X has a larger price than the asset Y .

Given two assets X and Y , several types of averages can be considered:

$$\text{Arithmetic: } A(T) = \left[\int_0^T X_Y(t) \eta(t) dt \right] Y(T), \quad (1.1)$$

$$\text{Geometric: } G(T) = \left[\exp \left(\int_0^T \log[X_Y(t)] \eta(t) dt \right) \right] Y(T), \quad (1.2)$$

*Email: j.vecer@fs.de

Acknowledgements

This work was supported in part by grant GACR 13-34480S.

➤ Access through your institution

Log in to Taylor & Francis Online

➤ Log in

Restore content access

➤ Restore content access for purchases made as guest


Purchase options *

Save for later

PDF download + Online access

- 48 hours access to article PDF & online version
- Article PDF can be downloaded
- Article PDF can be printed


EUR 48.00

 Add to
cart

Issue Purchase

- 30 days online access to complete issue
- Article PDFs can be downloaded
- Article PDFs can be printed

EUR 525.00

 Add to
cart

* Local tax will be added as applicable

Related Research

People also read

Recommended articles

Cited by
1

Information for

Authors

R&D professionals

Editors

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

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

