Taylor & Francis
Online

Home ► All Journals ► Economics, Finance & Business ► Quantitative Finance ► List of Issues
► Volume 14, Issue 8 ► Asian options on the harmonic average

Features

Asian options on the harmonic average

Jan Vecer ✉

📖 Cite this article   ↗ https://doi.org/10.1080/14697688.2013.847281   Check for updates

📄 Full Article   🖼 Figures & data   📰 References   66 Citations   📊 Metrics

🖨 Reprints & Permissions   Read this article   ◈ Share

Asian options on the harmonic average

JAN VECER*

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

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

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

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:

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

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

*Email: j.vecer@fs.de

Acknowledgements

Log in via your institution

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 697.00

🛒 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