

Accepted Manuscript

Randomness and fractional stable distributions

Charles S. Tapiero, Pierre Vallois

PII: S0378-4371(18)30883-5
DOI: <https://doi.org/10.1016/j.physa.2018.07.019>
Reference: PHYSA 19844

To appear in: *Physica A*

Received date: 3 April 2018

Please cite this article as: C.S. Tapiero, P. Vallois, Randomness and fractional stable distributions, *Physica A* (2018), <https://doi.org/10.1016/j.physa.2018.07.019>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Randomness And Fractional Stable Distributions

Charles S. Tapiero*

Pierre Vallois**

***Department of Finance and Risk Engineering
New York University Tandon School of Engineering
6 Metro Tech, Brooklyn, New York**

****Department of Mathematics
Universite de Lorraine, Institut de Mathematiques Elie Cartan,
INRIA.BIGS, CNRS UMR 7502, BP 239, F-54506
Vandoeuvre-Les-Nancy, France**

ABSTRACT

Stochastic and fractional models are defined by applications of Liouville (and other) fractional operators. They underlie anomalous transport dynamical properties such as long range temporal correlations manifested in power laws. Prolific applications to finance and other domains have been published, based mostly on a randomness defined by the fractional Brownian Motion. Application to probability distributions (Tapiero and Vallois 2016a, 2017, 2018), have indicated that fractional distributions are incomplete and their limit distributions (based on the Central Limit Theorem) depend on their fractional index. For example, for a fractional index $1/2 \leq H \leq 1$, we showed that a fractional Brownian Bridge defines a fractional randomness (rather than a Brownian Motion). In this paper we consider the case $0 < H < 1/2$ and prove that the underlying fractional distribution is a randomness defined by an α -stable distribution with $\alpha = 1/(1-H)$ to $H \in]1, 2[$. Then, the smaller the fractional index, the greater the propensity for a randomness to be defined by a jump process rather than diffusions defining randomness. These properties are important in applications where risks, prices and their management are dependent of their definition of randomness.

Download English Version:

<https://daneshyari.com/en/article/7374573>

Download Persian Version:

<https://daneshyari.com/article/7374573>

[Daneshyari.com](https://daneshyari.com)