Entropic information theory applied to uncertainty in financial markets

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Abstract

One of the most popular concepts used to measure the risk and the uncertainty is the variance and/or the standard-deviation. In this paper we explore the potentialities of the entropy as a measure of uncertainty in financial markets, and simultaneously verify if this measure take into account some basic assumptions of the portfolio management theory, namely the effect of diversification.

1. Introduction

This paper examines the adequacy of entropy as a measure of uncertainty in portfolio management in finance and its behaviour is compared with the most popular risk measure used in finance: the variance.

The notion of "risk" and "uncertainty" in economics and the distinction between these concepts was preconised by Knight (1921). According to this author, risk and uncertainty are both associated with the imperfect knowledge, but there is a conceptual difference between them. In Knight's interpretation, "risk" refers to situations where the decision-maker can assign mathematical probabilities to the randomness which he is faced with. In contrast, Knight's "uncertainty" refers to situations where randomness cannot be expressed in terms of specific mathematical probabilities. This idea was later reinforced by Keynes (1937).

In this paper, the concept of uncertainty is used to express the greater or lesser difficulty to predict the future. It is quite common to relate the variance or the standard-deviation and the VaR (Value-at-Risk) as the main measures of risk and uncertainty in finance. However, some authors (see e.g. Soofi (1997)) point out that these measures may fail in some specific situations as measures of uncertainty, since they require that the underlying probability dis-

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