Long-term memory in financial prices:
Evidence from the Dutch stock market returns

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Abstract

The purpose of this paper is to contribute to the discussion of long-term memory, focusing on the behavior of the main Dutch stock index.The analysis of the general characteristics of temporal frequency reveals that daily returns are non-ergodic, non-stationary and non-independent. Consequently, we have employed the rescaled-range analysis (R/S) and the detrended fluctuation analysis (DFA), under the fractional Brownian motion approach, and found slight evidence of long-term persistence. This suggests that this market is more prone to predictability ("Joseph effect"), but also trends that may be unexpectedly disrupted by discontinuities ("Noah effect"). Although the evidence of fractal dynamics has weak support, refutes the hypothesis of random walk with i.i.d. increments. This implies that the use of statistical limit arguments to determine conventional financial statistics, as used in the Capital Asset Pricing Model and option valuation models, is scientifically incorrect. Furthermore, a more localized (in time) study to identify the evolution of the degree of long-term memory over time showed a change in the characteristic index from persistent to anti-persistent, more evident after 2010. This suggests that the AEX market does not correspond to Efficient Market Hypotheis in strictly sense of Fama (1970), although it has progressed closer to this theoretical ideal during the worsening of the current international financial crisis.

Keywords: Long-term memory; Persistence; Hurst exponent; Rescaled-range analysis; Detrended fluctuation analysis; Econophysics.