

Looking for Macroscopic Parameters in Financial Fluctuations

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Abstract

The knowledge about how the price changes of different stocks are correlated is essential for the comprehension and the manipulations of the underlying working principles in financial market. Such knowledge has recently been formulated [1, 2] with the fluctuation data for prices of large pools of stocks. The studies have revealed certain robust collective properties, which are identified as the major ingredients of correlations contained in the fluctuations. The presence of the so-called “market mode”, in which all prices change coherently in one sign, suggests a way to describe the state of a stock market by few parameters. The concepts and the methods employed for the identification of macroscopic parameters in material systems provide useful guideline for the consideration of such issues. We found that one can embed the correlation information revealed from market data by a coupled random walk model [3], that the fitted parameters be realized as the quantities for macroscopic state. Under the scenario, the cross correlation among stocks is realized as relating the characteristic time required to relax any unbalance in prices caused by external information flux. The interplay between the price-unbalance relaxation processes and the delayed memory effect in the information flows is related to the presence of Epps effect [4]. Our analysis on the US stocks suggests the possibility of the presence of critical diverging fluctuations for the market in approaching to the state with full correlations.

References

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