Bouchaud, Jean-Philippe; Gefen, Yuval; Potters, Marc; Wyart, Matthieu
Fluctuations and response in financial markets: the subtle nature of \textquote{random} price changes.
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Summary: Using trades and quotes data from the Paris stock market, we show that the random walk nature of traded prices results from a very delicate interplay between two opposite tendencies: long-range correlated market orders that lead to super-diffusion (or persistence), and mean reverting limit orders that lead to sub-diffusion (or anti-persistence). We define and study a model where the price, at any instant, is the result of the impact of all past trades, mediated by a non-constant \textquote{propagator} in time that describes the response of the market to a single trade. Within this model, the market is shown to be, in a precise sense, at a critical point, where the price is purely diffusive and the average response function almost constant. We find empirically, and discuss theoretically, a fluctuation-response relation. We also discuss the fraction of truly informed market orders, that correctly anticipate short-term moves, and find that it is quite small.

MSC:
91G99 Actuarial science and mathematical finance
60G50 Sums of independent random variables; random walks

Keywords:
financial market fluctuations; random price changes

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References:
[19] The qualitative analogy with financial markets was recently discussed in Struzik Z 2003 Taking the pulse of the economy Quant. Finance 3 78


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