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Volatility, Persistence, and Survival in Financial Markets MAGDALENA CONSTANTIN, SANKAR DAS SARMA, Condensed Matter Theory Center, University of Maryland, College Park — We study the temporal fluctuations in time-dependent stock prices (both individual and composite) as a stochastic phenomenon using general techniques and methods of nonequilibrium statistical mechanics. In particular, we analyze stock price fluctuations as a non-Markovian stochastic process using the first-passage statistical concepts of persistence and survival. We report the results of empirical measurements of the normalized q-order correlation functions $f_q(t)$, survival probability $S(t)$, and persistence probability $P(t)$ for several stock market dynamical sets. We analyze both minute-to-minute and higher frequency stock market recordings. We find that the fluctuating stock price is multifractal and the choice of the sampling time has no effect on the qualitative multifractal behavior displayed by the $1/q$-dependence of the generalized Hurst exponent H_q. The probability $S(t)$ of the stock price remaining above the average up to time t is very sensitive to the total measurement time t_m and the sampling time. The probability $P(t)$ of the stock not returning to the initial value within an interval t has a universal power-law behavior, $P(t) \sim t^{-\theta}$, with a persistence exponent θ close to 0.5 that agrees with the prediction $\theta = 1 - H_2$. The empirical financial stocks also present an interesting feature found in turbulent fluids, the extended self-similarity. This work is partially supported by the NSF and U.S. ONR.

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