



# Maximum entropy distribution of stock price fluctuations

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The principle of absence of arbitrage opportunities allows obtaining the distribution of stock price fluctuations by maximizing its information entropy. This leads to a physical description of the underlying dynamics as a random walk characterized by a stochastic diffusion coefficient and constrained to a given value of the expected volatility, taking in this way into account the information provided by the existence of an option market. This model is validated by a comprehensive comparison with observed distributions of both price return and diffusion coefficient. Expected volatility is the only parameter in the model and can be obtained by analysing option prices. We give an analytic formulation of the probability density function for price returns which can be used to extract expected volatility from stock option data. This distribution is of high practical interest since it should be preferred to a Gaussian when dealing with the problem of pricing derivative financial contracts.

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