Time-dependent measure of asset performance

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In finance, one traditionally considers the return as a competitive measure of an assets performance, i.e., the profit generated by that asset after some fixed time span. It has been established that the distribution of returns exhibits "fat tails" indicating that large returns occur more frequently that what is expected from standard Gaussian stochastic processes. Instead of estimating this "fat tail" distribution of returns, we propose an alternative time-dependent approach by addressing the following question: what is the smallest time for an asset to cross a fixed return level of say 5%. For a particular asset, we refer to this as the investment horizon and the corresponding distribution as the investment horizon distribution. This latter distribution complement that of returns and provides new and crucial information for portfolio design and risk-management. By considering historical financial data, specifically the DJIA, SP500 and the Nasdaq index, we obtain a novel set of probability distributions for the investment horizons, which can be excellently fitted by a generalized gamma-distribution and can be used to estimate the optimal investment horizon for, e.g., a future contract or an option on the index. By considering equal positive and negative levels of return, we report on a quantitative gain-loss asymmetry most pronounced for short horizons. The most probable horizon, quantified by the peak of the gamma-distribution fitted, scales as a power law of the return level for large returns. Surprisingly, we do not find this asymmetry in the individual stocks that the DJIA consists of. It is argued that this discrepancy between the asymmetry in the index and none in the individual stocks reflects the market dynamics and we speculate over its origin.