On Risk Reduction in Kelly Betting Using the Conservative Expected Value

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Abstract— The celebrated Kelly betting strategy guarantees, with probability one, higher long-run logarithmic growth than any other causal investment strategy. However, on the way to its long-term supremacy, this strategy has a notable downfall: it typically displays high variation in the time-varying realization of the bettor's level of wealth. Hence, the following question has arisen: For a finite horizon involving N sequential bets, how might Kelly's scheme be modified so as to remain provably appealing in some sense and also less risky? One way to address this has been to employ fractional Kelly strategies. These strategies are arguably ad-hoc in that they involve scaling down the bet size without a significant theory providing rationale as to how this should be done. The results to follow in this paper can be interpreted as providing a systematic way of carrying out this scaling down process. To this end, we work with the so-called Conservative Expected Value, recently introduced in the literature, as an alternative for the classical expectation. As a first test case for this new paradigm, this paper considers the important special case where all N bets have even-money payoffs, are independent and follow the same Bernoulli distribution.

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