When Harry Met Kelly: Approximations to Optimal Capital Growth in Markowitz-Tobin Mean-Standard Deviation Space

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Abstract

A classic problem in finance is the question of how an investor should optimally share wealth over one risky and one risk-free asset. This paper reconsiders this theory under the assumptions that (1) the investor's objective is to maximise the intertemporal growth rate of their wealth, (2) that the investor can make portfolio adjustments only in distrete time, and (3) that the risky asset is defined in each period according to its mean return and the standard deviation thereof. Two methodologies for finding the solution to that problem are considered. They are shown to be first-order equivalent, but different from the existing methodology which is grounded on an assumption of continuous time. The the approximate strategy that is found here is also shown to be more accurate than is the continuous time model when time is indeed discrete. The continuous time model is shown to be recoverable as a limit version of the discrete time model.

Keywords: Mean-standard deviation model, Kelly Criterion, discrete time

JEL classification: G11

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