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Generalized Safety First and a New Twist on Portfolio Performance

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Abstra

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same decision as minimizing the underperformance probability itself, and thus that the decay-rate maximizing strategy may require the investor to take positions that do not minimize the probability of shortfall in each successive period. It also makes clear that the relationship between the marginal distribution of the one-period portfolio return and the mean-shortfall distribution is the same as that between the source density and the target density in importance sampling. Thus Geweke's (1989) measure of Relative Numerical Efficiency can be used as a measure of the quality of the divergence measure. Our interpretation of the decay rate maximizing criterion in terms of a one-shot problem enables us to use the tools of importance sampling to develop a "performance index" (standard error) for the Portfolio Performance Index (PPI). It turns out that in a simple stock portfolio example, portfolios within one (divergence) standard error of one another can have very different weights on individual securities.

Keywords: Entropy Importance sampling Kullback–Leibler divergence Portfolio choice Portfolio performance Safety first Shortfall

JEL Classification: G11 C4

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The artic … y in Econom … ul to Joel L. Horowitz … eferees for helpful c …

Notes

[1] R(w) c … cause our analysis … return.

[2]In relat … places the indicato … ints out that similar p …

[3]Stutzer (2003) is careful to point out how matters change with temporally dependent data. The I(d,w) function we work with describes the decay rate only in the case that the returns are IID, though a similar rate function characterizes the non-IID case. Since much of our analysis hinges on the precise form of I(d,w), it should be regarded as applying only to the IID case. We conjecture that something very similar to our analysis would apply in the non-IID case.

[4]In the log-optimal version in Stutzer (2003), $1 - \theta$ is interpreted as the coefficient of relative risk aversion.

[5]An additional interpretation of θ as a Lagrange multiplier will be offered in the next subsection.

[6]Technically, there is an important distinction between a divergence and a distance; the former is not a proper metric and may violate properties such as symmetry or the triangularity rule.

[7]For a general proof of Kullback's lemma see, for example, Bucklew (1990, p. 30).

[8]Note that the probabilities, $\pi_t(\cdot)$, are concentrated in terms of the to-be-determined multiplier θ; this reduces the dimensionality of the optimization problem from $(T + N + 1)$ to $(N + 1)$. For a more thorough discussion about the relationship between the $\pi_t(\cdot$ …

[9]To matc … greater than d to … . Our argumen … with a slightly l …

[10]Strictly … case that retur … rm "dynamic game …

[11]Horizo … ze discount … ometric.

[12]In rela … her using the sum-of-s … ce.

[13]That is, we seek a measure of the effect sampling error might have on the PPI. Such measures are relevant for all portfolio allocation procedures that rely on estimated moments or parameters, as sampling error will affect the performance of each such procedure.

[14]This notation generally follows that of Geweke (1989). For simplicity, we take $\mathcal{I}(\psi)$ and $p(\psi)$ to be proper normalized densities; Geweke works with the more general unnormalized (kernel) density.

[15]The adjective “numerical” is used to emphasize that even in a fully Bayesian context, frequentist procedures may be appropriate for assessing the sampling properties of a posterior sample generated randomly using Monte Carlo procedures. We will apply the same reasoning to the data sample, so the standard terminology applies.

∗Sample size equals 240.

[16]Two stocks Stutzer (2000) used have dropped out of the CRSP data set.

∗Sample size equals 240.

∗Sample size equals 240.

[17]The classic example is the “height with shoes on vs. height with shoes off” example: the popu ... hoes on.