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Smoothed safety first and the holding of assets

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1. Introduction and motivation

Perhaps the earliest and most celebrated of these shortfall methods is the Safety First (SF) principle of



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GSF is equivalent to Stutzer's (2000) PPI; when the logarithm of gross asset returns is

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IID, GSF is equivalent to Stutzer's (2003) Decay Rate Maximizing Portfolio. Net IID returns are used below, so in this context, PPI and GSF are interchangeable terms, but the analysis can be extended to the logarithm of gross returns if desired. The interested reader is referred to these papers for complete descriptions of these methods.

‡In fact, Markowitz (1999) has referred to Roy's shortfall-based SF rule as a 'tremendous contribution' and wrote (p. 5): 'On the basis of Markowitz (1952), I am often called the father of modern portfolio theory (MPT), but Roy (1952) can claim an equal share of this honour.'

§The wealth exhaustion constraint, $\sum_{n=1}^N w_n = 1$, is implied, but suppressed for notational parsimony throughout the remainder of the paper. Also, short positions are permitted, but all the analysis done here can be adapted to the case of no shorting if desired.

†In the presence of effective pruning strategies, this solution method is tractable for small N in the no-shorting case, but if shorting is permitted the problem becomes extremely computationally intensive, even for small N.

†We experimented with other sigmoid and sigmoid-like functions (such as Extreme Types I and II as well as the logistic, among others). We studied them using simulation methods and via Taylor-series expansions. The latter were particularly helpful in determining how different methods value even- and odd-order moments of the return distribut

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†We used the MATLAB™ optimization routine `fminunc`, using a quasi-Newton method with a line search subroutine and numerical derivatives. If the reader has a strong preference for analytic first and second derivatives, then they can be derived, but they are cumbersome to manage and return similar results when used in the optimization process. Of course, `fmincon` could be used as well.

†This last finding is not surprising: preference for positively skewed portfolio return distributions (and, thus, an aversion to negatively skewed portfolio return distributions) is a prominent feature of the PPI method; see Stutzer ([2000](#)).

‡In this instance, we used MATLAB™'s `fmincon` routine, though the older `constr` routine also works.

†Similar results were obtained using other reasonable values for d and \cdot .

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