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Safety-first portfolio optimization for US investors in emerging global, Asian and Latin American markets

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Abstract

Risk averse US investors with safety-first objectives in portfolio optimization hold small weights (maximum 10%) in emerging markets when constructing portfolios of the Standard and Poor's 500 (SP), and the Emerging Markets Composite Global (CG), Asia (AS) and Latin American (LA) indexes, respectively. The Composite Global and Asia weights are even smaller than their minimum variance weights. Yet, these optimal safety-first portfolios are dominant in terms of risk and return over the global minimum or higher variance portfolios. In contrast, safety-first optimization for Latin America is hardly different from the minimum variance and not clearly dominant over other mean–variance portfolios. Overall, safety-first limits portfolio losses associated with infrequent catastrophic events and otherwise optimize performance.

JEL classification: G150
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Emerging markets' domestic currency returns can be impressive at times but highly volatile. US investors in emerging markets normally experience lower return because of currency depreciation and higher risk because of exchange rate volatility compared to the domestic investors. Yet, the emerging markets' capitalization has grown at nearly double the rate of the developed markets, with international investor interest motivated by their portfolio diversification benefits.

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This study examines these diversification benefits within a safety-first context. Safety-first considers the investor's desire to minimize the chance of large negative returns, and may be appropriate for emerging markets, because their equity distributions are subject to extreme returns.[1] The focus is on the optimal portfolios of US risk averse investors in the International Finance Corporation (IFC) Emerging Markets Data Base (EMDB) equity indexes, including the Composite Global (CG), Asia (AS) and Latin America (LA) indexes, in combination with the Standard and Poor's 500 (SP). The portfolios are constructed using Roy's (1952) safety-first criteria, as applied by Arzac and Bawa (1977) and Jansen et al. (2000). For comparison, the results are contrasted with those applicable to Markowitz (1959) mean–variance optimization (M-V).

Jansen et al. (2000) use extreme value theory to apply safety-first. The approach can calculate the probability of extreme events, even with no such observations in the sample. They show that portfolio selection with limited downside risk includes both the safety-first investor of Roy (1952) and Arzac and Bawa (1977), and the value-at-risk (VAR) constrained investor of Gourieroux et al. (2000). Their approach is used in this research.

This paper is divided into the following six sections. Section 1 presents the literature, while Section 2 discusses the sample and data. Section 3 presents the methodology and results for exceedences and extreme values. Section 4 presents the methodology for safety-first (using extreme value theory) and Section 5 presents these results. Section 6 provides the concluding comments and summary.

1. Literature review

Safety-first involves the body of portfolio literature that concentrates on placing limits on the risks of bad outcomes. Roy's (1952) strategy involves minimizing the probability that outcomes will not fall below a pre-specified critical return. This strategy would be equivalent to maximizing the number of standard deviations below the mean that the pre-specified critical return can be when distributions are normal. The optimal choice between two portfolios is the one where the pre-specified critical return is the largest number of standard deviations from the mean, because then the probability on the left tail of obtaining a return below the critical is the lowest.

Kataoka (in Elton and Gruber, 1995, pp. 237–240 and 249–250) modified Roy's approach by pre-specifying the acceptable probability of a bad outcome, and choosing between two portfolios the one with the highest critical return at that probability. In this case, pre-specifying the probability is equivalent to pre-specifying the acceptable number of standard deviations that the critical return can lie below the mean, with the objective of picking the portfolio with the highest critical return. Telser (1955–1956) combines the

[1] There are many other instances where safety-first consideration would be appropriate for protection from dreadful events that might substantially erode wealth, such as the worldwide October 1987 stock market crash and the 1997 Asian financial crises. Indeed, Pownall and Koedijk (1999) show that Asian markets experienced more frequent extreme returns than suggested by conditional normality during periods of financial turmoil, including the 1997 crisis. And Bae et al. (2003) find that financial contagion is stronger for extreme negative returns, making safety-first critical in these instances.