3
Fund of Hedge Funds Portfolio Selection: A Multiple-Objective Approach

Ryan J. Davies, Harry M. Kat and Sa Lu

Ryan J. Davies is Assistant Professor and Lyle Howland Term Chair in Finance at Babson College (Boston, MA). His research interests include hedge funds, mutual funds, market microstructure and European securities market regulation.

Harry M. Kat is Professor of Risk Management and Director of the Alternative Investment Research Centre at the Sir John Cass Business School at City University in London. Before returning to academia, he was Head of Equity Derivatives Europe at Bank of America in London, Head of Derivatives Structuring and Marketing at Banc One in Tokyo and Head of Derivatives Research at MeesPierson in Amsterdam. He is a member of the editorial board of The Journal of Derivatives, The Journal of Alternative Investments and The Journal of Wealth Management.

Sa Lu is an Associate at UBS (London). She is a Structurer in the Fund Derivatives Structuring team. Her research is on the detailed characterisation of hedge fund portfolio returns and optimisation within a mean-variance-skewness-kurtosis framework.

Correspondence: Ryan J. Davies, Finance Division, Babson College, 224 Tomasso Hall, Babson Park, MA 02457-0310, USA E-mail: rdavies@babson.edu

Practical applications Hedge funds exhibit complex, non-normal return distributions. In this context, it is difficult for investors to determine how much capital to allocate across different hedge fund strategies. Standard mean-variance portfolio theory and performance measures based on it (for example, the Sharpe ratio) may be inappropriate. The paper proposes an alternative portfolio allocation technique based on polynomial goal

programming (PGP) that is simple to implement and computationally robust.

This chapter develops a technique for fund of hedge funds to allocate capital across different hedge fund strategies and traditional asset classes. Our adaptation of the polynomial goal programming optimisation method incorporates investor preferences for higher return moments, such as skewness and kurtosis, and provides computational advantages over rival methods. We show how optimal allocations depend on the interaction between strategies, as measured by covariance, co-skewness and co-kurtosis. We also demonstrate the importance of constructing ‘like for like’ representative portfolios that reflect the investment opportunities available to different-sized funds. Our empirical results reveal the importance of equity market neutral funds as volatility and kurtosis reducers and of global macro funds as portfolio skewness enhancers.

Introduction

As hedge funds continue to become more and more popular with investors, the amount of assets under their management has steadily grown, from around $40 billion in 1990 to an estimated $1839 billion by September 2007. Most investors do not invest in individual hedge funds directly, but invest in so-called funds of hedge funds (FoHF) instead. In return for a typically not-insignificant fee, FoHF (claim to) take care of the many unavoidable, time-consuming and complex issues that come with investing in a highly opaque asset class such as hedge funds. Although FoHF have been around for quite some time, it is still unclear how FoHF should optimally allocate capital across various hedge fund strategies.\(^1\) In this paper, we show how a simple allocation technique based on polynomial goal programming (PGP) is particularly well-suited to dealing with the complex return distributions of hedge funds and their practical institutional constraints.

Amin and Kat,\(^2\) Anson\(^3\) and others show that hedge fund returns are substantially more complex than common stock and bond returns. Not only do hedge fund return distributions tend to exhibit significant skewness and kurtosis, they also tend to display significant co-skewness with the returns on other hedge funds as well as equity. As a result, standard mean-variance portfolio theory (as well as performance measures based on it, such as the Sharpe ratio) is inadequate when dealing with portfolios of (or including) hedge funds – a more extensive model is required.\(^4\)

Here, we construct a PGP optimisation model that is able to balance multiple conflicting and competing hedge fund allocation objectives: maximising expected return while simultaneously minimising return variance, maximising skewness and minimising kurtosis. We show how changes in investor preferences lead to different asset allocations across hedge fund strategies and across asset classes (hedge funds, stocks and bonds). The PGP