

UNIVERSITY OF ZURICH

BACHELOR THESIS

Replication Methods and Return Characteristics of Hedge Fund ETFs

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Executive Summary

In March 2008, the Securities and Exchange Commission decided to approve the listing of active exchange traded funds (ETFs) in the US and thereby opened up for a new form of asset management (Schizas (2014)). This research paper investigates whether the actively managed ETFs that emerged after the aforementioned change in regulations offer their investors returns that are comparable to the returns of the hedge fund strategy they track with regard to desired return characteristics, statistical properties, and risk factor exposure. Further, the research demonstrates how simple statistical models can be utilized to create exposure to similar risk factors, as found in hedge funds' returns, in a replication approach of the equity market neutral and event driven hedge fund strategies.

Daglioglu, Georgiev and Gupta (2003) find that hedge fund returns are often negatively correlated to the equity markets in times of market distress, which can be utilized in the construction of a diversified portfolio. Modigliani (1999) argues that including hedge funds in a portfolio of stocks will significantly improve the risk-return characteristics of the overall portfolio. Brooks and Kat (2001) urge the analysis of the higher statistical moments in hedge fund returns and find that hedge fund returns can be characterized as having higher than usual negative skewness and positive excess kurtosis. Based on the findings of the aforementioned research, this thesis presents an analysis and comparison of alternative ETFs' returns and hedge fund returns and will address the question of substitutability between the two investment opportunities.

This high-level analysis reports and compares the statistical moments of the returns of both investment vehicles and investigates their correlation to standard asset classes (equities and bonds). The findings suggest that approximately half of the investigated alternative ETFs exhibit statistical properties that are comparable to their replication targets. In terms of diversification benefits, the findings for both the ETFs and the hedge funds are in line with the results of Brooks and Kat (2001) to the extent that, on average, both exhibit surprisingly high correlation to the equity markets and typically negative correlation to the bond markets. In detail, the findings suggest that the ETFs often exhibit lower correlation to the equity markets than their traditional counterpart, which makes them an attractive investment for diversification purposes. On the downside, the analysis finds that the alternative ETFs significantly underperform the hedge funds with regard to mean returns and associated risk, as measured by the standard deviation of the returns.

The analysis of the risk factor exposure of the alternative ETFs and their replication targets facilitates linear factor models based on three sets of regressors. Baseline model 1 (BM1) uses Fung and Hsieh's (2001) seven risk factors, which have been used for comparable investigations by Fung and Hsieh (2001, 2002a, 2004 and 2006) and Getmansky, Lee and Lo (2015). Baseline model 2 (BM2) uses factors based on the Merrill Lynch Factor Model - Exchange Series, which offer the advantage of being investable, as opposed to Fung and Hsieh's factors that do not all have tradable securities associated with them. Where the analysis using BM1 and BM2 does not yield satisfactory results, the author introduces alternative factors, discovered using an application developed for this purpose. The baseline models used can be summarized by the following equation:

$$R_t = \alpha + \sum_k \beta_k * SF_{k,t} + \epsilon_t,$$

where:

$$SF_{k,t}^{BM1} = [S\&P\ 500_t\ SC - LC_t\ 10Y_t\ CredSpr_t\ BdOpt_t\ FXOpt_t\ ComOpt_t],$$

$$SF_{k,t}^{BM2} = [S\&P\ 500TR_t\ Russell2000_t\ MSCIEAFE_t\ MSCIEMF_t\ FX_t].$$

The robustness of the alternative models was tested by applying them during different sub-periods and by substituting discovered risk factors with regressors capturing exposure to the same associated returns. Regarding the performance comparison, the risk factor comparison also supports the conclusion that approximately half the ETFs can be seen as substitutes for an investment in a hedge fund, albeit not perfect substitutes. In detail, the analysis finds that the ETFs do not exhibit significant positive alpha, which was identified for a number of hedge fund indices. Further, for both asset classes the equity market factors predominately yield statistically significant and comparable betas, whereas exposure to other risk factors in parts differs substantially.

The presented hedge fund replication approach facilitates the factor-based replication methodology described by Takahashi and Yamamoto (2008). The main difference from the traditional methodology, where the researcher limits the number of factors to only include regressors that have been identified to offer significant explanatory power, the presented approach uses either a set of available ETFs or stocks and iterates through all possible combinations to arrive at the replication portfolio. The findings suggest that an approach based on maximizing the R-squared value does not yield a replication strategy capable of delivering comparable performance to the replication target in the out-of-sample period. The analysis of the results from this replication approach emphasizes the need to include additional metrics in the maximization process. By including the volatility and past performance of the possible portfolio constituents, a satisfactory result was achieved.

The analysis is based on monthly price data obtained from either S&P's Capital IQ platform or Bloomberg. Factors not accessible via these sources were obtained from databases

provided by the researchers who introduced said factors, and the missing fixed-income prices were obtained from the online database of the Federal Reserve Bank of St. Louis. The initial sample of securities to be included in the alternative models or as replication portfolio constituents was filtered to only include securities providing price data for the specific time periods. In accordance with previous research, the hedge fund universe is represented throughout the thesis by aggregated hedge fund indices due to the unavailability of individual hedge fund returns.

In future research, it would be interesting to see how the performance of the two investment vehicles compares during times of major market distress. The analysis of different risk metrics and exposure to factors not included in this thesis could further advance the discussion of substitutability between the two asset classes.