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A Beta Proxy for Hedge Funds

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Hedge funds have provided both diversification and compelling risk-adjusted returns to investor portfolios over the past decades. But their illiquid nature and high cost structures can pose challenges, including misalignment to investment policy. We look at ways to navigate these obstacles when starting to invest in hedge fund strategies or when optimizing existing allocations.

Investors are once again engaged in a spirited debate over the effectiveness of including hedge funds within their asset allocations. Those in favor of including hedge funds cite strong risk-adjusted returns, diversification benefits, and less susceptibility to equity market drawdowns, while the counter arguments include high fees, little transparency, and poor liquidity.

In speaking with a number of our clients, we also hear of the challenges they face in attempting to keep their hedge fund allocations in line with their policy benchmarks — particularly amid the volatility of equity markets, demands on cash, and the illiquidity of alternative investments. Greater challenges await those adding exposure, given the increasing demands of getting access to the "right" hedge fund managers and the ever more onerous due diligence protocols required by many boards and investment committees. So, what tools are available for investors looking to add, shed or simply maintain exposure to hedge funds in their or their clients' portfolios?

Here are some potential solutions that investors have applied over the years:

1 **Proxy Hedge Funds Using Cash** This is based on the idea that hedge funds should be pure alpha and therefore have no beta. This approach seeks to provide drawdown protection, but introduces significant tracking error to a broad hedge fund benchmark like the HFRI or HFRX Global Hedge Fund Index (HFRX) indices. To be fair, this view seems to have gone the way of the dodo bird and the passenger pigeon.

2 **Proxy Using Equities** This is most often used to proxy equity long/short exposure, a specific sub-strategy within the hedge fund universe. The thought is that since the funds are equity based, then equity would be a reasonable hedge. This approach offers better potential return but higher volatility and very little of the diversification and drawdown protection that is traditionally associated with hedge funds.

3 **Proxy Using a Beta-adjusted Exposure to Equities** Now we're getting somewhere. We can adjust the beta of equities based upon some estimated measure of the equity beta within hedge funds. The exposure is not entirely static, which we believe is good; however, basing the solution entirely in equities and cash may limit its ability to track the returns of more diversified hedge funds that might include fixed income and commodities, for example.

4 **Proxy Using a Combination of Various Public Market Investments** Access to multiple asset classes, such as equities, fixed income and commodities, can provide better diversification than using only equities to proxy hedge fund portfolios, but care should be taken to ensure that the return and risk objectives align with client expectations for hedge funds. Moreover, given the ever-changing landscape of capital markets, hedge funds can be dynamic in their investment decisions. Therefore, is it reasonable for an investor to expect a static allocation, such as a 40/60 equity to fixed income proxy portfolio, to closely track a dynamic investment such as hedge funds?

While each of the approaches above may have some merit, we believe a more effective and dynamic hedge fund beta proxy can be created based on an evolving combination of factors or market premia that have empirically explained a portion of hedge fund returns. It is widely known that individual hedge funds can produce alpha, but beta has been a large driver of returns for hedge funds in aggregate. Academic research published over the past decades supports that factor models explain a large portion of the return variation of hedge fund indices, such as those provided by HFR*. Can we then build a hedge fund beta portfolio, by harvesting hedge fund betas using cost effective and liquid instruments to arrive at an effective, yet efficient solution to provide exposure to hedge funds? In this article, we'll explore a hedge fund beta proxy, utilizing a factor-based approach, for the purposes of exposure management.

What is HFR?

Hedge Fund Research ("HFR"), established in 1992, is the hedge fund industry's "go to" provider of hedge fund index information. They deliver over 300 indices for hedge fund benchmarking and performance measurement needs. HFR produces indices of hedge fund performance ranging from industry-aggregate levels down to specific, niche areas of hedge fund sub-strategy and regional investment focus. Beyond indices, HFR delivers high-value visibility into private hedge funds and publicly available liquid alternatives through their hedge fund databases.

What is the HFRX Global Hedge Fund Index*?

The HFRX Global Hedge Fund Index is an index that provides exposure to the following key hedge fund strategies: equity hedge, event driven, macro/CTA, and relative value arbitrage. The constituents of the index are asset weighted based on the distribution of assets in the hedge fund industry. The HFRX Hedge Fund Indices (HFRX) are investable indices constructed through a UCITS compliant methodology. Hedge funds need to have at least $50 million under management and a 24 month track record of active performance, before they can be included in the index. Returns are reported daily and net of fees. It's widely recognized and one of the most popular hedge fund indices for benchmarking purposes.

The Factor-Based Approach to Building a Hedge Fund Proxy Portfolio

Hasanhodzic and Lo's paper in 2006 was one of the first[1] to successfully replicate the return profile of a few hedge funds by using a set of six factors via regression analysis. Since the original paper in 2006, the academic literature on hedge fund replication has evolved and in the meanwhile several factors and different methodologies have been identified to replicate the risk/return profile of hedge fund indices. State Street Global Advisors built a Global Alternative Beta Strategy, which aims to provide beta exposure to hedge funds, back in 2016 and has been managing live portfolios since.

Figure 1 exhibits and defines our factors, which are based on academic and practitioners' research.

Figure 1
Hedge Fund Risk Factors

Factor Exposures	Factor Definitions
U.S. Equity Returns	Market cap weighted mixed equity indices of Russell 2000, Emerging Markets (MSCI Emerging Markets Index) and Developed Markets (MSCI EAFE Index)
Emerging Markets Equity	
Global Equity	
Interest Rates	Bloomberg U.S. Treasury 5–7 Year Total Return Index
Corporate Credit	Bloomberg U.S. Corporate High Yield Total Return Index
Commodity Carry	Bloomberg Roll Select Commodity Index

Source: Russell, MSCI, S&P, Barclays, Bloomberg and State Street Global Advisors.

The set of four factors were selected to capture the different risk exposures that hedge funds tend to have exposure to, and their feasibility of implementation via combinations of liquid futures contracts, other derivatives and/or ETFs. Our equity factor is formed by the market capitalization weighting of the three equity indices: firstly, the Russell 2000 Index is representative of the exposure to U.S. Small-Cap Equity; secondly, the MSCI Emerging Market Index captures the risk associated with Emerging Markets Equity; and thirdly, MSCI EAFE Index obtains exposure to risk associated with Equities of 21 Developed Market countries. The commodity carry factor is captured through the Bloomberg Roll Select Commodity Index. We selected the Bloomberg U.S. Treasury 5–7 Year Total Return Index and the Bloomberg U.S. Corporate High Yield Total Return Index as representatives of the Interest Rates and Corporate Credit factors, respectively.

Next, we developed a systematic and dynamic investment process that more closely aligns the exposures above to those in a broad hedge fund index, such as the HFRX Global Hedge Fund Index. With an objective of minimizing tracking error versus this index, we modelled the exposures in the form of a time varying model. Then, we used a recursive algorithm coupled with a Bayesian estimation technique to estimate the exposures, as explained in the deep dive below. We restricted the positions to long only and implement the model through a set of liquid instruments, such as futures and/or ETFs.

Global Alternative Beta Deep-Dive

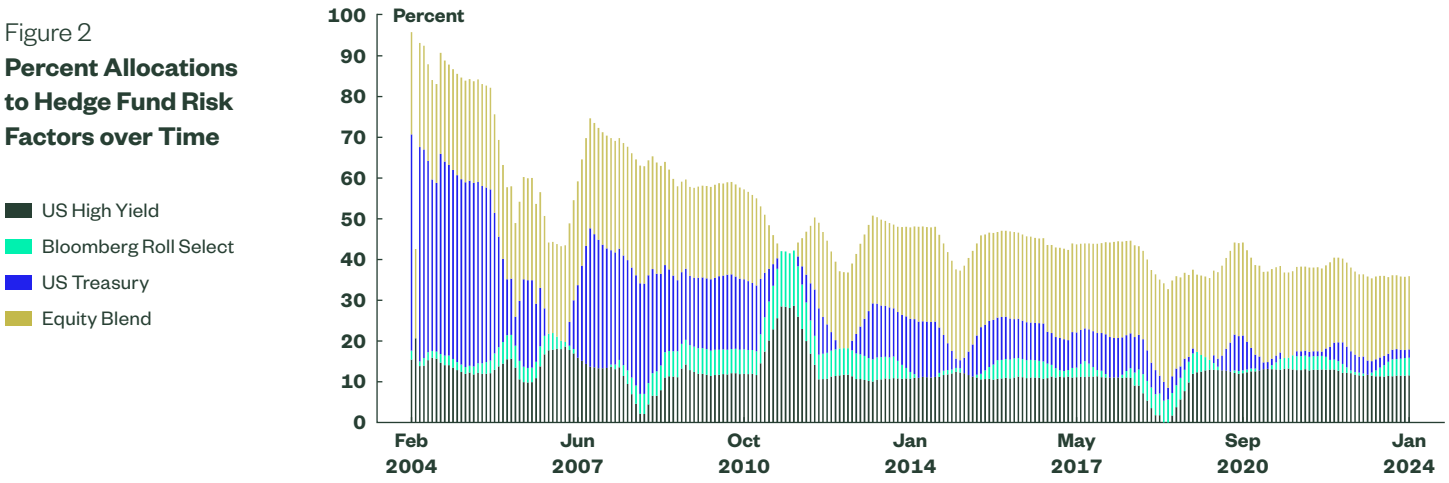
Our methodology is designed to achieve three objectives: first, replicating the benchmark index, such as the HFRX Global Hedge Fund Index, while seeking to minimize tracking error; second, generating a risk/return profile similar to the benchmark; and third, capturing the dynamic hedge fund exposures. We created a universe of factors representative of the major risk factors hedge funds are exposed to, such as commodities or interest rates, and offered a feasible and economical route for replication. The benchmark and factors were the inputs to our core model constituting of three moving parts.

First step of the model uses a Least Angle Regression (LARS) algorithm (Efron et. al.,2004), which is similar to a forward stepwise regression, to obtain the subset of factors that had predictive power in the recent period. The exposures to factors driving hedge fund returns are dynamic in nature. So, each month LARS selects those factors that are key drivers of hedge fund returns in the past three years. The choice of three years offers us a balance between availability of sufficient history and adaptability. An additional advantage of LARS is the algorithm's ability to handle the issue of multicollinearity, which can lead to unreliable estimates.

Kalman filtering, a recursive algorithm, is our workhorse for estimating the time-varying exposures to the chosen factors. At the end of each period, new information is available both for the benchmark index and the replicating factors. The estimation methodology of the Kalman Filter incorporates this new information, and continuously updates the ex-ante estimates of the exposures. A simpler alternative to Kalman Filtering is rolling-window OLS. But this method has several inherent issues such as the selection of an appropriate lookback window, stability of the estimated exposures, and the unchecked quality of the regression fit. Kalman Filtering, through its mechanism of predicting and updating estimates, is able to overcome the aforementioned issues and is considered an "Optimal Linear Estimator" for the case of time varying parameters.

Although, the estimates obtained by Kalman Filtering incorporate the new information available at the end of each period, they are based on certain assumptions. Gibbs Sampling, a Bayesian estimation technique, with Kalman Filtering provides stability and robustness to our estimates by generating a distribution of the exposures' ex-ante estimates and the associated uncertainty. Additionally, this part of the model allows us to mimic the infrequent changes in positions of hedge funds.

Figure 2
Percent Allocations to Hedge Fund Risk Factors over Time



Source: State Street Global Advisors. Allocations are as of the date indicated, are subject to change, and should not be relied upon as current thereafter. The data displayed for the Hedge Fund Replication Model is a hypothetical example of Back-Tested Performance for illustrative purposes only and is not indicative of the past or future performance of any SSGA product. Back-tested results are not indicative of the past or future of any SSGA product. The portion of results through (02/29/2024) represents a back-test of the Hedge Fund Replication model, which means that those results were achieved by means of the retroactive application of the model which was developed with the benefit of hindsight. All data shown above does not represent the results of actual trading, and in fact, actual results could differ substantially, and there is the potential for loss as well as profit. Please reference Back-tested Methodology Disclosure at the back of this document for a description of the methodology used as well as an important discussion of the inherent limitations of back-tested results.

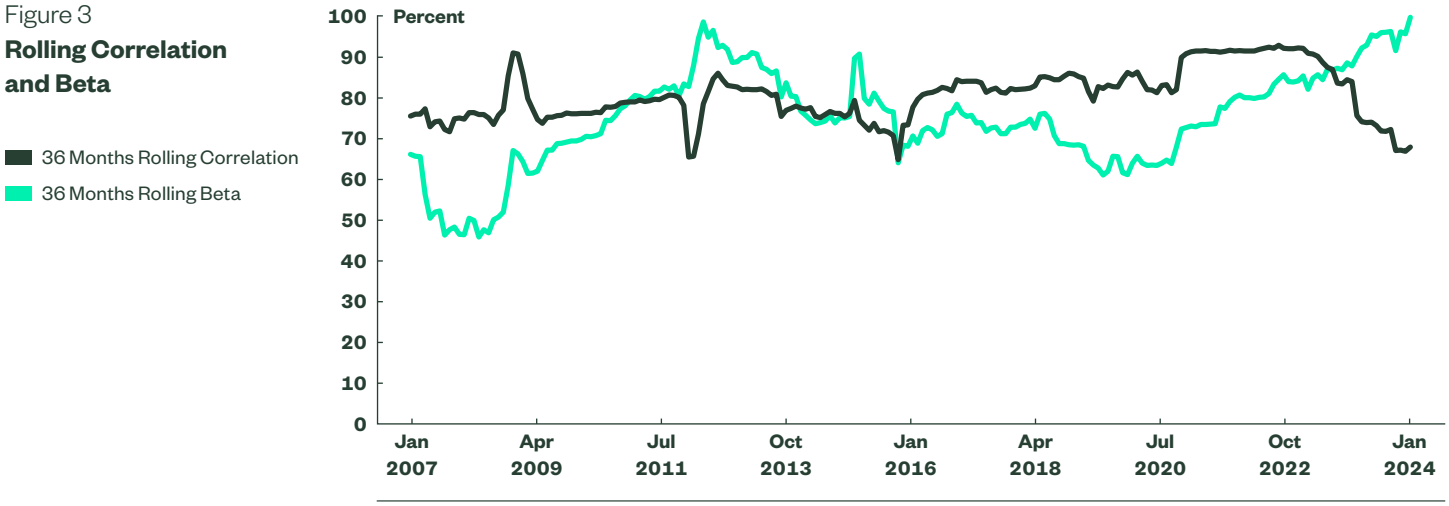
Figure 2 shows the results of the back-tested Global Alternative Beta Strategy described above against the HFRX Global Hedge Fund Index. In this graph you can see the market beta exposures that hedge funds have been exposed to, in aggregate, through time.

The resulting exposures through time appear to be intuitive. The exposures to the traditional long-only return factors, such as Equity Returns and Corporate Credit returns, were considerably stable throughout the sample period (the exposures' coefficient of variations were 20.4% and

32.7% respectively). The only exception was the volatile period of Global Financial Crisis (GFC) in 2008 when exposures to these two factors decreased, and the exposures to the U.S. Treasury and the Commodities increased. Remember, our objective of the Global Alternative Beta portfolio is to provide risk and returns that are similar to hedge funds, by buying market factors that hedge funds are positioned in, to minimize the tracking to the stated benchmark, the HFRX Global Hedge Fund Index in this case. The U.S. Treasury factor served as a diversifier to many of the other "growth" factors and helped to achieve a comparable risk/return profile versus the benchmark. Furthermore, the increased exposure to the Commodity factor during the GFC and in the subsequent QE period coincided with the period when hedge funds were looking at return diversifiers such as commodities.

Additional evidence of the model's adaptability is observable in 2009 when the hedge funds seemingly started to re-risk with the broad index generating 13.3% returns in the same period. It is interesting to note how the model replicates this re-risking and increases exposures to the corporate credit and commodity factors in the same period (combined exposure increased from 12.5% to 18% in 2009). The Global Alternative Beta portfolio generated 15.0% returns in 2009, outperforming the hedge fund benchmark.

Figure 3
Rolling Correlation and Beta



Source: HFR and State Street Global Advisors. The data displayed for the Hedge Fund Replication Model is a hypothetical example of Back-Tested Performance for illustrative purposes only and is not indicative of the past or future performance of any SSGA product. Back-tested results are not indicative of the past or future of any SSGA product. The portion of results through (02/29/2024) represents a back-test of the Hedge Fund Replication model, which means that those results were achieved by means of the retroactive application of the model which was developed with the benefit of hindsight. All data shown above does not represent the results of actual trading, and in fact, actual results could differ substantially, and there is the potential for loss as well as profit. Please reference Back-tested Methodology Disclosure at the back of this document for a description of the methodology used as well as an important discussion of the inherent limitations of back-tested results.

Figure 3 shows the Global Alternative Beta portfolio's rolling 36-month correlation and beta to the HFRX Global Hedge Fund Index. The Global Alternative Beta proxy maintains a high correlation to the hedge fund benchmark during this volatile period. The rolling beta of the Global Alternative Beta proxy remained less than one, providing evidence for the less volatile nature of the replicating strategy compared to the hedge fund index. The increased volatility of the market over this period (2004–2024) contributes to the Global Alternative Beta proxy re-estimating return drivers.

In our experience, the decision to allocate to a hedge fund beta proxy is about risk reduction. For example, investors mindful of their policy or strategic benchmark might point to liquidity and tracking error as primary concerns. A Hedge Fund Beta proxy's performance should be measured on multiple dimensions:

1. How well does the portfolio track the HFRX Global Hedge Fund Index, or an equivalent benchmark?

2. Does the proxy generate a risk/return profile similar to the benchmark and better than other more naïve overlay proxies as discussed earlier?

3. Is the process dynamic enough to evolve with market conditions, enabling the investor to capture hedge fund risk premia?

Figure 4 highlights the performance of a (back-tested) Global Alternative Beta proxy versus the HFRX Global Hedge Fund Index, as well as a 60/40 Equities/Bond Portfolio. To help reduce unintentional risk, it is important for the Hedge Fund Beta proxy to mimic the characteristics of the hedge fund benchmark. The Global Alternative Beta strategy has good efficiency, as shown by the Sharpe ratio. It has a high correlation, as well as high beta, when compared to the HFRX Global Hedge Fund Index. In addition, the Global Alternative Beta Strategy has a reasonably low tracking error to the investable HFRX Global Hedge Fund Index, considering the complexities of tracking hedge fund indices. Overall, the Global Alternative Beta Strategy has similar characteristics as its benchmark over this period.

Figure 4
Summary Statistics for Potential Hedge Fund Proxies
Back-tested from Feb 2004–Feb 2024

	HFRX Global Hedge Fund Index	State Street Global Alternative Beta Strategy (back-test)	MSCI World Index	Bloomberg Barclays Global Aggregate Bond Index	60% MSCI World Index/ 40% Bloomberg Global Aggregate Bond Index
Annualised Return (%)	1.20	2.92	7.90	2.24	5.85
Annualised Risk (%)	5.19	4.95	15.48	6.03	10.60
Sharpe Ratio	0.23	0.59	0.51	0.37	0.55
Tracking Error to the HFRX Index (%)	0.00	3.35	11.80	6.85	7.51
Max Drawdown (%)	25.21	19.41	54.03	24.19	36.40
Beta to Equity (MSCI World)	0.27	0.30	1.00	0.18	0.67
Beta to HFRX	1.00	0.75	2.36	0.31	1.54
Correlation to Equity (MSCI World)	0.79	0.93	1.00	0.45	0.98
Correlation to HFRX	1.00	0.78	0.79	0.26	0.75

Source: Russell, Barclays, HFRI and State Street Global Advisors. Past performance is not a guarantee of future results. The index returns are unmanaged and do not reflect the deduction of any fees or expenses. The index returns reflect all items of income, gain and loss and the reinvestment of dividends and other income. Source: State Street Global Advisors. Data is from 02/2004 through 02/2024. The data displayed is a hypothetical example of back-tested performance for illustrative purposes only and is not indicative of the past or future performance of any State Street Global Advisors product. Back-tested performance does not represent the results of actual trading but is achieved by means of the retroactive application of a model designed with the benefit of hindsight. Actual performance results could differ substantially, and there is the potential for loss as well as profit. The performance may not take into account material economic and market factors that would impact the adviser's actual decision-making. The performance does not reflect management fees, transaction costs, and other fees expenses a client would have to pay, which would reduce returns. Please reference the disclosures for the model methodology and other important disclosures. State Street Global Advisors does not yet manage actual assets to this strategy. A complete list of the firm's composites and their descriptions is available upon request.

Key Takeaways

Our empirical analysis suggests that several of the methods used to proxy hedge funds have desirable traits but fall short when measuring dimensions of either hedge fund returns or risk. Our Global Alternative Beta Strategy is based on academic research. It invests in common market premia that hedge funds themselves invest in, such as credit or commodities, via a dynamic weighting mechanism and is implemented using liquid and low-cost instruments, with the ultimate objective of replicating the return and risk profile of hedge fund indices such as the HFRX Global Hedge Fund Index. It provides investors the option to get a cost-efficient, core beta exposure to hedge funds as an asset class.

Endnote

1 The list of papers related to hedge fund replication has been provided in the references section.

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- Start with rigor
- Build from breadth
- Invest as stewards
- Invent the future

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* Pensions & Investments Research Center, as of December 31, 2022.
† This figure is presented as of December 31, 2023 and includes approximately $64.44 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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