ABSTRACT

Hedge fund replication is the process of creating an investment portfolio that attempts to replicate hedge fund performance. This practice encompasses a number of different strategies that seek to offer investors hedge fund results without investing in hedge fund products. This paper discusses the basic premises of hedge fund replication, three notable methods (factor-based, rules-based, and payoff distribution), and important considerations for institutional investors. Ultimately, we conclude that such products, as they currently exist, are not suitable hedge fund replacements for institutional investors. Not only are replication products relatively untested, they also fail to consistently provide alpha.

OVERVIEW

Hedge funds, despite the whispered secrecy of this exclusive cast of asset managers, have been the subjects of extensive enquiry, particularly since their propagation in the 1990s. As hedge funds became more prolific and they continued to outperform traditional assets, investment professionals and scholars began searching for explanations for hedge funds’ superior performance.

Hedge funds are a tempting target for scrutiny. As illustrated in Exhibit 1 below, over a 15-year period, hedge funds (represented by the HFRI Fund Weighted Composite) have granted investors superior returns over equities (Russell 3000 Index) with less than half of the volatility.

There are, however, many tradeoffs for this performance. While the HFRI Fund Weighted Composite illustrated above is net of hedge fund fees, the typical fee structures of 2% and 20% keep many investors away from

---

1 The HFRI Fund Weighted Composite Index is a global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. Constituent funds report monthly net of all fees performance in US Dollar and have a minimum of $50 Million under management or a twelve (12) month track record of active performance. The HFRI Fund Weighted Composite Index does not include Funds of Hedge Funds.

2 The Russell 3000 Index measures the performance of the largest 3000 U.S. companies representing approximately 98% of the investable U.S. equity market. The Russell 3000 Index is constructed to provide a comprehensive, unbiased, and stable barometer of the broad market and is completely reconstituted annually to ensure new and growing equities are reflected.
such products despite these results. Coupled with limited liquidity opportunities and the potential detriment of headline risk, many investors are left searching for less expensive and less publicly conspicuous sources of performance.

Despite some investor objections to the fee structures, liquidity limitations, and overall risk characteristics, the hedge fund industry is set for continued growth. Total hedge fund assets under management are estimated to potentially reach $5 trillion by 2016. This is up from approximately $2 trillion managed today. This persistent industry growth will likely catalyze a similar acceleration of interest in the replication sector. As additional assets flow into hedge funds, replicators will not only have more data with which to test their theories, but may also be further incentivized to claim a larger market share of these hedge fund assets.

In order to claim these assets, replicators must persuade investors to embrace a beta-centric rather than alpha-centric perception of hedge fund investing. That is, investors must look at hedge fund investments as sources of index risk returns rather than sources of excess returns from skill.

Replicators understand hedge fund performance to be the result of two phenomena: alpha (manager skill) and beta (risk exposures). They contest that the majority of hedge fund performance is attributable to beta rather than alpha. Lars Jaeger, considered to be one of the founders of replication as it exists today, estimates that up to 95% of average hedge fund returns are due to beta exposures.

These risk exposures are often termed alternative and exotic beta. As illustrated in Exhibit 2, a simplified attribution of hedge fund returns, alternative beta generally refers to any hedge fund risk exposure (systematic and idiosyncratic), while exotic beta is generally in reference to a nonsystematic risk exposure for which there is a positive premium, an expected positive return for bearing the risk.

Exhibit 2 (Simple Attribution of Hedge Fund Returns)
Replicators are interested in replicating hedge fund performance but only insofar as that performance is attributable to risk. By and large, they do not attempt to capture alpha, instead capitalizing on the potential positive premiums borne from risk exposures. In truth, whether replication models are capable of capturing alpha, even if it falls within a product’s investment mandate, is open for debate.

In attempting to replicate risk exposures, replicators assume that assets with similar risks will have similar performance. By investing in liquid, publicly traded securities, replicators claim to offer investors a more frugal, more accessible, and more liquid investment as compared with hedge fund or fund of funds products. The claims of hedge fund replicators, while appealing, may be lofty in their current manifestations. In general, financial services professionals and academics dispute the construction methodologies of replication products, claiming that the dynamic and asymmetrical behavior of hedge funds cannot be captured with existing replication techniques. Investor results, largely inconclusive at this time, seem to affirm, rather than contradict, this criticism.

We must also, of course, question the suitability of a beta-centric approach to hedge fund investing. According to most asset pricing models, alpha is the residual return of an investment after accounting for the risk free rate and returns earned on risk exposures. Alpha is often neglected in replication strategies, leaving replicators free to focus on risk exposures that are more readily replicated with liquid securities. There is a tradeoff, however, for such liquidity. By disregarding alpha, it can be argued, replicators are discounting the differentiating characteristic of hedge funds. This suggests that the best a replication product can hope to produce is an index return whereby manager skill (both good and bad) is canceled out, leaving behind the average beta returns.

The benefits borne of liquid investing are not compelling enough to render alpha obsolete for institutional investors. These investors often have less frequent liquidity needs than do other types of investors who may benefit from the daily or weekly liquidity offered by replication products. Moreover, although costly, hedge fund managers earn fees of 2% and 20% by providing superior investor results; they are not paid unless the investor’s portfolio excels. Though not all hedge funds are created equal, institutional investors have access to institutional grade hedge funds; these are hedge funds with the track records, infrastructure, and exceptional management required to both mitigate risk and provide alpha. Institutional investors do not need to “settle.”

**REPLICATION BASICS**

Replication models, frequently called clone and synthetic products, employ primarily quantitative techniques to identify the drivers of hedge fund returns and reproduce them through investments in liquid instruments. These products are constructed in a broad three-step process: identification of a target, analysis of target returns, and replication of target returns. This process is represented visually in Exhibit 3.
The first task of the replicator is to identify a suitable target for replication. This may be a single manager, a group of managers, a sector/industry index, a broadly diversified index, or an overall strategy. Second, replicators then try to define the drivers (market exposures and/or investment behaviors) responsible for hedge fund return profiles. Target performance can be attributed to several types of drivers, including risk premiums (S&P 500), investment behaviors (momentum), and specific types of risk (illiquidity risk), among others. The third step is the actual replication itself whereby the clone invests in baskets of liquid securities such as ETFs, futures, swaps, etc that are representative of the target return drivers.

Currently, there are three common construction methods. The remainder of this paper is dedicated to exploring these methods and the performance and consideration thereof. The three current methods of replication are:

- Factor-based
- Rules-based
- Payoff distribution

Often, factor- and rules-based methods are used in tandem.

**FACTOR-BASED**

Popularized by academics Fung, Hsieh, and Naik in the late 1990s, factor-based products take long and short positions in publicly traded instruments based on a set of factors that are representative of hedge fund performance. Factor-based replication is a top-down, “econometric approach” to construction, whereby statistical methods are employed to replicate a pre-determined hedge fund universe.

Factor-based methods are generally the most suitable when clone targets are fundamental strategies with consistent exposures. Equity long/short is an example of such a replication target. Consistency of exposure is imperative for hedge fund clones because factor-based replication is dependent upon two assumptions...
about hedge fund investing:
- Hedge fund managers tend to have similar collective views of market risk opportunities. These are evident in their portfolio exposures.
- In aggregate, hedge fund managers are slow to adjust underlying portfolio exposures. This is referred to as exposure inertia.

The success of factor-based replication products is dependent upon the overall hedge fund target’s adherence to these assumptions.

There are two techniques for factor-based replication. The first, which barely warrants mention, involves copying a list of hedge funds’ securities investments from regulatory filings. Obvious drawbacks include the relative infrequency and time lag of regulatory filings as well as the absence of information on certain types of investments and short positions.

The second strategy, more closely associated with regression and correlation analysis, often targets a larger group or index. The target is analyzed in a series of factor regression analyses to determine which factors are attributable to target’s performance. A simplified example of a factor-based asset pricing model is the Fama-French Model given in the equation below. This is a three factor model which states that the return of an asset \( r \) is equal to the sum of the risk free rate \( R_f \), the return of the overall market \( R_m \) less the risk free rate, the return difference between small cap stocks and large cap stocks \( SMB \), and the return difference between value stocks and growth stocks \( HML \).

\[
    r = R_f + \beta_m (R_m - R_f) + \beta_s (SMB) + \beta_v (HML)
\]

Replication products may find any number of factors to be representative of the target’s performance. These factors are then further refined into their appropriate weights. Before passive, liquid positions are implemented, the clone is assessed against the target in a series of in-sample and out-of-sample analyses that test the clone’s ability to generate returns consistent with the target.

**RULES-BASED/Mechanical Trading**

Rather than using econometric strategies, rules-based replication is a mechanical method that seeks to systematically replicate the trades that hedge fund managers make. Rules are simply conditional trading algorithms that dictate when to buy, sell, and hold particular types of securities. These rules allow the clone to mimic some of the non-linear behavior of hedge funds. Thus, rules-based products may short sell, employ leverage, and trade in derivatives, blurring the line between hedge fund and clone.

Merger arbitrage is an example of a mechanically replicated strategy whereby a rule exists that when news
of a merger breaks, the target company is purchased long, and the acquiring company is sold short. Eligible targets for rules-based replication are limited and therefore, this method is often supplemental to factor-based methods.

**PAYOFF DISTRIBUTION**

The final method of hedge fund replication, payoff distribution (or FundCreator), was developed by Amin and Kat in 2003. It is another top-down method that is based on derivatives pricing theory, with a focus on the shape of return distributions. It is not intended to replicate an existing fund. Rather, it is a risk management tool to construct a product with a preferred set of statistical properties. These properties are based on the desired shape of the product’s distribution and include statistics like standard deviation, skew, and kurtosis. For example, Exhibit 4 illustrates a normal distribution and the distribution of a hypothetical product constructed to be leptokurtic and have a skew akin to a normal distribution.

Exhibit 4 (Replication Product Distribution vs. Normal Distribution)

The objective of constructing a product with tailored properties is to complement a portfolio and achieve greater diversification.

**PERFORMANCE**

If successful, there are several areas in which clones would be equivalent to or superior to their conventional hedge fund counterpart: less exhaustive due diligence required, stable returns, low volatility, abundant liquidity, transparency, lower fees, and diminished headline risk. The investment community, however, Amenc et al reproduced many of the most notable factor-based replication products and concluded that: replication accuracy is not satisfying...This failure can be traced back to the difficulty in identifying the right factors, as well as the difficulty in replicating the dynamic exposure of hedge fund managers with respect to these
factors through simple regression methodologies that can only capture the past average exposures of the managers.x

With empirical analyses such as this, replication products continue to be held, at best, as an intriguing supplement to a diversified portfolio rather than a hedge fund replacement. They remain regarded as the pinch hitters of the alternative assets space, perhaps useful in temporarily mitigating the cash drag of a hedge fund portfolio but otherwise approached with ambivalence.

Despite the volume of academic work devoted to the theoretical construction of clones, there is a lack of information chronicling investor experience. The chief cause of this is likely time. Hedge fund replication products have simply not existed for a substantial amount of time. They have not been tested in varying economic conditions and have not yet proven other methodological concerns specious.

Another item of note when considering performance is what replication products are actually replicating. The dynamic trading factors that make hedge funds so difficult to replicate become less of an issue with a large collection of funds as they cancel each other out, leaving “an index with little hedge fund-like properties[,]... containing mainly equity and credit risk.”xi Essentially, replicators strip hedge funds of what makes them hedge funds; the result is largely long exposures with indefinite downside protection.

CONSIDERATIONS

The success of a replication product relies inherently upon the assumptions it makes about hedge funds and the steps it takes to replicate their conduct. Replication products, especially factor-based products, are particularly vulnerable to shifting markets, regulatory changes, and atypical hedge fund behavior.

The historical regression models used to identify hedge fund performance factors are also problematic. Out-of-sample analyses of clone products continue to underwhelm in their abilities to track target funds in real time.xii While correlation analyses may be accurate to a certain point, it is unclear whether such techniques can predict the current and future performance drivers of hedge funds, particularly in times of economic duress.

It is during these times of market dislocation that many hedge fund greats are made. This is also the time when many managers close due to poor performance, thus separating the top performers from the rest. Many hedge fund managers have made their marks on the investment community by behaving contrary to popular belief, in times of both economic devastation and prosperity, and generating market-timing alpha. Replication products, with their assumptions of consistent, slowly evolving exposures, generally do not view the hedge fund space through this lens. In light of such discordant realities, replicators’ responses to market conditions will always be more delayed than those of hedge funds.
In addition, products of rules-based construction are potentially inhibited by overcrowding in the investment space. As opposed to reacting to hedge fund consolidation, these rules-based clones may exacerbate the phenomena. Since rules-based products replicate the most recognized strategies employed by hedge funds, those strategies are also the most represented and likely to become encumbered by investors.

One should also consider replication products’ implication for discretionary investment decisions. Take the example of a rules-based product replicating a merger arbitrage strategy. Hedge fund managers (typically) devote a great deal of time to analyzing the regulatory and macro and micro economic climates surrounding an investment, their decisions are discretionary. A question for rules-based replicators is whether the existence of a long/short rule negates this type of fundamental analysis. Will the clone miss key indicators that the merger may not behave according to form and thus make a poor investment (non)decision?

Lastly, we must address hedge fund replication’s assumption that alpha is inconsequential to overall performance. The market-timing abilities, security selection skills, and contrarian perspectives of many of the world’s greatest investors should not be discounted as an as-yet unrecognized systematic risk. In a random selection process, alpha is at best diluted and at worst unimportant. However, in a prejudicial selection environment, the selection of managers that can deliver alpha is what is important.

**CONCLUSION - INSTITUTIONAL INVESTORS**

For institutional investors, replication products are not a viable replacement for hedge fund exposure. Clones are still in their infancy. They have neither the proven track record nor consensus of industry and academic professionals necessary to garner the confidence required for large, institutional investments. Long-term investors require stable risk-adjusted returns. Without these, increased liquidity and diminished fees may be less valuable. Hedge fund performance over the past 15 years (Exhibit 1) supports our conclusion that relative to other equity-like products, hedge funds continue to be a conservative choice for the delivery of consistent risk-adjusted returns.
ENDNOTES


