PORTFOLIOADVISOR

Repeat Business

New research shows hedge fund payoff replication works (and well)

BY PIERRE SAINT-LAURENT

It's been called the imitation crab meat of the investing world. It's been accused of delivering mediocrity (even in the good times). It's hedge fund replication: the intellectual endeavour to synthetically reproduce the characteristics of hedge funds or hedge fund composites (such as hedge fund indexes). And it's one of the hottest areas in financial R&D.

WHY BOTHER WITH HEDGE FUND REPLICATION?

Following the techno bubble burst investors started chasing more acceptable returns in a no-win environment for stocks and bonds. Hedge funds were offering a different approach that was uncorrelated to traditional asset classes, unfettered by excessive regulation and free to chase superior returns.

The problem is hedge funds have been, in a way, too successful. The catapult-like growth of the sector has attracted lesser managers and by the sheer diversity of their strategies, hedge funds have shown themselves to be complex and definitely not a one-stop-shop proposition. The Swiss Army knife of finance they are not.

Moreover, fees are arguably high and many think hedge fund managers simply can't justify their take-home pay on the basis of money made for their clients. In this view, the problem is with the hedge fund manager, not with hedge funds. The challenge, then, is whether or not managers can offer hedge-fund-like return/risk mixes at lower fees, without active management? Forget due diligence, turf the manager, keep the fund, lower the fees, up the return/risk dial, now where can we sign up?

Hedge fund replication is a work in progress. Several competing models have been proposed in the last few years and the field is evolving at a very rapid clip. The Holy Grail, then, is awarded to the firm that succeeds in achieving hedge fund replication. This has set in motion a huge applied R&D effort, with competing claims and counterclaims. For instance, claims of lower fees (up to 400 basis points lower, according to Lars Jaeger of Partners Group) have

helped convince managers to entrust their cash to replicators. On the other hand, some commentators have seen replication as high-tech mediocrity: For example, reproducing a hedge fund index will include low-performance funds, by definition, not just the top-performing ones; lower fees equals lower returns. You get what you pay for, according to this view.

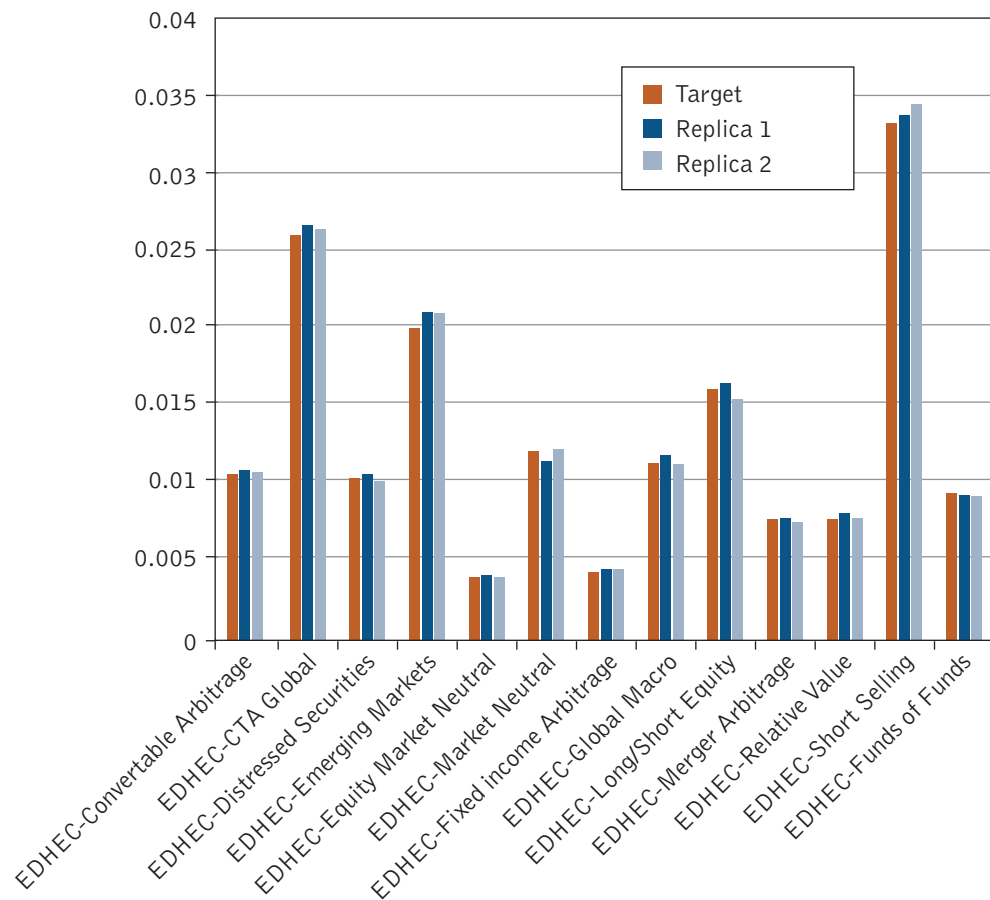## THE MANY FACES OF HEDGE FUND REPLICATION

Essentially, there are two ways of replicating hedge fund returns and risks. The first, and more traditional, is through factor models: identify all the factors that explain hedge fund behaviour, include them in a model, and run that model with hedge fund data. Factor models are a well understood, highly researched and fundamental part of the financial arsenal. However, factor models are *a priori:* you need to guess what factors underpin hedge fund returns then test to see if you're right. It's a somewhat messy, hit-and-miss process. Several critics (including EDHEC) point out that tests of this approach are inconclusive with a weak ability to successfully replicate actual hedge fund returns.

A more active, and more technical, approach to hedge fund replication is the payoff distribution approach. Instead of trying to reproduce hedge fund returns period by period, a manager strives to reproduce the long-term behaviour of hedge funds. In other words, the aim is to deliver the return, risk, skewness and kurtosis profile of the replicated hedge fund(s) given the investment horizon. For example, successful replication would then deliver accuracy at the end of a five or 10-year horizon. What happens, in the meantime, should be irrelevant to the investor. However, this can make investors nervous as they typically care about their investments on a regular basis, not just in the distant future.

RESEARCH TO THE RESCUE

New research addresses this issue. Nicolas Papageorgiou, Bruno Rémillard and Alexandre Hocquard at HEC in Montreal have refined the return distribution approach through clever and complex modelling of both the return distribution features and the dependence structure between assets (more

precisely, between the hedge funds and the replicating assets).

In a recent interview Papageorgiou said that investing in hedge fund indexes (as one would do with ETFs) is not enough as such indexes are not easily traded. Hence, the need for replication.

Papageorgiou has a simple way of explaining replication. Factor models seek to replicate the output — the track record produced by the replicated asset. In his view the problem with this is we cannot replicate returns as they constitute the *ex post* result of the investment — in other words a person cannot reasonably anticipate returns. Moreover, factor models lead to a pure beta exposure and cannot capture alpha (they are "doomed to mediocrity"). That's why he believes the right way to replicate is the payoff distribution approach, which models the input — the structure of the replicated hedge funds.

An interesting insight into the replication challenge is that every investment manager, at the end of the day, accesses the same Sharpe ratio, the same risk-adjusted return. Hedge funds are no better, except they are somewhat uncorrelated with traditional asset classes. The difference between managers is how they distort the payoff distributions through selective trading and leveraging (creating what Alexander Ineichen calls "asymmetric returns"). It's like saying that all managers, *ex ante*, are alike — the difference is how they leverage the markets, thus adjusting the return/risk mix.

What Papageorgiou and his col-

leagues are doing is to replicate this distortion, which constitutes the actual payoff distribution. This is a contingent claim — a fancy name for an option. This can be represented by a function (denoted g), the payoff of that option, which then needs to be priced. (The cost of generating the distortion is a measure of the value added by the replicated hedge funds). This g-function, however, cannot be bought — but you can dynamically replicate it.

The key difference between Papageorgiou et al. and previous research (in particular, Kat and Palaro's path-breaking payoff distribution papers) is in how they address two key issues. Kat and Palaro price the g-function and solve for the dynamic replicating strategy through Black-Scholes and delta hedging techniques. The problem is the normality assumption underpinning these techniques. Papageorgiou et al. propose a more robust pricing framework that does not make any assumptions about the distribution of the assets, providing a more precise replication.

The second and more troubling issue relates to the statistical properties of the reserve assets which are being traded on a daily basis in order to generate the monthly g-function. Kat and Palaro have depended on a distribution with unknown aggregation properties (we do not know the monthly distribution if we know the daily ones and vice versa), making the dynamic trading strategy inconsistent with the g-function.

The HEC researchers have

solved this latter issue by carefully selecting laws that have known statistical properties, specifically normal mixtures. In addition, clever modeling of the dependence structure between the so-called reserve assets (the assets from which the replicating characteristics are drawn) requires world-class expertise in copulas, which Bruno Rémillard brings to the fight. This has led to the development of a daily dependence structure, a much more accurate approach. Papageorgiou adds that the futures-based approach (those are the reserve assets) requires a minimum of $30 million initial cash to be implemented.

BLINDED BY SCIENCE?

All this is high performance financial science, but does it work? Desjardins Global Asset Management thinks so. They are currently seeding the approach and will shortly launch it to outside investors. Papageorgiou will insist that this approach will buy the investor accurate replication of volatility and dependence structure characteristics. This, in turn, will allow the manager to fine tune the replication the investor needs with significantly higher liquidity than hedge funds and with true transparency. This translates to hedge fund replication being truly leading-edge and it may change the way investors think about hedge funds. **AER**

Pierre Saint-Laurent, M.Sc, CFA, CAIA is president of AssetCounsel Inc. He can be reached at PSL@AssetCounsel.com

COMPARATIVE VOLATILITY MEASURES

Source: N. Papageorgiou, B. Rémillard and A. Hocquard, Replicating the properties of hedge fund returns. HEC Montréal Research Paper, Aug. 29, 2007.