Measure for measure

In a previous article, Hilary Till touched upon the difficulty of using standard measures to the evaluate certain hedge fund strategies. Here, after reviewing these difficulties, she discusses state-of-the-art solutions

The trouble with the Sharpe ratio (excess return of the investment over the risk-free rate divided by its standard deviation) results from its identification of risk as the standard deviation of returns around the investment's mean. This is appropriate only if the investment's return distribution is symmetric.

Sharpe's ascendency is a historical event: because empirical studies from the 1970s showed that diversified portfolios of equities have returns that appear to be distributed in a symmetric fashion, the use of the Sharpe ratio has become widespread in investment evaluation. But if an investment's returns are highly skewed, as with option strategies, the use of the Sharpe ratio is inappropriate. One can increase the Sharpe ratio of an investment by selling fairly-valued options: in this case, an investor is accepting the possibility of negatively skewed outcomes in exchange for improving the investment's average return.

The approach assesses which assets and options an investment is exposed to, then uses an non-parametric, non-linear optimiser to fit the returns to these exposures

The fact that investors have a preference for positively skewed outcomes and an aversion to negatively skewed outcomes is not captured by a risk measure that equally weights the two types of outcomes. Other analytical tools, such as mean-variance optimisation, also use the variance around a portfolio's mean returns as a risk criterion; conventional analytical tools are only appropriate for investments that do not have short-option-type risks.

Short-option-like strategies

As covered in last month's column, a number of alternative investment strategies actually have short-option-like risk profiles. These strategies include relative-value bond funds, equity risk arbitrage, equity option market-making, value-versus-growth equity strategies, and high-yield currency investing.

Investors in such strategies appear to earn their returns by assuming risk positions in a risk-averse financial world. They are earning a 'risk premium' rather than earning excess returns due to manager skill. A risk-premia strategy's 'excess' returns are in effect due to being short options. This is the opposite indicator of manager skill: one way to measure manager skill at market timing is if the manager's strategy produces a return profile similar to being long free put options.

An additional example of a risk-premia strategy to those presented in the September issue comes from the commodity futures markets, such as grain, coffee, and energy, which will sometimes embed a fear premium in anticipation of weather events that can dramatically impact supply or demand.

In this class of trades, a futures price is systematically 'too high', reflecting the uncertainty of an upcoming weather event. We say the price is too high when an analysis of historical data shows that one can make statistically significant profits from being short the commodity futures contract during the relevant time period. And, further, that the systematic profits from the strategy are sufficiently high that they compensate for the infrequent large losses that occur when the feared, extreme weather event does in fact occur.

These opportunities appear to occur because the economy cannot tolerate threats to either the food or energy supply, so the market adds a premium to the futures price around the time of potential weather shocks to ration demand. Further, the commercial commodity trade can be well aware of this return opportunity with no danger of it disappearing, because in order to take advantage of these positive expected-value opportunities it would have to absorb volatile price risk that would impair its ability to carry out essential business planning. In other words, the commercial trade has larger business considerations than the performance of futures hedges.

Active management of risk premia

This does not mean that risk-premia strategies do not require active management. A manager must decide how much to leverage the strategy, how many reserves to set aside in the event of a catastrophic event, and whether to give up any returns by hedging out some of the strategy's extreme risks. This is analogous to the issues facing commercial banks and insurance companies.

A bank exploits the structural nature of the yield curve, which is typically steep due to liquidity-premia considerations. As we know, all things being equal, a lender would rather lend in short maturities since they are less volatile than longer-term-maturity bonds. On the other hand, an entrepreneur would rather borrow in a long maturity in order to fix his costs and better plan for the future. In order to induce borrowers to lend long, they must be offered a 'liquidity premium' to do so. The result is that bond yield curves tend to be upwardly sloping. Commercial entities are willing to pay risk premiums from the profits of their on-going businesses to hedge away key volatile price risks.

Classically, a bank takes advantage of the structural nature of the yield curve by lending at higher rates

If pension funds provided liquidity options or contingent capital to holders of illiquid assets, this would alter the distribution of returns for some strategies

in long maturities and funding itself at lower rates in short maturities. It is then faced with the active decision of how much to leverage its balance sheet and how much to pay away in hedging its natural yield-curve exposure.

Similarly, once insurance underwriters determine their actuarial advantage, they are faced with deciding how much coverage to underwrite, how many reserves to hold against these policies, and how much reinsurance to purchase covering extreme tail events.

One element that would make the banking and insurance examples completely analogous to alternative investments is missing, though. How can alternative investment programs hedge away some of the event risks inherent in their strategies?

Myron Scholes has recommended that pension funds and other long-term holders of capital provide liquidity options or contingent capital to holders of illiquid assets. If this recommendation were taken up, the distribution of returns for a number of alternative investment strategies, including relative-value bond funds and merger arbitrage funds, would be fundamentally altered. Their short-option-like profiles during times of event risk may become truncated and be shaped more like an option collar.

Modelling uncertainty

Being able to model the shape of uncertainty is key to the establishment of correct risk-adjusted performance measures. One problem related to risk-premia strategies is that while one may be earning a return due to being exposed to a catastrophic risk, an empirical measure may not show this if the Big Event has not occurred yet. This is a particular problem for hedge fund track records, which can be quite short.

The current academic thinking on how to evaluate alternative investment strategies, which may have short-option-type risk and likely have brief track records, is to use 'asset-based style factors' to characterise an investment.

Ideally, financial economists would prefer to come up with the universe of fundamental risk factors that can explain the time-series behaviour of an investment's returns, rather than just explain an investment's return based on other asset returns. In other words, if an investment's return cannot be explained by its exposure to the market, what are the additional underlying risk factors of special hedging concern to investors (that give rise to the investment's return)? But that effort has not been fruitful as yet. Instead, linking a portfolio, whether it is a mutual fund or a hedge fund, to a limited set of investment styles has been a lot more empirically successful.

William Sharpe, the creator of the Sharpe ratio, originally used this approach in 1992 to model mutual fund risk. A current effort by academics is to extend this approach to hedge funds. (This effort has been spearheaded by William Fung of the Center for Hedge Research & Education, London Business School and David Hsieh of Duke University, and also by Vikas Agarwal and Narayan Naik of the London Business School.) In addition to including various asset classes and rule-based investment styles, they also explicitly include options as explanatory factors of a hedge fund's returns.

The idea is that if an investor can link a hedge fund's returns to its underlying 'style factors', then one can use the style factor's longer history of returns to evaluate the specific hedge fund. Presumably the return history of the style factor would be long enough so that if the hedge fund incorporates a short-event-risk-type strategy, the magnitude of the losses that have occurred (and perhaps could occur) would be apparent from the long-term data.

Generic model decomposition

So far, the best published, practical application of the 'asset-based style factor' approach can be found in a chapter by Andrew Weisman (of Nikko Securities International) and Jerome Abernathy (of Stonebrook

Structured Products LLC) in the recent book, Risk Budgeting.

Based on a qualitative review of an individual hedge fund, the authors decide which assets and option types that the investment likely has an exposure to. They then use an optimisation technique that fits the hedge fund's returns to these exposures. The particular non-parametric, non-linear optimisation technique they choose is based on their experience of which characteristics are most important in evaluating a manager. They try to capture the manager's large winning and losing months, the manager's use of leverage, and the inflection points of the manager's returns.

One of their examples emphasises why such an approach is needed. The authors bring up a mortgage-backed securities manager who had a historical Sharpe ratio of 4.99 using performance data from July 1995 to August 1998. A decomposition of the type of exposures in such a portfolio reveals that the pattern of reported returns would only have been achievable with substantial leverage and short option exposure. After August 1998, this manager reported a very large loss.

An investor who uses the reported Sharpe ratio as their basis of investment may unwittingly be maximising risk rather than risk-adjusted return, according to the authors.

Weisman and Abernathy's technique solves another problem that has been noted by the principals of the hedge fund, AQR Capital Management, LLC. AQR fund managers have distributed a working paper, which builds a convincing argument that the lack of correlation of hedge fund indices to the S&P 500 is actually due to the reporting of stale prices for hedge fund positions. Once one adjusts for stale pricing of illiquid hedge fund positions, the relationship of a respected hedge fund index to the S&P is quite high using data from January 1994 to September 2000. This is obviously troubling if investors are choosing hedge funds in order to reduce their equity market exposure.

Weisman and Abernathy take the investment performance produced by the likely factors driving a portfolio's return and compare it with the manager's reported performance. They notice a tendency for manager performance to be less volatile than the performance produced by their optimisation. They hypothesise that given the difficulty in valuing certain illiquid over-the-counter securities, their owners may underestimate the periodic changes in the value of these holdings. With their derived performance figures, the authors are in a position to evaluate the real underlying volatility of a portfolio and thereby adjust the risk measure used in evaluating a manager.

The authors note that if an investor uses conventional methods for evaluating hedge fund investments, one may be unwittingly maximising illiquidity.

As a final note, an investor with an economic understanding of the source of an investment's returns is in a good position to decide whether its risks, however they are defined, are appropriate. If we understand that a number of alternative investment strategies provide returns because the investor is being paid to bear risks others would prefer to lay off or not take on, then we have to conclude that alternative investments are not appropriate for everyone. After all, we cannot all be providers of insurance.

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