Alpha Transport With Derivatives

Separating security selection from asset allocation.

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Beam me up, Scotty! Alpha transport enables investors to obtain the best from both security selection and asset allocation.

Of all the futuristic devices dreamed up by science fiction, certainly one of the most useful is the "transporter" from the *Star Trek* series, used to "beam" characters instantaneously to their desired destinations. No long train commutes, no missed airline connections, just a little dematerialization; then, zip, you're rematerialized (most of the time) right where you want to be.

Unfortunately, science hasn't yet mastered the technology to get us from here to there instantaneously, at least in the physical universe. In the investment universe, however, the development of markets for derivatives provides some inkling of what the future may hold.

Derivatives can be used, like the transporter on the starship *U.S.S. Enterprise*, to beam the performance available from one set of securities to virtually any desired alternative set. When used in conjunction with underlying asset class portfolios in a strategy known as "alpha transport," derivatives can help solve one of the thorniest issues investors face — how to maximize the returns available from security selection while also achieving an asset allocation that meets desired return and risk goals.

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ASSET ALLOCATION OR SECURITY SELECTION

Empirical research has suggested that asset allocation has the greatest impact on an investment fund's returns. Over 90% of an average pension fund's total return variance can be traced to its investment policy — the long-term allocation of its investments across asset classes (Brinson, Singer, and Beebower [1991]). Even within asset classes, the allocation of a portfolio across subsets of the asset class can explain a large portion of the portfolio's return. For 1985-1989, for example, over 97% of the returns to a fund known for stock selection — Fidelity Magellan Fund — were mirrored by a passive fund invested in large-cap growth stocks (46%), medium-sized stocks (31%), small-cap stocks (19%), and European stocks (4%) (Sharpe [1992]).

These findings have helped to fuel the popularity of passive, or indexed, management. Index funds designed to offer risk-return profiles that match the risk-return profile of a given asset class or subset benchmark can be combined at the overall fund level so as to maximize expected return at a desired level of risk. As the trading required to keep portfolios in line with underlying indexes is generally modest, transaction costs for passive management are generally low. As much of the portfolio construction problem can be relegated to computers, the management fees for passive management are also modest.

Passive management is essentially insightless, however. It does not attempt to pursue alpha — return in excess of the return on the relevant benchmark. Rather, its appeal lies in its ability to deliver with consistency the asset class return or the return of a subset of the asset class. In practice, of course, trading costs and management fees, however modest, diminish this performance.

Active management does attempt to achieve returns above the asset class benchmark, by selecting from the benchmark individual securities that have higher expected returns. Even modest levels of success in active management can add meaningfully to portfolio value. Given the size of most institutional portfolios, even a small percentage increase in portfolio return translates into a large dollar gain. The opportunity cost of using passive management has nevertheless tended to be viewed as low. This is certainly the case when passive management is measured against the performance of traditional active managers, who as a group have tended to underperform their asset class benchmarks.

Traditional active management, however, suffers from at least two disadvantages when measured against the performance of the asset class underlying it. First, it is highly labor-intensive, involving in-depth examinations of companies' financial statements, management, product lines, and facilities. To make the stock selection task tractable, active managers generally focus on only a limited number of stocks; this can result in loss of potentially valuable information and loss of profit opportunity.

Second, traditional active management is highly subjective. Subjectivity in the process of selecting stocks can lead to cognitive biases, resulting in suboptimal decision-making (Jacobs and Levy [1998]). Furthermore, the qualitative nature of the stock selection process makes for ad hoc portfolio construction. The risk-return profile of the traditional active manager's portfolio may vary greatly relative to the underlying asset class (or subclass) from which its constituents are selected.

Skillful quantitative active management can combine the potential benefits of traditional active management — value-added relative to an underlying benchmark — with the benefits of passive management — tight control of risk and return relative to the underlying benchmark. Computerized information-gathering and adept statistical modeling can expand the scope of analysis and improve the quality of the selection process while reducing the risk of cognitive biases. Furthermore, the resulting numerical estimates for expected returns and risks are eminently suitable for portfolio construction via optimization techniques. The goal of optimization is to maximize portfolio return while controlling portfolio risk relative to the underlying benchmark (Jacobs and Levy [1995]).

Quantitatively managed active portfolios offer investors the potential to benefit from skilled security selection while retaining the performance available from underlying asset classes. Investors can seek out active managers who offer value-added relative to a chosen asset class. Ideally, skilled managers can be found for each of the asset classes the investor chooses to hold. The investor can thus maximize performance from both security selection and asset allocation.

In practice, however, the task of combining asset allocation with security selection often involves a trade-off. Even with active management of portfolios tied to underlying asset classes or subclasses, the goals of asset allocation and security selection sometimes conflict. Given the presumed priority of the asset allocation choice, it is often the return from security selection that is sacrificed.

Consider the case of an investor who has both

large- and small-cap equity managers. On the one hand, to the extent that small-cap stocks are less efficiently priced than their large-cap counterparts, the potential of the small-cap manager to add value relative to an underlying small-cap universe may be greater than the potential of the large-cap manager to add value relative to an underlying large-cap universe. The investor may thus want to allocate more to the small-cap than the large-cap manager.

On the other hand, small-cap stocks may be considered too risky in general, or may be expected to underperform larger-cap stocks. In the interest of optimizing overall fund return and risk, the investor may wish to limit the allocation to the small-cap manager and allocate significantly more to the large-cap manager. In this case, however, the investor sacrifices the potential alpha from small-cap security selection in exchange for overall asset class return and risk.

The investor's asset allocation decision comes down to a choice between sacrificing security selection return in favor of asset class performance, or sacrificing asset class performance in favor of security selection return. In the new world of derivatives, however, investors need no longer face such Solomonic decisions.

Derivatives can be used to liberate managers, and manager performance, from their underlying asset classes. Investors, or managers, can deploy derivatives to transport the security selection alpha of any manager to any asset class. Alpha transport enables the overall fund to add value from both asset and manager allocation.

ASSET ALLOCATION AND SECURITY SELECTION

Suppose an active small-cap manager has been able to add value relative to the Russell 2000 small-cap universe, but small-cap stocks are expected to underperform large-cap stocks. If the investor maintains its allocation to the small-cap manager, it will be giving up the incremental return expected to be earned by large-cap stocks relative to small-cap stocks. If the investor shifts funds from the small-cap to a large-cap manager to capture the expected incremental asset class return, it will be giving up the superior alpha from the small-cap manager's ability to select securities within the small-cap universe.

The investor, or the small-cap manager, can use derivatives to 1) neutralize the portfolio's exposure to small-cap stocks in general, and 2) transport any excess return (and residual risk) from the small-cap portfolio to the large-cap universe. The incremental returns from both security selection and asset allocation are retained.

In order to neutralize the portfolio's exposure to the small-cap universe, the portfolio manager or investor can sell short futures contracts on the Russell 2000 small-cap index, in an amount approximately equal to the portfolio's value. Changes in the value of the futures contracts will offset the changes in the value of the portfolio in response to movements in the small-cap universe underlying the futures.

The short derivatives position thus eliminates the fund's exposure to the small-cap universe. What remains is the differential between the portfolio's return (and risk) and the small-cap universe return (and risk) represented by the index. This excess return, or alpha, and its associated residual risk reflect the manager's stock selection efforts.

Simultaneously, the manager takes a long position in futures contracts on a desired universe — say, the large-cap universe represented by the S&P 500. This long derivatives position provides exposure to the desired asset class, in this case the large-cap equity universe. The fund can thus benefit from any positive performance of the large-cap asset class while retaining the small-cap manager's performance in excess of the small-cap universe.

The combined derivatives positions, one short and one long, effectively allow the fund to transport alpha from the underlying small-cap portfolio to the large-cap asset class.

As an alternative to the two futures trades, the portfolio or fund manager can look to the over-the-counter derivatives market, contracting with a swaps dealer to exchange small-cap equity returns for large-cap equity returns. The swap contract might specify, for example, that the fund pay quarterly over the term of the contract an amount equal to the return on the Russell 2000 index times an underlying notional amount, say, the value of the underlying small-cap portfolio. The swaps dealer pays in exchange an amount equal to the return on the S&P 500 times the value of the portfolio.

Consider, for example, a $100 million portfolio invested in small-cap stocks. Assume the Russell 2000 returns 10% over the period, the S&P 500 returns 13%, and the small-cap portfolio returns 12%. The small-cap portfolio grows from $100 to $112 million. The fund pays out 10% of $100 million, or $10 million, to the swaps dealer. The fund receives 13% of $100 million, or $13 million, from the dealer.

The fund winds up with $115 million for the

period. It benefits both from the superior return on the large-cap asset class in excess of the small-cap asset class return and the superior return of the active small-cap manager in excess of the small-cap asset class benchmark.

An active equity portfolio's value-added can even be transported to a bond universe with the use of futures or swaps. For example, futures contracts on an appropriate equity index can be sold short to neutralize the portfolio's equity exposure, while bond futures are simultaneously purchased to establish the desired bond exposure. Alternatively, the fund could enter into a swap to pay an equity index return times a notional value approximating the value of the underlying equity portfolio and receive an amount equal to a bond return times the portfolio value.

TRANSPORTER MALFUNCTIONS

When the transporter on the starship *Enterprise* malfunctioned, the results were generally not pretty. Sometimes the transporter failed to rematerialize its subjects, leaving a character's atoms lost in space. Sometimes it transported them to the wrong place, so they materialized within a bulkhead or, less fatally (usually), in an alternative universe. And sometimes, despite the utmost efforts of engineer Scotty, the transporter simply couldn't be made to cut through the interference raised by gamma radiation or Captain Kirk's bombast. Alpha transport faces a not dissimilar set of difficulties, but their effects are rarely as critical.

Alpha transport may face interference in the form of unavailability or illiquidity of derivatives instruments. In particular, futures contracts are not traded on all asset class benchmarks that may be of interest to investors, and even when available the contracts may not have enough liquidity to support institutional-size needs. While futures contracts on the S&P 500 enjoy excellent liquidity, liquidity drops off considerably for contracts on smaller-cap U.S. and on some non-U.S. equity indexes. When investors face insurmountable interference in transporting via futures, however, they can turn to the OTC swaps market. Swaps can be customized to meet most investor needs.

Alpha transport with futures contracts may also deposit investors at a slight remove from their desired destination. Although the futures price will converge to the underlying index price at expiration, futures-based strategies may not always provide the exact performance of the underlying index, for several reasons.

First, although futures are fairly priced to reflect the current value of the underlying spot index adjusted for the forward interest rate over the time to contract expiration and the value of dividends on the underlying index, actual futures prices can diverge from fair price. The S&P 500 futures contract usually tracks the underlying index closely, but less-liquid contracts tend to experience greater tracking error. This type of basis risk can add to or subtract from derivatives performance relative to the underlying index.

Futures performance may also differ from underlying index performance because of frictions introduced by margin costs and by the need to roll over the more-liquid short-term futures contracts. Because the purchase or short sale of futures contracts involves a deposit of initial margin (generally about 5% of the value of the underlying stocks) plus daily marks to market, a small portion of investment funds will have to be retained in cash. This will earn interest at the short-term rate, but will represent a drag on performance when the rate earned is below the interest rate implicit in the futures contract (and add to performance when the rate earned exceeds the implicit futures rate).

Swaps reduce some of the risks of missing the target index. Swaps generally require no initial margin or deposit (although one may be required by the terms of a specific swap contract), and the term of the swap contract can be specified to match the investor's horizon. Furthermore, swap counterparties are obligated to exchange payments according to the terms in the contract; payments are not subject to fluctuations about the value of the underlying benchmark, as is the case with futures.

Swaps do entail price risk. A swaps dealer will generally extract a charge in the form of a spread. For example, a party wanting to exchange the Russell 2000 return for the S&P 500 return may be required to pay the Russell 2000 plus some basis points.

In general, the price of a swap will depend upon the ease with which the swap dealer can hedge it. If a swap dealer knows it can lay off a swap immediately with a counterparty demanding the other side, it will charge less than if it knows it will have to incur the risks associated with hedging its exposure. Swap prices may vary depending upon a specific dealer's knowledge of potential counterparties, as well as its ability to exploit tax advantages and access to particular markets.

Swaps also entail some risk of "dematerialization," which comes in the form of credit risk. Swaps are not backed, as are futures contracts, by exchange clear-

inghouses. The absence of initial margin deposit and daily marking to market further increases credit risk. Although credit risk will generally be minimal for the investor or manager swapping with a large well-capitalized investment bank, the credit quality of counterparties must be closely monitored to minimize exposure to potential default. Default may prove costly, and as swaps are essentially illiquid, it may be difficult or impossible to find a replacement for a defaulting counterparty.

The potential benefits of alpha transport, in terms of flexibility and value-added, are nevertheless substantial for both investors and managers. By liberating the security selection return from the universe to which the securities belong, alpha transport allows investors to maximize both manager selection and asset class allocation. The decision to maximize alpha need no longer be subservient to the investor's asset allocation decision; the investor can pursue the best opportunities in both asset allocation and security selection.

Alpha transport may also liberate portfolio managers. This will certainly be the case if managers have neglected their own areas of expertise in order to pursue returns from those types of securities favored by clients. Alpha transport frees managers to focus on the universes within which they feel they have the greatest skill, hence the greatest potential to add value. This freedom should ultimately translate into enhanced performance for their clients.

Alpha transport, by decoupling the security selection decision from the asset allocation decision, affords investors increased flexibility in structuring an overall fund. This added flexibility should translate into enhanced performance. In much the same way, the manner in which an individual portfolio is constructed can afford the portfolio manager increased flexibility to pursue excess returns from security selection.

MATTER-ANTIMATTER WARP DRIVE

In searching for alpha, most managers (and investors) focus on "winning" securities, those expected to outperform their benchmark. But "losing" securities, those expected to underperform, have as much potential to contribute to excess return. Just as the warp engine of the *Enterprise* combined matter and antimatter for propulsion, the portfolio manager can combine securities with positive and negative expected returns to propel the pursuit of alpha. The ability to sell short securities with negative expected returns releases a portfolio from constraints imposed by underlying benchmark weights, enhancing its potential return.

A portfolio that can only hold securities long is restricted in its ability to pursue alpha. On a basic level, the long-only portfolio may not be able to reflect fully the manager's views about a particular stock. Consider a long-only equity manager who has a strong negative view about a company. The largest position this manager can take is to exclude the stock from the portfolio. As the typical U.S. stock constitutes only 0.01% of the capitalization of the U.S. equity universe, not holding this typical stock translates into a portfolio underweight of 0.01% relative to the underlying broad market benchmark. Such a minute underweight can hardly be expected to contribute a great deal to the portfolio's excess return.

The manager is restricted in a more general sense, however, by the weights of the stocks in the underlying index. Departures from benchmark weights, needed to produce excess returns, introduce residual risk relative to the benchmark. The more the portfolio departs from securities' weights in the benchmark, the greater the probability that its return will diverge from the return on the benchmark. Controlling the portfolio's residual risk means controlling the portfolio's weighting of each security relative to its index weighting.

In contrast, risk control in long-short investment uses a balance of security weightings. The ability to short in and of itself affords the manager greater flexibility to implement negative insights (see Jacobs and Levy [1996]). Furthermore, within the context of an integrated portfolio optimization that considers the risks and returns of all candidate securities (both potential outperformers and potential underperformers), the ability to short frees the portfolio from a benchmark's security weights. Rather than converging to benchmark weights, the portfolio can use offsetting long and short positions to control risk.

In fact, the manager can eliminate the portfolio's systematic risk entirely by holding offsetting long and short positions of approximately equal beta. Such a market-neutral portfolio incurs only the risk associated with the individual securities held long and sold short, which is controlled by the optimization process. The manager's ability to go long or short individual securities (or exclude individual securities) is limited only by the investor's taste for risk and the need to balance long and short betas.

Such a benchmark-neutral long-short portfolio offers an active return (and associated risk) from the specific securities selected to be held long or sold short.

Given the added flexibility that the long-short manager enjoys in implementing insights, this active return should exceed the excess return to a long-only portfolio based on the same set of insights. The neutral portfolio does not reflect either the return or the risk of the underlying equity benchmark. In benchmark-neutral long-short portfolios, the value-added from the manager's stock selection skill, represented by the spread between the returns on the portfolio's long and short positions, is independent of the performance of the equity asset class from which the securities are selected.

The value-added from security selection in a long-short portfolio can be transported to a desired asset class through the use of derivatives, just as with long-only alpha transport. As the long-short portfolio is already benchmark-neutral, however, there will be no need to short futures in order to establish neutrality, as is the case with a long-only portfolio. By purchasing futures in an amount approximately equal to the investment in the long-short strategy, the manager or investor can establish exposure to a desired asset class. (Alternatively, the manager can enter into a swap to obtain a desired asset class exposure.)

An equity index futures position will, for example, impart to the overall portfolio the return and risk of the underlying equity benchmark (see Jacobs and Levy [1997]). In addition, the portfolio will retain the return and risk of the long-short manager's active security selection — the long-short spread. This return should benefit from the long-short manager's added flexibility, attributable to the absence of restrictions on portfolio construction imposed by securities' benchmark weights, to pursue return and control risk.

Performance may be further enhanced by relaxation of additional constraints. For example, optimal long-short portfolio construction does not necessarily require benchmark neutrality (see Jacobs, Levy, and Starer [1999]). Rather, the optimal exposure to the benchmark arises naturally from an integrated optimization that takes the characteristics of the benchmark security explicitly into account, along with the risks and returns of the individual securities.

TO BOLDLY GO

Long-short portfolio construction affords flexibility in pursuit of return and control of risk at the individual portfolio level. Alpha transport affords flexibility in pursuit of return and control of risk at the overall fund level. By improving the manager's ability to implement investment insights, long-short construction can lead to better performance from security selection. Alpha transport can in turn enable the investor to capture that enhanced performance while maintaining the performance from the desired asset allocation.

Enhanced flexibility in asset allocation and enhanced potential for adding value from security selection should embolden both investors and managers in the pursuit of active returns. As new derivatives instruments are introduced, and existing ones develop liquidity (perhaps as the result of increased use by alpha transporters), opportunities for adding value should increase.

Derivatives and portfolio construction techniques such as long-short are essentially tools, however. They may be able to enhance good performance, but they cannot turn bad performance into good performance; in fact, both derivatives and long-short can magnify an investor's exposure to poor performance. In the end, the ability of either alpha transport or long-short construction to add value rests on the quality of the insights going into the investment process.

Live long and prosper!

ENDNOTE

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