

Publication

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Alpha-Beta: Separation, Transportation and Recombination

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In the search for new ways to maximize investment returns, the concept of separating manager skill from market risk and return, or alpha from beta, and recombining them in innovative ways has sparked significant interest, and debate, among institutional investors.

But what do we mean by “alpha” and “beta”? Alpha refers to the excess return, adjusted for risk, that an active manager seeks to add relative to a given market index. Beta represents the risk and return produced by the market index or asset class. “Portable alpha” refers to separating the active manager’s excess return from the base market return and transporting the alpha to some other market index.

As an active fixed income manager, the concept of portable alpha has been central to the PIMCO investment process for nearly 20 years. Our experience has taught us that separating alpha from beta is a little like splitting the atom. While the results can be powerful, portable alpha strategies can have negative side effects if not managed in a controlled fashion by experienced professionals.

New Dimensions to the Alpha-Beta Debate

Investors have long been confronted with the challenge of finding consistently superior active managers. Part of the challenge lies in evaluating a manager’s skill. The search for skill starts conceptually by dividing a manager’s returns into a passive component, which reflects returns from market risk (beta) exposure, and an active component, which reflects the returns that result from a manager’s skill at delivering excess returns (alpha) in his or her particular investment style.

The alpha-beta debate in its early years was whether investors should pay only for alpha and whether investors should try to separate a manager’s alpha from that manager’s beta. In recent years, there are new dimensions to the debate. Now investors are debating not just whether to separate alpha from beta, but how to put the manager’s alpha to better use. This concept of separating alpha from beta has been energized by the rapid growth of futures and swaps markets that can offer nearly pure market exposure to beta with apparently low transaction costs.

The perceived ability to gain relatively cheap exposure to beta using derivatives suggests new possibilities for customized exposure to market returns and manager skill. For example, an investor seeking enhanced equity market returns could find an active fixed income manager that is particularly skilled at adding alpha, use futures or swaps to strip away the passive fixed income exposure and a different set of futures or swaps to gain passive equity market exposure. To accomplish this using futures, the investor allocates a pool of capital across three strategies: The majority of the assets are invested with the active bond manager, a small portion is used to purchase equity index futures, and bond index futures are sold to eliminate the market return (beta) from the bond manager’s total return. The investor is then left with the fixed income manager’s alpha plus passive exposure to equity market returns.

Publication

May 2005

Strategy	Beta Exposure	Alpha Exposure
1. Hire Active Bond Manager	+ Bond Beta	+ Bond Alpha
2. Buy Equity Index Futures	+ Equity Beta	
3. Sell Bond Index Futures	- Bond Beta	
Portable Alpha Total Return =	+ Equity Beta	+ Bond Alpha

Another strategy would be to invest in an actively managed fixed income portfolio, keep the exposure to both the fixed income beta and the manager's alpha, and then use the fixed income portfolio as collateral for a portfolio of futures or swaps that provide equity exposure. Having the same capital exposed to both bond and stock market beta involves a potentially useful form of leverage for a number of applications. First, the portfolio can have higher expected return on capital given the two forms of diversified risk exposure. Second, some investors such as pension funds could employ this strategy to retain equity exposure while augmenting the total portfolio's responsiveness to interest sensitive, long duration liabilities.

While the search for manager skill has driven the alpha-beta separation debate historically, these derivatives-based portable alpha strategies are at the forefront of the investment industry today because of four recent industry developments:

- First, expected future returns from stock and bond markets are low. As a result, investors are more dependent on alpha to meet absolute return objectives.
- Second, alternative investments, hedge funds in particular, are thought to demonstrate pure manager skill and provide a source of consistent alpha.
- Third, seeing that manager skill and market exposure can be separated, some investors are taking a second look at alternative strategies.
- Fourth, Wall Street broker-dealers are pitching transaction-driven alpha transport strategies to investors without addressing the longer-term management issues.

Implementation Pitfalls of Portable Alpha Strategies

By combining the flexibility inherent in derivative instruments with the creativity of the investment marketplace, a solution for many investment dilemmas can be found, in theory. The actual implementation of the solution is often the more challenging part of the process. As most seasoned investors know, brilliance in asset management comes not just from good ideas but also from successful execution. Using the example below, we will describe some of the common pitfalls in portable alpha management.

The common proposal to institutional investors is intuitively appealing and relatively simple in design: The investor is advised to terminate underperforming active managers, liquidate the investments and deploy the resulting cash in a diversified portfolio of hedge funds, which serves as a potential alpha engine. The next step is to hire a third-party overlay manager to buy futures or execute swap transactions to

Publication

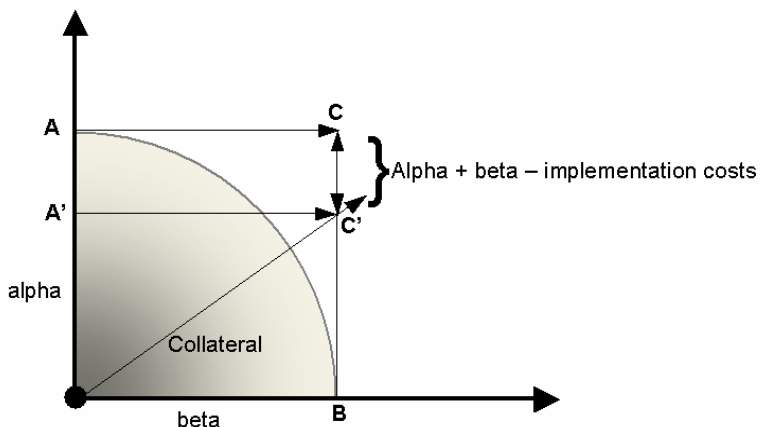
May 2005

provide passive exposure to the market sector formerly managed by the underperforming active manager. Only a small portion of the cash is required to replicate market exposure using derivatives. Depending on risk tolerance, all or a portion of the remaining cash can be invested in the hedge fund portfolio. The combined effect of the two strategies (alpha engine + overlay portfolio) is passive exposure to the original market plus the alpha from the hedge fund portfolio.

While simple in theory, there are several factors that make implementation of portable alpha strategies less elementary in practice. First, capturing consistently positive alpha is not easy. There are thousands of alpha trades, most result in negative or close to zero percent return on a risk-adjusted basis. Even fewer result from a repeatable investment strategy. In practice, most alpha strategies are a continuously evolving set of exposures to a variety of betas – some overweights, some underweights.

Second, alpha cannot always be separated from beta. Strategies that are able to produce consistent alpha often include *hidden* beta exposure. For example, merger arbitrage strategies utilize short equity puts, global macro funds have duration and currency exposures, convertible bond strategies are often short credit duration and long equity volatility, and long-short portfolios often have residual long equity exposure. What is sold as alpha, may in fact be hidden beta exposure as well as a potential Greek alphabet soup of risks – gamma, rho, vega, etc. (sensitivity of options to the underlying asset, interest and implied volatility of the underlying asset, respectively).

A third challenge in implementing portable alpha strategies stems from the hidden costs involved in creating beta. The chart below illustrates the effect of the hidden costs. The chart breaks a portfolio into an alpha component (Y axis) and a beta component (X axis). For illustrative purposes, assume that there is an alpha source, point A, to be transported. Beta exposure is added to the alpha strategy, and the investor arrives at point C. However, because beta is not costless to create, the alpha plus beta sum is reduced to point C'. The effect is estimated in the chart because the precise costs of beta exposure can be difficult to measure.



Publication

May 2005

The Hidden Cost of Beta

Beta exposure is generally assumed to cost very little because there are no active management fees involved, but that is not always the case. Assessing the costs of portable alpha strategies is complicated by the opaque nature of the beta costs. Beta costs are not only difficult to measure, but they can be highly variable as well.

Below are five costs of beta that can have an impact on the success of a portable alpha strategy:

- **Opportunity Costs:** One of the more difficult costs to measure is the opportunity cost associated with removing active management from beta exposure. If the beta were actively managed, overpriced assets could be strategically underweighted. For example, consider the case of a very thinly traded recent IPO stock trading at an expensive level. An active manager could add alpha by underweighting or not owning the security at all (assuming the price eventually corrects). With a passive beta portfolio, this alpha is forgone and represents an opportunity cost.
- **Transaction Costs:** Portfolio beta is typically managed relative to a constant portfolio duration or equity delta target (delta represents the sensitivity of derivatives portfolio value relative to changes in the value of the underlying asset). Managing duration or delta requires an active decision on the frequency with which the portfolio is rebalanced to the target. The frequency could be daily, monthly, or annually, but that decision represents a tradeoff in terms of tracking error and trading cost.
- **Leverage:** With the use of leverage, a financing rate or an implied borrowing rate is incorporated in the transaction. For example, the cost of replicating the return of the S&P 500 index using a total return swap could range from Libor minus 20 to Libor plus 30 basis points at any given time. The financing rate can fluctuate, and there have been periods when it has gone far outside that band.

A recent example is the cash demands that occurred in the days before Y2K. As markets prepared for a potential disruption in activity, year-end S&P 500 financing rates increased by 100 basis points. Any assumptions on the cost of replicating the beta of the S&P 500 index were dramatically changed for that period of time.

- **Futures Margin Flows:** Futures contracts are a wonderful tool for transporting alpha. However, they entail daily cash flows that need to be either deployed when earned or raised when a market movement results in a margin call. We have seen examples where extreme volatility has resulted in the futures exchange instituting hourly margin calls.

There is a definite need for an infrastructure to be put in place to manage the cash flows. Investors can attempt to manage the cash flows themselves or assign the responsibility to an outside manager. In either case, there's an expertise (and a related cost) that goes along with that.

Publication

May 2005

- **Swap Risk:** There is a monitoring cost associated with swap agreements. Swaps entail a legal investment upfront and ongoing management of counterparty credit risk. To the extent you have swap agreements with various counterparties, someone will need to monitor their credit risk over time.

The Price of Beta

To further demonstrate the potential costs of beta management, below is a representative list of indices for which an investor may want to create beta exposure:

	Futures Daily Volume (\$MM)*	SWAP Pricing (1-Year Term)**
S&P 500	10,640	Libor + 12
Russell 2000	394	Libor – 30
FTSE 100	5,352	Libor – 7
EAFE	NA	Libor + 30
LBAG	NA	Libor +20
TSX 60	353	Libor +20
DAX	15,050	Libor +5
SMI	1,226	Libor + 15
CAC 40	904	Libor – 7

Source: Lehman Brothers, Goldman Sachs. See appendix for index descriptions.

* Volume represents the average number of contracts traded YTD through 2/24/05 multiplied by the 2/24/05 index level, FX rate along with each index's constant multiplier.

** Indicative pricing for Equity TR Swaps provided by Goldman Sachs as of February 2005. Indicative pricing for LBAG TR Swaps provided by Lehman Brothers of February 2005.

As the table above demonstrates, the daily futures volume for the different indices can vary dramatically, from over \$15 billion worth of contracts trading per day on the German stock index (DAX), down to zero on the Lehman Brothers Aggregate bond index (LBAG) and the Europe, Australia, and Far East stock index (EAFE), where there are no futures contracts available. Liquid viable futures contracts do not exist for all indices. In fact, when it comes to liquidity in the futures market world, the S&P 500 index and the Treasury futures in the United States and some of the other major equity indices around the world are arguably the exception as opposed to the rule.

The right hand column of the table lists swap-pricing quotes from dealers currently making a market in these indices. These are one-year financing rates and represent the cost to put on a swap to get the total return of the index (beta exposure) over the next year. The costs vary from one contract to the other, reflecting the different supply and demand constraints for each of these indices. Not only do the prices vary across the indices, the prices can also be volatile. Adding to the beta cost uncertainty, in a year's time the contract will have to be rewritten at a potentially higher or lower rate.

Publication

May 2005

Suitable Beta Transfer Candidates

For a beta transfer candidate to be suitable, it should have the following minimum characteristics:

- The beta candidate should be represented by a large, liquid index as demonstrated by a large investor base and trading volume.
- Ideally, the candidate should have multiple options for creating beta to include both futures and swaps and if need be, the actual physical securities with a deep resale market or a market for borrowing the securities.
- The candidate should have an investor base comprised of natural buyers and natural sellers, or natural longs and shorts in the marketplace. The strategy should not be dependent upon just one investor or just one natural short because that natural short may disappear or move from an execution strategy using futures to one using swaps.

Even with these criteria met, problems can still occur on the beta side of the strategy. As an example, the 1998 collapse of Long Term Capital Management, coupled with the Russian default, dramatically reduced market liquidity. Wall Street dealers were significantly less willing to hold an inventory of securities as hedging those exposures became prohibitively expensive. Ultimately, Wall Street reduced their balance sheets by approximately one-third. This severely impacted many strategies in place that required borrowing of securities from these inventories. Smaller firms, in particular, that lacked influence in the marketplace were not able to rely on Wall Street balance sheets to the same extent they were prior to these events.

There should be sufficient depth and capacity in the expertise to respond to the changing demands over time and in crisis situations, as illustrated by the Long Term Capital Management and Y2K events. These are not examples of 100-year storms; these are crises that seem to come about every four or five years. In portable alpha strategies, most of the problems and surprises are going to occur on the beta side of the equation.

Consequently, investors should be careful in choosing betas and managing the collateral assets. Whether the portable alpha strategy depends on internal resources or employs the services of a third party overlay manager, its management requires expertise.

With some institutions considering remaking their entire investment programs around the concept of portable alpha, it is surprising how often one reads the presumption that beta is cheap or free. Indeed, the integrity of an entire investment program may hinge on having the right expertise in this critical dimension.

Conclusion

The alpha-beta separation debate has largely been a theoretical one in the industry, but its application in practice is growing. The current low-return (from traditional asset classes) environment increases investor reliance on alpha to meet return objectives. By separating alpha from beta, investors can focus on finding high alpha managers

Publication

May 2005

irrespective of asset class. Portable alpha strategies may represent a more efficient allocation of capital relative to a traditionally structured portfolio, but they are considerably more complex to manage. Implementation issues require serious consideration and study before engagement.

Many of the portable alpha solutions engineered by the investment industry have opaque costs and require ongoing management oversight. Highly customized strategies may look compelling on entry but may have significant exit costs or limited liquidity. To be successful, a portable alpha strategy must identify managers with consistent alpha, find appropriate beta transfer candidates, and have the expertise to execute the strategy. PIMCO has been implementing alpha transport strategies since 1986. We believe that when well managed, they represent a valuable tool for investors to accomplish their investment objectives.

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Use of derivatives may involve certain costs and risks such as liquidity risk, interest rate risk, market risk, credit risk, management risk and the risk that a portfolio could not close out a position when it would be most advantageous to do so. Portfolios investing in derivatives could lose more than the principal amount invested. The use of leverage may cause a portfolio to liquidate positions when it may not be advantageous to do so to satisfy its obligations or to meet segregation requirements. Leverage, including borrowing, may cause a portfolio to be more volatile than if the portfolio had not been leveraged.

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Publication
May 2005

Publication

May 2005

Appendix: Market Index Definitions

The Standard & Poor's 500 Composite Index (S&P 500) is an unmanaged index of U.S. companies with market capitalizations in excess of \$4 billion. It is generally representative of the U.S. stock market.

The Russell 2000 Index is an unmanaged index generally representative of the 2,000 smallest companies in the Russell 3000 Index, which represents approximately 10% of the total market capitalization of the Russell 3000 Index.

The FTSE 100 Index is a capitalization-weighted index of the 100 most highly capitalized companies traded on the London Stock Exchange. The equities use an investibility weighting in the index calculation. The index was developed with a base level of 1000 as of January 3, 1984.

The MSCI EAFE (Morgan Stanley Capital International Europe, Australasia, Far East Index) is an unmanaged index of over 900 companies, and is a generally accepted benchmark for major overseas markets. Index weightings represent the relative capitalizations of the major overseas markets included in the index on a U.S. dollar adjusted basis.

Lehman Brothers Aggregate Index (LBAG) is an unmanaged index, considered generally representative of investment-grade fixed income securities issued within the U.S.

The Standard & Poor's Toronto Stock Exchange 60 (TSX 60) is a capitalization-weighted index.

The German Stock Index (DAX) Index is a total rate of return index of 30 selected German blue-chip stocks traded on the Frankfurt Stock exchange. The equities use free float shares in the index calculation. The DAX has a base value of 1,000 as of December 31, 1987. As of June 1, 1999 only XETRA equity prices are used to calculate all DAX indices.

The Swiss Market Index (SMI) is a capitalization-weighted index of the largest and most liquid stocks traded on the Electronic Bourse System. The equities use free float shares in the index calculation. The SMI was developed with a base of 1,500 as of June 30, 1998.