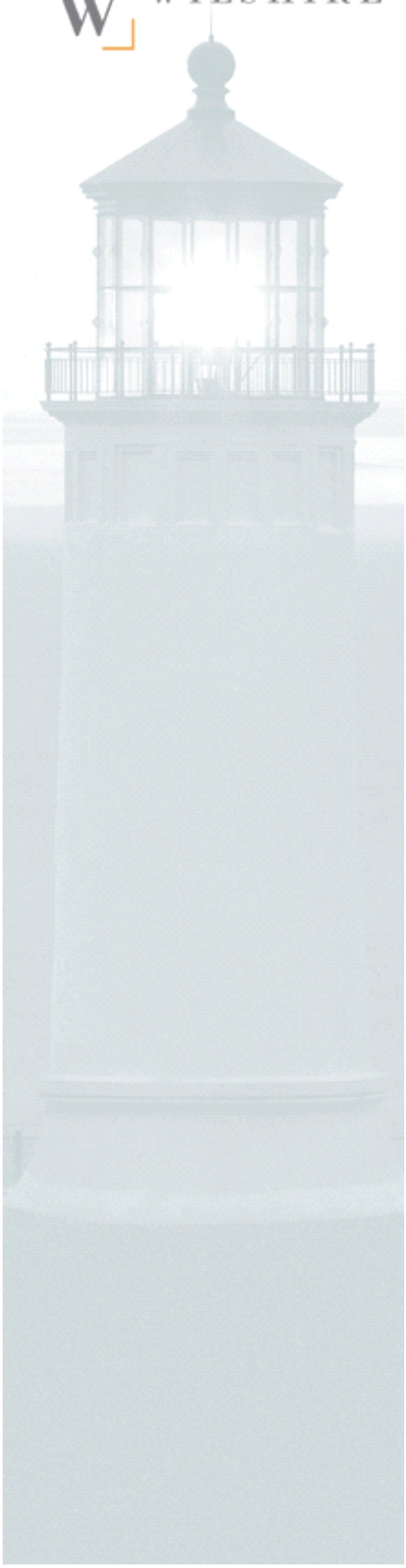

Wilshire Consulting

Incorporating Active Management… Over Active Imagination

Steven J. Foresti, Managing Director
Thomas E. Toth, Senior Associate
(310) 451-3051
sforesti@wilshire.com
ttoth@wilshre.com

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Introduction

The pursuit of alpha and the importance placed on capturing it has dominated investment community discourse in recent years. So much so that it's somewhat surprising we haven't yet seen a television drama based on the subject. Oh well, we're still holding out hope for the next "Raiders of the Lost Ark" sequel where Indiana Jones retires from archeology, starts a hedge fund and goes on an action packed search for alpha.

Aside from the thrill of the hunt, what has been the catalyst for the amplified interest in active returns? Is it because positive alpha has recently become so abundantly available? Not likely. What is more likely is that institutional investors feel pressured to supplement the low market returns they expect within the current environment. Unfortunately for all of us in this pursuit, just because we may need something more doesn't make it easier to achieve. In recent years, conventional wisdom seems to suggest that in the current "low market return" environment we must pursue alpha aggressively to make up for what we had received from the markets in the past. These arguments strike us as somewhat puzzling and contrary to conventional economic thinking. First, if alpha is available, wouldn't investors seek it out; no matter what level of market return they expect in the future? Second, accepting that alpha is more readily available during periods of market inefficiency; shouldn't our expectations for capturing it diminish as more investors hunt it down? As more research and effort is dedicated to identifying security mispricings, the markets themselves become more efficient and both the frequency and magnitude of pricing anomalies dissipate. This paper is designed to present Wilshire Consulting's views on the pursuit of alpha and to help guide investors through an efficient and risk-controlled incorporation of active management.

Where Does Alpha Fit In?

An examination of the role that active management can play in an institutional portfolio must begin with a basic definition of alpha. The building blocks that lead to a portfolio's returns can be broken down into three basic components as shown in the following formula.

$$(1) \qquad R_p = R_{rf} + \sum_{i=1}^{n} \beta_i (R_{m,i} - R_{rf}) + \alpha$$

In this form, alpha's (α) contribution to a portfolio's return (R_p) is expressed as the residual, or active component, that is not explained by the sum of the risk free rate of return (R_{rf}) and the returns received from systematic market exposures.[1]

Building a risk-controlled portfolio involves several important steps. The first is to develop a strategic asset allocation (SAA) through a combination of passive market returns. Each investor will select a mix of assets that strike an appropriate balance and trade-off between risk and return

[1] For a more detailed discussion we refer readers to our previous report "Alpha: A Right or a Privilege?"

according to the investor's risk tolerance.[2] The returns from an investor's asset allocation will be driven by all terms from equation 1 except for alpha. It is not until the next step, implementation of the strategic asset allocation and deployment of capital, where an investor must consider the use of active management. As is necessary when deriving an appropriate asset mix, investors must weigh the expected benefits of pursuing active returns against their risks. However, the risk considerations in this step of the process are substantially unique from those considered during the asset allocation step. We'll clarify this distinction in discussing the following question.

Why not combine alpha and beta assumptions during the asset allocation process?

Building an investment portfolio requires a balance between expected rewards and expected risks. Each investor reaches an appropriate trade off based on their unique tolerance or utility for return over risk. Why not combine our beta and alpha assumptions into a single series of return and risk estimates for each investment category during the SAA process? Conceptually, we would then be in a position to make our return versus risk utility decision in an intuitive and straightforward manner. Unfortunately, what may initially appear to be an appealing simplification results in an inappropriate combination of risks that are very different in nature.

Combining these risks can only be appropriate if one assumes that every investor's tolerance for active risk is either directly or indirectly observable from the investor's tolerance for market risk (or vice versa). The most straightforward way to counter this dubious assumption is to understand the very nature of the returns that are expected by accepting these separate forms of risk. Market returns, when aggregated across all investors, are expected to result in a positive sum game, where all investors can build wealth simultaneously by collecting a risk premium. In contrast, active returns are conditional upon skill and result in a zero sum game, where an investor only earns positive alpha at the expense of other investors. It seems rather intuitive that the relationship between these two risks varies widely among investors. Because one investor may have a higher level of tolerance for market risk than another investor does not mean that the same investor will have greater tolerance for active risk.

We see this over-simplification made most commonly with respect to the treatment of some alternative investments, such as hedge funds.[3] For convenience, many advisors force their optimization models to select a level of return for unit of risk without defining the nature of that risk (i.e. market vs. active). The potential consequence is a portfolio that either violates the investor's tolerance for market risk, active risk, or both. Investors following this path almost undoubtedly set themselves up for disappointment.

Investors who pursue such an approach often set out with an unclear set of expectations at the inception of a relationship with an active manager. Consequently, it becomes more difficult than

[2] 'Risk' in this context is not limited solely to the volatility of assets, but is also reflective of an institution's ability to meet future commitments. Interested readers are directed to Wilshire's report entitled "The Role of the Policy Portfolio" for an in depth discussion of these considerations.

[3] See Wilshire Consulting's paper "Institutional Use of Hedge Funds: Darkness on the Hedge of Town" for a more detailed discussion.

necessary to evaluate subsequent manager performance and to react appropriately to future results. Take, for example, the consideration of a market neutral manager with an objective of adding incremental excess returns above the risk free rate while avoiding systematic market exposure. The manager is successful when delivering a specified level of pure alpha above a cash equivalent return at a controlled level of active risk (i.e. 3% alpha with 4% active risk). However, the investor that arrived at their allocation to this manager by considering trade-offs against other passive market return and risk assumptions will find it difficult to avoid comparing the results of this manager to those of other asset classes – asset classes that have no relevance whatsoever to the objective and pursuits of the market neutral manager.

Let's consider how an investor following this approach might react to the performance shown over the following two hypothetical evaluation periods:

	Manager Results		Total Returns		
	(1)	(2)	(3)	(1 + 3)	
	Alpha	Active Risk	Risk Free	Market Neutral	Equity
Evaluation Period 1	3%	4%	4%	7%	28%
Evaluation Period 2	-4%	4%	4%	0%	-10%

In evaluation period 1 from above, the market neutral manager performed up to expectations, but an investor who views the results in relation to completely passive market exposure will likely find it difficult to be impressed with these results. Despite the successful execution of an active product, the investor will feel some regret over the opportunity cost of missing out on a surging equity market (28% in this example). Conversely, the investor may actually be satisfied with the results shown in evaluation period 2, despite receiving negative alpha from the market neutral manager. In this scenario, a 0% return is quite comforting in light of an equity market falling 10%. These types of inappropriate, but completely natural, reactions to future performance can be avoided by investors who evaluate the merits and performance of alpha and beta decisions separately.

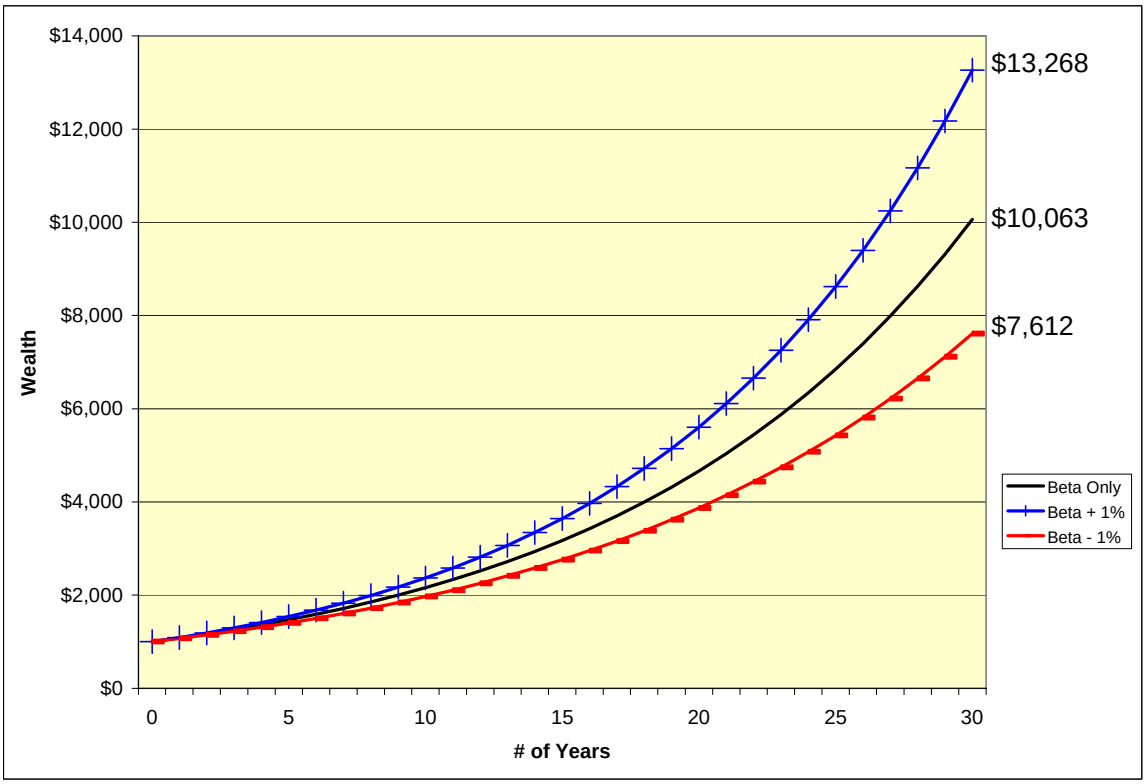
The successful incorporation of active management is sufficiently challenging even when expectations are set reasonably and the evaluation process is properly specified. Success becomes less likely for investors who have not put themselves in the best position to react appropriately to results. Though these types of oversimplifications in the implementation of alpha may help promote the virtues of active management in the short-run, they are likely to have a harmful impact on the long-term perception of active management. All of us interested in the pursuit of excess relative returns should make every effort to steer clear of the temptation to oversimplify.

The Power of Alpha: Are You A Believer?

There is no question that investors who are successful in the pursuit of alpha through active management will reap meaningful long-term benefits. Aided by the power of compounding, even relatively modest levels of incremental excess returns can contribute meaningfully to an investor's accumulation of wealth. The chart in Exhibit 1 below demonstrates the wealth

differential between an investor realizing an 8% market return and one achieving the same 8% market return plus a 1% boost from active management. Notice that, while both investors begin with an initial investment of $1,000, the investor capturing an additional 1% annually in alpha accumulated a total wealth of $13,268 over 30 years, or a 32% premium to the $10,063 wealth accumulated from the "Beta Only" investor. However, as the "Beta – 1%" line demonstrates, an investor who is unsuccessful at achieving alpha and instead realizes a negative 1% excess return will fall well short of the beta-only investor's ending wealth. One investor's wealth gathering is another investor's wealth squandering.

Exhibit 1
Wealth Accumulation



As Exhibit 1 demonstrates, the stakes are very high with respect to the pursuit of alpha. Investors who participate in the search for alpha through active management must have several core beliefs in order to justify this high stakes exercise. First, an investor must believe that there exist pricing anomalies or market inefficiencies that can be exploited by a skilled investor. Second, there must be a belief that an investor with skill has a unique opportunity to consistently add positive excess returns through a risk controlled process. In this context, a skillful investor can be broadly thought of as anyone possessing an investment edge over other market participants. Examples of such an advantage could be the result of an analytical or informational edge. The combination of skilled investors searching for opportunity in inefficient markets is a necessary combination of requirements to deliver consistent positive alpha. However, these are not the only beliefs an institutional investor must accept in order to pursue excess returns. The

institution must also believe that it has the ability to identify skillful managers in which to invest capital. In this pursuit, an investor should view its role as an exercise in portfolio management and just like the underlying product managers, building portfolios of securities, the institutional investor, building portfolios of managers, must possess special skill or insight to achieve success. Finally, the institution must have access to the managers it believes to possess skill. An institution's use of active management should never begin until it recognizes and accepts all of these beliefs to be truths. In the next section we layout several theoretical indicators of market inefficiency and examine some empirical data reviewing active managers in an attempt to identify and quantify skill.

Empirical Evidence on Active Management: Alpha, "It Don't Come Easy"

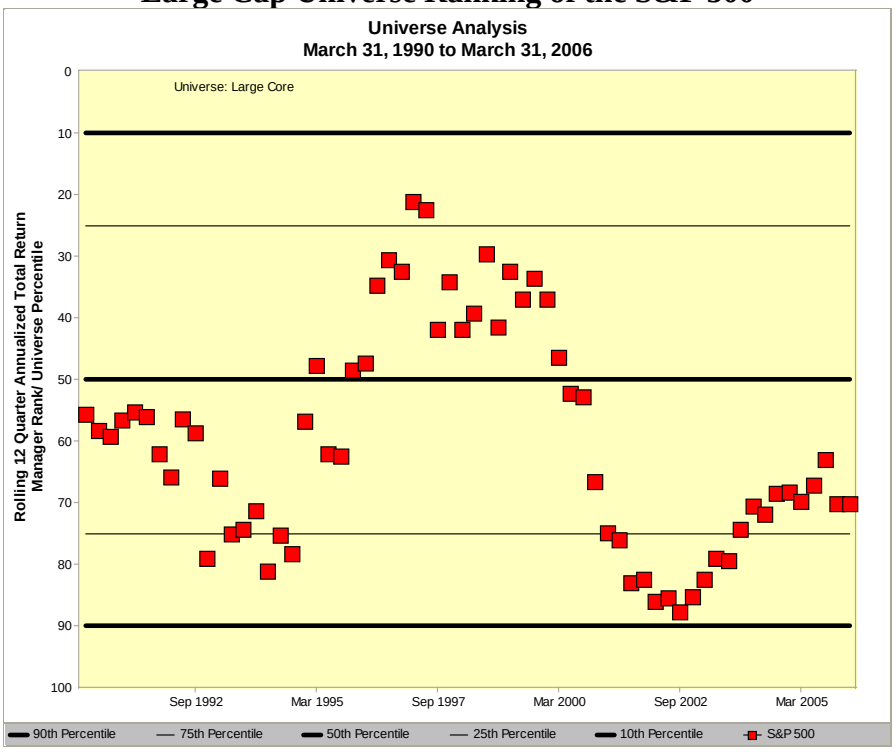
The efficient markets hypothesis has been a cornerstone of financial theory for decades, but more recent research has introduced psychological characteristics that purport to explain why markets may not be as efficient as EMH proponents believe.[4] Informational asymmetries, aversion to loss, and difficulties with interpretation all seek to undermine the image of the rational investor weighing all the available information and making calculated investment decisions. Wilshire Consulting believes that there are varying degrees of market efficiency depending on which sector of the market is being studied. For instance, large cap companies are heavily followed by analysts and release timely information for investors to use so it will be much more difficult to find and exploit mispricings on a consistent basis. However, smaller companies are less visible and generally do not have an army of analysts dissecting their every move. In this case, astute investors might be able to consistently incorporate information into their portfolios that allow them to generate returns above the market. By applying these theoretical principles across a spectrum of market segments, we begin with the following philosophical views regarding active opportunities within various investment categories.

Investment Category	**Market Observations**
Equity	
U.S. Large Cap	Highly Efficient
U.S. Small Cap	Moderately Efficient
Non-U.S. Developed Market	Moderately Efficient
Non-U.S. Emerging Market	Inefficient
Private Markets	Inefficient
Fixed Income	
Core-Oriented	Moderately Efficient
High Yield	Inefficient
Alternative / Other	
Public Real Estate (REITS)	Moderately Efficient
Private Real Estate	Inefficient
Commodities	Inefficient
Currency	Inefficient

[4] Please see the following for more information on behavioral finance: Barberis, Nicholas, and Richard Thaler. "A Survey of Behavioral Finance" Handbook of the Economics of Finance, 2003 / Hirshleifer, David. "Investor Psychology and Asset Pricing" Journal of Finance, 2001 / Shliefer, Andrei, and Robert Vishny. "The Limits of Arbitrage." Journal of Finance 1997.

In the following sections, we will examine data that attempts to measure the historical level of inefficiency and, therefore, alpha opportunities for a variety of asset classes and sub-asset classes. Exhibit 2 shows the relative ranking of the S&P 500 within the large core equity universe from 1990 to 2006 on a rolling 3 year basis. Currently, the S&P 500 would rank in the bottom of the return distribution of managers tracked by Wilshire, which would indicate that many managers have outperformed the index, i.e. provided alpha. However, this is a reversal from the trend seen in the late 1990's when most managers failed to outperform the index.

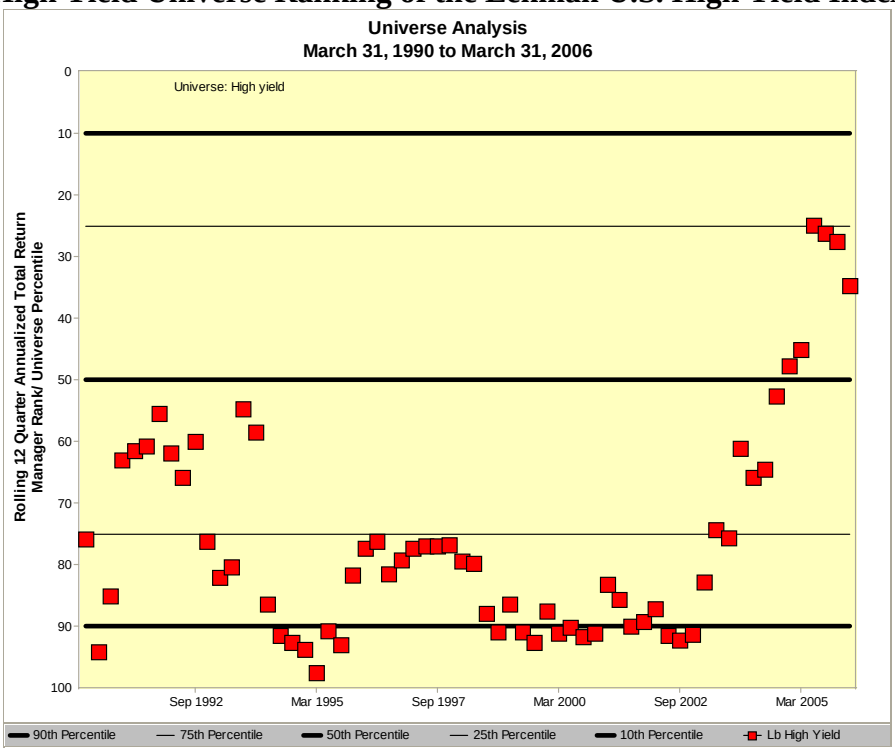
Exhibit 2
Large Cap Universe Ranking of the S&P 500



Source: Wilshire Associates

Exhibit 3 examines the high yield universe and finds that, until recently, the majority of managers have been able to outperform the high yield index.

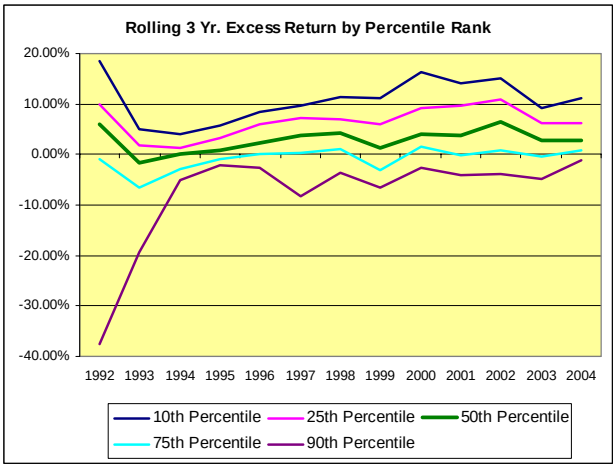
Exhibit 3
High Yield Universe Ranking of the Lehman U.S. High Yield Index



Source: Wilshire Associates

A slightly different type of analysis was performed below for small cap equities. The table in Exhibit 4 is based on quarterly data for small core active products in Wilshire Associates' COMPASS^{TM} database from 1990 to 2004. Initially, the distributions of excess returns for available products were measured over three-year rolling periods, i.e. 1990-1992, 1991-1993, etc. Exhibit 4 charts the evolution of excess returns over the Russell 2000 Small-Cap Index by percentile from 1992 to 2004. Importantly, the observation that the median manager in the small core space has produced positive excess returns in the majority of periods suggests that active management on average produces value in this area. It is important to note that these numbers are gross of fees, but even adjusting for fees of 1.0% the median manager still produces an average excess return of 1.8% over this time period.

Exhibit 4
Small Core U.S. Equity Rolling Excess Returns



If alpha is in fact a zero-sum game how can the results from above occur? There are several possible explanations. First, if many of the products being evaluated have persistent "misfit" risk versus the benchmark, their excess returns will contain elements that can not be described as pure alpha. For example, many small cap managers benchmarked to the Russell 2000 index hold a substantial weighting of securities with market capitalization above that of the largest stock in the benchmark. Therefore, the aggregate excess return measurements are biased by an exposure to mid-cap stocks, which could lead to faulty conclusions regarding median manager performance. In fact, a chart similar to Exhibit 4 shows a median level of excess return that is approximately 1.0% lower when the benchmark is the Dow Jones Wilshire 1750. In other words, manager misfit risk resulting from the choice of benchmark in the small cap space can dramatically impact the perceived level of alpha.

It is also important to note that the construction methodology of indexes such as the Russell 2000 allow active managers to benefit at the expense of passive investors. Because passive investors are constrained by a desire to minimize tracking error versus the index and many indexes are entirely rules-based, active managers can anticipate which stocks will be added and which will be deleted. The predictability of index fund changes allow active managers to buy stocks upon announcement of inclusion only to sell them to passive investors on the effective date for the index. It has been estimated that a strategy of buying the additions to the Russell 2000 on June 1st and selling them at the end of the month together with buying the deletions on the last trading day in June and selling them on August 31st produced excess returns of 1.84%.[5] Taking into account these factors, it is not at all apparent that consistent levels of skilled-base "pure alpha" are easily attainable.

[5] Chen, Hongchui et al. Index Changes and Unexpected Losses to Investors in S&P 500 and Russell 2000 Index Funds. March 2005.

Lastly, a median result does not take into account the relative size of each manager. For instance, if managers with a high level of assets underperform while smaller managers outperform, it would appear that the majority of managers are beating the index and providing alpha. In reality, on an asset-weighted basis, assuming all investors were included in the manager universe, it is impossible by definition to realize a positive net alpha result.

Manager Consistency

The evidence for consistent manager performance is mixed. Early studies concluded that performance was not easily distinguishable from mere chance.[6] Further research revealed what was described as the "hot hand" phenomena where funds which do well historically tend to outperform in the short term, but another study which took into account momentum factors dismissed that notion.[7,8] Additionally, partial persistence was found during the 1970's which disappeared in the 1980's when equity funds from 1971-1991 were studied.[9] Taken together, it is hard to completely dismiss the ability of active managers to consistently provide alpha. In the following section, we use the Wilshire COMPASS™ database of manager returns to provide more insight into manager persistence.

From the distribution of excess returns versus the Russell 2000 discussed earlier, managers were ranked in their respective quartiles for each three year period. The question then becomes; how many of the products displayed some measure of consistency over time? That is, which products that scored in the top quartile during one three year period went on to score in the top quartile in the next three year period? This required that the product have 6 consecutive years of results to be included in Exhibit 5 which delivered 751 observations. If the distribution was completely random, one would expect to find 25% of managers in each box.

Exhibit 5
Small Core Active Management Consistency

Quartile Rank 3 Years Previous	Quartile Rank 3 Years After			
	Bottom Quartile	3rd Quartile	2nd Quartile	Top Quartile
Bottom Quartile	29%	21%	22%	28%
3rd Quartile	20%	29%	32%	20%
2nd Quartile	23%	31%	26%	20%
Top Quartile	37%	21%	24%	18%

The table above leads to a number of interesting observations. The most striking feature is the appearance of some level of mean reversion in manager performance. There is a high concentration of managers (37%) who scored in the top quartile in the three previous years, but went on to end up in the bottom quartile in the following three years. This is highlighted in the lower left part of Exhibit 5. Additionally, a low percentage of managers who initially scored in the top quartile of the distribution placed in the highest quartile in the subsequent three years

[6] Jensen, M. "The Performance of Mutual Funds in the Period 1945-1968," Journal of Finance. 1968.
[7] Hendricks, D. et al. "Hot Hands in Mutual Funds: Short Run Persistence of Relative Performance, 1974-1988," Journal of Finance. 1993.
[8] Carhart, M. "On Persistence in Mutual Fund Performance," Journal of Finance. 1997.
[9] Malkiel, B. "Returns from Investing in Equity Mutual Funds 1971 to 1991," Journal of Finance. 1995

(18%). On the other hand, scoring in the lowest quartile also shows some mild correlation with scoring in the lowest quartile in the following three years (29%). In essence, there appears to be a concentration of managers who fell in the bottom quartile in the previous period who ended up in either the top or bottom quartile over the following three years. This may be indicative of an increase in risk taking in an attempt to "catch up." In an attempt to normalize for varying levels of risk, Exhibit 6 provides a similar table using an information ratio comparison rather than excess returns.

Exhibit 6
Small Core Active Management Information Ratio Consistency

Quartile Rank 3 Years Previous	Quartile Rank 3 Years After			
	Bottom Quartile	3rd Quartile	2nd Quartile	Top Quartile
Bottom Quartile	26%	26%	23%	25%
3rd Quartile	26%	26%	23%	24%
2nd Quartile	25%	28%	23%	23%
Top Quartile	31%	24%	23%	22%

Exhibit 6 reveals less evidence of mean reversion as described earlier for Exhibit 5, but once again there appears to be little reason to suspect that a small-cap manager who delivers a top information ratio in one 3-year period will do the same in the 3 years following. If anything, there appears to be a small bias to drop into lower quartile buckets which is highlighted in the bottom left corner. A reasonable conclusion would be that managers who take on larger amounts of active risk are apt to end up at either the bottom or the top of the distribution of 3 year returns as shown in Exhibit 5, but normalizing them with the information ratio removes that bias. Hence, the more even distribution of returns in Exhibit 6.

All of this is presented to demonstrate just how difficult it is to pick the top performing managers on a consistent basis. The evidence would seem to indicate that alpha opportunities exist in the small-cap space, but the real challenge is picking those managers that will deliver it consistently. It is apparent that past performance is a poor indicator and, in some sense, might even be a contrary indicator of future performance.

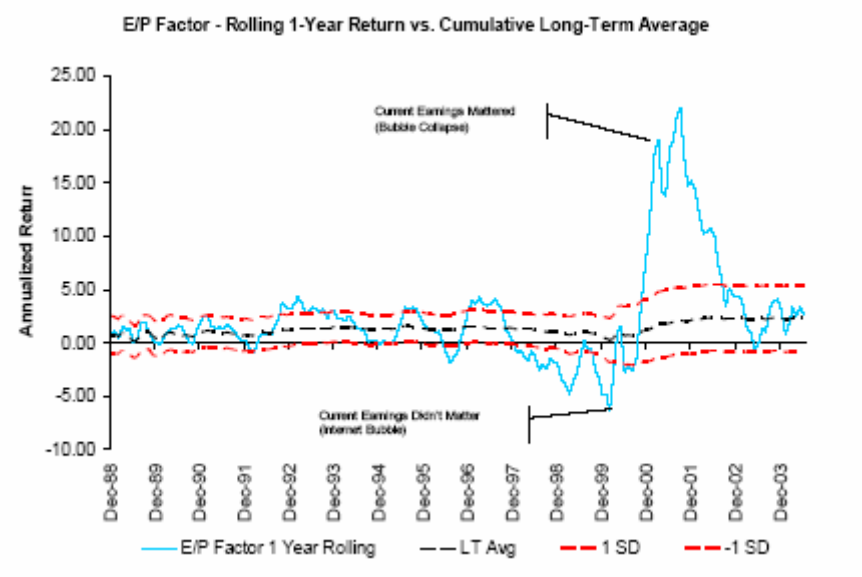
Manager Selection

The difficulty that institutional investors face in choosing managers with the potential of providing risk-adjusted "pure alpha" is apparent. It is necessary to stress that investors need to fully understand the strategy and philosophy of their active managers to determine which market environments will provide a tail wind for performance and vice versa. In other words, know what you've hired. By understanding the fundamental factors that underlie manager performance, investors can avoid the cost associated with replacing managers who have underperformed because of factor shifts in the market instead of a decline in investment skill and/or decision-making.

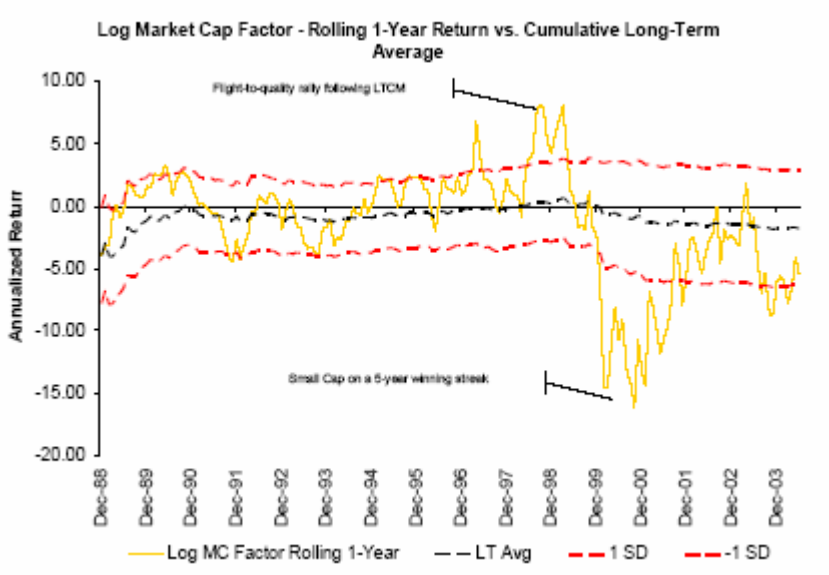
Wilshire's manager research group has performed attribution analysis that accounts for how fundamental risk factors contribute to manager performance.[10] Examples of fundamental risk factors included in Wilshire's ATLAS U.S. equity model are historic beta, book/price, earnings/price, log market cap, and momentum factors. The necessity of understanding how these types of factors influence prior performance, and how the current market environment and/or shifts to new factor regimes might influence the managers in a sponsor's portfolio, is high. Wilshire has found that a manager's track record can be influenced more by risk factor behavior than by security/industry selection skills and investors should therefore have a thorough understanding of a manager's inherent factor bets. Wilshire's manager research process utilizes quantitative risk models to disaggregate manager returns, helping clients fully appreciate embedded risk exposures. In this way, the investor can ascertain which environments provide positive support for a manager's performance and which are negative.

In addition, institutional investors need to distinguish between factors outside of a manager's control versus poor investment decisions. For example, it would be inappropriate to punish value managers for not investing in technology stocks in the late 1990's, just as it would be wrong to ascribe stock selection skill to managers who systematically over or under weight fundamental risk factors versus the benchmark. Exhibit 7 charts the returns associated with two particular fundamental factors, earnings/price and size, in one year rolling periods. The peaks and troughs indicate the degree to which the fundamental risk factors swing from one period to the next and the absolute level shows that the factors have meaningful impacts on performance.

Exhibit 7
Fundamental Risk Factor Behavior



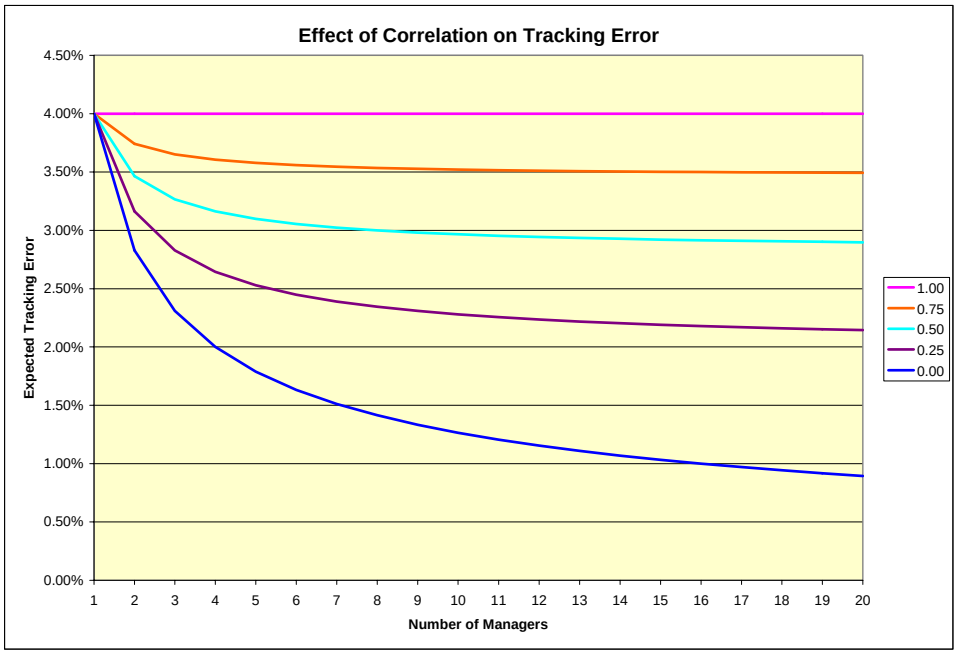
[10] Lavine, Benjamin. Manager Selection and Consideration of Risk Factor Regimes. 2005



Source: Wilshire Associates

The fact that some of the "alpha" generated by managers is linked to fundamental factor exposures produces another problem: multiple manager alphas might not be uncorrelated and therefore do not diversify as efficiently. When constructing multiple manager portfolios, investors often assume that the excess return between managers is uncorrelated. As was mentioned earlier in the discussion of benchmark misfit risk, this might not be a particularly valid assumption if the excess return is being generated by similar persistent market exposures across managers and is thus more highly correlated. Exhibit 8 illustrates this graphically. As the correlation between managers increases in a multi-manager portfolio, the diversification effect decreases markedly. At the extreme, when the correlation between managers is 1.00, the tracking error does not decrease at all as managers are added. Conversely, when the correlation is 0.00, there is a sharp decline in tracking error from adding incremental managers. In fact, at a manager active risk level of 4%, adding a second manager decreases the expected tracking error from 4.00% to 2.83%. This is an important distinction to make, because if managers' excess returns over a benchmark are driven by similar fundamental risk factors, it is likely the excess returns will not be uncorrelated. Therefore, the tracking error of the multi-manager portfolio will be higher than expected.

Exhibit 8
Tracking Error and Manager Correlation



Source: Wilshire Associates

As we have seen, the task of evaluating and picking managers to generate excess return is complicated by many factors. Some investors might consider an aggressive pursuit of alpha, but decide instead that the tradeoff between market and active risk does not justify the effort and implement tighter tracking error strategies such as indexing or enhanced indexing. However, for those who have decided that active management makes sense, we now turn to the implementation of active management within a portfolio framework.

The Mix of Active Management: Is it Art or Science?

There are many considerations when evaluating the use of active management. Several questions that arise are: "What's the appropriate mix between active and passive management?", "What's the right balance of active management sources?", and "What effect does alpha pursuit have on the overall risk of my portfolio?". Despite the importance of these questions, they are often addressed in a very informal way. Many active portfolios have been built from 'feel' and intuition, rather than from sound quantitative methods.

It is quite easy to get drawn in to an approach that avoids quantitative modeling. After all, developing estimates for manager performance can be an extremely imprecise exercise with large expected forecast errors. One can quickly discourage or dismiss a quantitative approach as being subject to "garbage in, garbage out". While it's true that alpha forecasting is difficult and prone to error, that's no reason to dismiss a risk-controlled quantitative method. Even the most fervent advocate of the garbage in, garbage out criticism can not argue with the scrutiny that a quantitative approach places on an investor's assumptions. When art becomes science, the so

called "garbage in" must be defended and many inconsistencies that may have otherwise been left unquestioned can be addressed.

Reverse Optimization: A Reality Check

At a minimum, all investors should understand the implied manager forecasts that are built into their active manager mixes and should ensure that the manager weights are consistent with their expectations. This is a fairly straight-forward test that can be accomplished by reverse optimizing the manager allocations. Unlike a traditional optimization, which takes assumptions of manager returns, risks and correlations to derive a frontier of allocations, a reverse optimization takes expected manager risks, correlations and existing weights along with an alpha forecast for one manager to back out the implied alpha forecasts required to justify the manager mix. Using the hypothetical equally-weighted manager mix and risk assumptions from Exhibit 9 below, an investor can back out the return assumptions that are implied by these inputs (manager to manager correlations are assumed to be zero in this example). This exercise forces an investor to reconcile the reasonability of their implied manager forecasts against their true expectations.

Exhibit 9
Implied Alphas: Reverse Optimization

	Inputs			Output	
	Weight	Active Risk	Exp Alpha	Implied Alpha	Implied Info Ratio
Manager 1	10%	1.0%	0.50%	0.50%	0.50
Manager 2	10%	1.0%		0.50%	0.50
Manager 3	10%	1.5%		1.13%	0.75
Manager 4	10%	2.0%		2.00%	1.00
Manager 5	10%	2.5%		3.13%	1.25
Manager 6	10%	3.0%		4.50%	1.50
Manager 7	10%	3.5%		6.13%	1.75
Manager 8	10%	4.0%		8.00%	2.00
Manager 9	10%	4.5%		10.13%	2.25
Manager 10	10%	5.0%		12.50%	2.50
Total	**100%**	**1.0%**		**4.89%**	**4.97**

Let's assume for a moment that the investor that constructed the portfolio in Exhibit 9 actually expects similar information ratios (alpha divided by active risk) from each manager. By performing a reverse optimization, the investor would very quickly see that the information ratios implied by their current manager mix are far from uniform across managers. As is evident in the right-most column of Exhibit 9, as the expected active risk of a manager increases, there must be a higher expected information ratio to justify an equal allocation to that manager. For example, in the case of Manager 10 with 5% active risk, the investor would be forced to address the implied information ratio of 2.5 against their true expectations of a "Manager 1" comparable 0.5 information ratio. Stated differently, while the investor expects an alpha of 2.5% from Manager 10, their current allocation suggests an implied alpha assumption of 12.5%! Talk about "garbage in, garbage out."

Building an Alpha Efficient Frontier

As was noted earlier, the practice of constructing a portfolio of managers is directly comparable to the process of building a portfolio of securities (i.e. stocks, bonds, etc.). It is at its core an exercise in finding the optimal mix of managers that will provide the highest level of expected alpha for a given level of expected active risk. While the reverse optimization technique described above can serve as an ideal entry point for investors interested in taking a more quantitative approach to the pursuit of active management, the journey from art to science must ultimately lead to an alpha optimization approach requiring assumptions of manager alpha, active risk, and manager pair correlations. Fortunately for most institutional investors, the mean-variance optimization techniques used in this endeavor are quite familiar, as they have been used for many years in developing strategic policy portfolios.

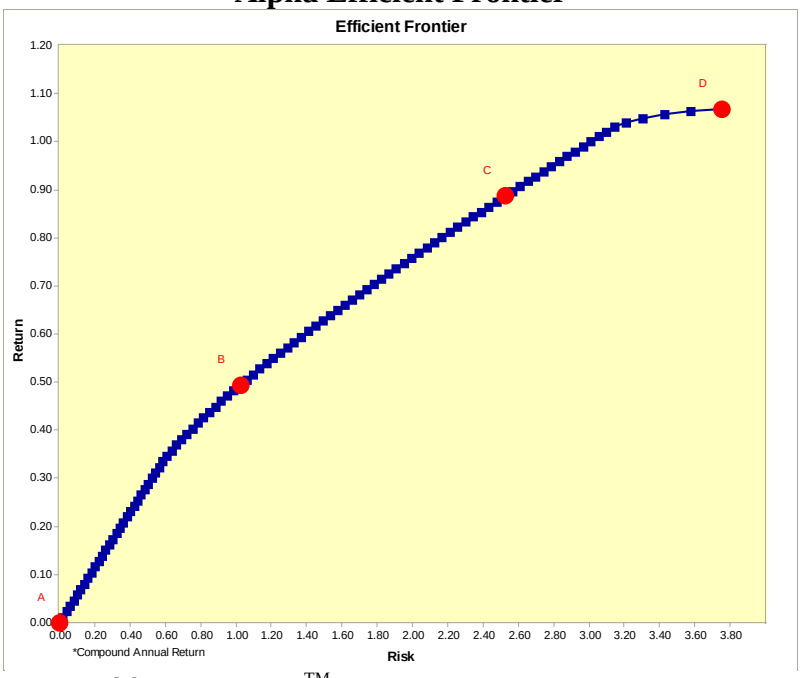
Exhibit 10 provides an illustrative example of active risk and return assumptions for representative products in a variety of investment categories. The equity asset class was divided up into large and small capitalization segments which were both sub-divided into value and growth. Within those sub-asset classes, a hypothetical stable and aggressive manager was included with varying active return and risk assumptions to illustrate the potential trade-offs an investor can make. The aggressive managers in all cases are assumed to have slightly higher excess returns with increased active risk and therefore lower information ratios relative to the stable managers. The manager-pair correlations were assumed to be non-zero, in a range of 0.10 to 0.30. The correlations were set up this way, because as was discussed earlier, it is reasonable to assume that active manager alpha opportunities will have some overlap across the various sub-classes and therefore will exhibit some measurable levels of correlation. In practice, alpha correlation assumptions should be based on historical relationships between individual managers' excess returns.

Exhibit 10
Asset Class Active Return and Risk Assumptions

Asset Class	Large Passive	Large Growth - Stable	Large Growth - Agg	Large Value - Stable	Large Value - Agg	Small Passive	Small Growth - Stable	Small Growth - Agg	Small Value - Stable	Small Value - Agg	Fixed Income Passive	Fixed Income - Enhanced	Fixed Income - Core
Return	0.00	0.70	0.85	0.60	0.65	0.00	3.60	4.50	2.30	3.50	0.00	0.05	0.50
Risk	0.00	7.00	9.00	5.75	6.75	0.00	12.00	16.00	7.00	11.50	0.00	0.30	4.00

Exhibit 11 displays the efficient active frontier which results from the combination of managers listed above.

Exhibit 11
Alpha Efficient Frontier



Source: Wilshire COMPASS™

Exhibit 12 lays out the resulting allocations for portfolios A through D along the active efficient frontier. At zero active risk, the entire portfolio is allocated to passive strategies in the prescribed 60/40 split between equities and fixed income. As active risk is increased, there is a gradual rotation from passive investments to products delivering an optimal level of expected alpha at each level of expected active risk. At the same time, risk controls ensure that the asset allocation remains both style and size neutral relative to the market index and does not deviate from the 60/40 strategic asset allocation.

Exhibit 12
Portfolio Allocations across the Active Risk Spectrum

Asset Class	Portfolio Allocation (%)			
	A	B	C	D
Large Passive	53.00	42.82	12.80	-
Large Growth - Stable	-	2.77	11.05	-
Large Growth - Aggressive	-	2.32	9.05	26.50
Large Value - Stable	-	2.25	8.91	-
Large Value - Aggressive	-	2.84	11.19	26.50
Large Total	**53.00**	**53.00**	**53.00**	**53.00**
Small Passive	7.00	-	-	-
Small Growth - Stable	-	1.12	-	-
Small Growth - Aggressive	-	2.38	3.50	3.50
Small Value - Stable	-	-	-	-
Small Value - Aggressive	-	3.50	3.50	3.50
Small Total	**7.00**	**7.00**	**7.00**	**7.00**
Equity Total	**60.00**	**60.00**	**60.00**	**60.00**
Fixed Income Passive	40.00	-	-	-
Fixed Income - Enhanced	-	29.66	7.43	-
Fixed Income - Core	-	10.34	32.57	40.00
Fixed Income Total	**40.00**	**40.00**	**40.00**	**40.00**
Total Portfolio	**100.00**	**100.00**	**100.00**	**100.00**
Active Return	0.00	0.49	0.89	1.07
Active Risk	0.00	1.02	2.53	3.75
Information Ratio	N.A.	0.48	0.35	0.29

There are many appealing attributes of following this type of mean-variance efficient quantitative approach. Most importantly, and as stated earlier, it ensures that the investor derives a mix of managers that is consistent with the investor's manager expectations. Regardless of the level of certainty around these assumptions, the results will be the most efficient reflection of the investor's manager insights, which is the best position an investor can place themselves in when pursuing alpha.

The alpha efficient frontier provides the series of optimal alternatives available to an investor across the spectrum of active risk. By providing passive product alternatives among the manager inputs, as was done in the example above, the alpha efficient frontier contains decisions regarding optimal combinations of active and passive management. Further, by expanding the approach to include assumptions for alternative sources of alpha and for the costs of adjusting beta misfit against an investor's strategic policy portfolio, this approach can be made to consider more sophisticated weighting schemes such as portable alpha strategies.

The process of building an alpha efficient frontier is true to the notion that the implementation of active management should be done as a decision that is separate from the development of a mix of asset classes. However, once complete, the expectations regarding the beta mix and alpha mix should be combined to form an investor's total fund expectations and risk budget. Mathematically, these expectations would be combined as follows:

Total Fund Return:	$r_{TF} = r_{SAA} + r_{\alpha}$
Total Fund Risk:	$\sigma_{TF} = \sqrt{\sigma_{SAA}^2 + \sigma_{\alpha}^2 + \left(2 \cdot W_{SAA} \cdot W_{\alpha} \cdot \rho_{SAA,\alpha} \cdot \sigma_{SAA} \cdot \sigma_{\alpha}\right)}$

Where: r_{SAA} and r_{α} = expected returns of the strategic asset allocation (SAA) and alpha

σ_{SAA} and σ_{α} = expected risks of the SAA and alpha sources

W_{SAA} and W_{α} = weights of the SAA and alpha source

$\rho_{SAA,\alpha}$ = expected correlation between the SAA and alpha return sources

For example, assuming an SAA policy portfolio return of 8% with risk of 11%, an alpha return of 1% with 3% risk, and zero correlation between the SAA and alpha sources of return, we would compute total fund expectations of:

Total Fund Return:	$r_{TF} = 8 + 1 = 9.0\%$
Total Fund Risk:	$\sigma_{TF} = \sqrt{11^2 + 3^2 + \left(2 \cdot 1 \cdot 1 \cdot 0 \cdot 11 \cdot 3\right)} = 11.4\%$

Thanks to a canceling out of risks from the diversification received by combining uncorrelated returns, a successful realization of these expectations would result in an increase in total fund return of 1% by adding active management versus a smaller increase of 0.4% in total fund risk. Notice that, while the total fund's risk increases at a smaller increment than its expected return, it does in fact increase. This is an important point that is often mistakenly embellished in the promotion of active management. It is all too common to hear the pursuit of alpha being justified as a mechanism to reduce overall fund volatility. However, as the risk formulas from above demonstrate, the only way an addition of active management can reduce volatility in the total fund, without altering the SAA, is if the alpha source has negative correlation to the returns of the policy portfolio. This would be an undesirable attribute as an investor's objective in implementing active management is to do so in a way that does not alter the integrity of the investor's strategic asset allocation policy. A correlation that is measurably different from zero, whether positive or negative is unwanted evidence that the investor's desired beta mix has been disturbed in the pursuit of alpha.

Conclusion

The potential rewards from the pursuit of alpha through active management can be quite substantial. Long-term success in capturing alpha can only be achieved by investors with a healthy appreciation of the significant obstacles to success and with a disciplined strategy for meeting these challenges. A clear understanding of the role that active management plays in the overall investment program is vital. Such clarity puts an investor in an ideal position to form reasonable expectations, judge performance, and react appropriately to results. At its core, the selection and combination of managers is an exercise in portfolio management, no different from that of assembling a portfolio of securities, and therefore, benefits greatly from a quantitative approach that makes efficient decisions in the trade-off between expected return and risk. Success is never guaranteed, for by its very nature alpha is a zero-sum game, but by circumventing some common pitfalls and avoiding the temptation to oversimplify, an investor can place themselves on a trajectory that dramatically improves the prospects for success.

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