

WHAT ARE YOU REALLY GETTING?

A PHILOSOPHICAL AND PRACTICAL REEXAMINATION OF
SINGLE MARKET (DOMESTIC) QUANTITATIVE STRATEGIES

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Why Bring This Topic Up Now?

Following significant capital markets disruptions, it is always wise to step back from the fray and reflect upon past experiences in the hopes of gleaning new insights and refining best practices. Such exercises should be conducted not only with an open mind, but with the primary goal of simplifying your understanding of the fundamental forces driving various strategies. For if we are confused as to the factors contributing to, or detracting from our success as investors, the problem of achieving our portfolio goals becomes all the more difficult. In the instance of domestic quantitative strategies, our thoughts and analysis lead us to believe an improvement in best practices is warranted in not only how these strategies are most successfully designed and employed, but also with respect to appropriately educating institutional investors as to the factors driving the success or failure thereof.

Probably the most notable impetus for this paper was the perceived widespread failure of “quants” in August 2007 when they suffered highly correlated losses at a time investors needed “alpha” the most. Though it has been some time, these events illustrated that quantitative strategies held previously unknown and poorly dimensioned risk factors; i.e., how having so many firms doing materially the same thing was in itself a cause for concern. Since then quantitative strategies have seen a steady decline in their excess returns relative to broad market benchmarks, creating another reason for a critical reexamination. Furthermore, dedicated quantitative strategies have nearly tripled¹ their representation within the US large cap universe in the last two decades, leading to concerns about capacity, investor herding, and continued viability as excess returns are potentially “crowded out.”

As such, the point of this paper is to provide a fundamental understanding of the unique factors driving excess returns for quantitative managers, as well as potential barriers to success. This should not be confused however, with any sort of inherent admonishment of these approaches. Though we believe there is room for improvement in the optimal implementation of these strategies, our primary concerns surround the appropriate formulation of expectations and integration into portfolio design. Put simply, we believe it is important to know what you are really getting with quantitative managers.

A Brief Primer on Quantitative Strategies

Though quantitative strategies come in a virtually limitless number of varieties, their approach can be generalized as one of buying and selling securities based on their deviations from theoretically expected patterns of behavior. Such activities often, but not exclusively, take the form of trading models, valuation based screening and portfolio construction, or volatility and correlation optimization. In their truest sense, quantitative managers eliminate subjective judgment, thereby relying almost entirely on the output of their quantitative models to select securities on a highly disciplined basis. Often traditional quantitative managers tend to be rather benchmark centric, which limits the potential for excess returns if and when successful, not to mention creating a rather high cost structure for the actively managed portion of the portfolio. We will address these ancillary issues later in this discussion, but provide a brief description of the aforementioned models below.

Trading Models

Though all quantitative strategies are generally well steeped in the practice of looking backwards to identify patterns of behavior, trading models best epitomize this approach. As a rule of thumb, trading models rely almost exclusively on pricing patterns to drive trading activity in an attempt to profit from short term price movements. As such, the concept of investing for the long term is simply out of the question. In the most colloquial sense, such things as “moving averages” that involve fast and slow moving pricing lines as trading signals are a great example of these models. Though a crude application of quantitative analysis by most active managers’ standards, such practices encompass the essence of looking backwards in time to identify short term behavior patterns to ostensibly produce superior returns to a buy and hold (or even indexed) strategy. Such terms as Kestner Ratios, Moving Average Convergence Divergence (MACD), Relative Strength Indices (RSI), Oscillators, Channel Breakouts, Volatility Breakouts, and Exponential Moving Averages (EMA) are all based on the very simple concept that trading patterns can be identified and exploited. What is most important to note is the disregard for underlying valuations or corporate fundamentals; pricing behavior is all that matters. Such strategies therefore rest upon the concept that analysis of historic and current trading patterns is a value added activity, which as we will discuss below is a very arguable point in relation to the Efficient Market Hypothesis (EMH).

Valuation Based Screening & Construction

Though it is not a stretch to imagine money managers paying attention to valuations, quantitative managers do so in a way that materially differs from their fundamentally oriented counterparts. Probably the most notable difference is quantitative managers’ sole reliance on data, as opposed to an integration of other objective and subjective factors such as on-site company visits, evaluation of management abilities, macroeconomic conditions, and the overall experience and judgment of the portfolio manager(s). For example, quantitative screens may be designed to target certain balance

sheet considerations such as price to book, cash flow, or earnings with the goal of systematically holding a cheaper portfolio than the index. Alternatively, screens may be conducted for changes in earnings and estimates thereof to capture a superior momentum effect relative to the index. The typical goal of such practices is to identify and target key balance sheet items that are believed to produce superior returns based on a manager's theoretical or philosophical views. The permutations of these approaches are vast, but ultimately rely on screening and selecting stocks based on publicly available data. Presumably, the objectivity of this process eliminates the drawbacks of behavioral biases, and commonly seen high levels of diversification minimize the risks of failing to dimension pertinent subjective information.

Though perhaps an unwelcome, but nonetheless accurate characterization, quantitative managers have a very narrow view of the world with their fixation on publicly available data and deliberate ignorance of other potentially salient information. This of course means the crux of their value added proposition is the assumption that superior returns can be derived based on public information alone, which is yet another arguable point vis-à-vis the Efficient Market Hypothesis. Moreover, such approaches imply subjective judgment is a value detracting proposition and should be extricated from the decision making process. Though there is ample empirical and theoretical evidence to argue for the wealth destroying properties of investor behavioral biases, such theories are just theories, not fact. So this approach to portfolio construction is by no means a sure thing.

Volatility and Correlation Optimization

Another valid, but less commonly seen approach in quantitative management would fall under the category of optimizing portfolios with respect to the volatilities of equities and their pricing correlations relative to one another. Such methodologies are steeped in statistical analysis, often invoking such terms as standard deviation, variance, co-variance, and optimization. Though intellectually fascinating to consider and tedious in practice, it is unnecessary to delve into the specifics of these models. What is important however, is to note these approaches deliberately ignore valuations as a means to produce higher absolute returns, and instead focus on statistical methodologies to garner superior risk adjusted results; or lower volatility per unit of return. Some managers may optimize based solely on past performance. Others may marry both history and forecasts. The real sticky point with the latter approach is such predictive models are generally proprietary "black boxes," which eliminate the ability to assess the viability of their predictive value. Though these approaches seek different goals than valuation based strategies, they nonetheless suffer from the same reliance on publicly available historic pricing data, as well as the due diligence considerations of not being able to assess the forecasting model. In other words, not only do these strategies face theoretical barriers to success (i.e., EMH), but utilizing them with only partial knowledge of the underlying models raises additional concerns and confidence in future returns.

The Efficient Market Hypothesis (EMH)

With a basic understanding of quantitative strategies in hand, the question then turns to what is the theoretical viability of realizing success. We believe a significant portion of this answer is best found through the prism of the EMH. After all, we have to rely on theory in such mental exercises, as opposed to simply looking backwards in time which generally tells us very little about the future. The SEC doesn't require the disclosure that "past performance is not indicative of future performance" just for giggles. We will get to past performance and an analysis of implications thereof, but in the meantime let's keep our discussion at the theoretical level.

As proposed in Eugene Fama's research,² an efficient capital market is one in which securities are rapidly priced to reflect new information as it becomes available. This theory implies markets virtually simultaneously reflect all historic and current information into prices, making it theoretically impossible to add value through informational analysis. For the purposes of this discussion we make no attempt to validate or debunk the EMH, but instead believe it important to note how the EMH potentially affects quantitative strategies given their fixation on publicly available data as a means to add value. This theory takes three "forms," each of which offers varying barriers to the success of any investment strategy; quantitative or fundamental.

Weak

In its most basic sense, weak form EMH states future prices cannot be predicted by an analysis of past prices, or that securities follow no consistent pattern of behavior and returns are random over time, at least over the short term in absence of fundamentally significant information. If you believe in this form of EMH, quantitatively based trading strategies have no theoretical basis for success over long periods of time because no profitable and persistent trading patterns can exist.

Semistrong

This form of the EMH hypothesizes capital markets adjust rapidly and efficiently to the release of new public information, thereby making it impossible to garner superior risk adjusted returns through analysis and incorporation of public information. This creates a barrier to success for all active investment managers, but is of special concern to quantitative managers whose models strictly rely on publicly available data, as opposed to an incorporation of subjective judgment. On the other hand, there is theoretical "alpha" to be found for those who provide the service of rapidly and efficiently adjusting securities prices to new information. From the standpoint of EMH, this is a valuable service to society and must be compensated lest the basic tenants of the EMH will fall apart; i.e., no one would incur trading costs to readjust portfolio holdings if there was no economic incentive to do so. This line of reasoning is likely a net advantage to quantitative managers, as their commonly seen rapid trading activity puts them at an advantage relative to fundamentally oriented managers that generally react more slowly and trade less frequently. However, do not forget there is only so much "alpha" in existence and capturing it under the EMH is highly dependent on both acting quicker than everyone else and doing so correctly. And all of us probably remember our

parents telling us to “look before you leap.” So reacting quickly in itself is not necessarily a value added proposition.

Strong

The strong form of EMH assumes securities prices are reflective of all public and private information, implying no excess returns can be garnered under any circumstance. Whereas fundamentally oriented managers could have arguably skirted the weak and semi-strong forms of the EMH through superior subjective judgment or using mosaic theories to produce non-public information, this form of EMH creates a barrier to success for all strategies. Of course, there remains “alpha” for those that are first to bring market prices back to an efficient state. But again there is only so much of this to go around, and must be in excess of transaction costs and fees to be a worthwhile pursuit for investors.

From a bigger picture point of view, the strong form EMH stands at the center of the active vs. passive argument and is candidly outside the realm of this discussion. More specific to quantitative managers, serious consideration must be given to the weak and semi-strong forms of EMH as they materially impact the viability of these approaches. This is because if you believe in these forms of EMH, it would be all but impossible to add value through methodologies that fixate on the use of publicly available data, while deliberately ignoring subjective judgment and expertise in security selection.

As we stated earlier, the goal of this paper is not to state an opinion on the EMH, but simply to integrate this theory into the evaluation of quantitative investment strategies. While doing so, we can only conclude the various forms of EMH serve more as a hindrance to the success of quantitative than fundamental strategies.

The “Crowding Out Effect”

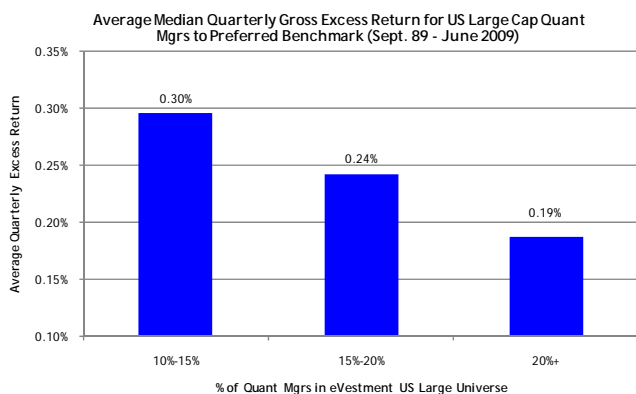
Another issue is the “crowding out effect,” which essentially refers to the diminution of excess returns as more and more people attempt to profit from market inefficiencies, especially in the context of doing so through a formulaic (or quantitative) approach. This is because the scientific knowledge underlying quantitative strategies and the computer systems necessary to implement them are widely available. So if there were excess returns to be found through quantitative models, you can rest assured the marketplace would exploit them in a highly competitive manner.

The fact of the matter is there are only so many ways to find alpha through quantitative tools and analysis. Simply consider the instance of a market inefficiency that could be detected and exploited through quantitative analysis. The chances of only one market participant discovering this inefficiency is low. The chances this opportunity will remain secret to other participants indefinitely is even lower, if not approximately zero over time; hence the crowding out affect. The awareness of this constraint leads to serious implications for the long term viability of quantitative strategies, more

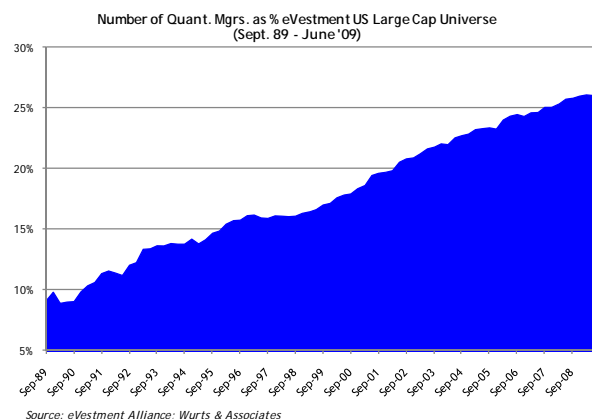
so in the case of traditional long-only mandates and less so for completely unconstrained long/short hedge fund strategies.

Because we know market inefficiencies are finite and the quantitative tools to identify and exploit them are widely available, we can logically conclude the universe of quantitative managers is caught up in a never ending struggle of beating each other to the punch. Resting the success of an investment on the hopes of a manager leading the evolution of quantitative methodologies seems dubiously reliable given the collective intellect of the investment industry; a tall task indeed. Nonetheless, if one chooses to, it is essential to find managers with truly exceptional theoretical and creative abilities to consistently stay ahead of the curve of an ever evolving universe of competitors. In our estimation the best way to bolster the chances of success are to do so through unconstrained equity mandates which allow the greatest flexibility to identify and exploit alpha. Moreover, one must minimize the chances of intellectual espionage to maximize the useful lifespan of a given approach if and when identified. Unfortunately, products established with these mandates in mind are rarely, if ever seen in the traditional long-only marketplace, and instead are exactly the types of products long/short equity hedge fund managers have been providing for years.

Moving forward, the question then turns to whether there is evidence to support the validity of the crowding out effect? Before answering however, keep in mind we are not trying to definitively prove/disprove this theory, but instead want to determine if there is any empirical evidence to support it. Well it seems there is. The results lead to concerns about the viability of quantitative managers to add value, at least assuming a continued growing popularity of these strategies. As you can see in the charts below, it is clear the popularity of quantitative strategies has grown tremendously over the last few decades, while at the same time they've seen the theoretically expected headwinds to excess returns. Could these data patterns be coincidental? Well sure they could, but it is more likely they are legitimately illustrating of the validity of the crowding out effect.



Source: eVestment Alliance; Wurts & Associates



Source: eVestment Alliance; Wurts & Associates

What is most interesting to us in examining the crowding out effect is the implied “bet” made when investing in quantitative strategies. To illustrate, let’s assume most investors are backward looking and would not allocate to any strategy unless it had been shown successful. So if excess returns were

to be produced by a quantitative model, capital inflows would then drive excess returns away through the crowding out effect. Subsequently investors would divest from a given strategy due to a lack of excess returns, thereby in all likelihood creating them going forward and repeating the cycle over and over again. So who wants to “bet” we’re in the latter stage of that cycle, but at the industry level?

This point relates directly to the title of this paper in that most investors are unlikely to recognize what they are really getting with quantitative strategies, which is for all intents and purposes a perverse bet on the crowding out effect. Though some may see the ebb and flow of excess returns and assets as a potential opportunity to add value, and it may very well be, such a strategy seems unfit for the vast majority of institutional investors because it would involve allocating to strategies without excess returns and correspondingly shrinking assets, only then to divest as excess returns peaked and assets flowed inwards. Such a practice would be contrarian to say the least and would be wholly dependent on predicting the behavior of the herd. Good luck with that!

“Goldilocks” Volatility

In continuing our understanding of what you are really getting with quantitative managers, a discussion of market volatility is in order. As stated earlier, the basic crux of all quantitative investment strategies is the trading of securities based on their deviations from theoretically expected patterns of behavior, which goes hand in hand with market volatility.

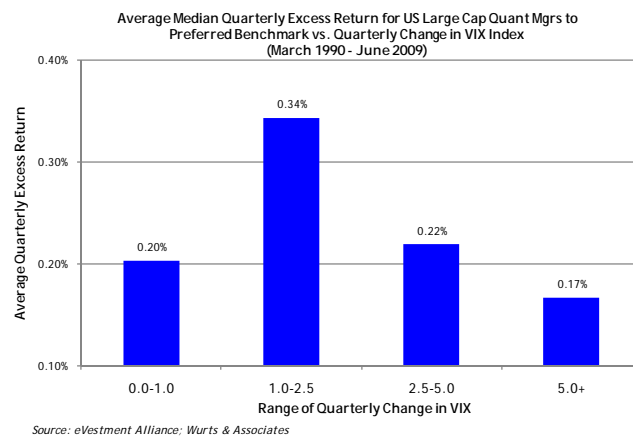
To demonstrate this relationship, consider a market where there is zero volatility. In such an environment there would be no deviations from theoretically expected patterns of behavior because there would be no deviations in prices, and therefore no opportunity to add value. Such an environment has of course never existed, but the point remains valid. Furthermore, consider the opposite extreme to this example, a market with infinitely increasing volatility. In such an environment quantitative approaches would be equally unable to add value, as theoretically expected patterns of behavior would be impossible to define or trade against. So by the very definition of their approach to investing, quantitative managers necessarily require a “goldilocks” volatility environment...not too little, not too much market volatility.

In a more practical sense, this line of reasoning holds a great deal of value in assessing the potential success of quantitative managers, especially if you happen to have an opinion on future market volatility. This is because in order for these strategies to add value, securities must not only trade differently from their expected patterns of behavior, but must do so to such an extent to justify management fees and trading costs, while at the same time not behaving too far outside of expected norms. For if there is not enough market volatility, then there is not enough available “alpha” to justify investing in these strategies. When you consider the average quantitative manager exhibits an R-squared (or closeness of fit) to their index of 94%,³ the question of market volatility becomes ever more important. This is because it is hard enough to add value with such little room to deviate from the benchmark, let alone without sufficient market volatility. On the other hand, if volatility is too great then quantitative models fall apart in their usefulness and tend to detract value. Let’s not forget

one of the greatest examples of quantitative models failing in the face heightened market volatility - Long Term Capital Management.

So do we have any empirical evidence to support this line of reasoning? We believe the answer is yes, but reiterate our acknowledgement that spurious relationships are always possible when looking backwards in time; the fact few managers stay in business for multiple decades only complicates this sort of analysis. Still, the results appear fairly in line with the premise of quantitative managers needing “goldilocks” volatility.

A little explanation is in order as to how we illustrate this relationship. The most commonly used application of “volatility” is the historic standard deviation of returns. The problem with using this measurement is that to get a meaningful statistical sampling thereof, you have to go far enough back in time to not only get smoothed volatility results, but smoothed excess returns as well, which is a good way to gloss over any potential relationship. To sidestep this limitation, we took the quarterly change in the VIX index, a well known benchmark for implied market volatility, and compared it to median excess returns for quantitative managers during those respective quarters. The results portend that too little or too much market volatility is bad for quantitative managers. The implications are rather straightforward in that a “bet” on quantitative management implies the view of expecting “goldilocks” levels of market volatility.



Some Practical Barriers

Relatively Expensive

On a more practical basis, it is worthwhile to consider some basic commonalities amongst traditional quantitative managers. As mentioned earlier, these managers tend to be highly benchmark centric, which is a side effect of their approach to marginally add value through minor tilts to the index. This aspect of most products’ design appeals to those seeking highly risk controlled exposures. Though logical from one point of view, such low tracking error strategies represent a significant impediment to active managers’ ability to add value on a net of fee basis. As demonstrated earlier, there are a myriad of theoretical factors working against quantitative managers, and putting constraints on the implementation of their models only serves to magnify them. Just consider the quarterly median gross excess returns shown in the previous charts. In many cases excess returns would barely justify fees over time, making these strategies expensive relative to the value they add.

Probably the best way to illustrate how benchmark constraints raise costs is to look at the “active share”²⁴ and resulting “active expense ratios.”²⁵ As you can see from the table, quantitative strategies are expensive in this context, especially when you consider their overall lower management fees relative to fundamental managers. However, keep in mind these costs could be lowered and the potential to add value increased if benchmark constraints were relaxed. Also note that such constraints are more a function of investors’ demand for product design than active managers’ best thinking for implementing their models. One simply needs to look at quantitatively oriented long/short equity hedge funds to realize active managers abhor benchmark constraints in their pursuit of alpha. The point being this is one barrier to success investors have imposed on themselves and their active managers, as opposed to an unavoidable theoretical limitation to success.

Median	Quantitative Strategies	Fundamental Strategies
Expense Ratio	0.50%	0.70%
R-Squared	94%	85%
Active Share	22%	30%
Active Expense Ratio	2.2%	2.1%

Source: eVestment Alliance, Wurts & Associates

The Crowding Out Conundrum

Now on the other hand, some barriers to success are unavoidable and must be recognized and embraced on the part of investors, more specifically the “black box” models used by many quantitative managers. As a reminder, managers are forced to employ such secretive methodologies in order to combat the “crowding out effect” out of fear their models may somehow become known to and exploited by competitors. The problem here for investors is the conundrum of needing to be ignorant of how their chosen manager proposes to add value, while at the same time forming an educated evaluation of their ability to do so. For all intents and purposes, it is very difficult to assess the potential success of a quantitative model if you cannot see how it works. So therein lies what is probably the single largest practical issue with quantitative managers, that you must essentially invest on faith in lieu of firsthand knowledge of their models. There is of course no correct answer to this conundrum, but at the very least fiduciaries must be aware of its existence and their implied acceptance thereof when making allocations. Again, it’s important to know what you’re really getting (or embracing) with these strategies.

Piecing it All Together

The goal of this paper is not to state a black and white opinion on the validity or usefulness of quantitative managers or their approach to investing. What we are trying to do is state one must be fully informed of overarching theoretical and practical constraints that contribute to the success or failure of any strategy. We believe an informed opinion along these lines is not only useful with respect to evaluating the performance of an existing or prospective manager, but also in determining if a given strategy represents “bets” an investor would like to incorporate into their portfolio.

From a theoretical point of view, quantitative strategies largest barrier to success is the EMH. In one form or another, they are constrained by all three forms of the EMH. This is in contrast to

fundamentally oriented active managers that are only constrained by the strong form of the EMH; i.e., non-public information can be gleaned through expertise, insights, and the mosaic theory. So before implementing a quantitative strategy, an investor must necessarily draw the conclusion they do not believe in all forms of the EMH, especially in the semi-strong and strong forms which encompass all forms of quantitative strategies; trading models are only constrained by the weak form.

The “crowding out effect” must be proactively and strategically managed, or mitigated through product design. Allocations would need to be rebalanced in light of prevailing excess returns and assets under management on a contrarian basis. Alternatively, negotiating lower fees can mitigate concerns over the ability of managers to add sufficient value. Keep in mind the more a strategy is index constrained, the harder it is to add value, necessitating lower fees for more benchmark centric mandates. Additionally, allocating to firms with presumably superior intellectual talent, no benchmark constraints, and high levels of secrecy can enhance chances of success; hedge fund formats work best if this approach is taken. But also don’t forget the need to deliberately embrace an ignorance of how managers propose to add value; the “crowding out conundrum” mentioned earlier.

The final factor to successfully employing quantitative strategies is planning on “goldilocks” volatility, on average, throughout the lifespan of the investment. This of course implies the need to have a macroeconomic opinion on prospective market volatility, and for that opinion to be correct, or to just hope things work out ideally. Without accommodative levels of volatility, quantitative managers may struggle to add value net of fees, especially for a highly constrained mandate. Fee negotiations and product mandate and format may also be used to address these concerns.

To conclude, we believe any approach to investing has its own unique and worthwhile characteristics and attributes, but also believe there is no universally appropriate strategy for every portfolio. This is why it is essential to understand the primary drivers of returns for any strategy, for without such an understanding the optimal construction and implementation thereof will never be achieved.

Our belief is very simple. The chances of success are maximized when you know what you’re getting into with any investment, which allows you to embrace and manage those factors as judiciously and successfully as possible. We believe such an intellectual exercise is invaluable not only to investors, but to those designing and executing investment strategies on their behalf. After all, the goal of wringing out as many market inefficiencies as possible is in everyone’s best interest.

But never forget, the search for alpha is not systematically rewarded. Some will find it and most will not; some will shoulder the costs to no avail and others will benefit from their efforts. If at all possible, don’t be afraid to let someone else bear the costs of keeping the market efficient if you conclude the odds are not in your favor.

¹ The eVestment Alliance database is recognized as an industry-leading resource for data on institutional investment management firms and their strategies. Wurts & Associates determined this figure based upon the eVestment Alliance “All US Equity” universe, including inactive products (to minimize survivorship bias). This universe was subsequently screened to include strategies with a primary equity capitalization identified as “Large Cap” and a portfolio management strategy identified as “Active” (rather than “Passive”). As of September 1989, 9.2% of the strategies in this universe listed their primary investment approach as “Quantitative.” By June 2009, the percentage identified as “Quantitative” had risen to 26.0%.

² Eugene F. Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance* 25 (May 1970): 383-417.

³ Per the eVestment Alliance database, the median R-squared to the S&P 500 index over the trailing 10-year period as of June 2009 for all quantitative large cap US equity strategies was 94%.

⁴ As defined by Ross M. Miller (“Measuring the Trust Cost of Active Management by Mutual Funds,” *Journal of Investment Management* Vol. 5, No. 1 (2007): 29-49), “active share” reflects the allocation of a portfolio implied to be “actively” (versus “passively”) managed. It is derived by deconstructing the correlation coefficient and R-Squared of a strategy relative to a benchmark in order to determine the active share, w_A :

$$w_A = \frac{\sqrt{1 - R^2}}{R + \sqrt{1 - R^2}}$$

⁵ As defined by Ross M. Miller (*ibid*) “Active Expense Ratio” is an estimate of the true cost of management for the “active” portion of a portfolio. Miller derives the active expense ratio (C_A) to be equal to the cost of indexing (C_I) plus the management fee paid (C_P), less the cost of indexing (C_I), divided by the active share (w_A):

$$C_A = C_I + \frac{C_P - C_I}{w_A}$$