

Dimensional's Approach to Core/Satellite Investing

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Introduction

After three years of poor investment returns, and despite the positive returns so far this year, plan sponsors are giving increasing consideration to switching “paradigms”—in particular, to moving from style boxes in which active managers provide market exposure with, hopefully, a bit of alpha added, to a core/satellite approach. This approach consists of a “core” portfolio which provides the market (or beta) exposure, while active “satellite” managers, unconstrained by style boxes and probably with concentrated portfolios, add uncorrelated alpha. Hedge funds and long/short strategies are held out as the most elegant providers of alpha, since (ideally) they can provide pure alpha, unsullied by any beta at all. If an institution believes that active management cannot add value, then it will have 100% of its portfolio in a core strategy. Conversely, if an institution believes that it can select managers who can add value, then it will reduce the assets in the core to fund these alpha managers.

We propose two modifications to the typical construction of the core portfolio. First, most plans use index funds for their core exposure. The use of index funds, however, assumes that the indices are the best representations of an asset class. As detailed below, we believe that there are a number of significant problems with using indices to represent an asset class. Instead, we propose a passive strategy with clear construction rules that faithfully replicate the asset class, and a trading methodology suited to long-term investors rather than to the provision of a benchmark to active managers.

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Second, core portfolios are usually constructed to match the market. That is, they are market-capitalization weighted and style neutral. However, an investor with a higher risk tolerance or a different time horizon might wish to increase his expected return by taking on more risk by increasing his exposure to the size and style risk factors. In other words, rather than thinking of the core portfolio in only one dimension of risk—the market—an investor should think in terms of the three dimensions of risk—market, size, and value. To the extent an investor desires these increased exposures to higher expected return and risk, they should be gained in the core portfolio rather than in the alpha strategies for reasons of cost; that is, it makes no sense to compensate an active manager for size and style bets which can and should be made passively.

Style Boxes

Plan sponsors and their consultants typically view their equity portfolios in terms of style boxes in which the market is sliced between value and growth and between small and large, so that plans will have a large value manager, a small growth manager, and so on. The role of each manager is primarily to provide exposure to its portion of the universe and secondarily to add a dollop of excess return.

Style boxes came about as a way to better measure a manager's performance, allowing value managers to be benchmarked against value indices, growth managers against growth indices, etc. Institutions have also found them useful in asset allocation studies, providing a finer level of plan detail than simply using an overall equity expected return and standard deviation.

In such a world, tracking error and information ratio become very important statistics. If the manager has a high tracking error—looks too unlike its style benchmark—then it is at risk of not fulfilling its primary function of providing asset class exposure¹. Of course, if the manager has a low or negative information ratio, then it is not meeting its secondary function of providing excess return².

As this structure became widely accepted, managers introduced a variety of products to meet demand. Strategies became risk-controlled, enhanced, benchmark-constrained—in short, cognizant of tracking error versus the benchmark. Interestingly, with the wave of acquisitions in the industry, this tighter control fit well into the managers' new business models, narrowing the role of analysts and portfolio managers and making them more fungible.

¹ Assuming that the benchmark adequately represents the asset class, an assumption which we discuss more fully below.

² Although relying on the information ratio to determine if a manager has skill is fraught with peril, as detailed in "Inside the Information Ratio" by Truman A. Clark, Dimensional Fund Advisors, 2003.

It should come as no surprise that this new structure had unintended consequences. Consistent and repeatable high information ratios have proved as chimerical as positive alphas used to be, especially on a factor-adjusted basis.³ Analysts and portfolio managers, bored by the constraints of the style boxes, have moved over to hedge funds, and sophisticated investors, once again looking for the new new thing, have begun to follow them.

The Core/Satellite Approach

Under these circumstances, a growing number of investors have decided to take a core/satellite approach, in which the core provides broad market exposure (beta) and the satellites add excess return (alpha). There are two main attractions to this approach. First, overall management costs are typically lower because the majority of the assets are passively managed. Second, the search for a manager subtly changes from finding the best manager in each box, even if the sponsor thinks none of them can add value, to hiring only managers that the sponsor believes can outperform an index or an absolute return hurdle. Some active managers also see an advantage in the satellite structure, believing that removing the shackles of the boxes allows them to “look for value across the universe”.

The core/satellite approach has also found favor in other asset classes, particularly in fixed income, where the “core plus” approach, whether implemented using one manager or several, is quite common, and in international equities, where a similar structure, with an EAFE mandate serving as the core, supplemented by emerging markets and/or small cap stocks, is becoming increasingly common.

Most plan sponsors focus most of their efforts and resources on finding satellite managers, satisfied to use index funds for their core exposure. However, index funds have shortcomings to index funds that undermine the basic philosophy of this approach. A more thoughtful portfolio construction process and a greater focus on trading methodologies can compensate for these shortcomings.

Index Funds

Institutional investors use indices as both a representation of an asset class and as a benchmark for a manager's performance. In fact, Gus Sauter at Vanguard has gone so far as to argue that “*an index must reflect the way that money managers actually invest*” (italics his).⁴ This focus on benchmark provision, though, means that passive investors who use benchmarks to represent an asset class are not necessarily well served. In fact, we would argue that for the most part indexes are not the best representations of an asset class, and that investors lower their returns when they treat them as asset classes.

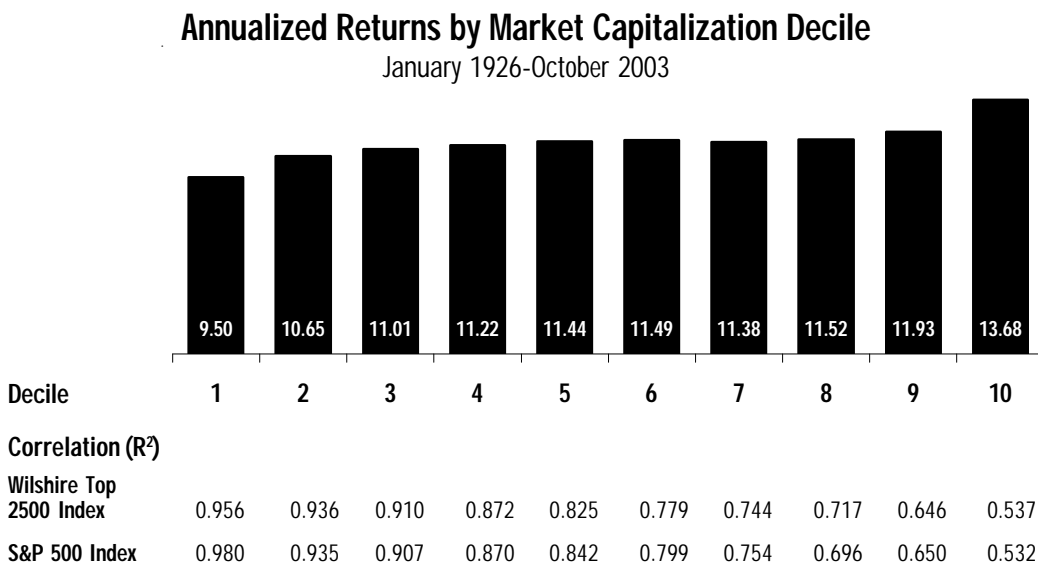
³ Although relying on the information ratio to determine if a manager has skill is fraught with peril, as detailed in “Inside the Information Ratio” by Truman A. Clark, Dimensional Fund Advisors, 2003.

⁴ Gus Sauter, “Index Rex: The Ideal Index Construction,” *Journal of Indexes*, Second Quarter 2002.

The first problem with indexes as a measure of an asset class is trading costs. Truly passive investors should prefer to avoid transaction costs associated with index changes which have nothing to do with asset class replication. For example, Dimensional estimates that rebalancing the Russell 2000 every year has reduced the return of the Russell 2000 by approximately 200 basis points annualized from 1993 to 2002.⁵ This rebalancing effect is more pronounced because the Russell indices do not use a buffer zone or hold range. This reduction in return comes from passive investors in the Russell 2000 and goes mostly to active managers and hedge funds who game the rebalancing, and probably explains a good deal of active small cap manager outperformance.

Ironically, problems with rebalancing are exacerbated by the popularity of indexing. It is estimated that 10% of the S&P 500 and 6% of the Russell 2000 are held by indexers.⁶ Event studies have shown that stocks being added to an index have a positive excess return in the days before the effective date of the rebalance, with negative excess returns afterwards. Index investors bear the cost of this “S&P effect”. A patient trading strategy and a refusal to blindly adhere to an index eliminate and even profit from the unnecessary cost of this rebalancing effect.

Figure 1



⁵ See also Ananth Mahavan, “The Russell Reconstitution Effect,” *Financial Analysts Journal*, July-August 2003 and Peter Jankovskis, “The Not-So-Perfect Index,” *Journal of Indexes*, Second Quarter 2002.

⁶ Jim Quinn and Frank Wang, “The Impact of Adds and Deletes on the Return of Stock Indexes,” March 2003, University of California, Berkeley, unpublished working paper.

Besides the costs of rebalancing, problems result from construction methodology.⁷ For example, several small cap indices exclude the smallest stocks on the basis of liquidity. Again, we believe this might be useful for constructing a manager benchmark but less so in replicating an asset class. As Figure 1 shows, the small cap effect has been monotonic and most dramatic in the smallest deciles. Furthermore, as the correlation numbers show, the smallest decile, which the Russell 2000 excludes, offers the greatest diversification benefit to an S&P 500 investor.

Another problem, at least in the case of the S&P indices, is that stocks for inclusion are decided by a committee based not only on market capitalization but also on industry representation and company profitability. It is difficult to see, in fact, how the construction of the S&P 500 differs from active management.

Finally, there is an arbitrary element to most style definitions used by index providers. Russell, for example, tries to define value and growth as a manager would, resulting in some stocks that are in both their value and growth universes simultaneously. Again, while there might be a certain wobbly logic to this from a benchmarking perspective, it does not seem to make sense for a long-term investor seeking to replicate an asset class.

Dimensional's Approach

Dimensional believes that tracking error should be used only as a rough indicator that a manager is following its mandate, not as an investment objective in itself. It is our view that the problems inherent in index-based strategies can be addressed through better construction rules and realistic trading methodologies. To develop better construction rules, Dimensional starts by asking a simple question: What are the attributes of a particular asset class? It is not until we have answered this question that we turn to the next: What is the most cost-effective way to capture those attributes? In our equity strategies, this approach has led to broadly diversified portfolios of stocks which meet objective and rational criteria. For example, we exclude REITs from our equity portfolios because research by Donald Keim⁸ and others has shown that REITs behave more like real estate than stocks. We have careful definitions of value and small based on academic research by Eugene Fama and Kenneth French.⁹

Once we have established the construction rules, we can then use various trading strategies that minimize trading costs to create the portfolio. Because we do not attempt to closely track an index, we are able to trade opportunistically (e.g., through block trading)

⁷ As previously noted, these are "problems" from the perspective of an investor seeking asset class exposure, not necessarily for an investor seeking a credible passive representation of an active manager, i.e., a benchmark.

⁸ Joseph Gyourko and Donald Keim, "What Does the Stock Market Tell Us About Real Estate Returns?", *Journal of the American Real Estate and Urban Economics Association*, 1992, V20, 3.

⁹ Eugene Fama and Kenneth French, "The Cross-Section of Expected Stock Returns", *Journal of Finance*, June 1992.

and patiently. Both strategies allow us to take advantage of our size in the small cap market by providing liquidity rather than demanding it. This approach, combined with the broad diversification of our portfolios, means that we are not afraid of illiquidity; rather, we are willing to hold the illiquid stocks which most index funds and active managers shy away from. As mentioned above, it is in precisely these most illiquid securities that a great deal of the diversification benefit and expected return of small cap stocks lies.

Risk Factor Exposure

In the core/satellite approach, the role of the core is typically to provide market exposure. Research has shown, however, that an investor can expect a higher return if he or she tilts towards those risk factors that are compensated by the market—size and value. Many investors attain this exposure by allocating assets to active managers within each style box, hoping to receive factor exposure plus a little alpha from each manager. It is preferable, however, to tilt the core, passively managed, portfolio towards size and/or value targets to increase the expected return of the overall portfolio rather than to pay active management fees for less structured exposure to the risk factors. In other words, active fees should be paid for the value which active management adds, not for the return which comes from greater exposure to risk factors. In the same way, one would not pay an incentive fee to an equity manager for outperforming Treasury bills if he underperformed the equity market.

For example, Table 1 shows the performance of the Vanguard Windsor Fund versus the S&P 500. As can be seen, from January 1979 through October 2003, the Fund has outperformed the S&P by 127 basis points per year, a very attractive alpha indeed. The Windsor Fund has a value bias, however, so perhaps a better benchmark would be the Russell 1000 Value index. Against this, Windsor has also done well, although not so well as it appeared versus the S&P 500.

Table 1

Current Multi-Period Annualized Returns

January 1979-October 2003

		excess return vs. S&P 500
Vanguard Windsor	14.93	1.27
S&P 500 Index	13.66	0.00
Russell 1000 Value Index	14.31	0.65

Table 2 shows the results of running the performance of the Windsor Fund through a model using three factors—the market, size, and value.

Table 2

US 3-Factor Regression

January 1979-October 2003

Manager	a	Std Err	t-stat(a)	MKT-B Coef	MKT-B Std Err	MKT-B T-Stat	SmB Coef	SmB Std Err	SmB T-Stat	HmL Coef	HmL Std Err	HmL T-Stat	Adjusted R-2	R-2	Std-Err
Vanguard Windsor	-0.02	0.10	-0.21	0.99	0.02	40.96	0.01	0.04	0.15	0.47	0.03	14.72	0.851	0.853	1.763
S&P 500 Index	0.02	0.02	0.69	1.01	0.01	199.58	-0.19	0.01	-25.49	0.04	0.01	6.74	0.993	0.993	0.368
Russell 1000 Value Index	0.00	0.06	-0.03	0.97	0.01	71.59	-0.15	0.02	-7.68	0.34	0.02	18.79	0.946	0.946	0.984

The alpha for the Windsor Fund, which is labeled “a” in the left column, drops to slightly below zero in the 3-factor model. This can be explained by looking at the three coefficient columns. The market exposure (market beta) of the fund and the two indices are all close to one. Size (SmB, or small minus big) is positive for Windsor, negative for the two indices. This indicates that the Windsor has a slight small cap bias against the two benchmarks. Finally, Windsor’s value coefficient (HmL, or high minus low) is higher than both the S&P 500 and the Russell 1000 Value and statistically significant. Over the years, the value Windsor has added has come from higher exposure to value. When this higher value exposure is adjusted for, the value added by “manager skill” drops to zero. This value exposure, however, could be obtained passively for less cost and with greater reliability.

Two Solutions from Dimensional

Dimensional offers two solutions to investors looking to construct a better core portfolio. First, we have recently launched a family of global balanced funds which provide investors with a single, well diversified portfolio of Dimensional funds. As discussed above, the targeted asset class strategies that underlie each of the asset allocation funds provide an exposure that is more robust than traditional active or index managers. Furthermore, Dimensional employs a transparent approach across all asset classes, thereby avoiding the unnecessary risks and costs of tactical asset allocation and market timing in favor of focused asset class exposure.

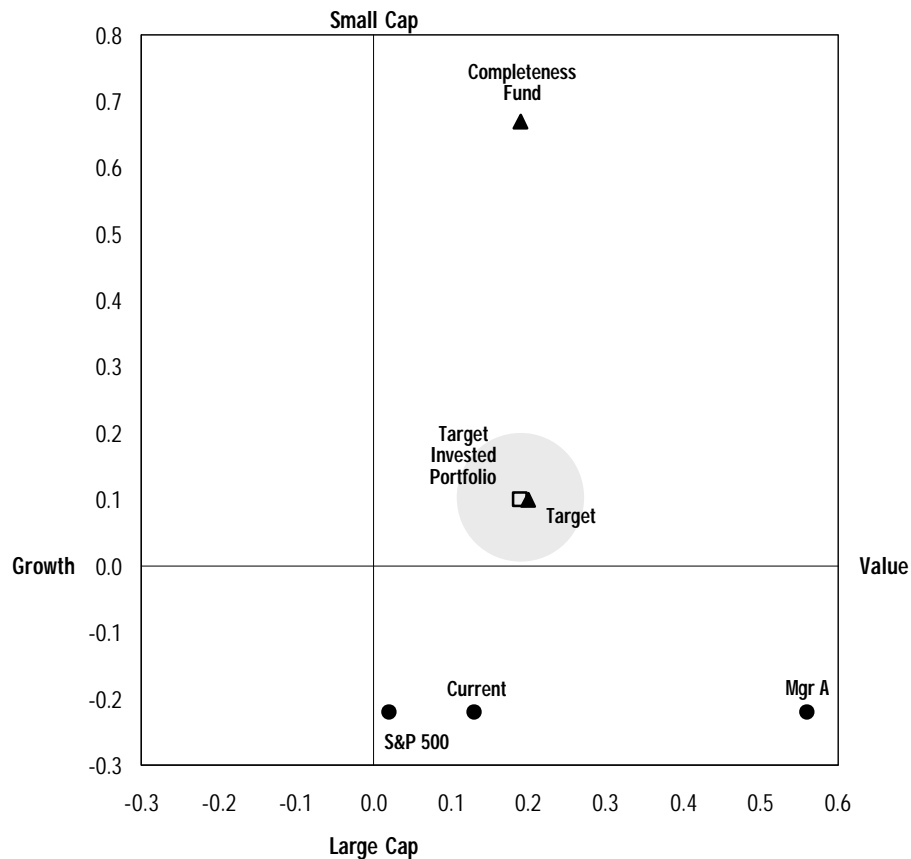
Second, for clients looking to complement a range of existing managers, Dimensional is able to construct “completeness funds” that allow the investor to target overall exposure to risk factors without disturbing the managers already in place. Figure 2 shows a simplified example of this. The chart shows portfolios based on their exposure to the size and value factors, with smaller portfolios towards the top and more value-oriented portfolios towards the right. In this example, the fund has two managers: an S&P 500 index fund

and an active large cap value manager (Manager A). The factor exposures of the combined portfolio are shown by the point marked “current”. Assume that this sponsor wants to shift its overall portfolio to the point marked “target”, but to do this without disturbing Manager A. By shifting assets from the S&P 500 index fund into a customized completeness fund, which in this case is tilted towards small cap stocks, we are able to meet the sponsor’s objective. Furthermore, as Manager A shifts its portfolio’s factor weightings over time, we are able to adjust the exposures of the completeness fund to allow the overall plan to remain at its desired levels of exposure.

Figure 2

US Three-Factor Regression

Monthly: Periods Ending December 2002



As with all of Dimensional’s strategies, both of these solutions meet our firm’s goal of helping our clients structure globally diversified, cost effective portfolios through portfolio engineering and trading.