The Enhanced Index Fund as an Alternative to Indexed Equity Management

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Abstract

This paper examines the properties of enhanced index funds as an alternative to index funds and as an alternative to combinations of index funds and active management. Enhanced index funds are more likely to be mean-variance efficient than passive funds invested in specified market indices. Investing in enhanced index funds is found to be more efficient than equally risky combinations of index funds and active management. As compared to combination strategies, enhanced index funds reduce transaction costs, reduce capitalization biases, and provide better utilization of manager forecasting skill. In addition, enhanced index strategies lower estimation risks, allowing for more precise allocations of capital across asset classes and managers. *This study was underwritten by INVESCO Management and Research.*

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Introduction

Over the past thirty years, index funds have gained tremendous popularity among institutional equity investors. This has lead many investors to adopt strategies that allocate capital to both passive index and active management strategies. In recent years, enhanced index funds have been introduced as a compromise between passive and active management approaches. Enhanced index funds generally involve a quantitatively defined strategy that "tilts" the portfolio composition away from strict adherence to some popular market index to a slightly different composition that is expected to produce more return for similar levels of risk. Unfortunately, very little formal research has been done on enhanced index funds, with Riepe and Werner (1998) being the only directly related study.

Our research finds that enhanced index funds are at least as likely to be mean-variance efficient as passive funds invested in specified market indices. Investing in enhanced index funds is found to be more efficient than equally risky combinations of index funds and active management. As compared to combination strategies, enhanced index funds reduce transaction costs, avoid capitalization biases, and provide better utilization of manager forecasting skill. In addition, enhanced index strategies lower estimation risks, allowing for more precise allocations of capital across asset classes and managers.

For the purposes of this study, our definition of enhanced index funds will mean equity funds with less than 2% ex-ante tracking error to their benchmark index and that use equity valuation techniques (as opposed to derivatives overlays, or cross-asset alpha portability) to increase their expectations of returns.

Ex-Ante Mean Variance Efficiency

The primary rationale for index fund investing is that of market efficiency in asset pricing. If asset prices are set properly by market mechanisms then an investor can have no better reward/risk tradeoff than that available by holding a portfolio consisting of a proportional quantity of every investment available in the portfolio consisting of all market assets. Hence a capitalization-weighted index of all tradable securities should be "efficient" in providing the best reward/risk relationship. This relationship is embodied in equilibrium asset pricing models such as the Capital Asset Pricing Model of Sharpe (1964).

However, if we make an examination of the assumptions that underlie such asset pricing models, we find many aspects that bring into question the robustness of the expectation that capitalization weighted portfolios are mean-variance efficient. Among these assumptions are that all investors possess all information in the market, that all investors have the same utility function, and that there are no transaction costs or taxes. In addition, the theories suggest only that the market portfolio consisting of all marketable assets in the world is efficient, not subsets such as "the one thousand largest common stocks in the US". At best, we can make the case that capitalization-weighted index funds can be expected to approximately mean-variance efficient.

Practitioners seem to recognize this issue quite well. Although most index funds in the United States are based on the Standard & Poors 500 index, other indices such as the Russell 1000 and Russell 3000 have also proven popular. Obviously, only one of these indices will prove to be the most efficient over any measured period of time. Upon first glance, one might think the Russell 3000 should have a theoretical edge in that it contains the most assets and hence is closest to the market portfolio of all tradable assets. However, many of the smaller companies in the Russell 3000 can only be traded with considerable transaction costs, violating another typical assumption of asset-pricing models.

Annual Return Statistics for US Equity Indices 1980-1999

	Total Return	Standard Deviation	Relative Return to S&P 500	Tracking Error to S&P 500	Bayes Relative Return	Bayes Tracking Error
S&P 500	17.68	14.92	0	0	0	0
Russell 1000	17.36	15.11	-.32	1.45	-.17	1.47
Russell 3000	17.10	15.23	-.58	2.00	-.25	2.02

Table 1

There are a number of interesting points to be noted. The first is that the S&P 500 provided both the highest returns and lowest volatility during the sample period. In looking at past relative returns, we see that the relative returns, while seeming large enough to be economically meaningful are not statistically different from zero.

The membership of the Russell indices is selected once yearly by simply taking the appropriate number of the largest companies and capitalization weighting them (actually there are some minor adjustments for cross-ownership). For the S&P 500, a human committee revises the members from time to time. *A provocative view of this result is that Standard & Poors is a mildly effective enhanced index fund manager and that every fund now indexed to the S&P 500 is actually an enhanced index fund.*

As investors, what we are really concerned about is our expectations of future differences in order to make choices about our portfolios. One popular means of adjusting past information to form unbiased expectations about the future is the use of Bayes-Stein statistical procedures, as derived in Jorion (1986). When we apply these statistical adjustments, we find the expected differences shrink to even smaller levels and hence are again far from statistically significant. Not only are the expected differences in return small, but also the standard deviations of relative returns (tracking error) are in the range of 1.5% to 2% per year. This is very important, because this range of tracking error magnitudes is precisely the range in which most enhanced index funds operate. As such, we may conclude that we cannot distinguish between these indices in terms of ex-ante mean variance efficiency, *but also that we cannot distinguish likely ex-ante efficiency between various index funds and enhanced index funds that would be operated within comparable tracking error limits.*

Now let's consider an even more extreme view. It is a widely held view that the average active manager underperforms passive index funds after costs. To investigate this, we choose to compare the return/standard deviation ratio of two popular US indices, against the median value of the same ratio for a universe of mutual funds. The mutual fund returns were computed net of all operating expenses (exclusive of sales loads) and are derived from month data from the Micropal database. We select return/standard deviation metric as opposed to the Sharpe ratio ([return – risk free return] / standard deviation), in that the use of the Sharpe ratio would be indicative of portfolio efficiency in circumstances where investors may freely borrow or lend at the risk free rate. For normal institutional investors, borrowing is not a permitted activity.

We first looked at large capitalization US equities using the S&P 500 as the index. We computed the annualized return/standard deviation ratio for each consecutive two-year period from 1970 through 1999 and compared them to the median ratio for mutual funds from the union of the Micropal "Growth" and "Growth and Income" fund categories. We then repeated the exercise using the Russell 2000 as the small capitalization index and the "Small Capitalization" fund universe for the consecutive two-year periods from 1980 through 1999. These results are shown in Table 2.

Return/Risk Ratios for US Indices and Funds

	S&P 500	Median Large Fund	Difference	Russell 2000	Median Small Fund	Difference
1970-1971	0.54	0.37	0.17			
1972-1973	0.07	-0.27	0.34			
1974-1975	0.02	0.00	0.02			
1976-1977	0.59	0.81	-0.22			
1978-1979	0.45	1.11	-0.66			
1980-1981	0.77	0.78	-0.01	0.83	0.80	0.03
1982-1983	1.51	1.58	-0.07	1.77	1.32	0.45
1984-1985	1.42	1.02	0.40	0.61	0.61	0.00
1986-1987	0.49	0.40	0.09	-0.07	0.10	-0.17
1988-1989	1.77	1.88	-0.11	1.71	1.70	0.01
1990-1991	0.73	0.74	-0.01	0.38	0.73	-0.35
1992-1993	1.36	1.27	0.09	1.56	1.24	0.32
1994-1995	1.98	1.48	0.50	1.16	1.22	-0.06
1996-1997	2.14	1.89	0.25	1.30	1.37	-0.07
1998-1999	1.45	1.12	0.33	0.38	0.40	-0.02
Mean			0.07			0.01
Standard Deviation			0.29			0.23

Table 2

We broke the long sample into two-year periods in order to minimize the likelihood that survivorship bias would operate in favor of the mutual funds (i.e. poor performing funds get dropped out of the sample before the period is complete). Survivorship bias in mutual fund performance studies has been addressed by numerous studies including Brown, Goetzmann, and Ibbotson (1992), Elton, Gruber and Blake (1996) and Hendricks, Patel and Zeckhauser (1997).

If we observe the differences in the return/risk ratio between the indices and the median mutual fund, we would note that the differences are not statistically significant if we assume that this ratio is normally distributed. However, Jobson and Korkie (1981) find that this ratio is not normally distributed and devise a complex test statistic for the ratio. Using the Jobson and Korkie test, we also find that the differences between the return/risk ratios of the indices and the contemporary median fund to generally not be significant, even for individual two-year period sub-samples. Litterman (2000) reports that median return/risk ratios for institutional funds are above the return/risk ratio of the index for all asset classes he tested, with the exception of US large capitalization equities. *In view of the above, we can conclude that there is no compelling evidence that the median active fund is likely to be any less mean-variance efficient than an index fund.*

There is a vast literature on so-called "market anomalies" that purportedly demonstrate defects in market efficiency. Other papers such as Fama and French (1992) and Wilcox (1994) that demonstrate that various capitalization-index portfolios have not proven to be ex-post efficient even over long time horizons. Enhanced index funds structured to take advantage of apparent defects in market efficiency are more likely to be mean-variance efficient than strict adherence to capitalization weighting.

Tracking Error Paradox and Active-Passive Allocation

There is something of a logic paradox associated with the use of tracking error around a benchmark as a risk measure for active management. Investors hire active managers because they are believed to possess special information or skill that will allow for better return/risk tradeoffs. If such special skills exist, then the mean-variance efficient frontier for that manager will be above the frontier defined by the market index portfolio. Using tracking error as a metric for risk (in relative return space), we penalize an active portfolio that is superior to the index as much as we would penalize an active portfolio that was inferior to the index in absolute mean-variance efficiency. This issue was first pointed out by Roll (1992) and elaborated on by Wilcox (2000).

It has been suggested that the use of tracking error for active managers is justifiable in that while an investor may believe an active manager offers superior return/risk trade-offs for the future, this is not a certainty and therefore anchoring the manager to an index that is presumed to be ex-ante mean-variance efficient in the absence of manager skill is sensible. This is essentially an estimation error argument.

Once we admit estimation error to be part of the problem, the process of allocating between active and passive management is more complex than the traditional portfolio optimization process. A traditional process is described in Miller, Samak and Sorensen (1998). The issue of estimation error in portfolio construction has an extensive literature that is summarized in Michaud (1999). In general, these studies have found that optimization processes place too much portfolio weight on assets with high returns because the process does not recognize the fact that our optimization inputs are only estimates of the required statistical parameters, not known values of those parameters. This effect is well illustrated in Broadie (1993).

In the context of allocating assets between active and passive managers, this means that although two managers may have the same expected active return/tracking error ratio (information ratio), the allocation will be unduly biased to the manager with high magnitude numbers as the numerator and denominator of the ratio. By their nature, enhanced index funds have lower magnitude numbers than active managers and hence we may be more confident that our allocation to an enhanced index fund is correct as compared to our confidence in an allocation to an active manager with the same information ratio. Litterman (2000) proposes to reduce this problem by assuming that the information ratios of all acceptable active managers within an asset class are equal to the median information ratio.

The Cost of Multiple Active Managers

In making allocations of capital between active and passive investment, institutional investors rarely limit their employment of active management to a single manager. As noted earlier, such investors typically believe that active managers will add to returns, but have a low confidence that any particular active manager will add to returns during any specific time period. One popular way to deal with this problem is to use many active managers simultaneously, thereby diversifying the risk of poor performance by any one active manager during any future time period.

However, this approach has many of its own drawbacks. Among these are difficulties with risk management of the aggregate portfolio, and the wasted transaction costs as multiple active managers trade among themselves in response to market events. A detailed analysis of multiple active managers is presented in diBartolomeo (1999).

Enhanced index funds represent a way around some of these difficulties. Rather than employing several active managers within a management style (i.e. small/large, growth/value), a larger allocation to an enhanced index fund using that same style can produce similar expected risk/return trade-offs as multiple active managers within one style, at lower costs in both fees and transactions costs.

No-Short Sale Constraint

One can think of an actively managed portfolio as being separable into two pieces: a "core" consisting of the benchmark index and an "active" portfolio consisting of the differences between the benchmark index and the subject portfolio. To the extent that active managers charge their fees for all assets under management, the index core can be thought of as "dead weight", as in Freeman (1997).

To avoid the "dead weight" costs and to encourage active managers to have risk/reward tradeoffs consistent with assigned benchmarks, institutional funds frequently push active managers to be more active (higher tracking errors), while continuing to insist on a "long-only" strategy. Grinold and Kahn (2000) studied the impact of the "no short sale" constraint and found it to be very large for active managers with typical tracking errors (i.e. 4% to 5% per annum) against capitalization-weight benchmarks. They found that active managers often lose half of the information content of the their forecasts because they are not permitted to short-sell. They also found that the long-only constraint forces active managers to be biased toward small capitalization stocks, in that they are unable to make meaningful negative active weights on small-stocks. Not only can active managers not actively underweight small stocks, they are simultaneously precluded from over-weighting large capitalization stocks since those active positions would have to be offset by unavailable negative active weights on small stocks. Active managers are therefore substantially handicapped in periods such as the recent years when large capitalization stocks outperformed small capitalization stocks by large magnitudes. The result of this bias is easily observed in the most recent six years of large capitalization results displayed in Table 2.

At first glance, this suggests that active managers should simply be allowed to pursue long-short strategies. However, there are some impediments to long-short strategies, as summarized by Michaud (1993) such as substantially increased transaction costs. By virtue of being a less active strategy, an enhanced index fund that followed the same strategy as an active manager but to a lesser degree, will largely avoid both the informational decay and the small capitalization bias problems. If an institution were allocating between an index fund and an active manager, they could achieve a better risk/reward by allocating three times the capital to an enhanced index fund following the same strategy as the active manager, but doing so only one-third as aggressively.

Conclusions

Institutional investors that currently employ strict indexing strategies should reconsider those strategies in the face of a lack of compelling evidence as to ex-ante mean-variance efficiency of capitalization weighted index funds. Enhanced index funds offer no less likelihood of mean-variance efficiency.

Investors that allocate between passive and active management are strongly encouraged to consider the advantages of substantial allocations to enhanced index funds as opposed to a combination of a indexing and multiple active managers. Use of enhanced funds provides for more precise allocation between active and passive strategies and the likelihood of decreased costs. In addition, enhanced index strategies dramatically reduce the bias and loss of informational efficiency associated with the "no-short sale" constraint.

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