

Do Vanguard's Managed Funds Beat Its Index Funds? Looking for Prescient Stock and Style Selection

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Paul Merriman: “How does Vanguard justify with this great family of index funds also having all of these actively managed funds?”

John C. Bogle: “Well I don’t run Vanguard any longer, but I will take plenty of responsibility for having those active funds in all of the years I ran it. And the answer to that is really a couple of things. One, a lot of investors, no matter how persuasive the case for indexing is, and it’s overpoweringly persuasive, just don’t quite get it. They want a little more activity. They want something to watch. Index funds, as you all know, are roughly as exciting as watching paint dry or maybe watching the grass grow. They create great returns but they’re not that exciting. So what we tried to do and what I tried to do personally was pick good managers, and that’s very, very hard to do. I want to be clear on that, and I have some hits and some runs and some errors in that category, have funds with multiple managers, so you get a much broader diversification, which is not unlike an index fund.... [for example, take] our Windsor II fund. It’s a large cap value fund. And it has five different managers. I think that’s the number now. And so you are going to tend to have a value average return for that fund. And then, actually, make sure you have the other two big advantages of indexing, or three really, no sales commissions, very low expense ratios, because I negotiated with all those advisors and got those fees as low as I could possibly get them, and hire advisors with low portfolio turnover. An article was done by some professors at Duke University about a year ago and they showed that our active managers in the life of the index fund actually did a hair better than the index fund. [Reinker and Tower (2005)]. On the other hand if we had started the comparison a little bit later, the active managers would have done a little bit worse. But I think it’s a valid strategy. What can I do and tell you? I’m still 80% indexed.” [Bogle, 2006b, approximate transcription]”

“Vanguard wants you to ‘believe’ in indexing. Your faith in indexing is the cornerstone of their business. But it’s a lie. And your trust could cost you... plenty! ... **Indexing doesn’t work for you. It works for them.** The big famous Index funds at Vanguard have chronically underperformed over the last few years, exposing conservative investors to the *worst* risks of bear markets. But Vanguard knows investors who plunk money into an index become “passive.” Their money goes “dead.” And Vanguard *never* has to worry about these clients getting antsy. Indexing is a great *business*—but it’s a lousy investment!” [Wiener (2007a).]

¹ This paper is drawn from Abel Rodriguez’ economics master’s thesis, which was advised by Tower and written by Rodriguez while earning his PhD in statistics. Thanks go to Bill Bernstein, John Bogle, Karl Boulware, Ed Burmeister, Phil Cook, Andriy Gubachov, Allen Kelley, Kevin P. Laughlin, Mel Lindauer, Eric Nels, J. Scott, D.K. Turner, and J. B. Wagner for helpful comments, without implying their approval of the final product. We benefited from the discussion of this paper on the Morningstar Vanguard Diehards web-based discussion group.

ABSTRACT

Is John Bogle right that Vanguard's index and managed funds are comparable and by his example that investors should hold both? Each Vanguard managed fund produces the same return as the tracking basket of Vanguard's indexed funds plus a differential, α . If α , is positive the managed fund is superior to the tracking index. Managed funds that are closely tracked by their tracking basket have been beaten by their baskets. Those that are loosely tracked have beaten them. We find α 's in one period did not predict subsequent α 's and that managers didn't make prescient style choices.

INTRODUCTION

Is John Bogle (and the authors he refers to) right that Vanguard's index and managed funds are comparable and by his example that investors should hold both? Is Dan Wiener right that Vanguard's index funds, especially the big index funds underperform? How should Vanguard investors chose between Vanguard's index funds and its managed funds? Each Vanguard managed fund produces the same return as the tracking basket of its indexed funds plus a differential. If the average differential, which we refer to as α , is positive the managed fund is superior to the tracking index basket, which from now on we refer to as the tracking index. We calculate two types of α for Vanguard's managed funds. Our preferred measure is the geometric α . If the α for a managed fund is positive, that fund is superior to its tracking index.

What do we find? Managed funds that are closely tracked by their tracking basket were beaten by their baskets. Those that are loosely tracked, beat their baskets. We also ask whether α 's in one period predict α 's in the next period. They did not. And we ask whether managers made prescient style choices. They did not.

Daniel Wiener in his *The 2006 FFSA Independent Guide to the Vanguard Funds* (p.186) provides correlations of returns between different Vanguard equity funds to help investors reduce risk. A complementary tool is the one we provide, the tracking index basket, defined as that collection of index funds which best tracks the returns of the managed funds. It enables one to describe the return of a managed fund as the return of a

basket of index funds plus a constant term, which may be positive or negative. Investors who find that one of their managed funds substantially duplicates one of their index funds may wish to lighten their holdings of one or the other in order to maintain portfolio diversification.^{2 3}

METHOD

We wish to describe each of Vanguard's managed funds in terms of its index funds. The index funds we use are the entire collection of 12 diversified equity funds available over the four year period, January 2003-December 2006. These are

1. 500 Idx,
2. Emerging Market Idx,
3. Europe Idx,
4. Extended Market Idx,
5. Growth Idx,
6. Mid Cap Idx,
7. Pacific Idx,
8. Small Cap Idx,
9. Small Growth Idx,
10. Small Value Idx,
11. Total Stock Idx, and
12. Value Idx.

Each index fund represents an investment in a segment of the stock market, i.e. a particular style of investment.

The Vanguard managed funds we consider are the following:

1. Capital Opportunity,
2. Capital Value,
3. Dividend Growth,
4. Equity Income,

² Morningstar's portfolio instant X-Ray is also useful. It breaks managed funds down into the nine style groups (from large cap value, through mid cap blend, and small cap growth) by proportion. But it does not distinguish between domestic and foreign equity.

³ Throughout the paper we ignore taxes. Thus, the analysis applies to mutual funds in a tax sheltered account. We don't find mutual funds appealing as a saving vehicle in a taxable account, as there, we prefer to hold individual stocks, selling off losers for capital losses when need be and postponing taxable sales or else passing them onto our heirs tax free.

5. Explorer,
6. Global Equity,
7. Growth and Income,
8. Growth Equity,
9. International Explorer,
10. International Growth,
11. International Value,
12. Mid Cap Growth,
13. Morgan Growth,
14. PRIMECAP,
15. Selected Value,
16. Strategic Equity
17. US Growth,
18. US Value,
19. Windsor,
20. Windsor II.

There are 20 managed funds. These are Vanguard's general funds which have at least 90% of assets invested in stocks and "other" (which we presume means derivatives) during the entire four year period. None of these funds invest more than 10% of assets in bonds and cash at the annual reporting times indicated by the Morningstar Principia Pro Disks.

The Investor share class carries higher expenses than the Admiral share class. But some funds do not have Admiral shares, so to keep our sample size large and for the sake of uniformity we work with Investor shares. Investors are concerned with real returns, so we adjust nominal returns by the consumer price index (provided in the Morningstar Principia Pro disks) to get real returns. **Henceforth, when we refer to returns, we mean real returns.** The formula used for the conversion is

$$1 + R = [1 + N]/[1 + I].$$

where R is the real rate of return, N is the nominal rate of return and I is the rate of inflation in the consumer price index, with all expressed as a fraction/month.

To describe the return of a managed fund (say PRIMECAP) in terms of the index fund returns, we regress the monthly return of PRIMECAP on the monthly returns of all of the

indexes, while constraining all of the coefficients of the index funds to be non-negative and to sum to one. We get:

$$R_{\text{primecap}} = +2.83/12 + 0.37 * R_{\text{S\&P500}} + 0.01 * R_{\text{emerging market}} + 0.29 * R_{\text{growth index}} + .09 * R_{\text{mid cap}} + 0.24 * R_{\text{small cap growth}},$$

where R denotes monthly (real) return in percentage points. This regression says that PRIMECAP is an asset whose return is best described as the return of a basket of index funds consisting of 37% invested in the 500 Index fund, 1 % in Emerging Market Index, 29% in Growth Index, 9% in Mid Cap Index and 24% in Small Cap Growth Index, with an additional return of 2.83/12 % per month, and a random term, where the index basket is rebalanced at the beginning of each month. We refer to this index basket as the tracking index. Here the managed fund outperforms the tracking index by 2.83/12 % per month or 2.83 % per year, the arithmetic α . These results are recorded in Exhibit 1.⁴

We use the statistical program, R and its package *mgcv*, which are free on the web⁵, to perform all of the calculations. In addition to the regression coefficients, we compute R^2 values (interpreted as the proportion of variability in the data explained by the model) as one minus the ratio of the sum of squared errors to the sum of squares of the returns, as well as t-statistics for the significance of the intercept term using the standard formulas for linear models.⁶ An easier approach for those unfamiliar with R is to follow Tower and Yang (2007) and program the calculation using Microsoft Excel's solver.

⁴ Our study is a variant of usual returns-based style analysis. For a useful survey see Rekenhaller et. al. [2006].

⁵ R is a general-purpose statistical language that provides enormous flexibility and has become the academic standard for statistics departments at most universities in the U.S. It is a freeware version of the S language, originally developed in the AT&T labs and currently commercialized by the Insightful Corporation under the S-plus brand. Alternatively, one can use the solver feature in Microsoft Excel to perform the constrained regression described here.

⁶ Although the regular theory of linear models is rendered invalid by the introduction of the constraints on the coefficients of the model, these values provide a good approximation. In particular, we think it is safe to assume that t-values over 3 in absolute value correspond to funds that have a statistically significant arithmetic α , even after adjusting for non-normality and multiple constraints. Our R^2 's are not corrected for degrees of freedom.

Next we use the regression coefficients to calculate the return of the tracking index basket over the period. We calculate geometric α as the geometric average monthly return of the managed fund minus that of the index basket.⁷ In the table we multiply it by 12 to put it on the more familiar annual basis. The geometric α differs from the intercept of the regression, the arithmetic α , because geometric α is the difference in geometric returns, while the intercept of the regression is the difference in arithmetic returns. The arithmetic α is the amount by which the expected one-period return of the managed fund exceeds the expected one-period return on the tracking index.⁸ Exhibits 1 and 2 show the two α 's to be similar.

Our use of the tracking basket is our attempt to deal with Kizer's [2005] point that in assessing managed funds versus index funds one must compare managed performance with index performance of comparable style.

⁷ Let R_1 and R_2 be successive monthly returns, expressed as proportions. The average arithmetic return is $(R_1+R_2)/2$, the average return each period. The average geometric return is $[(1+R_1)*(1+R_2)]^{.5} - 1$, the common return each period which would generate the observed return over the entire span.

⁸ The expected one period return exceeds the expected long period return where future returns are drawn evenly from past returns without replacement. For example, if the past annual returns were 0% and 300%, the expected one year return is $0.5[0+3] = 150\%$. This is the past arithmetic rate of return. This is also the expected annual return over any number of years if we expect that the return in all future periods will be drawn randomly from past returns with replacement, so for example after two years we expect to have returned sequences of 0% then 300%, 0% then 0%, 300% then 0% and 300% then 300% each with probabilities of 0.25% which after two years turns one dollar into an expected $\$6.25=(2.5)^2$, for an expected annual return of 150%. However, the expected annual return over a two year span, when returns are drawn evenly from past returns is $[(1+0)(1+3)]^{.5}-1= 100\%$. This is the past geometric rate of return. It is also the expected return over many periods when future returns are drawn evenly without replacement from past returns. The reason it is lower than the expected return when expected returns are calculated from past returns with replacement is that in the replacement case, the magic of compounding marries big returns with big returns more frequently to raise the expected return beyond the geometric average return. We believe in regression to the mean, i.e. that big returns are more likely to be married with small returns in the future. Therefore, we think the sensible policy is to report only geometric average returns and use them to calculate geometric α . But the standard in the literature is the arithmetic α . We bow to this misleading convention by reporting the latter in combination with our preferred measure. This discussion is based on Kritzman [2002, chapter 4].

For our managed funds the average arithmetic α exceeds the average geometric α by 26%. This is partially explained by the fact that the standard deviation of return for the managed funds is 4% higher than that of the index baskets, and arithmetic returns exceed geometric returns by more, the higher is the standard deviation of return.

We did not bother to risk adjust. Instead, we simply report the standard deviations of monthly returns of the fund and the tracking index. Given α , the risk-averse investor will prefer the fund with the lower standard deviation.^{9 10}

RESULTS

Exhibits 1 and 2 present the calculations from which most of our conclusions flow. Exhibit 1 provides calculations for the period of our study taken as a whole: January 2003 through December 2006. Exhibit 2 presents the calculations from the first half of our study, 2003-2004, and the last half, 2005-2006. They list the managed funds vertically and the index funds horizontally. They indicate the composition of the tracking indexes, geometric and arithmetic α 's, t-stats for the arithmetic α 's, R^2 s for the regression of the managed real returns on the index real returns, and standard deviations of the returns.¹¹ Our data covers years in which the S&P 500 index was rising. During such years index funds tend to beat managed funds by more than when the index is falling, because index funds tend to be more fully invested in equities than the managed funds.¹²

⁹ One could follow Reinker and Tower [2004] and calculate a risk-adjusted α by combining a low risk asset with the security (the managed fund or the tracking basket) with the higher standard deviation of return, until the standard deviations of returns for the two portfolios were equal, and then comparing returns. But the result depends on the low risk asset chosen. Moreover, the analysis may be misleading. Suppose fund A returns more each period than does fund B, but while fund B has a zero standard deviation of return, fund A's return is irregular. Then risk adjusting fund A (using a low return, low risk asset) will bring its return below that of fund B, yet no investor would choose fund B over fund A.

¹⁰ This paper parallels Sharpe [1992]. This is a useful paper, which is clearly constructed, not technical and available on line. Our R^2 is the same as his. He compares a mutual fund with 12 component asset classes including bills, government bonds, corporate bonds and mortgage-related securities and various stock indexes. We are interested in how managed equity funds compare with a collection of equity index funds, so that is what we use as our comparison group. His regressions span five years. Ours span four and two year periods. Our α is the sum of his "tracking error." He found that Fidelity Magellan dramatically reduced its exposure to small cap stocks as the fund got larger during the 1980's. He writes "style analysis provides measures that reflect how returns act, rather than a simplistic concept of what the portfolios include."

¹¹ Each figure is the estimate of the population standard deviation based on the standard deviation of the sample.

¹² We restricted our study to the four most recent years in order to include Strategic Equity and U.S. Value in our sample and to learn about performance that reflects current management. We feel that the two-year period is the shortest period we could use and still have confidence that we have enough data points to produce a reliable regression. However, we do discuss some eight year calculations.

Adequate comparisons between managed and index funds require multiple indexes.

Using only the S&P500 index as a benchmark for managed funds is a misguided strategy. Exhibits 1 and 2 show that all tracking baskets require at least two different index funds, and no single index (neither the S&P500 nor any other) is consistently used across all managed funds. However, we do observe indexes, like Small Cap Value and Total Stock, which add little explanatory power.

The tracking basket provides insights into the managing styles of funds.

Most of the results from the linear regression are not surprising, like Growth funds invest heavily in securities highly correlated with Growth Index. However, some striking patterns arise, shedding light into the managing style of funds. For example, drawing on Exhibit 1, Windsor II invests 92% of its funds in securities linked to the Value index, while Windsor diversifies its investment, investing only 46% in Value-index linked securities with 28% in Growth and 9% in Small Cap Growth. The Morningstar Principia Pro disk lists both of these funds as large value funds. The disk lists Capital Opportunity as a Mid Cap Growth fund, while we find that its major holding is small cap growth linked securities. This is also true of Mid Cap Growth. We suspect both are explained by the absence of a Vanguard Mid Cap Growth index fund until recently – too late to include in the study. Also, International Value and International Growth follow similar strategies, with European and Pacific stocks making up around 55% and 24% of their portfolio respectively. The main difference is the higher proportion of emerging markets securities held by International Value. If international growth and value indexes were to exist, then the differences between these two funds would be more marked. The only fund that tracks the S&P500 closely is Growth & Income, with 84% of its capital invested in securities highly correlated with this index.

The FTSE social index fund underperformed the index basket.

We find that the FTSE social index, investor class has an average short period α of

-0.52%/ year, and it is riskier than the tracking index basket in both periods. These are the costs of socially conscious investing with Vanguard during the period. In our tabulations of indexed versus managed funds below, we exclude the FTSE social index, as it is not a managed fund or an index fund that one invests in for the purposes of raising return or controlling risk.

The managed portfolio outperformed the index basket in one of the two periods

One useful set of findings is the top row in each set in Exhibits 1 and 2. We combined all of the managed funds into a single portfolio, using the portfolio weights at the beginning of 2003, and assuming continual monthly rebalancing. The managed portfolio beat its tracking index by 0.98 % points per year in January 2003-Dec 2004 (a statistically significant difference), but underperformed its tracking index by 0.04 % points/year in January 2005-January 2006 (not a statistically significant difference), for an average outperformance of 0.46% per year (not statistically significant). Much of this differential is explained by the extraordinary performance of International Explorer, Capital Opportunity and PRIMECAP.¹³

Some individual funds have statistically significant α 's after style adjustment.

Exhibit 1 shows that, over the whole four-year period, Capital Opportunity, International Explorer and PRIMECAP have arithmetic α 's that are statistically greater than 0, while Equity Inc, US value and International Growth have α 's that are statistically less than 0. That is, the probability of any of these funds showing such an extreme value for α but representing no improvement over the tracking basket if the experiment were repeated

¹³ We use the Wilcoxon sign-rank test to test the hypothesis that the “median” managed fund produces no improvement over its index basket. This test assumes that the values of α obtained from independent regressions represent a random sample from a common population, but it does not assume any parametric form for its distribution. A slight variation of this test can be used to compare the variances of the managed funds versus its corresponding tracking basket. This test shows that there is no statistically significant evidence that the median fund has α different from zero (p-value 0.5661).

indefinitely is at most 0.05. However, in the 2005-2006 subperiod, the only significant α is International Explorer.

Of the 22 funds, the α 's are large and positive (greater than one) for four funds, small and positive for four, and negative for fourteen.

On average the managed funds which are closely tracked by their tracking indexes have negative α 's; those that are loosely tracked have positive α 's.

Exhibit 3 illustrates an important discovery. Exhibit 3 graphs the average short-period geometric α against the R^2 , which shows how well the monthly managed returns fit the monthly returns of the corresponding tracking index. We see that managed funds that are not tracked closely, so they have low R^2 's tend to beat their tracking indexes, whereas managed funds that are tracked closely tend to underperform their tracking indexes. Thus, investors would be well advised to buy index funds instead of managed funds which closely track them. However, managed funds whose performance is not well explained by a tracking index, beat the tracking index. Why? Perhaps only competent managers dare to deviate from the indexes. Perhaps risk-averse executives at Vanguard are willing to give fund managers their heads to deviate from the indexes only when they have lots of confidence in the fund managers or a style not captured by its index funds, and this confidence turns out to be well placed. Perhaps we are making an apples-to-oranges comparison and we should disregard these results, because we failed to find a good tracking index.

Exhibit 3 suggests that we further explore this issue by dividing our sample up into closely tracked managed funds, with high R^2 's and loosely tracked managed funds, with low R^2 's. We do this in Exhibit 4.

Exhibit 4 presents long and short period geometric α 's. The 13 managed funds which closely track their tracking indexes (so they have high R^2 's) have an average short-period α of -1.28 %/year; the 7 managed funds which weakly track their tracking indexes have

an average short-period α of +1.87%/year. Thus, the closely-tracked funds lose to their tracking indexes; the loosely tracked funds beat them.¹⁴

The average geometric α is positive, while the median geometric α is negative. Sixty percent of the short period calculations show managed funds to have negative α 's. Thus, we can't identify either managed or index funds overall as the winning class.

The managed funds on average have expense ratios that are 0.26%/year greater than their corresponding tracking index. And they have turnover rates that are 33% greater. If we follow Bogle [2006a] and estimate that each 100% point increase in turnover reduces return by 1% per year, we would expect the managed funds to underperform their tracking indexes on average overall by 0.59 % per year. This predicted underperformance is greater than any of the observed underperformance figures in Exhibit 4 for the short or long run average overall.

But for the managed funds which closely track their index basket, the reverse is true: the managed funds underperform the tracking indexes by more than can be accounted for by the excess expense ratios and turnover of managed funds (-1.28 %/year to -0.68% per year). This implies no stock picking prescience over our two year periods for the closely tracked managed funds net of the cash drag due to the fact that managed funds hold more cash on average than index funds do. These are to some degree closet indexers, and they would have served their clients well by adhering even more closely to the indexes. Using turnover and expense ratio differentials between the managed fund and the index basket to predict α 's is tricky, because Vanguard tells us 17 out of the 20 managed funds we consider have expense ratios which reward performance of the fund.

¹⁴ This is true for a longer period as well. Over the eight year period, 1999-2006, for the funds that existed during the whole 8 years, the low R^2 funds for the 8 year regression ($R^2 < 0.85$) have an average short-period (two-year) α of 2.18 and the high R^2 funds ($R^2 > 0.85$) have an average two-year α of -0.14.

When we use the funds in existence for the entire 8 year period, and regress 2 year geometric alpha on the R^2 from the previous two year period as well as dummies for the two year periods, our point estimate is that a ten percentage point decrease in R^2 increases the alpha by 1.37% age points/year.

Managed funds are more risky.

From the last row of Exhibit 4, we see that managed funds have an average standard deviation of returns which is 0.11% per month or 0.12% per month higher than that of the corresponding tracking index.¹⁵ Hence, managed funds are more risky.

This is surprising in view of the fact that managed funds tend to be less fully invested in equity than the index funds. We think by being less diversified, managed funds tend to be more risky. Referring back to our quote from John Bogle, Windsor II, which strives to improve diversification by hiring more managers, is one of the few funds that have a lower risk than its tracking basket.

α 's are not generally predictable.

When we regressed the second period geometric α on the first period geometric α , for 2003-2006 we found a positive relationship. Thus during the bull market of 2003 through 2006 (inclusive) outperformance is predictable. This predictability might be due to autocorrelation in expense ratios, turnover, the share of assets held out of the stock market, stock picking genius of managers, or the returns of the style of the mutual fund, not captured by the styles of the indexes. As examples of the last point, Vanguard has no international value index, international growth index or international small cap index. The correlation between the first and second half period geometric α 's is 0.74. The correlation between the arithmetic α 's is the similar 0.75.

However, when we look only at funds that are closely tracked over the four year period, with R^2 's greater than 0.9, high α 's in the first period predict slightly lower α 's in the second period. Moreover, when we break the eight year period 1999-2006 inclusive into four two year periods (with the two funds discussed in footnote 11 missing), the

¹⁵ Also, from the Wilcoxon sign-rank test we get significant evidence that the distribution of standard deviations of the tracking baskets has a significantly lower median than the distribution of standard deviations of the managed funds (p-value 0.001097, with a two-sided confidence band for the median of the difference equal to (-1.425 -0.210)).

correlation between α 's in one period and in the subsequent period is negative. Thus, we don't see that picking mutual funds on the basis of past α 's is profitable. These results are consistent with Bogle (2007, p.xvii), who writes "Fund investors are confident that they can easily select superior fund managers. They are wrong."

Mutual funds don't make prescient style adjustments.

If mutual funds adjust their styles and correctly anticipate the winning styles, we would expect the α 's for the whole period to exceed the average α 's for the shorter periods. In fact the whole period average α 's exceed the average of the short period α 's by 0.55%/year for the closely tracked funds and 0.05%/year for the loosely tracked funds, for an average of 0.38%/year and a median of 0.14%/year. Thus, in the last four years mutual funds did make prescient style adjustments, and this adjustment is more marked for the closely tracked funds.

However, when we do the same analysis for the last 8 years, for all funds in existence during the entire period, we find average α 's exceed the average of the short period α 's by -0.11%/year for the closely tracked funds and +0.16 %/year for the loosely tracked funds, for an average of -.01 %/year, where $R^2=.85$ is the cutoff between close and loose tracking.

Thus, there is no evidence that fund managers make prescient style choices. Individuals may wish to adjust their styles in accordance with anticipated differential returns to different styles if they are able to correctly predict differential style returns. To help with these tasks are the style suggestions provided on Paul Merriman's web site (<http://www.fundadvice.com>), in Dan Wiener's *The Independent Advisor for Vanguard Investors*, the style return predictions offered on the GMO web site (<http://www.gmo.com>) and discussed in Tower [2007]), and the evaluations of mutual fund letters, including Wiener's, in the *Hulbert Financial Digest*.

IS DAN WIENER RIGHT THAT VANGUARD'S MANAGED FUNDS ARE BETTER THAN ITS INDEXED FUNDS?

Dan Wiener, editor of the *Independent Advisor for Vanguard Investors*, in the quote at the beginning of this paper denigrates the idea of investing in broad-based indexes. Both Bogle and Swensen [2005] advocate investing in broad-based indexes. Swensen refers to optimum indexing as the selection of index funds which are broadly based enough to minimize transactions costs and provide diversification. It is important to remember the proposition that if markets are efficient, investors should hold all equities in proportion to their market capitalization which is another rationale for broad-based indexing. Bogle suggests that all investors need do is place their wealth in three broad based index funds, a U.S. equity fund, an international equity fund and a bond index fund. William Bernstein (<http://www.efficientfrontier.com>) tells us he believes that a modest excess long-term return can be obtained by making small and infrequent adjustments in asset allocation opposite large changes in asset class valuation.

It is instructive to see how Wiener's growth portfolio has performed. We draw on data from *The Hulbert Financial Digest* from the inception of Wiener's portfolios through December 31, 2006.

Wiener's Growth Portfolio from January 1992 (the first January after its inception) through December 2006 returned 2.27 %/year more than the Wilshire 5000 with less risk. The probability that the Growth Portfolio could have outperformed by such a wide margin because of luck rather than skill is only 13.4 %.¹⁶ The outperformance over the

¹⁶ These are real, continuously compounded returns. The test used is Microsoft Excel's t-test: paired two sample for means. More precisely, if the returns of the two series are samples drawn from populations, the population of the Wiener series has a greater mean than that of the Wilshire series with a probability of 0.87%. However, according to Hulbert, Wiener's growth portfolio performed better over the ten years ending in December 2006 on both a risk-adjusted and a non-risk-adjusted basis than his other three portfolios. The odds that one of his portfolios would perform well due to luck are greater than the odds that one particular portfolio will perform well, so arguably our 13.4% figure in the text overstates his portfolio picking prowess. The March 2007 edition of Hulbert lists the Wiener newsletter fifth out of 24 mutual fund newsletters on the basis of total return and 10th out of the 24 on the basis of risk adjusted return.

last nine years is 5.44 %/year and in each of those years the Growth Portfolio has outperformed the Wilshire 5000.

Dan Wiener's belief that offering index funds is more profitable than offering managed funds, quoted at the beginning of the paper, recalls Paul Krugman's [1998] argument. When he drives from Boston to New York and faces a headwind does he drive more slowly? No he depresses the accelerator further and maintains his speed. Likewise, he argues, imports from abroad, do not cause unemployment. This economic headwind signals the Federal Reserve to sop up the incipient unemployment by depressing the interest rate accelerator, which stimulates investment and leaves employment where it was before. Similarly, when investors invest in a low-cost, low-turnover broad-based index fund, Vanguard is able to sop up the incipient profits by depressing the expense ratio it charges. That Vanguard is unusual in doing this is the thrust of many of John Bogle's speeches. Bogle also champions low-cost competition in the mutual fund sector, and such competition should strengthen this mechanism.

Finally, if Vanguard's investors in indexed funds are less well treated than those who invest in Vanguard's managed funds with the same style, we would expect α 's for the managed funds that are closely tracked by their index baskets to be positive. This is not the case: the average is $\alpha = -1.28$ percentage points per year. It may be that individual investors can pick styles presciently. If so, that argues for slice and dice indexing combined with managed funds for parts of the market not covered by index funds, not the exclusive use of managed funds.

Is there any relationship between our α 's and Wiener's buy, hold and sell recommendations? Looking at the February 2007 edition of his newsletter, Wiener [2007b], we find that those managed funds that he rates buy, hold and sell have average geometric α 's for the four year period of +1.39, -0.83, and -1.66 %/year respectively. Thus, his recommendations are consistent with our α 's.

RANKING MUTUAL FUND FAMILIES

Each February *Barron's* ranks mutual fund families. Reinker, Zheng and Tower [2005] published a letter to the editor with suggestions for improvement in its methodology. This paper builds on that methodology. We believe that a more useful ranking would use the methodology that we use in Exhibits 1 and 2 to evaluate Vanguard's Managed portfolio because it:

- corrects for style (to correct for being in a lucky corner of the market);
- uses a longer time period than *Barron's* one year evaluation does;
- uses portfolio weights at the beginning of the period rather than at the end of the period, as winners come to have larger portfolio weights so the latter biases performance upwards;
- focuses on mutual funds in a particular cost structure category (so that the rankings are useful to a particular type of investor);
- compares the portfolio to a portfolio of low-cost index funds (so that investors can see whether paying for active management is worthwhile).

CONCLUSION

We find that Vanguard's index and managed equity funds are comparable.

There seems to be little reason to build a portfolio solely out of one or the other if one wishes to overweight some style categories, especially since Vanguard's managed equity funds are able to overweight patches of the market not overweighted by its index funds, like international value, international growth and international small.¹⁷

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¹⁷ Vanguard's new Midcap Growth Index and Midcap Value index funds capture two more parts of the market for its index funds.

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EXHIBIT 1: α 's, portfolio composition & risk for the whole period

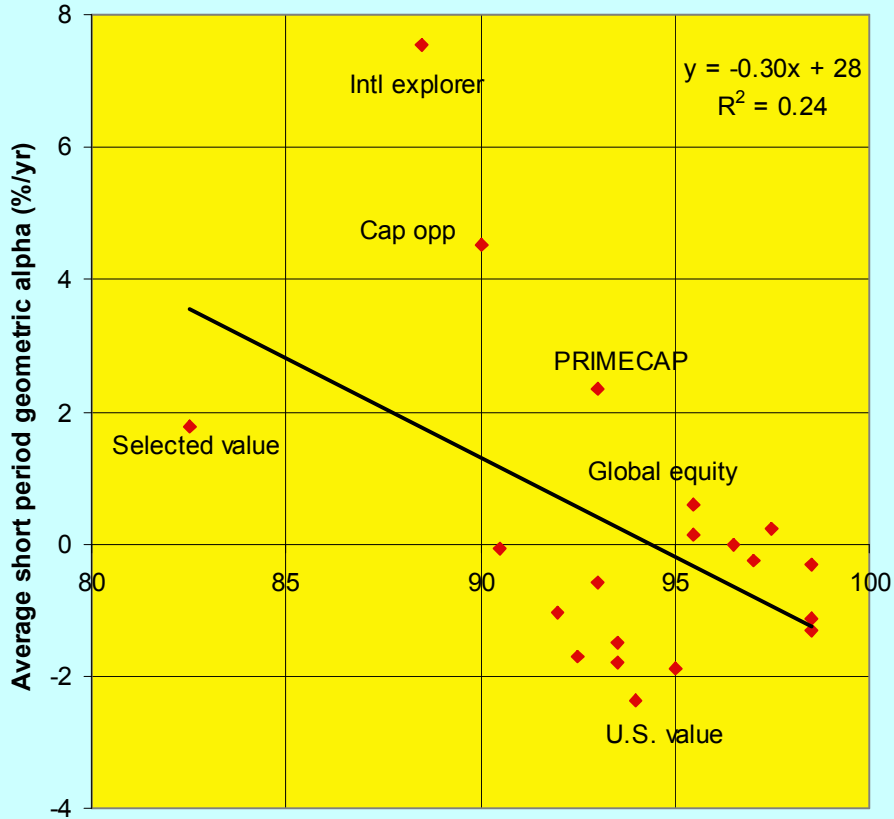
Jan 2003 - Dec 2006

Mgd fund	Geom α	Aritm α	t-stat	Portfolio Composition (%)													Std dev	Track B	Std dev Man	R ²
	%/yr	%/yr		SP500	Emerg Mkt	Eur Stk	Extd Mkt	Growth	Mid Cap	Pacific Stk	SmCp Grow	SmCp	SmCp VI	Tot Stk	Value	%/mo	%/mo	%		
Mgd portfolio	0.50	0.52	1.79	0	0	6	5	22	7	3	8	0	0	15	34	2.81	2.83	99		
Cap Opp	4.24	4.44	3.32	0	0	3	13	22	12	0	48	1	0	0	0	3.65	4.15	89		
Capital Value	-0.10	0.08	0.08	0	0	24	20	22	0	0	0	10	0	0	24	3.02	3.47	90		
Dividend Gr	-1.26	-1.28	-2.26	44	0	0	0	0	0	2	0	0	0	0	54	2.63	2.52	95		
Equity-Inc	-1.78	-1.82	-3.62	27	0	0	0	0	0	0	0	0	0	0	74	2.70	2.53	96		
Explorer	-1.49	-1.38	-2.85	0	0	0	21	0	2	0	53	24	0	0	0	4.08	4.25	99		
FTSE Soc Idx	-0.17	-0.11	-0.20	53	0	0	0	40	0	0	0	4	0	0	3	2.62	2.84	96		
Global Equity	0.96	0.94	1.43	0	10	27	5	0	8	18	10	0	0	0	23	3.14	3.14	95		
Gr & Inc	-0.14	-0.13	-0.30	84	1	0	0	7	4	4	0	0	0	0	0	2.56	2.60	97		
Grow Equity	-1.78	-1.72	-2.12	0	3	0	18	56	0	0	22	0	0	0	0	3.19	3.37	94		
Intl Explorer	7.33	7.48	6.01	0	10	47	15	0	0	28	0	0	0	0	0	3.26	3.70	88		
Intl Gr	-1.57	-1.57	-3.39	0	10	56	4	0	0	27	0	0	0	0	4	3.27	3.27	98		
Intl Value	-0.14	-0.13	-0.19	0	20	55	0	0	0	20	5	0	0	0	0	3.48	3.51	96		
Mid Cap Gr	-0.61	-0.49	-0.40	0	0	0	0	8	17	6	69	0	0	0	0	3.87	4.09	90		
Morgan Gr	-0.12	-0.11	-0.24	0	0	2	30	54	9	1	4	0	0	0	0	3.03	3.10	98		
PRIMECAP	2.78	2.83	3.39	37	1	0	0	29	9	0	24	0	0	0	0	2.99	3.13	92		
Selectd Valu	1.33	1.39	1.21	0	0	0	5	0	25	0	0	0	5	0	66	2.88	3.06	85		
Strategic Eq	0.35	0.37	0.63	0	1	0	40	0	35	3	12	9	0	0	0	3.59	3.61	97		
U.S. Gr	-1.55	-1.45	-1.76	0	3	0	0	87	0	0	10	0	0	0	0	2.85	3.13	92		
U.S. Value	-2.29	-2.26	-3.46	15	0	0	0	0	0	0	0	0	22	10	53	2.85	2.91	95		
Windsor	0.32	0.40	0.68	0	0	13	5	28	0	0	9	0	0	0	46	2.82	3.00	96		
Windsor II	-0.50	-0.56	-0.94	5	0	0	0	0	0	3	0	0	0	0	92	2.74	2.55	94		

EXHIBIT 2: α 's, portfolio composition, & risk for the short periods

mgd fund	Geom α	Arithm α	t-stat	Portfolio Composition											Std dev Track B	Std dev Man Fund	R ²	
	%/yr	%/yr		SP500	Emg Mkt	Eur Stk	Extd Mkt	Growth	Mid Cap	Pacific Stk	SmCp	Grow	SmCp	SmCp VI				Tot Stk
Jan 2005 - Dec 2006																		
Mgd portfolio	-0.04	-0.04	-0.12	34	3	10	0	28	12	4	2	0	0	0	7	2.37	2.41	99
Cap Opp	3.48	3.71	2.25	0	0	0	0	53	0	0	47	0	0	0	0	3.29	3.85	87
Capital Value	-0.73	-0.55	-0.38	10	0	21	0	40	29	0	0	0	0	0	0	2.52	3.09	85
Dividend Gr	-0.98	-1.02	-1.43	38	0	0	0	0	0	0	0	0	0	0	62	2.05	1.89	90
Equity-Inc	-1.32	-1.36	-2.35	16	0	0	0	0	0	0	0	0	0	0	84	2.04	1.89	93
Explorer	-0.86	-0.84	-2.23	0	2	0	0	14	4	0	80	0	0	0	0	3.92	3.94	99
FTSE Soc Idx	-0.20	-0.14	-0.20	56	0	0	0	45	0	0	0	0	0	0	0	2.33	2.54	95
Global Equity	-0.34	-0.31	-0.58	0	10	31	0	0	3	17	4	0	14	0	21	2.73	2.78	97
Gr & Inc	-0.20	-0.19	-0.36	89	1	0	0	7	0	0	2	0	0	0	0	2.24	2.35	96
Grow Equity	-2.22	-2.16	-2.14	0	4	0	4	63	0	3	26	0	0	0	0	3.01	3.19	93
Intl Explorer	4.02	4.12	3.15	0	14	55	0	0	0	22	9	0	0	0	0	3.06	3.32	89
Intl Gr	0.31	0.36	0.91	0	7	53	0	0	0	35	0	0	4	0	0	2.90	2.99	99
Intl Value	0.84	0.85	1.61	0	18	57	0	0	0	23	2	0	0	0	0	3.14	3.20	98
Mid Cap Gr	-0.43	-0.40	-0.39	0	0	0	0	18	10	18	54	0	0	0	0	3.35	3.44	94
Morgan Gr	0.42	0.44	1.15	0	1	0	31	61	0	8	0	0	0	0	0	2.72	2.80	99
PRIMECAP	0.04	0.11	0.10	0	7	9	0	71	2	1	10	0	0	0	0	2.75	2.96	91
Selectd Valu	2.05	2.09	1.45	0	0	0	0	24	26	0	0	0	0	0	50	2.31	2.43	75
Strategic Eq	-1.48	-1.43	-2.59	0	5	0	11	0	46	0	11	28	0	0	0	3.45	3.57	98
U.S. Gr	-2.10	-1.94	-1.66	0	6	0	0	88	0	0	6	0	0	0	0	2.75	3.17	90
U.S. Value	-1.67	-1.63	-1.85	47	0	0	0	0	0	0	0	0	19	0	34	2.25	2.40	91
Windsor	-0.25	-0.18	-0.22	5	2	16	0	42	0	0	2	0	0	0	33	2.27	2.55	93
Windsor II	-1.72	-1.78	-2.82	0	0	0	0	0	0	2	0	0	0	0	98	2.03	1.75	91
Jan 2003 - Dec 2004																		
Mgd portfolio	0.98	0.95	3.48	0	0	4	7	0	3	1	8	0	0	58	19	3.22	3.18	99
Cap Opp	5.57	5.75	4.46	0	0	5	0	0	0	0	72	0	0	0	23	3.97	4.37	93
Capital Value	0.61	0.68	0.81	0	0	31	14	10	0	1	0	17	0	0	28	3.61	3.79	96
Dividend Gr	-2.03	-2.06	-3.34	15	0	0	0	14	0	5	1	0	0	0	66	3.10	3.03	97
Equity-Inc	-2.45	-2.48	-4.10	33	0	0	0	0	0	0	0	0	0	0	67	3.20	3.06	97
Explorer	-1.73	-1.58	-2.50	0	0	1	17	0	0	0	47	36	0	0	0	4.23	4.53	98
FTSE Soc Idx	-0.85	-0.80	-1.48	0	0	1	4	60	0	0	0	5	0	0	31	2.96	3.12	97
Global Equity	1.55	1.52	1.68	0	14	26	5	0	14	17	8	0	0	0	17	3.51	3.45	94
Gr & Inc	-0.30	-0.32	-0.70	84	1	1	0	2	5	7	0	0	0	0	0	2.88	2.81	98
Grow Equity	-1.37	-1.30	-1.42	0	0	0	25	53	0	0	23	0	0	0	0	3.35	3.54	94
Intl Explorer	11.08	11.33	7.44	0	2	40	20	0	0	28	0	0	0	0	11	3.46	4.02	88
Intl Gr	-2.59	-2.57	-4.81	0	12	44	0	0	0	21	0	0	7	9	8	3.57	3.57	98
Intl Value	-0.89	-0.83	-0.88	0	25	47	0	7	0	15	6	0	0	0	0	3.73	3.85	95
Mid Cap Gr	-1.67	-1.49	-0.94	0	0	0	0	4	7	0	89	0	0	0	0	4.32	4.66	90
Morgan Gr	-1.07	-1.04	-1.93	0	0	0	34	50	7	0	9	0	0	0	0	3.29	3.39	98
PRIMECAP	4.64	4.64	5.73	53	0	0	0	15	0	0	33	0	0	0	0	3.24	3.24	95
Selectd Valu	1.52	1.61	1.31	0	0	0	23	0	0	3	0	0	6	0	68	3.37	3.58	90
Strategic Eq	1.94	1.90	2.60	0	0	0	52	0	32	7	8	0	0	0	0	3.69	3.58	97
U.S. Gr	-1.28	-1.24	-1.58	0	0	0	0	88	0	0	12	0	0	0	0	2.96	3.11	95
U.S. Value	-3.06	-3.10	-4.92	0	4	0	5	0	0	3	3	0	11	5	70	3.36	3.33	97
Windsor	0.50	0.49	0.94	0	0	13	4	27	0	0	0	17	0	0	39	3.32	3.38	98
Windsor II	0.54	0.47	0.61	0	0	0	0	4	4	2	0	0	0	0	90	3.29	3.13	95

EXHIBIT 3: Geometric alpha depends negatively on goodness of fit



Average short period R square for real monthly returns (%). A high value means that the tracking index basket explains the monthly returns well. Managed funds whose returns are well explained by the tracking index tend to underperform the tracking index.

EXHIBIT 4: Summary				
Performance differentials		geometric alpha %/year		
7 funds are low R ² , with R ² of 92% and below. 13 are hi R ² .	average of short-period R ² s %	whole period %/yr	average of short periods %/yr	whole period minus average of short periods %/yr
avg for low R ²	90	1.92	1.87	0.05
avg for hi R ²	96	-0.73	-1.28	0.55
avg overall	94	0.20	-0.18	0.38
median overall	95	-0.14	-0.27	0.14
Risk				
excess standard deviation of managed fund return over tracking index return			average of short periods %/mo	whole period minus average of short periods %/mo
average overall			0.12	0.11
Conclusion				
On average managed funds which are not closely tracked have positive α's.				
On average managed funds which are closely tracked have negative α's.				
Managers did not make prescient style choices (based on 8 year calculations, not shown).				
Managed funds were riskier than their tracking indexes.				
Short period α's for hi R ² funds are negative: they underperform their tracking indexes.				