Index Fundamentalism Revisited—Redux

Results are attributable to value and small-stock premiums.

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In "Index Fundamentalism Revisited," Reinker and Tower [2004] find that a synthetic portfolio of Vanguard's U.S. actively managed equity funds outperformed a synthetic portfolio of its U.S. equity index funds from 1977 through 2003 by about 0.8 percentage point per year. The synthetic portfolio of active funds also was less volatile than the synthetic portfolio of index funds.

This extension of the Reinker-Tower study explains these U.S. results and discusses the relevance of the findings for the future performance of active funds versus passive funds.

OVERVIEW

The methodology of the Reinker-Tower [2004] study is straightforward. They construct a synthetic portfolio of Vanguard's actively managed funds and index funds by weighting funds in each synthetic portfolio according to the fund's annual assets under management (AUM). Funds with more AUM receive greater weightings in each synthetic portfolio than funds with fewer AUM. To calculate the annual real return for each synthetic portfolio, the real return of each fund is multiplied by its weight within the portfolio. These weighted real returns are then summed to produce an annual real return for each synthetic portfolio. All returns are net of fund expense ratios.

This process is repeated each calendar year from 1977 through 2003, so fund weights in the synthetic port-

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folios are readjusted on an annual basis. The authors reason that portfolio returns and other statistics calculated this way typify the experience of a hypothetical average investor at Vanguard.

Reinker-Tower compute various return and volatility statistics over different time horizons for each synthetic portfolio. They generally find the synthetic portfolio of actively managed funds outperformed the synthetic portfolio of index funds on a pure return basis and on a risk-adjusted return basis over longer time horizons. Over intermediate horizons, the portfolio of index funds outperformed the portfolio of actively managed funds, and over short horizons, the portfolio of actively managed funds outperformed the portfolio of index funds.

We believe these results are attributable primarily to two sources. First, the active fund synthetic portfolio is tilted toward value stocks, which are stocks of companies with relatively low valuation ratios, and the synthetic index fund portfolio is not. Second, but less important, the U.S. index portfolio appears to have held slightly larger companies than the managed portfolio.

Given that the stocks of both value companies and small companies have earned historical return premiums over the stocks of growth companies and large companies, the Reinker-Tower return results are not entirely surprising.

LITERATURE SURVEY

There is a considerable literature on the size and value effects.

Value, Size, and the Three-Factor Model

The academic discovery of the value effect is usually attributed to Basu [1977, 1983], who finds that stocks with low price-equity ratios tend to outperform stocks with high P/E ratios. The initial discovery of the small-firm or size effect is attributed to Banz [1981], who finds that stocks of small firms tend to outperform stocks of large firms. Both effects persist even after adjusting for the capital asset pricing model beta.

Fama and French [1992, 1998] and Davis, Fama, and French [2000] confirm the presence of size and value effects in U.S. markets over 1929–1997 and of the value effect in several international markets over 1975–1995 and emerging markets over 1987–1995. These authors also confirm that the CAPM has difficulty explaining the returns of U.S. equity portfolios formed on size and value characteristics. In general, they find that the slope between CAPM betas and return is too flat.

Fama and French [1993] propose a three-factor model that explains the returns of portfolios formed by market capitalization and book-to-market as well as portfolios formed using other fundamental factors (e.g., dividend yields and P/E ratios). The three factors in Fama and French's model are the market factor, defined as the return of the U.S. equity market minus the risk-free return of one-month Treasury bills; the size factor, defined as the return on a portfolio of small companies minus the return on a portfolio of large companies (classified according to market capitalization relative to the median market capitalization); and the value factor, defined as the return on value companies minus the return on growth companies, with the top 30% of companies ranked by B/M classified as value and the bottom 30% classified as growth—that is, value companies have a high B/M, and growth companies have a low B/M.

The three-factor model is:

$$R_j - R_f = a_j + b_j[R_m - R_f] + s_j SMB + h_j HML + e_j$$

where R_j is the return on asset j; R_f is the return on one-month Treasury bills; a_j is alpha; and R_m is the return on the total U.S. equity market. The term, $R_m - R_f$, is the realized equity premium or market factor; SMB (i.e., small minus big) is the size premium or size factor; and HML (i.e., high minus low) is the value premium or value factor.[1]

The SMB portfolio is long small stocks and short large stocks, and the HML portfolio is long value stocks and short growth stocks. Both portfolios are therefore zero-investment portfolios. The variables b_j, s_j, and h_j are the loading coefficients on each of the three factor premiums; e_j is the error term.

Explanations for the Size and Value Premiums

Fama and French [1993] argue that the size and value premiums are proxies for systematic risks that have historically been rewarded with higher returns. The academic literature seems to have accepted this argument more for small stocks than for value stocks.

Black [1993], for example, has argued that the value premium is a chance result of a specific time period, and not likely to be found in out-of-sample tests. Some out-of-sample U.S. and international findings, however, negate the validity of this explanation. Kothari, Shanken, and Sloan

[1995] argue biases in the original data led to Fama and French's findings, although Chan, Jegadeesh, and Lakonishok [1995] show that data biases could not explain the findings.

In perhaps the most popular argument against the risk-based explanation of the value premium, Lakonishok, Shleifer, and Vishny [1994] argue that value strategies earn higher returns because they "exploit the suboptimal behavior of the typical investor and not because these strategies are fundamentally riskier" (p. 1,541). Chan and Lakonishok [2003] and Haugen [1995] make similar arguments. These explanations represent the market inefficiency or behavioral finance point of view. Campbell and Vuolteenaho [2003] argue that value stocks are indeed riskier than growth stocks using a two-beta model.

There appear to be about as many articles arguing that the value premium is a risk-based phenomenon as there are articles arguing it is not. It is possible then that the value premium is partially risk-based and partially market inefficiency. Note, however, that while the presence of the value premium has largely been resolved, the argument now is primarily *why* it exists.

EXAMINATION OF "INDEX FUNDAMENTALISM REVISITED"

We believe the Reinker-Tower findings are primarily attributable to the tilt of the synthetic actively managed portfolio toward value stocks with a slight tilt away from large stocks. The synthetic index portfolio should be essentially neutral with respect to the value factor and tilted toward large-cap stocks. If total costs are low enough to preserve the small-stock and the value premium, as they appear to be with Vanguard's actively managed funds, it is not then surprising that the synthetic actively managed portfolio outperformed the passively managed portfolio.

Exhibit 1 details the annual statistics for the three Fama–French factors for the 1977–2003 period used in the Reinker-Tower study.[2] Over this period, all three factors were largely positive, although the market factor is the only one statistically significant at the conventional confidence level of 95%. (This is not of concern because SMB and HML are both statistically significant over the complete period of 1927–2003. Also, our goal is not to examine the statistical significance of these factors over various time periods but rather to explain the results in the Reinker-Tower study.)

EXHIBIT 1

Annual Statistics—1977–2003

	$R_m - R_f$	SMB	HML
Average Return	7.76%	3.96%	4.02%
Standard Deviation	16.28%	13.23%	15.88%
t-statistic	2.48	1.56	1.32

Data source:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Given these positive values for all three factors, one would expect a portfolio that loads positively on the SMB and HML factors to have outperformed a portfolio that did not, after accounting for market betas and assuming *total* costs were low enough to preserve the premiums.

Interesting points emerge when we separately graph, through time, the combined synthetic index portfolio weight of Vanguard's 500 Fund plus Vanguard's Total Market Fund compared to the synthetic active portfolio weight of Vanguard's Windsor Fund plus Vanguard's Windsor II Fund. First, however, examine Exhibit 2, which reports the regression of each fund's monthly excess return on Fama and French's three-factor model. The regression analysis begins in 1977 for the two funds that have data at that point and at inception for the other two funds. Data end in December 2003 for each fund.

The *a* represents alpha, or value-added return, and the other three letters represent the loading coefficients on each factor. As indicated by the R-squared values, the three-factor model explains the variation in returns of each

EXHIBIT 2

Three-Factor Regression Data (t-statistics in parentheses)

Fund	a	b (Market)	s (Size)	h (Value)	Adjusted R^2	Time Period
500 Index	0.00 (-0.2)	1.00	-0.20 (-27.5)	0.04 (6.3)	1.00	1/77-12/03
Total Stock Market	-0.03 (-2.4)	0.99	0.00 (0.1)	0.01 (3.3)	0.99	5/92-12/03
Windsor	-0.02 (-0.2)	0.99	0.01 (0.4)	0.47 (15.3)	0.86	1/77-12/03
Windsor II	-0.03 (0.3)	0.92	-0.18 (-5.6)	0.37 (12.5)	0.88	7/85-12/03

EXHIBIT 3
500 Index Plus Total Stock Market

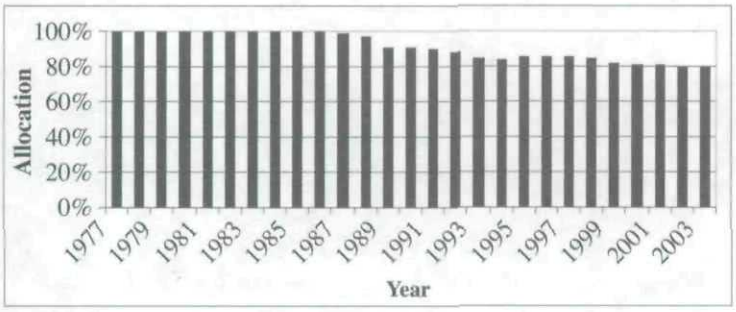
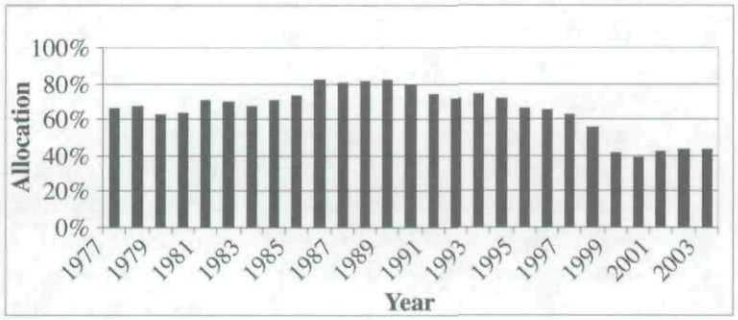


EXHIBIT 4
Windsor Plus Windsor II



fund very well. The lowest R-squared value is that of Vanguard Windsor, which is still 0.86.

Note also that the value loading coefficients are positive and significant for the two active funds while the value loading factors for each index fund are very close to zero. This indicates that these two active funds had fairly significant exposure to value stocks while the two index funds did not.

Exhibit 3 plots the combined annual percentage allocation of the synthetic index portfolio to the S&P 500 index fund and total stock market index fund. Exhibit 4 plots the combined annual percentage allocation of the synthetic active portfolio to Windsor and Windsor II.

Two important points emerge from these exhibits. First, the synthetic index portfolio is composed almost completely of two funds for the whole time period. The lowest annual percentage allocation to the two funds is approximately 80% in the last two years of the study. In fact, for the first ten years of the study, the index portfolio is completely made up of the S&P 500 fund because Vanguard had no other index funds during the period. This means that the index portfolio should have a market loading of close to one, a value loading close to zero, and a slightly negative size loading, given the regression results reported in Exhibit 2.

Second, the two Windsor funds represent a significant portion of the active portfolio. According to the regression analysis in Exhibit 2, these funds would be classified as value funds, and would therefore be expected to earn a higher return than a market portfolio when the value premium is positive, as it was over 1977–2003, all else equal. This implies that the synthetic active portfolio was probably tilted toward value stocks.

For three-factor regression analysis of actual returns data for the synthetic portfolios presented in Reinker-Tower [2004], we simply take the annual real returns presented in Exhibit 1 of their study and convert them to nominal returns using annual inflation data, and then regress the nominal excess returns on the Fama and French three-factor model.[3] (The appendix shows the annual returns for all the data used in the regression analysis.)

Exhibit 5 reports the regression results for each synthetic portfolio.[4] These data confirm the analysis of the individual funds. The active portfolio has a higher loading on the value premium, which indicates a greater exposure to value stocks. The active portfolio is also more neutral with respect to size, while the index portfolio is tilted toward larger-cap stocks, so it earns a negative size premium. These two factors seem to explain why the active portfolio outperformed the index portfolio over this period.

Assuming zero alpha, the three-factor average loadings and average factor premiums (from Exhibit 1) indicate that the index portfolio should have earned an excess return of 7.3 percentage points over the one-month Treasury bill, while the active portfolio should have earned an excess return of 8.5 percentage points. In reality, the excess returns were 7.1 and 8.0 percentage points, respectively. The difference in expected excess returns and actual excess returns can be attributed to the negative (although insignificant) annual alphas.

It is important to note the role that relatively low expenses played in the return advantage for the active portfolio. Had the expenses of the active funds been higher, as is the case with most other actively managed funds, the premiums may not have been preserved. In fact, Houge and Loughran [2003] show that most value funds do not appear to earn the value premium, at least in part because of high total expenses.

EXHIBIT 5

Three-Factor Regression Data—Synthetic Portfolios

Synthetic Portfolio	a	b (Market)	s (Size)	h (Value)	Adjusted R^2	Time Period
Index	-0.21 (-0.7)	1.00	-0.13 (-7.1)	0.03 (1.8)	0.99	1977-2003
Active	-0.48 (-0.5)	0.91	0.05 (0.8)	0.30 (5.4)	0.92	1977-2003

EXHIBIT 6

15-Year Rolling Average Annual Returns

Starting Year	SMB	HML
1977	3.79	2.67
1978	2.64	3.56
1979	2.08	4.65
1980	0.90	4.71
1981	0.19	5.74
1982	-0.39	3.99
1983	-1.08	3.88
1984	-3.07	1.90
1985	-1.91	-1.35
1986	-2.34	-0.42
1987	0.38	0.83
1988	1.29	1.56
1989	2.39	1.54

Other findings we examine include the issue of consistently lower volatility in the synthetic active portfolio than the index portfolio and explanation of the change in relative performance through time for the synthetic active and index portfolios.

The consistently lower volatility of the active portfolio is not as easily explained as the relative returns of the two portfolios. Davis, Fama, and French [2000] report that their portfolios of value stocks were more volatile than portfolios of core stocks (i.e., neither value nor growth), holding size constant. (Core, as opposed to growth, more accurately represents the index portfolio since its loading on the value premium is essentially zero.) The French database of benchmark portfolio returns shows that value stocks were generally more volatile than core stocks over the 1977–2003 period, again holding size constant.

One possible explanation for a portion of the volatility difference is that the actively managed funds held a portion of their holdings in international stocks and cash, which both have low correlation with U.S. equities. As of April 2004, the active funds noted in Reinker-Tower that are listed in Morningstar Principia held a weighted-by-assets under management allocation to international stocks of about 5.6%. The index funds held essentially no international stocks. For these holding differences to explain a significant portion of the volatility difference, the average allocation to international stocks by the synthetic active portfolio would probably have needed to be higher.

Also, we find for the same funds in Principia a current weighted-by-AUM allocation to cash of 4.5% for the actively managed funds compared to a weighted-by-AUM allocation of 0.6% for the index funds. Consistently higher relative cash percentages probably contributed to the lower observed volatility.

Exhibit 7 in Reinker and Tower shows rolling 15-year annualized real return comparisons between the active portfolio and the index portfolio. In the early 15-year periods, one sees that the active portfolio outperforms the index portfolio. In later 15-year periods, however, one sees the opposite. What can explain this phenomenon?

Reinker and Tower conjecture that one possibility is "that the U.S. stock market has become more efficient" [2004, p. 44]. Whether the market has become more efficient over the period is unknown, but the results in their Exhibit 7 seem to be partially explained by the same factors that explain our general performance results (i.e., value and size factors).

Exhibit 6 shows the SMB and HML rolling 15-year average annual returns for 1977–2003. The last rolling 15-year period begins in 1989, with an ending year of 2003. Note that the patterns of the size premium and value premium roughly correspond to the patterns in the Reinker-Tower Exhibit 7.

The height of the index advantage was in 1999, which corresponds to a starting year of 1985. In this starting year, both annual premiums were negative over the next 15 years, which is consistent with the index portfolio outperforming the active portfolio. Further, the value and size premiums were both positive in 15-year rolling periods before 1982. This seems to explain why the active portfolio outperformed the index portfolio in the early 15-year rolling periods.

Reinker and Tower note that:

> One important conclusion is that managed funds

> may provide some sort of protection against the type of stock market bubble that characterized many markets at the end of the 1990s [2004, p. 47].

In fact, the results during this period do not seem to be explained by active versus passive per se but rather by value versus core and smaller versus larger. During the bubble implosion of 2000–2002, the value and small-stock premiums averaged 14.5% and 13.1% per year while the market premium averaged –17.8% per year. Given what is known about the factor exposures of both portfolios, premiums of this degree seem to account for the return difference between the active portfolio and the index portfolio during the period.

Also, note that the active portfolio would probably have had an even greater advantage during this period had there been higher portfolio allocations to two of the value funds, Vanguard Windsor and Windsor II. As Exhibit 4 shows, the combined active portfolio allocations to these two funds were at their lowest during this period.

IMPLICATIONS

Our results indicate that the difference in the returns of the synthetic active and index portfolios is attributable largely to the value and size premiums. The question then is the relevance of this finding for the investment decisions of an investor. The answer depends upon whether one believes a portfolio tilted toward value stocks and small stocks is truly riskier than a portfolio that is not tilted toward these factors. If these factors represent systematic risk, then the active portfolio was a riskier portfolio than the index portfolio, even though the risk did not show up during this period in the form of higher volatility.

But higher volatility is just one measure of risk, not *the* measure of risk, and if these factors do truly proxy for systematic risk, it is not prudent for all investors to tilt toward value and small stocks in the same way that it is not prudent for all investors to be 100% in equity. Conversely, if one believes these return premiums are simply the result of market inefficiencies (and not risk), one should load up on value and small stocks and hope the inefficiency persists. For those who believe the answer lies somewhere in between risk and inefficiency, allocation methods might fall somewhere in between as well.

Whether one believes the value premium is a risk-based phenomenon, a market inefficiency, or some combination of both, should an investor who desires exposure to value stocks use an active fund or a passive fund to tilt toward value stocks? After all, there are now a plethora of passively managed value funds in the marketplace (Vanguard itself has had a value index fund since November 1992), and active management is not necessary to simply tilt toward stocks with common fundamental factors like relatively low price-to-book ratios.

Active or passive value is largely a question of whether the active manager can add net-of-cost alpha in the form of security selection and market timing that the index fund cannot, because exposure to the factors of returns can be adequately adjusted by simply altering the allocation to a fund within the overall portfolio. For example, if an active fund like Vanguard's Windsor Fund loads higher on the value factor than Vanguard's Value Index Fund (as has been the case historically), one could simply increase the allocation to Vanguard's Value Index Fund to achieve the overall *portfolio* exposure to the value factor that is desired.

The answer to active value or passive value—with value defined by exposure to the value factor—thus becomes conditional upon one's belief in the ability of active managers to add persistent alpha and is relatively independent of factor loadings. Extensive comment on active or passive value funds is beyond the scope of this article, but suffice it to say that adding net-of-cost alpha is not easy, especially in a taxable environment (see Wermers [2000]).

CONCLUSION

We show that Fama and French's three-factor model can largely explain the general return results in Reinker and Tower [2004]. The active portfolio was tilted toward value stocks and slightly smaller stocks, while the index portfolio was essentially neutral with respect to value or growth and tilted toward larger companies more than the overall market. Given that both value and small-stock premiums were positive over 1977–2003, it is not surprising that a *low-cost* active portfolio would outperform the index portfolio.

We also find that the value and small-stock premiums can explain some other Reinker and Tower findings such as the variation in 15-year annualized returns between portfolios and between the performance of the active portfolio and the index portfolio during the bursting of the stock market bubble. We do not find a conclusive explanation for the active fund portfolio's persistently lower volatility relative to the index portfolio.

The more interesting question is what our findings

mean for the average investor. If the value and small-stock premiums are proxies for systematic risk, as Fama and French argue, all investors should not systematically tilt toward small or value with either passive or actively managed funds. If these premiums are the result of market inefficiency, however, it may be appropriate to tilt toward small and value with the hope that these premiums will persist into the future.

Vanguard is to be commended for its dedication to low costs in both its active and passive funds. This commitment to low costs has ensured that Vanguard investors have earned their fair share of what the equity markets have given, as evidenced by preservation of the three equity return premiums in net fund returns. This focus on cost minimization and the investor's best interests ought to pervade the mutual fund industry.

ENDNOTES

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[1]SMB is the return on Fama and French's three small-cap benchmark portfolios minus the return of the three large-cap benchmark portfolios. The three small-cap portfolios are small value, small core, and small growth, and the three large-cap portfolios are large value, large core, and large growth. Formally, SMB is 1/3(Small Value + Small Core + Small Growth) – 1/3(Large Value + Large Core + Large Growth). HML is formally 1/2(Small Value + Large Value) – 1/2(Small Growth + Large Growth). Differing fractions (i.e., 1/3 or 1/2) are used

APPENDIX

Nominal Return Statistics (percent)

Year	Index Portfolio	Active Portfolio	Active – Index	1-Month T-Bills	$R_m - R_f$	SMB	HML
1977	-7.78	2.11	9.90	5.13	-8.20	23.24	7.79
1978	5.88	12.84	6.96	7.20	1.04	14.16	0.48
1979	18.08	20.30	2.22	10.38	13.33	20.40	-2.22
1980	31.79	24.04	-7.75	11.26	22.10	5.58	-24.57
1981	-5.19	11.47	16.66	14.72	-18.05	7.30	24.57
1982	21.02	23.44	2.42	10.53	10.79	8.79	13.17
1983	21.30	28.97	7.67	8.80	14.40	13.94	18.86
1984	6.28	10.87	4.60	9.78	-4.76	-8.61	18.63
1985	31.20	28.15	-3.05	7.73	24.63	-0.92	1.16
1986	18.11	15.86	-2.26	6.15	10.40	-10.00	10.00
1987	4.69	0.51	-4.19	5.46	-3.51	-10.39	-2.54
1988	16.24	26.39	10.15	6.36	11.55	6.72	13.78
1989	31.11	18.32	-12.80	8.38	20.50	-12.01	-5.65
1990	-4.37	-12.51	-8.14	7.82	-13.84	-14.40	-10.60
1991	31.39	29.84	-1.56	5.60	29.10	16.50	-15.08
1992	8.23	13.37	5.14	3.50	6.41	7.78	23.05
1993	10.57	14.71	4.14	2.90	8.36	7.48	16.95
1994	0.75	0.07	-0.68	3.91	-4.11	0.39	-0.08
1995	36.78	34.43	-2.35	5.60	31.04	-6.94	-3.46
1996	22.18	23.91	1.74	5.20	16.25	-1.86	0.23
1997	32.25	27.55	-4.70	5.25	26.07	-3.73	11.14
1998	26.14	15.33	-10.81	4.85	19.42	-23.29	-15.04
1999	22.12	13.07	-9.05	4.69	20.20	11.66	-39.41
2000	-10.11	3.75	13.86	5.88	-16.71	-5.69	21.39
2001	-11.21	-9.70	1.51	3.85	-14.78	28.41	27.25
2002	-21.66	-22.87	-1.21	1.63	-22.91	4.36	3.72
2003	30.24	34.56	4.32	1.02	30.74	28.08	15.14
Average Return	13.56	14.40	0.84	6.43	7.76	3.96	4.02
Standard Deviation	16.22	14.50	7.37	3.09	16.28	13.23	15.88
Relevant t-statistic					2.48	1.56	1.32

because of the number of portfolios in the equation. For example, since there are three small-cap portfolios in the first term of the SMB equation, the summed return of the three small-cap portfolios is divided by three.

[2]All standard deviation calculations are estimations of the population standard deviation from sample data.

[3]Nominal returns are calculated by solving for (1 + Real Return)(1 + Inflation) – 1 for each year of data.

[4]While ideally we would like to have 36 data points for a regression, we are limited by the 27 years of data in the original work.

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