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Investment Insights

Creating, transforming and sharing knowledge

Analyzing the Greatest Return Stories Ever Told

PERFORMANCE THROUGH INNOVATION

BARCLAYS GLOBAL INVESTORS

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I. Introduction

Who are the really great investors? Who has added the most value over long periods of time to the portfolios for which they are responsible? All investment professionals are curious about this, but little research literature exists to answer these questions.

In fact, the search for the true heroes of the investment profession can be a frustrating one. Many investment track records that look spectacular in absolute return terms are less compelling when properly adjusted for the risks taken. All too often, a "high flyer" turns out to have offered risk-adjusted returns lower than what could have been achieved by investing in an index fund. And, as academic theory predicts in markets that are at least somewhat efficient, time usually erodes the best track records, with winning funds in one time period later becoming losers.

Looking at returns over the long term also raises questions about the limits of active management. Just how much can active management reasonably hope to contribute to a portfolio over a meaningfully long period of time? What is the most that has been contributed? Who did it? In what kind of fund? By what measure?

Consider, for example, the experience of the BGI 60-40 Tactical Asset Allocation Fund (TAA). Started as a formal fund in July 1977, it had nearly 23 years of history over which it had earned an active return of 2.4% per annum (as of March 2000) above its benchmark. Many of the most aggressive active managers routinely promise twice that much active return, but their delivery seems inconsistent. Is the BGI TAA record unique? Might it be that BGI TAA, a perennial workhorse, could stand among the heroes of the profession with its modest but highly persistent 200+ basis point long-term record? It seemed vaguely plausible in the context of our research into active management generally, but inconsistent with the marketing promises of the traditional active management profession.

To investigate these possibilities and to learn who the heroes really are and how much they have contributed to their portfolios, we collected data on all the funds—mutual funds, institutional separate accounts, institutional commingled funds and so forth—for which returns were available over the time period during which BGI TAA has existed. (Necessity forced us to focus on a slightly shorter period just over 20 years in length, from January 1980–March 2000, although we were able to get some data for the full July 1977–March

2000 period.) We then selected a suite of statistical measures that adjust returns for various types of risk, or for multiple risks. Finally, we ranked the funds for which we had data by each risk-adjusted performance measure, producing a tableau of measures and rankings of the best managers over this significantly long period of time.

The work documented in this paper reveals a panorama of who produced how much over this period. Many of the winning managers are household names, famed for their investment wizardry—and many are obscure. Many were incredibly productive during some portion of this history (typically early in the fund's life), sufficiently so as to have carried their long-term record over periods of negative productivity. Others were more consistent over time.

BGI TAA ranked extremely well on many measures and is in fact the very top performer when the funds were ranked by Sharpe ratio. It appears that consistency is more important than the occasional spectacular performance.

This paper presents a study of the rankings across all the measures we reviewed, each offering a different insight into who has done the best and what it takes to be among the very best. One conclusion we draw from these results is that there almost certainly are managers with real skill, not just lucky members of a large population of managers generating random performance relative to their benchmarks. In the face of the data that follow, one would have a hard case asserting, as some academics have, that no investment practitioner has skill.

In order to decide how to adjust investment returns for risk, we had to learn a great deal about the various statistical measurements that are used for that purpose. This paper devotes a substantial section to sharing some of what we have learned on that topic. Thus, the present work serves as a companion piece to an article by Siegel, Kroner and Clifford (2001) in *The Journal of Investing*.[1] That article discussed how the top funds earned their returns and focused on one key measure, rankings by Sharpe ratio. Here, in contrast, we discuss a number of additional measurement techniques as well as reporting more extensively on the fund rankings that emerge from our data study.

One caveat, to protect ourselves from the wrath of those who feel they should be on these lists, but aren't: while our institutional data set is substantial, we know it is not exhaustive. The institutional world simply doesn't have the same data infrastructure that the mutual fund world has. There will undoubtedly be those that should have been listed as great managers, but weren't found in the data we evaluated.

To begin, we define and examine the properties of the five statistical measures used to rank the funds in our study. We then present data on the top-performing funds.

II. Measures of risk-adjusted return

There is no single ideal measure of risk-adjusted return, so we present a number of different measures.

A. Sharpe ratio

The Sharpe ratio is named for its inventor, the Nobel Prize–winning economist William F. Sharpe, and measures risk-adjusted return to the extent that standard deviation characterizes the risk to which investors are averse.[2] Standard deviation measures the volatility of portfolio returns, both above and below the average, over a time frame equal to the frequency with which returns are calculated. Thus, for a monthly data series, the standard deviation (although expressed as an annual rate) measures the volatility of *monthly* portfolio returns. This is the simplest way to adjust for risk, by dividing the return (in excess of the riskless rate) by the standard deviation:

$$S_p = \frac{r_p - r_f}{\sigma_p} \qquad (1)$$

where

S_p = Sharpe ratio of portfolio *p*;

r_p = annualized arithmetic mean return on portfolio *p*;

r_f = annualized arithmetic mean return on the riskless asset, usually defined as short-term US Treasury bills; and

σ_p = annualized standard deviation of periodic (say, quarterly) returns on portfolio *p*.

The Sharpe ratio has the advantage that it puts highly dissimilar investment strategies into a common analytical framework. The Sharpe ratio is especially valuable in risk-adjusting the returns of unusual investment strategies, such as hedge funds, for which other risk-adjustment metrics (say, beta) are likely to be meaningless (because many hedge funds neutralize their beta risk, or exposure to the stock market, by balancing long and short positions). Moreover, two funds with the same Sharpe ratio would also have the same return if the funds were leveraged (or de-leveraged) so as to have identical standard deviations.[3]

Controversy regarding standard deviation as a measure of risk. Some observers believe that standard deviation (and, therefore, the Sharpe ratio) misleads because, it is argued, investors care principally about downside risk.[4] We agree that, in principle, all risk is downside—yet downside-only *measures* of risk miss the information inherent in upside volatility. In addition, downside risk measures are more difficult to calculate, communicate and interpret, even when one has agreed on which measure to use. (Semi-deviation below the series' own mean? Below a target? Which target?) Many passionate words have been devoted to this debate, with neither side convincing the other.[5] Other observers quarrel with the short-term nature of standard deviation, arguing that risk is better understood as the likelihood of falling short of one's long-term investment goals. Our view is that while

standard deviation is not perfect as a measure of risk, either in capturing the essence of what investors are averse to or in getting the time horizon right, it is the best single measure available. It is also, as we pointed out above, the closest thing to a *universal* risk measure—one that does not depend on what strategy is being analyzed. Our use of other measures, including beta and style-adjusted benchmarks, acknowledges that standard deviation is not the only risk measure that might be relevant.

Time dependence. Note that the Sharpe ratio cannot be used directly to make comparisons of managers from different time periods, because the Sharpe ratio of the *benchmark* varies over time. Thus, the Sharpe ratio of a fund indexed to the benchmark would vary depending on what time period was selected.

B. CAPM alpha and beta

A quite different approach to calculating risk-adjusted return uses the Capital Asset Pricing Model (CAPM) of expected return developed by William Sharpe, John Lintner and others. It compares the actual portfolio return (r_p) to the return that the CAPM says was expected, $E(r_p)$, to arrive at alpha (α_p), a measure of risk-adjusted return in excess of the benchmark:[6]

$$\alpha_p = r_p - E(r_p) \qquad (2a)$$

where

$$E(r_p) = r_f + \beta_p(r_m - r_f) \qquad (2b)$$

where

r_m is the return on the market benchmark (here, the S&P 500), and

β_p is the slope coefficient of the regression of portfolio returns (in excess of the riskless rate) on market-benchmark returns (in excess of the riskless rate), that is:

$$\beta_p = \frac{\text{cov}[(r_p - r_f), (r_m - r_f)]}{\text{var}(r_p - r_f)} \qquad (2c)$$

The resulting alpha, which can also be understood as the intercept coefficient of the same regression, represents the part of the portfolio return that is not explained by co-movement with the market, and is the value added by the manager.[7]

The alpha of a portfolio measures its risk-adjusted return only if the CAPM is valid (that is, if it is an accurate model of expected return). If the security-market line (representing the expected returns on securities with different betas) is flatter than the CAPM predicts—and Fama and French, among others, have presented evidence that it is flatter—then the alpha of a portfolio produces a distorted measure of its risk-adjusted return.[8] (By "flatter" we mean that low- and high-beta portfolios have returns closer to the broad market return than the CAPM predicts.) Specifically, with a flatter-than-predicted CAPM line, the alpha of a low-beta portfolio attributes to skill (or luck) return that was actually a result of passive exposure to the market. Specifically, in a low-beta portfolio, a flatter-than-predicted CAPM line causes return to be attributed to skill or luck

(i.e., alpha) that was actually a result of passive exposure to the market (i.e., beta). Because of possible shortcomings such as this, alpha is a less powerful measure of risk-adjusted return than the Sharpe ratio.

We would also point out that risk-adjusted return measures that use standard deviation are dependent only on the assumptions of utility theory, which suggests that investors are (or should be) averse to total risk. Alpha, in contrast, also requires that the CAPM be valid. Utility theory has fewer awkward assumptions than the CAPM, and is closer to being universally "true," so we have greater confidence in risk-adjusted return measures that use standard deviation to measure risk than we do in measures that use beta.

C. Treynor ratio

The Treynor ratio, named for its inventor, the scholar and portfolio manager Jack L. Treynor, is analogous to the Sharpe ratio but uses beta rather than standard deviation as the measure of risk:[9]

$$T_p = \frac{r_p - r_f}{\beta_p} \qquad (3)$$

The Treynor ratio measures the return that would have been produced by the fund if it had been leveraged (up or down) to have a beta of one. (It is assumed, for the purpose of this calculation, that investors can borrow and lend at the riskless rate.) The Treynor ratio is expressed as a compound annual return in excess of the riskless rate.

Some observers prefer the Treynor ratio to the Sharpe ratio because they believe that beta, not standard deviation, measures the risk with which investors should be concerned; while the non-beta component of total (standard deviation) risk is diversifiable and can be avoided, beta risk cannot be eliminated through diversification and must be taken if one wants to participate in equity markets. That argument, however, applies only to funds that have significant equity exposure and thus a meaningful beta. For market-neutral, fixed-income and other strategies having returns unrelated or only distantly related to those of the stock market, the Treynor ratio does not contain much information.

D. Active return, tracking error, and information ratio

The active return of the fund, A_p, is simply the compound annual rate of the fund minus that of the benchmark where

$$A_p = R_p - R_m \qquad (4)$$

R_m is the compound annual return on the market benchmark which, in this case, depends on the fund being studied, as discussed in section IV.

Note that these active returns are not risk-adjusted returns because they are not specifically adjusted for the risk of the fund, only for the risk of the benchmark to which the fund is compared.

The tracking error to the benchmark, $\sigma_{(p-m)}$, is defined as the annualized standard deviation of periodic (say, quarterly) differences between the returns on portfolio *p* and the returns on benchmark *m*.

If one divides the active return, calculated as an arithmetic average (denoted by e_p to contrast with the compound rate or geometric average, A_p), by the tracking error, the resulting ratio, called the *information ratio*, I_p, characterizes the reward earned for taking active risk:[10]

$$I_p = \frac{e_p}{\sigma_{(p-m)}} \qquad (5)$$

Note that the information ratio is simply the Sharpe ratio applied to active returns rather than total returns.

E. Style-adjusted alpha

To calculate an alpha that adjusts for the portion of returns that were achieved simply by exposure to style factors (that is, to growth, value, large-capitalization or small-capitalization stocks in a way different from that offered by the S&P 500), we use a "style regression" first suggested by Eugene F. Fama and Kenneth R. French.[11] The equation is:

$$\alpha_p = r_p - E(r_p) \qquad (6a)$$

where

$$E(r_p) = r_f = \beta 1_p(r_m - r_f) + \beta 2(HML) + \beta 3(SMB) \qquad (6b)$$

where

r_p, r_m, and r_f are the returns on the manager, benchmark (here, the S&P 500) and riskless asset respectively,

HML is the return on a portfolio of high (H) book-to-price stocks minus the return on a portfolio of low (L) book-to-price stocks,[12] and

SMB is the return on a portfolio of small (S) capitalization stocks minus the return on a portfolio of big (B) capitalization stocks.[13]

A portfolio with a positive β2 is thus identified as having positive co-movement with value stocks relative to growth. A portfolio with a positive β3 has positive co-movement with small-cap stocks relative to large. The alpha resulting from this analysis represents excess return *after* the return from the style factors has been taken into account. We report the alpha, alpha t-statistic and all three betas.

The careful reader will note that the Fama–French regression is a special, constrained case of the returns-based style-analysis regression proposed by William Sharpe.[14] Sharpe's approach, which accommodates as many style regressors (benchmarks) as one wishes, might be useful in this exercise, to identify additional style exposures such as international equities or different types of fixed income. However, with limited data (we have 81 quarterly return observations), one must be careful not to specify too many regressors or the whole analysis becomes suspect, with noise and spurious correlation contaminating the results. We therefore limit

our style analysis to the two non-market factors (valuation and smallness) that Fama and French identify as relevant to most US equity portfolios. For funds, such as fixed-income or international-equity funds, where the Fama and French regression is clearly unhelpful, we indicate "na" (not applicable) in the style analysis columns in the data tables.

We do not mean to disparage Sharpe's approach to returns-based style analysis, with its indeterminate number of regressors, in any way. With any method, one must be aware of its limitations. Returns-based style analysis can reveal where a manager's bets were placed on average and, if there are sufficient data points, how those bets changed over time. For calculating a style-adjusted alpha and alpha t-statistic, and for ranking managers (whose performance is tightly clustered) on those metrics to see who is "greatest," however, we believe that a returns-based style analysis with many regressors could be misleading.

By the way, exposure to fixed income (cash or bonds, with no distinction made between them) *is* captured by the Fama and French regression. The estimate of fixed-income exposure equals one minus the market beta.[15]

III. Collecting fund return data

Using each risk-adjusted calculation we've discussed, we compared the total returns on all managed pools of assets (other than funds with a cash or cash-like investment strategy) for which accurate, long-term data could reasonably be obtained. These include:

- *Institutional composites.*[16] Wilshire Associates provided quarterly returns for 146 institutional investment products, covering at least January 1980 through March 2000. Of these, 63 have data starting in July 1977. US and non-US equity funds, and US fixed-income funds, are represented.[17]

- *Institutional separate accounts.* The Northern Trust provided quarterly returns for all institutional separate accounts that were custodied at that institution continuously from October 1979–March 2000, the longest period for which they have data.[18] All 12 of the institutional separate accounts are equity funds.[19] Unlike mutual funds and institutional composites, which represent different customers from year to year, institutional separate accounts represent a *single client* (typically a pension fund) retaining a *single manager* over the whole study period.[20] For conformity with the Wilshire sample, we use Northern Trust data starting in January 1980.

- *Mutual funds.* Morningstar provided monthly returns for all mutual funds that survived continuously from July 1977–April 2000 (the period for which BGI TAA return data exist). There are 338 such funds, including equity, fixed income, balanced, asset allocation and other funds.

- *Berkshire Hathaway*. While Berkshire Hathaway Inc. is organized as an operating company, we consider it to be an investment company (mutual fund) for the purpose of this analysis. We collected monthly returns from July 1977–April 2000, the same period as for the mutual funds.

- *Barclays Global Investors Tactical Asset Allocation (BGI TAA)*. Returns are monthly and cover the period from July 1977–April 2000.[21]

- *Endowments*. We have data for two endowed institutions: the Ford Foundation and Harvard University's general investment account. The Ford Foundation supplied monthly returns over July 1977–April 2000, and Harvard supplied quarterly returns over July 1977–March 2000.

We cannot claim to have conducted an exhaustive search for great return stories. There are institutional separate accounts with custodians other than the Northern (but the situation is better than it sounds because managers, although not investors, tend to be duplicated from one custodian to another). There are institutional composites not collected by Wilshire. There are many endowments, pension plan sponsors and other pools of assets such as hedge funds and private equity funds for which we could not or did not obtain access to data. Other than Berkshire Hathaway, we leave out individual securities and portfolios consisting primarily of a single security.

IV. Benchmarks for calculating excess returns and information ratios

Some of the risk adjustments described in section II, such as the Sharpe ratio, do not require selection of a benchmark, and others, such as the CAPM and style-adjusted alpha, are arguably amenable to using the same benchmark for all funds. For calculating information ratios, however, it is necessary to have a benchmark for each fund that is (1) relevant to the fund's investment strategy and (2) at least roughly risk-comparable.

We start with mutual funds as reported by Morningstar. We base the benchmark of each fund on its investment objective, as follows:[22]

Morningstar investment objective	Benchmark
US equities (growth, aggressive growth, growth/income, equity income, small company, sector funds)	S&P 500
US balanced and asset allocation	60% S&P 500, 40% Lehman Aggregate
Foreign stock	MSCI EAFE*
European stock	MSCI Europe*
Pacific stock	MSCI Pacific*
World stock	MSCI World*
World balanced/asset allocation	60% MSCI World*, 40% Lehman Aggregate
All fixed-income funds (including municipal, foreign, cash, etc.)	Lehman Aggregate

* In US dollars, unhedged.

Wilshire and the Northern Trust provided investment objectives for manager composites and separate accounts, respectively, (although Wilshire included asset-allocation and balanced funds in the US equity category and we had to separate them out manually). We classified Berkshire Hathaway as US equity, and the Ford Foundation and Harvard as global balanced. Because there were no hedge funds with monthly or quarterly return data starting in January 1980 or earlier, we did not need benchmarks for these funds (because they are excluded from the main data tables; we can calculate Sharpe ratios without benchmarks).

While recognizing that some US equity managers pursued small-cap, growth or value strategies, we use the S&P 500 as the benchmark for all US equity funds because, over most of the period studied, it was the index to which most such funds were benchmarked by their managers and customers. (The proliferation of style benchmarks and of funds managed to these benchmarks that we observe today came late in the period.) We thus use the S&P 500 as the market return for our CAPM calculations, as the (unstylized) market return in the style analysis, and as indicated above in the selection of benchmarks for calculating the excess return, tracking error and information ratio.

V. Presentation of the data

Incorporating risk into a return measurement produces notably different results than looking solely at absolute returns. Sometimes a spectacular track record looks more modest or even inferior to that offered by an index, when adjusted properly for the risks taken. Likewise, some less well-known funds jump to the head of the pack by adjusting for risk.

A. Top 40 funds ranked by Sharpe ratio over January 1980–March 2000 (Exhibit 1)

The time period covered is January 1980 through March 2000, selected because that is the longest time frame for which we have manager separate account returns from the Northern Trust and a full sample of manager composite returns from Wilshire Associates. All returns are quarterly. In this exhibit, funds are ranked by Sharpe ratio (we present rankings by different statistics later).

Each of the top 11 funds is worthy of at least a brief comment. Funds that are noteworthy when ranked by a statistic other than the Sharpe ratio are covered when those rankings are presented.

1. *BGI TAA.* For the record, we selected the time period and the variable on which to rank the funds before finding out who ranked first.[23] Most of the value added

was in the 1977–1986 period, the crash of 1987, and then gradually between 1989 and the present.

2. *W. H. Reaves.* The presence of the W. H. Reaves fund, consisting mostly of boring old utilities, may surprise some. The value added by active management was clearly exceptional since the S&P Utilities index had a Sharpe ratio of only 0.6118 over the period and would have ranked 191st. The negative information ratio shows the limitations of that statistic when the benchmark has a risk level substantially different from that of the fund.

3. *Harvard University's endowment* was managed from 1974–1990 by Walter Cabot, the patrician Bostonian chronicled by John Train in *The New Money Masters*.[24] Unlike most endowed institutions, Harvard manages most of its money using its internal, 150-person staff. Starting in 1990, Jack Meyer (who previously ran the Rockefeller Foundation's portfolio) moved the fund sharply toward alternative strategies, with great success. The fund's modest absolute return reflects its conservative, balanced policy. All of Harvard's excess returns were earned since 1993, with private equity and hedge fund exposure providing big gains. The fund's hedged strategies stumbled badly in August 1998, but quickly recovered.

4. *Phoenix-Engemann Capital Growth A* earned its high Sharpe ratio through risk control. While many large-cap growth funds soared over the period, this Phoenix-Engemann fund edged out the S&P 500 by only 1.4% compounded annually, and failed to beat the S&P over the most recent 5-, 10- and 15-year periods as reported by Yahoo. However, the full-period standard deviation of 14.2% makes this fund a great risk-adjusted performer.

5. *Dresdner RCM Balanced.* RCM, founded in 1970 by the growth-manager-turned-philanthropist Claude Rosenberg and recently acquired by Dresdner Bank, has three entries in the top 17 (reflecting, presumably, all three funds following the same general investment style). On the equity side of the balanced account, RCM tries to identify companies with "superior management, strong balance sheets, differentiated products or services, and a strong commitment to research and development." The Dresdner RCM Balanced fund earned much of its excess return in the great growth-stock market of 1998–2000, while not losing ground during periods when value stocks excelled.

6. *Magellan.* The highest Sharpe-ratio fund over the period from July 1977–March 2000, Fidelity's Magellan Fund ranks fifth over the 1980–2000 period. Often thought of as a growth fund, Magellan earned its

high rank without any exposure to the growth factor as detected by our style analysis. Note that Peter Lynch, whose name is closely associated with Magellan, managed the fund for only 13 of the years covered by our study.

7. *Ashland Large-Cap Growth's* fast start, with a return 19% per year in excess of the S&P over 1980–1982, helped catapult the fund's whole-period Sharpe ratio into the top 10. It had strong but not spectacular performance in the 1980's but not the 1990's, when it just kept even with the S&P.

8. *Institutional Capital Discretionary Equity (ICAP)* is one of only two self-identified value managers in the top 10. (Growth-style indices beat value over the period studied.) The subadvisor to the Nuveen Growth and Income Stock Fund, ICAP achieved well-below-market risk and an enviable –9.8% return in the crash of 1987. Although ICAP beat the S&P by less than 1% per year, the Sharpe ratio was strong because volatility was unusually low, especially for a concentrated portfolio.

9. *Waddell & Reed Core Equity.* The venerable (founded in 1937) Kansas City firm of Waddell & Reed is a prominent regional manager with over $35 billion in mutual-fund assets and a focus on individual financial planning. The firm's entry that finished in the top ten, however, is its institutional core equity product. The Waddell & Reed Core Equity fund, which is sensitive to the small-cap style factor, earned steady gains over the S&P 500 from 1981–1994 but has just kept even with that benchmark in the last six years.

10. *Boston Company Core Value Equity* earned its high Sharpe ratio through risk control, with a standard deviation of only 13.9%. Following a classic value strategy, the Boston Company portfolio gained steadily from 1981–1994, but plummeted in the recent "value crash," falling behind the S&P 500 by more than 21% in the two-and-a-half years ending March 31, 2000.

11. *The Ford Foundation.* Because we have data for only two plan sponsors (Harvard and the Ford Foundation), we have to be careful about making special claims regarding these institutions' high risk-adjusted returns. We recognize that plan sponsors and other diversified funds tend to look good when viewed through the Sharpe-ratio glass. However, notice the Sharpe ratio of the Global Balanced Benchmark, which was the Ford Foundation's policy benchmark (0.701 vs. 0.818 for the fund). Some 84 funds separate the Ford portfolio from its benchmark. A caveat is that (as with Harvard) private equity holdings in the fund "dampened" the risk as measured by standard deviation, slightly exaggerating the fund's Sharpe ratio—but the dampening is minor, since private equity did not represent a significant proportion of

holdings until the late 1990's. Real estate holdings, which are subject to the same caveat, were extremely small.

One notable feature of the top-ten list is the large number of funds that did not achieve extraordinary absolute returns. Unadjusted for risk, Magellan is the only really big winner of the ten. Among the funds that earned huge absolute returns are Berkshire Hathaway (#23) and Driehaus Small Growth (#51), which lost in the Sharpe ratio ranking to more conservative funds because of their risk levels.

Other funds in the top 40 that are widely held by institutions include Alliance Capital's large-cap growth offering managed by Alfred Harrison, the Lincoln Capital fund associated with Parker Hall, and State Street's large-value fund. There are also some widely held mutual funds. However, what stands out about the list of top 40 funds by Sharpe ratio is the number of smaller and lesser-known funds. Perhaps it is easier to beat the market when one is small and nimble. But performance success tends to breed asset-gathering success fairly quickly, so the preponderance of minor players in the list of high-Sharpe-ratio funds suggests that investors are not consistently picking their managers on the basis of Sharpe ratio.

Many well-regarded funds did not rank in the top 40 by Sharpe ratio. Examples include Michael Price's Mutual Shares Z (#58), Fidelity Contrafund (#77), the Windsor Fund, managed until 1995 by John Neff (#169—but see our comments on this fund in section VII), and Ralph Wanger's Acorn Fund (#226). Note that the S&P 500 itself ranked 67th, with the 60/40 benchmark (that is, 60% in the S&P 500 and 40% in the Lehman Aggregate) doing even better, landing in the 45th position.

While all of the statistics in Exhibit 1 are revealing in some way, the style analysis is particularly worthwhile in confirming or disconfirming one's memory about how particular funds were positioned. Janus, for example, is shown to be one of the "growthiest" funds (that is, its valuation beta is a large negative number), as one might expect—but Magellan, often thought of as a growth fund, was not "growthy" at all. Instead, on average over the period studied, Magellan had a bet on small-company stocks.

B. Data from January 1980–March 2000 ranked by other variables

We now re-rank the funds for which we have data over January 1980–March 2000 (including funds not shown in Exhibit 2) according to other variables. (We conduct this extended analysis on the January 1980–March 2000 sample, not on the July 1977–March 2000 sample, because the latter is impoverished by the absence of institutional manager separate accounts and the scarcity of institutional composites covering that long a period. Later, we present fund rankings by Sharpe ratio for the July–March 2000 sample, but we do not re-rank the funds using alternative measures.)

Ranking by total return

Exhibit 2 shows funds ranked by total return, unadjusted for risk. The list consists entirely of equity funds, particularly those with small-cap, growth or concentrated strategies. Balanced and conservative strategies did not rank as well. The highest-returning fund was Richard Driehaus' acclaimed small-cap offering, which ranked only 51st by Sharpe ratio.

Ranking by information ratio

Exhibit 3 ranks funds by their information ratio relative to the fund-specific benchmark. The benchmarks are displayed along with the information ratios and other statistics. Note the predominance of fixed-income funds (denoted by "LA," for Lehman Aggregate, in the benchmark column). Information ratios tend to be high for successful fixed-income managers because the principal means used to add value—yield-curve risk—had a relatively consistent payoff over the period studied, with bond yields plummeting and prices soaring. Thus, managers had to get one decision right: to have a longer duration than the benchmark. Credit risk also paid off well, except in 1989–1990. BGI (#38) and the Ford Foundation (#116) had too much tracking error to make the cut.

The information ratio can be misleading if the risk of the fund is notably different from the risk of the benchmark, as we saw earlier with W. H. Reaves. Thus, several of the equity funds with high information ratios, as show, in Exhibit 3, achieved that status by taking substantially more risk (as measured by standard deviation) than the benchmark. Examples include Driehaus Small Growth and Berkshire Hathaway. Information ratios for the benchmarks themselves are zero by definition, so the benchmarks would all be tied for 171st place in this ranking. We omit the benchmarks from the table.

Ranking by alpha

Exhibit 4 ranks US equity, balanced, and asset-allocation funds by their CAPM alpha relative to the S&P 500. The rankings in Exhibit 4 are relative to the 357 US equity, balanced and asset-allocation funds in the study over January 1980–March 2000, not to the 495 funds in all asset classes.

Most of the names are familiar from Exhibit 1, illustrating the high correlation between the alphas and Sharpe ratios of the funds. However, Berkshire Hathaway, which ranked only 23rd by Sharpe ratio because it took a great deal of risk as measured by standard deviation, had the highest alpha—an astounding 8.5% per year. BGI TAA, with an alpha of 4.0%, is in fifth place, with its competitor the Lindner Asset Allocation Fund (covered in greater detail in section VI) just behind. The Ford Foundation ranks 47th but has a still very respectable 1.4% alpha compounded for the more than 20-year period. Note that the *benchmarks* for BGI TAA and the Ford Foundation have small alphas, due to the diversification effect of fixed income.

Alpha t-statistic. Exhibit 4 also shows alpha t-statistics, although to save space we do not rank funds separately by this statistic. The t-statistic of BGI TAA's alpha, 2.25, indicates significance at the traditional 95% level and ranks second (to W. H. Reaves). BGI TAA is thus one of only four US equity, balanced or asset-allocation funds to have an alpha t-statistic above 2, a widely used threshold for the statistical significance of achieved alpha.

Ranking by Treynor ratio

Since the Treynor ratio divides by beta, low-beta funds (including several balanced and asset-allocation funds) come to the fore here. As we noted earlier, the Treynor ratio is meaningful only for funds that are fully or significantly invested in equities, so we limit Exhibit 5, which ranks funds by the Treynor ratio, to US equity, balanced and asset-allocation funds. Note that four of the top six funds ranked by the Treynor ratio have a 60/40, rather than an all-equity, benchmark. The Lindner Asset Allocation Fund, which pursued a lower-risk tactical asset allocation strategy than BGI TAA, ranks at the top; BGI TAA is fourth. The Ford Foundation, which placed far below the top funds in some of the other rankings, is boosted to a lively 26th by the Treynor measure because of its low-risk approach.

The USAA Income fund, which had a low Sharpe ratio and which is not on any of the other lists, is #3 by Treynor ratio because of its unusually low beta (0.18).[25] There are several other low-beta income or utility funds with poor Sharpe ratios on the list of top Treynor-ratio funds.

Ranking by style-adjusted alpha

The alpha produced by the style regression, described in section IV, represents the return in excess of what would have been earned simply by passive exposure to the fund's style characteristics as revealed by its return patterns.[26] Exhibit 6 presents the results; as in several previous exhibits, only US equity, balanced and asset-allocation funds are considered. The "style alpha" of the Driehaus Small Growth fund is so high, 16.8% per year, that it bears some analysis. Small-cap growth stocks, as represented by the Russell 2000 Growth index, returned only 12.8% per year over the period studied, 4.7% less than the return of the S&P 500. Yet the Driehaus fund returned 31.3% per year, the highest raw return of any fund studied. In other words, the fund beat the S&P by a large margin although the style benchmark having the closest fit to the fund's strategy underperformed the S&P. As one might expect, however, the Driehaus fund's total risk (standard deviation) was also uncommonly high, reflecting the fund's specialization.

Like Driehaus, most of the funds with high style alphas are emerging growth, small-cap or technology funds. Such strategies, which are typically high-risk and concentrated, often produce returns quite different from those of the style benchmarks. Berkshire Hathaway is notable for being the *only* value-oriented fund in the top 20.[27]

BGI TAA ranks 36th. Having no intentional style bias—it is built out of index funds—its style alpha should be the same as its CAPM alpha (which is unadjusted for style). Actually its style alpha (3.4%) is reduced slightly, relative to the CAPM alpha, by a modest correlation of BGI TAA's returns with the large-cap and growth factors, an apparent consequence of its timing decisions. The Ford Foundation, a growth-oriented fund, had a style alpha (1.9%) that is slightly *larger* than its CAPM alpha. Nonetheless the Ford Foundation ranks only 70th. BGI TAA and the Ford Foundation lag in the rankings by style alpha because their strategies are highly diversified while the big winners in this particular horse race took large bets, through specialized or concentrated holdings, that are not captured by the style regressors.

C. Time series analysis of fund returns

Here we delve into the ways that fund behavior changed over time, specifically by looking at their performance...

- In bull and bear markets
- In crashes and other turbulent periods
- When large-cap or small-cap stocks were outperforming
- When growth or value stocks were outperforming

Bull and bear markets

We define bear markets as having occurred in July 1977–February 1978, December 1980–July 1982, September–November 1987, June–October 1990 and July–August 1998. For simplicity, all other periods are defined as bull markets even if, as in 1984 and 1994, little if any gain occurred. Exhibit 7 shows, along with other statistics, the bull-market and bear-market returns (in excess of the fund-specific benchmark) of each of the four highlighted funds.

Berkshire Hathaway, BGI TAA and Magellan had better returns (in excess of the fund-specific benchmark) in bear markets. This risk-dampening is one way they achieved high Sharpe ratios. The effect is particularly pronounced for BGI TAA, which is designed to be a defensive strategy and which won big in October 1987; and for Berkshire Hathaway in 1977–1978. The Ford Foundation's slightly higher excess return in bull markets is not large enough to be noteworthy.

Crashes and volatility

Returns in crashes. There was only one true market crash (October 19, 1987) in the period studied. The August 1998 turbulence resulted in a calendar-month return on the S&P 500, –14.5%, that is in the same league as the October 1987 return of –21.5%, so when looking at market history from a monthly-return perspective we have two crashes to study.

Exhibit 7 shows the performance of each highlighted fund in excess of the fund-specific benchmark during the crash months. BGI TAA's 20.4% excess return in October 1987 is so large that it looks like a typo, but as we saw earlier, it is correct and was the

defining event for the fund.[28] Berkshire Hathaway did modestly well in crashes; the other managers generally fared poorly in these sharp market declines.

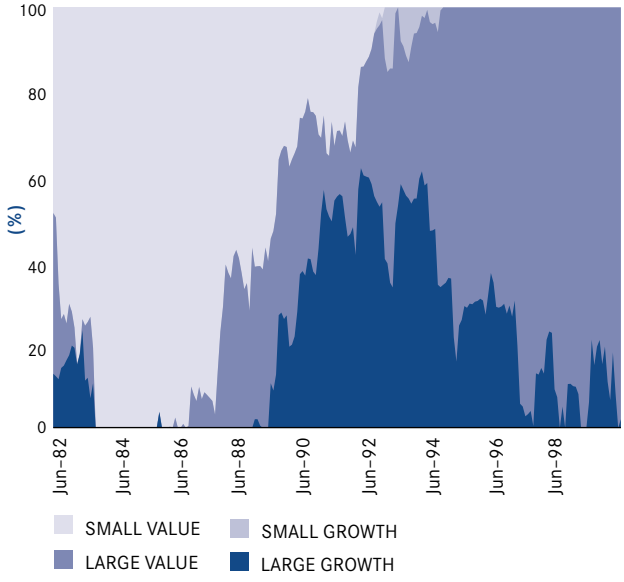
Returns and market volatility. To get a sense of the relation between market volatility and manager performance across different market environments, and not just in crashes, we calculated the correlation between each highlighted manager's monthly return in excess of the fund-specific benchmark and the *volatility* of the market in that month. (Volatility is measured as the standard deviation of daily returns within each month.)[29] All of the funds except BGI TAA were hurt by market volatility, although the effect is not dramatic; BGI TAA performed *much* better in volatile markets. However, a reasonable guess is that BGI TAA's 20.4% excess return in October 1987 had something to do with that result. To test that conjecture, we removed that month from the data; the resulting correlation (not shown in Exhibit 7) is only 0.09, so almost the entire positive relation between BGI TAA excess returns and market volatility is due to that one month's return. "Leading" or "lagging" the returns by one month, to see if there is a delayed effect, does not improve the result.

Growth, value, large-cap and small-cap exposure

Here we use returns-based style analysis to look at the way these style exposures changed over time for the four highlighted funds.[30] Charts 1–4 show the style exposures for the four funds, based on a rolling 60-month data window (that is, the style exposure shown for each month represents the average style exposure over the 5 years ending in that month).

- Berkshire Hathaway mutated from a small-value fund in the 1970's and 1980's to a large-value fund today. However, the "style fit" (percentage of variance explained by the style benchmarks) was poor for Berkshire Hathaway, indicating that the fund pursued a strategy that was not closely tied to benchmarks.[31]
- Magellan likewise changed over the years, with small-cap exposure dominating the fund at the beginning but shrinking to a market weight by 1990–1991; today Magellan is a large-cap growth fund.

Chart 1
Berkshire Hathaway



- BGI TAA's timing decisions gave the fund a value tilt on average, but this was highly variable: the fund was 100% exposed to large value for a brief period in the late 1980's and early 1990's, and was "growthy" at the fund's inception and then again recently due to a large weight in the "growthy" S&P 500.[32]
- The Ford Foundation maintained a balance between growth and value, except in the late 1980's when it was mostly value-oriented. It has had only a little small-cap exposure. Today it manifests a modest growth bias.

Chart 3
BGI TAA

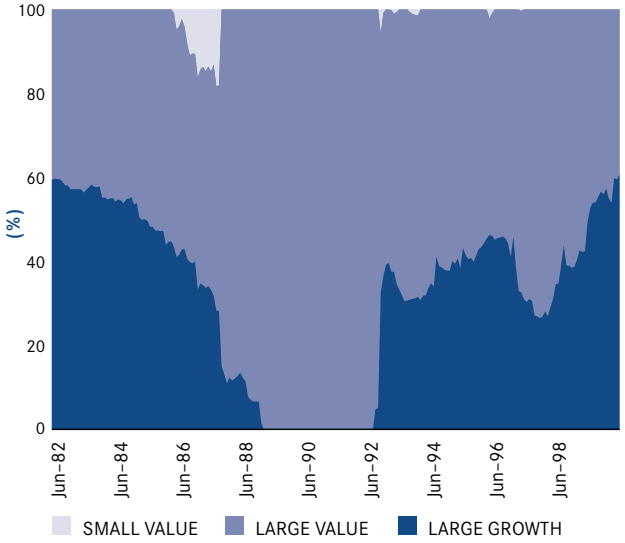


Chart 2
Magellan

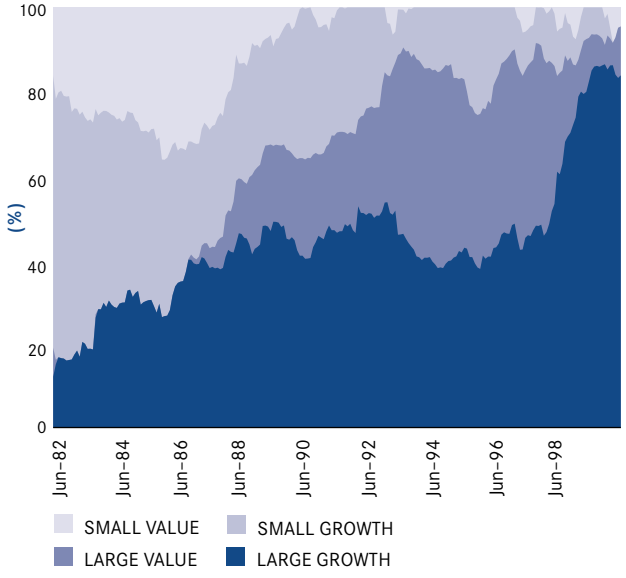
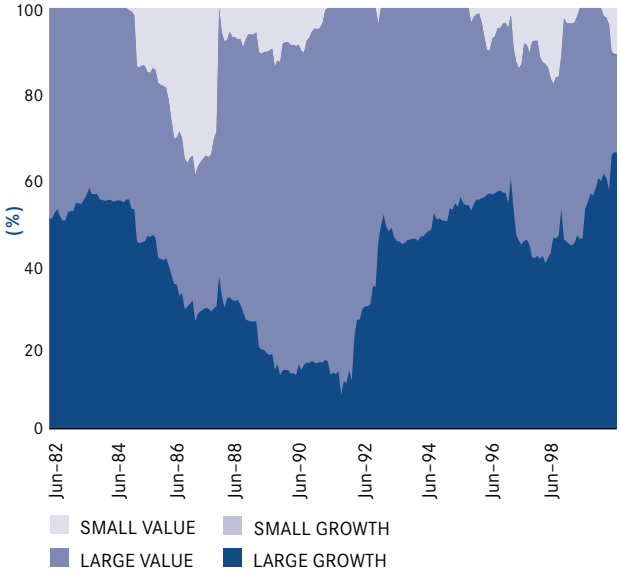


Chart 4
Ford Foundation



VI. Conclusion

By varying the measurement tool used to assess fund performance, one arrives at very different lists of "best-performing" funds. The Sharpe ratio, which is the most general tool for making the across-asset-class comparisons in this study, ranks BGI TAA as the number-one fund over the 20-year-and-three-month time period ending in March 2000. Many celebrated funds are missing from the list of top funds as ranked by Sharpe ratio while many lesser-known funds are near the top of the list. When other measurements are taken into consideration, however, some familiar names emerge as winners. Berkshire Hathaway had the highest CAPM alpha. The Driehaus Small Growth fund had the highest absolute total return (that is, return unadjusted for risk), and ranked highly by most of the measures we used. Fidelity's Magellan Fund also generally ranked highly, and had the highest Sharpe ratio over our longer study period covering the 22 years and nine months ending in March 2000.

To give a sense of scale as to what active management can achieve, let's look at the range of CAPM alphas produced by the managers we studied. The highest alpha over the 1980-2000 period, that of Berkshire Hathaway, was about 850 basis points per year. The tenth-highest alpha was less than 300 basis points per year. (This scale is stretched somewhat by the failure of the alpha calculation to adjust fully for the risks taken in concentrated strategies, and by mismatch between the strategy and the benchmark.) This result implies that it is difficult for all but the best (or luckiest) managers to depart far from the returns offered by markets. Going forward, our results suggest that 20-year realized annual alphas of, say, 2000 basis points are all but inconceivable while realized alphas of 100 basis points should be generated by quite a few managers. Expected alphas of even 300 to 400 basis points, commonly promised by aggressive equity managers, should probably be dismissed as exaggerated marketing claims.

Ranking on other indicators of active management ability tells a similar story. For example, the highest information ratio achieved over the period was less than 0.9, and the tenth highest less than 0.5. While managers often point to information ratios above 0.5 as being indicative of skill, it turns out that such a track record has very rarely been sustained over a 20-year period. As with expected alphas, investors should expect much more modest information ratios than they have been typically promised.

Along the way to these findings, we have catalogued a great deal of information about statistical performance measurement techniques as well as funds and managers. We conclude that there cannot be a single best performance statistic, since each investor has his or her own view about what constitutes the risk for which returns need to be adjusted. Thus we recommend that performance analysis be conducted using multiple measures, so that investors can have a variety of viewpoints from which to assess long-term investment performance.

Exhibit 1

Top 11 funds ranked by Sharpe ratio over January 1980–March 2000

Rank	Fund name	Fund structure	Inv. strategy	Compound annual return (%)	Annualized standard deviation of quarterly returns (%)	Sharpe ratio
1	BGI TAA	Inst. commingled acct.	US AA	17.30	11.20	0.906
2	W. H. Reaves	Inst. composite	US balanced	18.13	12.58	0.878
3	Harvard University	Endowment	Global balanced	15.77	10.08	0.863
4	Phoenix-Engemann Capital Growth A	Mutual fund	US equity	19.17	14.19	0.857
5	Dresdner RCM Balanced	Inst. composite	US balanced	16.89	11.49	0.855
6	Magellan	Mutual fund	US equity	23.57	20.07	0.844
7	Ashland Large-Cap Growth	Inst. composite	US equity	21.72	17.74	0.841
8	Inst. Capital Discretionary Equity	Inst. separate acct.	US equity	18.27	13.44	0.839
9	Waddell & Reed Core Equity	Inst. composite	US equity	19.68	15.50	0.826
10	Boston Co. Core Value Equity	Inst. composite	US equity	18.34	13.91	0.823
11	Ford Foundation	Endowment	Global balanced	15.41	10.25	0.818

Exhibit 2

Top 20 funds ranked by total return over January 1980–March 2000

Rank	Fund name	Compound annual return	Sharpe ratio
1	Driehaus Small Growth	31.34	0.752
2	Berkshire Hathaway	28.99	0.786
3	Jundt Emerging Growth	24.42	0.768
4	Spectra	24.07	0.735
5	Magellan	23.57	0.844
6	Alliance Large Cap Growth	22.11	0.780
7	Fred Alger Growth	22.09	0.705
8	Van Kampen Emerging Growth A	22.04	0.676
9	Jennison Growth Equity	21.90	0.746
10	Ashland Large-Cap Growth	21.72	0.841
11	United Science & Technology A	21.53	0.672
12	Columbus Circle Large Cap Growth	21.39	0.798
13	Deutsche Pyramid Small-Cap	21.30	0.599
14	Janus	20.93	0.789
15	CGM Capital Development	20.80	0.617
16	Putnam Voyager A	20.72	0.675
17	Provident Large-Cap Growth	20.69	0.671
18	AXP New Dimensions A	20.68	0.764
19	Dresdner RCM Large Cap	20.65	0.816
20	Jundt Core Growth	20.50	0.734
89	S&P 500	17.77	0.734
111	BGI TAA	17.30	0.906
222	Ford Foundation	15.41	0.818
253	60/40 Benchmark	14.91	0.761
263	Global Balanced Benchmark	14.73	0.701

Exhibit 3

Top 20 funds ranked by information ratio over January 1980–March 2000

Rank	Fund name	Information ratio relative to benchmark	Benchmark	Compound annual return	Standard deviation	Sharpe ratio
1	Western Asset Core	0.888	LA	11.21	8.17	0.535
2	PIMCO Total Return	0.783	LA	11.41	7.73	0.586
3	Magellan	0.690	SP	23.57	20.07	0.844
4	Alliance Large Cap Growth	0.645	SP	22.11	20.11	0.780
5	Standish, Ayer & Wood Active Core	0.641	LA	11.25	8.17	0.540
6	Driehaus Small Growth	0.606	SP	31.34	36.58	0.752
7	Berkshire Hathaway	0.566	SP	28.99	30.39	0.786
8	STW Long Duration Tax Exempt	0.551	LA	12.80	11.42	0.537
9	Columbus Circle Large Cap Growth	0.550	SP	21.39	18.51	0.798
10	W. R. Huff High Yield	0.498	LA	13.92	9.03	0.766
11	Jennison Growth Equity	0.496	SP	21.90	21.01	0.746
12	Dresdner RCM Large Cap	0.494	SP	20.65	17.01	0.816
13	Spectra	0.480	SP	24.07	24.87	0.735
14	Jundt Emerging Growth	0.476	SP	24.42	23.88	0.768
15	Miller, Anderson & Sherrerd Core Fixed	0.468	LA	11.41	8.65	0.531
16	Dresdner RCM Balanced	0.465	60/40	16.89	11.49	0.855
17	Prudential Private Placement Investors	0.461	LA	10.89	8.00	0.508
18	Lehman Corp. BAA Long Term Index Fund	0.456	LA	11.72	11.51	0.447
19	Columbia Intermediate Fixed Income	0.447	LA	10.45	8.32	0.442
20	Ashland Large-Cap Growth	0.447	SP	21.72	17.74	0.841
116	Ford Foundation	0.123	60/40	15.41	10.25	0.818

Exhibit 4

Top 20 funds ranked by CAPM alpha over January 1980–March 2000

Rank	Fund name	CAPM alpha	Alpha t-statistic	Compound annual return	Sharpe ratio
1	Berkshire Hathaway	8.498	1.639	28.990	0.786
2	Driehaus Small Growth	7.338	1.286	31.335	0.752
3	W. H. Reaves	5.478	2.344	18.131	0.878
4	Jundt Emerging Growth	4.655	1.323	24.415	0.768
5	BGI TAA	4.020	2.251	17.297	0.906
6	Lindner Asset Allocation	3.980	2.108	14.954	0.810
7	Ashland Large-Cap Growth	3.694	1.818	21.716	0.841
8	Magellan	3.578	1.915	23.567	0.844
9	Spectra	3.102	0.943	24.071	0.735
10	Sequoia	2.952	1.393	17.915	0.776
11	Van Kampen Emerging Growth A	2.931	0.781	22.044	0.676
12	Janus	2.749	1.316	20.930	0.789
13	Phoenix-Engemann Capital Growth A	2.699	2.032	19.175	0.857
14	Waddell & Reed Core Equity	2.615	1.591	19.679	0.826
15	United Science & Technology A	2.488	0.698	21.531	0.672
16	Jundt Core Growth	2.377	0.958	20.498	0.734
17	Ashfield Core Growth	2.263	1.037	19.779	0.746
18	Institutional Capital	2.215	1.757	18.270	0.839
19	Harvard University	2.114	1.781	15.774	0.863
20	Columbus Circle Large Cap Growth	2.094	1.393	21.390	0.798
49	Ford Foundation	1.422	1.454	15.410	0.818
89	60/40 Benchmark	0.601	0.826	14.908	0.761
93	Global Balanced Benchmark	0.513	0.418	14.735	0.701
134	S&P 500	0.000	0.000	17.767	0.734

Exhibit 5

Top 20 funds ranked by Treynor ratio over January 1980–March 2000

Rank	Fund name	Treynor ratio	Comp. ann. return	Sharpe ratio	Benchmark
1	Lindner Asset Allocation	22.32	14.95	0.810	60/40
2	W. H. Reaves	22.02	18.13	0.878	SP
3	USAA Income	19.85	10.28	0.439	60/40
4	BGI TAA	18.38	17.30	0.906	60/40
5	Berkshire Hathaway	17.24	28.99	0.786	SP
6	Vanguard Wellesley Income	16.25	12.90	0.664	60/40
7	Franklin Utilities A	16.24	11.98	0.432	SP
8	Driehaus Small Growth	15.15	31.34	0.752	SP
9	Sequoia	15.13	17.91	0.776	SP
10	Jundt Emerging Growth	14.88	24.42	0.768	SP
11	Ashland Large Cap Growth	14.76	21.72	0.841	SP
12	Harvard University	14.67	15.77	0.863	GB
13	Phoenix-Engemann Capital Growth A	14.27	19.17	0.857	SP
14	Magellan	14.08	23.57	0.844	SP
15	Waddell & Reed Core Equity	13.95	19.68	0.826	SP
16	Institutional Capital	13.82	18.27	0.839	SP
17	Janus	13.74	20.93	0.789	SP
18	Franklin Income A	13.74	12.40	0.512	60/40
19	Dresdner RCM Balanced	13.71	16.89	0.855	60/40
20	Spears Benzak Large Cap	13.56	16.57	0.799	SP
26	Ford Foundation	13.37	15.41	0.818	GB
76	60/40 Benchmark	12.01	14.91	0.761	
82	Global Balanced Benchmark	11.88	14.73	0.701	
132	S&P 500	11.10	17.77	0.734	

Exhibit 6

Top 20 funds ranked by style-adjusted alpha over January 1980–March 2000

Rank	Fund name	Style-adjusted alpha	Style-adjusted alpha t-statistic	Compound annual return	Sharpe ratio
1	Driehaus Small Growth	16.786	4.321	31.335	0.752
2	Jundt Emerging Growth	10.323	4.058	24.415	0.768
3	Van Kampen Emerging Growth A	8.871	3.250	22.044	0.676
4	United Science & Technology A	8.455	3.553	21.531	0.672
5	Spectra	8.331	3.446	24.071	0.735
6	Kemper Technology A	6.683	2.872	20.306	0.611
7	Deutsche Pyramid Small Cap	6.556	2.740	21.304	0.599
8	Fred Alger Growth	6.247	3.203	22.088	0.705
9	Berkshire Hathaway	6.063	1.159	28.990	0.786
10	Jundt Core Growth	5.470	2.553	20.498	0.734
11	United Vanguard A	5.463	3.274	19.032	0.708
12	Deutsche Pyramid Capital Appreciation	5.367	2.642	20.453	0.622
13	Janus	5.314	2.959	20.930	0.789
14	Delaware Trend A	5.202	1.956	20.342	0.595
15	Ashland Large-Cap Growth	5.147	2.559	21.716	0.841
16	Fortis Growth A	4.709	2.446	19.277	0.588
17	Jennison Growth Equity	4.707	3.378	21.900	0.746
18	AXP New Dimensions A	4.621	3.509	20.683	0.764
19	Magellan	4.555	2.737	23.567	0.844
20	Putnam Vista A	4.379	2.063	20.174	0.692
36	BGI TAA	3.439	2.245	17.297	0.906
70	Ford Foundation	1.920	2.875	15.410	0.818
162	Global Balanced Benchmark	0.023	0.018	14.735	0.701
165	60/40 Benchmark	0.000	0.000	14.908	0.761
166	S&P 500	0.000	0.000	17.767	0.734

Exhibit 7

Additional data on highlighted managers

	Bull and bear markets: Average monthly return in excess of benchmark (%)		Crashes of 1987 and 1998: One-month return in excess of benchmark (%)		Market volatility
	Bull markets	Bear markets	October 1987	August 1998	Correlation of monthly returns in excess of benchmark with volatility measure*
Berkshire Hathaway	1.21	1.70	0.40	0.89	–0.142
BGI TAA	0.10	0.73	20.38	–1.74	0.544
Ford Foundation	0.11	–0.08	–1.11	–2.11	–0.089
Magellan	0.52	0.88	–5.46	–1.20	–0.044

* June 1977–December 1998. "Volatility measure" = standard deviation of daily S&P 500 returns within each month.

Endnotes

1 Siegel, Laurence B., Kenneth F. Kroner, and Scott W. Clifford, "The Greatest Return Stories Ever Told," *The Journal of Investing*, Summer 2001.

2 Extensive commentary on the Sharpe ratio, including a discussion of alternative formulations of the ratio, is in Dowd, Kevin, "Adjusting for risk: An improved Sharpe ratio," *International Review of Economics & Finance*, 2000 (Vol. 9, issue 3).

3 Sharpe, William F., "Mutual fund performance," *Journal of Business*, January 1966.

4 Sortino, Frank, and Robert van der Meer, "Downside risk." *Journal of Portfolio Management*, Summer 1991.

5 See, for example, almost the entire Fall 1994 issue of *The Journal of Investing*.

6 The alpha described in equations (2a) through (2c) is sometimes referred to as Jensen's alpha, after the Harvard professor Michael C. Jensen, to distinguish it from other formulations of alpha. (See Jensen, Michael C., "The performance of mutual funds in the period 1945–1964," *Journal of Finance*, May 1968.) A good general discussion of alpha, beta, and the CAPM is in Sharpe, William F., Gordon J. Alexander and Jeffery V. Bailey, *Investments*, 5th edition, Prentice Hall, Englewood Cliffs, N..J., 1995, chapter 8, pp. 206–211 (on the "market model," used to calculate portfolio alpha), and chapter 10 (on the CAPM). Like many authors, Sharpe et al. draw a distinction between the market model and the CAPM, noting that the CAPM is a description of how prices are set for securities in equilibrium, and thus is predictive—it estimates the *expected* return. The market model, in contrast, seeks only to apportion actual *past* return in excess of the riskless rate between the part attributable to market movement (beta, multiplied by the market return in excess of the riskless rate) and the part that is security- or portfolio-specific (alpha). Strictly speaking, we use the market model, not the CAPM, to estimate alpha and beta; and the market model would produce numerical estimates of a security's or portfolio's alpha and beta even if the CAPM were completely invalid or had never been invented. However, since the estimates produced by the market model contain useful information only if the CAPM is true, it is appropriate for the purpose of this article to refer to the resulting statistics as "CAPM alpha and beta."

7 This value added is sometimes attributed to manager "skill," although we would point out that this method does not enable one to distinguish skill from luck as contributors to value added by the manager. Dybvig, Philip, and Stephen A. Ross, "Differential information and performance measurement using a security market line," *Journal of Finance*, June 1985, and Elton, Edwin J., and Martin J. Gruber, "Differential information and timing ability," *Journal of Banking and Finance*, February 1991, have made additional worthwhile observations on the danger of interpreting alpha as "skill."

8 Eugene F. Fama and Kenneth R. French, in "The cross-section of expected stock returns," *Journal of Financial Economics*, June 1992, observe that over the period they studied, the CAPM line for US equities was completely flat, which is tantamount to finding that the CAPM is worthless. Several authors have responded by demonstrating that the CAPM does hold, over other periods or using different estimation methods; see Chan, Louis, and Josef Lakonishok, "Are reports of beta's death premature?" *Journal of Portfolio Management*, Summer 1993, and Kothari, P. P., Jay Shanken, and R. G. Sloan, "Another look at the cross section of expected stock returns," *Journal of Finance*, March 1995. No firm conclusion has been reached and the controversy continues.

9 Treynor, Jack L., "How to rate management of investment funds," *Harvard Business Review*, January–February 1965.

10 The information ratio was first described by Treynor, Jack L., and Fischer Black, "How to use security analysis to improve portfolio selection," *Journal of Business*, January 1973.

11 Fama, Eugene F., and Kenneth R. French, "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, February 1993.

12 Note that book-to-price is the reciprocal of the more familiar price-to-book ratio, so that the high book-to-price portfolio contains value stocks and the low book-to-price ratio contains growth stocks. Thus, a positive value for HML in a given period is a high return for value relative to growth, and a positive beta on that factor identifies a positive relation between the return on portfolio *p* and the return on value stocks relative to growth.

13 We obtained the monthly factor return data for HML and SMB from Kenneth R. French's Web site, http://web.mit.edu/kfrench/www/data_library.html. We used the benchmark factors, not the research factors. The methodology for the factors can be found on the Web site by following appropriate links.

14 Sharpe, William F., "Asset Allocation: Management Style and Performance Measurement," *Journal of Portfolio Management*, Winter 1992.

15 This estimate is accurate if the equity market beta of the fixed-income assets is zero.

16 A composite is a series of time-weighted rates of return on the aggregation of accounts invested in a given investment product or strategy. The intent of a composite is to describe the return that would have been available to a typical investor in the strategy, and is supposed to avoid biases caused by managers reporting only their best-performing accounts within that strategy.

17 In compiling data from the managers, Wilshire requested composites but some managers may have supplied separate-account data. Starting in 1993, data comply with Association for Investment Management and Research (AIMR) performance presentation standards and reflect composites only.

18 The Northern Trust actually provided a mixture of quarterly and monthly data, with monthly data for all accounts starting in April 1985. We converted the entire institutional separate-account sample to a quarterly frequency so that we could compare it to the larger institutional composite sample, which is quarterly and which covers roughly the same time period.

19 Northern provided only account numbers and returns. We obtained manager names by hand-matching compound annual returns from the Northern database, over a subperiod of that provided by Northern, to a list of managers and their compound returns over the same time period.

For two managers that rank highly enough to be included in the data tables (Institutional Capital and Lincoln Capital), we have both an institutional separate account and an institutional composite for the same product over the same time period. Because the separate-account returns were actually achieved by a single client, we consider that series more revealing. To avoid double-counting the manager in rankings, we deleted the composite when separate-account data were available.

20 There are few instances of such customer loyalty, which is why we have data for only 12 accounts. Pension plan sponsors tend to be quick to hire and fire managers, so a sponsor must be profoundly happy with a manager to keep him or her for more than two decades. Thus, the returns in the institutional separate account sample are probably higher than average. The upward bias in the sample works in our favor because we are looking for the highest-returning funds (rather than an unbiased sample representing the average investor's experience), and it is likely we have found them, or most of them, despite the small sample size.

21 While BGI runs a mutual fund based on the TAA strategy, the returns presented here for BGI TAA are all institutional. The returns represent a separate account until March 31, 1985, when the commingled BGI TAA fund was created; monthly return data starting April 1985 thus represent a composite.

22 Note that Morningstar's use of the word "growth" refers to the capital appreciation expected from diversified stock portfolios, and is not an indicator of the manager using a growth, as compared to value, style of selecting stocks.

23 As noted earlier, we selected this particular time period because of data availability for other institutional managed accounts. BGI TAA data are available over a longer period (starting July 1977). We selected the Sharpe ratio as the principal ranking variable for reasons discussed in section III.

24 Train, John, *The New Money Masters*, Harper & Row, New York, 1989, pp. 171–191.

25 The Treynor ratio may be interpreted as follows: USAA Income, with a beta of 0.18, could have been leveraged more than five-to-one to achieve a beta of 1.00, at which point it would have had a compound annual return of 26.7%, which is the sum of the Treynor ratio of 19.8% and the riskless rate of 6.9%.

26 The "smallness beta" is the beta coefficient of the fund's returns on the small-minus-large-cap factor returns, where a higher number indicates more small-cap exposure; negative numbers indicate even greater large-cap exposure than that of the S&P 500 benchmark. The "valuation beta" is the beta coefficient of the fund's returns on the value-minus-growth factor returns, where positive numbers indicate a value style and negative numbers indicate a growth style.

27 Magellan, with its valuation beta of 0.002 just barely putting it in the value category, should not be counted as a value fund on the basis of that measurement.

28 Some readers will wonder how a fund that earned 6.5% in October 1987 when the benchmark fell by 11.5% can be said to have an excess return of 20.4%, not 18% (the sum of 6.5% and 11.5%). As with most such wonderments, the answer has to do with arithmetic versus geometric calculations. The excess return of 20.4% is calculated as the return relative on the fund, (1 + 0.65) = 1.065, divided by the return relative on the benchmark, (1 – 0.115) = 0.885, minus one.

29 We have the volatility measure, based on daily data, only through 1998.

30 As the style benchmarks (regressors), we used the Fama–French large growth (BL), large value (BH), small growth (SL) and small value (SH) benchmarks, from Kenneth R. French's Web site, http://web.mit.edu/kfrench/www/data_library.html. (The two-letter abbreviations are the codes used in Fama and French's data tables to identify the series.) We used the benchmark portfolios, not the research portfolios. The methodology for the portfolios can be found on the Web site by following appropriate links.

31 "Style fit" data are not shown.

32 Although the S&P 500 is style-neutral by construction when analyzed using S&P value and growth benchmarks, it has a pronounced growth bias relative to the Fama–French benchmarks used for this analysis.

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