



Morningstar Research Paper

Estimating Portfolio Style:
A Comparative Study of Portfolio-Based
Fundamental Analysis and Returns-Based Style Analysis

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Introduction

Investment style has become a prominent concept in the world of investment management. Fiduciaries who select mutual funds or money managers for retirement plans and pensions often place a high premium on consistency of investment style, and even many individual investors now recognize the important role played by style in influencing a fund's behavior. Yet little academic research has been conducted that empirically and systematically compares the two most common approaches to assessing a mutual fund's investment style, portfolio-based fundamental style analysis and returns-based style analysis. Each method has its proponents and detractors, yet fundamental questions about the accuracy of each approach remain open. This paper attempts to clarify the debate over style analysis and fill in existing knowledge gaps by undertaking an empirical analysis of the accuracy of the two methods, with respect to an actual set of open-end mutual funds. Using the database of Morningstar, Inc., we tested the results of both methodologies in relation to all U.S. diversified equity funds for which Morningstar has complete historical data since 1997. We find that while both portfolio-based and returns-based analysis can be useful in certain circumstances, portfolio-based analysis is in general more accurate. Moreover, a key finding is that holdings-based analysis maintains its advantage even when older portfolio data are used; as discussed below, this result counters a frequent criticism of the portfolio-based approach.

Methodological Background of Portfolio-Based and Returns-Based Style Analysis

Fundamental, or portfolio-based, analysis has historically been viewed as "common-sense" approach to evaluating the style composition of a mutual fund. Fundamental analysis determines a portfolio's style by an examination of the actual underlying holdings. No elaborate methodology is required to perform the analysis, only a consistent framework for defining the risk factors by which the individual securities will be categorized.

Naturally, fundamental analysis produces the highest degree of accuracy when examining a current portfolio. The biggest drawbacks to fundamental analysis are the timeliness and cost of the data. Whereas mutual fund holdings were once obtainable only irregularly and with great difficulty, however, fund companies are now required to disclose holdings at least semiannually, and several well-established third-party firms collect and analyze the data. The cost of tracking holdings for a substantial assemblage of funds remains high, however.

Given the twin issues of timeliness and cost in accumulating portfolio-based data, the investment community has long sought a cheaper, more-practical substitute. In the late 1980s, an alternative was indeed introduced. Developed by William Sharpe, returns-based style analysis quickly gained popularity (see Sharpe [1988]). Today, the technique has become a frequently used analytical tool for pension managers, plans sponsors, consultants, and others in the world of investment management. Returns-based style analysis uses a method of

constrained quadratic optimization to regress an investment portfolio's returns against a set of predetermined benchmark indexes in order to determine what Sharpe called its "effective asset mix"—essentially, the asset allocation that most closely approximates the behavior of the fund during the period over which the regression takes place (Sharpe [1988, 1992]). The parameters of the regression are constrained to be non-negative and to add up to 100%. Commercial software applications that perform Sharpe's return-based style analysis have made the methodology widely available. As summarized by Christopherson and Sabin [1999], returns-based style analysis "has become popular because, among other reasons, it requires few inputs, is relatively easy to perform, and yields a reasonable picture of market and style exposure at the broad-brush level."

What remains to be addressed regarding returns-based style analysis is its accuracy. Controlling for investment style has come to be viewed as a critical aspect of investment monitoring and decision-making in both the financial-planning and pension-management communities. Money managers are often evaluated, in part, based on how well they stay within the bounds of a given investment style. In addition, investment style is often used as a proxy for risk, and the value of a such an approach depends on a correct initial assessment of style. A central question, therefore, is how well each method of style classification actually performs the job it claims to perform. How accurately have returns-based style analysis and portfolio-based fundamental analysis described the style traits of funds? At what point may returns-based style analysis be considered "fresher" (i.e., more timely) than portfolio-based fundamental analysis? Surprisingly, little empirical research has been conducted on these crucial questions, and none that adequately addresses them in a comparative and systematic fashion.

Literature Review

Most previous studies on this subject have focused on returns-based style analysis alone, rather than comparing style analysis with alternatives or examining fundamental analysis independently. These previous investigations have made important contributions to our understanding of the limitations of style analysis and ways of improving the method's accuracy; nevertheless, they fail to offer any empirically tested answer to the question of what degree of error can normally be expected from style analysis, whether this level is an acceptable alternative to fundamental analysis, or when fundamental data become "too old." Lobosco and DiBartolomeo [1997] developed a formula to measure the "confidence intervals" of various style weights and recommend using daily return data, as opposed to the more common monthly data. However, they fail to display asymptotic results for the distributions of the estimates, thus the usefulness of the standard errors that they report is not clear. The authors also point out that the constrained regressors in returns-based style analysis can be collinear, thus limiting the precision of the estimates. Buetow, Johnson and Runkle [2000] do look at aggregate mutual fund statistics, but only with the aim of determining consistency of style exposures. The authors recommend using portfolio-specific or custom benchmarks to

improve the stability of results using style analysis, but they do not address the problems of collinearity raised by Lobosco and DiBartolomeo.

Despite the lack of quantifiable comparative data, many of these studies assert based on statistical or theoretical reasoning that returns-based style analysis serves as an adequate substitute for fundamental analysis, given the greater labor and expense involved in accumulating the portfolio data necessary to perform fundamental analysis (Lieberman [1996]). Some go so far as to suggest that the difficulty of obtaining timely portfolio data may render fundamental analysis less reliable than style analysis (Cummisford and Lummer [1996]). A more moderate position concedes that some level of fundamental analysis is necessary to ground the style analysis, and that “style analysis can be used as an additional method to verify more traditional techniques, such as holdings-based analysis.”¹ Yet even the strongest critics of style analysis, such as Christopherson, who advocates holdings-based analysis instead, rarely offer empirical proof for their arguments.²

Some more empirical comparative studies have been conducted recently, however, although their focus and approach differ from that of the present study. Mayes, Jaye, and Thurston [2000], for instance, use discriminant analysis techniques to assess the consistency of returns-based style analysis with fund objective categories for a reasonably large sample of funds. They find that style analysis correctly predicts category membership for a statistically significant percentage of funds. The authors’ claims are complicated by the fact that their definition of statistically significant includes a correlation of 15% for capital appreciation funds, an unacceptably high error rate on a practical level, and by their use of traditional fund objectives, a method of categorizing mutual funds whose reliability is questionable because of its partial reliance on a fund’s stated investment practice.

Kahn [1996] performs a future-oriented comparative study that is focused on the value of style analysis in predicting fund risk. Kahn finds that forecasts of the risk of a mutual fund based on the portfolio approach generally have a higher correlation with future risk than do forecasts based on historical performance (i.e., returns-based analysis). This implies that the portfolio approach produces more accurate predictions of risk. Kahn bases his research on only a small sample, however. Also supporting the superiority of portfolio-based analysis is the study conducted by Chan, Chen, and Lakonishok [1999]. In the course of a wide-ranging discussion of mutual fund investment styles, the authors devote some attention to the relative merits of portfolio-based and style-based analysis (which they refer to as “characteristics-based” and “loadings-based” approaches, respectively). Although they find that in their general fund sample the two methodologies have fairly close correlations in reading a fund’s investment style, in a smaller sample of cases where the two approaches are greatly mismatched, portfolio-based analysis shows greater accuracy in predicting future returns.

This paper extends the current literature by focusing on the comparative abilities of portfolio-based and returns-based style analysis in assessing current portfolio

styles. Our study, described in detail below, finds that while both returns-based analysis and fundamental analysis can in certain cases provide acceptable levels of accuracy, in general fundamental analysis provides a greater degree of accuracy. Later, we discuss the practical implications of our findings for investors and fiduciaries.

Data and Methodology

Our study began by selecting from Morningstar’s database those diversified U.S. equity funds for which we annual portfolios for a 12-31 date from 1997 through 2000, and complete monthly performance data since 1995. This resulted in a total sample of 586 funds (multiple share classes were eliminated).³

We initially established a baseline portfolio for each fund using a holdings-based analysis of each as of 12-31-2000. Each individual security in the portfolio was identified according to its appropriate style category: cash, bonds, international equity, or one of six style subcategories for U.S. equities assigned to a corresponding Russell Style Index from the Frank Russell Company: large growth, large value, mid-cap growth, mid-cap value, small growth, and small value. [see Table 1] This set of data, referred to as FA 00, forms the “correct” style breakdown of the 586 funds as of 12-31-00—that is, the actual style composition of the fund at that given point in time, as defined by the selected indexes. We then ran similar portfolio-based analyses for the 586 funds as of year-end 1999 (FA 99), 1998 (FA 98), and 1997 (FA 97). In each instance, securities were classified according to Russell’s 12-31-00 subcategories.

Table 1. Style Categories and Corresponding Benchmark Indexes

Cash	90-day Treasury Bill
Bonds	Lehman Brothers Aggregate
International Equity	MSCI EAFE ND
U.S. Large Growth	Russell Top 200 Growth
U.S. Large Value	Russell Top 200 Value
U.S. Mid-Cap Growth	Russell Mid Cap Growth
U.S. Mid-Cap Value	Russell Mid Cap Value
U.S. Small Growth	Russell 2000 Growth
U.S. Small Value	Russell 2000 Value

Next we performed a comparative returns-based style analysis using a constrained quadratic regression following Sharpe’s recommended method, which requires three years of monthly return data.⁴ The same Russell indexes that were used with the fundamental portfolios were chosen. These indexes limit the most commonly identified problems in index selection, multicollinearity and insufficient coverage of asset classes. In addition, Russell indexes are frequently used as benchmarks for mutual fund managers, making them appropriate for this test case. Finally, the Russell indexes (unlike, for example, the style indexes of Standard & Poor’s), are comprehensive, thereby permitting the highest possible

hit rate for holdings within the individual mutual funds (that is, the percentage of securities found in both the fund and the index). In cases where a stock crossed two style categories, its weighting was distributed according to a ratio assigned by Russell.⁵

Using the same sampling of 586 mutual fund portfolios, we ran style analysis calculations for year-end 2000 (SA 00), 1999 (SA 99) 1998 (SA 98), and 1997 (SA 97). Extending the study back to 1997 allows us to test the efficacy of style analysis on a current portfolio, its out-of-sample predictive value up to three years from the baseline portfolio, and its comparative value vis a vis fundamental analysis.

With four years of data in hand that show both the fundamental analysis and returns-based analysis of a large sampling of diversified equity mutual funds, we are in a position to address the questions most important to investors; namely, how accurate is each methodology in its estimation of portfolio style traits, what degree of error can typically be expected, in what circumstances is each method best used, and how do the two methods stack up against one another? Our study first examines the reliability of style-based analysis in assessing a current, holdings-based portfolio; it then analyzes the accuracy of fundamental analysis when using older portfolios.

Results

Assessing the Style of Current Portfolios

One of the basic questions an investor might ask is how well portfolio-based and returns-based analysis evaluate the style exposure of a fund's *current* portfolio. This is to some extent a loaded question, since one expects the fundamental analysis of a current portfolio to be the correct one (FA 00 in our study).⁶ Returns-based analysis, by definition, can only serve as a constrained *estimate* of a portfolio's current exposures. Nevertheless, the test is a reasonable one in that the output of returns-based style analyses are frequently used as proxies for a fund's current positioning. The question then becomes, since returns-based style analysis is an estimate, what is the error term? There is also a question to be asked of portfolio-based fundamental analysis: namely, at what rate does its quality degrade over time? Since, on a pragmatic basis, the most current portfolio may not always be available to conduct holdings-based analysis, it is instructive to test a less-satisfactory alternative, a one-year-old portfolio. Thus, to answer both questions regarding style analysis of current portfolios—the relative accuracy of a “current” returns-based style analysis and a year-old portfolio—we compare FA 00 with both SA 00 and FA 99.

Because the portfolios under consideration belong to diversified U.S. equity funds, our primary interest throughout this study is in the results for the domestic stock portions of the portfolios. To assess these results, we use two different methods for measuring accuracy: correlation and mean absolute deviation. Correlation expresses in percentage terms the degree to which the holdings of a test portfolio match an actual baseline portfolio. For example, to compare large-

growth style exposure in a test portfolio of SA 2000 with a baseline portfolio of FA 2000, we take the percentage of assets attributed to large growth in SA 2000 and determine their fit with the large growth component of FA 2000, on a percentage basis. We then repeat this process for each style category. Correlation figures offer a good first-line assessment of error, but to look at the actual impact of the estimation “error,” it is helpful to examine absolute deviation alongside correlation. Absolute deviation--the unsigned difference between the style category exposures of a test portfolio and the baseline portfolio--is a relevant and intuitive measure because, on a practical level, investors and consultants are more likely to think in terms of the absolute deviation of an asset class from its prescribed allocation than in percentage terms. A 75% correlation may look acceptable at first, for example, but if it results in a plus-or-minus 15-percentage-point deviation from a style target of 20%, this correlation quickly becomes less acceptable.

Taking first the SA 00 data, we find a correlation ranging from strong (88% for large growth) to middling (64% for midcap value). [see Table 2] When we look at the correlations for FA 99, however, we find substantially higher correlations. For domestic stock style categories, no correlation is lower than 85% (midcap value), and the highest is 94% (small value). These correlations are higher in every case than those of SA 00. Therefore, it is reasonable to say that, as measured by correlation, using fundamental analysis for a year-old portfolio results in only a marginal decline in value for estimating the style of a current portfolio, and a considerable improvement over returns-based analysis. Because of complicating factors associated with international stocks, we have not made them a focus of this study, but it is worth noting in passing that FA 99 produces visibly higher correlations (58%) than SA 00, which scores very poorly (6%).⁷

Table 2. Correlations with FA 2000

Series	SA_2000	FA_1999
CASH	0.17	0.39
BOND	0.11	0.50
INTL	0.06	0.58
LG	0.88	0.92
LV	0.74	0.91
MG	0.70	0.87
MV	0.64	0.85
SG	0.68	0.92
SV	0.79	0.94

We then examine the statistics for mean absolute deviation from the baseline portfolio. In the case of current portfolios, we can see that the deviations for SA 00 are on average greater than those for FA 99, in some cases by a factor of two or more (see Table 3). Double-digit deviations exist for large value (11.21) midcap value (12.64), and small growth (10.31). By contrast, FA 99 does not

reach this level for any style categories; the highest deviation is 7.79, for large growth. These results confirm the results for correlations, that using “current” returns-based style analyses provides significantly less accurate estimates of a fund’s portfolio-based style exposure than using a 12-month-old portfolio.

Table 3. Mean Absolute Deviations from FA 00

Series	SA_2000	FA_1999
CASH	5.16	3.59
BOND	2.15	0.66
INTL	4.55	2.20
LG	7.67	7.79
LV	11.21	6.97
MG	9.60	5.33
MV	12.64	5.83
SG	10.31	4.17
SV	7.05	2.76

Using Older Portfolios in the Assessment of Style

Our results thus far indicate that a year-old portfolio used for fundamental analysis of a current portfolio provides better results than a current returns-based style analysis. At what point does fundamental analysis lose this advantage? When does returns-based style analysis become a more accurate estimator of a fund’s current portfolio? To answer this question, we tested the results of a three-year-old portfolio (FA 1997) against both the current fundamental portfolio (FA 00) and the current portfolio as determined by returns-based style analysis (SA 00). (Older returns-based style analysis results [SA 1997] are also compared).⁸ This is reasonable because returns-based style analysis gives equal weight to each of the 36 monthly returns, thus one can argue that on average the returns-based information is 18 months old.

As far out as three years, fundamental analysis continues to provide results that are on par with or superior to a current style analysis. Correlations for FA 97 are better in four of the six domestic-equity cases than for SA 00, with only marginally lower correlations in the cases of large-cap growth and mid-cap value. Absolute deviation follows the same pattern, with a more noticeable error term accruing to SA 00 in the mid-cap and small-cap categories. Absolute deviation for SA 00 exceeds 10 percentage points in three cases, whereas it does not reach that high for FA 97 once.

Likewise, when FA 97 and SA 97 are compared, both methodologies perform adequately for the most part, but fundamental analysis maintains a consistent if slight overall advantage in the correlation with the 1997 portfolios, with a particularly marked difference in the mid-cap style categories (see Table 4). For all domestic-stock categories fundamental analysis produces correlations of better than 60% with the three-year-old portfolios, and better than 80% in four of the six

cases. Style analysis generates correlations of better than 60% in four of the six cases (three of them higher than 70%), but in the cases of the two mid-cap categories the correlation falls to less than 40%. The mean deviations tell a similar story.

Table 4. 1997 Correlations with and Deviations from FA 00

Series	FA_1997 Corr.	SA_1997 Corr.	FA_1997 Dev.	SA_1997 Dev.
CASH	0.33	0.11	4.15	6.36
BOND	0.35	0.19	0.93	3.09
INTL	0.41	0.08	2.73	3.95
LG	0.85	0.76	7.16	9.45
LV	0.84	0.66	9.24	12.73
MG	0.71	0.38	8.20	15.26
MV	0.63	0.39	8.23	13.56
SG	0.86	0.74	5.38	11.06
SV	0.89	0.74	4.14	6.79

Using Returns-Based Style Analysis as a Baseline

To this point, fundamental analysis has served solely as our baseline portfolio. Thus, if the fundamental approach carries any consistent intrinsic peculiarities, it is fair to expect the fundamental analysis results of one date to approximate those of another date. Therefore, we also replicated our testing procedures with returns-based style analysis providing the baseline portfolio (SA 2000). Surprisingly, portfolio-based analysis maintains an advantage, though lessened, over returns-based analysis even when the latter is used as the baseline. In four of the six domestic-stock cases, the correlation between 2000 and 1997 for the two methodologies is statistically quite close, within 11 percentage points of one another, and all are above 60%. In only one case does returns-based analysis produce a marginally higher correlation than portfolio-based analysis. Once again in the two mid-cap examples, however, holdings-based analysis produces visibly higher correlations than returns-based analysis: 60% versus 42% for mid-cap growth, and 61% versus 44% for mid-cap value. The absolute deviations show that in the mid-cap area both methodologies depart significantly from the actual SA 97 results, with double-digit error terms for both. Yet both methodologies in general perform adequate estimates even when using older portfolios or style analyses conducted based on earlier years of returns. The more meaningful finding is that fundamental analysis performs equally as well as returns-based style analysis even when the latter determines the baseline portfolio; the advantage increases when a current portfolio is determined through holdings-based analysis.

Table 5. 1997 Correlations with and Deviations from SA 00

Series	FA_1997 Corr.	SA_1997 Corr.	FA_1997 Dev.	SA_1997 Dev.
CASH	0.17	0.10	5.56	4.95
BOND	0.11	0.31	2.06	3.45
INTL	0.06	0.07	5.01	4.95
LG	0.88	0.89	9.54	9.86
LV	0.74	0.79	9.05	10.52
MG	0.70	0.74	12.34	16.10
MV	0.64	0.72	13.03	14.79
SG	0.68	0.71	9.57	10.01
SV	0.79	0.80	7.44	8.28

Case Studies

The consequences of our findings regarding the relative accuracy of portfolio-based and returns-based style analysis may be better observed through specific examples. In this section, we drill down from the study's composite statistics to fund-specific statistics for three test cases: a stable actively managed fund, a stable actively managed fund affected by market conditions, and a dynamic actively managed fund. We incorporate additional fundamental knowledge of the funds, such as turnover rate and management philosophy, to frame our interpretation of the data. The case studies illuminate particular types of weaknesses in each methodology, and give texture to the difficulties one may encounter when evaluating a mutual fund based on style or fundamental analysis.

Vanguard Windsor II

Vanguard Windsor II is a strictly value-oriented fund that was originally created as a spin-off from Vanguard Windsor, the fund managed for many years by the value investor John Neff. With a turnover rate averaging around 30% annually, the fund ranks among the least active in terms of its trading activity. It therefore makes an excellent test case for the methodologies. The portfolio composition as of 12-31-00 shows the fund's two major style concentrations to be in the large value and mid-cap value categories, with 50.4% in the former and 28.1% in the latter. The preponderance of value stocks and the tendency toward larger securities accords with our expectations of the fund. The approximately 20% of the fund's assets remaining are scattered across the other asset classes.

The SA 00 results for the fund dramatically overstate the actual exposure to mid-cap value, with a 51.3% output that deviates from the actual style weight by 23.2 percentage points. SA 00 does accurately describe the large-cap portion of the fund, attributing 48.7% of the returns to the large-value category. [See Table 6.] The cumulative effect, however, of the returns-based approach's failure to recognize exposure to cash, international stocks, large growth, and mid-cap growth is to make the fund appear more concentrated and therefore more risky than is truly the case. The FA 99 results, like the style analysis, closely capture

the large-value weight (53.6%). The mid-value weight of this portfolio (20.75%) produces a greater deviation from the baseline portfolio in both absolute and percentage terms. Still, the error term is three times less than that produced by style analysis. The 1999 fundamental analysis does overstate the weight in large growth by 9.4 percentage points. Nevertheless, given the overall lower absolute deviation, the closer prediction of the two major style weights, and the better reflection of the portfolio's diversification, FA 99 clearly produces results preferable to those of SA 00.

Table 6. Style Weights and Deviations for Vanguard Windsor.

	FA 00	SA 00	Abs Dev	FA 99	Abs Dev
Cash	8.16	0.00	8.16	5.50	2.66
Bonds	0.00	0.00	0.00	0.00	0
Intl	3.89	0.00	3.89	1.26	2.63
LG	6.90	0.00	6.90	16.26	9.36
LV	50.37	48.71	1.66	53.57	3.2
MG	1.57	0.00	1.57	2.65	1.08
MV	28.09	51.29	23.20	20.75	7.34
SG	0.19	0.00	0.19	0.00	0.19
SV	0.83	0.00	0.83	0.00	0.83

MFS Emerging Growth

MFS Emerging Growth is a growth-oriented mutual fund with an unusually low turnover rate for the category averaging around 30%. The same manager has been in place for 10 years. Therefore, we would normally expect the fund to show relatively consistent style behavior from year to year. Two factors work against this expectation, however. For one thing, the fund's asset base grew at a rapid pace in the mid-1990s following several years of exceptional performance, and the median size of its holdings has increased commensurately, moving the fund from a mid-cap to large-cap tendency. Second, owing to its high concentration in technology, the fund was hit hard during the stock-market sell-off of 2000. As a result, many of its stock holdings moved from a growth classification to a value classification. This was not the result of managerial style shift but price compression. How do the two methods register these subtleties?

Looking first at the FA 99 portfolio, we note the aforementioned difference in the large growth weighting, which produces a fairly significant deviation of 18.1 percentage points. [See Table 7.] The analysis of SA 00, on the other hand, estimates the large growth weighting almost perfectly (44.79% vs. 44.09% for FA 00). As in the previous example, however, style analysis proves far less accurate in estimating style categories from the smaller market-capitalization areas (small growth, small value). Of the remaining five U.S. equity classifications, style analysis produces a deviation of greater than 11 in four of them, with an extreme of 44.8 points. This comes from the estimation of 47.2% for small growth as compared with the actual weight of 2.4%. While this may

reflect to some degree the true growth orientation of the fund, it vastly overstates the small-cap portion of the fund which, even in the three prior years, has not exceeded 11% when examined through the portfolio-based analysis. The fund appears to have hardly any exposure to mid-cap stocks, and the excess small-cap weighting would seem to characterize the fund as riskier than it truly is. The deviations for FA 99, by contrast, do not exceed seven percentage points, with the exception of the large-growth portion of the portfolio. Thus we find that in this case, returns-based analysis captures the growth qualities of the portfolio well, but accuracy suffers when estimating the composition of smaller-cap components. Fundamental analysis is more accurate overall, but has some difficulty reflecting sudden changes to the portfolio.

Table 7. Style Weights and Deviations for MFS Emerging Growth

	FA 00	SA 00	Abs Dev	FA 99	Abs Dev
Cash	3.27	0.00	3.27	0.34	2.93
Bonds	0.01	0.00	0.01	0.01	0
Intl	4.12	0.00	4.12	2.01	2.11
LG	44.09	44.79	0.70	62.19	18.1
LV	12.73	0.00	12.73	6.33	6.4
MG	19.86	8.01	11.85	14.41	5.45
MV	12.74	0.00	12.74	8.28	4.46
SG	2.40	47.20	44.80	4.72	2.32
SV	0.77	0.00	0.77	1.71	0.94

Fidelity Contrafund

Fidelity Contrafund does not have a mandate to invest in either a specifically growth or value style. It is designed to be an opportunistic investment vehicle, and the several managers who have run this successful fund have typically been eclectic in their style, shifting as market conditions and other circumstances present new perceived values. The fund invests across an array of styles, but it is prone to sudden concentrations in a single area. It has a high turnover rate, ranging between 144% and 197% during the years covered in the study, reflecting the fast-paced approach of management.

As expected, returns-based style analysis has difficulty keeping up with a kinetic fund like Fidelity Contrafund. (See Table 8.) Examining the U.S. equity portion of the results only, the SA 00 analysis produces an average deviation of 10.62, with an extreme of 21.96 for small growth. The FA 99 data show an average deviation for the same portion of 7.05, with a maximum of 11.15 for large growth. The differences are starker if we move back to 1997. SA 97 has an average U.S. equity deviation of 15.35, with an extreme of 36.22; FA 97 actually scores better here than FA 99, with an average deviation of 6.07, though the extreme is 14.54. Neither methodology can be said to work especially well for this fund, although on average fundamental analysis arrives at closer estimates than the style analysis.

Table 8. Style Weights and Deviations for Fidelity Contrafund

	FA 00	SA 00	Abs Dev	FA 99	Abs Dev	SA 97	Abs Dev	FA 97	Abs Dev
Cash	9.05	0.00	9.05	2.99	6.06	0.00	9.05	9.51	0.46
Bonds	2.43	14.93	12.50	2.35	0.08	10.53	8.1	4.67	2.24
Intl	11.01	5.92	5.09	16.43	5.42	17.20	6.19	10.42	0.59
LG	18.64	29.34	10.70	29.79	11.15	0.00	18.64	18.65	0.01
LV	28.45	24.71	3.74	18.98	9.47	15.47	12.98	13.91	14.54
MG	9.29	0.73	8.56	18.27	8.98	45.51	36.22	20.66	11.37
MV	17.05	0.00	17.05	6.11	10.94	0.00	17.05	12.32	4.73
SG	2.41	24.37	21.96	3.78	1.37	2.94	0.53	7.30	4.89
SV	1.68	0.00	1.68	1.30	0.38	8.35	6.67	2.57	0.89

Conclusion

Our paper constitutes the first systematic, empirical investigation of the relative merits of two widely used methods of measuring a portfolio's style. By extending the current literature on the subject, this study provides practitioners with important insights. A comparison of the two methodologies of holdings-based fundamental analysis and returns-based style analysis demonstrates that, whether measured by correlation or absolute deviation, returns-based analysis produces significantly weaker results than does fundamental analysis based on a one-year-old portfolio. The advantage to fundamental analysis persists even when portfolios older than one year are used, and even when returns-based analysis provides the baseline style composition.

This is not to say that style analysis has no value, only that its results must be considered cautiously, and they may be more useful in some contexts than others. We found, for instance, that the deviation of style analysis estimates is far greater among small-cap and mid-cap U.S. equities. Therefore, it is reasonable to suggest that style analysis is less useful for groups of mutual funds that concentrate on small-cap stocks. (This point implies that some level of a priori fundamental research is necessary to run the style analysis in the first place). And with fund types for which no portfolio data are available, such as hedge funds, it is clear that returns-based style analysis is the best available option. We can also speculate that style analysis would prove advantageous in the case of mutual funds whose managers made substantial use of options or other derivatives.

In some cases, neither fundamental analysis nor style analysis is especially reliable. This is true, for instance, of funds that shift styles frequently. Investors would be well-advised to view results for either methodology with caution when these conditions obtain. Even in such a case, however, fundamental analysis is the more effective of the two methods, given overall weaker correlations.

However, in most cases where holdings data are available, our study supports the claim that portfolio-based fundamental analysis is the preferred methodology. Portfolio data do not need to be absolutely current to provide an acceptable degree of predictive efficacy. A further advantage of fundamental analysis is that only one year's worth of data are needed to perform an acceptable calculation, as opposed to the three years' data needed to run returns-based style analysis. This has the potential of making fundamental analysis more affordable for consultants weighing the costs of each approach, particularly when new funds are involved.

While our study does not address the question of how well the two approaches to current portfolio style predict future style exposure of mutual funds--a potentially important question for those who view style as a proxy for risk--existing studies (Kahn [1986] and Chan et al. [2001]) show that fundamental analysis has greater accuracy than returns-based analysis when analyzed from this perspective as well. Therefore, the portfolio-based approach to style analysis should be the method of choice in most situations. In the future, our research will address this topic of the risk implications of style exposure.

Endnotes

¹ Mayes et al [2000], p. 103.

² Kahn [1996] is one exception to this trend.

³ Our study does not make any adjustments for selection bias, but we do not envision that doing so would affect the results in any meaningful way.

⁴ For a detailed description of the methodology, see Sharpe [1988].

⁵ Certain stocks classified by Russell into its style indexes may contain a mixture of the price and growth characteristics associated with growth or value. In such cases, Russell weights the stock according to its combined features (e.g., 70% growth, 30% value). When we encountered cases of such stocks in our study, we distributed their market caps across the indexes based on the ratio designated by Russell.

⁶ This may not always be the case, however, since the individual securities within a portfolio may differ from their Russell categorization. The total assets of a company such as Microsoft, for example, may in fact be allocated 10% to cash. The difficulty and labor required to track net assets within this information would make it an impractical addition to the portfolio-based method.

⁷ Many foreign-based multinational companies have behavioral characteristics that during some periods tend to mimic those of large U.S. stocks, leading returns-based style analysis to frequently misattribute international stock performance. Multicollinearity is clearly present, and it is possible that improved index selection could partially correct the problem. An additional problem is that with only a small sample of stocks, minor numerical changes in style composition produce significant percentage shifts.

⁸ The same data comparing current and older style analysis results could also be used, in reverse, to assess each method's relative efficacy as an attribution measurement for a mutual fund's past style behavior.

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