When Do Value Stocks Outperform Growth Stocks?:
Investor Sentiment and Equity Style Rotation Strategies

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Abstract

This paper investigates a relation between investor sentiment and performance of value stocks over growth stocks. To measure noise investors' sentiment, we use gauges: the CBOE equity put-call ratio and the market volatility (VIX) index. We find that value stocks tend to outperform growth stocks when the CBOE equity put-call ratio is relatively low or the VIX is relatively high. When the put-call ratio is relatively high or the VIX is relatively low, however, growth stocks marginally outperform or perform as well as value stocks. This finding suggests that the return premium of value stocks over growth stocks is at least partially influenced by investor sentiment. A strategy that switches equity styles on the basis of the put-call ratio seems to beat the benchmarks.

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I. Introduction

Institutional investors have long recognized that equity style as well as asset allocation decisions have a significant impact on the portfolio performance. Balch, Hardy, Scheinman, and Winston (1993) report that the return difference between the best and worst performing equity style (i.e., large-cap value, large-cap growth, small-cap value, and small-cap growth) during the period of 1978 through 1991 was 23.5% per annum versus 20.2% per annum for the asset classes (i.e., stocks, bonds, cash, and real estate). Sharpe (1992) finds that about 90% of return variability for a large sample of mutual funds for the period of 1985 through 1989 was driven by their exposures to equity styles with the remaining 10% resulting from individual stock selection. The dramatic rotation of performance between growth and value stocks during the period of 1996 to present has yielded a strong interest in equity style investment strategies even by individual investors. To meet individual investors' interest in equity style investing, most of the mutual fund companies currently include value and growth equity funds on the menu of their fund family.

There has been a divergence of research interest in equity styles between the academic and professional investment community. The academic community has investigated the long-run return differences between equity styles and the implications of these equity style factors on asset pricing and the Efficient Market Hypothesis (e.g., Chan, Hamao, and Lakonishok (1991), Fama and French (1992), Fama and French (1996), Lakonishok, Shleifer, and Vishny (1994)). In contrast, the professional

investment community has been interested in finding the factors that drives the equity style return differences, and developing the equity style timing strategies (e.g., Asness, Friedman, Krail, and Liew (2000), Case and Cusimano (1995), Fan (1995), Forsythe (1995), Kao and Shumaker (1999), Macedo (1995)). In particular, the professional investment community has focused on the macro variables or valuation measures as possible determinants of the return differences between equity styles.

Comparing quarterly returns of value and growth stocks during the period of 1963 through 2001, we confirm the results from the previous studies (e.g., Fama and French (1992), and Lakonisok, Shleifer, and Vishny (1994)) that overall, value stocks outperform growth stocks. In addition, we find that outperformance of value stocks over growth stocks are particularly salient around recession periods. This observation leads us to conjecture that investor sentiment may be an important determinant of relative performance of value stocks over growth stocks. Recent literature on behavioral finance emphasizes importance of noise traders' sentiment in determining stock prices (e.g., see Black (1986), De Long, Shleifer, Summers, and Waldman (1990), Lee, Shleifer, and Thaler (1991), Haugen (1994), Lakonishok, Shleifer, and Vishny (1994) among others). In this paper, we explore a possible link between investor sentiment and relative performance of value and growth stocks, and attempt to develop an equity style rotation strategy based on that link. In our opinion, development of equity style rotation strategies, as an alternative to the buy and hold strategy, is particularly important in the current environment where some studies such as Fama and French (2002), and Arnott and Bernstein (2002) predict a modest equity premium in the next decade.

The remainder of this paper is organized as follows: Section II discusses a theoretical background on the relation between investor sentiment and relative performance of value and growth stocks. Section III describes data and methodology used in this study. Section IV reports empirical evidence and Section V discusses empirical evidence from implementation of the equity style rotation strategy. Section VI concludes with some remarks about possible extension of this research.

II. Investor Sentiment and Performance of Value and Growth Stocks

The Efficient Market Hypothesis suggests that fluctuations in stock prices are wholly attributable to changes in fundamental values. There is ample empirical evidence supporting this hypothesis. Several recent studies of asset pricing, however, have challenged the view that only fundamental values affect asset prices. For instance, Cutler, Poterba, and Summers (1989) finds that it is difficult to explain as much as half of the variance in aggregate stock prices on the basis of publicly available news bearing on fundamental values. Lee, Shleifer, and Thaler (1991) report empirical evidence suggesting that discounts on closed-end funds reflect changes in individual investor sentiment, and that the same sentiment affects returns on smaller capitalization stocks predominantly held and traded by individual investors. Roll (1988) finds that most of the monthly variation in returns for individual stocks cannot be explained by systematic economic influence. Shiller (1981) claims that stock prices are far more variable than can be justified by shocks to future cash flows or plausible variations in future discount rates.

De Long, Shleifer, Summers, and Waldmann (DSSW) (1990) present a model of asset pricing in which the opinions of noise traders (i.e., not-fully-rational investors)

impose additional risk on assets traded in the market. In their model, noise traders' expectations about asset returns are subject to the influence of sentiment: noise traders are bearish in some periods and bullish in other periods. With risky assets held and traded by risk averse investors, the equilibrium price reflects the opinions of noise traders. As a result, asset prices are determined not solely by fundamental values, but also by investor sentiment.

DSSW (1990) suggest that with mean-reverting investor sentiment, the buy and hold strategy may not be the optimal investment strategy. The optimal strategy for sophisticated investors is a market timing strategy which calls for increased exposure to stocks when noise traders are pessimistic, and decreased exposure to stocks when they are optimistic. As DSSW (1990) acknowledge, however, such an investment strategy requires a long time horizon, and is by no means safe because of the noise trader risk. An alternative investment strategy would be to gather information about investor sentiment and to trade based on investor sentiment shifts.

According to Gordon (1962), the expected return of a given stock consists of two parts: the stock's current earnings yield and the expected earnings growth.

$$E(r) = Y/P + g$$

where E(r), Y, P, and g denote the expected return, earnings, stock price and expected earnings growth of a given stock, respectively. By definition, growth stocks have a higher earnings growth than value stocks, while value stocks carry a greater current earnings yield than growth stocks. When noise traders are bullish, they may overestimate the future earnings growth, and, thus, give more weight to the expected earnings growth than the current earnings yield. Consequently, they may allocate a greater proportion of

their portfolio to growth stocks. This means that by the time when it is detected that investor sentiment has been shifted to bullishness, growth stocks would have been already overbought and value stocks oversold. A consequence is that growth stocks are now relatively overvalued, while value stocks are relatively undervalued. In contrast, when noise traders are bearish, they may underestimate the future earnings growth, and focus more on the current earnings yield. In such a circumstance, they may favor value stocks over growth stocks. By the time when it is found that investor sentiment has been changed to bearishness, value stocks would have been already overbought and growth stocks oversold. As a result, value stocks are now relatively overpriced, and growth stocks are relatively underpriced. The reasoning above suggests a simple investment strategy to invest in growth stocks when investor sentiment measures indicate a shift from bullishness to bearishness, and value stocks when they reveal a change from bearishness to bullishness.

III. Data and Methodology

To measure noise investors' sentiment, we use the CBOE (Chicago Board Options Exchange) equity put-call ratio and the market volatility (VIX) index since they are the most widely watched gauges of investor sentiment. The CBOE equity put-call ratio is calculated by dividing the trading volume of CBOE equity put options by the trading volume of CBOE equity call options. The VIX measures the expected volatility of the US equity market. This index is calculated by taking a weighted average of the implied volatilities of eight Standard & Poor's 100 index call and put options with an average maturity of 30 days.

As with many investor sentiment indicators, the equity put-call ratio is interpreted in a contrary fashion. Since noise traders are usually wrong at extremes in the market, a high put-call ratio, which indicates that noise traders believe stock prices are falling, is viewed as bullish. On the other hand, a low put-call ratio resulting from the expectation of higher stock prices are interpreted as bearish.

The VIX measures noise investors' precariousness about future direction of the stock market. When noise investors panic, the VIX tends to jump up. Macedo (1995) conjectures that "the urge to play safe is strongest when investors are nervous or uncertain." A "flight to quality" is often observed during periods of high uncertainty. During such periods, noise investors tend to hold quality stocks or those estocks they are familiar to. Compared to value stocks, growth stocks are considered safer and better known to noise investors. As a result, growth stocks are overbought and, thus, overvalued during the period of high volatility. In contrast, during the low volatility period, noise investors may be more comfortable with value stocks, and, thus, value stocks tend to be overvalued.

The data consists of monthly equity put-call ratios and VIX during the period of 1987 through 2001 that are collected from Barron's and the CBOE web site, respectively.[1] The stock return data comprise all firms included in both (1) the NYSE, AMEX, and NASDAQ return files from the Center for Research in Security Prices (CRSP) and (2) the COMPUSTAT annual industrial files during the 1987-2001 period. We choose this time period since data on the two key variables, i.e., the put-call ratio and VIX are available only from 1987 and 1986, respectively. When we initially overview

the performance of the value and growth portfolios, however, the time period covers from July 1963 to September 2001.

To ensure that the accounting data is available when all stocks in the sample are sorted by P/B (price to book value), we follow the methodology of Fama and French (1992).[2] Specifically, we match the accounting data for all fiscal yearends in calendar year t – 1 (1986-2000) with stock returns for July of year t to June of year t + 1. We use a firm's market equity at the end of each month to calculate its P/B ratio and measure its size.

We create portfolios at the end of each month starting from July 1987. In order to control for the size effect, every month we sort all stocks in the sample by size and create ten size portfolios using the NYSE breakpoints. We subdivide each size decile into five portfolios based on the P/B ratio. The value and growth portfolio consists of all firms included in the quintile with the lowest P/B ratio, and the highest P/B ratio for each of the ten size portfolios, respectively. After assigning firms to the value or growth portfolio, we calculate the value-weighted holding period return on the two portfolios for the next three and six months. If one stock drops from the portfolio in any month, we assume that the stock earns the average return of the portfolio for the remaining months. Since we construct portfolios at the end of each month during July 1987 to June 2001, we have 168 value and growth portfolios for the three-month holding period, and 165 for the six-month holding period.

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[1] Barron's reports the CBOE equity put-call ratio for the previous week every Monday. To convert the data into a monthly series, an average was taken over four or five weeks for each month, including the week which was closest to each month end.

III. Empirical Evidence

Figure 1 shows the quarterly return premium of the value portfolio over the growth portfolio over the period of June 1963 through September 2001. NBER-dated economic recessions are shaded in gray to illustrate cyclical changes in the return premium. From Figure 1, we can make several observations regarding the return premium of the value portfolio over the growth portfolio. First of all, the return premium is volatile and changes rapidly the sign from positive to negative, or from negative to positive. The value portfolio outperforms the growth portfolio more frequently (65 quarters vs. 50 quarters). When the growth portfolio beat the value portfolio, however, they sometimes do so in an impressive way. In particular, the growth portfolio returned the value portfolio by more than 30% in 1981 and 2000. The value portfolio appears to do better than the growth portfolio during the recession periods. In contrast, the growth portfolio tends to outperform the value portfolio toward the end of or immediately after recessions.

Table 1 shows summary statistics for the quarterly returns of value and growth portfolios during the period of June 1963 through September 2001. During this period, the value portfolio outperformed the growth portfolio. Specifically, the value and growth portfolios had an average annual return of 23.02% and 19.31%, respectively. Furthermore, the value portfolio had a significantly lower standard deviation than the growth portfolio. The betas for the value and growth portfolio were 1.12 and 1.55,

[2] We also sorted the sample by P/C (price to cash flow) ratio and found similar results. Therefore, we only report the results based on P/B ratio.

respectively.[3] Clearly, the value portfolio was less risky than the growth portfolio during the sample period. As a result, the value portfolio had a significantly higher information ratio than the growth portfolio. Both the value and growth portfolio return distributions were slightly right-skewed, but the return of the growth portfolio had a fatter tail than that of the value portfolio. As table 1 reveals, the value portfolio is only slightly smaller than the growth portfolio in the market value of equity. As a result, the returns of the value and growth portfolios are not unduly influenced by the firm size.

We divide 168 months of the sample period into two subperiods, according to whether the CBOE equity put-call ratio or VIX in each month is higher or lower than an average of the previous six months. For each of the two subperiods, we compute the return premium of the value portfolio over the growth portfolio for subsequent three and six months. All return premiums reported are annualized, in order to facilitate comparisons of the results for different holding periods. Panel A of Table 2 presents the return premium of the value portfolio over the growth portfolio for each of the two subperiods. When the CBOE equity put-call ratio in a given month is lower than its prior average, the value portfolio outperforms the growth portfolio by an annual mean (median) of 10.49% (11.54%) for following three months, significant at the ten percent level, and an annual mean (median) return of 9.59% (11.38%) for subsequent six months, significant at the one percent level. When the put-call ratio in a given month is higher than its previous six-month average, however, there is no statistically significant difference in performance between the value and growth portfolios for subsequent three

[3] The betas are estimated, using the monthly returns of value and growth portfolios that are constructed at the end of June each year. The value-weighted return of NYSE, AMEX, and NASDAQ stocks is used as a proxy for the market.

or six months. Specifically, the mean (median) value portfolio return premium is equal to –1.94% (2.04%) and –0.42% (4.37%) for subsequent three and six months, respectively.

When the VIX is instead used as an investor sentiment measure, the results turn out to be generally weaker. When the VIX in a given month is higher than an average over the previous six months, the value portfolio beats the growth portfolio by an annual mean (median) of 6.99% (7.40%) for subsequent three months, not significant at the conventional levels, and by an annual mean (median) of 7.63% (8.45%) for next six months, significant at the five percent level. Even when the VIX in a given month is lower than its prior average, the value portfolio marginally outperforms the growth portfolio for all subsequent time periods. Specifically, the mean (median) value portfolio return premium is equal to 1.65% (5.54%) and 1.74% (3.57%) for following three and six months, respectively. Neither of the return premiums is statistically significant at the conventional levels, however.

We now investigate whether the return premium of the value portfolio over the growth portfolio varies with the market capitalization. Remember that we initially divided the entire sample into ten size portfolios. We examine the return premium of the value portfolio over the growth portfolio in the top three deciles (large caps) and bottom three deciles (small caps). Panel B of Table 2 shows the return premium of the large cap value portfolio over the large cap growth portfolio. Inspection of Panel B of Table 2 reveals that the return premium is only half as good for the large cap value portfolio when the put-call ratio in a given month is low or the VIX in a given month is high relative to its previous six-month average. As a result, the value portfolio return premium is no longer significant for both subsequent three- and six-month periods. When the put-call

ratio in a given month is relatively high or the VIX in a given month is relatively low, the value portfolio return premium is again noticeably reduced. In particular, the mean and median return premiums turn into negative when the put-call ratio in a given month is relatively high, although they are not statistically significant.

The results for the large caps lead us to conjecture that the value portfolio return premium may be greater for small caps than for large caps. Our conjecture is confirmed by the results reported on Panel 3 of Table 2. Panel 3 reveals that the small cap value portfolio return premium is significantly greater than that for the large cap value portfolio. Specifically, when the put-call ratio in a given month is relatively low, the mean (median) of the value portfolio return premium is equal to as much as 13.50% (16.35%) and 13.65% (16.28%) for subsequent three- and six-month periods, respectively, both of which are significant at the one percent level. Similar results are obtained when the VIX is used. Even when the put-call ratio in a given month is relatively high, or the VIX in a given month is relatively low, the median of the small cap value portfolio return premium is significantly greater than zero for both subsequent three- and six-month periods.

The results reported so far reveal that the value portfolio either outperform or perform as well as the growth portfolio. The value portfolio does not underperform the growth portfolio at least statistically, regardless of whether the put-call ratio or VIX is high or low. We now compare the value portfolio in the top three size deciles (the large cap value portfolio) with the growth portfolio in the bottom three size deciles (the small cap growth portfolio). Panel 4 of Table 2 shows that the large cap value portfolio significantly underperforms the small cap growth portfolio for subsequent three- and six-

month periods when the put-call ratio in a given month is relatively high. The mean value portfolio return premiums are equal to –9.44% (-9.51%) for next three months, significant at the ten percent level, and –13.48% (-7.57%) for following six months, significant at the one percent level. In contrast, the large cap value portfolio outperforms the small cap growth portfolio in the opposite case. In particular, the mean and median large cap value portfolio return premiums for the next six months are equal to 5.68% and 9.12%, respectively. Although these return premiums are not statistically significant at the conventional levels, they are economically significant. With the VIX used as an investor sentiment measure, the return premium is mostly negative regardless of whether the VIX is high or low, although they are not statistically significant.

Table 3 presents estimates from regressing the six-month return premiums on the relative put-call ratio or relative VIX. The relative put-call ratio and VIX are calculated by taking the ratio of the formation month put-call ratio and VIX to their previous six-month average. Consistent with the results from dichotomizing the put-call ratio or VIX, the regression results show a significantly negative relation between the return premiums and the relative put-call ratio. Such a negative relation is particularly salient with small caps and large cap value minus small cap growth. However, the negative relation between the return premiums and the relative put-call ratio turns out to be weak with large caps. In contrast, the regression results present no relation between the return premiums and the relative VIX.

We have so far investigated the return premium of the value portfolio over the growth portfolio in relation with either one of the two investment sentiment indicators, the CBOE equity put-call ratio and VIX. Each of the two indicators alone may not be

sufficient to measure the investor sentiment since they may contain some noise. Consequently, a simultaneous use of the two indicators may enhance the effectiveness of the two indicators as the investor sentiment gauges. There are four possible combinations of the put-call ratio and VIX, i.e.,

(Put-Call ratio, VIX) = {(High, High), (Low, High), (High, Low), (Low, Low)}

Panel 1 through 3 in Table 4 report the return premiums of the value portfolio over the growth portfolio for the four different combinations of the put-call ratio and VIX. According to Panel 1 of Table 4, the value portfolio return premium for all size deciles is the largest when the put-call ratio in a given month is relatively low and simultaneously the VIX in the same month is relatively high. Specifically, the annualized mean (median) return premiums are equal to 26.11% (23.71%) and 22.58% (21.44%) for next three- and six-month periods, respectively, both of which are statistically significant at the one percent level. For the other three combinations of the put-call ratio and VIX, the return premiums are not statistically significant from zero.

Panel 2 of Table 4 presents the value portfolio return premium for large caps. The large cap value portfolio also significantly outperforms the large cap growth portfolio when (put-call ratio, VIX) = (Low, High), although the return premium is not as large as that for all size deciles. The large cap value portfolio return premium turns into negative when (put-call ratio, VIX) = (High, High), although the negative premium is not statistically significant. Panel 3 of Table 4 reports the value portfolio return premiums for small caps that turn out to be similar to those for all size deciles. Panel 4 of Table 4

shows the return premiums of the large cap value portfolio over the small cap growth portfolio. According to Panel 4, the large cap value portfolio significantly underperforms the small cap growth portfolio when (put-call ratio, VIX) = (High, High). Specifically, the annual mean (median) return premiums are equal to –18.35%(-11.69%) and –16.45% (-10.52%) for next three- and six-month periods, respectively, most of which are statistically significant at the one or five percent level. In contrast, when (put-call ratio, VIX) = (Low, High), the large cap value portfolio significantly outperforms the small cap growth portfolio especially for subsequent six-month period. In particular, the annual mean and median large cap value portfolio return premiums for subsequent six months are equal to 21.27% and 19.05%, respectively, which are significant at the one percent and ten percent level, respectively.

The results above suggest that the CBOE equity put-call ratio has a more predicting power for the value portfolio return premium when the VIX in a given month is high relative to its prior average than otherwise. Such an observation can be interpreted in the following way. A high volatility means that investors are anxious about the market because they expect the market to make a big move soon. Consequently, the anxious investors may attempt to protect themselves against a significant market correction by purchasing safer stocks, i.e., growth stocks, and selling value stocks that are not familiar to them. In contrast, a low volatility suggests that investors are "self-complacent." They do not expect the market to move much in the near future at all. Therefore, they are not much motivated to trade. Since they do not actively trade, there may not be much difference between value and growth stocks in performance.

IV. Implementation of the Equity Style Rotation Strategy

The empirical results reported above suggest that an equity style rotation strategy, i.e., to invest in value stocks when the put-call ratio in the current month is below average and growth stocks when it is above average, may outperform a simple buy and hold strategy. Implementation of such a strategy, however, will involve large transaction costs if we rotate between a portfolio of value stocks and a portfolio of growth stocks. To reduce transaction costs, we may implement the equity style rotation strategy using exchange-traded funds (ETFs). ETFs are a relatively new breed of index funds. ETFs cover broad-based market indexes such as S&P 500 as well as equity style indexes such as Russell 3000 Growth and Value. ETFs are ideal for equity style rotation strategies. For instance, ETFs can be bought and sold exactly like a stock of an individual company during the entire trading day. They can be bought on margin, bought at limit prices, or sold short. Certain ETFs are exempt from the rule that requires shares to be sold short only on an "uptick." Unlike closed-end funds, ETFs, through the arbitrage mechanism, keep the market price close to the net asset value.

There are currently available ETFs based on Russell 3000, 1000, and 2000 Value and Growth Indexes, where Russell 3000, 1000, and 2000 represent the broad, the large cap, and the small cap US market, respectively. We test the equity style rotation strategy by assuming to invest in either Russell value or growth index for next three months, depending on the CBOE equity put-call ratio in a given month compared to its past six-month average.[4] We implement this strategy every month from July 1987 to June 2000. Panel A through E in table 5 report results from implementation of such a strategy. Panel A shows performance of the strategy to rotate between Russell 3000 Growth and Value

Indexes, relative to three benchmarks, Russell 3000, Russell 3000 Value, and Russell 3000 Growth Indexes. The equity style rotation strategy outperforms the three benchmarks by an annualized mean (median) of 2.47% (2.30%), 4.07% (0.00%), and 1.03% (0.00%), respectively. The outperformance of the equity style rotation strategy over a strategy of buying and holding the Russell 3000 and Russell 3000 Value Indexes is statistically significant at the one percent level. Panel B and C reveal that superiority of the equity style rotation strategy is persistent regardless of whether large cap or small cap indexes are used. Panel D indicates, however, that the strategy to rotate between Russell 1000 Value Index and Russell 2000 Growth Index does not significantly outperform the strategy of buying and holding either Russell 3000, or Russell 1000, or Russell 2000 Index.

The equity style rotation strategy involves a higher transaction cost than the buy and hold strategy because the former requires more frequent rebalancing of the portfolio. If the value and growth ETFs are rotated every quarter according to the current month put-call ratio, the equity style rotation strategy may require at maximum four times as much transaction cost as the buy and hold strategy. If we assume that a round trip trade involves 0.50% of transaction cost (including the bid and ask spread and trading commissions) of the market value of ETFs, the return from the equity style rotation strategy net of the transaction cost, relative to benchmarks, will be 1.5% less than those reported in Table 5. It follows that with the transaction cost subtracted from the gross return, the equity style rotation strategy will outperform the buy and hold strategy by about one percent per year.

[4] We cannot use the ETFs based on Russell indexes since these ETFs started trading only recently.

It should be emphasized that the open-end mutual fund investors, as opposed to the ETF investors, bear little or no transaction cost associated with implementation of the equity style rotation strategy discussed above. This is because there is no bid and ask spread in the net asset value at which investors can purchase or redeem open-end mutual fund shares. Most of the mutual fund and brokerage companies charge little or no transaction fee when regular investment account holders trade open-end mutual fund shares. Growth and value funds are included on the menu of most of the defined-contribution retirement plans. In general, the retirement plan service plan providers charge no transaction fee when the plan participants rebalance their portfolios of open-end mutual funds.

V. Conclusions

This paper finds that value stocks tend to outperform growth stocks when the CBOE equity put-call ratio is relatively low or the VIX is relatively high. When the put-call ratio is relatively high or the VIX is relatively low, however, growth stocks marginally outperform or perform as well as value stocks. This finding suggests that the return premium of value stocks over growth stocks is at least partially influenced by investor sentiment. A strategy that switches equity styles on the basis of the put-call ratio seems to beat the benchmarks.

A possible extension of this research is to investigate a strategy to rotate between value and momentum strategies based on investor sentiment gauges. Asness (1997) discusses interrelation of value and momentum strategies. In particular, Asness finds that value strategies are the strongest among low-momentum (loser) stocks, and the

momentum strategy is strong among growth stocks. Macedo (1995) reports evidence on superior performance of a strategy to switch country selection styles, favoring markets with high relative value during volatile periods and favoring markets with high relative strength otherwise, relative to a fixed tilt toward either style alone. We are currently conducting research on investor sentiment and relative performance of value and momentum strategies.

References

Arnott, R.D., and P.L. Bernstein, 2002, What risk premium is "normal"? *Financial Analysts Journal* 58, 64-85.

Asness, C., 2000, The interaction of value and momentum strategies, *Financial Analysts Journal* 56, 29-36.

Asness, C., Friedman, J.A., Krail, R.J, and Liew, M.L., 2000, Style timing: Value versus growth, *Journal of Portfolio Management* 26, 50-60.

Black, F., 1986, Noise, *Journal of Finance* 41, 529-543.

Case and Cusimano, 1995, Historical tendencies of equity style returns and the prospects for tactical style allocation, *Equity Style Management: Evaluating and Selecting Investment Styles*, edited by R.A. Klein, and J. Lederman, Irwin, Chicago.

Chan, L.K.C., N. Jegadeesh, and J. Lakonisok, 1995, Evaluating the performance of value versus glamour stocks: the impact of selection bias, *Journal of Financial Economics* 38, 269-296.

Cutler, D.M., J.M. Poterba, and L.H. Summers, 1989, What moves stock prices, *Journal of Portfolio Management* 15, 4-12.

Davis, J.L., 1994, The cross-section of realized stock returns: the pre-COMPUSTAT evidence, *Journal of Finance* 49, 1579-1593.

De Long, J.B., A. Shleifer, L. Summers, and R. Waldmann, 1990, Noise trader risk in financial markets, *Journal of Political Economy* 98, 703-738.

Fama, E. and K.R. French, 1992, The cross-section of expected returns, *Journal of Finance* 47, 427-465.

Fama, E. and K.R. French, 1996, Multifactor explanations of asset pricing anomalies, *Journal of Finance* 51, 55-84.

Fama, E. and K.R. French, 2002, Equity premium *Journal of Finance* 57, 637-659.

Fan, S.C., 1995, Equity style timing and allocation, *Equity Style Management: Evaluating and Selecting Investment Styles*, edited by R.A. Klein, and J. Lederman, Irwin, Chicago.

Forsythe, G.J., 1995, How does stock selection criteria performance vary across investment style universes?, *Equity Style Management: Evaluating and Selecting Investment Styles*, edited by R.A. Klein, and J. Lederman, Irwin, Chicago.

Hansen, L. P., and R. Hodrick, 1980, Forward exchange rates as optimal predictors of future spot rates: An econometric analysis, *Journal of Political Economy* 88, 829-853.

Haugen, R., 1994, *The New Finance: The Case Against Efficient Markets*, Prentice-Hall, Englewood Cliffs, N.J.

Lakonishok, J., A. Shleifer, and R. W. Vishny, 1994, Contrarian investment, extrapolation, and risk, *Journal of Finance* 49, 1541-78.

Lee, C., A. Shleifer, and R.H. Thaler, 1991, Investor sentiment and the closed-end fund puzzle, *Journal of Finance* 46, 75-110.

Macedo, R., 1995, Value, relative strength, and volatility in global equity country selection, *Financial Analysts Journal* 51, 70-78.

Roll, R., 1988, R^2, *Journal of Finance* 43, 541-566.

Shiller, R.J., 1981, Do stock prices move too much to be justified by subsequent changes in dividends, *American Economic Review* 71, 421-436.

Figure 1 Quterly return premium of value portfolio over growth portfolio

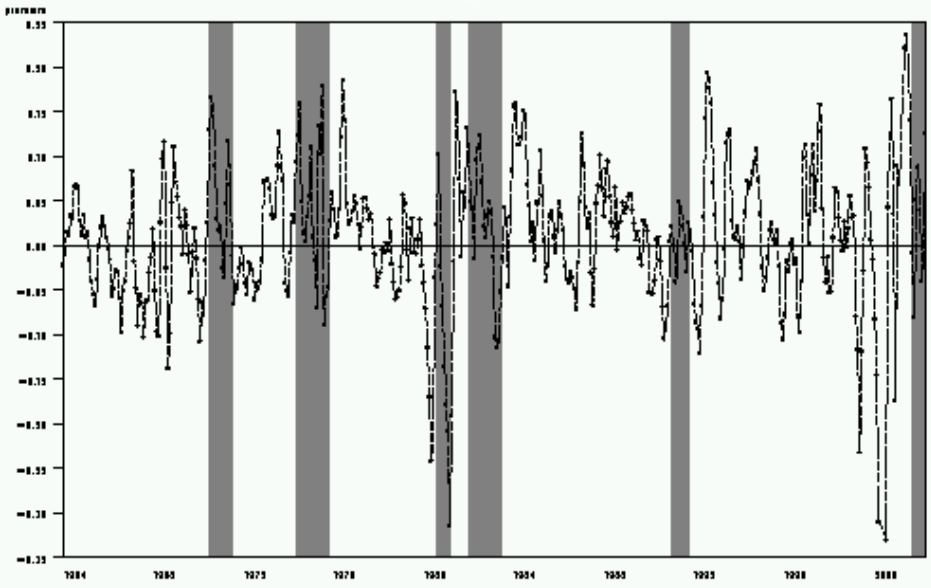

Table 1. Descriptive Statistics of Value and Growth Portfolios in the Period of July 1963 – September 2001

Measure	Value Portfolio	Growth Portfolio
Mean return		
Quarterly	5.76%	4.83%
Annualized	23.02%	19.31%
Median return	5.58%	4.70%
Maximum Quarterly Return	58.45%	77.98%
Minimum Quarterly Return	-26.79%	-38.26%
Number of outperforming quarters	65	50
Beta[a]	1.12	1.55
Standard deviation		
Quarterly	10.60%	14.46%
Annualized	21.19%	28.92%
Skewness	0.3452	0.3703
Kurtosis	1.8103	1.9291
Information ratio	1.09	0.67
Market value of equity (in millions)		
Mean	$53.78	$69.74
Median	$44.70	$67.17

[a] Beta was estimated using the method of Fama and French (1992), i.e., regressing portfolio returns against value weighted market returns of current and previous months, then combining the two slopes together.

Table 2. Return Premium of the Value Portfolio over the Growth Portfolio in the Period of July 1987 – September 2001

The value and growth portfolios are formed based on the P/B ratio each month and held for subsequent three or six months. The stocks are initially divided into ten size portfolios using the NYSE breakpoints, and then each of the ten size portfolios is further divided into five portfolios by the P/B ratio. The value and growth portfolios consist of the fifth and first quintile of each of the ten size portfolios, respectively. Depending on each month's CBOE put-call ratio or VIX compared to the prior six-month average, the value or growth portfolio is assumed to be held for the following three- or six- month period. The return premium of the value portfolio over the growth portfolio is measured as the average return to the value portfolio held during the periods chosen by the CBOE put-call ratio or VIX minus that of the growth portfolio held in the periods selected by the same indicator. ***, **, and * indicate statistical significance of a modified *t*-test for the means and the sign test for the medians at the one percent, five percent, and ten percent levels, respectively.[b]

Panel A: ALL

		CBOE P-C ratio		VIX	
		High	**Low**	**High**	**Low**
3-month return (%), annualized	**mean**	-1.94	10.49*	6.99	1.65
	median	2.04	11.54***	7.40**	5.54**
6-month return (%), annualized	**mean**	-0.42	9.59***	7.63**	1.74
	median	4.37*	11.38***	8.45***	3.57

Panel B: Large Cap

		CBOE P-C ratio		VIX	
		High	**Low**	**High**	**Low**
3-month return (%), annualized	**mean**	-3.38	5.16	3.13	-1.63
	median	-3.04	5.34	0.26	0.62
6-month return (%), annualized	**mean**	-0.91	3.59	3.94	-0.85
	median	-4.41	5.26**	3.36**	-4.26

Panel C: Small Cap

		CBOE P-C ratio		VIX	
		High	**Low**	**High**	**Low**
3-month return (%), annualized	**mean**	2.40	13.50***	12.50**	4.58
	median	5.68*	16.35***	12.64**	9.81***
6-month return (%), annualized	**mean**	2.36	13.65***	11.71***	4.60
	median	7.50***	16.28***	12.22***	11.05**

[b] Standard errors for *t*-tests involving three- and six-month horizons are computed with the method of Hansen and Hodrick (1980).

Panel D: Large Cap Value vs. Small Cap Growth

		CBOE P-C ratio		VIX	
		High	**Low**	**High**	**Low**
3-month return (%), annualized	**mean**	-9.44*	-0.24	-7.14	-4.61
	median	-9.51	6.19	-1.18	-1.56
6-month return (%), annualized	**mean**	-13.48***	5.68	-2.39	-6.25
	median	-7.57*	9.12	-3.78	2.10

Table 3. Regression Estimates from Regressions of the Six-Month Return Premium of the Value Portfolio over the Growth Portfolio on the Relative Put-Call Ratio and VIX in the Period of July 1987 – September 2001

The relative put-call ratio and VIX are calculated as the ratio of the current month put-call ratio and VIX to their past six-month average. ***, **, and * indicate statistical significance of a modified *t*-test for means and the sign test for medians at the one percent, five percent, and ten percent levels, respectively.[b]

Dependent Variables	Independent Variables			
	Intercept	Relative Put-Call Ratio	Relative VIX	Adjusted R^2
All	0.165 (0.0257)	-0.132* (0.0626)		0.014
Large Cap	0.068 (0.434)	-0.0501 (0.5381)		-0.004
Small Cap	0.188* (0.0078)	-0.140** (0.0379)		0.019
Large Cap Value minus Small Cap Growth	0.299*** (0.0013)	-0.296*** (0.0011)		0.056
All	0.029 (0.62109)		0.001 (0.9910)	-0.006
Large Cap	0.021 (0.762)		-0.004 (0.9498)	-0.006
Small Cap	0.021 (0.7088)		0.024 (0.6575)	-0.005
Large Cap Value minus Small Cap Growth	0.044 (0.5654)		-0.045 (0.540)	-0.004

[b] Standard errors for *t*-tests involving overlapping three- and six-month horizons are computed with the method of Hansen and Hodrick (1980).

Table 4. Return Premium of the Value Portfolio over the Growth Portfolio in the Period of July 1987 – September 2001

The value and growth portfolios are formed based on the P/B ratio each month and held for subsequent three or six months. The stocks are initially divided into ten size portfolios using the NYSE breakpoints, and then each of the ten size portfolios is further divided into five portfolios by the P/B ratio. The value and growth portfolios consist of the fifth and first quintile of each of the ten size portfolios, respectively. Depending on a pair of CBOE put-call ratio and VIX each month compared to the prior six-month average, the value or growth portfolio is assumed to be held for the following three- or six- month period. The return premium of the value portfolio over the growth portfolio is measured as the average return to the value portfolio held during the periods chosen by a pair of the two indicators minus that of the growth portfolio held in the periods selected by the same pair. ***, **, and * indicate statistical significance of a modified *t*-test for means and the sign test for medians at the one percent, five percent, and ten percent levels, respectively.[b]

Panel A: All

(CBOE P-C Ratio, VIX)		(High, High)	(Low, High)	(High, Low)	(Low, Low)
3-month return (%), annualized	mean	-5.18	26.11***	1.45	2.32
	median	2.78	23.71**	1.99	9.40***
6-month return (%), annualized	mean	-1.60	22.58***	7.89	2.56
	median	4.78*	21.44***	3.05	4.62

Panel B: Large Cap

(CBOE P-C Ratio, VIX)		(High, High)	(Low, High)	(High, Low)	(Low, Low)
3-month return (%), annualized	mean	-8.32	22.84**	1.87	-3.94
	median	-5.00	13.42	-1.96	3.59
6-month return (%), annualized	mean	-3.13	15.25***	1.38	-2.73
	median	0.03	8.02***	-7.37*	1.41

Panel C: Small Cap

(CBOE P-C Ratio, VIX)		(High, High)	(Low, High)	(High, Low)	(Low, Low)
3-month return (%), annualized	mean	2.45	26.06**	2.35	6.82
	median	8.09	29.12*	2.32	13.71***
6-month return (%), annualized	mean	2.93	25.88***	1.80	7.01
	median	7.11	24.93***	10.06**	11.83

[b] Standard errors for *t*-tests involving overlapping three- and six-month horizons are computed with the method of Hansen and Hodrick (1980).

Panel D: Large Cap Value vs. Small Cap Growth

(CBOE P-C Ratio, VIX)		(High, High)	(Low, High)	(High, Low)	(Low, Low)
3-month return (%), annualized	**mean**	-18.35**	13.94	0.40	-7.66
	median	-11.69	10.63	-7.36	6.12
6-month return (%), annualized	**mean**	-16.45***	21.27***	-10.38	-2.66
	median	-10.52**	19.05*	-4.75	2.87

Table 5. Relative Performance of the Equity Style Rotation Strategy relative to the Benchmark Indexes in the Period of July 1987 – June 2000

Depending on the CBOE put-call ratio each month compared to the prior six-month average, the value or growth segment of Russell indexes is assumed to be held for following three months. The relative performance of the equity style rotation strategy is measured as the average return to the equity style rotation strategy minus a benchmark index. ***, **, and * indicate statistical significance of the *t*-test for means and the sign test for medians at the one percent, five percent, and ten percent levels, respectively.

Panel A: A Strategy to Rotate between Russell 3000 Value and Growth Index

	Relative to		
3-month return (%), annualized	**Russell 3000**	**Russell 3000 Value**	**Russell 3000 Growth**
mean	+2.47***	+4.07***	+1.03
median	+2.30***	0.00***[c]	0.00

Panel B: A Strategy to Rotate between Russell 1000 Value and Growth Index

	Relative to		
3-month return (%), annualized	**Russell 1000**	**Russell 1000 Value**	**Russell 1000 Growth**
mean	+2.38***	+4.13***	+0.81
median	+2.12***	0.00***[c]	0.00

Panel C: A Strategy to Rotate between Russell 2000 Value and Growth Index

	Relative to		
3-month return (%), annualized	**Russell 2000**	**Russell 2000 Value**	**Russell 2000 Growth**
mean	+3.51***	+3.79**	+3.26*
median	+2.20**	0.00	0.00*[c]

[c] Even if the median is equal to zero, it can be statistically significant as long as the returns above the median significantly outnumber those below the median.

Panel D: A Strategy to Rotate between Russell 1000 Value and Russell 2000 Growth Index

	Relative to		
3-month return (%), annualized	**Russell 3000**	**Russell 1000**	**Russell 2000**
mean	+2.19	+1.02	+3.92**
median	+0.96	0.00	+2.45***