

Market timing using the VIX for style rotation

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Abstract

We examine the effectiveness of the market volatility index (VIX) provided by the Chicago Board Options Exchange in timing shifts for style asset allocation. The findings of Copeland and Copeland (1999) suggest portfolios of value stocks outperform (underperform) portfolios of growth stocks following an increase (decrease) in the VIX index. We find some evidence supporting their initial findings using data from 1990 to 2008 that corresponds with the Chicago Board Options Exchange new VIX measurement. However, the results of this study are only statistically significant for longer holding periods of 30 days or more. Thus, for longer holding periods individuals may be able to gain economically significant returns by rebalancing their portfolios between value and growth stocks based on changes in the VIX index. © 2011 Academy of Financial Services. All rights reserved.

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1. Introduction

Irvin and Pontiff (2009) document the impact of increased economy-wide competition on the significant increase over time in the idiosyncratic volatility of firm-level earnings, cash flows, and sales, which in turn, has led to higher levels of market volatility. This increased market volatility is a concern for investors and financial planners. Traditional asset allocation models built around modern portfolio theory address portfolio efficiency with respect to risk and return. Market turbulence increases the likelihood that investors may forgo investments in equity securities, because of increased risk. However, there is limited empirical research investigating asset allocation with respect to heightened market volatility. Jacquier and Marcus (2001) point out that increased volatility increases the importance of systematic risk

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because of associated increases in asset correlations. Investors nearing retirement or in the early years of retirement are more sensitive to market volatility as their portfolios may represent a means of maintaining sustainable income during retirement. Making up for losses associated with volatility may be difficult because of an inability to increase savings or reduce living expenses during the retirement years, which presents a special challenge to financial planners as they advise their clients.

Equity style management based on value, growth, and blended assets is a common approach used by financial advisors to help achieve individuals' objectives outlined in investment policy statements. Thus, mutual funds are often designed to help meet the specific needs of individuals who desire a specific mix of value or growth investments. The unique properties of each investment style may result in different reactions to increased market volatility. We investigate whether investors can benefit from growth versus value investing based on the implied market volatility.

The market volatility index (VIX) index was first introduced by the Chicago Board Options Exchange (CBOE) in 1993 as a measurement of implied volatility based on Standard and Poor's S&P 100 call and put options. The financial media often refer to the VIX index as a "fear index." This suggests that the VIX is an indicator of market sentiment regarding the level of uncertainty in the U.S. equities market. Using the old VIX measurement based on the Standard and Poor's 100 index as a proxy for implied volatility, Copeland and Copeland (1999) find that changes in implied volatility on stock index futures serve as a market-timing signal. In particular, they find that portfolio returns can be enhanced through style rotation between growth and value portfolios based on changes in the VIX index. In particular, they find portfolios of value stocks outperform (underperform) portfolios of growth stocks following an increase (decrease) in the VIX index. The premise behind these results is that investors switch to value (growth) stocks with increased (decreased) levels of uncertainty. Thus, the VIX index provides an interesting signal for individual investors, because it is readily available and widely followed by market participants.

On September 22, 2003, the CBOE and Goldman Sachs revised the VIX index that uses 30-calendar-day out-of-the-money SPX calls and puts with weights that are inversely proportional to the squared strike price. This new VIX index is based on the S&P 500 index replacing the S&P 100 index used in the original 1993 VIX measurement. The resulting construction is based on work by Detererfi et al. (1999) and referred to as the fair value of future variance. Previously, the Black-Scholes-Merton (1973) model was used as a basis for the construction of the VIX index. The CBOE calculated the revised version of the VIX back to January 1990.¹ Jiang and Tian (2007) point out that the revised version of the VIX creates an economically significant bias in the estimation of true volatility.

We investigate whether Copeland and Copeland (1999) findings are robust based on the revisions to the VIX index over a longer and more current time period. We find some evidence supporting their initial findings using data from 1990 to 2008 that corresponds with the CBOE new VIX measurement. However, the results of this study are only statistically significant for longer holding periods of 30 days or more. Thus, the anomaly of shorter holding period style trading strategies of Copeland and Copeland (1999) no longer appear to exist.

2. Literature review

Although asset allocation is clearly one of the most important determinants of a portfolio's performance, there is increasing evidence that market timing is also a relevant determinant. A recent study by Below et al. (2009) provides evidence that style rebalancing significantly outperforms naïve buy-and-hold approaches. Other studies also suggest market timing benefits resulting from active asset allocation and specifically investigate style-based strategies (Arshanapalli et al., 2004; Holmes and Faff, 2007; Puttonen and Seppa, 2007;). Earlier work addressing value versus growth also indicated mixed results (Bauman and Miller, 1997; Chan et al., 2002).

Merton (1980) suggests the market risk premium, measured as the difference between the market return and the risk-free rate, is directly related to the market variance. Furthermore, French, Schwert, and Stambaugh (1987) suggest predicted volatility increases if the volatility of the market increases unexpectedly. The increased market volatility causes market risk premiums to increase causing an increase to investors' required rates of return on equities. Assuming no changes in cash flows for the equities the increased required returns will result in decreasing stock prices. Thus, a time-varying risk premium based on changes in market volatility is hypothesized to lead to differences in performance for value and growth portfolios.

Numerous studies have found compelling evidence that implied volatility measurements such as the VIX index are effective in predicting future market volatility for the next 30 days.² Low (2004) finds evidence that risk is semidimensional. The study finds that extreme drops in prices lead to rapid increases in risk, while extreme price increases lead to gradual reductions in risk. Fleming et al. (1995) provide the initial empirical evidence of the predictive ability of the VIX. There are numerous studies examining the ability of implied volatility measures to time the market. Arak and Mijid (2006) show that before the Russian default in August 1998 that the previous version of the VIX did not serve as a pure measure of market sentiment, but also seemed to reflect investor fear.

There is considerable debate regarding whether or not the VIX index is the best predictor of future volatility. For example, Caninna and Figlewski (1993) suggest historical estimates of volatility are better forecasts of future market volatility than implied volatility calculated from the Black-Scholes option-pricing model. Becker, Clements, and White (2007) find the VIX index does not contain additional information than other forecasting models. Fleming, Ostdiek, and Whaley (1995) observe a strong relationship regarding the ability of the VIX index to predict future market volatility. Thus, previous studies indicate it is a useful measure of predicting future volatility, regardless of the debate regarding which model is best. Furthermore, the VIX index is widely publicized and followed by media and practitioners. A recent article by Goldwhite (2009) suggests that the VIX index is useful in categorizing investments to enhance performance based on unexpected changes in risk aversion.

Fig. 1 illustrates the daily close of the SPX (Standard & Poor's 500 index) and the VIX from January 1990 to December 2008. The time series plot over this time line reflects the largest increase in the VIX during the market uncertainty that resulted from the credit crisis and financial sector failures in 2008. In addition, 1997, 1998, 2001, and 2002 also reflected heightened degrees of market uncertainty relative to other time periods from 1990 to 2008.

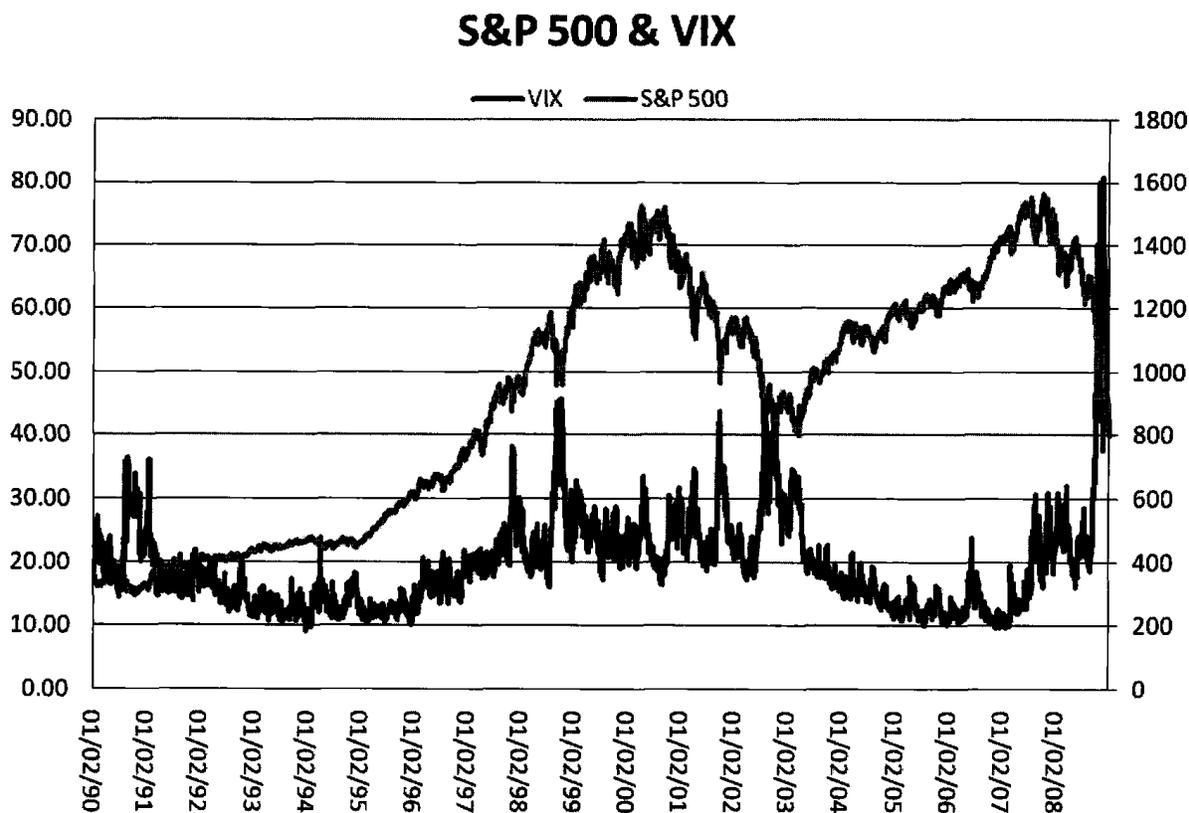


Fig. 1. S&P 500 index and VIX Index January 1990 to December 2008.

Furthermore, there appears to be a potential contemporaneous inverse relationship between the VIX and SPX.

The style rotation timing strategy suggested by Copeland and Copeland (1999) is based on the notion that investors will rotate into (out of) value portfolios and out of (into) growth portfolios with an increase (decrease) in the VIX index and market uncertainty. This implies that growth and value stocks are not highly correlated with one another. Table 1 illustrates the high correlations of Barra growth and value portfolios with each other and the SPX. Thus, in addition to testing the style rotation strategy based on the new VIX measure changes in correlations between value, growth, and S&P 500 portfolios may also influence the effectiveness of the strategy.

3. Sample and methodology

Daily data from April 17, 1990 to December 31, 2008 from Barra small-cap growth, mid-cap growth, large-cap growth, small-cap value, mid-cap value, and large-cap value indexes are used to test the performance differences of value-based versus growth-based strategies relative to changes in perceived volatility as measured by the percentage change in VIX. The differences between the value and growth portfolios are computed for all three size categories and serve as the dependent variable in our regression analysis.

Table 1 Correlations of portfolios with the S&P 500 index

	S&P 500 index	Small-cap value	Small-cap growth	Mid-cap value	Mid-cap growth	Large-cap value	Large-cap growth
Panel A: Correlations from April 17, 1990 to December 31, 1999							
Small-cap value	0.93	1.00	0.94	0.99	0.90	0.96	0.87
Small-cap growth	0.95	0.94	1.00	0.95	0.98	0.95	0.92
Mid-cap value	0.97	0.99	0.95	1.00	0.94	0.99	0.93
Mid-cap growth	0.97	0.90	0.98	0.94	1.00	0.96	0.97
Large-cap value	0.99	0.96	0.95	0.99	0.96	1.00	0.97
Large-cap growth	0.99	0.87	0.92	0.93	0.97	0.97	1.00
Panel B: Correlations from January 1, 2000 to December 31, 2008							
Small-cap value	0.45	1.00	0.78	1.00	0.49	0.92	-0.12
Small-cap growth	0.87	0.78	1.00	0.80	0.92	0.91	0.51
Mid-cap value	0.50	1.00	0.80	1.00	0.53	0.94	-0.08
Mid-cap growth	0.93	0.49	0.92	0.53	1.00	0.71	0.78
Large-cap value	0.73	0.92	0.91	0.94	0.71	1.00	0.20
Large-cap growth	0.79	-0.12	0.51	-0.08	0.78	0.20	1.00
Panel C: Correlations from January 1, 2004 to December 31, 2008							
Small-cap value	0.94	1.00	0.95	0.99	0.92	0.96	0.86
Small-cap growth	0.95	0.95	1.00	0.95	0.99	0.95	0.96
Mid-cap value	0.95	0.99	0.95	1.00	0.94	0.97	0.88
Mid-cap growth	0.94	0.92	0.99	0.94	1.00	0.95	0.97
Large-cap value	0.97	0.96	0.95	0.97	0.95	1.00	0.92
Large-cap growth	0.95	0.86	0.96	0.88	0.97	0.92	1.00

Following the methodology of Copeland and Copeland (1999) we further examine the impact of percentage changes in the VIX index as a market signal. The percentage change in the VIX is calculated by subtracting the 75-day moving average of the VIX index from the Day 0 VIX index and then dividing this difference by the 75-day moving average. This smoothes out the daily “noise” of the VIX index and identifies the percentage changes in the VIX index that are relatively large compared to a 75-day moving average. This percentage change in the VIX index is used as a trading signal to switch between value and growth portfolios. For percentage increases in the VIX index, a long value and short growth portfolio is formed. Similarly, when the VIX index decreases a significant percentage from the 75-day moving average, a long growth and short value portfolio is formed.

4. Empirical results

Table 2 illustrates the results of a regression of the difference in returns for the value and growth portfolios for 1 to 20 day holding periods versus the percentage change in the VIX for today, Day 0. The results are statistically significant at the 0.01 level for all three size indexes for holding periods of more than 10 days. These results are consistent with the findings of Copeland and Copeland (1999) suggesting the VIX provides valuable information regarding a switch in investor preferences between value and growth indexes.

The findings of Table 2 suggest holding periods greater than 60 days result in statistically significant expected returns for the value minus growth portfolio for large, mid, and

Table 2 Value vs. growth using the percentage change in VIX as the explanatory variable

Holding period	Intercept	t-stat	Slope	t-stat
Panel A: Large-cap				
1	-0.0001	-0.57	0.0000	0
5	-0.0004	-1.51	0.0005	0.35
10	-0.0009	-2.53*	0.0016	0.79
20	-0.0020	-3.77**	0.0048	1.65
30	-0.0032	-4.68**	0.0076	2.06*
40	-0.0047	-5.80**	0.0174	3.97**
50	-0.0062	-6.74**	0.0312	6.27**
60	-0.0078	-7.67**	0.0445	8.16**
Panel B: Mid-cap				
1	-0.0001	-1.07	-0.0004	-0.52
5	-0.0009	-2.59**	0.0002	0.11
10	-0.0018	-3.58**	-0.0001	-0.03
20	-0.0036	-4.59**	-0.0001	-0.02
30	-0.0057	-5.50**	-0.0004	-0.08
40	-0.0079	-6.51**	0.0044	0.67
50	-0.0102	-7.36**	0.0119	1.61
60	-0.0125	-8.22**	0.0221	2.71**
Panel C: Small-cap				
1	-0.0001	-0.74	-0.0012	-2.11*
5	-0.0006	-2.24*	-0.0006	-0.38
10	-0.0014	-3.20**	-0.0003	-0.13
20	-0.0027	-4.10**	0.0005	0.13
30	-0.0042	-5.04**	0.0028	0.63
40	-0.0059	-5.97**	0.0094	1.76
50	-0.0076	-6.79**	0.0173	2.88**
60	-0.0093	-7.51**	0.0273	4.12**

The results of a regression of the difference in returns for the value and growth portfolios for 1 to 20 day holding periods vs. the percentage change in the VIX for today, Day 0. **Indicates statistical significance at the 0.01 level and *indicates statistical significance at the 0.05 level.

small-cap portfolios. Holding periods of 30 days or more resulted in statistically significant returns for the value minus growth portfolios for large-cap Barra portfolios. Only the 60 day holding period value minus growth portfolio was statistically significant for the mid-cap Barra portfolios. Interestingly, the one day holding period was statistically significant for value minus growth small-cap Barra portfolios, as well as the 50 and 60 day holding periods. A possible explanation for this result is day traders are more likely to trade in more volatile small-cap stocks and thus the one-day holding period is only statistically significant for small-cap stocks and not mid or large-cap stocks.

These results are somewhat contradictory to earlier findings of Copeland and Copeland (1999). In their study value minus growth portfolios were statistically significant when holding periods exceeded two days. The most likely explanation for the difference for the findings between our study and Copeland and Copeland (1999) is the time period. For large-cap results, it is possible that after the publication of the Copeland and Copeland (1999) study more active managers tried to take advantage of this anomaly. Thus, our study using data up to 2008, reflects the lack of abnormal returns using shorter term trading strategies. However, it is interesting to note that when we extended the holding periods beyond the 20

Table 3 Results of percentage change in VIX trading strategies of large-cap value vs. growth

Holding period	Change in VIX	Cumulative ret (%)	Number of transactions	Number of days	Daily ret
1	0.2	-11.43	117	607	-1.88
1	0.3	-1.01	62	327	-0.31
1	0.4	4.22	42	201	2.10
1	-0.2	0.99	197	584	0.17
1	-0.3	7.75	152	319	2.43
2	0.2	-3.69	88	695	-0.53
2	0.3	15.69	51	378	4.15
2	0.4	4.92	31	232	2.12
2	-0.2	2.35	182	766	0.31
2	-0.3	-0.38	152	471	-0.08
3	0.2	-1.11	74	769	-0.14
3	0.3	18.09	47	425	4.26
3	0.4	4.05	28	260	1.56
3	-0.2	0.19	171	936	0.02
3	-0.3	-1.76	150	620	-0.28
10	0.2	-3.47	44	1152	-0.30
10	0.3	17.28	31	649	2.66
10	0.4	7.54	14	375	2.01
10	-0.2	7.13	118	1874	0.38
10	-0.3	18.13	126	1546	1.17

day horizon in the Copeland and Copeland (1999) study, we again see statistically significant abnormal returns.

Other plausible explanations for the differences in findings are related to market efficiency, new VIX methodology, and changing correlations. In an efficient market, short-term trading strategies rotating between growth and value portfolios using the methodology described by Copeland and Copeland should not persist after the market is aware of this strategy. Another plausible explanation for the differences in the two studies is the new VIX index based on the SPX rather than the S&P 100 index impacted the results. However, this is a less likely explanation. Finally, it is possible that the correlations between growth and value stocks have increased over time. With high correlations rotating between value and growth stocks would be of little use regardless of the timing strategy used. Based on the results in Table 1, this explanation is not likely as correlations have not changed significantly over time.

Table 3 shows the results for Barra large-cap value minus growth portfolios. The results for a 30% or 40% increase in the VIX index for a one day holding are a large one-day negative return. Similar findings are reflected in Tables 4 and 5 for the Barra mid-cap and small-cap portfolios. These results contradict the findings of Copeland and Copeland (1999) who found significant positive returns for one day holding periods with an increase of 10%, 20%, or 30% in the VIX index. We offer no apparent explanation of the large negative returns for one-day holding periods. However, these findings suggest that the anomaly no longer persists using more recent data. Conversely, for holding periods of 10 days,³ there

Table 4 Results of percentage change in VIX trading strategies of mid-cap value vs. growth

Holding period	Change in VIX	Cumulative ret (%)	Number of transactions	Number of days	Daily ret
1	0.2	-12.73	117	607	-2.10
1	0.3	-10.13	62	327	-3.10
1	0.4	-3.10	42	201	-1.54
1	-0.2	3.57	197	584	0.61
1	-0.3	7.66	152	319	2.40
2	0.2	-6.36	88	695	-0.92
2	0.3	14.88	51	378	3.94
2	0.4	13.08	31	232	5.64
2	-0.2	4.41	182	766	0.58
2	-0.3	6.65	152	471	1.41
3	0.2	-11.73	74	769	-1.53
3	0.3	17.67	47	425	4.16
3	0.4	5.62	28	260	2.16
3	-0.2	2.44	171	936	0.26
3	-0.3	-7.03	150	620	-1.13
10	0.2	-6.16	44	1152	-0.53
10	0.3	21.03	31	649	3.24
10	0.4	12.93	14	375	3.45
10	-0.2	-10.47	118	1874	-0.56
10	-0.3	2.61	126	1546	0.17

does appear to be large cumulative returns for value minus growth portfolios across large, mid and small-cap portfolios. There does not appear to be any consistent market reaction for VIX decreases of -20% or -30% in this study.

Table 5 Results of percentage change in VIX trading strategies of small-cap value vs. growth

Holding period	Change in VIX	Cumulative ret (%)	Number of transactions	Number of days	Daily ret
1	0.2	-17.70	117	607	-2.92
1	0.3	-10.99	62	327	-3.36
1	0.4	-6.78	42	201	-3.37
1	-0.2	-5.08	197	584	-0.87
1	-0.3	5.19	152	319	1.63
2	0.2	-13.62	88	695	-1.96
2	0.3	6.69	51	378	1.77
2	0.4	0.89	31	232	0.39
2	-0.2	-3.31	182	766	-0.43
2	-0.3	6.10	152	471	1.30
3	0.2	-13.53	74	769	-1.76
3	0.3	9.95	47	425	2.34
3	0.4	-1.29	28	260	-0.50
3	-0.2	-3.00	171	936	-0.32
3	-0.3	-7.93	150	620	-1.28
10	0.2	0.65	44	1152	0.06
10	0.3	20.25	31	649	3.12
10	0.4	17.01	14	375	4.54
10	-0.2	-10.56	118	1874	-0.56
10	-0.3	5.62	126	1546	0.36

5. Conclusion

Portfolio results based on switching from value to growth stocks based on changes in the VIX index appear to still exhibit economically significant trading strategies for longer holding periods. Conversely, trading strategies based on shorter trading strategies first suggested by Copeland and Copeland (1999) no longer appear to be significant. For longer holding periods of 30 days or more using the one-day percentage change in the VIX from its 75-day moving average as a signal to switch to value from growth style portfolios resulted in positive returns. However, no consistent trading strategies persisted for decreases in the VIX index. This again is most likely the result of the increased market awareness of the anomaly after the Copeland and Copeland (1999) study or changes in correlations between value, growth, and S&P 500 portfolios. Thus, it appears that the style rotation timing strategy may still be an effective strategy for “flights to quality” during periods of increased market uncertainty evidenced by a rising VIX. The results of this study suggest individual investors may benefit from switching to value stocks in their equity portfolios during periods of increases in the VIX index.

Notes

1. For a more detailed explanation of the calculation of the VIX index and the actual levels refer to the Chicago Board Option Exchange’s Website at <http://www.cboe.com>.
2. Latane and Rendleman (1976), Chras and Manaster (1978), Beckers (1981), Jorion (1995), Fleming, Ostidiek, and Whaley (1995), Fleming (1998), Christensen and Prabhala (1998), Christensen and Strunk-Hansen (2002), Fleming (1999), Blair, Poon, and Taylor (2001), and Becker, Clements, White (2006) find implied volatility measures are effective predictors of future market volatility.
3. As a test of model robustness, we extend out the holding periods to 20, 30, 40, 50, and 60 days for Tables 3–5 and observe no statistically significant results. The tables associated with the alternative holding periods are available upon request.

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