



Market Volatility and Investment Style

Dan Bukowski Northfield Research Conference Venice, Italy June, 2009

Agenda - Volatility

Two Studies:

Macro – Market wide volatility

- Impact on performance
 - \rightarrow Market, style
- Variation by environment
- > Micro idiosyncratic/residual
 - Effectiveness as a universe
 - \rightarrow Inter-relation with investment styles
 - Predictor of performance (alpha)



Macro – Market Wide

Proxy - VIX:

- Launched in 1993
 - Original series: VXO
 - Based on the S&P 100 (OEX)
 - Implieds using:
 - → Black Scholes
 - \rightarrow At the money puts and calls
 - \rightarrow Index options
- > Revamped in 2003:
 - Uses a wider range of strike prices
 - \rightarrow Near term and next
 - \rightarrow Out of the money
 - \rightarrow Weighted by price (+), strike price (-) and time to expiration (-)
 - Implied vol independent of any model
 - Uses S&P 500
 - History backfilled to 1986
- > Behavior of the series very similar

Daily VIX 1986 - 2009



Source: CBOE

Uses VIX from 2003, VXO prior; Values capped at 90

- > Volatility
 - Daily VIX, 2003 present
 - VXO: 1986 2003 (backfilled pre-1993)
- > Alpha models, 1994 present
 - Long/short decile spreads
 - Equal weighted
 - Universe: Russell 1000
- Russell Indices
 - 1000 Cap and Equal Wgtd
 - 1000 Growth/Value
- Data Limitations
 - Alpha models, 1994 -
 - Backfilled VIX, 1986 -

High Vol vs Low Vol

Live alpha models

VIX Data

Cumulative Returns	of Long-Sh	ort Spreads	5						R1000
		Growth			R1000	R1000 EQ	2	R1000	V - G
	Value	Momentun	R1000	R1000 EQ	V - G	V - G	High Volatility		
High Volatility							Jan 86 - Nov 88	39.5	8.4
Mar 96 - Feb 04	54.8	17.2	102.8	151.3	13.6	-3.7	Nov 89 - Mar 91	15.1	-13.3
Jul 07 - Mar 09	23.9	57.7	-44.9	-47.4	-19.2	-11.0	Dec 96 - Oct 03	55.5	10.2
							Jul 07 - Mar 09	-44.9	-19.2
Batting Avg	100%	100%	50%	50%	50%	0%			
Avg Annl	3.7	3.5	0.6	1.6	-0.5	-0.9	Batting Avg	75%	50%
							Avg Annl	2.5	-1.4
Low Volatility									
Feb 94 - Feb 96	38.2	26.5	40.3	34.6	-6.5	-1.2	Low Volatility		
Mar 04 - Jun 07	34.5	11.2	41.8	58.6	20.4	5.5	Dec 88 - Oct 89	28.0	-8.8
							Apr 91 - Nov 96	138.0	5.8
Batting Avg	100%	100%	100%	100%	50%	50%	Nov 03 - Jun 07	55.4	25.5
Avg Annl	12.1	6.5	13.5	15.0	2.2	0.8			
							Batting Avg	100%	67%
Overall Average:							Avg Annl	16.4	1.9
Feb 94 - Mar 08								Ì	
Avg Annl Ret	8.7	6.5	5.4	7.1	0.2	-0.7	Average:		
							Jan 86 - Nov 08		
							Avg Annl Ret	9.0	0.6

High volatility = *VIX* > sample median (19.1)

High Vol vs Low Vol - Observations

- Market as a Whole
 - Prefers low volatility
- Value vs Growth
 - Largely indifferent
 - \rightarrow Bias towards growth during HiVol
 - \rightarrow Bias towards value during LoVol
- > Alpha Models
 - Prefer periods of low vol
 - Discriminatory power in both
- > Robust to choices of cutoff

Falling vs Rising Vol

Live alpha models

VIX Data

									R1000
								R1000	V - G
							Falling Volatilities		
							Jan 88 - Jun 89	36.9	8.4
		Growth			R1000	R1000 EQ	Nov 89 - Jun 90	6.5	-8.3
	Value	Momentum	R1000	R1000 EQ	V - G	V - G	Sep 90 - Dec 93	66.1	5.8
Falling Volatilities							May 94 - Sep 94	3.7	-4.7
Nov 97 - Jul 98	23.0	23.2	22.2	10.7	-6.5	-1.5	Dec 94 - Nov 95	37.6	0.2
Oct 98 - Aug 00	-42.2	55.1	56.9	66.1	-34.1	-38.8	Nov 97 - Jul 98	22.2	-6.5
Apr 01 - Jun 01	-4.2	5.8	6.3	12.4	-4.2	-6.7	Oct 98 - Aug 00	56.9	-34.1
Oct 01 - Jul 05	-7.5	1.9	31.0	81.7	19.6	0.4	Apr 01 - Jun 01	6.3	-4.2
Jun 06 - Jan 07	5.0	-4.3	14.7	14.3	3.8	2.1	Oct 01 - Jul 05	31.0	19.6
Dec 08 - Mar 09	-11.8	8.7	-9.0	-1.5	-12.8	-6.5	Jun 06 - Jan 07	14.7	3.8
							Dec 08 - Mar 09	-9.0	-12.8
Batting Avg	33%	83%	83%	83%	33%	33%	Batting Avg	91%	45%
Avg Annl	-5.2	9.2	15.5	20.7	-3.9	-6.9	Avg Annl	15.7	-3.8
							Rising Volatilities		
Rising Volatilities							Jan 86 - Dec 87	21.3	-3.4
Dec 95 - Oct 97	15.3	22.3	55.1	47.1	1.0	5.8	Jul 89 - Oct 89	7.4	-5.7
Aug 98 - Sep 98	2.7	-6.5	-9.2	-11.9	-1.8	2.0	Jul 90 - Aug 90	-10.0	0.8
Sep 00 - Mar 01	94.6	-40.0	-24.3	-17.4	62.8	45.8	Jan 94 - Apr 94	-2.8	2.4
Jul 01 - Sep 01	44.3	-0.7	-15.2	-20.2	9.7	13.9	Oct 94 - Nov 94	-1.8	-1.8
Aug 05 - May 06	-3.7	0.8	4.9	7.1	6.5	-0.5	Dec 95 - Oct 97	55.1	1.0
Feb 07 - Nov 08	42.3	45.8	-36.3	-42.7	-7.8	-6.5	Aug 98 - Sep 98	-9.2	-1.8
							Sep 00 - Mar 01	-24.3	62.8
Batting Avg	83%	50%	33%	33%	67%	67%	Jul 01 - Sep 01	-15.2	9.7
Avg Annl	31.2	0.0	-8.6	-11.0	10.4	9.6	Aug 05 - May 06	4.9	6.5
							Feb 07 - Nov 08	-36.3	-7.8
							Batting Avg	36%	55%
							Avg Annl	-4.4	5.7

Falling vs Rising Vol - Observations

- Market as a Whole
 - Prefers falling volatility
- > Value vs Growth
 - Value out performs during rising volatility
 - Growth during falling
- > Alpha Models
 - Similar to value vs growth above
- Consistent with duration argument



Extreme Volatility / de-Leveraging

		Growth			R1000	R1000 EQ			
	Value	Momentun	R1000	R1000 EQ	V - G	V - G			
Spikes/de-leverage									
Feb 07	2.3	-0.6	-1.7	0.0	0.3	0.4			
Jul 07	-0.6	1.4	-3.1	-4.3	-3.1	-2.3			
Batting Avg	50%	50%	0%	50%	50%	50%			
Avg Annl	11.1	5.4	-25.4	-23.4	-15.5	-10.8			
Pre 94 avg + 1 sd (~	~25)								
Aug 07	-1.2	0.0	1.4	0.2	-0.5	-0.7			
Sep 07	-2.4	3.6	3.8	2.8	-0.8	-1.1			
Nov 07	6.4	5.6	-4.3	-5.3	-1.2	-0.5			
Jan 08	-0.8	-8.9	-6.0	-4.5	3.8	2.3			
Feb 08	-4.7	7.6	-3.1	-2.8	-2.2	-1.6			
Mar 08	5.7	-2.0	-0.7	-2.2	-0.1	-0.1			
Jul 08	4.4	-1.5	-1.2	-0.7	1.5	2.1			
Sep 08	7.0	-2.6	-9.5	-11.4	4.2	3.9			
Oct 08	8.3	4.7	-17.5	-21.4	0.3	0.0			
Nov 08	9.6	8.1	-7.6	-10.7	0.8	0.0			
Dec 08	-2.7	0.5	1.6	6.7	-0.4	1.0			
Jan 09	-1.0	8.3	-8.2	-7.5	-6.7	-4.9			R1000
Feb 09	0.5	5.9	-10.3	-11.2	-5.8	-4.1		R1000	V - G
Mar 09	-8.9	-5.7	8.7	12.4	-0.4	1.5			
							Spikes: 1986 - 200	9	
Batting Avg	50%	64%	29%	29%	36%	36%	Batting Avg	41%	51%
Avg Annl	16.9	20.3	-38.6	-41.2	-6.7	-2.2	Avg Annl	-24.9	1.6
Recent Period (Sen	08 - Mar09)								
Ratting Avg	57%	71%	29%	29%	43%	43%			
Ava Annl	21.6	36.3	-55.0	-56.8	-13.6	-4.8		-	R1000
								R1000	V - G
pre Sep 08							Pre Sep 08:		
Batting Avg	43%	57%	29%	29%	29%	29%	Batting Avg	43%	53%
Avg Annl	12.4	6.1	-16.3	-19.9	0.8	0.4	Avg Annl	-15.4	5.5

Extreme Volatility – Initial Observations

> Pre 2008Q4

> Extreme volatility

- Market does poorly
- Value tends to outperform

> Alpha Models

- Continue to add alpha
- Value tends to do better
- > De-leveraging
 - Expect growth to outperform

De-leveraging - Observations

- > De-leveraging
 - Market did poorly
 - Value vs Growth inconclusive
 - \rightarrow Slight bias towards Growth
 - » Consistent with hypothesis
 - → Daily data?
- > September 2008 March 2009
 - Market did poorly
 - → Consistent with both a volatility spike and de-leveraging
 - Initially:
 - \rightarrow Value outperformed growth
 - » Consistent with volatility spike
 - » Inconsistent with de-leveraging
 - Subsequently growth outperformed

Economic backstop - recessions

									R1000
								R1000	V - G
							Recession (NBER)	1	
							Jan 80 - Jul 80	8.9	-1.2
		Growth			R1000	R1000 EC	Jul 81 - Nov 82	13.1	-0.6
	Value	Momentun	R1000	R1000 EQ	V - G	V - G	Jul 90 - Mar 91	9.0	-5.5
							Mar 01 - Nov 01	-0.9	-5.1
Recession (NBER)							Jan 08 -	-44.1	-11.0
Mar 01 - Nov 01	-4.0	4.9	-0.9	5.8	-5.1	-6.6	6		
Jan 08 -	25.8	32.1	-44.1	-43.6	-11.0	-4.6	Batting Avg	60%	0%
							Avg Annl	-5.4	-2.3
Batting Avg	50%	100%	0%	50%	0%	0%	, ,		
Avg Annl	10.3	18.6	-26.5	-23.6	-8.4	-5.8	B Expansion		
							Aug 80 - Jul 81	13.4	1.7
Expansion							Dec 82 - Jul 90	223.6	9.3
Feb 94 - Mar 01	119.9	58.9	170.3	151.0	-7.4	-5.8	3 Apr 91 - Mar 01	285.2	5.9
Dec 01 - Dec 07	34.3	18.2	48.7	88.4	32.2	6.3	B Dec 01 - Dec 07	48.7	32.2
Batting Avg	100%	100%	100%	100%	50%	50%	Batting Avg	100%	100%
Avg Annl	8.5	4.9	11.1	12.4	1.5	0.0) Avg Annl	13.6	1.9
Leading into a reces	ssion						Leading into a rece	ssion	
Oct 00 - Mar 01	83.9	-36.4	-20.6	-14.5	47.5	38.1	1 Aug 79 - Jan 80	14.4	-10.2
Jul 07 - Dec 07	-1.5	19.4	-1.3	-6.7	-9.2	-6.7	7 Feb 81 - Jul 81	4.0	5.4
							Feb 90 - Jul 90	9.3	-8.9
Batting Avg	50%	50%	0%	0%	50%	50%	Oct 00 - Mar 01	-20.6	47.5
Avg Annl	81.1	-24.1	-21.6	-20.2	34.0	28.8	3 Jul 07 - Dec 07	-1.3	-9.2
Leading into a recov	very						Batting Avg	60%	40%
Jun 01 - Nov 01	3.5	-1.0	-8.9	-7.4	-0.8	1.0) Avg Annl	0.8	10.1
Batting Avg	100%	0%	0%	0%	0%	100%	Leading into a reco	wery	
Avg Annl	7.1	-1.9	-17.0	-14.3	-1.6	2.0) Feb 80 - Jul 80	8.9	-1.2
							Jun 82 - Nov 82	27.6	-6.1
							Oct 90 - Mar 91	26.5	-6.8
							Jun 01 - Nov 01	-8.9	-0.8
							Batting Avg	75%	0%
							Avg Annl	26.6	-7.4



Economic Cycle - Observations

- > Recessions
 - Market does poorly, not conclusive
 - Growth outperforms Value
 - Alpha models sample size
- > Expansions
 - Sample size mimics overall averages
- Entering a recession
 - Market tends to do poorly
 - Value tends to outperform
- > Entering an expansion
 - Market tends to do well
 - Growth tends to outperform

Implications at year-end

- Recent behavior
 - Poor overall market, value outperforms
 - Market behavior consistent with:
 - → High/extreme, rising volatility
 - \rightarrow Entering a recession
 - Style behavior consistent with:
 - → Extreme volatility
 - \rightarrow Entering a recession
 - → Inconsistent with de-leveraging
- Going forward
 - Continued recession/recovery, vols high but declining
 - Overall market
 - \rightarrow Generally bullish, depending on how high vols remain
 - Bullish for growth
 - → Again, depending on how high vols remain
- Caveat this does not consider valuations
 - Market valuation likely neutral towards bullish territory
 - \rightarrow Another leg down?
 - Value inexpensive relative to growth
 - \rightarrow Are valuations real?

- Recent behavior
 - Poor overall market, growth outperforms
 - Market behavior consistent with:
 - → High/extreme volatility
 - \rightarrow Entering a recession
 - \rightarrow Inconsistent with declining volatility
 - Style behavior consistent with:
 - →Declining volatility
 - \rightarrow In a recession
- Going forward
 - Little change from previous
 - Impact of valuations may have changed

- Style bias?
- > Alpha?



Micro – background

- > Idiosyncratic measure
 - Daily data
 - Z-score of daily return
 - \rightarrow Also considered downside
 - Trailing 36 months
 - \rightarrow 6 and 12 show similar results
 - Actual, not implied vols
- > Universe: MSCI World Large Cap
 - Approximately 1000 global stocks
 - Developed markets only
 - June, 1993 June, 2008
- Long- short quintile spread portfolios

Spread portfolio performance



Rising line indicates LoVol outperforming

Spread Portfolios:		LoVol	HiVol	Entire
Performance - June, 1993 - June, 2008	Spread	(Long)	(Short)	Univ
Average Annual Return	4.0	13.2	5.1	8.7
Average Annual Volatility	17.8	12.0	23.3	14.9



LoVol tends to outperform

- Highly volatile

> HiVol outperforms during the tech bubble

- LoVol outperforms subsequently
- LoVol outperforms leading into the bubble

Portfolio composition – sector weights

Sector Weights	Index	Excess Weight:		
June, 1993 - June, 2008	Weight	Low Vol	High Vol	
Industrials	22.8	-6.5	0.1	
Finance	17.4	5.3	-1.8	
Consumer Discretionary	16.2	-6.8	-0.1	
Materials	11.4	-0.6	1.0	
Consumer Staples	9.0	6.4	-4.3	
Information Technology	6.4	-5.0	10.4	
Health Care	4.5	0.1	-2.6	
Utilities	3.7	7.1	-3.2	
Undefined	3.6	0.2	0.4	
Energy	2.8	-0.2	0.3	
Telecom	2.2	-0.2	-0.1	

- LoVol favors defensive, value-oriented sectors
- HiVol favors technology
- > LoVol reduced its financial exposure towards end of 2007

 \rightarrow Confirms intuition of previous slides



Portfolio composition – rolling style regression



Rolling 36 month regression, coefficients constrained to sum to one LoVol/HiVol are independent variables, MSCI Growth/Value dependent

LoVol consistently shows a higher exposure to value



Portfolio composition – Northfield style exposure



≻ LoVol consistently shows a higher exposure to value
 → Based on a bottom-up stock by stock measure



Value Composite	<u>Uı</u>	niverse
June, 1993 - June, 2008	LoVol	HiVol
Average IC	0.1	0.19
IC t-stat	0.6	50 1.81
Average Annual Spread Return	0.3	% 4.2%
Spread Return Annualized Volatility	8.4	% 11.4%

Universe broken into halves, equal weighted quintiles based on multi-factor score Multi-factor model combines Bk/P, FCF/P, SIs/P, Div Yld and EBITDA/EV

- Valuation based alpha signals
 - Discriminate better in the HiVol universe
 - Greater marginal impact



Micro work

- LoVol proxies for Value, HiVol for growth
 - Not clear it adds additional value beyond traditional universes

Avenues for further research

- Missing variables
- Specification of variable
 - Risk model specifications
 - Time period and weighting scheme
- > Implied volatilities
- Trading variables



Avenues for further research

Macro work

- Macro data
 - Missing variables
 - Additional macro indicators
 - \rightarrow Interest rates
 - \rightarrow Credit spreads
 - Daily data
 → Spikes
- > Valuation, earnings momentum data
 - Market, styles
 - With / without financials
 - \rightarrow Impact of overstated accounting variables
- > Tests
 - Marginal explanatory power

Quantitative Services Group LLC 1560 Wall Street, Suite 334 Naperville, IL 60563 (630) 637-8088 www.qsg.com

These materials are confidential. Distribution is Prohibited. © 2009 Quantitative Services Group LLC. All Rights Reserved.