Waverly Advisors

Relative Strength Tools in Trading and Investing

April 8, 2014

Adam Grimes, CIO, Waverly Advisors

Outline:

- What is relative strength?
- What are some ways to measure relative strength?
- Ideas for applying relative strength:
  - As a step in the screening process
  - As a stand-alone methodology
- Ideas for further research

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Relative Strength

- Comparing the relative performance of different markets.
- Two questions:
  - How to measure relative performance?
  - What markets can we compare?

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Relative Strength Index (RSI)

- The relative strength index (RSI) does not measure relative strength (and it is not an index.)
- This is a common problem with technical indicators: terminology was very loosely adapted from other disciplines so names can be misleading.
  - Other common examples:
    - CCI (Commodity Channel Index) is not commodity-specific.
    - The Stochastic oscillator has nothing to do with stochastics in mathematics.
- RSI may be useful, but it is not meant to be used for relative strength trading or analysis!

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Measuring Relative Performance

- Simple percent returns
- Performance relative to a market average
- Volatility-adjusted performance
- Composite returns over multiple time periods

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Simple Return Measures

- In most software packages can use Rate of Change (ROC), which is a simple percent change over a specified time period.

$$ROC = Close_{today} / Close_{n\ periods\ ago} - 1$$

- A basic relative strength measure can be created as a ranking of these returns.

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Relative Strength (RS) Universe

- The next examples will use these markets:
  - S&P 500 Cash
  - S&P 500 Futures, continuous contract
  - SPY
  - 30 Year Treasury Bond Futures, continuous
  - TLT
  - US Dollar Index, Cash
  - UUP
  - Gold Futures, continuous
  - Crude Oil Futures, continuous
  - USO
- (This list of markets may not make sense for actual relative strength analysis, but we are illustrating a few points.)

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Ranked by One Month Returns

TLT	1.19
SP Cash	0.90
SP Futs	0.80
Treas Futs	0.64
SPY	0.57
DX cash	-0.07
UUP	-0.09
Crude Oil Futs	-1.56
GLD	-2.06
USO	-2.05
Gold Futs	-2.15

- Exchange traded products (ETPs) and their related markets show some differences.
- What happens if we use another time period?

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Multiple Period Comparison

1 Month		3 Month		6 Month		1 Year	
TLT	1.19	GLD	8.37	SP Futs	10.69	SP Futs	21.91
SP Cash	0.90	Gold Futs	8.21	SP Cash	9.92	SP Cash	20.03
SP Futs	0.80	TLT	6.41	SPY	9.85	SPY	19.99
Treas Futs	0.64	Treas Futs	4.7	TLT	2.67	USO	6.56
SPY	0.57	Crude Oil Futs	1.48	Treas Futs	2.26	Crude Oil Futs	5.43
DX cash	-0.07	SP Futs	1.42	GLD	1.55	DX cash	-2.95
UUP	-0.09	SPY	1.19	DX cash	0.01	Treas Futs	-3.73
Crude Oil Futs	-1.56	SP Cash	1.15	Gold Futs	-0.53	UUP	-5.00
GLD	-2.06	USO	1.12	UUP	-0.74	TLT	-7.33
USO	-2.05	DX cash	-0.09	USO	-1.69	Gold Futs	-17.84
Gold Futs	-2.15	UUP	-0.88	Crude Oil Futs	-2.06	GLD	-18.52

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Things to Think About

- Are you comparing apples to apples?
  - Currency considerations.
- Are you accounting for dividends, splits, and other corporate actions?
- If you are using futures, do you understand the rolls?
  - Two methods:
    - Differenced: Cannot use for returns or percentages.
    - Ratio-adjusted: Can use for percentage measurements.
- A return is a measurement over a specific time window.
  - It is sensitive to what happens on *both* ends of the time window.

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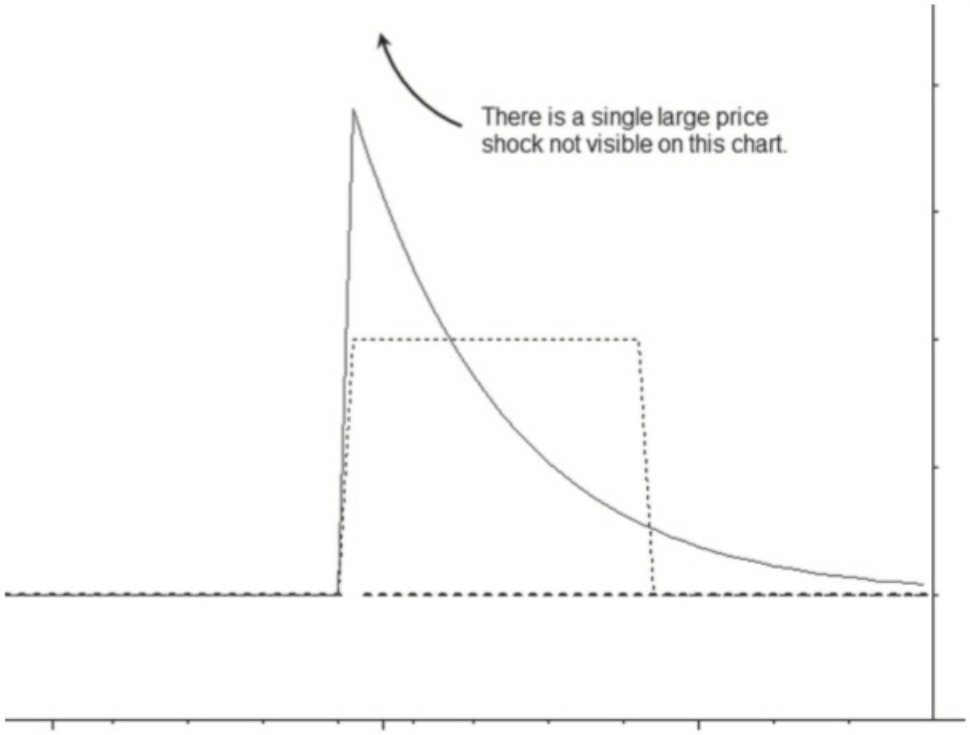
Possible Distortions



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One Possible Solution

- Rather than use a simple measurement of return, average several periods' returns.
  - A good discussion can be found in O'Neil (William O'Neil: *How to Make Money in Stocks*, 4th ed 2009), but many other authors use similar tools.
- Many options:
  - Use as few as two or many more periods.
  - Weighted or unweighted.
  - Can implicitly weight by period selection:
    - E.g., 1 week, 2 week, 1 month, 1 year is front weighted
    - E.g., 1 month, 1 year, 1.5 year, 2 year is back weighted

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Waverly Advisors' Relative Strength

- We use a front-weighted multi-period relative strength measure.
- Periods and calculation are proprietary, but there is no secret sauce.
  - The measurement was crafted to be coherent with and to support our trading style, not because it is better than any other.
- We use this as an idea generation tool and as a filter for other trades.

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Multi RS

1 Month		3 Month		6 Month		1 Year		WA Multi RS	
TLT	1.19	GLD	8.37	SP Futs	10.69	SP Futs	21.91	TLT	2.42
SP Cash	0.90	Gold Futs	8.21	SP Cash	9.92	SP Cash	20.03	Gold Futs	2.02
SP Futs	0.80	TLT	6.41	SPY	9.85	SPY	19.99	SP Futs	1.90
Treas Futs	0.64	Treas Futs	4.7	TLT	2.67	USO	6.56	Treas Futs	1.65
SPY	0.57	Crude Oil Futs	1.48	Treas Futs	2.26	Crude Oil Futs	5.43	SP Cash	1.26
DX cash	-0.07	SP Futs	1.42	GLD	1.55	DX cash	-2.95	SPY	0.87
UUP	-0.09	SPY	1.19	DX cash	0.01	Treas Futs	-3.73	GLD	0.70
Crude Oil Futs	-1.56	SP Cash	1.15	Gold Futs	-0.53	UUP	-5.00	USO	0.14
GLD	-2.06	USO	1.12	UUP	-0.74	TLT	-7.33	UUP	-0.18
USO	-2.05	DX cash	-0.09	USO	-1.69	Gold Futs	-17.84	Crude Oil Futs	-0.19
Gold Futs	-2.15	UUP	-0.88	Crude Oil Futs	-2.06	GLD	-18.52	DX cash	-0.41

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Ranked RS

- The actual RS value may not be especially meaningful.
  - This shouldn't be surprising: **relative** strength!
- Can simply compare a list of RS values to each other to get a RS ranking.
- It is also possible to compare stocks relative to a stock universe.
- We do this with a non-parametric ranking:
  - Create the raw RS measure for each stock in the S&P 500
  - Create the raw RS measure for the test stock.
  - Express the test stock's RS as a percentile of the S&P 500.
    - Can also be outside the range of the S&P 500

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Ranked RS in Our Research

Tactical Equity Screening Models

Big Movers

Ticker	Desc	Close	Change	VolSpike	KPos	RS(SP500)
ANN	Ann Taylor Stores Corporation	42.05	13.0%	5.8	147	0.94
EIX	Edison Intl	53.87	3.6%	4.1	106	0.71
EMR	Emerson Electric Co	65.33	2.8%	3.0	71	0.32
NFX	Newfield Exploration	30.08	6.0%	2.8	107	0.96
TEX	Terex Corp	43.71	4.4%	2.8	67	0.89
BBY	Best Buy	26.96	4.3%	2.7	76	0.02
SXC	SunCoke Energy Inc	23.36	4.4%	2.7	92	0.90
FCX	Freeport-McMoRan Copper&Gold B	32.30	4.6%	2.6	58	0.11
ETR	Entergy Corp	66.04	2.0%	2.5	95	0.38
DO	Diamond Offshore Drilling	47.24	3.5%	2.5	65	0.01
DTV	DirecTV Group	73.94	-2.4%	-2.5	14	0.67
GSK	GlaxoSmithKline PLC ADR	53.07	-1.8%	-2.5	-5	0.21
MR	Mindray Medical Intl Limited	31.36	-4.7%	-2.6	7	0.00
NPSP	NPS Pharmaceuticals	30.08	-7.7%	-2.6	6	0.97
DDD	3D Systems Corp	56.83	-5.9%	-2.7	-1	0.10
REGN	Regeneron Pharmaceuticals	310.79	-5.5%	-2.7	20	0.77
ZTS	Zoetis Inc	29.26	-2.8%	-2.7	23	0.05
CAMP	CalAmp Corp	28.85	-6.4%	-2.8	5	0.99

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In Our Research

Relative Strength Rankings: One Week Changes in Rankings

US Market Cap Indexes	Now	Chg	VRat
iShs Russell MicroCap Index	1	0	0.8
S&P SmallCap 600 Index	2	0	0.8
Russell 2000 Index	3	0	0.9
Dow Jones Wilshire 5000 Comp	4	0	0.9
S&P 500 Index	5	0	0.9
S&P 100 Index	6	0	1.0

US Style Indexes	Now	Chg	VRat
US Mid Cap Growth	1	0	0.8
US Small-Cap Value	2	0	0.8
US Small-Cap Growth	3	0	0.9
US Growth	4	0	1.0
US Mid-Cap Value	5	1	0.7
US Large Cap Growth	6	-1	1.0
US Value	7	0	0.9
US Large Value Index	8	0	0.9

US Sectors	Now	Chg	VRat
Health Care	1	0	1.3
Financials	2	4	0.8
Materials	3	-1	0.8
Technology	4	3	1.1
Industrials	5	0	0.9
Cons. Discretionary	6	-2	0.7
Utilities	7	-4	1.3

US Industries	Now	Chg	VRat
Banks	1	8	1.0
Chemicals	2	0	0.7
Technology	3	3	1.1
Healthcare	4	-3	1.3
Construction and Matrls	5	-2	0.8
Financial Service	6	2	0.7
Insurance	7	5	0.6
Media	8	-4	0.6
Automobiles & Parts	9	6	0.8
Industrial Goods	10	1	0.9
Retail	11	-4	0.6
Utilities	12	-7	1.2
Food & Beverage	13	1	0.8
Real Estate TR	14	-4	1.7
Oil & Gas	15	2	0.7
Real Estate	16	-3	1.7
Telecommunication	17	2	1.1
Non-cyclical Good	18	-2	0.9
Basic Resources	19	-1	1.1

Market	Now	Chg	VRat
Israel	1	0	1.0
US (SP500)	2	0	0.9
France	3	0	0.8
Switzerland	4	0	0.8

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Trading Relative Strength

- There are many academic papers on this subject, and many of them are pretty accessible to the non-specialist.
- Be aware that some of the research uses the term "momentum" in the way we understand relative strength. (Traders tend to use "momentum" differently.)
- The basic concept is that the strongest markets tend to stay strong and the weakest weak.

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Trading Relative Strength

- But it may not be that simple.
- Much research shows that naïve relative strength strategies are not effective.
  - In general, academic research shows this, but whitepapers written to support marketing of simple relative strength strategies take a more simplistic approach.
- Mean reversion is the "enemy" of a relative strength strategy.
  - Buying the strongest and selling the weakest could leave you exposed to mean reversion.
  - Several ways to compensate, but could begin by filtering for overextension.

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Filtering for Overextension

- When markets are stretched far from a moving average, mean reversion is more likely.
  - Need to define “stretched far”
  - This tendency is different in different asset classes
- Properly calibrated bands or channels are one way to quantify “stretch” from a moving average.

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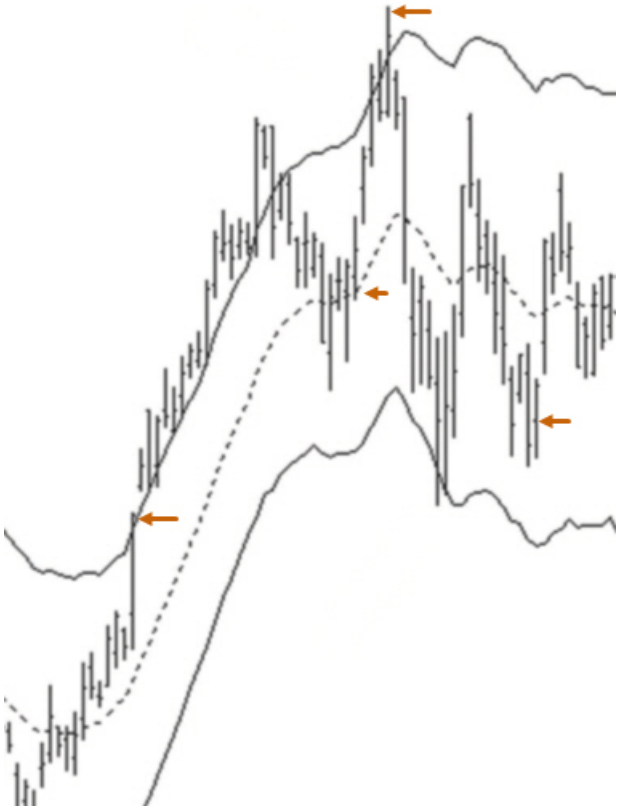
Waverly Advisors' KPos Measure

- KPos = Keltner Position = the close as a % of the band width.
- 50% = the moving average
- 100% = the upper band
- 75% = halfway between the average and the upper band.
- Measure can be > 100% or < 0%



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KPos in Waverly Advisors' Research

Tactical Equity Screening Models

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BBY	Best Buy	26.96	4.3%	2.7	76	0.02
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MR	Mindray Medical Intl Limited	31.36	-4.7%	-2.6	7	0.00
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REGN	Regeneron Pharmaceuticals	310.79	-5.5%	-2.7	20	0.77
ZTS	Zoetis Inc	29.26	-2.8%	-2.7	23	0.05
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Keltner Channel Statistics

TABLE 7.1 Excursion Stats for 2.25 ATR Modified Keltner Channels

	Mean	Min	Max
	Large-Cap Stocks (496 stocks)		
Inside	87.7%	67.0%	100.0%
Free bars	3.4%	0.0%	11.7%
	Small-Cap Stocks (500 stocks)		
Inside	85.4%	36.0%	96.2%
Free bars	4.3%	0.2%	21.2%
	Futures (16 contracts)		
Inside	85.9%	77.8%	92.5%
Free bars	3.8%	0.7%	6.4%
	Forex (9 pairs)		
Inside	89.8%	87.8%	92.0%
Free bars	2.3%	1.5%	3.7%
	Randomly Generated Data (7 series)		
Inside	86.8%	85.8%	87.7%
Free bars	3.8%	3.3%	4.4%

"Inside" records the percentage of the total trading range that is inside the bands.
"Free bars" are the percentage of all bars that are completely outside the bands.
Min and Max show the lowest and highest stat for individual instruments (i.e., individual stocks, futures markets, etc.) in the sample classes.

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Keltner Excursion Stats

TABLE 16.36 Fading Moves Outside Keltner Channel; Previous Bar Must Have Been Inside Channel

	Equities—Buy			Futures—Buy			Forex—Buy		
Days	$\mu_{sig}-\mu_b$	Diff. Med.	%Up	$\mu_{sig}-\mu_b$	Diff. Med.	%Up	$\mu_{sig}-\mu_b$	Diff. Med.	%Up
1	24.4**	19.3	53.7%	12.2	18.8	60.3%	(12.7)	(10.3)	45.7%
2	27.9**	22.6	53.6%	15.6	13.3	57.7%	(10.3)	3.1	55.4%
3	23.8**	27.0	53.6%	12.1	3.6	53.2%	(5.7)	0.2	52.2%
4	23.0**	29.9	53.2%	7.6	(2.5)	52.1%	(27.6)	(12.6)	46.7%
5	33.0**	38.6	53.9%	0.2	2.0	53.4%	(11.4)	(10.6)	50.0%
10	20.8*	40.2	54.1%	(45.4)	(27.1)	50.5%	(30.7)	(8.9)	53.3%
15	43.0**	91.1	56.4%	(14.4)	(19.6)	52.9%	(15.0)	18.6	58.7%
20	47.2**	113.8	57.3%	(27.8)	(54.2)	51.6%	(22.7)	29.4	58.7%
	Equities—Sell			**Futures—Sell**			**Forex—Sell**		
Days	$\mu_{sig}-\mu_b$	**Diff. Med.**	**%Up**	$\mu_{sig}-\mu_b$	**Diff. Med.**	**%Up**	$\mu_{sig}-\mu_b$	**Diff. Med.**	**%Up**
1	(18.9)**	(14.7)	45.9%	(1.1)	(3.5)	47.7%	6.9	(1.2)	50.3%
2	(29.1)**	(18.5)	46.8%	22.9*	4.9	54.8%	15.4	2.6	54.5%
3	(38.6)**	(22.5)	47.1%	31.7*	9.3	55.5%	13.0	2.0	51.7%
4	(37.3)**	(21.5)	48.2%	20.8	4.7	54.4%	10.8	8.0	56.6%
5	(41.8)**	(16.7)	49.1%	13.0	(0.4)	54.6%	19.8	30.9	62.8%
10	(63.3)**	(22.7)	50.0%	0.4	(22.4)	51.6%	54.8**	67.0	66.2%
15	(73.5)**	(13.2)	51.3%	(3.3)	(55.9)	49.3%	72.1**	70.9	68.3%
20	(65.7)**	7.7	53.1%	2.1	(36.5)	52.8%	54.4*	42.4	62.8%

Results for means and medians are in basis points, excess returns over the baseline for that asset class. %Up gives the number of days that closed higher than the entry price on the day following the signal entry. For comparison, the percent of one day Up closes in the Equity sample is 50.07%; in the Futures sample, 50.59%, and in Forex 51.0%.
*indicates difference of means are significant at the 0.05 level, and **indicates they are significant at the 0.01 level.

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KPos as a Filter

- Since there is a statistical edge for mean reversion when a market is outside the channels, one strategy would be to avoid buying or selling markets outside the bands.
- This would lead to a strategy that is similar to trading pullbacks.
- (Realize these tests work with a wide range of parameters. The concepts are much more important than the details.)

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Another Way to Measure

- To measure the relationship of a market to an index (or group of markets) calculate a spread.
- Spread = $Close_{Sample}$ / $Close_{Reference}$
- Can plot this as an “indicator”
- For instance, to see if a stock has out or under performed the broad market

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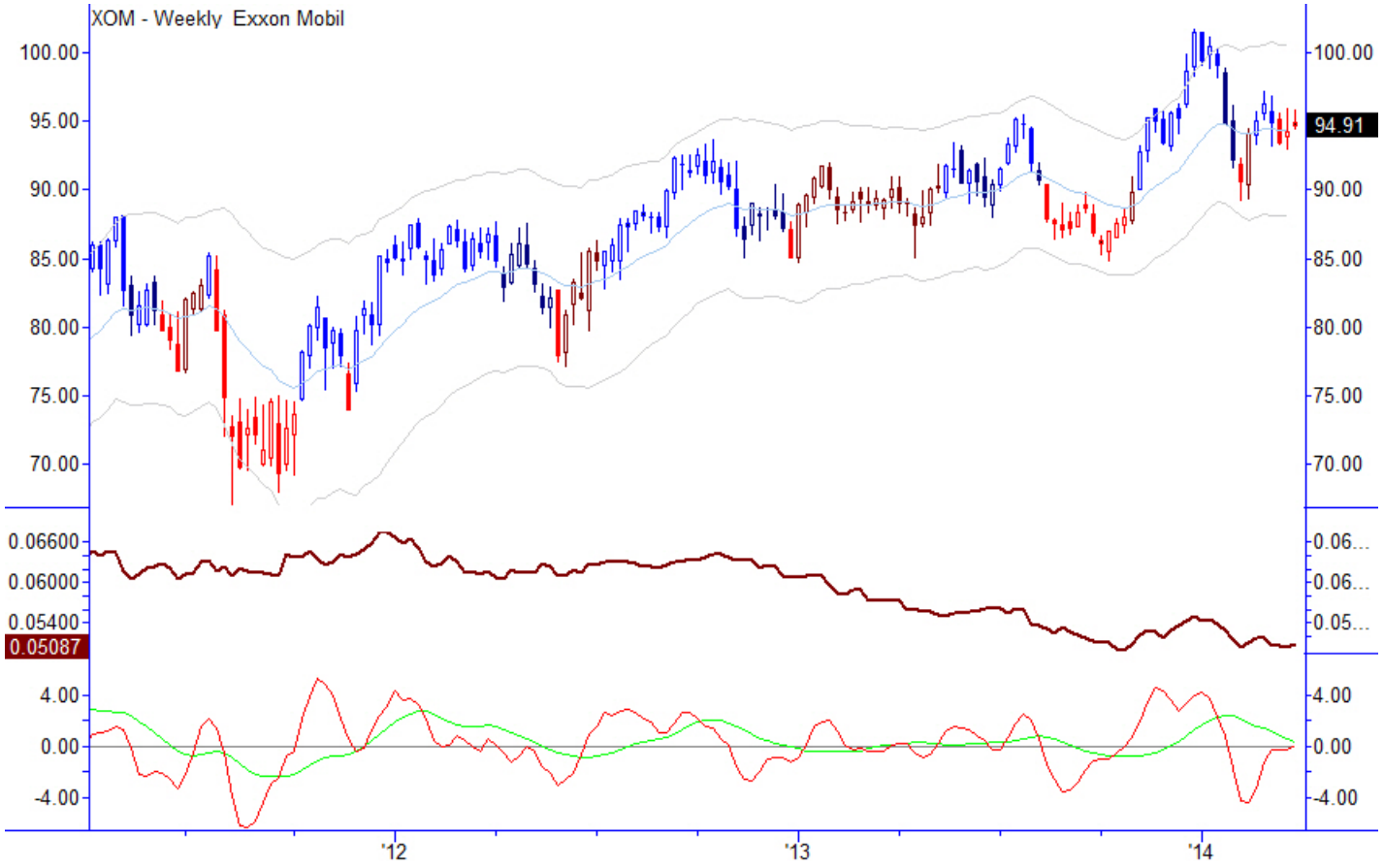
Relative Strength (to Market)



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Relative Strength (to Market)

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Trading a Spread

- Can also treat the spread measure as a synthetic price series.
- Indicators can be calculated using the spread as an input.
- When you analyze spreads you will see that some mean-revert.
  - Until they don't. Risk management is always key!
- And some spreads trend.
  - Trending spreads were good relative strength trades.
  - How to find these in the future?

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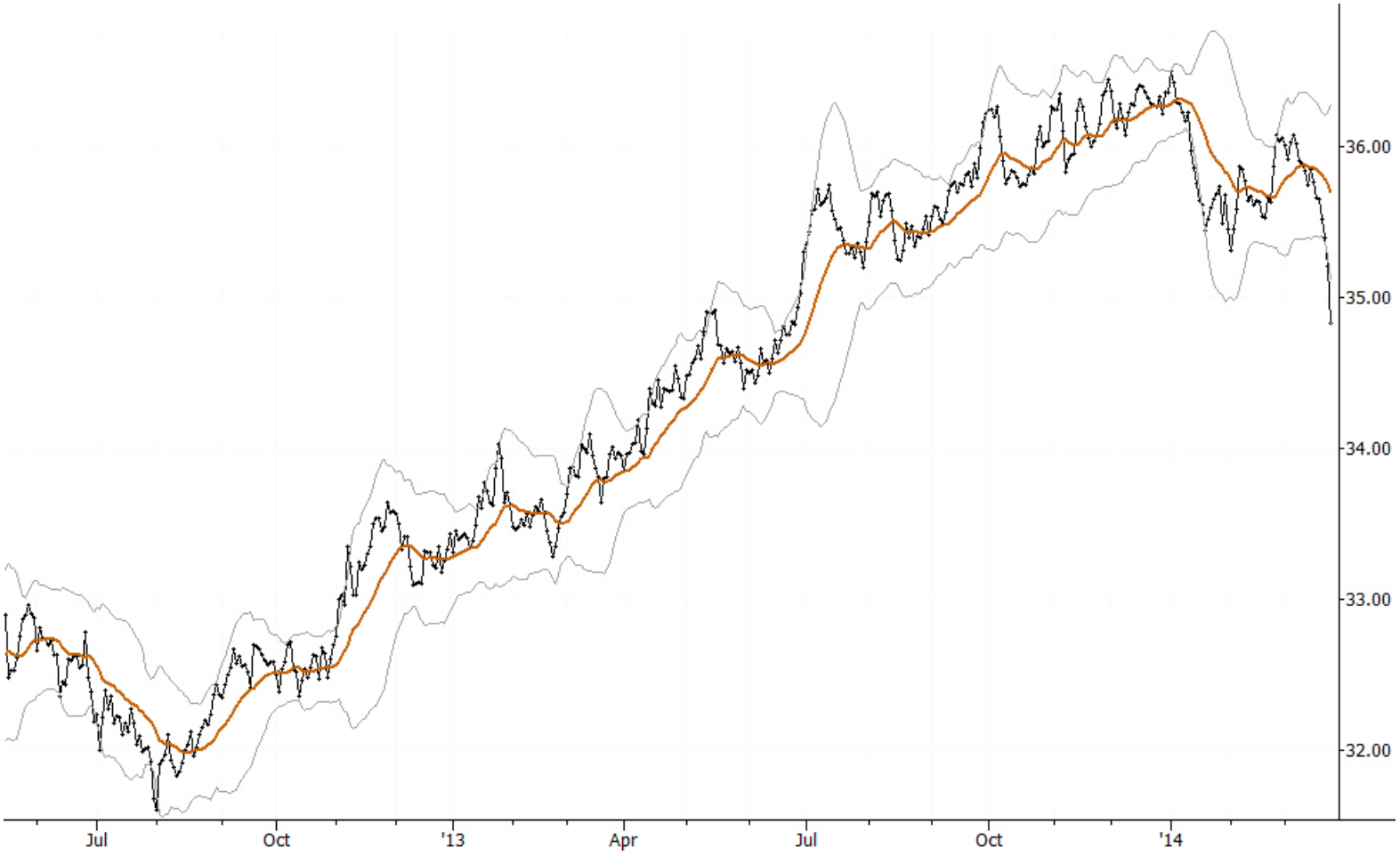
Consumer Disc / S&P 500



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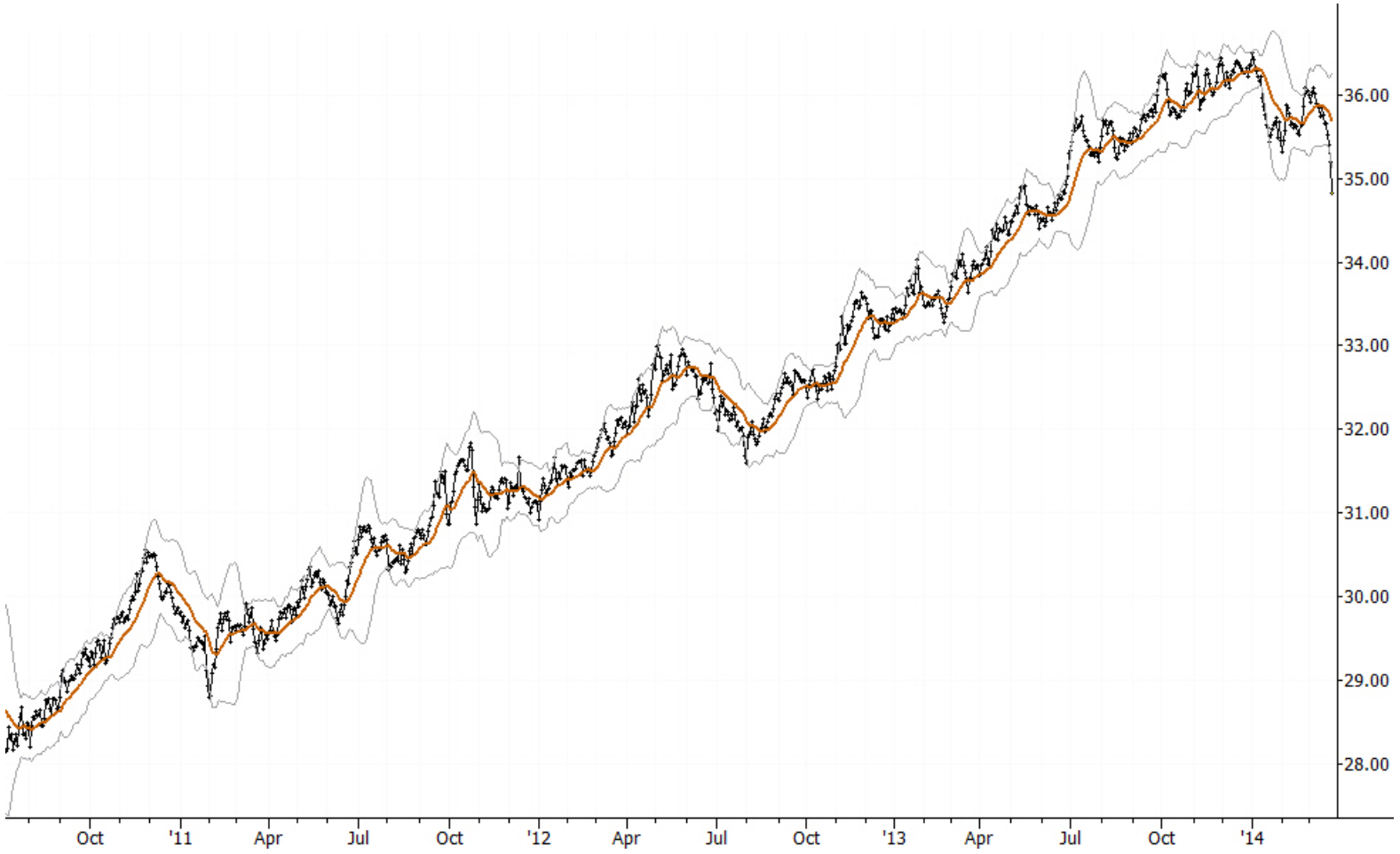
Perspective Matters



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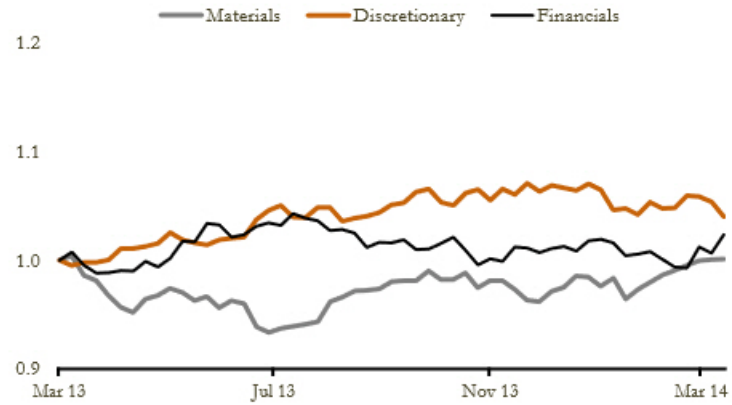
Sector RS in Waverly Advisors' Research

US Equity Sectors—Cyclical (performance relative to S&P 500)



US Large Cap Sector Weighting

	Sector	Weighting	LastChange	RelPerf
Sensitive	Energy	Underweight	12/13/13	-2.3%
	Industrials	Overweight	8/30/13	3.4%
	Technology	Marketweight	6/7/13	-
Cyclic.	Materials	Marketweight	8/30/13	-
	Discretionary	Overweight	2/10/12	16.7%
	Financials	Marketweight	2/14/14	-
Def.	Staples	Underweight	11/8/13	-5.3%
	Hcare	Overweight	7/27/12	15.8%
	Utilities	Underweight	1/27/12	-24.9%

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Implementing Relative Strength Strategies

- Use the information and ideas in this presentation as a departure point.
- It is possible to create specific relative strength strategies.
  - Portfolio allocation models
  - Tactical trading systems
- There is no magic bullet, but there are strong statistics behind these ideas.
  - Some of the strongest “anomalies” in published research are relative strength/momentum-driven.

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Using RS as a Filter

- "Top down" approaches identify broad markets and then zero in on specific trading candidates.
- Example:
  - Global stocks → Nation or region → Market cap → Sector
  - Then select individual names within the candidate sectors
- Can use this concept with stocks, currencies, or commodities.
  - Make sure you understand structural issues in commodities.
    - E.g., some contract months represent different crops and may have few fundamental connections.

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Stock Screens Using RS

Consolidating Near Extremes

Ticker	Desc	Close	Change	VolSpike	KPos	RS(SP500)	52WkH	52WkL	C%52Wk
JOSB	Jos.A. Bank Clothiers	64.25	-0.1%	0.0	98	0.97	64.63	38.36	99%
R	Ryder System	78.69	0.4%	0.4	86	0.88	79.43	52.58	97%
BEAM	Beam Inc.	83.16	0.0%	0.0	60	0.86	84.00	60.13	96%
ZLC	ZALE Corp	21.01	-0.6%	-0.7	63	>	21.97	3.76	95%
GPRE	Green Plains Renewable Energy	30.43	0.6%	0.3	103	>	31.57	10.32	95%
UNM	UNUMProvident Corp	35.65	0.2%	0.2	74	0.65	36.30	25.55	94%
FWLT	Foster Wheeler Ltd	31.92	1.1%	2.1	63	0.72	33.08	19.29	92%
VC	Visteon Corporation	85.67	0.4%	0.5	76	0.75	88.74	52.26	92%
ANGI	Angie's List Inc	12.93	-1.0%	-0.5	28	0.00	28.32	11.88	6%
UNXL	Uni-Pixel, Inc.	8.92	0.1%	0.0	27	<	41.42	8.36	2%

RS Strong

Ticker	Desc	Close	Change	VolSpike	KPos	RS(SP500)	52WkH	52WkL	C%52Wk
FSLR	First Solar Inc	73.37	4.1%	0.7	150	1.00	73.97	25.66	99%
ANN	Ann Taylor Stores Corporation	42.05	13.0%	5.8	147	0.94	43.61	27.63	90%
BIG	Big Lots Inc	38.02	1.5%	0.3	138	0.89	39.22	25.50	91%
WSM	Williams-Sonoma	66.99	1.1%	0.5	138	0.90	67.88	44.31	96%
HP	Helmerich & Payne	106.64	2.4%	1.8	124	0.99	106.77	55.78	100%
ATI	Allegheny Technologies	37.27	3.0%	1.6	123	0.90	37.47	25.60	98%
CMA	Comerica Inc	52.37	0.8%	0.7	121	0.92	53.50	33.55	94%
WLP	WellPoint Inc	99.74	0.1%	0.0	120	0.89	102.56	63.31	93%
FNSR	Finisar Corporation	27.77	4.0%	1.8	119	0.98	28.05	12.17	98%
GLNG	Golar Lng Ltd	43.04	5.4%	1.8	115	0.94	43.17	30.51	99%
SWN	Southwestern Energy	46.58	2.0%	1.2	115	0.87	46.62	34.68	100%
UNH	UnitedHealth Group Inc	81.36	-0.2%	-0.2	113	0.84	83.32	54.23	93%

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Summary

- Relative strength concepts are robust and are supported by much research.
- There are several ways to measure RS.
- Understand the tradeoffs and potential issues.
- RS can be used as a stand-alone trading tool, or as a filter to find trades.
- Though there are many ways to create these calculations, some will serve certain purposes better than others.

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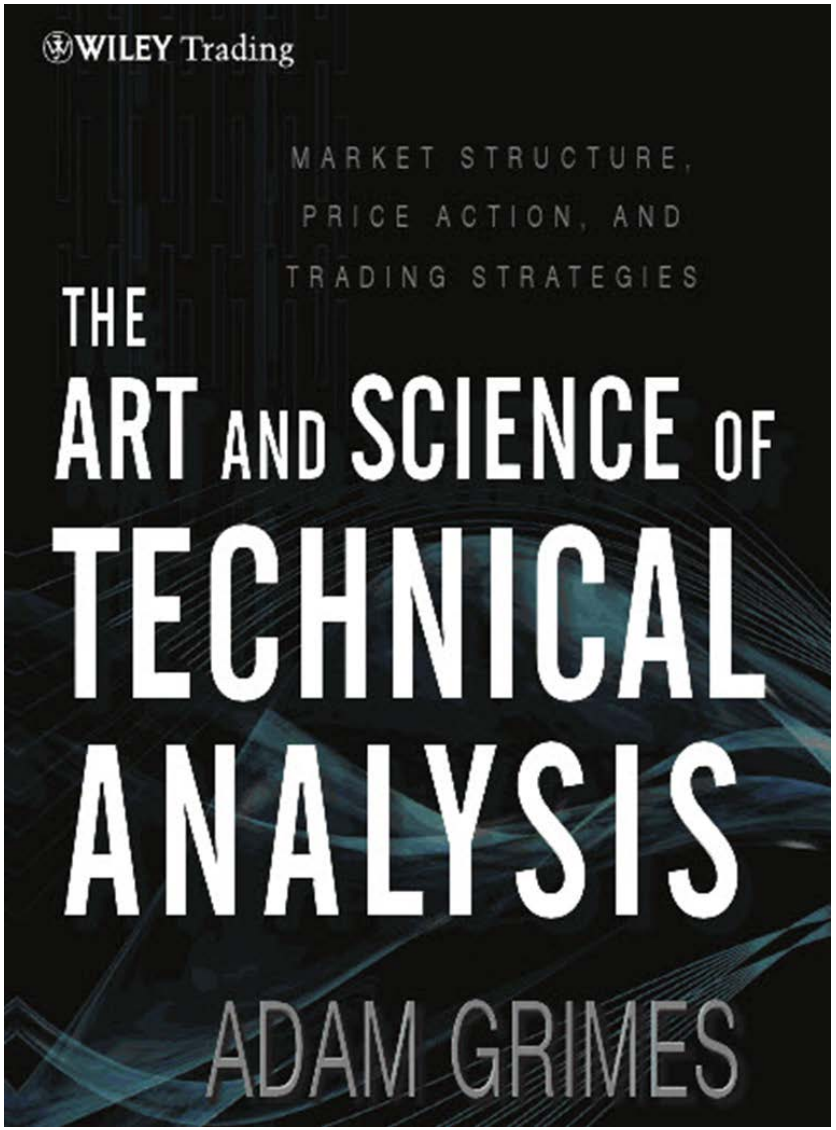

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Waverly Advisors' Process

- Our methodology is blended quantitative / discretionary.
- Quantitative work was both high-level and system-specific.
  - For breadth, our research went all the way back to commodity prices in the Middle Ages. It works.
- The discretionary component is the input of a trader (me!) who has spent nearly every day of the past 20 years watching markets and prices, actively managing risk for much of that time.

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Waverly Advisors' Research

- Specific systems, broad tendencies, and actionable ideas in major liquid markets.
  - Futures
  - Currencies
  - Stocks (indexes and individual names)
- Both trend-following and counter-trend components.
- Applicable to traders working on all timeframes.
  - Daytraders—swing traders—investors

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Waverly Advisors, LLC: Research Products

Tactical Playbook – Available on Interactive Brokers

- Written for the active trader on the daily/weekly timeframes
- Exact trade recommendations
  - Hybrid systematic-discretionary methodology
- In-depth technical "drill down" into a set of markets.
- Bigger-picture overview of all liquid asset classes.

Tactical Portfolio Outlook – Available on Interactive Brokers

- Written for the longer-term manager
  - Addresses both the allocator and the longer-term active trader.
- Emphasis on executing with ETFs in a long-only and long-short environment
- Focus on Equities, Equity Sectors, and other asset classes
- Macro perspective on risk factors and major economic events.

Options Market Outlook – Contact Waverly Directly

- Proprietary, quantitative analysis of options market
- Incorporates both volatility and directional analysis
- Macro risk factors and cross-asset perspective
- Actionable trade ideas

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