

Opposites Attract: Improvements to Trend Following for Absolute Returns

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ABSTRACT

Recent market events have reminded market participants of the long-term profitability of long/short trend following strategies. While trend following can be profitable over the long term, choppy or trendless markets can make trend following challenging. Large short-term, counter-trend moves are typical during strongly trending markets, and when unaccounted for can often produce a large drawdown in an otherwise successful trend following system.

The purpose of this paper is to demonstrate a simple quantitative blend of Momentum investing and Counter Trend methodology that offers the benefits of long/short trend following strategies with reduced drawdown. The result is a simple-to-apply investment method that has delivered a significant increase in annual returns and reduced risk over the benchmark index over a 35-year period.

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Trend Following: Explained

History has shown that the stock market can exhibit long periods of both rising and falling prices. Trend following (or Momentum investing) is predicated on the ability to properly identify trends and align portfolios accordingly. Over multiple market cycles, actively adapting a portfolio to the current market trend can greatly improve both absolute and risk-adjusted returns.

The various drivers of market trends and price momentum is a well-observed phenomenon and is a key component of investor psychology. John Murphy in his book Technical Analysis of the Financial Markets states the following: *“There is a corollary to the premise that prices move in trends- a trend in motion is more likely to continue than reverse.”*

Trend Following: A Quantitative Trend Strategy

Popular literature is beset with profitable examples of Momentum investing methodologies, ranging from fundamental earnings growth¹ to technical-price and volume-based indicators. Perry Kaufman writes *“The purpose of all trend identification methods is to see past the underlying noise in the market, those erratic moves that seem to be meaningless, and find the current direction of prices.”*²

To illustrate the benefits of Trend Following we will apply a very simple, rules-based strategy. Examining only closing prices and moving averages, we will identify and trade the trend of the NASDAQ Composite Index since its inception in 1971. We will utilize Exponential Moving

Averages, as they have the benefit of adapting more quickly to price trend because the most recent price is treated with a higher weight.

NASDAQ Composite Index as our trading vehicle provides several important benefits. First, the index has sufficient history to examine a model through several cycles of Bull and Bear markets. Second, the index is widely followed and provides adequate liquidity and indexed trading vehicles to provide easy replication. Lastly, the NASDAQ Composite generally represents small, emerging companies which historically have exhibited more pronounced rising and falling price trends.

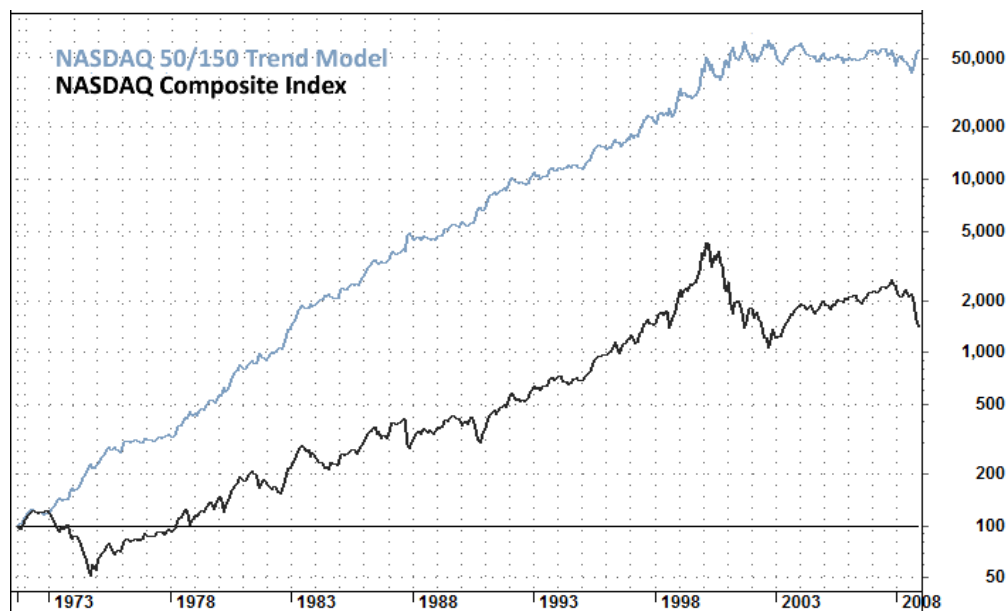
Trend Following : [Strategy Rules](#)

BUY: when the daily closing price is:
Above the 50-day and 150-day EMA.

SELL: and move to cash when the daily closing price is:
Below the 50-day and Above 150-day EMA.

SELL SHORT: when the daily closing price is:
Below the 50-day and Below 150-day EMA.

NASDAQ Composite 50/150 Trend Model Results



1972 – 2008 Compound Annualized Return		
NASDAQ Composite 50/150		18.5%
NASDAQ Composite Index		7.4%
Maximum Drawdown		
NASDAQ Composite 50/150		-34.9%
NASDAQ Composite Index		-75.0%

Back Testing Notes:

1. All entry and exit prices are on the day of the signal at the close.
2. Cash returns are estimated with an annual rate of 3% per annum. (This grossly understates the amount of interest earned and therefore the total return. However the point of the exercise is to demonstrate the profitability of trading market trends both long and short. Any un-accounted for interest during periods spent in cash is an added benefit not illustrated in the results provided).
3. Taxes, commissions and slippage are excluded.

By applying these simple trading rules over the life of the NASDAQ Composite Index, annualized return is more than 2.5 times the index, while the maximum drawdown³ is less than half. By any measure, actively trading the NASDAQ Composite Index with the simple quantitative model presented would significantly improve risk-adjusted results over the preceding 35 years.

Trend Following: Challenges

While the long-term results of our simple quantitative trend model significantly improve investing experience, the challenges inherent to Momentum investing still remain. Periods of substantial market outperformance are accompanied by periods of flat or negative returns. The tables below outline several of these sub-par periods.

NASDAQ 50/150 Model Sub-Par Periods

Begins	4/28/1989	Lasts	17 Months
Model	1.8%	Max DD	-9.3%
Index	40.0%	Max DD	-5.9%

Begins	7/30/1993	Lasts	17 Months
Model	2.7%	Max DD	-8.6%
Index	11.3%	Max DD	-11.1%

Begins	10/29/1993	Lasts	15 Months
Model	2.7%	Max DD	-8.6%
Index	11.3%	Max DD	-11.1%

Of possibly even greater concern is the inability to produce positive results over the past seven years. On a relative basis, the Trend model has substantially outperformed the index, with positive returns since the tech bubble high on 3/29/2000. But since 9/30/2002, the model has remained relatively flat, delivering a negative -2.2% annualized return while the NASDAQ Composite has returned +4.9% annualized.

When trend models underperform, it becomes tempting to “optimize” the model’s moving average lengths to improve results, a process of testing each moving average length interval in succession to determine the optimal length.

All investment methods possess a *mechanism for profit*. This mechanism is what drives returns through the understanding of the particular market behavior the strategy is exploiting.

Momentum investing strategies exploit the markets tendency to exhibit long periods of price advances and/or declines. When these trends do not exist, expectations for profit should be reduced for trend following programs. When addressing concerns over subpar results, a distinction must be made between a breakdown of the model and a trendless market environment.

Modifying the Trend model to account for these uncomfortable periods of drawdown may indeed improve returns, but one also runs the risk of curve fitting the strategy to the past, and possibly distilling away the very essence of the model.

Instead, improvements can be made by introducing an entirely opposite strategy.

Counter Trend Trading: [Explanation](#)

As profitable as Trend Following is in the long term, the short term can introduce significant challenges. When prices snap back against the macro trend, month-long progress is often lost in just a few sessions. This *reversion to the mean* price action is a natural tendency for markets. For example in Bull markets, traders become overly optimistic and momentum builds, pushing prices higher until demand has been exhausted. Prices become stretched far beyond their mean average, a buyer's vacuum is created, and prices retreat-- resetting values before new waves of

buying momentum continue. The same phenomenon in reverse is observed to the downside during Bear markets.

While trend following is concerned with keeping in line with the overall market trend, Counter Trend strategies look to exploit the very short-term tendency for prices to revert to the mean.

Counter Trend Trading: Example

In order to improve the overall risk/return of our 50/150 Day Moving Average NASDAQ model, we will introduce a simple Counter Trend Strategy. As with our Trend model, there are several considerations to make in selecting the index for which to apply a Counter Trend program.

While trend following is best deployed on higher volatility securities, Counter Trend strategies are best applied to more predictable asset classes where price extremes have a higher statistical probability of returning to their mean average.

We will also need an index with sufficient liquidity in which to trade quickly, with little price impact. Lastly, we will need an index with at least the same length of historical price records as that of our Trend index. The two most reasonable indexes that meet all the above criteria would be the Dow Jones Industrial Average, and the S&P 500 Index. We will choose the S&P 500 Index because it represents a broader view of the markets, and provides more diversification than the Dow Jones Index.

While there are many ways to capture the short-term mean reverting characteristic of markets, we will focus on buying only after significant declines and exiting quickly, rather than shorting significant rallies.

Counter Trend Trading : Trading Rules

The rules for our Counter Trend strategy are simple:

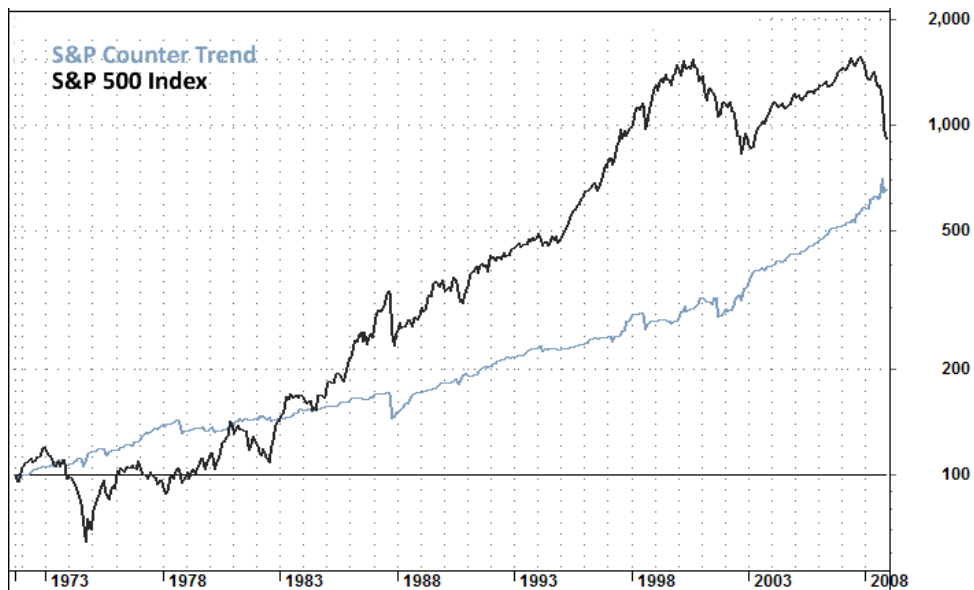
Using the daily prices of the S&P 500 Index:

BUY: If today's Low is the lowest in the past 20 days.

SELL: When today's Low is not the lowest value in the past 20 days.

These rules will keep the strategy in cash the majority of the time, only venturing out to buy the S&P after significant market declines.

S&P 500 Counter Trend Results



1972 – 2008 Compound Annualized Return		
Counter Trend Model		5.2%
S&P 500 Index		6.1%
Maximum Drawdown		
Counter Trend Model		-15.3%
S&P 500 Index		-46.3%

Back Testing Notes:

1. All entry and exit prices are on the day of the signal at the close.
2. Cash returns are estimated with an annual rate of 3% per annum. (This grossly understates the amount of interest earned, especially for a strategy such as this which spends the majority of the time in cash. However the point of the exercise is to demonstrate the profitability of the counter trend method. Any un-accounted for interest during periods spent in cash is an added benefit not illustrated in the results provided).
3. Taxes, commissions and slippage are excluded.

Over a 35-year period, the S&P Counter Trend strategy delivers similar results as buying and holding the S&P Index, with just 1/3 the drawdown. There are many inferences about market character than could be derived, but one that stands out is that buying the S&P on declines seems to be a profitable strategy.

It is also important to note that while the NASDAQ 50/150 Trend model has had a difficult time producing alpha during the past seven years, the S&P Counter Trend model has actually become *more profitable as market volatility has increased.*

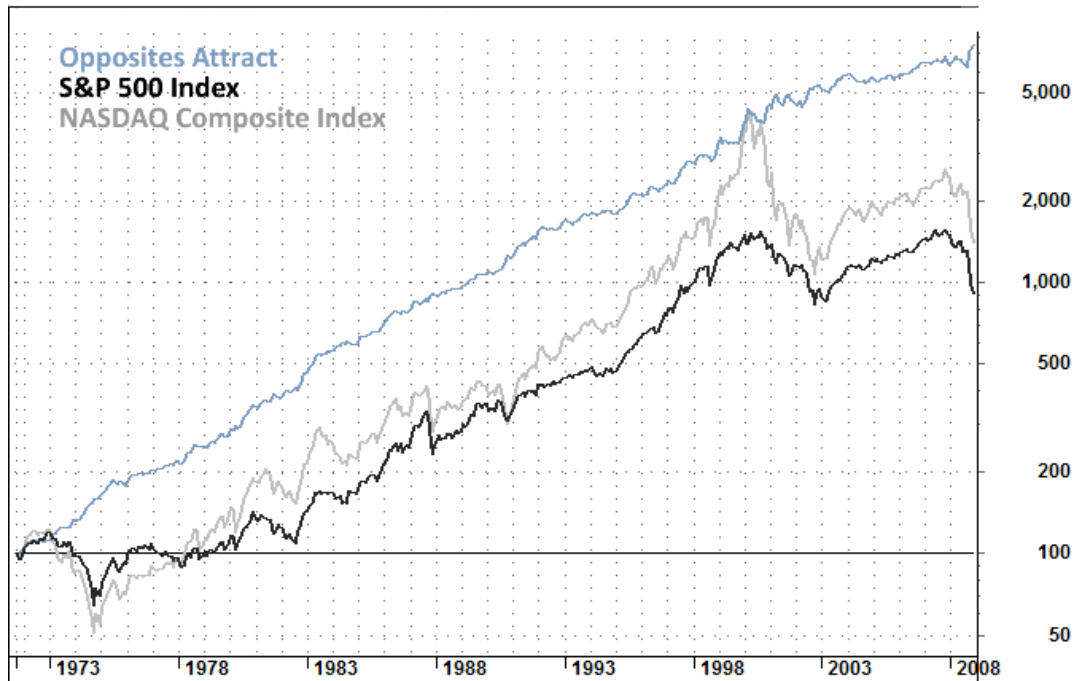
Trend Following and Counter Trend : Comparison

The NASDAQ 50/150 Trend model and the S&P Counter Trend both present profitable trading programs, each exploiting different market character. The chart below illustrates the attributes of each strategy:

Attribute	Trend Following	Counter Trend
Profitable in Bull Trends	YES	YES, Few Trades
Profitable in Bear Trends	YES	NO
Profitable in Range bound	NO	YES
Avg. Holding Period	1 Month	1 Day
Attribute	Ignores short-term fluctuations in favor of the macro trend	Ignores macro trend in favor of short-term opportunities
Attribute	Exploits the trending character of the market	Exploits the Mean Reverting character of the market
Market Exposure	82%	10%

Opposites Attract Portfolio : 35 Years of Market Outperformance

So far we have illustrated the separate benefits of two quantitative index trading strategies. We have examined the benefits and drawbacks to each. When an equal allocation is made to each strategy, the result is an investment method with the capacity to handle a broader range of market environments without the need for optimization, constant adjustment or other ongoing adaptations.



1971 – 2008 Compound Annualized Return		
Opposites Attract 50/50 Model		12.2%
S&P 500 Index		5.5%
NASDAQ Composite Index		7.0%
Maximum Drawdown		
Opposites Attract 50/50 Model		-11.5%
S&P 500 Index		-46.3%
NASDAQ Composite Index		-75.0%

Summary

The synergistic combination of Trend Following and Counter Trend strategies produces a risk adjusted return that substantially beats both the S&P 500 and NASDAQ Composite Indexes for the past 35 years. Here are just a few accomplishments worth noting about the Opposites Attract Portfolio:

1. Delivers positive returns during the 1973 – 1974 Bear Market.
2. Entirely avoids the market crash of 1987
3. Participates fully in the 1990's Bull Market
4. Experiences minimal drawdown during the tumultuous summers of 1997 and 1998
5. Delivers positive returns during the 2000 – 2002 Bear Market
6. Delivers positive returns during the current 2007 – 2008 Bear Market.

Conclusions

No matter your investment method, successful investing requires discipline. The mark of successful trend followers is the ability to remain invested in the direction of the larger trend despite short-term fluctuations. Trend followers must be prepared for the abuse they will endure when the inevitable violent counter trend move occurs. On the other hand, Counter Trend traders must exhibit patience, waiting silently when prices march ever higher, crouching ready for the next market decline. This requires the discipline to buy into extreme market declines, when the headlines are at their worst.

Combining Momentum investing with Counter Trend strategies such as the S&P Counter Trend model can offer a balanced approach-- exploiting the full range of market behavior. The Opposites Attract strategy not only provides a higher probability of delivering positive, risk-adjusted results, but also a more balanced approach to the extreme discipline required to follow either strategy alone.

References

1. Narasimhan Jegadeesh, Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, 7/2001
2. Perry Kaufman, Trading Systems and Methods, Third Edition, p.62.
3. Maximum Drawdown is an indication of volatility and risk, the peak-to-trough decline an investor would experience in an investment, calculated on a monthly basis.
4. John Murphy, Technical Analysis of the Financial Markets, New York Institute of Finance, 1999
5. Perry Kaufman, Trading Systems and Methods Third Edition, Wiley Publishing, 1998

Appendix

Exhibit 1: NASDAQ 50/150 Model Data

	All trades	Long trades	Short trades
Initial capital	\$1,000.00	\$1,000.00	\$1,000.00
Ending capital	\$553,303.42	\$462,386.06	\$93,009.59
Net Profit	\$552,303.42	\$461,386.06	\$92,009.59
Net Profit %	55230.34%	46138.61%	9200.96%
Exposure %	84.38%	56.48%	27.90%
Net Risk Adjusted Return %	\$654.54	\$816.89	\$329.78
Annual Return %	18.46%	17.89%	12.93%
Risk Adjusted Return %	21.88%	31.68%	46.34%

All trades	407	226 (55.53 %)	181 (44.47 %)
Avg. Profit/Loss	\$1,309.71	\$1,825.16	\$666.12
Avg. Profit/Loss %	1.79%	2.49%	0.90%
Avg. Bars Held	20.5	24.5	15.5

Winners	124 (30.47 %)	78 (19.16 %)	46 (11.30 %)
Total Profit	\$1,615,584.72	\$913,031.21	\$702,553.51
Avg. Profit	\$13,028.91	\$11,705.53	\$15,272.90
Avg. Profit %	8.39%	9.12%	7.17%
Avg. Bars Held	53.63	58.72	45
Max. Consecutive	6	7	4
Largest win	\$178,495.54	\$178,495.54	\$138,498.88
# bars in largest win	113	113	87

Losers	283 (69.53 %)	148 (36.36 %)	135 (33.17 %)
Total Loss	-\$1,082,530.93	-\$500,544.33	-\$581,986.60
Avg. Loss	-\$3,825.20	-\$3,382.06	-\$4,311.01
Avg. Loss %	-1.11%	-1.00%	-1.23%
Avg. Bars Held	5.98	6.47	5.44
Max. Consecutive	16	17	14
Largest loss	-\$36,387.58	-\$36,387.58	-\$29,753.85
# bars in largest loss	2	2	6

Max. trade drawdown	-\$74,402.73	-\$63,148.40	-\$74,402.73
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Max. trade % drawdown	-15.10%	-11.70%	-15.10%
Max. system drawdown	-\$246,235.46	-\$206,214.66	-\$297,495.92
Max. system % drawdown	-37.25%	-36.80%	-99.97%
Recovery Factor	2.24	2.24	0.31
CAR/MaxDD	0.5	0.49	0.13
RAR/MaxDD	0.59	0.86	0.46
Profit Factor	1.49	1.82	1.21
Payoff Ratio	3.41	3.46	3.54
Risk-Reward Ratio	0.18	0.18	0.05
Ulcer Index	11.08	10.07	66.86
Ulcer Performance Index	1.35	1.43	0.14
Sharpe Ratio of trades	0.77	0.86	0.58
K-Ratio	0.0197	0.0204	0.0051

NASDAQ 50/150 Model

Annual Returns and Maximum Monthly Peak-to-Valley Drawdown

	NASDAQ 50/150 Model Results	NASDAQ Composite Index Results	NASDAQ 50/150 Model Drawdown	NASDAQ Composite Index Drawdown
1972	8.6	17.2	-6.7	-3.6
1973	39.8	-31.1	-2.17	-31.06
1974	36.7	-35.1	-5.89	-41.36
1975	17.4	29.8	-8.12	-14.58
1976	22.0	26.1	-3.52	-2.85
1977	4.1	7.3	-4.26	-3.83
1978	29.0	12.3	-5.02	-17.7
1979	24.9	28.1	-2.7	-9.91
1980	51.8	33.9	-5.4	-19
1981	10.7	-3.2	-7.46	-19.44
1982	50.6	18.7	-1.49	-14.55
1983	36.0	19.9	-3.95	-13.85
1984	10.2	-11.2	-5.33	-17.55
1985	32.9	31.5	-1.84	-6.96
1986	22.6	7.3	-4.39	-13.98
1987	40.4	-5.3	-4.59	-32.93
1988	-4.0	15.4	-4.89	-5.88
1989	18.1	19.3	-3.56	-3.83
1990	24.0	-17.8	-5.17	-28.65
1991	43.4	56.8	-4.12	-5.97
1992	12.8	15.5	-8.39	-11.11
1993	5.8	14.8	-7.6	-5.01
1994	3.3	-3.2	-4.35	-11.8
1995	31.8	39.9	-3.49	-0.71
1996	11.7	22.7	-9.78	-13.1
1997	27.6	21.6	-6.74	-11.46
1998	33.6	39.6	-11.37	-20.87
1999	49.0	85.6	-11.5	-8.69
2000	11.5	-39.3	-25.7	-47.4
2001	6.2	-21.1	-17.93	-45.94
2002	6.9	-31.5	-13.44	-39.91
2003	7.8	50.0	-16.01	-1.3
2004	-10.5	8.6	-21.1	-14.04
2005	-7.9	1.4	-11.33	-11.67
2006	12.4	9.5	-3.21	-10.61
2007	-17.2	9.8	-19.09	-7.23

2008	21.7	-40.5	-19.14	-42.1
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Complete trade history may be furnished upon request.

Exhibit 2: S&P Counter Trend Model Data

All trades	
Initial capital	\$1,000.00
Ending capital	\$6,557.75
Net Profit	\$5,557.75
Net Profit %	555.77%
Exposure %	10.34%
Net Risk Adjusted Return %	5373.42%
Annual Return %	5.05%
Risk Adjusted Return %	48.86%
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All trades	477
Avg. Profit/Loss	\$6.64
Avg. Profit/Loss %	0.20%
Avg. Bars Held	3.09
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Winners	290 (60.80 %)
Total Profit	\$9,078.10
Avg. Profit	\$31.30
Avg. Profit %	1.07%
Avg. Bars Held	2.72
Max. Consecutive	20
Largest win	\$360.27
# bars in largest win	2
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Losers	187 (39.20 %)
Total Loss	-\$5,909.87
Avg. Loss	-\$31.60
Avg. Loss %	-1.16%
Avg. Bars Held	3.66
Max. Consecutive	6
Largest loss	-\$627.75
# bars in largest loss	7
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Max. trade drawdown	-\$1,309.52
Max. trade % drawdown	-26.34%
Max. system drawdown	-\$1,309.52
Max. system % drawdown	-26.40%

Recovery Factor	4.24
CAR/MaxDD	0.19
RAR/MaxDD	1.85
Profit Factor	1.54
Payoff Ratio	0.99
Risk-Reward Ratio	0.18
Ulcer Index	3.2
Ulcer Performance Index	0.48
Sharpe Ratio of trades	0.99
K-Ratio	0.0201

Annual Returns and Maximum Monthly Peak-to-Valley Drawdown

	S&P Counter Trend Model	S&P 500 Index Results	S&P Counter Trend Model Drawdown	S&P 500 Index Drawdown
1972	6.58	15.63	-2.27	-9.58
1973	0.86	-17.37	0	-2.18
1974	8.91	-29.72	-3.13	-18.71
1975	0.69	31.55	-5.68	-34.86
1976	6.41	19.15	-4.41	-11.89
1977	10.61	-11.5	-0.82	-2.98
1978	-3.42	1.06	-0.47	-14.07
1979	0.44	12.31	-8.12	-9.82
1980	4.4	25.77	-2.55	-6.86
1981	3.78	-9.73	-3.56	-10.57
1982	-0.58	14.76	-1.41	-14.57
1983	6.49	17.27	-3.02	-12.62
1984	2.03	1.4	-0.4	-3.03
1985	3.39	26.33	-1.61	-8.72
1986	2.64	14.62	-0.53	-5.09
1987	-10.07	2.03	-1.34	-8.54
1988	15.02	12.4	-15.33	-30.17
1989	6.28	27.25	0	-3.16
1990	6.4	-6.56	-3.37	-15.84
1991	4.47	26.31	-1.74	-5.11
1992	6.61	4.46	-0.59	-3.21
1993	6.28	7.56	0	-2.54
1994	-0.85	-2	-3.21	-7.75
1995	3.33	34.11	0	-0.5
1996	4.81	20.26	-1.07	-4.57
1997	12.64	31.01	-2.95	-5.74
1998	-0.8	26.67	-10.86	-15.57
1999	0.1	19.53	-2.73	-6.56
2000	16.77	-10.14	-2.92	-13.36
2001	-5.2	-13.04	-11.96	-23.8
2002	19.87	-23.37	-3.26	-28.99
2003	14	26.38	-1.52	-4.4
2004	8.52	8.99	-1.02	-3.77
2005	7.01	3	-0.28	-4.5
2006	11.93	13.62	0	-3.09
2007	13.09	3.53	-1.64	-5.23
2008	12.6	-38.49	-8.55	-38.96

Complete trade history can be furnished upon request.

Exhibit 3: Opposites Attract Model Data

Annual Returns and Maximum Monthly Peak-to-Valley Drawdown

	Opposites Attract Model Results	S&P 500 Index Results	Opposites Attract Model Drawdown	S&P 500 Index Drawdown
1972	7.86	15.63	-1.22	-9.58
1973	19.25	-17.37	-0.7	-2.18
1974	22.67	-29.72	-1.32	-18.71
1975	8.98	31.55	-4.58	-34.86
1976	14.16	19.15	-0.66	-11.89
1977	7.49	-11.5	-0.5	-2.98
1978	12.07	1.06	-2.54	-14.07
1979	12.22	12.31	-2.38	-9.82
1980	26.48	25.77	-2.6	-6.86
1981	7.71	-9.73	-3.15	-10.57
1982	23	14.76	-1.7	-14.57
1983	20.74	17.27	-1.31	-12.62
1984	6.41	1.4	-1.82	-3.03
1985	17.57	26.33	-1.1	-8.72
1986	12.43	14.62	-2.53	-5.09
1987	15.07	2.03	-2.7	-8.54
1988	5.34	12.4	-1.66	-30.17
1989	12.27	27.25	-0.8	-3.16
1990	15.74	-6.56	-2.37	-15.84
1991	23.03	26.31	-2.43	-5.11
1992	10.01	4.46	-2.47	-3.21
1993	6.24	7.56	-3.43	-2.54
1994	1.38	-2	-2.77	-7.75
1995	16.98	34.11	-1.17	-0.5
1996	8.62	20.26	-4.78	-4.57
1997	20.37	31.01	-2.32	-5.74
1998	15.85	26.67	-6.1	-15.57
1999	23.31	19.53	-5.57	-6.56
2000	15.8	-10.14	-11.51	-13.36
2001	0.06	-13.04	-8.56	-23.8
2002	14.18	-23.37	-4.72	-28.99
2003	11.58	26.38	-3.31	-4.4
2004	-0.92	8.99	-8.36	-3.77
2005	-0.49	3	-4.37	-4.5
2006	12.3	13.62	-1.06	-3.09
2007	-2.55	3.53	-8.31	-5.23
2008	19.02	-38.49	-9.31	-38.96

