Omega Analysis

The Risk Cycle

Omega Analysis' business is the robust engineering development of solutions to practical problems in finance backed by decades of experience in cutting edge mathematical sciences research.

Omega Metrics® technology for risk management, trading strategy development, portfolio construction and performance analysis is based on Omega Analysis' fundamental research advances in mathematics and statistics.

Projected Time Remaining in the U.S. equity market boom: 75 trading days.
Omega Metrics® Risk Cycle Analysis correctly predicted both the timing and the magnitude of the 2000 and 2008 crashes. It did the same in 1929 and 1937.

Risk Cycle Analysis identifies unsustainable market booms and predicts the magnitude of the correction which should follow. The Risk Cycle Downturn Indicator marks the transition from boom to bust by turning from positive to negative. (See Figures 1 and 2.) When this happens in a market which has a large correction outstanding the result is a dramatic collapse in prices. By monitoring the evolution of the Indicator we can estimate the number of trading days left in a bull market.
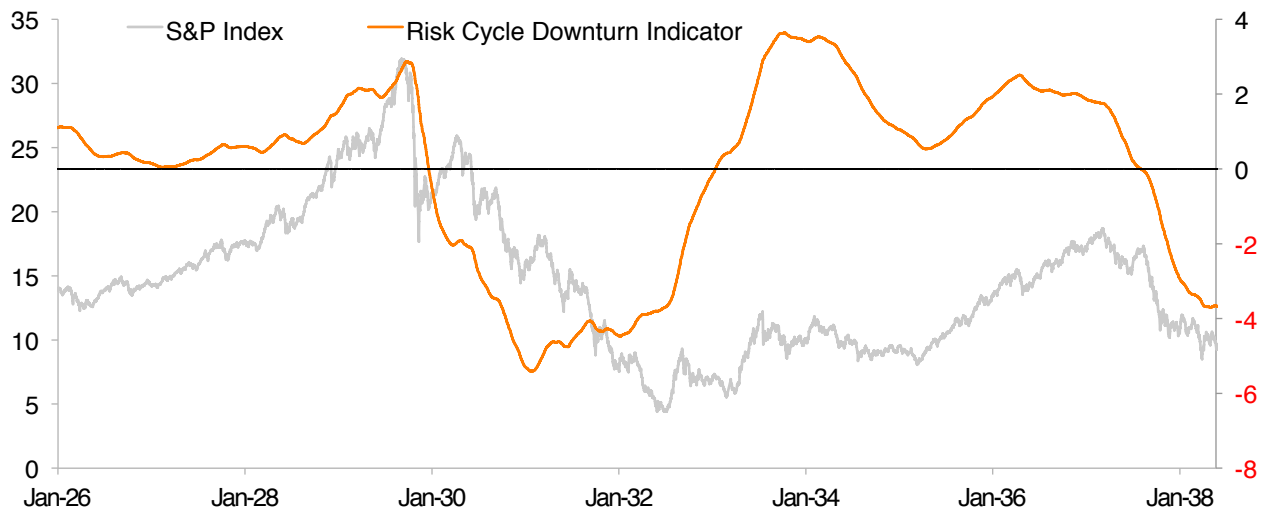

Figure 1. S&P Index and Risk Cycle Downturn Indicator, 1926-1938.

In early 1937 a correction of at least 36% was predicted. In mid April 1937 the estimated time to the end of the boom was 380 days. By the beginning of May this had shortened to 180 days. At the end of May it was reduced to 60 days. The transition occurred on 5 August 1937 and was followed by a 50% decline in the S&P Index.

Current Analysis: Current warning signals are eerily similar to those in 1937. The S&P 500 Index is due for a correction of at least 40%. In April 2015 the estimated time left in the boom was 300 days. By mid May 2015 this had shrunk to 200 days. At the end of June the estimate has dropped to 160 days as the Greek crisis intensified. At the market close on July 31, 2015 the estimate has dropped still further to 75 days.
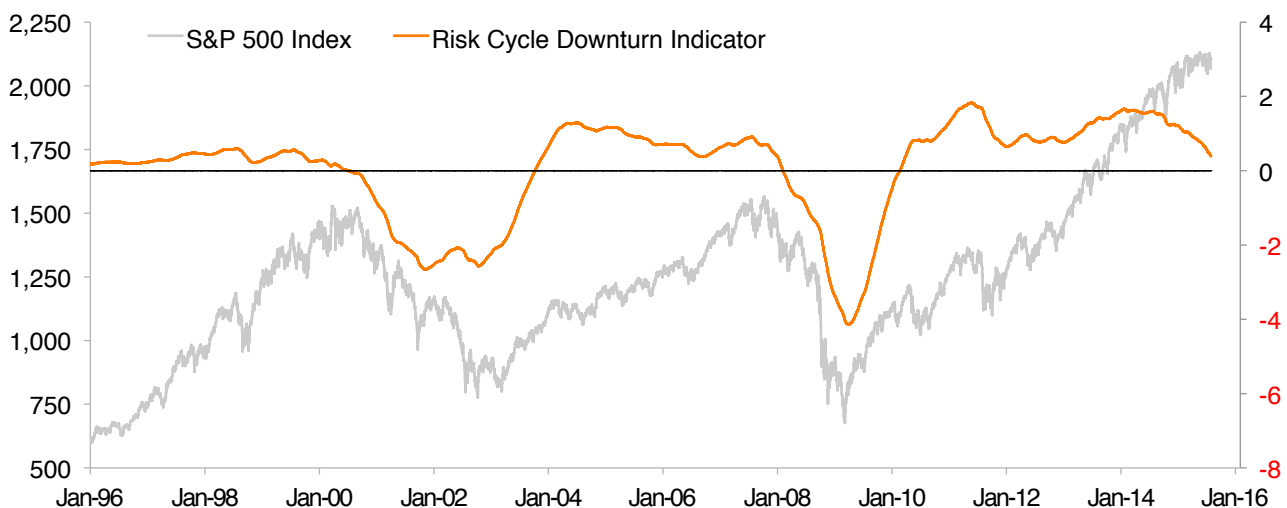

Figure 2. S&P 500 Index and Risk Cycle Downturn Indicator, 1996-2015.

Omega Metrics® Market Intelligence makes Risk Cycle technology available for applications ranging from early warning indicators of emerging bubbles, corrections and recoveries to risk management of investment portfolios and trading positions.

"...the stars in the Milky Way cannot be resolved by the unaided human eye and were only 'discovered' when Galileo turned his telescope upon them."[1]

New Risk Technology

In the aftermath of the 2008 Crash we created a revolutionary statistical instrument. Like Galileo's telescope, it reveals previously invisible phenomena–not in the night sky but in financial market data.

Our advances in statistical technology provide risk measurements of unprecedented accuracy. The predictive power of these measurements has been confirmed in large scale historic data sets and, day after day, in real time, for several years across asset classes in financial markets worldwide.

Predicting Booms and Busts

This technology reveals predictable Risk Cycles which are *leading indicators* of market booms and busts. Risk Cycles are characterised by alternating periods of falling and rising measured risk and by periods of persistent asymmetries in the distribution of gains and losses–which we call Market Modes.

These have been the statistical fingerprints of booms and busts for more than a century.

The predictive power of Risk Cycles is demonstrated by the excess returns generated in an out of sample trading simulation over almost two decades. We apply the Risk Cycle signals to a generic trading system[2] for a global equity index. The system maintains a constant default risk budget. Additions to the default risk budget are made according to the Market Mode signals (which include the timing of transitions from long to short trading).

The proof of the Risk Cycle predictions can be seen in Figure 1. Since October 1996 the gap between the equity index and the Risk Cycle Trading has continued to widen, providing unmistakeable evidence of the information in the statistical signals that drive it. The default Risk Cycle Trading reduces drawdowns and volatility and increases risk adjusted return, generating 'smart beta'. The Market Mode signals generate alpha.
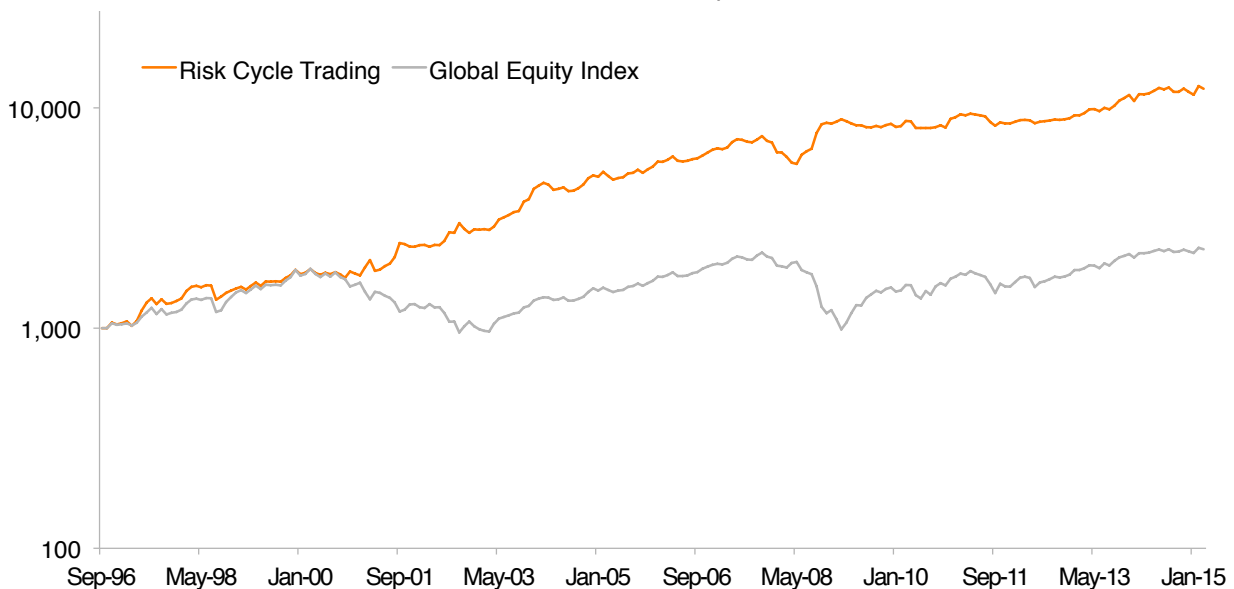

Figure. 1. Risk Cycle predictions applied to a global equity index. Annualised return is increased by a factor of 3 from 4.6% to 13.9%, volatility is reduced from 16.3% to 13.9% and the worst drawdown is cut in half.

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[1] John Gribbin, *The Scientists*, Random House, New York, 2002, p 589.

[2] Trading system parameters have been set to generic unoptimised values. For example we measure risk by our standard 1 in 100 day VaR and Expected Shortfall.

Omega Metrics® Risk Parity portfolios target a constant risk level while maintaining equal risk exposure to bonds and equities throughout the Risk Cycle. They dramatically out-perform the standard bond equity mix.

A Dangerous Tradition

A traditional portfolio mix of equities and bonds leaves almost all of the risk concentrated in the equity component. This can have disastrous consequences when equity markets crash because the diversification benefit of the bond investment is swamped by the equity losses.

Risk Parity Portfolios

This has led to the strategy of designing investment portfolios in which risk rather than capital is allocated equally between the component assets. In its simplest form a 'Risk Parity' portfolio of equity and bond investments distributes risk equally between the equity component and a levered bond component with much better results than the conventional capital weighted allocation, especially through periods of market turmoil.

To construct a Risk Parity portfolio we must select component assets, balance their risk and maintain that balance over time. The success of this approach therefore depends both on the manager's ability to choose component assets and *also on the quality and predictions of his risk measurement tools.*

Risk Targeting

Omega Analysis' advances in statistical technology provide risk measurements of unprecedented accuracy. The predictive power of these measurements has been confirmed in large scale historic data sets and, day after day, in real time, for several years across asset classes in financial markets worldwide.

This technology reveals predictable Risk Cycles which *lead* market booms and busts. Maintaining a constant risk level through the Risk Cycle *automatically increases market exposure as booms grow and decreases it as they peak and turn to busts.*

We demonstrate the power of this approach–and the information content of our risk measurements–by constructing a Risk Parity portfolio from two 'off the shelf' components: the S&P 500 Index and the Vanguard Total Bond Market Index, in an out of sample simulation over almost 3 decades using our proprietary tail model.[1]
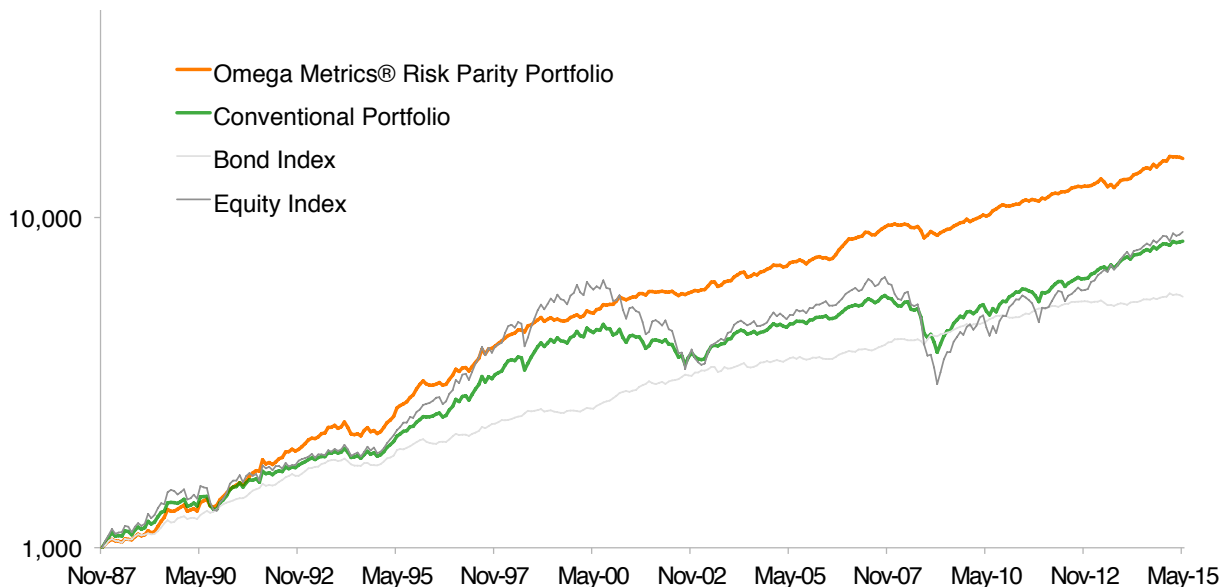

Figure. 1. The Omega Metrics® Risk Parity Portfolio targets a constant Expected Shortfall level through the boom and bust cycles over the past 28 years. It increases annualised return from 8.1% to 10.4% while reducing annualised volatility from 8.9% to 6.3%. The worst drawdown has been cut from 33% to only 9%.

[1] Unlike volatility, which treats large gains as well as large losses as equally risky, Omega Metrics® Expected Shortfall accurately predicts downside risk at a given probability level.

Omega Metrics® Risk Cycle Trading generates 'smart beta' by maintaining a constant risk level throughout the cycle and generates alpha from Market Mode signals. This powerful combination produces outstanding risk-return characteristics.

Smart Beta

The traditional mix of equities and bonds leaves almost all the risk concentrated in the equity component. When equity markets crash their losses can swamp the diversification benefit of the bond component–leaving a drawdown that can take a very long time to recover from. For investors who need growth this is a serious setback. For those who need income, it can be catastrophic.

In 'Constructing Risk Parity Portfolios' we showed the benefit of using Risk Cycle technology to build a Risk Parity portfolio which not only allocated equal risk to equities and bonds but maintained that constant risk level throughout the cycle. Using only the S&P 500 Index and the Vanguard Total Bond Market Index as components the Omega Metrics® Risk Parity portfolio dramatically outperforms the standard 60-40 equity bond mix with the same components.

This advantage is entirely due to our ability to measure risk accurately. Because Risk Cycles lead market booms and busts, maintaining a constant risk level through the Risk Cycle automatically increases market exposure as booms grow and decreases it as they peak and turn to busts.

Adding Alpha

But there is additional, alpha generating, information in the Risk Cycle. Market Mode signals indicate periods which produce higher than normal risk adjusted returns in the expansion phase of the market cycle. They signal advantageous times to switch between a long and a short position and subsequently identify periods where the short position can obtain higher than usual risk adjusted return.

Figure 1 shows the effect of adding Risk Cycle Trading of Market Mode signals in the S&P 500 Index to the Omega Metrics® Risk Parity portfolio. The alpha added increases the annual return from 10% to 14.5% while improving the Shape ratio. It also reduces the worst drawdown by more than a third, from 10.4% (October 2008) to 6.9% (August 2013).
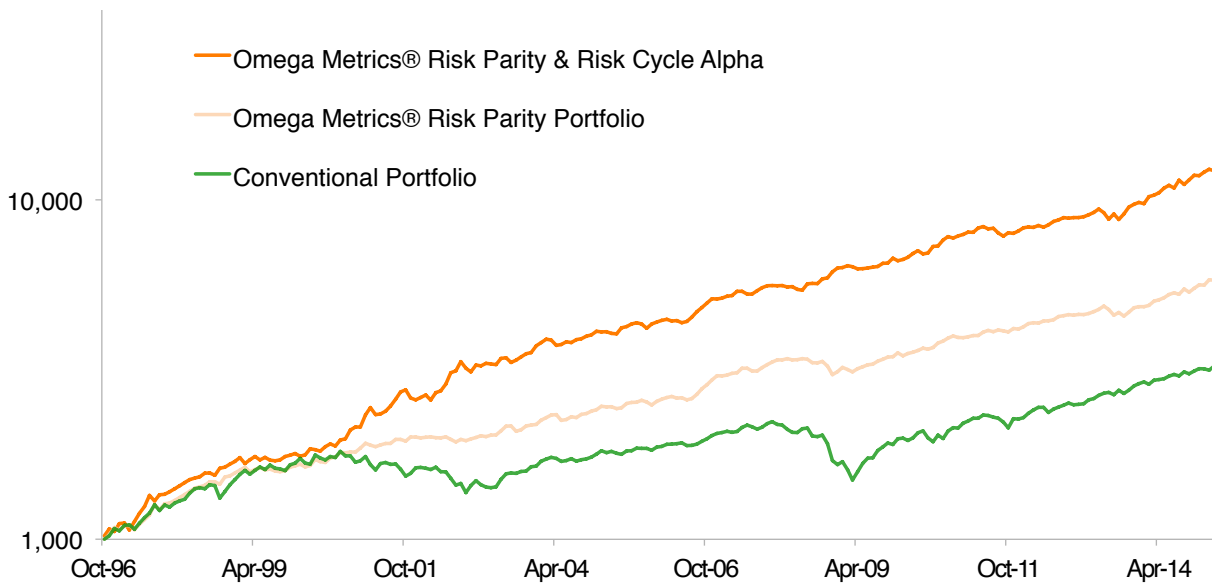

Figure 1. The Omega Metrics® Risk Parity Portfolio outperforms the Conventional Portfolio of Bonds and Equities. Adding Risk Cycle information generates alpha, increasing annualised return from 10% to 14.5%. The annualised standard deviation increased from 6.2% to 8.3%.

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