Omega Analysis

Omega Metrics® Risk Cycle Technology

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Omega Analysis

Omega Metrics Risk Cycle Technology

Accurate *Market Risk Measurement* across asset classes, market sectors and investment portfolios.

Macro level market intelligence providing *Early Warning Indicators* of bubbles and anti-bubbles.

Trend Analysis that identifies threats or opportunities in the Risk Cycle.

Omega Analysis

Market Risk Measurement

VaR provides a threshold for loss at a given frequency.

For example: the 1-day 99% VaR is the *most* you will lose 99 days in 100.

So it's also the *least you will lose 1 day in 100.*

Expected Shortfall (ES) tells you how much you should prepare to lose conditional on a VaR breach.

Omega Analysis

Market Risk Measurement

VaR provides a threshold for loss at a given frequency.

ES tells you how much you should prepare to lose conditional on a VaR breach.

The key to using these statistics to control risk is the ability to model the tail of a distribution accurately.

Financial data has fat tails. Using Normal distribution models for VaR and ES simply doesn't work.

Market conditions can change rapidly. Conventional Extreme Value Theory (EVT) tail models require far too much data to respond quickly to market events.

Market Risk Measurement

To use VaR and ES to control risk you must be able to model the tail of a distribution using short data series.

Our proprietary tail models are based on fundamental new discoveries in the mathematics of extreme value probability and statistics.

Omega Metrics® VaR and ES provide unprecedented accuracy in prediction of downside for 1-day, 5-day, 10-day, 15-day and 20-day returns across a wide range of instruments and markets.

Market Risk Measurement

Measured, not Modelled

The VaR for n-day returns is *not* a fixed multiple of the daily VaR. Standard models for multi-day VaR and ES depend on assumptions that are simply not satisfied in financial data.

Omega Metrics® VaR and ES provide unprecedented accuracy in prediction of downside for 5-day, 10-day, 15-day and 20-day returns because they are *measured* from historic multi-day returns, not modelled on the basis of daily returns.

Market Risk Measurement

Predictive Power: US and European Bank Risk

Instrument	Value at Risk (VaR) 99% 5-day	Expected Shortfall (ES) 99% 5-day	Worst 5-day Loss (since 23 June 2016)
KBW Nasdaq Bank Index	-10.9%	-16.8%	-9.3%
Stoxx® Europe 600 Banks	-14.3%	-21.8%	-16.8%
Banca Monte dei Paschi	-31.8%	-47.4%	-32.5%
Barclays	-14.2%	-21.3%	-27.1%
Deutsche Bank	-19.4%	-28.4%	-21.5%
HSBC	-10.8%	-15.7%	N/A
JPMorgan	-10.9%	-17.8%	-7.6%
UniCredit	-21.5%	-31.3%	-27.7%

Omega Analysis' 5-day drawdown predictions made *prior to the UK referendum*, compared with worst 5 day periods following the surprise Leave vote.

Early Warning Indicators-Asset Bubbles

Risk Cycles are leading indicators of market booms and busts.

They are characterised by alternating periods of falling and rising measured risk.

They also exhibit periods of *persistent asymmetries* in the distributions of gains and losses.

We call these periods of asymmetric risk *Market Modes*.

Early Warning Indicators-Asset Bubbles

Market Modes are the statistical fingerprints that identify booms and busts in the U.S. equity market for over a century.

Before and after the creation of the US Federal Reserve system.

Before and after the Gold Standard was replaced by the Dollar.

Before (and almost certainly after) the advent of QE.

The fingerprints are always the same.

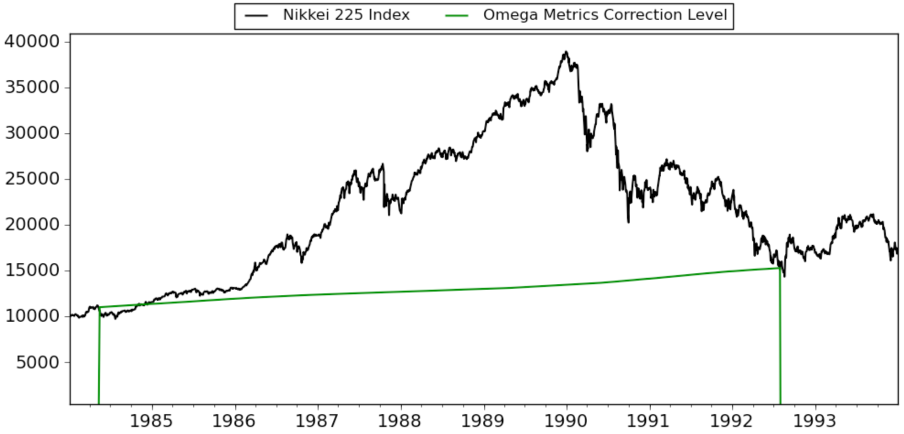
Early Warning Indicators-Asset Bubbles

Unstable Expansion Modes are extended periods in which the market is rising but the downside risk of the long position remains higher than that of the short position.

The *Correction Level* is obtained by taking the market level at the time the Unstable Expansion is confirmed and following it at the Risk Free Rate.

Markets with Unstable Expansions which remain uncorrected for long periods are asset price bubbles which almost always crash violently.

Early Warning Indicators-Asset Bubbles

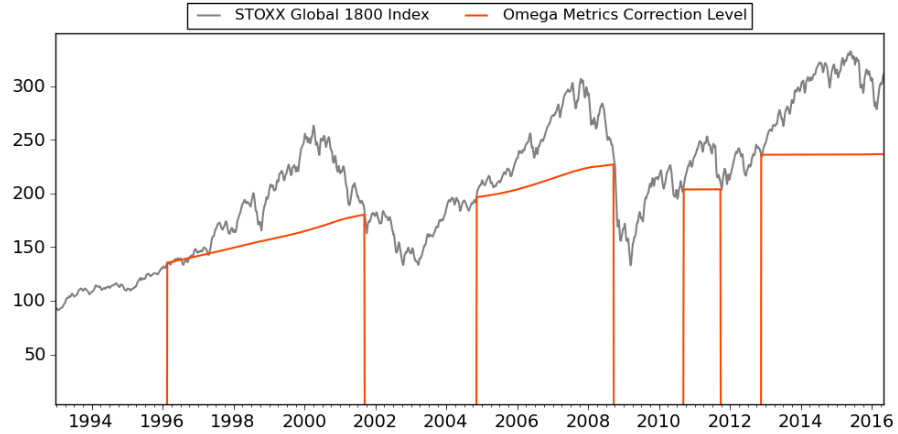


Predicted Correction: Nikkei 225 Index 1984-94

Early Warning Indicators-Asset Bubbles

Predicted Corrections: STOXX® China A 900 Index 2005-2015

Early Warning Indicators-Asset Bubbles



Predicted Corrections: STOXX® Global 1800 Index 1994-2016

Early Warning Indicators - Anti-Bubbles

Unstable Contractions are just Unstable Expansions for the short position.

Unstable Contractions during a downturn are anti-bubbles of panic selling.

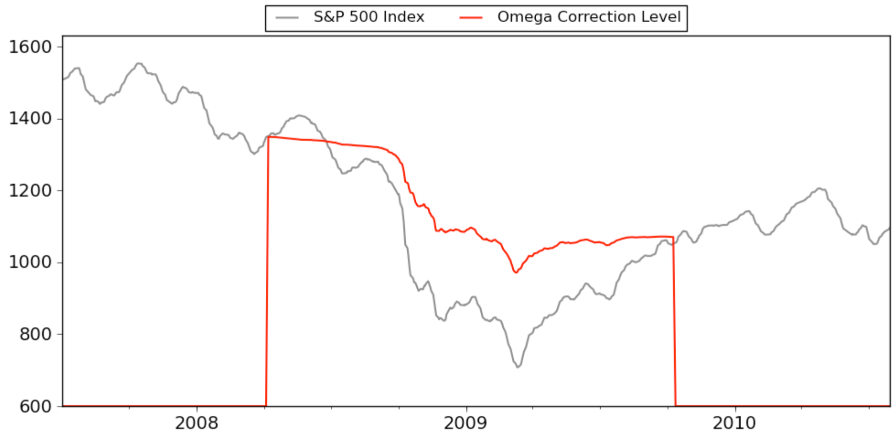
They correct as the market becomes over-sold.

Early Warning Indicators - Anti-Bubbles

Correction of Unstable Contractions reliably mark the bottoms of US equity market busts.

During an Unstable Contraction, the Correction Level is the value the Index will have to rise to in order to complete the correction in the short position.

Early Warning Indicators - Anti-Bubbles



By the end of Q1 2009 the predicted Correction Level indicated that the S&P 500 was oversold by 25%.

Trend Analysis

The Information Content of Market Modes

In order to take advantage of the information in Market Modes (or even to test that they *contain* information) we need to distinguish between expanding and contracting phases in the market.

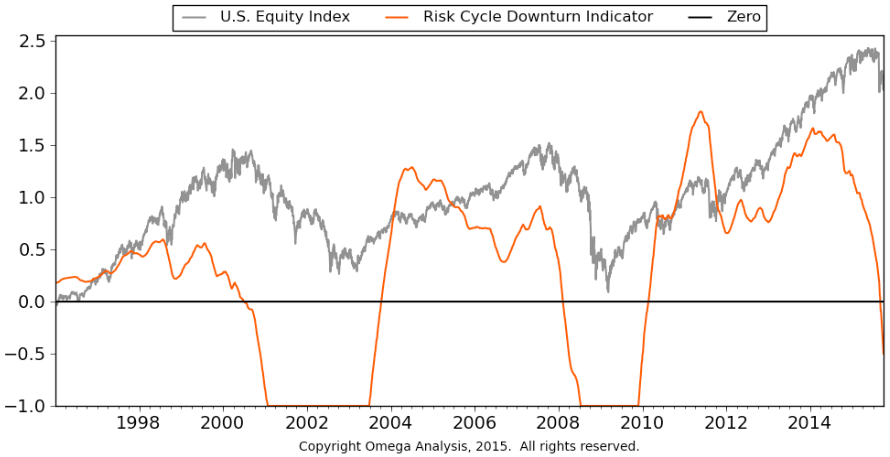
We have done this with proprietary trend tools which capture the 'long wave' boom and bust behaviour.

Trend Analysis

When our Downturn Indicator passes through zero it signals a change in trend from boom to bust.

By extrapolation of the Downturn Indicator direction we can estimate the time remaining to a change–as we began reporting to clients in May of 2015.

Trend Analysis



Downturn Indicator Tracking Trends in the Global Equity Market

What Omega Metrics Technology can do for you.

A Case Study
RBS bid for ABN Amro in 2007 and the rights issue in 2008 produced losses for shareholders of over 95%.

Omega Metrics

Market Risk Measurement

Early Warning Indicators of asset price bubbles

Trend Analysis identifying a downturn

Provided real time warnings of the risk of catastrophic loss in this investment.

Omega Analysis

What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Market Risk Measurement

In the post 2003 equity market recovery, equity market risk declined.

For RBS, 5-day 99% VaR and ES were at their lowest in May 2006.

VaR 4.8%   ES 7.1%

For the Stoxx Europe 600 Banks Index they were moderately lower at

VaR 4.0%   ES 6.6%

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Market Risk Measurement

Risk Increased Rapidly through 2006 and 2007

September 2007 RBS shareholders approve ABN Amro Bid.

October 2007 ABN Amro shareholders approve bid.
RBS's 5-day 99% VaR and ES had risen to

VaR 10%   ES 15.8%

For the Stoxx Europe 600 Banks Index they were only

VaR 8%   ES 13.4%

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Market Risk Measurement

Before the April 2008 rights issue, RBS's 5-day 99% VaR and ES were

VaR 11% ES 16%

These were the loss levels that should have been expected once every 5 months!

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Early Warning Indicators of Asset Price Bubbles

In the post 2003 equity market recovery equity market risk declined and banks stocks appreciated rapidly.

Unstable Expansions were detected in RBS shares (July 2004) and in the Stoxx Europe 600 Banks Index (September 2004).

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Early Warning Indicators of Asset Price Bubbles

By mid 2007 the Correction Level for the Stoxx Europe 600 Banks Index the Correction Level indicated a loss of at least 32% should be expected in the European bank sector.

But for RBS *a loss of at least 60%* was predicted.

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Early Warning Indicators of Asset Price Anti-Bubbles

By August 2007 RBS went into an Unstable Contraction–an anti-bubble of panic selling.

The ABN Amro bid was approved by RBS shareholders and ABN Amro shareholders (and secured regulatory approval) while RBS was in Unstable Contraction.

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What Omega Metrics Technology can do for you.

A Case Study: RBS ABN Amro purchase and rights issue

Trend Analysis

In mid August 2007, *prior to the ABN Amro bid approvals,* our Downturn Indicator signalled the end of the boom in RBS shares.

In October 2007 the Downturn Indicator gave the same signal for the entire European bank sector.

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What Omega Metrics Technology can do for you.

A Case Study

By the time of the rights issue, RBS shareholders would have seen:

Market Risk Analysis

99% 5-day VaR of 11% and ES of 16%

Early Warnings of Asset Price Bubbles and Anti-Bubbles

Prediction of a loss of at least 60% from RBS's market peak. Panic selling Anti-Bubble began August 2007.

Trend Analysis

The European Bank sector in general and RBS in particular had moved from boom to bust.

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What Omega Metrics Technology can do for you.

We provide these services through:

- Customised regular risk analysis, risk reports & risk alerts on individual markets, sectors and portfolios…
- Subscriptions to weekly Risk Cycle Research Reports
- Retainer based consulting for bespoke risk and hedging analysis