Accidents Waiting to Happen:
The 'Everything Bubble'

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Starting in January 2009…

- In the aftermath of the 2008 market crash, we developed a new approach to measuring market risk — one that would have shown clear danger signals well in advance of the Sept-Oct 2008 meltdown.

- By 2010 this led us to the discovery of statistical markers that provide early warning of asset price bubbles and anti-bubbles *and* predict correction levels.

- After the 2015-2016 'mini-correction' in the S&P 500 Index, we developed indicators for turning points in financial markets.

The 'Everything Bubble'

- After 10 years of unprecedented monetary intervention by Central Banks, bubbles are ubiquitous across asset classes all over the world.

- We had the 'tech bubble' and the 'credit bubble' — now we have the 'Everything Bubble'.

The 'Everything Bubble'

- The indicators we started to develop in 2009 are all flashing red warning signs.

- The extent of the coming corrections and the timing of bubble deflations vary greatly across regions, countries and asset classes.

The 'Everything Bubble'

- Market risk levels are alarmingly high and the tails of returns distributions are extremely fat.

- In spite of renewed Central Bank efforts, it appears that we are in the final phase of the Everything Bubble.

- There is now a panoply of Accidents Waiting to Happen (with attendant opportunities for investors) as the Everything Bubble bursts.

Outline of this talk

- New Risk Measurement Technology

- Market Modes as early warning indicators of bubbles and anti-bubbles

- (Multi-trend analysis for market turning points)

- Examples of Accidents Waiting to Happen

New Risk Measurement Technology

- Everybody talks about the weather, but nobody does anything about it…

- Risk analysis prior to the 2008-9 crisis failed badly.

- In the aftermath of the crisis, it was even asserted that accurate measurement of market risk is impossible (the 'Black Swan' fallacy etc).

- This is simply wrong, as our results show.

New Risk Measurement Technology

- Regulators and many investors had (inexplicably) adopted Value at Risk (VaR) as a 'risk measure'.

- They ignored Expected Shortfall (ES)— the average loss conditional on a VaR breach—which actually does measure risk.

- The trick is extracting accurate VaR and ES levels from market data.

Slide 1

Value at Risk

- The 1-day 99% Value at Risk (VaR) is the worst loss 99 days in 100.

- But that means it's the *least* you will lose 1 day in 100.

- VaR *is just a dividing line*.

- This is what that dividing line looks like for the EuroStoxx 50 Index, calculated with our proprietary tail model.

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Slide 2

Value at Risk

EuroStoxx50 — VaR
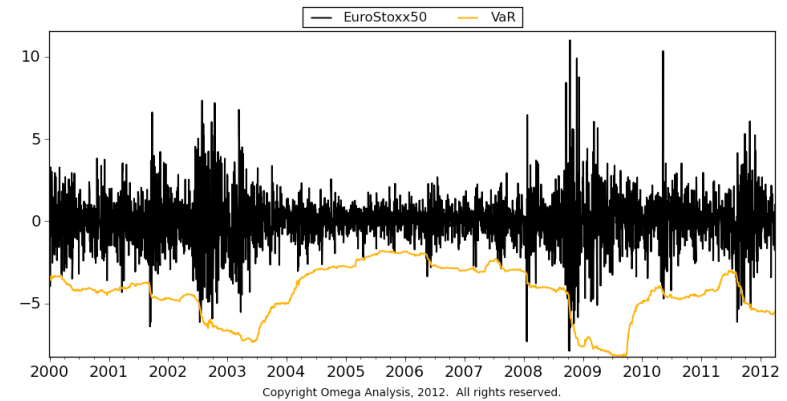
Predicted 99% VaR levels in % per day. In 3154 days out of sample the VaR level was breached 34 times.

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Slide 3

VaR is only half of the information we need

- VaR is just a dividing line.

- The 1-day 99% Value at Risk (VaR) is the *least* you will lose 1 day in 100.

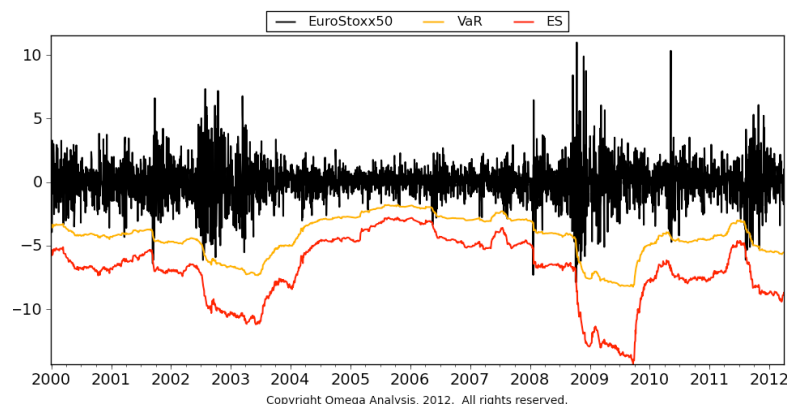- What should you expect to lose that 1 day in 100?

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Slide 4

Expected Shortfall

- The 1-day 99% Expected Shortfall (ES) is the average loss conditional on a VaR breach.

- Expected Shortfall, at least in theory, allows you to control risk by being prepared for these losses.

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Expected Shortfall

Predicted 99% ES levels in % per day. In 3154 days out of sample the ES level was breached 5 times.

Expected Shortfall

- Expected Shortfall, at least in theory, allows you to control risk.

- In practice, this only works if your estimates are good.

- VaR and ES can only be calculated by using a model of the tails of returns distributions.

- The tail model is a critical tool. Financial market data has *fat and asymmetric* tails.

Checking the Tail Model

- VaR breaches should match the probability level.

- Over a long period the model should produce one 99% VaR breach per 100 days.

- ES breaches should be consistent with the tail model.

- For example, in typical equity markets the number of breaches of our ES is consistent over time with the average probability of an ES breach. (The latter changes daily with the tail parameter.)

New Risk Measurement Technology

- Extreme Value Theory (EVT) is the standard toolkit for dealing with fat tails.

- *In principle,* it could have been used to predict the extreme risk levels that preceded the 2008 Crash— but it wasn't.

- *In practice*, conventional EVT requires so much data for accurate estimates of VaR and ES in financial time series that its impact so far has been very limited.

New Risk Measurement Technology

- More efficient tools are needed to detect changes in risk while there's still time to deal with them.

- We have discovered a new differential invariant which provides an intrinsic measure of 'efficiency' in terms of the rate of convergence to an EVT limit. (See IMPA seminar May 2018)

- Our tail models are very efficient and produce accurate VaR and ES estimates using short data windows.

Bank 5-day Drawdowns as of 6 July 2016

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%

Example - Bank Risk from UK Referendum

- The result of the UK 'Brexit' referendum on 23 June 2016 came as a surprise to many market participants.

- Many banks suffered large losses in the subsequent month, an even bigger surprise to some. This was an accident waiting to happen.

- Here's what our tail models predicted, *prior to the referendum* and what happened in the subsequent two weeks.

Example - the 'Short VIX' trade

- As equity market volatility reached historic lows, many investors, including large institutions and ETFs, crowded into the 'Short VIX' trade.

- By June 2017, JPMorgan analyst Marco Kolanovic warned that an increase in the VIX index from its current value of 10.5-11.5 to 20 would *wipe out* the Short VIX positions.

- There's a big difference between knowing that and knowing how likely the move from 10 to 20 was.

Example - the 'Short VIX' trade

- The big jumps up in the VIX are in clusters—most of the damage is done in 3 days.

- The Short VIX returns are enormously volatile so predicting 3 day return levels is a challenge.

- Over almost 3 decades the back-test of our 3-day 99% VaR estimates showed a handful of excess VaR breaches—so we were likely to be *underestimating* the risk if anything.

- This was another accident waiting to happen.

Example - the 'Short VIX' trade

- In June 2017 we published our estimate that a 3-day surge to Kolanovic's catastrophic level could be expected 1 time in 280 days, likening the Short VIX trade to Russian roulette with 1 bullet in 280 chambers.

- The VIX reached 16 in August 2017 and by the end of that month we revised the frequency. Now there was one bullet and only 48 chambers.

Example - the 'Short VIX' trade

- There's a new 3-day return every market day — so we expected this 'game' to last about 2 months on average.

- It lasted 5 months.

- In February 2018 the surge came, wiping out the Short VIX traders and the ETFs which had opened it to retail investors.
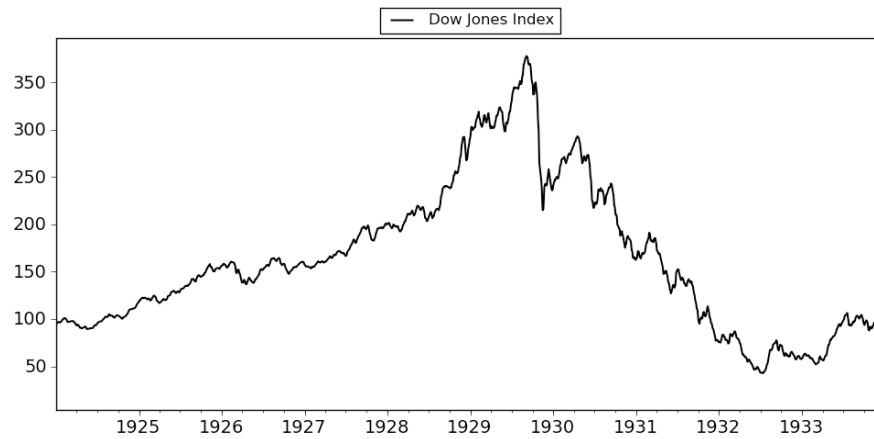
- Several lawsuits are underway.

Market Modes

- Equity Market Boom and Bust Cycles are present in data for (at least) the past 150 years.

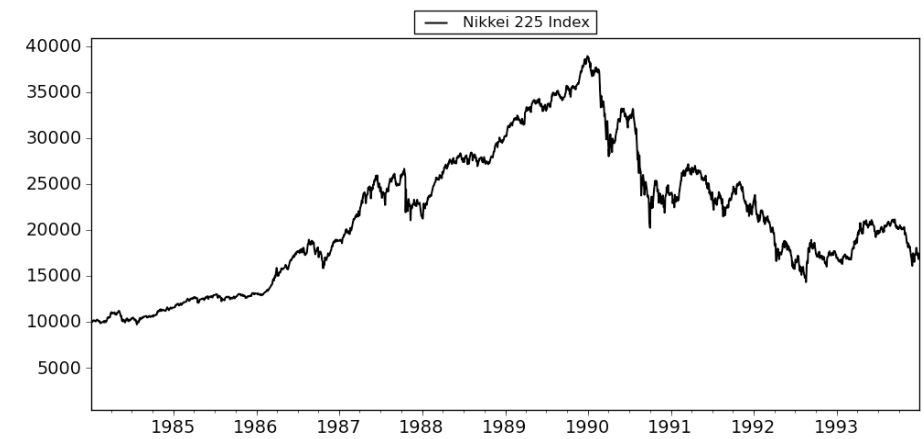- Here are some examples from the 20th and 21st Centuries.

Dow Jones Index 1929

Dow Jones Industrial Index 1924-1934

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Nikkei 225 Index

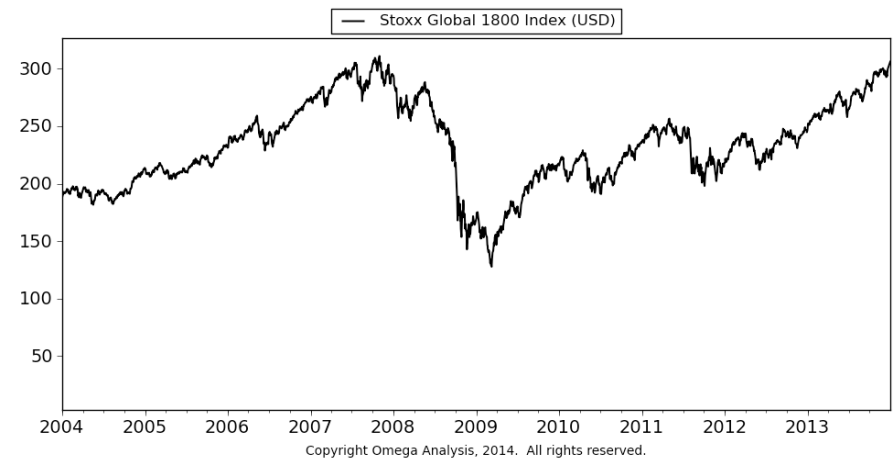Nikkei 225 Index 1984-1994

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STOXX ® Global 1800 Index

There have been 3 global equity booms, and 2 busts, since 1994

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STOXX ® Global 1800 Index

Stoxx Global 1800 Index– now 405 after Jan 2018 all time high of 416 .

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Market Modes

- Whenever a boom turns to bust there are people who say it was a bubble (this is the IMF's *definition*)–and others who say that it wasn't or that there was no way to know if it was without hindsight.

- The 2013 Economics Nobel Prize Lectures of Eugene Fama and Robert Shiller provided a wonderful glimpse of two extremes in the debate. (*See John Cochran's Grumpy Economist blog—Link in the References*)

Market Modes

Fama lays down the challenge:

"Such policy statements seem to define a bubble – now I have to say it this way because when people use the word bubble they never tell you what they mean –

–such policy statements seem to define a bubble as a strong price increase that implies a predictable strong decline – *predictable strong decline*. ...But the available research provides no reliable evidence that price declines are predictable."

Market Modes

- Omega Analysis has a great deal of empirical evidence that some strong price increases lead to *predictable* declines.

- We can make a prediction such as: "The S&P 500 Index will decline by at least 50%."

- (That is, in fact, our current prediction.)

- This arises from observed persistent anomalies in relative *risk of loss* to buyers and short sellers.

- To explain the ideas behind this, we need to return to Risk Measurement.

Market Modes

Comparing Upside and Downside Risk

- Our daily ES measurement for Long and Short positions reveals recurrent anomalies in the comparative risk to long and short positions in the same asset.

- When a market is rising but buyers are persistently exposed to more downside risk than short sellers, the market is out of balance for speculators.

- We call such periods *Unstable Expansion Modes*. (*These could not exist if the returns distribution were symmetric*)

Market Modes

- Intuitively, Unstable Expansion Modes *should* lead to market corrections (which may be small).

- They (almost) always do. When they persist for long periods the correction can be violent.

- We require the UE to be present for at least 60 trading days for confirmation. (Central Bank timescale)

Market Modes

- We can then make a *prediction* of the future correction.

- When an Unstable Expansion has been confirmed we carry the market value forward *as if it had been invested at the risk free rate on the UE inception date.*

- This is our predicted *Correction Level.*

Market Modes

- Anyone who buys an asset during an Unstable Expansion which later reaches its Correction Level has been exposed to market risk throughout.

- But he has typically received at most the risk free rate on the investment.

- All you need to implement this calculation is a good measure of upside and downside risk. (For details see our IMPA seminar May 2019.)
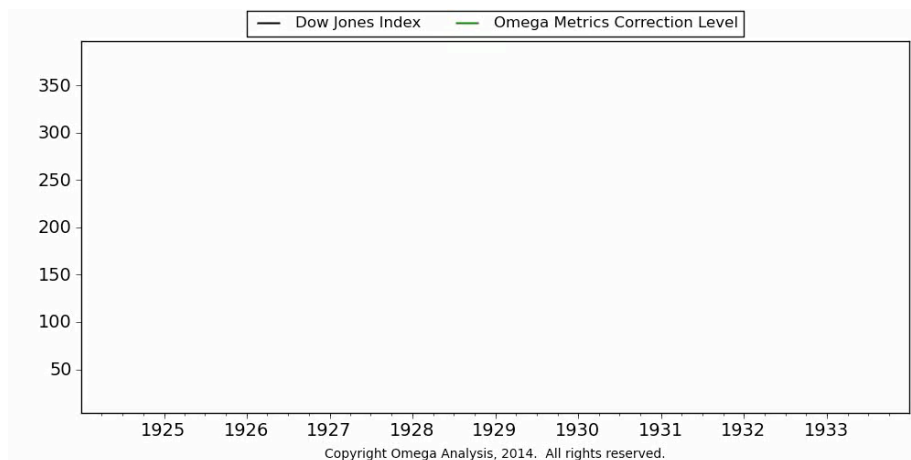
Early Warning of Asset Price Bubbles

- What follows is a series of *out of sample predictions* made using only the data available in the past.

- Nothing has been optimised.

- The same parameters have been used in each case.

- When the gap between price and Correction Level exceeds 25% we call the Unstable Expansion a bubble, in keeping with the IMF.
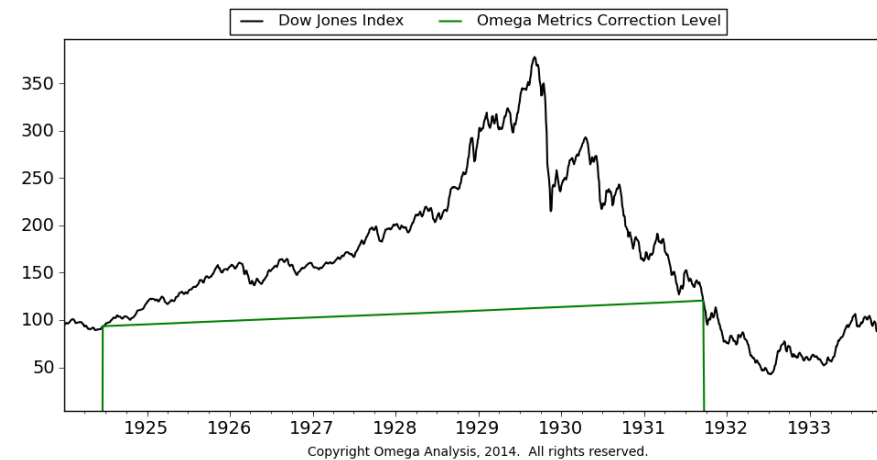
The 1929 Crash Prediction

Dow Jones Index — Omega Metrics Correction Level

Dow Jones Industrial Index 1924-1934

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The 1929 Crash Prediction

Dow Jones Index — Omega Metrics Correction Level

Dow Jones Industrial Index 1924-1934

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The Japanese Equity Crash Prediction

Nikkei 225 Index — Omega Metrics Correction Level
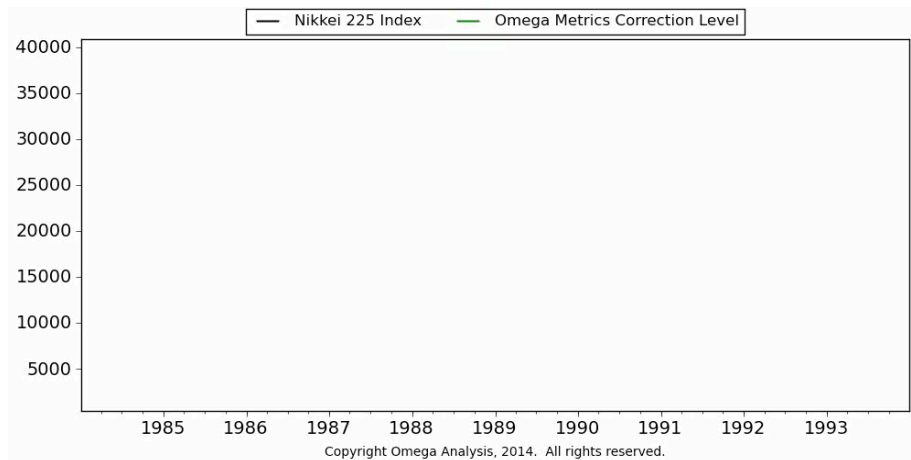
Nikkei 225 Index 1984-94

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The Japanese Equity Crash Prediction

Nikkei 225 Index — Omega Metrics Correction Level
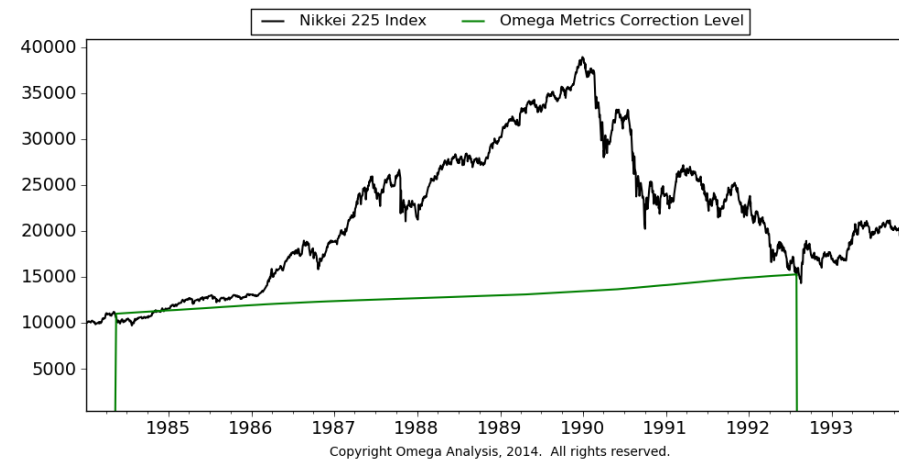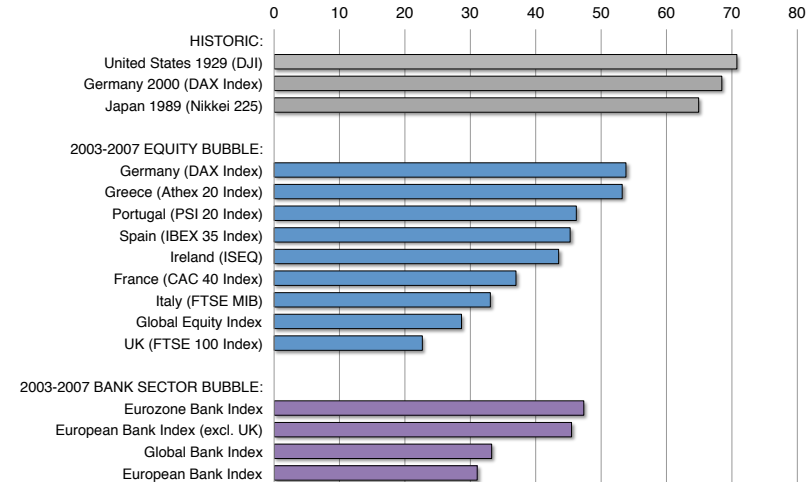
Nikkei 225 Index 1984-94

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Comparison of Historic Correction Levels

- The 'Tech Bubble' was part of a global equity bubble— which reached its peak in the German DAX Index.

- The 'Credit Bubble' was part of a global equity bubble—with Germany more overheated than Greece.

Comparison of Historic Correction Levels

All subsequently fell at least as much as the Correction Level predicted.

Comparison of Historic Correction Levels

- Our prediction for the IBovespa during the 'Credit Bubble' was a correction of 57% at the Index peak in May 2008.

- The IBovespa Correction Level was reached in October 2008.

- The most recent UE began in December 2016.

- We're currently expecting a 30% correction.

Market Modes —Unstable Contractions

- The same approach can be used to identify *Unstable Contractions* –'anti-bubbles' which should produce a market rebound but may instead turn into panic selling.

- These are periods where a 'formal' short seller (who compounds *minus* the market returns) would observe an Unstable Expansion.

- This provides us with a Correction Level for Unstable Contractions.

Anti-Bubbles

- Imagine a short seller who constantly rebalances his position.

- Every day he receives minus the market return and compounds them.

- It is a feature of our tail analysis that he will see an Unstable Expansion where in the real price we see an Unstable Contraction.

- Each day there's a return that will take his NAV to the UE correction level.

- We apply that return to the actual price to produce the Correction Level for the UC.

WTI Unstable Contraction and Correction

The UC Correction Level (Red) is produced by calculating the return required to bring the formal short position to its CL and applying that to the actual price.

Anti-Bubbles

- Unless the price goes to zero, the formal short seller can expect to see his Unstable Expansion correct.

- Unlike the long position holder, his losses can be more than 100% after a major decline in the actual price.

- Since Commodity prices and equity indices can't drop to zero, we generally observe Unstable Contractions reaching their Correction Level.

Anti-Bubbles in Share Prices Can End Badly

- Unlike commodity prices, individual share prices *can* go to zero.

- As they did for Lehman Brothers and (essentially) the Royal Bank of Scotland.

- Both banks were in Unstable Contraction from Q4 of 2007 and trading well below their Correction Levels in the run up to the 2008 Crash.

- An Anti-bubble is a 'sell'. Other banks such as Goldman Sachs and Barclays were in Anti-bubbles as well, found outside capital and survived.

Trends and Turning Points

- The utility of knowing you're in an asset price bubble (or anti-bubble) is limited…

- *Unless you have a means to identify the turning points between boom and bust.*

Trends and Turning Points

- Trend indicators have to deal with the 'up the escalator, down the elevator' behaviour of financial markets. Booms can take a long time to play but when the bust comes it can bottom out and rebound very rapidly.

- We have adapted and extended existing signal processing technology to produce a 'Multi-trend' analysis designed to do this with 3 different time scales. (See the References for links to technical background and details on our website.)

Trends and Turning Points

- When all 3 turn negative we expect the boom to turn to bust.

- Historically, Red Alerts, when all indicators are negative, have been highly destructive of capital.

- In October of 2018 these indicators had gone from Yellow to Orange or Red Alerts in many major markets worldwide.

- It appears that we're coming to the end of the 'Everything Bubble'.

The 'Everything Bubble'

- Just as in prior instances, we've observed global equity indices and individual share prices in Unstable Expansion growing to bubble dimensions.

- This began in Q4 2009. In 2011 the US credit downgrade produced a decline in the S&P 500 Index and others that reached our Correction Levels.

- By 2013 Unstable Expansions were emerging in equity markets globally.

- Many of these (but not the U.S.) reached their Correction Levels in the 2015-16 downturn.

The 'Everything Bubble'

- Then, in the rebound that began in Q3 of 2016, the entire cycle of overheating began again with many equity markets now back to Bubble levels (Correction at least 25% predicted).

- Just like the previous cases—without, so far, the massive correction.

- Of course, one significant difference is Central Banks actively cheering on the bubbles.

The 'Everything Bubble'

- One additional difference is the 'ETF-isation' of virtually every asset class.

- The rise of the Exchange Traded Fund is the basis of our observation of bubbles in asset classes of all sorts.

The 'Everything Bubble'

- We have found that ETFs behaved as we'd expect through the 2008-2009 crash.

- They exhibit Unstable Expansions and Unstable Contractions which correct as we predict.

The 'Everything Bubble'

- But an ETF of USD denominated emerging market bonds or a Junk Bond ETF *trade as equities*.

- *There is every reason to expect that their Unstable Expansions will correct exactly as they do in equities*.

- That's the basis for our description of the Everything Bubble.

- Everywhere we look we see bubbles across asset classes, across countries and regions, many with horrific Corrections predicted.

The 'Everything Bubble'

- ETFs have provided the retail investor, as well as many investment funds, unprecedented access to these assets— just as in the case of the 'Short VIX'.

- There may be effectively zero liquidity in the underlying assets while the ETF shares trade millions of times a day.

- This is one of many Accidents Waiting to Happen.

Accidents Waiting to Happen—Regulation can make it worse!

- Unlike banks going into the 2008-2009 financial crisis, banks today are subject to 'improved' regulatory capital regulation.

- So that 'taxpayers' are not on the hook for another bank bailout, bondholders (and depositors) will be 'bailed in' in almost all developed markets.

- This has been sold uncritically in the press everywhere as if neither bondholders nor depositors are also taxpayers.

Accidents Waiting to Happen—Regulation can make it worse!

- A bank with a sound balance sheet but a wobbly share price now pays a high interest premium for regulatory capital.

- The first 'new improved' Contingent Convertible (Co-Co) bonds have recently reached their call dates and there has already been trouble for Deutsche Bank (much higher rate to renew) followed by Santander(opting *not* to repay as had been expected).

Accidents Waiting to Happen—Regulation can make it worse!

- Major banks all over the developed world have Uncorrected UEs. When the next equity market slump comes, they will likely see large drops in their share prices.

- Bank sector and Financial sector ETFs are in the same position. But their holders can't sell individual banks— they can only sell the entire ETF putting the same pressure on all of the components.

- Even if there are no bank failures this time, the increased cost of funding will force banks to reduce lending in the next recession.

Accidents Waiting to Happen—Regulation can make it worse!

Deutsch Bank Share price and Correction Level in Euros
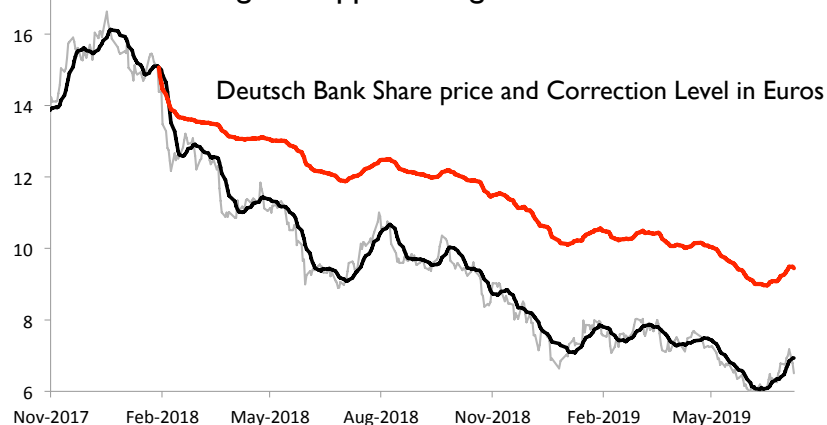
Deutsche Bank Shares went into Unstable Contraction in February 2018. They remain well below their UC Correction Level (Red). Deutsche Bank says they need no new capital. That's what Lehman Brothers said in August 2008.

The Next Accident Waiting to Happen— U.S. Equities

- In October 2018 we observed fatter tails in the U.S. equity market than had ever occurred *prior* to a major downturn.

- In December 2018 the S&P 500 Index had its worst 10-day drawdown (almost 11%) since the shock of the US credit downgrade in August 2011.

The Next Accident Waiting to Happen— U.S. Equity Markets

- Tails in U.S. equity indices, sectors and ETFs remain extremely fat.

- One of the fattest is in 'Low Volatility' ETFs. (This illustrates the fact that volatility cannot accurately measure risk.)

- ETFs for High Yield Corporate bonds also have near record fat tails— although their drawdown *levels* are lower than conventional equities the probability of losses that will come as a shock to 'fixed income' investors is now very high.

For More Accidents Waiting to Happen

- See the ongoing series on https://www.omegaanalysis.com/accidentswaitingtohappen
- April 2019 Short VIX Again
- May 2019 Deutsche Bank

References

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Important Notice