Reader guide to using the HED analysis

Introduction

At HED we work in the area of cause and effect, where the influence of feedback is important. The past affects the present in both obvious and subtle ways and behaviour is altered by it. The effect on markets is our main concern, where price movements affect the behaviour of the people in the marketplace and they in turn affect the price.

Residential real estate booms are an example. Demand makes prices rise, as we would expect, but any rise in price also makes potential buyers anxious. They see that the market has moved and is still moving up and away and this pushes them to act with greater urgency - to buy more quickly before prices get even higher. Sellers retreat as they too raise their expectations and this combination makes the price go up even more, so the trend becomes self-sustaining. If you fail to see this link between price movement and behaviour you risk missing the move.

Eventually more houses will be built but this apparent extra demand can take prices higher for many years. Much later on, a crash may happen as gloom turns to panic and falling prices push sellers into a 'fire sale' while buyers step aside. Both on the way up and on the way down, positive feedback is at work as the continued trend in price reinforces the behaviour of the participants.

In other circumstances, rising demand will be met by a quicker increase in supply but there is usually still some lag and this causes cycles. In the hotel business for example, when a busy city becomes short of rooms so occupancy and room rates both become high then many hoteliers will notice this at the same time and seek permission to build. After the few years needed to complete the new hotels, a glut ensues and room rates fall back again. This is negative feedback and it leads to cyclicality and self-limiting behaviour - price ranges, in other words. In this case the link between price movement and behaviour is not the exaggerated mood of the crowd but the natural time lag between cause and effect.

This explains the 'tower crane' indicator that often marks the top of a building boom in commercial property - a frenzy of new building sparked by high demand and prices. The peak of new construction usually marks a temporary top that leads to a pause or a dip and then renewed growth until the next one - just another peak in a cycle. These rhythmic ups and downs affect many markets for the same reason which is the lag between cause and effect. There are other examples in our videos, from copper and cocoa to the so-called business cycle in free-market economies in the videos on our website www.hedcapital.com

Often we cannot see the connecting mechanism that links effect back to cause but the signs are clear – patterns that repeat, a tendency to cyclicality and self-sustaining trends, both up and down. Feedback is the principal reason why markets are not random and it is part of the evolving field of behavioural finance, which provides better explanations than traditional economics and offers a chance to predict. We have identified two ways to make use of this method of thinking to predict what may happen next:

THE BASICS

1. **Measuring mood.**

We measure the feedback-driven shifts in the mood of the market. From this we can see when bullish mood has reached such a fever pitch that prices can rise no further. This moment of exhaustion usually comes at a time of great enthusiasm for the market – there will be newspaper and magazine articles proclaiming that a new higher level of prices is here to stay and maybe declaring a whole new paradigm. This will all be wrong but it will be hard to detect that among all the shouting. The same happens in reverse in bear markets when despair reaches its maximum after price declines, near or exactly at a low point. Mood extremes can be of optimism or pessimism but a third condition also exists – that of doubt.

2. Analysing cycles caused by lags and nature.

Lags between cause and effect are the most common causes of cycles, as in the hotel example above but they can also come from the rhythms of nature, like the seasons or the tides. Whatever their cause, there are always plenty of cycles in active operation or in temporary suspension. These all interact together to make more cycle so the outcome is complex. We break down this complexity to identify which underlying cycles are currently operating and project this forward to see when important highs and lows should occur.

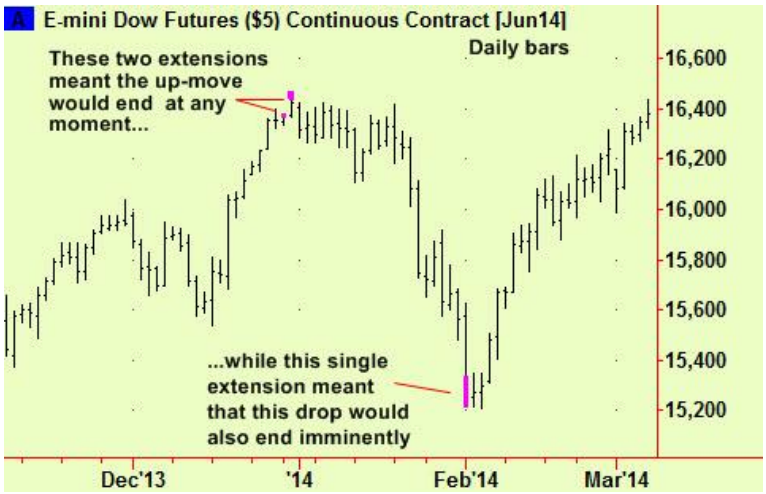
THE TECHNIQUES - Mood measurement

We know that mood is affected by the direction of price but also by its type of movement – prices that rise and fall in a jagged uptrend don't bring as much excitement as those that rise smoothly and steeply so we use a measure of both trend and smoothness called Hurst, to see how eager or despondent the crowd has become. We do this at many different time frames so as to capture the shifts in mood of all participants, from day traders to pension funds.

There is almost never 100% agreement in the market. Any sustained trend gets pushed along by positive feedback and believers will mainly outnumber sceptics as the trend persists. The prevailing mood also shifts periodically from one to the other as the trend either continues or as prices reverse during reactions. When the trend is well established the feedback loops that kept it going start to tighten and this shows up in our analysis as a quickening rhythm in these mood shifts. Predominantly high Hurst numbers become interspersed with intervals when lower numbers occur and this alternation speeds up as the end of the trend approaches. When the shifts are almost continuous, we get a signal called an extension.

Extensions

Are evidence that the market has run ahead of the facts and so is vulnerable to a reversal. Extension signals are displayed as a pink tip on the bar of the relevant period:



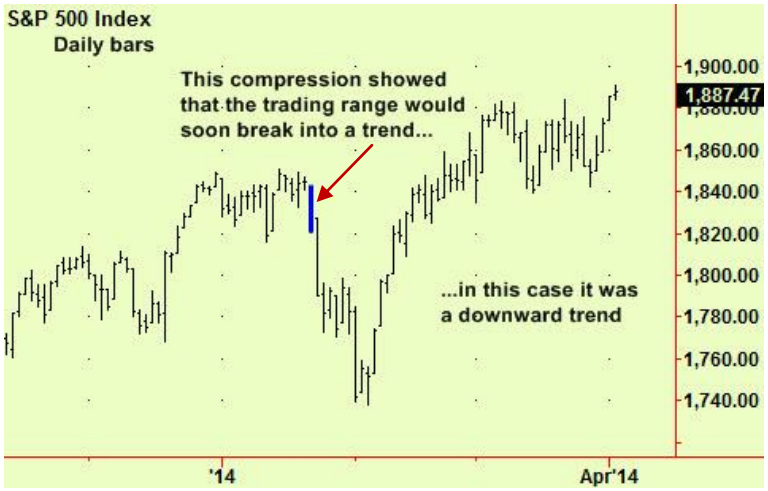
An extension signal sometimes coincides with the start of a new trend in the opposite direction, but this is more common in the case of bottom extensions, as shown here. This reflects the usual emotional state of the marketplace - fear is stronger and more urgent than greed so down-moves can be brutal, especially in their late stages. The bottom may come as a single event as the last weakly-held 'long' position gives up and gets out. Tops are often made as a process that takes some time.

Although market 'tops' often form over a fairly prolonged period, the process usually starts with a top extension, then continues with a period of price churning, as shown here, before prices eventually drop. Sudden 'spike' tops can and do occur but they are much rarer than spike bottoms.

Mood is also important when there is no consensus and doubt prevails instead, because that is when new trends start. We measure this using the same tools but now we look for generally low Hurst numbers with a sprinkling of high ones for contrast, with the same quickening rhythm in the different time frames. When this rhythm has become very fast, it means that disagreement is at the maximum and a compression signal is the result.

Compressions

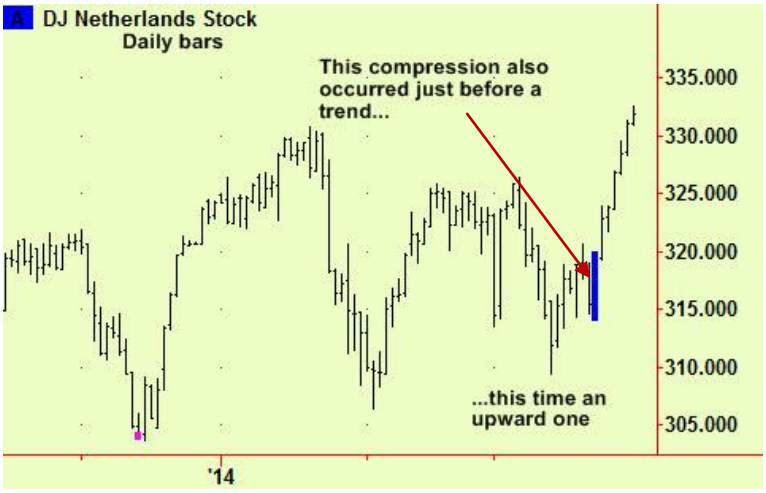
Show that there is no consensus but a high degree of confusion. Compressions signals are displayed by a blue line, covering the whole bar of the period concerned:



There is no reliable way to tell which way the price will move immediately after a compression. A new trend is likely to start at any moment but it could go either up or down, as it did in this example from the S&P. The trend started immediately but there are further possibilities too, which we deal with in the Compressions section later

This S&P500 chart shows a period of market activity that overlaps the earlier Emini Dow chart. Using data from different instruments can result in different signals - there was no compression in the Dow chart and there were no extensions in the S&P. By combining signals from both (and others) we were able to identify and predict all the main ups and downs in this period as we expect to do in most cases.

Compressions are just as likely to lead to up-moves, as in this Dutch example:



This compression example from Holland broke upwards, and a strong new uptrend developed immediately. Compressions often lead to trends like this but sometimes there is just an increase in range without any defined direction. We usually cannot tell which way a compression will break, so we generally wait for the break and then follow it. There are also other ways to use compressions as described below.

CYCLE analysis - what cycles are

Cycles in price can originate from natural rhythms, such as the time of orbit of the earth around the sun or the breeding seasons of livestock, but most such natural cycles have little market effect. Grain is mostly not cheaper at harvest time even if tomatoes and apples are. Markets that have futures contracts or their equivalent tend to 'smooth out' any obvious cyclical effects and so little advantage can be gained. There are seasonal effects on intra-commodity price spreads that can be identified with some reliability but even these tend to be 'arbitraged away' over time. Other cycles stem from lags between cause and effect, as in the hotel building example in the Introduction, or from interaction between 'core' cycles. These last two are common, and have different characteristics – cycles from lags are not as regular as say, the tides and interactions between cycles lead to yet more cycles that can appear then subside for a while. The result in most markets is a very complex set of cycles – too many to be immediately useful. We condense matters to make sense of it.

What we do

First we identify all the many cycles that are usually present in the price history of a market, then break down that complex muddle into a few underlying cycles that are currently active and interacting to make the rest. We then re-combine them, projecting forward to see when they will occur in the future. These future dates mark moments when important highs and lows are likely to occur.

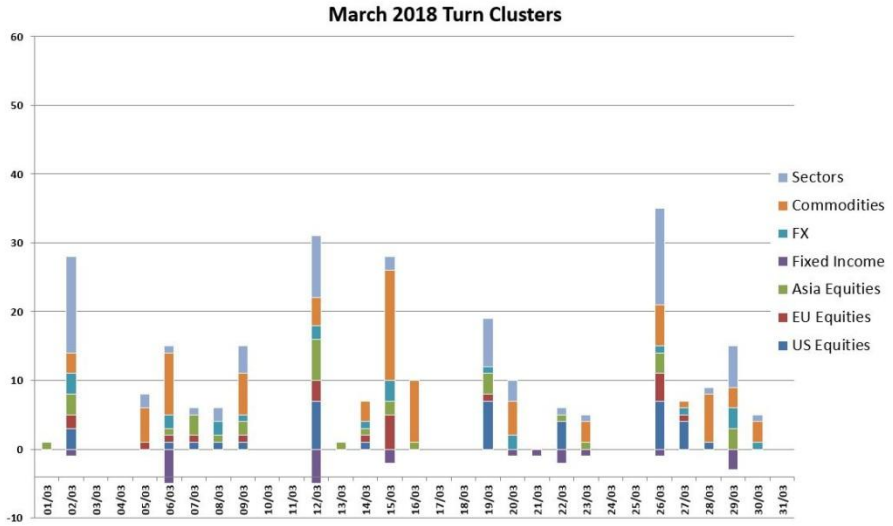
We do this for a large variety of markets in commodities, currencies, bonds and equity indices and then look across the results to see where those turns are due, paying particular attention to days when turns in related markets coincide or 'cluster'. Clusters of turns are a particularly good guide to when high or low points will come. The bigger the cluster, the more important the high or low tends to be. We use a slightly different method to examine the very long-term Dow industrial series in US equities and the Dow bond index and consider these more significant than any other single turns.

Uncertainty

There is an important uncertainty that remains as we cannot tell in advance if a turn will mark a high or low point – this is a consequence of the inputs that we use and the type of calculation that we do. As the date approaches, this uncertainty falls away and we can usually see what is coming. If markets are rising, the turn will mark a high point. If they are falling, it will be a low. If there is no clear prior trend we have to wait for the turn date to recede into the past to see what occurred.

Turn Display

We publish these upcoming turn dates in this format every month in AlphaMail:

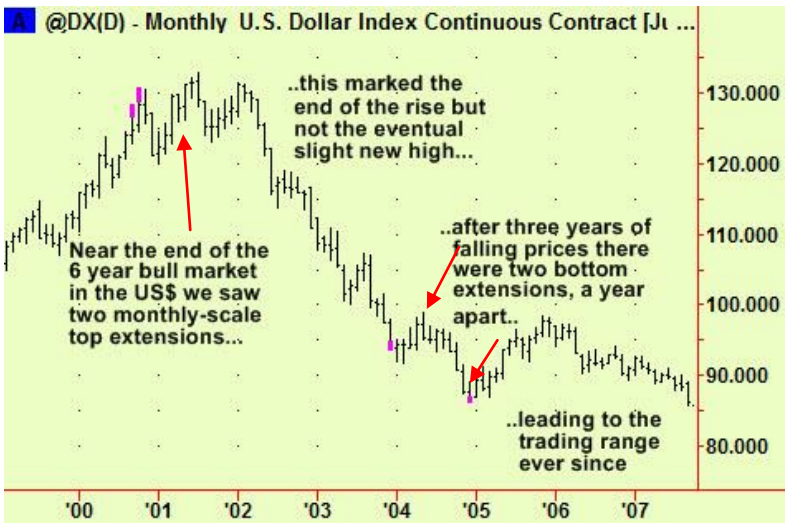


Each column shows how many turns are due that day and in what assets, split into the main conventional categories, including the individual sectors of the US equity market. Many assets typically show turns on the same day, leading to 'clustering' and they are 'stacked' like this to make it obvious when those clusters will occur.

The bigger clusters tend to match the bigger turns in markets, with an accuracy of +or- one day. These signals are only easy to use when there is a clear prior trend. Prices that rise into a turn will probably make a high on or very near that day whereas falling prices will probably make a low then and there. Other circumstances require some interpretation and maybe some patience (see a note of the accuracy of turns below).

Interpretation and particular features of extensions, compressions and cycle turns

Extensions mark the end of trends. The end of one trend may also mark the start of the next one but it is rare for markets to flip from an uptrend into a downtrend - there is usually an interval in which a 'top' forms. It is much more common for a downtrend to end abruptly and for an uptrend to start immediately in a 'spike bottom'. Accordingly we have different expectations of bottom and top extensions. Top extensions are more likely to mean 'not up and maybe down' while bottom extensions are more likely to mean 'reverse from down to up':



The pair of top extensions at the start of this chart signalled the end of the uptrend but we did not expect that the dollar would then drop immediately. Instead it was likely that some kind of 'top' would form – i.e the top extensions marked the 'beginning of the end' so it is prudent to exit all longs and start trading from the short side. One can also trade back-and-forth while building a core short position.

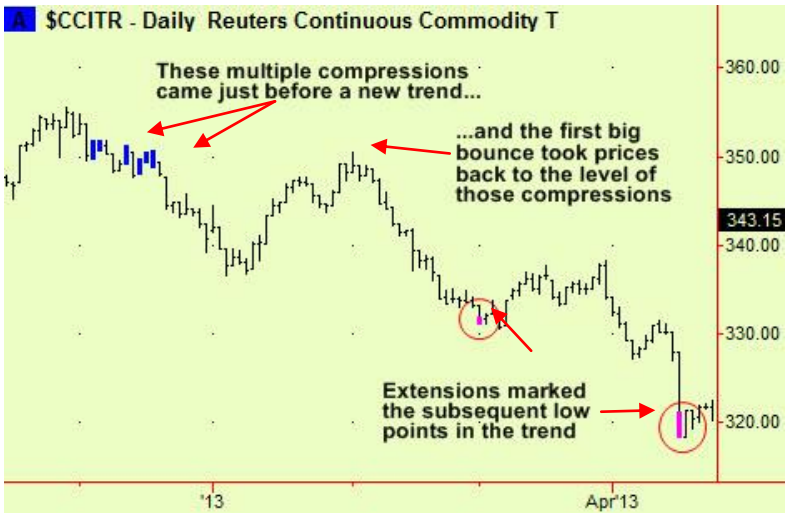
On the other hand, when prices drop and bottom extensions appear, we expect imminent rallies.

Extensions can mark the absolute end of trends, as in the end of the $ index bull market above but can also mark the end of interim 'legs' in the trend as the two bottom extensions in the last chart above show - each preceded a mere bounce. Signals from longer-term periods (weekly or monthly) have longer-term significance but the 'active shelf-life' is always about 15-17 periods.

When do Extensions occur?

When a trend has been in place for a while, conditions for an extension signal start to appear. Hurst measures generally rise and reactions within the trend appear, so that fluctuations in the Hurst numbers also start to happen. Only when Hurst remains high overall and these fluctuations quicken enough to reaches a critical pace of change can an extension occur. Unlike the way in which oscillators or other overbought/oversold indicators are generated, it is not sufficient for the price to have travelled 'far enough' – these other conditions must also exist.

Compressions can also act in several different ways. A **new trend** often starts with a compression (or multiple compressions – see more below). A little later there is a tendency for prices to return to the price level of the compression before the trend then resumes. Once that trend is mature, contra-trend reactions within it will often begin with an extension:



This commodity index example shows a down-trend that started after multiple compressions. After the initial 'break' began the move, the first good bounce took prices back up to the compressed area, where the rally then failed – this is normal.

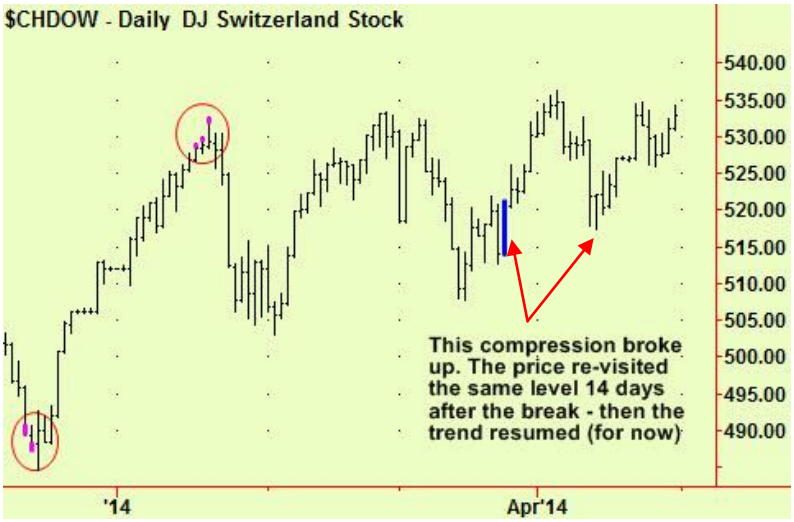
Subsequent drops in the down trend ended with bottom extensions marking the low points – this too is normal

Any ‘return’ to the compression may happen after some time has passed, as in the example above or it may be fleeting and come much sooner, as in these other examples from the same commodity index:

These ‘Return Movements’ back to compressions do not always happen – they did not in the earlier S&P and Dutch stock market examples. When they do, it can be very soon after the compression breaks or shortly after as both seen here OR after quite some time has passed as in the first commodity index chart above. In all cases the compression level acts as a ‘barrier’ to the price which may approach it but will have difficulty going through it – this is a valuable trading tool

After the pair of compressions early in the chart broke down here, there was a fleeting rally on the third day after the break which was small but gave a chance to sell a rally with the full knowledge that a break down had already occurred. In the later example in this chart there was a rally that peaked on the fifth day after the break which again gave a clear opportunity to sell at prices in the area of the compression, with the certain knowledge that a break down had occurred so a downtrend had begun.

Return Movements can also happen after an upward break from a compression:



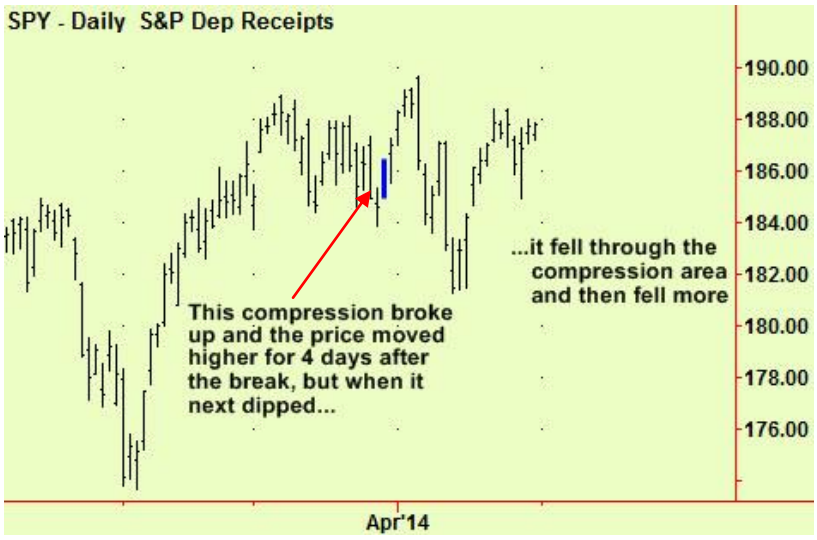
After a compression breaks upward, the trend is clearly up and any Return Movement may take the price back down to the area of the compression, offering a second chance to buy. There may not be any return movement - there was none in the Dutch example - but if there is, the area of the compression will act as support for the price. It is safer to buy in these circumstances than to try and ‘buy the break’.

There is no reliable way to predict whether a return movement will occur or when, so the best preparation is to know what to do if one does happen - assume the trend has begun when the break of a compression occurs and take advantage of the return to the compressed price area to take a low-risk position pointing in the same direction as that trend. Protective stops may then be placed a little beyond the other side of the compression. The reason for the existence of return movements is covered later in a note on Attractors.

Volatility increase and repeat compressions

Sometimes a compression does not break into a trend. There are two other possibilities:

- Volatility simply increases on both sides of the compression. This can be dangerous as the increased volatility will start with an apparent break of the compression which then 'fails' to continue, instead pushing back through the other side of the compression:



Here a compression formed in Spyders which broke upward. The price trended up a little before a dip started. The price fell back through the compressed area. This would have been very difficult to trade profitably and yet there is still some pattern here. The price rose above the compression by a little over 3 points and then moved below it by almost exactly the same amount. This is typical and is part of the 'Attractor' aspect of compressions - see a note on this at the end of this guide.

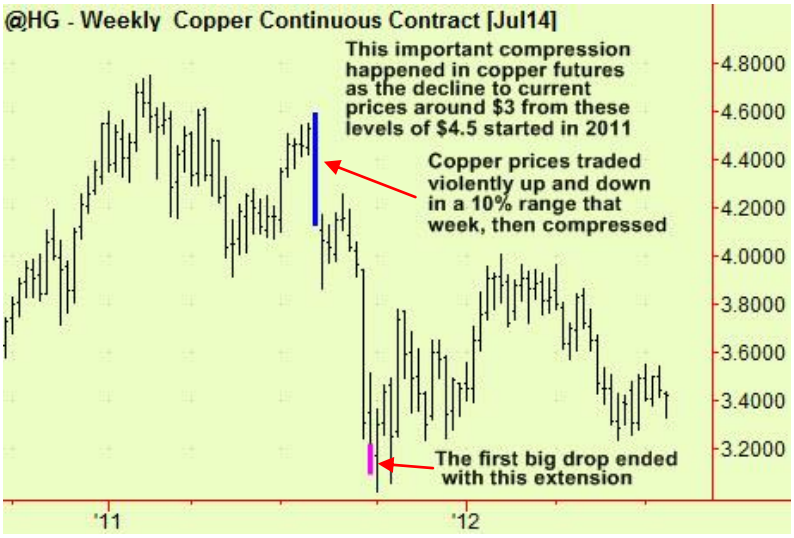
- Multiple compressions can occur, as shown in the early part of the first commodity index chart above and this first DAX chart below. Markets do sometimes get 'stuck' for longer periods of time when caught between conflicting forces and this is when we can see multiple compressions. Such multiple compressions will eventually break into a new trend but there is the risk of some short-term 'false breaks' before that happens with the risk of 'whipsaw' trading losses. In circumstances like these, compression signals will usually also appear at weekly or even monthly scales before a 'real' break occurs, so we scan these time frames constantly.

Multiple compressions at a daily-scale occurred in the DAX futures in April 2014. Each broke in one direction or another, meaning there was a high risk of 'whipsaw' trading losses. In the early part of the same period there was also a weekly-scale compression in another German stock index and this warned that a 'real break' would not occur until this larger-scale signal also broke. This saved us from serious whipsaw.

When do Compressions occur?

Compressions are not the same as the simple 'range break', defined and used by technical analysts. There are quite specific requirements for a pattern of mainly low Hurst measures to develop a quickening rhythm before a compression can happen and this makes compressions rarer than simple trading ranges that may have been going on for a while. They do occur in such circumstances but also when a range is narrowing or

when a period of erratic market action has continued for a while. There are no consistent visual clues that a compression is due – the calculation is paramount. The oddest occasions are when a particularly wild trading day, week or month comes along with a wide price range and afterward we see a compression signal occurred. An example from copper futures:



Despite the violence of the trading conditions in the week of this compression, the conditions that are needed for such a signal were met, but there was no way of telling while events were unfolding. We just have to wait and see if the signal has been generated at the close of the period.

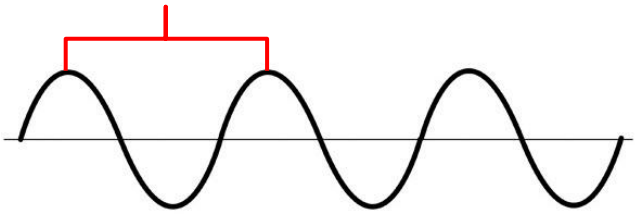
Stops are a vital part of trading but placing stops too close almost guarantees overall losses as small random moves will elect many of them. Placing them too far away means that hitting one is expensive. As described above. Compressions act as support and resistance once a trend has started and this property can be used to place stops at the proper distance, in locations where they are unlikely to be hit. This is especially useful when a trade is in progress and a new compression appears - the stop can be moved closer to the price, protected by that compression.

Turns

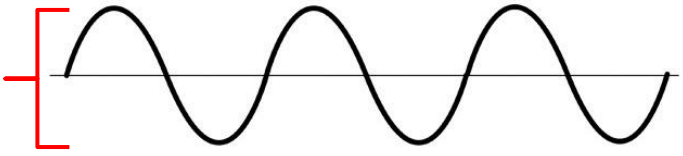
Typically, turns reliably mark market price highs and lows but there is some need for interpretation as the turn date approaches in the calendar because we do not know whether to expect a high or low point. This is a consequence of the way that we re-combine the component cycles discovered in the price history.

Every cycle has 3 characteristics:

- Wavelength, or its inverse, which is frequency

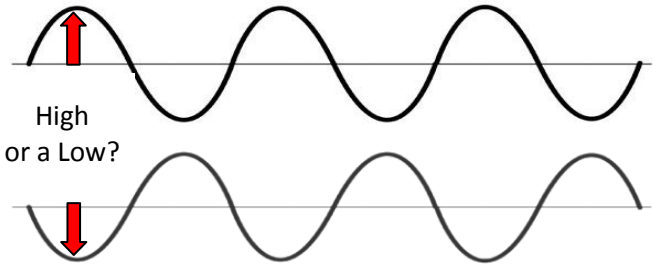


- Amplitude, or how big each is from bottom to top



wave

- Phase – whether we are expecting a high or a low



Previous work done by others on predicting market turns using cycles has mostly used methods based on an 18th century approach that emphasises only the wavelength. This is too rigid as each of the three characteristics of a cycle can have an important effect, so we use more recent mathematics (a fast Walsh-Hadamard Transform in a divide-and-conquer algorithm) that allows all three to contribute.

The result is much greater accuracy of timing in our turn prediction results at the expense of certainty about phase. We cannot know in advance whether to expect a high point or a low. We deal with this by publishing turn dates in advance and waiting until the date of a turn is very near before trying to tell what it will be. Here the prior trend is all important as uptrends lead to highs and downtrends lead to lows. When there is a clear trend, interpretation is easy. When there is not, it is hard.

Swerves

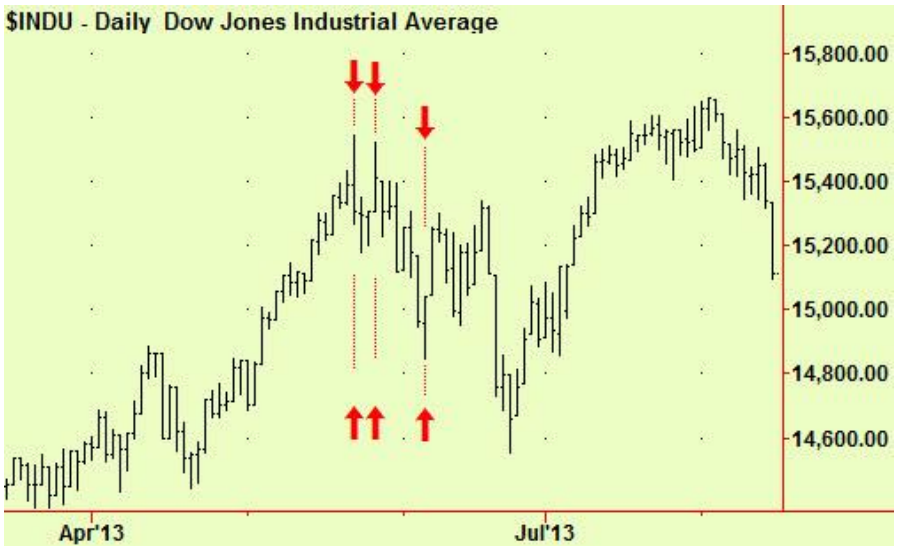
There is a further complication. When markets are in trading ranges or are simply erratic, turns pick out highs and lows with good accuracy and reliability. This is useful, as these can otherwise be times of great trading risk - whipsaw is common, as described above.

When markets are in trends however, the turns don't just disappear - the 17 different cycles in the Dow with periods of less than a year are mostly still present when the market goes up all year, but they mean different things.

In a strong trend, such as the bull market in US stocks through 2013, an upcoming turn will often seem to mark an obvious imminent high point. Some days before the turn arrives, the market will dip without warning and the expected high point turns into a low instead. The uptrend then continues from that low point until the next turn. This is a 'swerve' and is another reason why we watch carefully as a turn date approaches, as it is easy to be wrong-footed. Swerves are very useful as they provide extra evidence that the market is currently in a trend, possibly a strong one.

Chicanes

As stated, we look for clusters of turns in related markets and the more we find on or near the same day, the more likely it is that an important high or low will occur that day. Clusters are often spread over two or three days but when significant numbers of turns are due over a slightly longer period, the possibility arises that we may be looking at more than one event. When markets enter a highly volatile period, there may be significant high and low points separated only by a few days. These 'chicanes' can be very useful when detected in advance (and dangerous when hidden) and closely-spaced turn dates are a good way to see them coming. An example from US equities: we expected large-scale turns from the longer-term Dow series on 22nd and 28th May 2013 and another on June the 5th/6th. What happened was this:



These pairs of arrows show three forecast turn dates. The first two coincided exactly with actual highs that were only four trading days apart and the third was a two-day period when a low point came on the second day, seven trading days after the prior turn. The first and second turns were very close together and could easily have marked the same event. We guessed that they would not.

This requires a degree of interpretation, which we try to provide, as any individual example of a chicane may also resemble a large but diffuse turn event that simply spreads over a larger-than-average number of days. There are some clues but they are faint and we have not found a way to improve upon the trained human eye when examining the evidence.

Accuracy of turns

Turns are often accurate to the day or within one day either side. If the cluster spans two or three days then it is probable that the high or low point will happen on one of those days but there is the possibility that it may still come on a day either side of that. If it comes even further away from the day when we expect it, we consider this a failure as the need to act on turn signals is urgent and greatly impeded by such uncertainty.

Even if an expected turn is hard to read as the date fails to coincide with either a high or low point, there is still valuable information in a turn. Waiting for a few days and looking back can reveal the true nature of events and still leave enough time to take profitable action. A large turn will have affects that last many weeks and even smaller turns are useful for a week or more. Being patient can prevent losses from hasty action.

CONCLUSIONS

Hurst-based signals

Extension and compression signals are 'coincident' indicators - they need constant recalculation and tell us about the current state of the market. The signals themselves only appear when strict conditions are met and those signals have considerable power. Extensions mean that the current trend is stalling and compressions that a sharp increase in range is due - probably a new trend. We at HED also monitor the general state of Hurst measures of all the markets that we follow to see if the pre-conditions for signals are falling into place but keep this analysis for internal purposes. Using some or all of these signals is a good way to engage with the markets – for example buying any share that has a weekly- or monthly-scale bottom extension and selling or hedging the whole portfolio whenever there us a weekly or monthly-scale top extension produces very good returns. Adding shares that have also made upward breaks from longer-term compressions provides similar results but adds diversification while adding the third method of buying stocks that have returned back down to compressions adds a bit more alpha to the venture.

Turns

Predictions of upcoming turns based on cycle work are reliable on timing but leave room for doubt about direction. Using some rules derived from experience and the judgement of the HED staff reduces that doubt but there are still occasions when the date arrives and recedes into the past without certainty about the turn. Waiting a little reduces this uncertainty further, leaving only a few indeterminate turns a year.

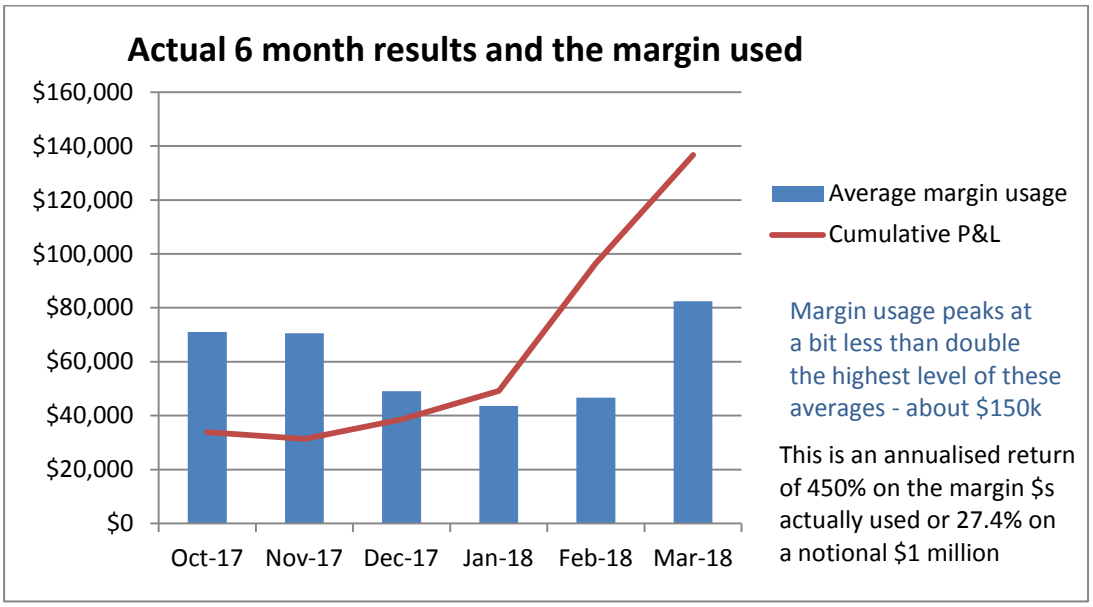
Combinations

The best results come from using the two techniques. We provide a running commentary about all of this but usually issue firm trading recommendations only when there is a coincidence of a turn with one of the Hurst signals:

- A turn with a bottom extension (to take long positions) is the most reliable of these.
- A turn with a return to a compression is the next best – to take long or short positions, depending on the direction of the original break
- A turn with a top extension is only the third best combination (to sell short) due to the time that is usually needed to make a 'top' – profits may come only after that time which can be lengthy.
- A turn with a compression that is breaking is the last. This is a powerful combination – we often say that the turn 'turbo-charges' the compression – but the possibility of false breaks and/or recompressions makes the direction subject to a greater degree of doubt.

Results

Using this combination of coincident (Hurst-based) signals and Turn predictions from and trading in a variety of time frames we have a real-time track record that started in October 2017 and looks like this:

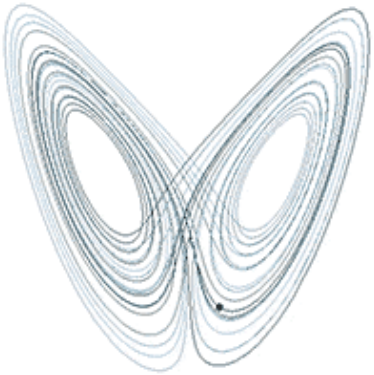


A note on Attractors

Markets are dynamic systems, so share many of the recognisable characteristics of others, most of which are caused by feedback, as written at the start of this guide. Patterns that repeat at different time frames, a tendency to cyclicality and self-sustaining trends, are the natural consequence of the feedback loops that come from cause and effect interacting. So are attractors.

Just as weather systems will produce similar swirls again and again as the seasons turn, so prices tend to form the same patterns. Many of the static versions of these patterns have become well-known through the work of technical analysts but there is another aspect too – the tendency for prices to re-visit the same level before retreating from it.

This phenomenon is known as an Attractor (sometimes called a 'Strange Attractor') and was discovered by Edward Lorenz when he was trying to model weather but settled for something simpler, in 1963. It is a famous repeating pattern in which the dot follows the double loop path endlessly, never exactly repeating but constrained within this double orbit. It gave rise to the expression 'butterfly effect'. For an animated version, click here.



There are many other Attractors in Physics and Mathematics and the market equivalent is a Compression. We have pointed out that prices frequently break up or down from Compressions, only to re-visit the price level where the Compression occurred again before moving away once more, perhaps at greater speed. This alternate attraction/repulsion is typical of an Attractor and is entirely the result of the feedback loops that are ever-present in such systems. It was first noticed by students of market price activity in the 1930s and then called 'price magnetism' but there was no reasonable explanation available then and so it was dismissed as mystical nonsense (of which there is still no shortage) and forgotten. Now we see why these things can happen and so can make use of them as described in the Compressions section above.