BofA SECURITIES

Technicals Explained

Get to know even more technical strategy

Primer

A resolution to know even more technical strategy

This report summarizes some of the indicators and methods discussed in our technical research, on trading desks and at investment meetings. Get to know technical strategies to develop and refine an investment process, time trades, get conviction and estimate risk/reward. Whether you're a novice or a seasoned investor, a market speculator or hedging risk, we're confident there is something in this report for you.

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Table of Contents

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Technical Analysis Mindset

- The mindset and process of a technical analyst begins with learning about the many aspects of technical analysis, and there are many.

- Get to know the theories, tools and assumptions and begin applying them to financial markets.

- Create a process to evaluate markets and a check list of your preferred indicators. Consult and learn from them over time.

Technical approach explained

To engage in technical analysis is to assess market trends and find high conviction trade and investment ideas with attractive risk/reward. This can be accomplished by applying a diverse set of technical tools, strategies and theories. An aspiring technician should define technical analysis, understand and learn about its tools, and then create, implement and refine a process.

Technical analysis defined, in our view

Technical analysis is the extraction of information from market data into objective visualizations primarily through the use of charts and mathematics with an emphasis on investor behavior and supply and demand to explain the current and anticipate the future path of markets (Ciana, P. New Frontiers in Technical Analysis. John Wiley & Sons Inc. 2011). This definition has five specific parts, including:

- Market data – cross asset prices, volume, open interest, breadth, spreads, ratios, yields, volatility, etc.

- Objective visualizations – lead with a clear, concise chart to show a view, and consider using other tables and figures to support it. Don't use too many indicators, lines, methods all at once.

- Mathematics – apply measurements, calculations and statistics to help define trends, targets, levels and to explain your view. Every technical indicator has a mathematical formula behind it.

- Investor behavior and supply/demand – identify rational and irrational market movements such as price patterns, positioning and sentiment.

- Anticipate the future – apply a process of technical tools to forecast markets, assess risk/reward, and make buy and sell decisions.

The body of "technical" knowledge is vast

There are many tools and strategies available to the technician. Taking the time to get to know them is an important step. The following table lists some of the technician's tools in six categories.

Exhibit 1: **The Technician's Toolbox**
There are many areas of technical analysis to learn about and apply

Chart types	Indicators	Theories	Data	Testing	Management
Line	Trending	Intermarket	Price & volume	Rules based	Underlying or derivatives
Bar	Oscillators	Sector rotation	Accurate history	Define probabilities	Risk/Reward
Candle	Statistical	Cycles	Sentiment	Optimize	Position size
Market profile	Exhaustion	Seasonality	Breadth	Test a universe	Confirmations
KASE bars	Intraday	Dow Theory	Macro / Economic		Disciplined
Heikin-ashi	Fibonacci	Elliott Wave	Multi-time frame		
Point & figure					

Source: BofA Global Research

Technical analysis has three assumptions

1. Market actions discount everything

Price should reflect all available information. To a technician, how markets are moving is more important than why. By observing price and other tools, a technician can assess the trend and estimate future price action.

2. Prices move in trends

Like Newton's law, it is widely believed a trend in motion remains in motion until acted upon by a large enough counterforce. Technicians follow the trend and attempt to enter and exit markets at the most opportune times.

3. History repeats itself

Whether history repeats or rhymes, there is an echo, and technicians believe market patterns and signals will repeat based on human nature such as fear and greed.

We propose a fourth: First discipline and then conviction

The tools and rules of a process should be prioritized over a current conviction and evaluated regularly. This, we think, should allow for more timely position changes and limit losses by not sticking with a losing trade for too long.

Start the process with a question

Is the market in a trend? Is it range bound? Is it leading or lagging? Or has it possibly moved too far, too fast? Many technical indicators are meant to be used in a certain type of market or interpreted differently, depending on the state of the market.

Work through a checklist

- Apply your preferred indicators to multiple time frame charts. Consider those that are more applicable than the others. For example, if trending, apply moving averages, Ichimoku, MACD (Moving Average Convergence/Divergence Indicator) and ADX (Average Directional Index). If range bound, apply oscillators such as RSI (Relative Strength Index), Stochastics or CCI (Commodity Channel Index). If parabolic, estimate an end with candle patterns, TD Sequential, regressions, long-term trend lines, divergences and log scaled charts.

- Identify key levels for support, resistance and trend continuation with relevant moving averages, trend lines and Fibonacci retracements and projections.

- Review multiple time periods and study the trend to find strong trend lines, significant highs, lows and consolidation areas, and consider Fibonacci levels.

- Run some tests. Test what strategies are working and decide if they may continue. Find what odds or probabilities exist to support or contradict a view.

- Determine what other unique technical charts suggest. Analyze bar, candle, market profile or another technical charts for added color.

- Review intermarket relationships to better understand the market environment. Compare trends and relationships to other markets using charts, ratios, correlations, regressions and distributions.

- Review market breadth, volumes, flows. Use such data to assess market internals and compare that to market trends.

- Review the sentiment in the market. Look at CFTC/COT (Commodity Futures Trading Commission/Commitments of Traders) data, surveys, put/call ratios and compare that to market trends.

- Find alignments and compare conclusions. Review conclusions with the fundamental, quant and economic views.

Make the call

Present high conviction views with a convincing chart or visual and a brief explanation of the call including key levels and potential risk/reward.

Support & resistance = supply & demand

- Support (demand) halts a decline ahead of a move higher. Resistance (supply) halts a rally ahead of a move lower.

- Support & resistance are important in identifying trends (up, down or trading range) & patterns (reversal or continuation).

- Support & resistance can reverse roles. Use time, tests, depth & volume to assess the importance of a support or resistance.

Support & resistance = economics 101
When technical analysts refer to support and resistance, they are referring to areas on a chart of demand (support) and supply (resistance). It is economics 101.

Buyers win at support & sellers win at resistance
Buyers equal demand and win when support holds on a decline. Sellers equal supply and win when resistance contains a rally.

Support halts a decline ahead of a move higher
Support is a price level or zone where buyers (or demand) are strong enough to overpower sellers (or supply) and halt a decline ahead of a move higher. Holding support is bullish. From a fundamental perspective, a decline to a support may have made a security cheap enough to entice investors to buy and sellers to step aside.

Resistance halts a rally ahead of a move lower
Resistance is a price level or zone where sellers are strong enough to overpower buyers and halt a rally ahead of a move lower. Holding resistance is bearish. From a fundamental perspective, a rally into resistance may have made a security expensive enough to entice investors to sell and buyers to step aside.

Chart 1: Support & resistance on Regeneron (REGN) - illustrative example
When technical analysts refer to support and resistance, they are referring to areas on a Chart of demand (support) and supply (resistance). It is economics 101.

Source: BofA Global Research, Bloomberg

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Lows & highs define support & resistance

Price lows or troughs are potential support (demand) and price highs or peaks are potential resistance (supply). Buyers tend to become more interested near lows and sellers tend to become more interested near highs.

Supports & resistances define trends

- Uptrend: When demand is increasing relative to supply, investors are willing to pay higher prices for a security. This often leads to higher support and resistance levels (higher lows and higher highs).

- Downtrend: When supply is increasing relative to demand, investors are willing to sell a security at lower prices. This often leads to lower resistance and support levels (lower highs and lower lows).

- Trading range: Supports form at or near the same price below the market and resistances form at or near the same level above the market. There is a supply and demand balance between these levels that forms a trading range.

- Range breakouts and breakdowns negate the supply/demand balance of a trading range. An upside break or breakout from a trading range above resistance is bullish and suggests that demand has become strong enough to overcome supply. A downside break or breakdown from the range below support would indicate that supply has become strong enough to overcome demand.

- Trendless: Supports and resistances do not have a well-defined pattern.

Chart 2: Support & resistance on Apple (AAPL)
Price lows or troughs are potential support (demand) and price highs or peaks are potential resistance (supply).

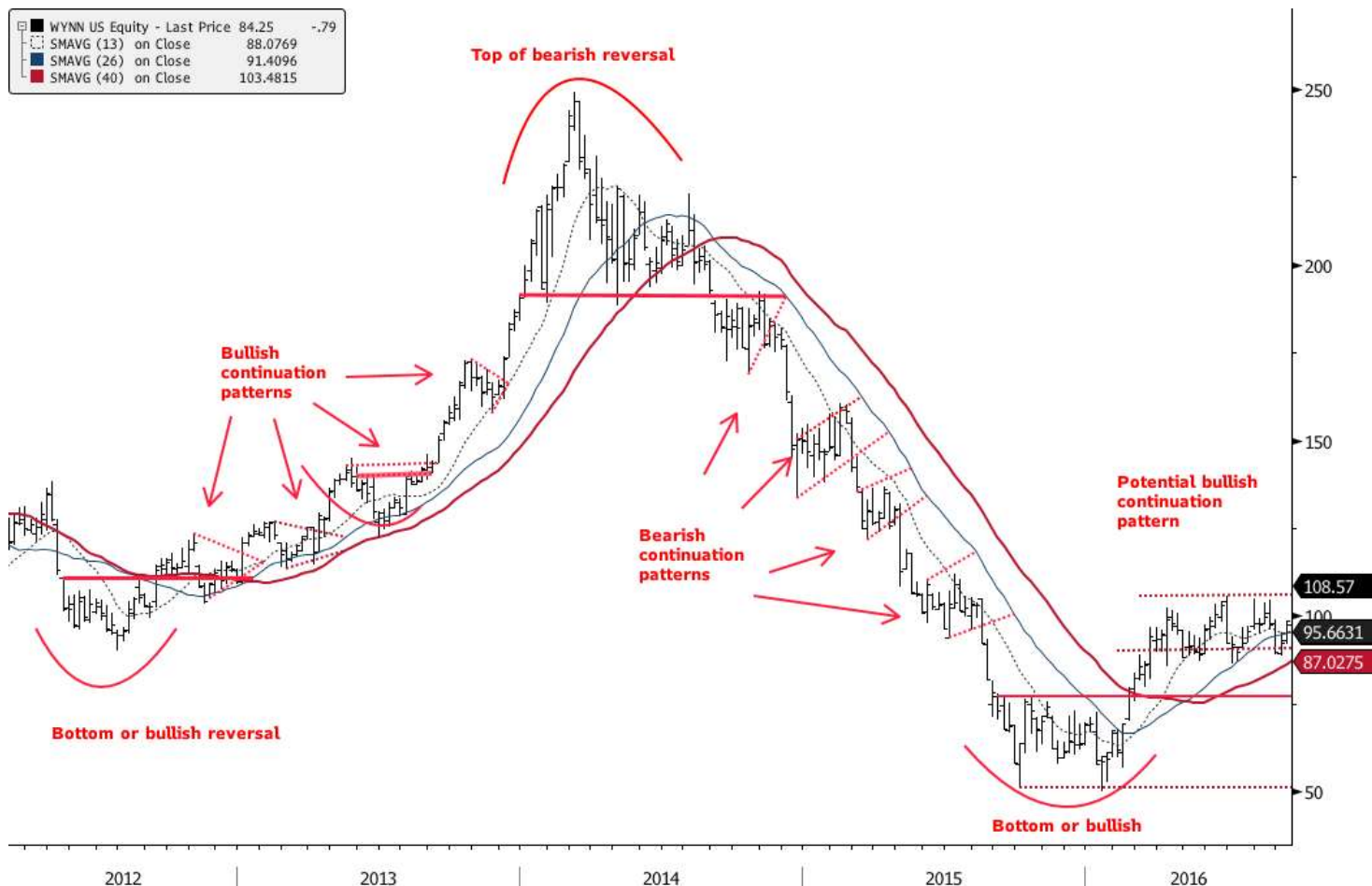Source: BofA Global Research, Bloomberg

Supports & resistances define price patterns

There are two types of price patterns: reversal and continuation. Support and resistance levels play important roles in defining these patterns.

- Reversal patterns, such as double bottoms (tops) and head and shoulders bottoms (tops), are characterized by changes in supply and demand. Bottoms occur when supply is getting exhausted and demand is improving to the point where the trend changes from down to up. Top patterns show diminishing demand and increasing supply that is sufficient enough to change the trend from up to down.

- Bullish continuation patterns, such as flags, pennants, and triangles, occur within uptrends. These patterns reflect a loss of demand and/or increase in supply that is not strong enough to reverse the uptrend but rather leads to a consolidation or a pullback. This pause in the uptrend moves prices down to a level where the security finds renewed demand or support that is strong enough to continue the uptrend.

- Bearish continuation patterns occur in downtrends when there is a pick-up in demand and/or decrease in supply that is not strong enough to reverse the downtrend but rather that leads to a rebound or an upside consolidation. This pause in the downtrend moves prices up to a level where the security finds increased selling pressure or resistance that is strong enough to continue the downtrend.

Chart 3: Support & resistance & price patterns on Wynn Resorts (WYNN)
Supports and resistances define, as well as confirm, price patterns.

Source: BofA Global Research, Bloomberg

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Supports & resistances can & do reverse roles

When a support or resistance is breached, it can and often does reverse roles. This is a signal that the supply and demand relationship has changed and occurs within uptrends and downtrends as well as after prices break out or break down from price patterns.

- Breakouts: When price breaks out above resistance and the resistance reverses roles to act as support, the security or market shifts from "sell the rallies" to "buy the dips." This role reversal happens because buyers are happy and looking to buy more and sellers (or shorts) are not happy and looking to get out even on dips.

- Breakdowns: When price breaks below support and the support reverses roles to act as resistance, it means that the security or market shifts from "buy the dips" to "sell the rallies." This happens because sellers are happy and looking to sell (or short) more and buyers are not happy and looking to get out even on rallies.

Chart 4: Resistances break & then reverse role to act as supports
A shift from greater supply (sell strength) to greater demand (buy dips).

Source: BofA Global Research, Bloomberg

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Chart 5: Support breaks & then reverses role to act as resistance
A shift from greater demand (buy dips) to greater supply (sell strength).

Source: BofA Global Research, Bloomberg

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Assessing the importance of support & resistance areas

Supports and resistances are often called congestion areas since prices often have difficulty moving through these zones. Below we highlight four criteria for assessing the importance of a support or resistance zone: time, tests, depth, and volume.

- Time: The more time spent at a support or resistance zone, the stronger that congestion zone should be. Monthly and weekly levels are generally more important than daily or intra-day levels. The time factor suggests that minor lows and highs should lose their effectiveness as support or resistance much more quickly than supports and resistances created by more significant price moves within major trends. However, older support and resistances can get weaker over time if the market participants who created those levels are no longer in the market.

- Tests: The greater number of times a support or resistance gets tested without decisively breaking, the stronger that congestion zone tends to be.

- Depth: A wider congestion area tends to be stronger that a narrower one. A support or resistance zone that spans 3-4% may be stronger and harder to penetrate than one that within a 1% price range.

- Volume: When congestion areas are greater in time, number of tests, and depth, volume tends to be higher within these zones. The greater the volume of transactions in that area, the more significant that support or resistance. Higher volume suggests greater interest or commitment among investors, who would anticipate buying (demand) within support and selling (supply) within resistance.

Terrific trend lines

- A trend line is a directionally sloped line that provides support in uptrends and resistance in downtrends.

- Multiple points and time make a trend line more important and useful to identify support, resistance and changes in trend.

- We provide rules that define a trend line as broken and how to create targets using Fibonacci extensions and measured moves.

Trend lines imply trend direction and can signal change

A trend line is a guide to the overall direction of the market in an upward, sideways or downward direction. It is there for four reasons:

1. Estimate support in an uptrend as price temporarily corrects the larger trend. Support is a level where buyers outnumber sellers. It is a location where a dip is bought.

2. Estimate resistance in downtrends during relief rallies. Resistance is a level where sellers begin to outweigh buyers, which can push prices lower. It is a location in a rally where sellers add to shorts.

3. Create a parallel channel line based on 1 and 2 above. A support line in an uptrend can be used to estimate the top of a channel. The resistance line in a downtrend can be used to estimate the bottom of a channel.

4. When a trend line is broken, it adds to the body of evidence that the trend has changed.

5. A broken trend line can chance roles, such as turning to resistance.

Chart 6: USD/INR weekly Chart with long term support trend line and parallel channel line
This is an example of a long term trend line that was tested 11 times, broken and then the line acted as resistance.
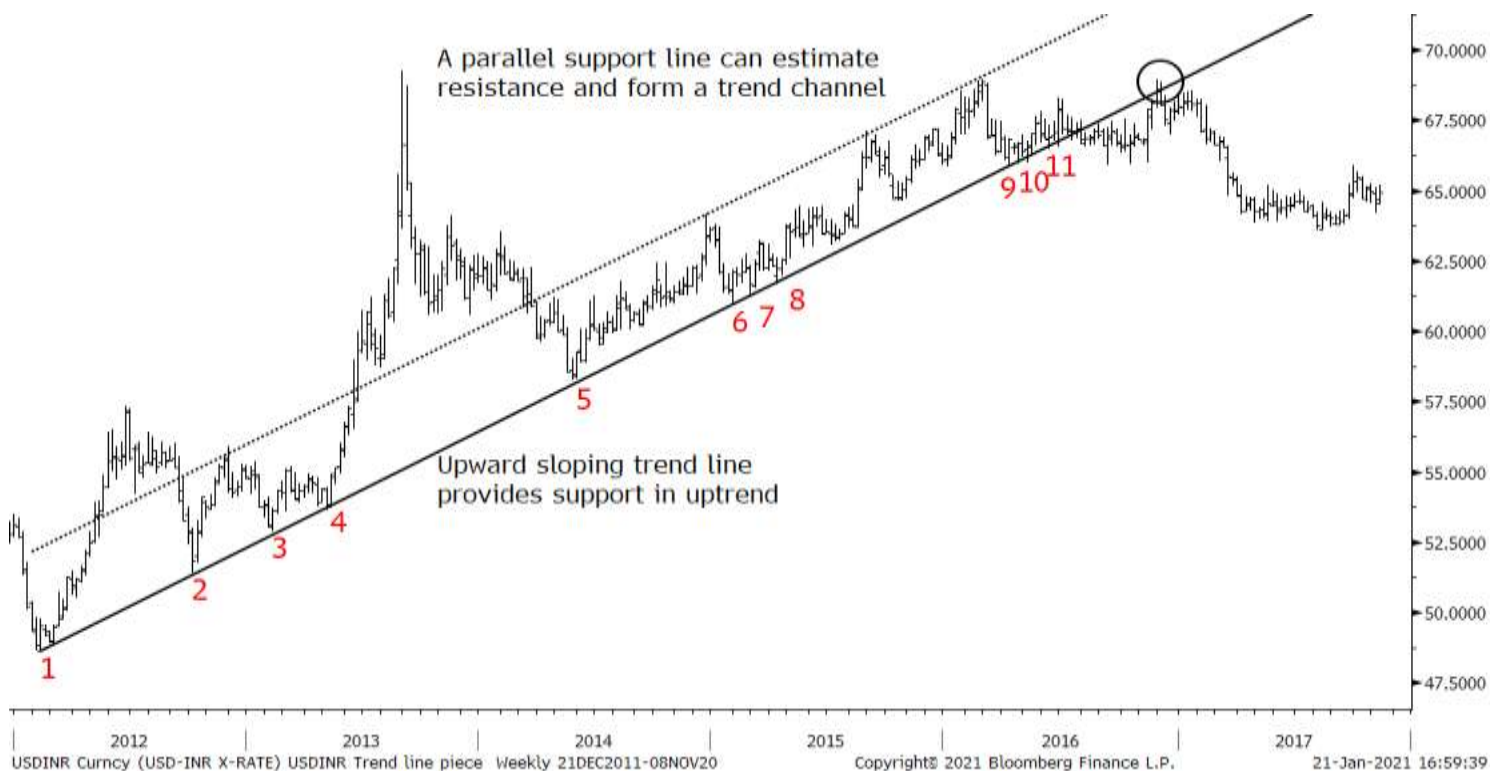
Source: BofA Global Research, Bloomberg

Not all trend lines are created equal

A variety of characteristics help to differentiate good trend lines from not so good ones. A few ways to differentiate them are listed below.

1. Multiple touch points with time between each test.

2. Duration or age of the line increases significance. This trend line in Chart 6 is over four years old.

3. Not too steep, not to flat. Steep trend lines are often broken early and flatter trend lines provide confirmation signals. A 30 to 50 degree slope is ideal.

4. If the distance from the start of the trend line to the current price level exceeds 30%, it is recommended to also consider a log scale chart in addition to an arithmetic scale. The log scale chart can result in an earlier trend line break. However, in this case we prefer the arithmetic scale because the 50wk moving average (red) aligns with the support line.

What constitutes a broken trend line?

If price were to break down through a supporting trend line, it would be ideal if at least one or more of the following conditions occurred.

1. Price closes at least 1% below the trend line.

2. Volume, if available, is greater than the average volume.

3. Consecutive bars close below the line.

4. Post break, intraday rallies test and fail to move back above the line. Such tests are more convincing if they occur on less than average volume.

5. The size of the break down is greater than the ATR value.

Average true range (ATR) measures the volatility of prices over the past x bars. In Chart 7, the five week ATR has a value that rounds to .90. A close .90 below the trend line could also be used to confirm a trend line break. ATR is calculated by taking the average of the largest absolute value of the following three calculations for each included period: the high minus low, high minus prior bars close and low minus prior bars close.

Chart 7: USD/INR with Average True Range indicator (ATR)
Consider the current size of the ATR as an amount to break through a trend line.

USDINR Curncy (USD-INR X-RATE) USDINR Trend line piece Weekly 21DEC2011-08NOV20   Copyright 2021 Bloomberg Finance L.P.   21-Jan-2021 17:00:34

Source: BofA Global Research, Bloomberg

Projecting price after a qualified trend line break

Suppose price broke down through a trend line. A measured move calculation or a Fibonacci Extension can be used to estimate targets. Calculate a target by taking the height of prior moves above the trend line and subtracting that from the confirmed breakdown point.

The distance from the peak in 2016 down to the trend line was about -5.05%. This is a reasonable technical target to subtract from the trend line break down point. Choose the next largest height such as that period in 2012 for a more medium or long term possibility.

Also pay close attention to horizontal levels that were once resistance such as the area at about 64.00 and 61.00. They have a tendency to turn into support during declines. As more levels break without technical signals to refute the decline, the deeper targets become more achievable.

Chart 8: Measured move example
Measure the height of a channel and subtract it from the breakdown point to derive a target for the trend when it changes.

USDINR Curncy (USD-INR X-RATE) USDINR Trend line piece Weekly 21DEC2011-08NOV20   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 17:04:4

Source: BofA Global Research, Bloomberg

Fibonacci Extensions can also be used to estimate targets

By measuring the largest distance from the trend line we can project lower from the break out point including key Fibonacci ratios. This projection method can be more aggressive so it is not to say they will all be reached. Rather the point is to isolate levels that might matter and to have a roadmap should the trend accelerate. In Chart 9, the largest height above the trend line was in 2013. A 38.2% target comes close to the 61.00 area discussed in Chart 8. The 50% target aligns with the 2014 lows.

Chart 9: Projecting levels using Fibonacci Extensions
The height of a trend above a trend line can be used for downside targets. In this case, a Fibonacci extension offers multiple levels.

Source: BofA Global Research, Bloomberg
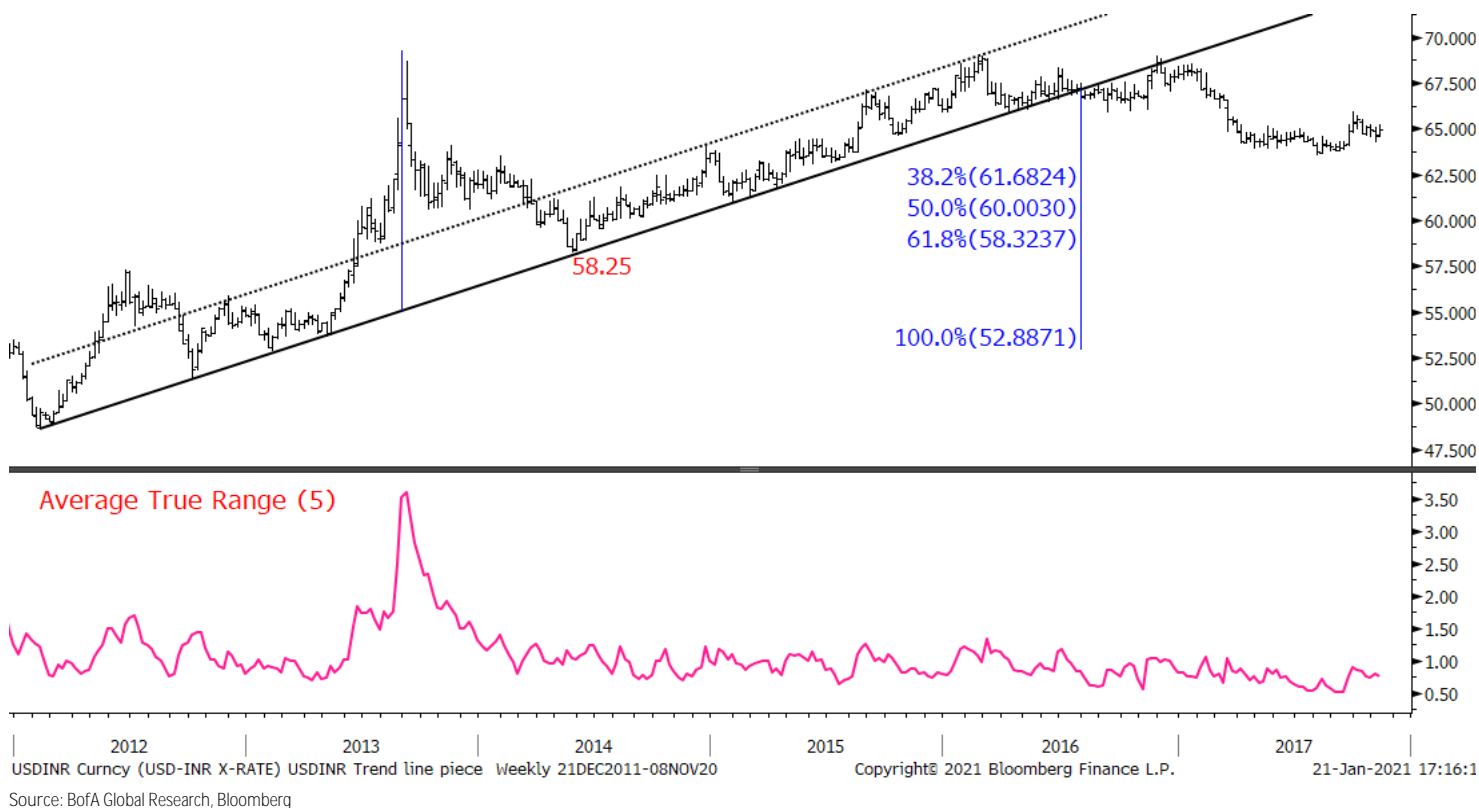
Engulfed by greed, reversed by fear

- We review the characteristics and application of outside reversal signals, also known as engulfing patterns, which are often quoted in strategy reports.

- These valuable reversal patterns formed at the 2017 bottom in GBP/USD, the 2008 peak in oil and 2016 low in US 30y yield.

- In our examples we incorporate other technical indicators and signals from other sections in this primer series.

What is an outside reversal and engulfing pattern?

Whether you prefer to use bar or candle charts, the technical significance of an outside bar or engulfing candle is the same. Both signal a trend reversal point if and only if there is a trend to reverse. In this report we summarize what an outside reversal and engulfing pattern is and discuss qualitative technical examples of where they may work well.

Recognize a bullish outside reversal / engulfing pattern

The following graphic is an example of a bullish outside reversal pattern and bullish engulfing pattern. The following conditions are important to define them. First there must be an established downtrend to reverse. If this pattern formed at new highs it wouldn't be called a reversal pattern because price just closed at a new high. The pattern consists of two trading ranges. The first period of the pattern (left) should be a smaller trading range with a down close. The second period of the pattern (right) should open lower, trade down to a new low and then reverse to a higher high. The second period and market sentiment should look, feel and be a bullish up period overall.

Exhibit 2: Bullish outside reversal pattern and engulfing pattern. (Red = down. Green = up)
After a downtrend, the second candle entirely engulfs the first to suggest higher.
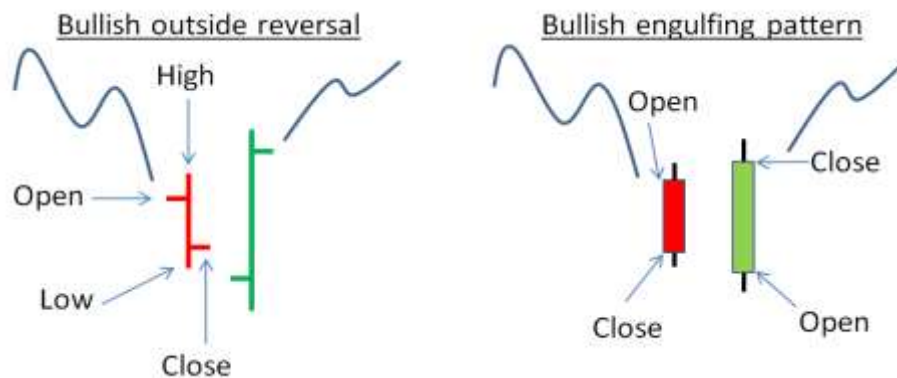
Source: BofA Global Research

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Technical conditions that may enhance a reversal pattern

The following conditions in a technical chart may make a bullish reversal more effective.

5. If price is in a tactical correction while above a positively sloped 200 period SMA or if the 50 period SMA is already above the 200 period SMA.

6. If price is declining to test trend line, moving average or Fibonacci support and a bullish reversal pattern forms on or around support suggesting it will hold.

7. If the downtrend prior to the reversal pattern results in RSI reaching recent lows or oversold levels, then a rally may follow a reversal pattern.

8. Low volume/flows on the first period and high volume/flows on the second. This may suggest hesitation to go lower and agreement on the outside

Bearish outside reversals and engulfing patterns

The opposite holds true for bearish reversal patterns. First there must be an established uptrend to reverse. If this pattern formed at new lows it wouldn't be called a reversal pattern because price just closed at a new low. The first period of the pattern (left) should be a smaller trading range and close higher. The second period of the pattern (right) should open higher, trade to a new high and then reverse to a lower low. Ideally, price should close below the prior range low or at least the prior range open.

Exhibit 3: Bearish outside reversal and engulfing patterns
A bearish reversal occurs in an uptrend when the second bar entirely engulfs the prior bar.
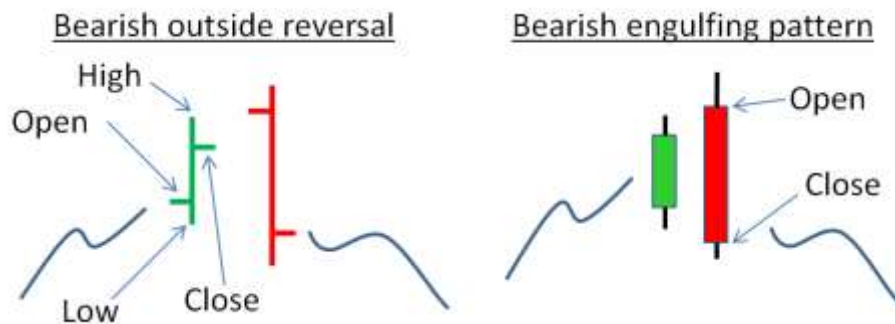
Source: BofA Global Research

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Doji's applied to bullish and bearish reversal patterns

A Doji candle forms when price opens and closes at about the same level after trading higher and lower on the period. This type of price action after a trend is viewed as a change to neutral because buyers and sellers have agreed that prices should not move higher or lower at that time. In other words, supply and demand is balanced. When a doji forms in an established downtrend it could be a hint a rally may occur. Similarly if it occurs in an established uptrend it could be a hint a decline may follow. These patterns are most useful near important support and resistance levels or after parabolic moves. When the period after the doji engulfs the entire doji candle, that too signals a reversal. It confirms the doji candle sentiment and forms an outside reversal / engulfing pattern.

Exhibit 4: Doji candle as part of a bullish outside reversal or bearish engulfing pattern
A doji means the a balanced or neutral trend When engulfed it is a change in trend signal.
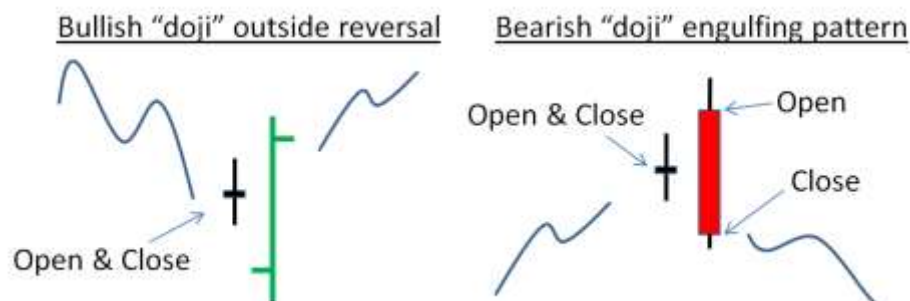
Source: BofA Global Research

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Reversal patterns in practice

- In this section we review three charts with bullish and bearish outside/engulfing reversal patterns and pair them with other technical indicators.

- We review the bullish reversal patterns in GBP/USD during the 1Q17 bottom, the bearish reversal in WTI crude oil prices at the all-time highs in 2008 and US 30y yield's outside reversal after making an all-time low in 2016.

Bullish reversal present during Cable's post Brexit bottom

The downtrend in GBP/USD leading up to and after Brexit resulted in a technical base forming near 1.20. Two bullish outside week patterns formed in 1Q2017. The first occurred in January and the second in March. Each bullish reversal was part of a shorter term and longer term downtrend. But more importantly the price action that immediately preceded the patterns was lower. The psychological support level of 1.20 and a supportive trend line continued to hold while these bullish patterns formed.

Additional technical signals occurred before and after these bullish outside weeks. Before the outside weeks there was a bullish TD Sequential signal (red 13) at the October 2016 low. The reversal weeks and no new low was offering confirmation of this signal and a possible bottom. Rising trend line support and declining trend line resistance formed a triangle pattern. Price resolved higher through trend line resistance (dashed line), confirmed the prior bullish signals and a bottom in GBP/USD.

Chart 10: GBP/USD Weekly bar Chart with bullish outside reversal weeks
Two bullish reversal patterns helped form a triangle bottom.

Source: BofA Global Research, Bloomberg

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Oil: Reversal month signals end to rally

Below we show a monthly chart of oil prices and notate bullish and bearish engulfing patterns. The largest and most significant bearish engulfing month occurred at oil's peak in 2008. In June 2008 oil prices rallied for the fifth consecutive month and the Relative Strength Index (RSI) reached the most overbought condition since 1996. In July, price action made a new high above June's high and then began to decline. By the end of July, prices declined to a low below June's and closed near the low of the month. This price action combined with RSI is a bearish reversal. A downtrend followed, which found support in early 2009 at the 200 month simple moving average.

In 2011 another bearish engulfing pattern formed. This pattern formed as price closed above and then back below the 50% Fibonacci retracement of the 2008-2009 decline. This implied the midpoint of the prior decline was rejecting price from moving higher. Price trended lower for four more months. After the four month decline, a bullish engulfing pattern emerged. Oil prices rose for about five months to a lower high.

Chart 11: WTI Crude Oil monthly Chart - roll adjusted for difference and for active future
A bearish engulfing pattern with overbought RSI is two bearish conditions simultaneously.

Source: BofA Global Research, Bloomberg

US 30y treasury yield's outside reversal at all-time lows

When the bond market peaked in 2016, US 30y yield formed an outside reversal week at its all-time low. The six week decline in yield during June-July of 2016 made a closing low of 2.0936%. Entering the second week of July yield traded a few ticks lower to 2.0882% and then began a sharp reversal higher, engulfing the prior week and reversing the decline.

In this example, it would have been more ideal for the open of the outside bar (2.1003) to be below the close of the prior bar (2.0983%) as that is one of the aforementioned criterion. Such action on the weekly chart would suggest the same sentiment persisted over the weekend and that is an important ingredient to a stronger reversal signal. Given the marginal difference between the close and open (.0020%) and that a new low occurred we consider this reversal valuable and worthwhile to review. In practice, we would also look for other technical indicators to confirm.

The week after the reversal yield continued to rise, however, it quickly fell into a holding pattern called a pennant. A pennant is a short term continuation pattern and looks like a small triangle. The move higher in September and retest/hold in October emphasized the strength of the outside reversal week at the all-time lows.

An outside reversal week can also be an important part of forming a larger technical pattern, such as a head and shoulders. The bond rally during the latter half of 2017 led yield to form a head and shoulders base. The low of the left shoulder shows an outside reversal week.

Chart 12: US 30y yield – weekly Chart
Outside reversal weeks were seen at the July 2016 yield lows and the left shoulder of a head and shoulders base in 2017.

Source: BofA Global Research, Bloomberg

Candles light the way

- Japanese candle stick charts are a way to visualize price action to show who is in control of the trend and if there is potential for a change in trend.

- In the prior section we introduced the bar and candle chart and the popular bullish and bearish engulfing patterns, including the doji candle.

- In this section we expand our candle pattern coverage to the primary candle stick terms including one, two and three candle stick patterns.

A doji candle suggest balance between buyers and sellers

A Doji candle forms when price opens and closes at about the same level on the trading day having traded reasonably higher and lower during the session. By closing near the open it suggests the market found balance between buyers and sellers. Balance suggests the prior trend may be at risk of reversal. So if a downtrend was occurring and a doji forms then it may turn up, such as Exhibit 5. Should price gap down to open the doji day it is thought to be an even stronger pattern because the pattern rejected follow through during the session. If an uptrend was occurring and a doji forms, the trend may turn down. There are other types of doji candles with unique characteristics. They include:

- Dragonfly Doji: This is a bullish candle that occurs in a downtrend to signal a reversal higher. The open and close are nearly equal at the top of the trading range. A long lower tail defines the pattern as it represents sellers that were overtaken by buyers with price closing at the open and high. (Exhibit 6)

- Gravestone Doji: This is a bearish candle that occurs in an uptrend to signal a reversal lower. The open and close are nearly equal at the bottom of the trading range. A long upper tail defines the pattern as it represents buyers that lost control to sellers as price closes at the open and low of the day. (Exhibit 7)

- Long Legged Doji: This candle is viewed as a more extreme doji candle because the trading range on the day was much wider than a typical day. Like a doji candle, it suggests the prior trend is set to reverse but the battle that ensued during the trading session was larger than usual. (Exhibit 8)

- Doji Star: This candle is viewed as a strong signal of market balance at the current price levels. It has a very small trading range on the day and price still opens and closes at about the same level. This candle is often stronger if there was a gap to open the day, such as down in Exhibit 9. This candle is often combined in other patterns to increase its value which we'll cover later.

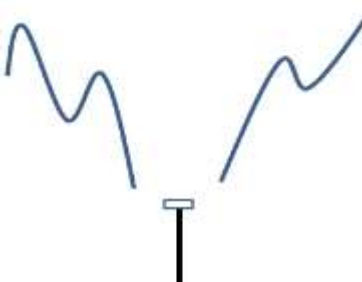Exhibit 5: Doji candle
Doji candle in a downtrend may turn price up
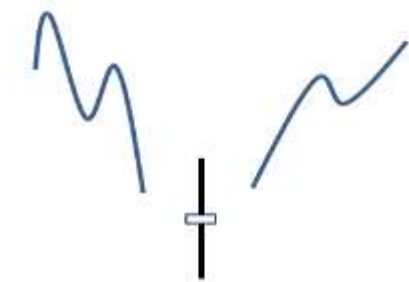
Source: BofA Global Research

Exhibit 6: Dragonfly Doji
A bottoming candle

Source: BofA Global Research

Exhibit 7: Gravestone Doji
A top candle
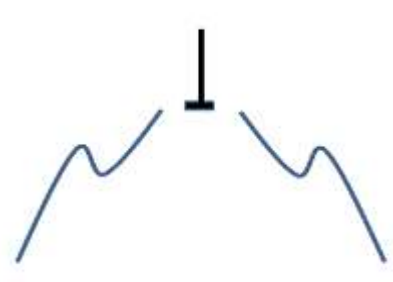
Source: BofA Global Research

Exhibit 8: Long legged Doji
A more volatile range and reversal candle
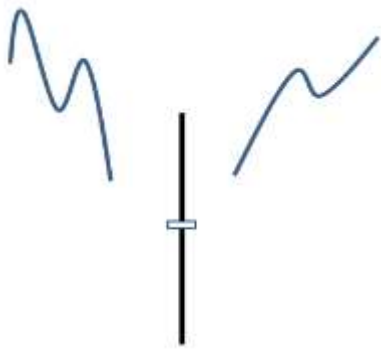
Exhibit 9: Doji star
A simple change in trend
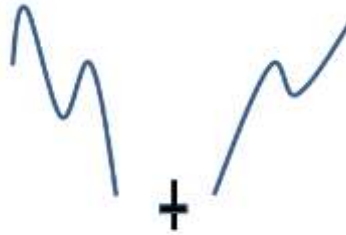
Source: BofA Global Research

Source: BofA Global Research

Hammer out a bottom in a downtrend

The hammer candle looks distinctly different than many candles. As the name implies, it looks like a hammer. It only forms in a downtrend to signal the end of the decline. It has a small body at the top of the trading range with a long lower trading range. The lower range is usually 2-3 times the size of the candle body. The long lower range shows buyers stepped in during the trading session resulting in price closing above the open (Exhibit 10). It is considered to be more bullish than a dragonfly doji because price closes above the open as opposed to equal to.

An inverted hammer can only form at a peak. It forms when price is in an uptrend, trades to new highs and then closes below the open and at/near the low of the day (Exhibit 11). The upper candle wick is about 2-3 times the size of the body. It represents sellers overwhelmingly entering at higher prices of the trading session. Supply therefore outweighs demand and price falls.

Exhibit 10: Hammer out a bottom
A hammer candle is a bottom signal in a downtrend.
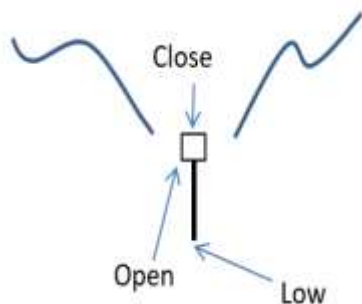
Exhibit 11: Inverted hammer
An inverted hammer is a top signal in an uptrend.
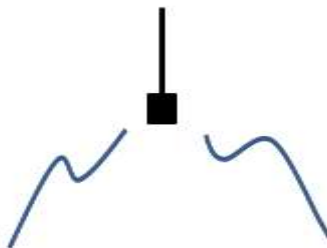
Source: BofA Global Research

Source: BofA Global Research

Bullish and bearish Harami patterns

A harami pattern switches the candles in a bullish and bearish engulfing pattern discussed on page 1. By reversing the candles it is thought that the second trading day is rejecting the large directional day that preceded it. A bullish harami forms in a downtrend. The first candle is a down day and the second candle a small up day within the candle body (open and close) of the first session. The second candle tends to gap up and close a little higher on the session. These characteristics suggests price will turn higher rejecting or trapping the sellers on the first down session like in Exhibit 12. A bearish harami is the opposite of this. It forms in an uptrend and warns of a turn lower.

The first candle is a strong up session and the second candle gaps down at the open, closes slightly lower and within the body of the first (Exhibit 13).

Exhibit 12: Bullish Harami
A bottom signal for a downtrend
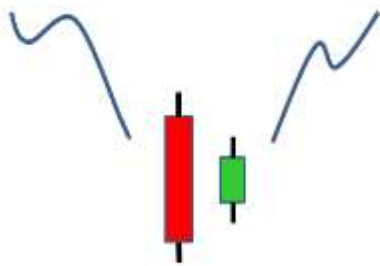
Source: BofA Global Research

Exhibit 13: Bearish Harami
A top signal for an uptrend

Source: BofA Global Research

Piercing lines and dark cloud cover

The piercing line candle pattern is another variation of a bullish engulfing pattern and only occurs in a downtrend to signal a turn higher. The primary difference is price opens lower on the second day, trades to a new low and then closes up about 50% of the way into the first candle. This suggests buyers entered late in the session on the second day shifting the supply/demand relationship in favor of the bulls. (Exhibit 14)

A dark cloud cover pattern occurs in an uptrend and is bearish. Price action on the first day is up. The second day begins bullish by gapping up at the open. However price then reverses lower to close down and about 50% of the way into the first candle (Exhibit 15)

Exhibit 14: Piercing line (Bullish)
A bottom signal for a downtrend
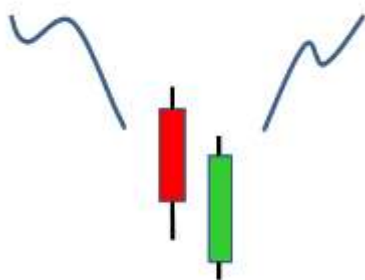
Source: BofA Global Research

Exhibit 15: Dark cloud cover (Bearish)
A top signal for an uptrend

Source: BofA Global Research

Shooting stars are abandoned candles, trapped positions

Shooting stars or abandoned candles refer to trading days that sit out in the air of a chart. There are no other trading days nearby in recent history. A gap up and then down or down and then up occurs leaving it in some empty space.

To infer an abandoned candle as bullish there are a few criteria. The setup is referred to as a morning star pattern. First a downtrend, then a strong down day, then a gap down forming a doji like candle and then a gap up forming a bullish up day at least 50% into the first down day. These tree candles in this order is read as a shift in bearish sentiment to bullish. Many times bears get caught in a position on the first and second day and are later forced to exit their trade in the coming days as prices rise. (Exhibit 16)

An evening star pattern forms in an uptrend and is bearish. Sometimes it is called a shooting star pattern in relation to those found in outer space. Prices in space meaning prices are too high and eventually a shooting star loses speed, burns out and rolls over. A strong up day, gap up to a shooting doji star and then a gap down for a down day occur. The down day confirms the doji star and that a reversal lower is underway. (Exhibit 17)

Exhibit 16: Morning star pattern
A bottom pattern in a downtrend.

Source: BofA Global Research

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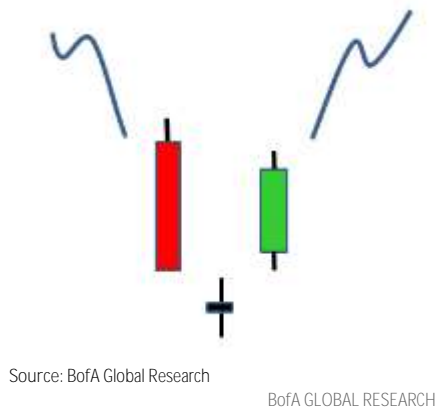
Exhibit 17: Evening star pattern
A top pattern in an uptrend,

Source: BofA Global Research

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The three soldiers are setting up for a big move

The three soldiers pattern is a trend reversal set up that represents gradually increasing demand to change the prior trend. Consider Exhibit 18, a bullish setup where a new low is made but closes a little up on the day. Then the market gaps down to open the second day and succeeds in closing up on the day above the high of the first. Then on the third day the market gaps down again, maybe half way into the second days range, to then close above the second days high for a third up day of even larger size (Exhibit 18). This sequence of events suggest the bears tried and failed three days in a row to push price lower. These failures suggest bulls are taking control and price is set to move higher. Three bearish soldiers would see three down days of increasing size beginning with a new high and a down day. Then with gaps up on the second and third day rejected by bears as the market closes lower each day. (Exhibit 19)

Exhibit 18: Three bullish soldiers
A bullish pattern gaining momentum.

Source: BofA Global Research

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Exhibit 19: Three bearish soldiers
A bearish pattern gaining momentum.

Source: BofA Global Research

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Finding Fibonacci

- The purpose of Fibonacci levels is to estimate support in a downtrend, resistance in an uptrend, estimate price targets and estimate time targets.

- The Fibonacci ratios are derived by the constant relationships found in the number sequence 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 etc where each number is added to the prior to get the next.

- When dividing these numbers by one another the important ratios of 61.8%, 50% and 38.2% are found. Secondary ratios of 76.4% and 23.6% are notable, too. However the most important ratio is 61.8% which ties to the golden mean.

Fibonacci number sequence and technical analysis

The Fibonacci number sequence begins with a 0 and 1 and continues should you add the largest to the second largest. In this case, 0+1=1 so the sequence is 0, 1 and 1. Add the two largest together (1+1) and get 2. Then 2+1 is 3, 3+2 is 5 and so on where the never ending sequence grows to 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 etc. The relationships between these numbers is studied in mathematics, architecture, science and applied to charts in technical analysis. For example, 89 / 144 = .618 or 61.8%. This is the most significant Fibonacci ratio used in many technical measurements and Elliott wave theory. Similarly, 55 / 144 = .382 or 38.2%. This is another important level.

Why are the ratios relevant? Because they are everywhere

The Fibonacci number pattern and subsequent ratios are found in many places in the world whether it be formed in nature or man-made. A few examples include many proportions of the human body such as head to waist and waist to feet. In architecture such as the design of the white house and Egyptian pyramids. In high value art, such as the placement of Mona Lisa on the poplar board and the distance between here facial features. In nature such as the number of petals on different types of flowers, the spirals found in pinecones and sea shells, rabbit reproduction and even outer space. With these number and ratio patterns appearing in so many places, technical analysts use them as a guide to identify support, resistance and estimate targets based on prior price trends. After all, one of the three principles of technical analysis is history repeats itself.

Fibonacci retracements

A Fibonacci retracement is applied to an uptrend when a top is found in order to estimate levels price might retrace down to. When a bottom is found a Fibonacci retracement is applied to estimate how much of the prior trend price might retraced up to. Should a technical top be found the idea is to estimate levels of support or downside targets for a short trade. If a bottom was found, the idea is to estimate levels of resistance or upside targets for a long trade. It is most important to draw retracements from major turning points in trends, as opposed to random points.

For example, the S&P 500 in Chart 13, a head and shoulders top formed in 2007 with a high of 1576.09 and a head and shoulders bottom in 2009 with a low of 666.79. These are two distinct turning points in trend. The rally that followed in 2009-2010 was to the 61.8% retracement of 1228.74 of the 2008-2009 decline. This is calculated by taking .618 * (1576.09 - 666.79) + 666.79 = 1228. The April 2010 high was 1220 (close!).

Another example is the head and shoulders bottom that formed in 2009 to the head and shoulders top in 2011. A Fibonacci retracement can be drawn from the low of 2009 to the high of 2011 and we see the 38.2% retracement of 1370.58 - .382 * (1370.58 - 666.79) = 1101.73. The first circled low was 1101.54. The second circled low was 1074 however price closed that week at 1155.

Another example could be the euro shown in Chart 14. A double top formed in 2008 leading to a downtrend and a long range bottom from 2015-2017. The distance from the high in 2008 of 1.6038 to the low in 2017 of 1.0341 is 0.5697. 38.2% of 0.5697 is

0.2176. Add 0.2176 to the low of 1.0341 and an estimated retracement level of the prior down trend is 1.2517. This is where price peaked in 2018. There was also a double top in 2014 at 1.3993 that lead to a downtrend to 1.0341. A 61.8% retracement of this trend is 1.2598. Two of the primary Fibonacci levels point to strong resistance in the 1.25s.

The difficult or speculative part of this example may have been knowing the 2017 low was a big low. The market had just broken down below the 2015-2016 lows, paused with a doji and then a long legged doji for the final low. Once the technical feel was more bullish some may begin to consider the 1.25s as a longer term objective. For more on doji patterns, please see the "Candles light the way" section.

Chart 13: S&P 500 Fibonacci example 1
Apply Fibonacci from important turning points to estimate future levels of support and resistance.

Source: BofA Global Research, Bloomberg
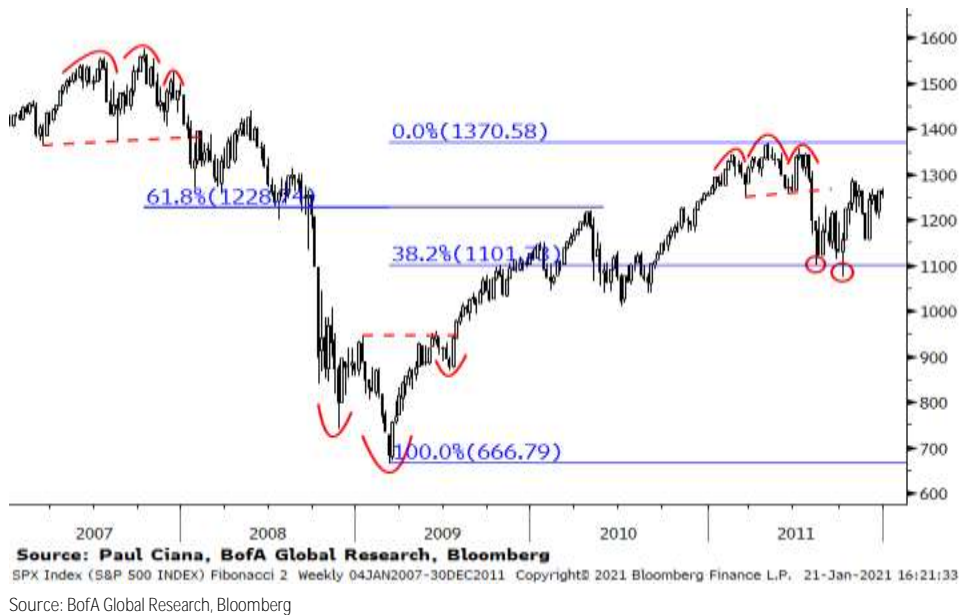
Chart 14: EUR/USD Fibonacci retracement example
Candle patterns may signal a Fibonacci line will hold.

Source: BofA Global Research, Bloomberg

Fibonacci projections and extensions

Fibonacci projections and extensions are often used to estimate targets for a trend based on the height of a price pattern, range breakout or during price discovery (when price is at new all-time highs or lows). The idea is to take the height of a price pattern, range or prior trend and add that to the breakout point.

In Chart 15 below we look at the head and shoulder patterns on the S&P 500 during the 2007 and 2009 period. For the top in 2007 we take the height of the top and subtract it from the breakdown point. For the bottom, we take the height of the pattern and add it to the break up point. The expectation is to see a trend to the 100% target of 1179 and 1224 respectively. The unknown is if a larger projection factor should be applied. For example, 161.8% or 300% or even 361.8% projection. In the head and shoulders section of this report we go into more detail on this.

Chart 15: Fibonacci projections example
Use Fibonacci ratios to estimate multiple targets after a top or bottom pattern forms.

Source: Paul Ciana, BofA Global Research, Bloomberg
SPX Index (S&P 500 INDEX) Fibonacci 4 spx Weekly 05JAN2007-30SEP2010   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 16:21:34

Source: BofA Global Research, Bloomberg

When may a target be reached? Fibonacci time projections

The Fibonacci sequence and ratios can also be applied to time, not just price, as a guide for when a price target might be reached. In the following example we measure the width (amount of time) the head and shoulders bottom took to form in late 2008 through mid-2009 and found 38 weeks. Adding that distance to the breakout point suggests peaks may occur at the Fibonacci ratios of time, such as 161.8% and 200%, which in this case were pretty close to the actual peaks before the trend turned lower. (Chart 16)

Chart 16: Fibonacci time projections
Estimate when price might reach a target by measuring the width of a pattern with Fibonacci ratios.
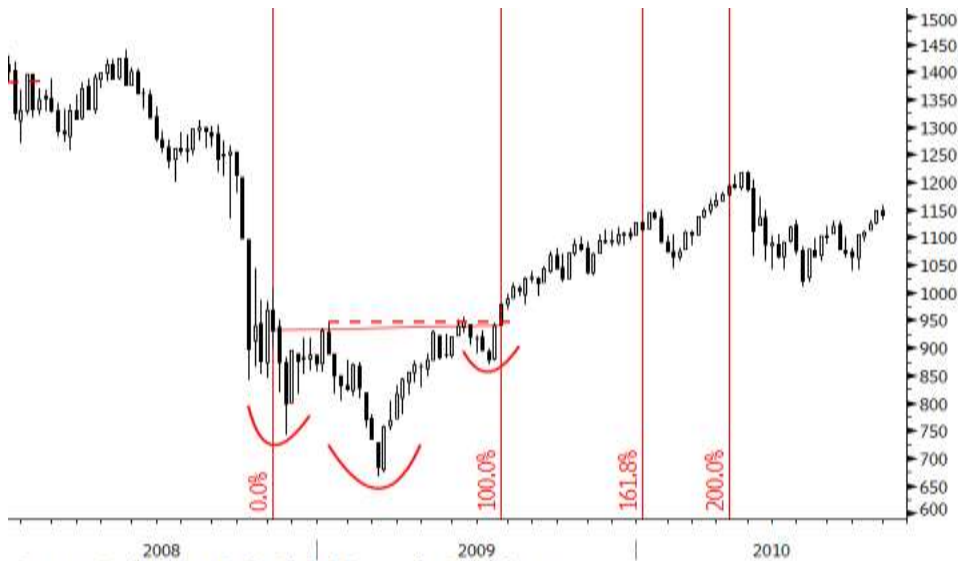
Source: Paul Ciana, BofA Global Research, Bloomberg
SPX Index (S&P 500 INDEX) Fibonacci 5 spx Weekly 05JAN2008-30SEP2010   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 16:21:47

Source: BofA Global Research, Bloomberg

Fibonacci arcs project price and time

If you want to estimate what price level might be resistance for an uptrend and when that resistance may be found, you can use the Fibonacci arc tool. By choosing the high of the head and shoulders in 2007 and the low of the head and shoulders bottom in 2009 (just like a retracement), the arcs are drawn. The highest point of each arc represents a Fibonacci retracement level. So the 61.8% arc peak shown in Chart 17 is at 1228 which is the 61.8% retracement point in Chart 13. Time is equally spread on each side and as it turns out the 100% arc time and the 61.8% retracement is where the S&P 500 peaked in June 2010.

Chart 17: Fibonacci arc example
Estimate price and time levels by using Fibonacci arcs.
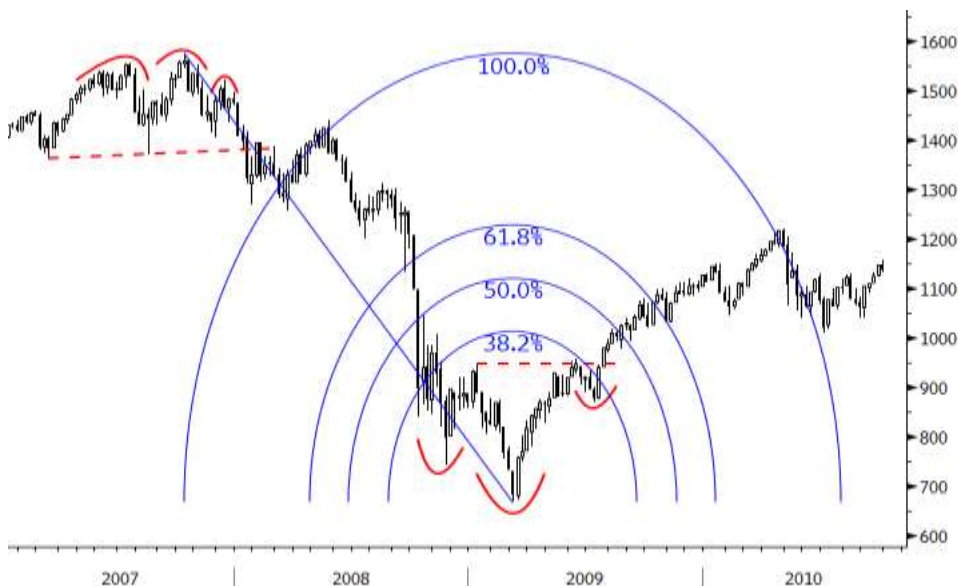
Source: Paul Ciana, BofA Global Research, Bloomberg
SPX Index (S&P 500 INDEX) Fibonacci 5 spx Weekly 11JAN2007-30SEP2010   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 16:21:33

Source: BofA Global Research, Bloomberg

A well massaged head and shoulders

- The head and shoulders pattern is a popular chart pattern that usually implies the prior trend is changing direction

- We explain what to expect as the pattern forms and how to use other indicators to increase conviction in the formation.

- We show how to create targets using Fibonacci and discuss multiple examples when indicators aligned to strengthen the pattern

Spotting a head and shoulders formation

The head and shoulders formation is useful in identifying market tops and bottoms. It can even be a continuation pattern if it appears in the opposite direction of the trend. In this primer we review the necessary inputs for a top pattern and summarize additional technical criteria to increase conviction when trading it.

The basics of a head and shoulders top

A prior uptrend to reverse. If there is not a trend prior to the formation then there is not a trend to correct or change.

1. Three peaks and two troughs. The first peak is the left shoulder, the second the head and the third the right shoulder. The head is always the highest high. The troughs separate the peaks from one another and help create the neckline.

2. Estimate a neckline by drawing a trend line after the second trough forms. In a top pattern, the neckline should have a slightly positive slope or at least be flat. This is important because price will be in the earlier phase of a downtrend when the neckline breaks, making the sell entry point higher.

3. The right shoulder should make a lower high than the head. It is also ideal for the right shoulder to be similar or smaller than the left.

4. A decisive move down through the neckline with greater than average volume should occur to solidify the pattern.

5. The neckline may be tested as resistance on a light volume rally and offers a second opportunity to sell the security. An appropriate stop is often the top of the right shoulder.

Volume can enhance the pattern

When an uptrend is coming to an end, it is preferred to see lighter volume in up moves and heavier volume in down moves. When volume is available it is better if it corresponds to a head and shoulders top pattern in the following ways:

- The rally to the head occurs on light volume. It could be compared to the volume to the top of the left shoulder or to a moving average.

- The decline down to the second trough occurs on rising volume suggesting an increase in supply or selling pressure.

- The rally to the top of the right shoulder occurs on light volume suggesting a lack of demand or little buying pressure.

- The decline from the top of the right shoulder through the neckline should occur on heavy volume.

Calculate targets with Fibonacci

There are two ways to calculate downside targets for a head and shoulders top. The first is to use a measured move projection with a Fibonacci Extension annotation (red). Measure the distance from the top of the head to the neckline and subtract that from the breakdown point. This will also create levels where price may find some support.

The second is to apply a Fibonacci retracement (blue) of the prior uptrend to find levels of confluence. In this example the 50% provided resistance and support in the uptrend. The 61.8% retracement provided resistance. They also come close to aligning with some of the red projections. The confluence of levels suggests a high conviction view that the blue 50% and red 61.8% levels are reached. A probable conviction would foresee price reaching the blue 61.8% and red 100% projection.

Chart 18: Calculating a target with Fibonacci retracements and extensions
A Fibonacci retracement and Fibonacci extension can be used to estimate downside levels for this head and shoulders top pattern.
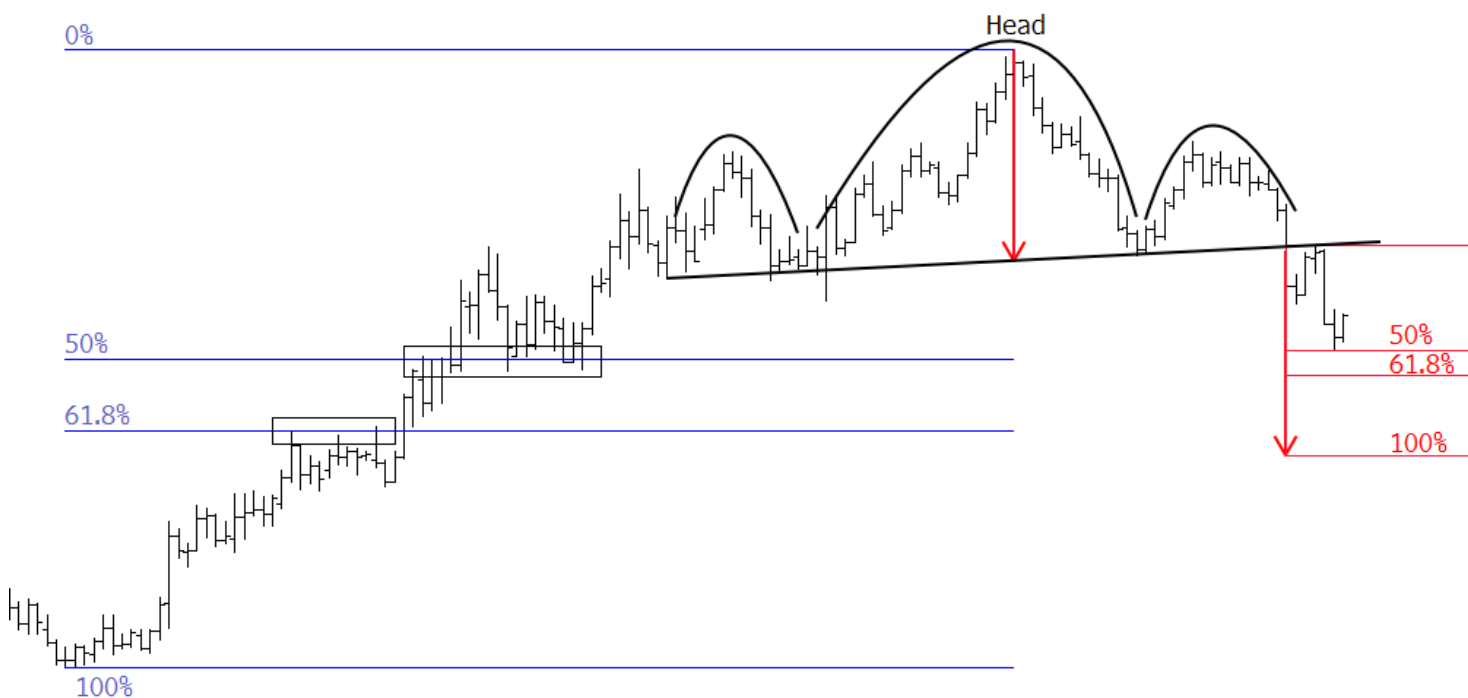
Source: BofA Global Research, Bloomberg

Use additional indicators to confirm the pattern

When a head and shoulders pattern is developing, check other technical indicators for complimentary signals at turning points and breaks.

- Check if the head or shoulder failed at a moving average or trend line on the current or a higher time frame. Often a key trend line or moving average toggles between resistance and support when developing the pattern, which is called polarity.

- Check for bar or candle pattern formations at the peaks and troughs. Bearish patterns such as an outside day, doji candle or bearish engulfing pattern may form at the peaks emphasizing the technical trend in the market.

- Momentum divergence – It is considered bearish when a new price high occurs forming the head of a pattern and a lower high in momentum also occurs (such as RSI, Stochastics or MACD histogram).

- Check to see if trending indicators such as MACD or Ichimoku are approaching or already crossed bearish.

- For an index, review the breadth of index constituents and sentiment indicators while the pattern develops.

Examples with additional indicators

Multiple time frame resistance and trend lines

In this daily chart, the 200wk moving average (blue) was pivotal. It provided resistance during the formation of the left and right shoulder. It was also important during the rally to the head and on the decline to the second trough. The failure to break back above it while forming the right shoulder was an early indication the pattern would form. The trend line (magenta) showed polarity. It was support in the uptrend until the left shoulder broke it. Then it became resistance when forming the head.

Chart 19: Multiple time frame indicators and trend lines help to frame out pattern
The 200WK SMA and trend line helped identify resistance points while the head and shoulders top formed.

Price finds resistance and support at the 200 week SMA

This trend line that was support turned into resistance forming the head

Source: BofA Global Research, Bloomberg

Doji candles form at key points including Fibonacci targets

Doji candles are known for representing indecision in continuing the prior trend. It forms when price opens and closes at nearly the same level and trades higher and lower during the period. In this example a doji candle formed at the top of the left shoulder, the first trough and just before the neckline break. When price reached the 100% Fibonacci measured move target it also formed a doji where the low touched the 61.8% retracement.

Chart 20: Doji candles form at key points in forming top pattern and reaching target
Candle patterns can be used to identify tactical turning points when a head and shoulders pattern is forming.
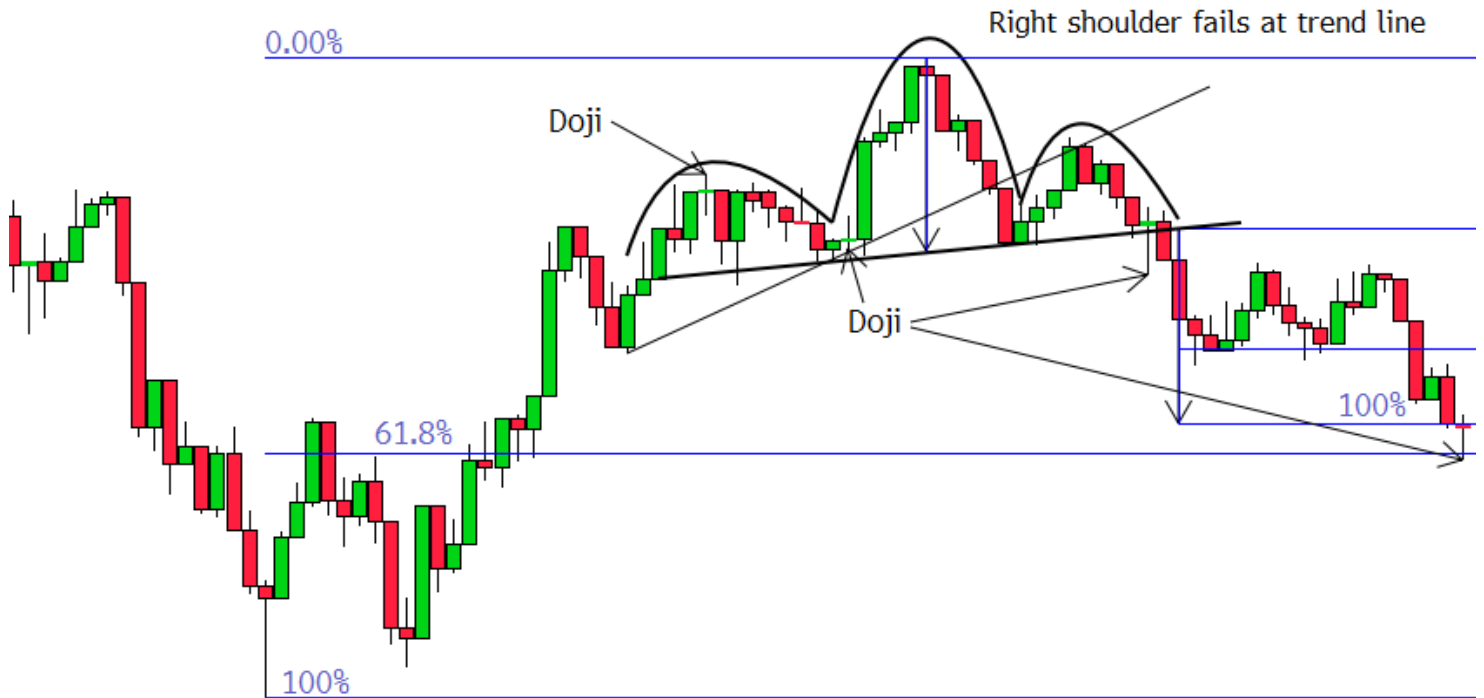
Source: BofA Global Research, Bloomberg

Trend exhaustion signals help to form a bottom

Two technical indicators suggested a bottom was forming. A TD Setup green 9 'buy' signal occurred at the lows. Also a bullish momentum divergence occurred when price made new lows but momentum made a higher low. When price broke above the neckline it was also able to break above the 50-week and 12-month moving average. Later, price reached the aligned Fibonacci targets of the measured move projection and the 61.8% retracement.

Chart 21: Head and shoulder bottom formed with bullish momentum signals
The TD Sequential indicator can be used to identify turning points when a head and shoulders pattern is forming.

Source: BofA Global Research, Bloomberg, DeMark Analytics

Double trend exhaustion, momentum divergence, gaps

In this bottoming example, four technical signals pointed to a bottom pattern. There were two trend exhaustion signals near the lows of the head; a TD Setup 9 and TD Countdown 13. Momentum as defined by RSI presented a bullish divergence. The decline to new lows did not even exhibit enough momentum to reach oversold. A short-term trend line was broken when forming the right side of the head and provided support to the right shoulder. The trend also gapped higher a few times when forming the right side of the head and right side of right shoulder.

Chart 22: Head and shoulders bottom with multiple technical signals
An example of a head and shoulders base with RSI divergence, a TD Sequential reversal signal, trend line break and measured move targets.

Source: BofA Global Research, Bloomberg, DeMark Analytics

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Evidence of the most popular indicators

- RSI is the most popular technical indicator, ahead of MACD and Bollinger Bands. It is used to measure and trade momentum.

- We review the essence of the RSI formula as well as the facts and myths of overbought and oversold trends.

- We also discuss our most preferred signals including a three troughed bullish divergence and three peaked bearish divergence.

Relative Strength Index is the most popular

Data published in 2011suggests the Relative Strength Index (RSI) is the most popular technical study used on the Bloomberg terminal. The Moving Average Convergence Divergence (MACD) is the second most popular, though half as popular as RSI. Third place goes to Bollinger Bands (BOLL). The top three indicators represented 78% of the seven most used indicators. The others include Stochastics (TAS), the Directional Movement Index (DMI) and an increasingly popular study called Ichimoku (GOC). The last is Volume at Time (VAT). Notably missing and assumed in the top 10 are simple moving averages and Fibonacci price retracements. In our view, knowing the different ways the popular indicators are used is an important step in learning and using technical analysis.

Exhibit 20: Indicator use as a percentage of the top seven most used
The Relative Strength Index (RSI) is the most popular technical indicator (excludes moving averages).
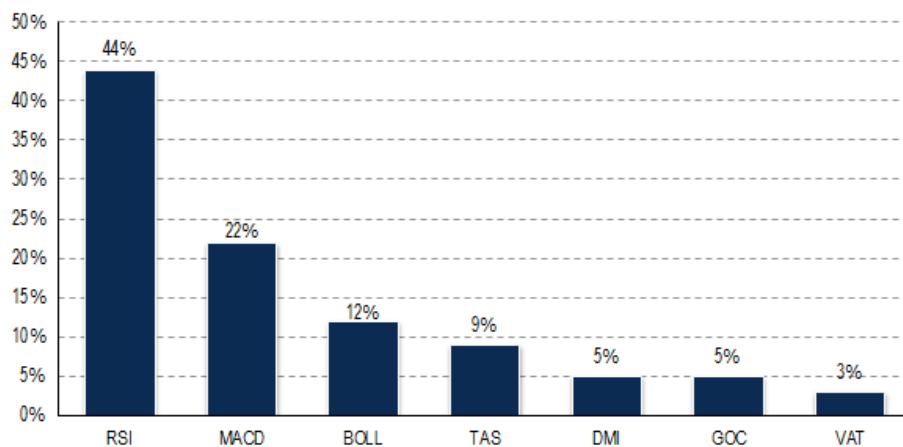
Source: Ciana, P. New Frontiers in Technical Analysis. John Wiley & Sons Inc. 2011

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Markets use different types of indicators

The top three most popular indicators suggest market participants use a diverse group of indictors. RSI is a momentum oscillator offering confirmation of price breakouts, short-term buy and sell signals, and longer-term, trend-ending implications from price and momentum divergences. MACD is a trending indicator that attempts to improve upon moving averages by offering an earlier trend start and end signal. It too can provide divergence signals. Bollinger bands is a statistical indicator that attempts to identify when markets may be overdue for a volatile move when the bands are relatively narrow or when the market has moved to far too fast as price exits the bands.

Get a chart with the popular indicators

There is a sample chart on Bloomberg that is accessible by typing {G BBTA 10<GO>} with all of the popular indicators preloaded. Click the red "Actions' button, choose "Save a copy," title it popular indicators, and click the gray "Save" button. The right side of the red toolbar should say G # and the title. Type, for example, EURUSD Curncy G#<GO>, to open a chart of the euro with the popular indicators.

Moving Average Cross Strategies

- Moving averages are one of the most popular trend following, support/resistance and quoted indicators in technical analysis.

- With many uses, in this report we review the simple moving average, generally accepted signals, popular periods and examples.

- We correctly define the "golden cross" & "death cross." We also recap the TMAC and MACD moving average based strategies.

Moving average cross strategies

The 50 day and 200 day simple moving averages (SMA) are the most popular and quoted moving average (MA) signals and levels. There are many ways to leverage their value. In this primer we introduce the MA, different types of averages, look back periods and multiple time frame uses. We recap the golden cross and death cross, a Triple Moving Average Cross (TMAC) and Moving Average Convergence/Divergence (MACD).

Why 50 & 200? What about the 100, 150 or Fibonacci #s?

History suggests the 50 and 200 day SMA, and to an extent the 100 and 150 day SMA, are the most popular because they were simple to calculate by hand prior to computers. Now they tend to be the default on charting software. They may work at times because others are looking at them however plenty of other conditions exist when technical traders, trend followers and systematic firms take action. A trader, whose trade horizon is shorter, consider smaller SMA periods such as the 5, 10, 15, 20, 30 and 50 day MAs. Futures traders tend to remove one day for the roll. A Fibonacci enthusiast may follow a few in the Fibonacci sequence such as 5, 8, 13, 21, 34, 55, 89, 144 and/or 233.

Generally accepted bullish and bearish signals

Moving average signals are bullish (bearish) when the faster moving elastic time series moves above (below) a slower moving inelastic line, such as 1) Price crosses above (below) a moving average; 2) When the slope of an average turns positive (negative); 3) When a shorter period average crosses above (below) a longer period average; 4) When price trends too far below (above) the average relative to history.

Golden Cross & Death Cross is reserved for 50 & 200 day

The golden cross and death cross names are generally reserved for the crossing of the 50 day and 200 day simple moving averages. A golden cross occurs when the 50 day simple moving average crosses above the 200 day. The signal suggests the time series will rise. The death cross is the opposite of the golden cross and occurs when the 50 day moving average crosses below the 200 day. This signal suggests the time series will fall. We recommend being mindful/explicit of the time series the signal occurs on because a golden cross on the VIX, a bond future or JPY/KRW may infer a bearish risk tone.

TMAC and MACD moving average strategies

We discuss the TMAC and MACD strategies which are two popular ways to leverage a combination of MAs to generate signals for a qualitative and quantitative approach.

- In this section we summarize and review an example of using the 20, 50, 100, 150 and 200 day simple moving averages.

Trend following with a set of moving averages

Below we present a price chart with five moving averages on it including the 20, 50, 100, 150 and 200 day simple moving averages (Chart 23). As a rule of thumb, it's visually simple to differentiate the short from the long based on how much it moves. The more elastic the line the shorter the period. Price is the most elastic time series while the 200 day moving average is relatively inelastic. Given the generally accepted rules for using moving averages, there are a total of 20 conditions and signals generated with price and five moving averages on a chart.

1. When price is above a moving average it is considered bullish so higher prices should follow. When price is below a moving average it is considered bearish so lower prices should follow. In this example there are a total of five conditions.

2. When the slope of a moving average is positive it is considered bullish. When the slope of a moving average is negative it is considered bearish. In this example there are a total of five conditions. When a long term average looks flat, we assume there is little trend.

3. When a shorter term moving average crosses above a longer term moving average it is considered bullish. When a shorter term moving average crosses below a longer term moving average it is considered bearish. In this example there are a total of ten bullish and bearish conditions.

Using a set of moving averages is referred to as a moving average fan. It is used to determine short, medium and long term trends, estimate targets and estimate support and resistance. Given the number of bullish and bearish conditions it is fairly simple to conclude how strong or weak the trend is by aggregating the conditions (more on this later in the TMAC section). Or, when looking at the chart and seeing the averages are dispersed (fanned out) like in December 2019, the stronger the trend is assumed to be.

Chart 23: An example of five simple moving averages on a daily Chart
Price vs a 20, 50, 100, 150 and 200 day simple moving average

Source: BofA Global Research, Bloomberg

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Use moving averages for support and resistance

Moving averages can provide support to price in uptrends and resistance to price in downtrends. We define support as a level the market will not allow price to move below and so the market begins to buy the security. In other words, demand is greater than supply. Similarly, resistance is a level that the market won't let price go above and so supply becomes greater than demand leading to a turn lower in prices.

In August 2018 the 200 day simple moving average (blue) provided support to price. The 100, 150 and 200 day moving averages still had a positive slope. The test of the 150 day moving average (green) in September resulted in a higher low with support holding. A rally to a new high followed.

A downtrend from October through January presents many examples of resistance from a moving average. In October price closed below the 200 day moving average and could not get back above it. In December price action failed to close back above the 20 day moving average. It wasn't until January that it did and then struggled at the 50d SMA. Eventually an uptrend persisted guided higher by the 20 day moving average.

Chart 24: An example of five simple moving averages on a daily Chart
Moving averages can act as support and resistance to price trends.

Source: BofA Global Research, Bloomberg

Many types of moving averages…keep it simple

- A simple moving average is an equal weight average of a specified look back.

- An exponential moving average is a form of a weighted average that gives more consideration to newer price data.

There are many MA types to consider. The simple moving average is often used the most followed by the exponential moving average. There are many other types such as weighted, variable, adaptive and triangular. Then there are indicators such as MACD, Envelopes, Bollinger Bands, TRIX and Trender that use moving averages as the basis of their calculation. We recommend keeping it simple and, over time, experimenting with other averages especially on different asset classes. For example, a rule of thumb says rates tend to mean revert more often, commodities tend to trend longer and stock indices tend to go up. Therefore an exponential moving average on a commodity may work better in your process than a simple average because the average will trend closer to price as it reaches new extremes. This will allow it to trigger a reversal signal sooner.

Simple vs. Exponential moving averages

A simple moving average is an equal weight average. It takes the sum of x data points and divides by x to calculate the current value. An exponential moving average is a form of a weighted average that gives more consideration to newer price data. However in contrast to a weighted moving average it maintains a longer memory of historical price action in its calculation. In other words, there is a slower roll off of old data points while

emphasizing new data while a weighted average has a fixed roll off. This exponential average is the basis of the MACD indicator.

Besides its memory of historical price action, exponential moving averages are viewed as appealing because they tend to stay closer to price. This means their slopes tend to change sooner, price tends to break them sooner and a faster average tends to cross a slower average sooner. All together this could mean earlier signals with the same period input as a simple MA. Whether they offer the correct signal more than simple averages is debatable. It more likely boils down to process and a disciplined application.

> Chart 25: Example of simple moving averages (solid) vs. exponential moving averages (dashed) on a daily Chart
> Exponential moving averages tend to stay closer to price trends than simple moving averages.
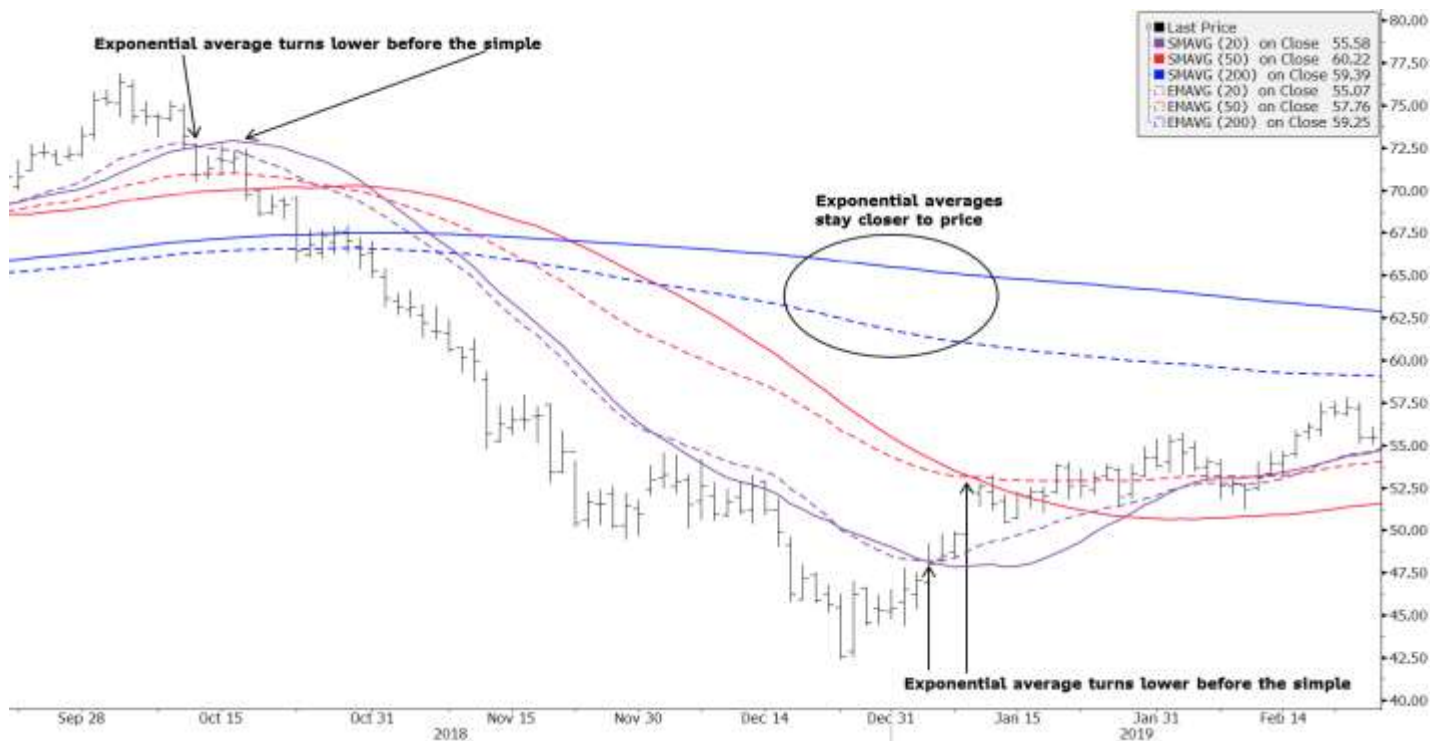
Source: BofA Global Research, Bloomberg

Not just daily moving averages
- Looking at the 50, 100 and 200 period moving averages on many time frames can show where short, medium and long term support and resistance levels lie.

Multiple time frame technical strategy is important
The markets are comprised of short, medium and long term traders and investors. These market participants will choose to look at different moving averages but they most certainly look at different time frame charts. The integration of popular moving averages across time frames can often tell a participant what others may be looking at or thinking with regard to trend conditions, support/resistance and targets. The short term oriented may look at a 5 minute, 60 minute, 240 minute and daily set of charts with 200 period moving averages on each. A medium term participant may look at a 240, daily and weekly. A long term participant may only concern themselves with a weekly, monthly and even a quarterly chart. Here are some examples where different time frame 200 periods SMA's were highly relevant.

US 10 year treasury yield peaked at the 200 month SMA
The bond bear market of 2016-2018 was capped by the 200 month simple moving average. This averaged had not been tested since 1989 however it became increasingly relevant on the weekly chart below as yield began to double top at 3.25% (Chart 28).

Chart 28: US 10 year treasury yield – weekly Chart with 200 month simple moving average
The 200 month simple moving averaged resisted yield from going any higher in 4Q18

Source: BofA Global Research, Bloomberg

The S&P 500 tests the 200 day SMA and the 200 week SMA in 2018
During 2018, heightened volatility, geopolitical risks and macro risks caused the S&P 500 to decline to the supportive 200 day moving average in March. Later that year a new high was made and then another decline followed. This time the 200 day was less supportive rather the market traded around the average a few times as it hesitated before its next decline. The next decline tested support at the 200 week moving average and marked a significant low before a strong rally in 2019 tested the 200d SMA, again.

Chart 29: S&P 500 Daily Chart with 200 day and 200 week simple moving average plotted
The S&P 500 finds support and resistance at the 200 day SMA and 200 week SMA.

Source: BofA Global Research, Bloomberg

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DXY bounces between the 200 month and 200 quarter moving averages

The long term trend, or a monthly chart, of the DXY shows the index trading down to the 200 month moving average in 2018 and struggling for three quarters to close above the 200 quarter moving average in 2018-2019.

Chart 30: DXY Index – Monthly Chart with 200 month SMA and 200 quarter SMA plotted
The DXY finds support at the 200 month SMA and resistance at the 200 quarter SMA.

Source: BofA Global Research, Bloomberg

Brent trends up along the 200 hour SMA and then tests the 200 day

The uptrend in Brent oil futures tested the 200 hour (60 minute) moving average twice during April to then peak in the 75s. Then it declined below the 200h SMA and failed to move back above it as it became resistance. Later, price tested the 200d SMA for support and held above it for four trading days forming a base.

Chart 31: Brent oil vs the 200 hour (60 min bar Chart) and 200 day moving average
Brent oil future was supported by the 200 day SMA and both supported and resisted by the 200 period (60min) SMA.

Source: BofA Global Research, Bloomberg

Does the Golden Cross & Death Cross Work?

- A popular moving average cross signal is the 50 day and 200 day moving average.

- When the 50d crosses above the 200d, a golden cross is said to have occurred. When the 50d crosses below the 200d, a death cross is said to have occurred.

- We look at historical forward returns for the golden cross and death cross on the DXY index and incorporate the 200d SMA slope, too.

Golden Cross & Death Cross is reserved for 50 and 200

The golden cross and death cross names are generally reserved for the crossing of the 50 day and 200 day moving averages. A golden cross occurs when the 50 day moving average crosses above the 200 day moving average. The signal suggests the time series it is calculated on will rise. The death cross is the opposite of the golden cross and occurs when the 50 day moving average crosses below the 200 day moving average. This signal suggests the time series it is calculated on will fall. We recommend being mindful/explicit of the time series the signal occurs on because a golden cross on the VIX, a bond future or JPY/KRW may infer a bearish risk tone.

Golden Cross = 50d crossing above the 200d

In Chart 26 a golden cross occurred on October 20th 2016 because the 50 day moving average crosses above the 200 day moving average (red line crossed above the blue line as indicated by the green circle). This is considered a bullish signal suggesting price should rise. The closing value on this day was 98.31. The trend persisted higher to the 103s however then turned down. Eventually a death cross occurred.

Death cross = 50d crossing below 200d

On May 26th 2017 the 50 day moving average crossed below the 200 day moving average (Red line crossed below the blue line as indicated by the red circle). This is considered a bearish signal and suggests price should fall. The closing value on this day was 97.44. A downtrend persisted into 2018 and on June 7th 2018 another golden cross occurred with a closing value of 93.43.

Chart 26: Example of two golden crosses and one death cross
A golden cross occurred in October 2016 and June 2018. A death cross occurred in June 2017.

Source: BofA Global Research, Bloomberg

Good for context, not necessarily entry AND exit strategy

A trend can persist after a golden cross or death cross occurs. By the time the opposing signal occurs, however, much of the trend may have already reversed. Relying on it for both entry and exit like a "black box" system may mean much of the trend based on the prior signal has already been given back. Using the golden cross and death cross may be ideal for context within a trend that is already underway and for understanding historical forward returns.

Below we show the percent change from the close on the golden cross in October 2016 to the high as +5.6%. By the time the opposite signal occurred, the death cross, price was -.89% below the entry point. From this short point, the trend was down as much as -9.43% in February 2018. The next golden cross didn't occur until June 2018. The bullish signal was -4.10% below the short entry point leaving about half the trend behind.

Chart 27: Example golden cross and death cross signals on the DXY index – Daily Chart
Percent change after a golden cross and death cross signal.

Source: BofA Global Research, Bloomberg

DXY after a golden cross

When the 50d SMA crossed above the 200d SMA, in the past the US Dollar index (DXY) was higher 25-80 trading days later. This has occurred for as much as 24 of 29 signals or 83% of the time since 1979 (Table 1). The best "% Up" ratio shown in Table 1 is 40 and 60 days later while the highest average and median change is 50 days later. The Min and Max percent change become more favorable 40-50 days later. If entering at the close of the golden cross signal, history suggests the sweet spot to target or consider exiting a long trade may be about 40-60 days later.

When the 50 day SMA crossed above the 200 day SMA and the 200 day SMA had a positive slope (rising), the DXY was mostly higher 20-80 days later with the strongest point being 50 days later. Then, it was up 15 of 17 times or 88% of the time (Table 2).

Table 1: Price trend in the DXY after the 50 day simple moving average crosses above the 200 day simple moving average
The DXY tends to rise 25-80 trading days after a golden cross signal.

Ticker: DXY			Start Year: 1979		# Signals: 29			# < 80 days: 1				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	55%	62%	48%	62%	66%	62%	72%	83%	79%	79%	83%	72%	72%
Up	16	18	14	18	19	18	21	24	23	23	24	21	21
Down	13	11	15	11	10	11	8	5	6	6	5	8	8
Average	0.17%	0.07%	0.17%	0.41%	0.77%	0.89%	1.22%	1.57%	1.66%	1.98%	1.59%	1.81%	1.95%
Median	0.49%	0.16%	-0.02%	0.41%	1.15%	1.20%	1.44%	1.51%	1.76%	2.71%	1.94%	2.12%	2.35%
Min	-2.26%	-4.60%	-2.47%	-4.23%	-4.26%	-4.94%	-5.15%	-5.16%	-6.94%	-7.88%	-10.17%	-9.89%	-10.72%
Max	2.56%	3.09%	2.55%	3.10%	3.89%	4.14%	7.32%	10.87%	8.26%	10.93%	8.52%	9.50%	10.35%

Source: BofA Global Research

Table 2: Price trend in the DXY after the 50 day average crosses above the 200 day average and the 200 day average was rising
The DXY tends to rise after a golden cross signals with a 200d SMA that has a positive slope.

Ticker: DXY			Start Year: 1979		# Signals: 17			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	59%	65%	41%	65%	65%	71%	71%	88%	82%	88%	82%	82%	76%
Up	10	11	7	11	11	12	12	15	14	15	14	14	13
Down	7	6	10	6	6	5	5	2	3	2	3	3	4
Average	0.25%	0.01%	0.02%	0.55%	0.77%	1.02%	1.54%	2.11%	2.00%	2.55%	1.94%	2.58%	2.97%
Median	0.49%	0.15%	-0.08%	0.45%	1.41%	1.33%	1.76%	1.84%	2.19%	3.17%	1.37%	3.14%	3.99%
Min	-2.26%	-4.60%	-2.24%	-1.51%	-4.26%	-4.94%	-5.15%	-5.14%	-6.94%	-6.80%	-7.72%	-7.74%	-8.72%
Max	2.56%	3.07%	2.25%	3.10%	3.89%	4.14%	7.32%	10.87%	8.26%	10.93%	8.52%	9.50%	8.31%

Source: BofA Global Research

DXY after a death cross

Since 1979 there have been 28 instances when the 50 day SMA crossed below the 200 day SMA. In the past, the DXY was lower 5 to 10 days later about 2 of every 3 time or about 66% of the time. There is a slight bias to see the DXY weaker 20-25 days later. (Table 3)

In Table 4 we show a death cross with a negatively sloped 200d SMA. There are only 11 signals since 1979 vs. the 26 in table 3. There is a stronger tendency on this notably small set of observations for the DXY to be lower after a death cross with a negatively sloped 200d SMA as much as 9 of 11 times 5-25 days later and 50 days later.

Table 3: Price trend in the DXY after the 50 day simple moving average crosses below the 200 day simple moving average
The DXY tends to 5-25 days after a death cross signal.

Ticker: DXY			Start Year: 1979		# Signals: 28			# < 80 days: 1				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	32%	36%	43%	39%	39%	50%	50%	57%	44%	46%	46%	50%	50%
Up	9	10	12	11	11	14	14	16	12	13	13	14	14
Down	19	18	16	17	17	14	14	12	15	15	15	14	14
Average	-0.24%	-0.40%	-0.36%	-0.41%	-0.69%	-0.39%	-0.24%	-0.68%	-0.54%	-0.76%	-0.37%	0.21%	-0.07%
Median	-0.31%	-0.80%	-0.40%	-0.63%	-1.52%	-0.05%	-0.01%	0.38%	-0.23%	-0.37%	-0.21%	0.16%	0.14%
Min	-2.14%	-2.63%	-3.68%	-4.92%	-6.11%	-6.81%	-6.61%	-8.06%	-6.00%	-8.53%	-9.10%	-5.30%	-11.48%
Max	1.75%	4.02%	4.19%	5.27%	5.91%	6.06%	6.25%	6.50%	4.67%	5.67%	7.43%	8.07%	8.06%

Source: BofA Global Research

Table 4: Price trend in the DXY after the 50 day average crossed below the 200 day average and the 200 day average was falling
The DXY tends to decline after a death cross with falling 200d SMA

Ticker: DXY			Start Year: 1979		# Signals: 11			# < 80 days:	0			
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	18%	18%	18%	18%	18%	27%	27%	45%	27%	18%	27%	36%	27%
Up	2	2	2	2	2	3	3	5	3	2	3	4	3
Down	9	9	9	9	9	8	8	6	8	9	8	7	8
Average	-0.46%	-1.08%	-1.44%	-1.62%	-1.95%	-1.33%	-1.42%	-1.85%	-1.85%	-2.51%	-2.18%	-1.63%	-1.99%
Median	-0.27%	-1.27%	-1.44%	-1.11%	-2.36%	-0.89%	-0.97%	-1.73%	-1.11%	-1.41%	-2.56%	-1.79%	-2.73%
Min	-1.99%	-2.59%	-3.68%	-4.92%	-6.11%	-4.59%	-6.32%	-8.06%	-5.64%	-8.53%	-9.10%	-5.30%	-6.90%
Max	0.64%	1.01%	1.25%	1.68%	1.62%	2.39%	3.12%	2.64%	1.56%	0.78%	5.70%	3.58%	3.94%

Source: BofA Global Research

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US long bond future after a golden cross

Since 1977, the US long bond treasury future (front month US1) saw 31 golden cross signals implying higher prices (lower yields). 35-50 trading days later bond prices rose 67-73% of the time or 20-22 out of 31 times. There was also some tendency to see prices higher 5, 10 and 20 days after the signal (Exhibit 21). When a golden cross signal occurred and the 200d SMA was rising, the front month continuous long bond treasury future price was up 11 of 12 times 45-50 days later. (Exhibit 22)

Exhibit 21: Price trend after the 50d SMA crossed above the 200d SMA
The front month long bond treasury futures tends to rise after a golden cross.

Ticker: US1			Start Year: 1977		# Signals: 31			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	65%	65%	58%	65%	58%	61%	68%	67%	68%	73%	65%	60%	67%
Up	20	20	18	20	18	19	21	20	21	22	20	18	20
Down	11	11	13	11	13	12	10	10	10	8	11	12	10
Average	0.09%	0.32%	0.51%	0.35%	0.52%	0.63%	0.82%	1.09%	1.61%	1.58%	1.26%	0.96%	1.04%
Median	0.30%	0.50%	0.54%	0.63%	1.05%	0.59%	1.28%	1.20%	1.95%	1.92%	1.25%	1.34%	1.57%
Min	-3.25%	-5.84%	-8.49%	-10.05%	-7.08%	-10.25%	-11.63%	-14.49%	-14.28%	-15.88%	-14.40%	-19.31%	-16.70%
Max	2.27%	3.93%	5.46%	4.52%	7.08%	10.68%	10.48%	11.79%	12.00%	12.05%	16.20%	15.04%	11.24%

Source: BofA Global Research

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Exhibit 22: Price trend after the 50d SMA crossed above the 200d SMA and the 200d SMA was rising
When a golden cross occurred and the 200d SMA was rising, the US1 bond future was up as much as 11 of 12 times 45-50 days later.

Ticker: US1			Start Year: 1977		# Signals: 12			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	67%	58%	58%	58%	58%	75%	75%	82%	92%	92%	75%	67%	67%
Up	8	7	7	7	7	9	9	9	11	11	9	8	8
Down	4	5	5	5	5	3	3	2	1	1	3	4	4
Average	0.03%	0.24%	0.18%	0.38%	0.51%	0.95%	0.94%	1.93%	2.84%	3.11%	2.88%	2.38%	1.62%
Median	0.40%	0.47%	0.38%	0.77%	0.85%	0.78%	0.59%	1.32%	2.21%	2.78%	0.90%	1.36%	0.55%
Min	-3.25%	-1.98%	-3.32%	-5.29%	-6.66%	-3.35%	-6.60%	-3.09%	-2.08%	0.00%	-2.59%	-6.54%	-8.04%
Max	2.27%	2.09%	2.38%	3.48%	3.62%	3.81%	7.65%	11.79%	12.00%	9.91%	12.56%	15.04%	9.54%

Source: BofA Global Research

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US long bond future after a death cross

There have been 30 death cross signals for the US long bond treasury future suggesting lower prices and higher yield since 1977. History shows these signals have little relevance on the future trend. (Exhibit 23)

Exhibit 23: Price trend after the 50d SMA crossed below the 200d SMA
The death cross presents little trend bias for the long bond future.

Ticker: US1				Start Year: 1977			# Signals: 30			# < 80 days: 0		
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	53%	53%	50%	63%	55%	60%	50%	57%	53%	53%	57%	53%	57%
Up	16	16	15	19	16	18	15	17	16	16	17	16	17
Down	14	14	15	11	13	12	15	13	14	14	13	14	13
Average	-0.25%	0.04%	-0.15%	0.11%	-0.05%	0.21%	-0.17%	-0.11%	-0.07%	0.57%	0.96%	1.01%	0.71%
Median	0.07%	0.10%	0.13%	0.51%	0.03%	0.77%	0.34%	0.40%	0.67%	0.67%	0.64%	0.49%	0.43%
Min	-5.06%	-5.17%	-6.55%	-8.80%	-8.56%	-9.45%	-11.67%	-10.53%	-11.48%	-8.98%	-8.95%	-8.94%	-9.13%
Max	3.19%	6.97%	6.51%	7.19%	5.80%	7.34%	9.99%	12.45%	16.03%	17.98%	18.47%	19.16%	16.99%

Source: BofA Global Research

Oil after a golden cross

Since 1983, there have been 30 golden cross signals. In the past, oil prices were higher 50 days after the signal 67% of the time or 20 out of 30 (Exhibit 24). When the 200d SMA had a negative slope and a golden cross occurred, the signal was poor because oil tended to go lower through 35 days and then higher at 50 days (Exhibit 25). However when the 200d SMA had a negative slope, the golden cross signals tended to be better. From the signal through 10 days oil was up 69% of the time and from 45-70 days it was up 69% of the time (Exhibit 26).

Exhibit 24: Price trend after the 50day MA crossed above the 200 day SMA
Oil prices tended to be higher 50 days later 67% of the time of 20 of 30 times.

Ticker: CL1				Start Year: 1983			# Signals: 30			# < 80 days: 0		
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	47%	50%	50%	53%	50%	43%	47%	50%	62%	67%	57%	60%	53%
Up	14	15	15	16	15	13	14	15	18	20	17	18	16
Down	16	15	15	14	15	17	16	15	11	10	13	12	14
Average	-0.05%	0.32%	-0.71%	-0.07%	0.66%	0.67%	1.17%	-0.27%	0.70%	1.55%	-0.69%	0.11%	-3.14%
Median	-0.77%	0.23%	-0.01%	1.43%	0.12%	-0.64%	-0.71%	-0.25%	2.30%	2.94%	3.69%	1.92%	2.98%
Min	-10.69%	-11.85%	-17.54%	-19.08%	-18.28%	-17.18%	-14.71%	-31.05%	-39.15%	-65.46%	-104.33%	-100.23%	-156.40%
Max	11.69%	14.42%	12.59%	17.61%	30.83%	27.28%	30.88%	25.66%	15.28%	21.52%	25.76%	24.56%	23.40%

Source: BofA Global Research

Exhibit 25: Price trend after the 50day MA crossed above the 200 day SMA and the 200 day SMA had a negative slope
Beware of a positively sloped 200d SMA when a golden cross occurs. Oil tends to be lower through 35 days and then higher at 50 days.

Ticker: CL1				Start Year: 1983			# Signals: 12			# < 80 days: 0		
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	17%	33%	33%	42%	33%	33%	33%	50%	58%	67%	50%	58%	50%
Up	2	4	4	5	4	4	4	6	7	8	6	7	6
Down	10	8	8	7	8	8	8	6	5	4	6	5	6
Average	-2.32%	-2.43%	-3.18%	-2.33%	-1.26%	-0.95%	-0.15%	-1.42%	-1.80%	-0.42%	-6.57%	-3.62%	-10.31%
Median	-2.84%	-3.22%	-2.53%	-2.78%	-3.20%	-3.29%	-1.78%	-1.15%	2.01%	4.80%	1.06%	2.33%	0.77%
Min	-7.73%	-11.85%	-14.04%	-19.08%	-18.10%	-17.18%	-13.44%	-31.05%	-39.15%	-65.46%	-104.33%	-100.23%	-156.40%
Max	6.34%	5.41%	8.63%	15.52%	30.83%	27.28%	30.88%	25.66%	8.98%	21.52%	10.86%	23.01%	19.21%

Source: BofA Global Research

Exhibit 26: Price trend after the 50day MA crossed above the 200 day SMA and the 200d SMA had a negative slope
When the 200d SMA had a negative slope and a golden cross occurred, oil prices tended to be higher through 10 days later and 45-50 days later.

Ticker: CL1				Start Year: 1983		# Signals: 18		# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	69%	69%	54%	54%	54%	46%	54%	54%	69%	69%	62%	69%	62%
Up	9	9	7	7	7	6	7	7	9	9	8	9	8
Down	4	4	6	6	6	7	6	6	4	4	5	4	5
Average	1.51%	2.83%	0.26%	1.00%	1.36%	1.87%	2.51%	0.31%	2.93%	3.01%	3.75%	4.00%	2.38%
Median	1.51%	2.56%	0.91%	4.83%	1.01%	-0.98%	2.10%	1.07%	3.47%	1.90%	4.32%	3.58%	3.32%
Min	-10.69%	-6.72%	-17.54%	-17.23%	-18.28%	-13.29%	-14.71%	-19.25%	-21.47%	-21.65%	-20.68%	-23.31%	-31.30%
Max	11.69%	14.42%	12.59%	17.61%	18.29%	11.29%	11.93%	14.27%	15.28%	19.84%	21.71%	24.56%	17.54%

Source: BofA Global Research

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Oil after a death cross

There have been 29 times when the 50 day SMA crossed below the 200 day SMA on oil prices since 1983. Oil prices tended to be down 19 of 29 times 25 and 35 days later or lower 66% of the time (Exhibit 27). When the 50 day SMA crossed below the 200 day SMA and the 200 day SMA had a positive slope, oil prices were lower 5 days, 25 days and 35 days 12 of 17 times or lower 71% of the time.

Exhibit 27: Price trend after the 50 day SMA crossed below the 200 day
Oil prices tended to be down 19 of 29 times 25 and 35 days later

Ticker: CL1				Start Year: 1983		# Signals: 29		# < 80 days: 2				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	38%	38%	48%	45%	34%	41%	34%	41%	52%	52%	54%	55%	59%
Up	11	11	14	13	10	12	10	12	15	15	15	16	17
Down	18	18	15	16	19	17	19	17	14	14	13	13	12
Average	-1.10%	-5.05%	-5.75%	-6.37%	-7.73%	-8.03%	-8.91%	-9.14%	-8.96%	-7.21%	-6.88%	-5.93%	-2.61%
Median	-1.00%	-1.20%	-0.66%	-1.21%	-2.13%	-1.83%	-1.67%	-2.55%	0.09%	0.24%	0.28%	4.59%	1.32%
Min	-10.23%	-37.31%	-61.60%	-73.16%	-89.06%	-74.75%	-92.08%	-128.68%	-119.80%	-73.24%	-96.04%	-96.36%	-86.27%
Max	7.17%	4.95%	6.88%	12.70%	11.47%	9.09%	9.08%	12.22%	14.59%	15.29%	15.45%	14.21%	38.65%

Source: BofA Global Research

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Exhibit 28: Price trend after the 50 day SMA crossed below the 200 day SMA when the 200 day SMA had a positive slope
Oil prices were lower 5 days, 25 days and 35 days 12 of 17 times

Ticker: CL1				Start Year: 1983		# Signals: 17		# < 80 days: 1				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	29%	35%	47%	41%	29%	41%	29%	41%	53%	53%	47%	53%	59%
Up	5	6	8	7	5	7	5	7	9	9	8	9	10
Down	12	11	9	10	12	10	12	10	8	8	9	8	7
Average	-1.99%	-4.33%	-5.22%	-5.06%	-5.29%	-6.21%	-7.46%	-5.59%	-5.55%	-5.11%	-7.41%	-7.91%	-5.67%
Median	-1.06%	-1.20%	-2.91%	-2.84%	-2.53%	-5.42%	-7.07%	-3.08%	0.91%	1.26%	-3.59%	0.70%	1.22%
Min	-10.23%	-27.90%	-38.94%	-37.82%	-41.14%	-56.22%	-60.84%	-59.33%	-81.37%	-71.96%	-96.04%	-96.36%	-86.27%
Max	5.37%	4.09%	5.30%	12.70%	8.39%	9.09%	7.90%	8.60%	9.72%	11.48%	12.79%	12.78%	16.39%

Source: BofA Global Research

BofA GLOBAL RESEARCH

S&P 500 after a golden cross

A golden cross for the S&P 500 tends to be a bullish event. Out of 48 signals since 1927, the S&P 500 was up 65-75% of the time 10-80 days later with the strongest points being 30 days and 70 days. A golden cross with price above the 200d SMA reduced the signals from 48 to 45 and looks to have removed some poor signals. Up ratios rose and average and median percent change inched higher (Exhibit 30). A golden cross when the 200d SMA had a positive slope resulted in a higher S&P 500 as much as 21 of 27 times 60 days later or up 78% of the time (Exhibit 31).

Exhibit 29: Price trend after the 50d SMA crossed above the 200d SMA
S&P 500 was up 65-75% of the time 10-80 days later

Ticker: SPX			Start Year: 1927		# Signals: 48			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	58%	67%	67%	65%	73%	75%	67%	69%	65%	67%	73%	75%	73%
Up	28	32	32	31	35	36	32	33	31	32	35	36	35
Down	20	16	16	17	13	12	16	15	17	16	13	12	13
Average	0.61%	1.27%	0.88%	1.28%	1.63%	2.29%	2.43%	2.64%	2.08%	2.51%	3.52%	4.16%	4.46%
Median	0.39%	1.11%	0.96%	1.47%	1.68%	3.17%	3.49%	2.76%	2.12%	3.42%	4.14%	4.44%	4.37%
Min	-4.99%	-4.46%	-13.39%	-7.83%	-8.23%	-8.24%	-9.99%	-11.78%	-11.28%	-9.76%	-9.68%	-11.09%	-14.87%
Max	9.11%	13.06%	15.78%	9.85%	17.21%	20.48%	28.82%	30.08%	16.64%	14.04%	17.42%	23.63%	21.84%

Source: BofA Global Research

Exhibit 30: Price trend after the 50d SMA crossed above the 200d SMA and price was above the 200d SMA
When a golden cross occurred and price was above the 200d SMA, the outlook is a little stronger as three signals are removed.

Ticker: SPX			Start Year: 1927		# Signals: 45			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	58%	71%	67%	64%	76%	78%	69%	71%	67%	69%	73%	76%	73%
Up	26	32	30	29	34	35	31	32	30	31	33	34	33
Down	19	13	15	16	11	10	14	13	15	14	12	11	12
Average	0.58%	1.46%	0.98%	1.39%	1.76%	2.36%	2.70%	2.85%	2.24%	2.63%	3.48%	4.24%	4.44%
Median	0.39%	1.23%	1.04%	1.47%	1.69%	3.20%	3.58%	2.82%	2.50%	3.42%	4.27%	4.52%	4.42%
Min	-4.99%	-4.46%	-13.39%	-6.54%	-8.23%	-8.24%	-7.84%	-11.78%	-10.26%	-9.76%	-9.68%	-11.09%	-14.87%
Max	9.11%	13.06%	15.78%	9.85%	17.21%	20.48%	28.82%	30.08%	16.64%	14.04%	16.26%	23.63%	21.84%

Source: BofA Global Research

Exhibit 31: Price trend after the 50d SMA crossed above the 200d SMA and the 200d SMA had a positive slope
There were 27 signals when a golden cross occurred with the 200d SMA rising and the tendency is to see a higher trend, too.

Ticker: SPX			Start Year: 1927		# Signals: 27			# < 80 days: 0				
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	48%	63%	70%	63%	70%	70%	63%	67%	63%	70%	78%	74%	74%
Up	13	17	19	17	19	19	17	18	17	19	21	20	20
Down	14	10	8	10	8	8	10	9	10	8	6	7	7
Average	0.01%	0.79%	1.19%	1.24%	1.39%	1.81%	2.70%	2.81%	2.05%	2.16%	3.14%	4.40%	4.78%
Median	-0.03%	1.12%	1.06%	1.47%	1.39%	2.79%	3.98%	2.82%	1.75%	2.05%	4.00%	4.52%	4.65%
Min	-4.99%	-4.46%	-5.72%	-6.54%	-6.03%	-8.24%	-7.84%	-11.78%	-10.26%	-9.76%	-9.68%	-11.09%	-11.33%
Max	3.55%	13.06%	15.78%	9.85%	17.21%	20.48%	28.82%	30.08%	16.64%	12.08%	16.26%	23.63%	21.84%

Source: BofA Global Research

S&P 500 after a death cross

A death cross for the S&P 500 is typically not a significant bearish signal (Exhibit 32). Price had a slight tendency to be lower 15 days later 28 of 28 times (or 58% of the time). However by 30 days later price was up 27 of 48 times (or 63% of the time). When the death cross occurred and the 200d SMA was declining (negative slope) then 15-20 days later the S&P 500 tended to be lower 17 or 23 times (Exhibit 33).

Exhibit 32: Price trend after the 50d SMA crossed below the 200d SMA
Not a significant signal. At best down 15 days later and up 30 days later

Ticker: SPX				Start Year: 1927		# Signals: 48			# < 80 days: 0			
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	55%	58%	42%	44%	56%	63%	56%	60%	58%	52%	58%	54%	60%
Up	26	28	20	21	27	30	27	29	28	25	28	26	29
Down	21	20	28	27	21	18	21	19	20	23	20	22	19
Average	-0.28%	0.09%	-0.82%	-0.62%	0.26%	0.87%	0.83%	1.15%	1.37%	1.73%	2.25%	3.14%	2.98%
Median	0.56%	1.02%	-0.59%	-1.26%	0.70%	1.26%	0.69%	1.52%	1.34%	0.95%	2.32%	1.05%	1.91%
Min	-6.34%	-10.78%	-15.48%	-14.55%	-13.59%	-17.26%	-23.34%	-17.04%	-27.73%	-26.97%	-19.99%	-19.59%	-19.59%
Max	5.35%	8.02%	8.95%	23.72%	32.87%	32.16%	37.38%	38.61%	45.93%	51.77%	55.23%	66.57%	55.14%

Source: BofA Global Research

Exhibit 33: Price trend after the 50d SMA crossed below the 200d SMA and the 200d SMA had a negative slope
A death cross with a declining 200d SMA tended to lead prices lower 15-20 days later.

Ticker: SPX				Start Year: 1927		# Signals: 23			# < 80 days:	0		
Days after	5 Day	10 Day	15 Day	20 Day	25 Day	30 Day	35 Day	40 Day	45 Day	50 Day	60 Day	70 Day	80 Day
% Up Ratio	57%	52%	30%	26%	43%	57%	39%	57%	52%	48%	57%	61%	74%
Up	13	12	7	6	10	13	9	13	12	11	13	14	17
Down	10	11	16	17	13	10	14	10	11	12	10	9	6
Average	-0.14%	-0.32%	-1.74%	-1.95%	-0.91%	0.01%	-0.48%	0.55%	1.23%	1.78%	2.10%	2.82%	3.90%
Median	0.56%	0.32%	-1.72%	-3.24%	-0.87%	0.21%	-1.47%	1.43%	0.49%	-0.24%	0.43%	1.19%	5.00%
Min	-4.80%	-10.78%	-15.48%	-12.79%	-11.05%	-15.48%	-10.85%	-12.39%	-11.99%	-11.92%	-15.62%	-9.95%	-11.07%
Max	5.35%	8.02%	8.65%	9.62%	9.79%	8.86%	11.49%	14.49%	17.30%	19.44%	16.05%	18.23%	20.85%

Source: BofA Global Research

Triple moving average cross (TMAC)

- As the name implies, the triple moving average cross system uses three moving averages to define trend and buy/sell signals.

- Typically it is a shorter term set up using the 10, 20 and 30 day moving average.

- TMAC Sum aggregates the 9 trend conditions available in TMAC to easily see trend and create a rule set for trading it.

Triple moving average cross as a trading system

The triple moving average cross trading system, or TMAC, utilizes three moving averages on a price chart. It generates signals when price closes through the moving averages and when the shorter period moving averages cross the longer period moving averages. It can consider changes in average slope, too.

In Chart 32 we show multiple sell signals in the middle of October and a down trend that followed. In December price consolidated and flirted with triggering buy signals but never confirmed. It wasn't until January that price rallied enough to trigger TMAC buy signals.

Chart 32: Price vs. three moving averages. Green = 10d, Purple = 20d, Red = 30d
Price versus three moving averages with buy and sell signals noted

Source: BofA Global Research, Bloomberg

TMAC down trend observations in 2018

In late November price action began breaking above the shortest period moving average when price closed above the green moving average (left black oval in Chart 33). Price never closed above the purple moving average which acted as closing resistance. It also didn't close above the red moving average and the green moving average never crossed above the purple. The slope on the purple and red average remained negative, or bearish, while the green turned sideways. In conclusion, the trend remained mostly bearish according to the failure of price action to break more resistance levels and the moving average conditions. During such a period some may have pared back their shorts in the event the trend changed to lock in gains from the downtrend already realized. It is also possible they began to sell again when price closed at a 12 day new low in mid-December.

Chart 33: Triple Moving Average Cross example (TMAC)
Support and resistance from the moving averages

Source: BofA Global Research, Bloomberg

TMAC up trend observations in 2019

As price was rising during January 2019 it closed above all three moving averages in just five trading days. Such a decisive break above all levels speaks to the change in trend that may be underway and the large capitulate range days at the December low. The moving averages crossed in January to confirm the price breaks. In February, price declined below two of the three moving averages and the green average almost crossed the purple one. Longs may have begun trimming their position due to some of these signals occurring however the red average held on a test and closing basis as support. When price rallied back above the averages and the green avoided a cross below the purple average, the uptrend is thought to have resumed.

TMAC Sum tracks trend strength, possible reversals

Using three moving averages and generally accepted moving average rules means there are nine conditions to evaluate. This includes where price is vs. each moving average (3), where each moving average is vs. the other (3) and the slope of each average (3). The below chart set up makes it simple to see how bullish or bearish the moving average trend conditions are and can be useful for creating a system, for example:

9. Be long when TMAC is greater than zero and be short when it is less than zero.

10. Buy when the TMAC sum = 9 (Max) and add to longs on any down day that does not reduce the sum. Reduce long if TMAC equals 6. Exit if it equals 3. Sell when the TMAC sum = -9 (Min) and add to shorts on any up day that does not reduce the sum. Reduce shorts if TMAC equals -6 and exit if equals 3.

11. Buy 1/3 when TMAC >= 3, another 1/3 when it >= 6 and a final 1/3 when it = 9. Exit part of longs on moves back to 5, 2 and 0. Sell 1/3 when TMAC <= -3, another 1/3 when it <= -6 and a final 1/3 when it = -9. Cover part of shorts on moves back to -5, -2 and 0.

As with any system, there are many considerations...
There are many other considerations however this is an introduction to the methodology behind trend following with moving averages. Other considerations may include filtering signals base on a long term moving average. For example, be long when TMAC is greater than zero and the 200 day moving average has a positive slope. This may better incorporate the long term trend with the shorter term signals. The above rules are written in a way to try and capture trends; however some markets trend more than others. For markets that tend to trend less, they may need a rule to exit when a certain gain is reached. And like we said on the front page "plenty of other conditions exist when technical traders, trend followers and systematic firms take action."

Chart 34: Triple Moving Average Cross example (TMAC) with sum of signals and paint bars for max condition
Color coded price bars and a histogram showing bullish and bearish conditions accumulated.

Source: BofA Global Research, Bloomberg

Measure momentum with RSI

- RSI is the most popular technical indicator, ahead of MACD and Bollinger Bands, and is used to measure and trade momentum.

- We review the essence of the RSI formula as well as the facts and myths of overbought and oversold trends.

- We also discuss our most preferred signals including a three troughed bullish divergence and three peaked bearish divergence.

Measure and trade with momentum

The Relative Strength Index (RSI), which is the most popular technical indicator used on Bloomberg, measures the momentum of a trend by comparing the average size of the up periods to the average size of the down periods over a specified timeframe, such as 14 days. Common thought suggests if momentum reaches an extreme then a reversal, or at least a consolidation, will occur. While this may be the short term outcome, sometimes the trend resumes until momentum finally depletes with a bullish or bearish divergence. In this primer, we will review RSI and the signals it can generate.

The essence of the RSI calculation and levels

If price went up $1.00 for 10 of the last 14 days and down $0.25 four of the last 14 days, then we know price went up on average much more than down. However, in financial markets, the up/down relationship is rarely this clear cut. This type of market may be described as overbought and the opposite as oversold. Both mean the market moved too far too fast. RSI is normalized to fall between 0 – 100. So when it is above 70, the trend is described as overbought. When it is below 30, it is described as oversold.

The facts and myths of overbought and oversold

The terms overbought and oversold mean the market may have risen or fallen too much, especially in the short term. Exiting or reversing a position solely because the market is deemed overbought or oversold may be the right trade for a short period of time but could be the wrong trade for the intermediate-term trend. One way of filtering this is to incorporate support and resistance. In theory, momentum complements a breakout similar to greater than average volume. If price and momentum break up through resistance, the expected overbought dip could be buyable. Similarly, if price and momentum break down through support, a bounce may be sold.

Momentum trades vs momentum trends

In a trend-less market, also referred to as a sideways or range-bound trend, RSI rarely moves through overbought or oversold readings. When price reaches the high end of the range and RSI is equal to or less than its prior peaks, price can be sold. If price were to breakout to new highs and RSI is still not overbought, then the breakout lacks confirmation from RSI and may soon fall. However, when price and RSI break out together, a new uptrend is under way, and longs could be held or added to in a dip.

Price vs RSI divergences signal a trend is changing

When prices make lower lows and the RSI indicator makes higher lows, a bullish divergence is forming. Conversely, when price makes higher highs and RSI makes lower highs, a bearish divergence is forming. Think of price as a car and RSI as the foot on the accelerator. If a car is going uphill and the foot is pushing the accelerator, then the car is moving uphill. However, if the pressure on the accelerator starts to decrease, the car will be climbing the hill at a slower speed (with less momentum). Eventually the car makes it to the top of the hill, or the peak of the uptrend, and the foot comes completely off the pedal. If the bearish divergence is correct, all that's left is for the car to go down the hill.

Chart 35: RSI is the most popular technical indicator (excluding moving averages) - Example 1
Understanding overbought, oversold and RSI divergences.

Source: BofA Global Research, Bloomberg

Adjust overbought and oversold levels for trend direction

In the above chart, another important aspect of using RSI is shown. When markets are in a downtrend, naturally they should be oversold more often than not. When markets are in uptrends, they should be overbought more often. When a clearly defined trend is present, it usually makes sense to adjust the overbought and oversold levels. In uptrends, consider using 40-80 and in downtrends 20-60. If price is in a downtrend and reverses so RSI fails at 60, it is still in a downtrend. If RSI moves through 60, the downtrend may be near an end. The same goes for an uptrend and the 40 level.
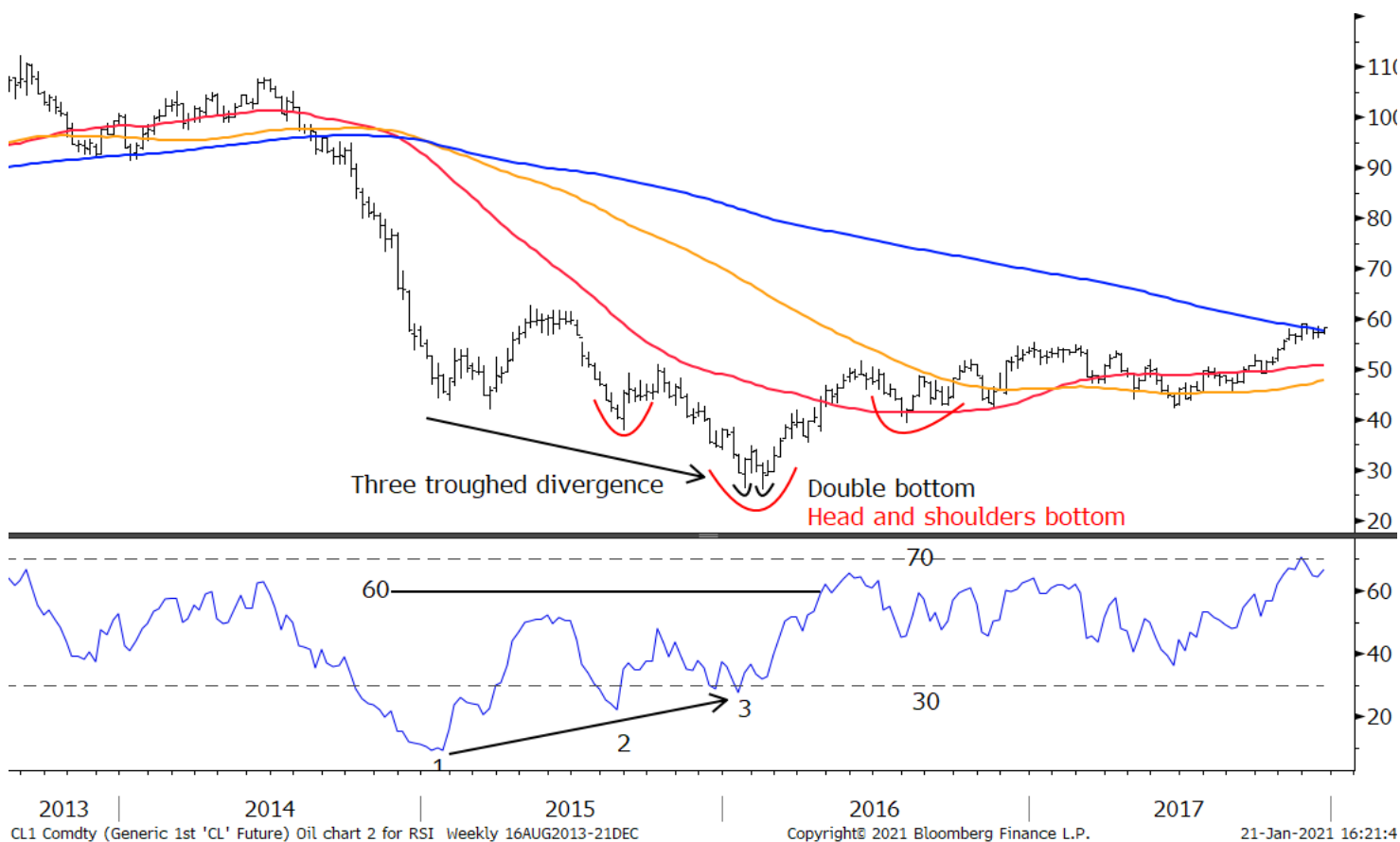
Three troughed divergences are strong reversal signals

When prices undergo three momentous moves lower and the rate at which those moves occur is less severe each time, a strong "bullish divergence" signal is forming. In Chart 2 below, we show the difference between a small divergence, which can still be valid and is tradable, and a longer-term bottoming process. Price levels at points 1, 2 and 3 are lower while the RSI lows are higher. This is a three troughed bullish divergence. By the third point, a double bottom formed and this led to a large rally. This rally led RSI to break up through the 60 level confirming the end of the downtrend signaled by the three troughed divergence. However, RSI has since failed to reach the standard overbought threshold of 70 since early 2011 and so price still lacks momentum for an uptrend. Price has also yet to break trend line resistance. If price were to move above the trend line and RSI reaches 70, then technically a new uptrend may be forming.

Chart 36: RSI example 2
A bullish RSI divergence as part of a head and shoulders bottom pattern

CL1 Comdty (Generic 1st 'CL' Future) Oil chart 2 for RSI Weekly 16AUG2013-21DEC   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 16:21:4

Source: BofA Global Research, Bloomberg

Three peaked divergences are strong reversal signals

When prices undergo three momentous rallies and the rate at which those moves occur is less overbought each time, a strong "bearish divergence" signal is forming. In Chart 37 below, we show a three peaked divergence in addition to some other signals and topics discussed in this larger report.

In this example, price was rising for much of 2013-2017. However, the bearish divergence began building in late 2015 and into 2016. A TD Sequential '13' sell signal formed at the third peak of the divergence and what turned out to be the head of a head and shoulders top. The neckline and trend lines were later broken, suggesting the trend was down.

Chart 37: RSI Example 3 including TD Sequential, Head and Shoulders top and trend lines
A bearish RSI divergence as part of a head and shoulders top.

Source: BofA Global Research, Bloomberg

Mighty MACD

- No one likes to be late to a trend. Waiting for moving average crosses takes time and leads to price moving away from the high/lows.

- MACD provides earlier signals by comparing the spread between two moving averages to an average of the spread.

- Get to know MACD and you may be earlier to trend reversals. Signals occur when the lines cross and when they diverge from the current trend.

## MACD provides earlier signals than moving averages

Waiting for a moving average cross can take a while. Often price moves away from the highs or lows, creating a less opportune time to trade and the feeling of being late to the move. The Moving Average Convergence Divergence indicator (MACD) attempts to provide an earlier signal by tracking the spread between two moving averages (MA).

MACD = Spread of two MA vs an MA of the spread

The MACD line is the spread between two exponential moving averages of price. Typically it is the spread between the 12 and 26 period averages. A second line, called the Signal Line, is the 9 period moving average of the MACD line. Plotted on the same panel below price, the MACD1 line is in black and the Signal line is in red; crossings create reversal signals.

Chart 38: Example of two exponential moving averages and MACD signals
The MACD line is the spread between two moving averages of price. The signal line is a moving average of the MACD line.
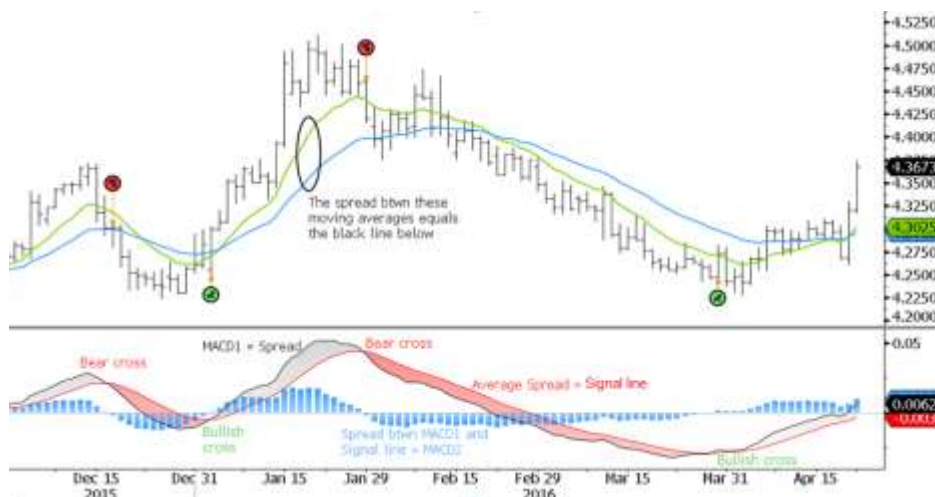
Source: BofA Global Research, Bloomberg

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Bullish and bearish MACD cross signals

The chart above highlights bullish cross signals with green circles and bearish signals with red circles. It is bullish when the MACD1 line crosses above the Signal line while less than zero. It is bearish when the MACD1 line crosses below the Signal line while greater than zero. Bullish or bearish crosses that occur when positive/negative can complement continuation patterns, such as a flag or pennant pattern. It is also considered bullish when the MACD line crosses above zero and bearish when it crosses below. This is the same as the underlying MACD1 moving averages crossing on the price chart.

Price and MACD divergences warn of a change in trend

The overall trend of price and MACD can lead to trend changing conditions that a MACD cross confirms. When price continues to trend to new highs or lows and MACD fails to do the same, a divergence is occurring.

Bearish divergence can lead to a market decline

Below is an example of a two peaked bearish divergence. Price was in an uptrend guided by two trend lines of short and long duration. A small head and shoulders top pattern developed with two TD Sequential trend exhaustion signals on the head of the pattern. During the formation of the head, price and MACD were bearishly diverging. Price was at a higher high while MACD was at a lower high. Then the MACD1 line crossed below the signal line. The neckline support broke projecting price down to trend line support. After grinding slightly higher between the trend lines, price could not break horizontal resistance, so it broke down below the long term trend line and declined.

Chart 39: Example of a bearish divergence
MACD bearish divergence and bearish cross as part of a head and shoulders top pattern.

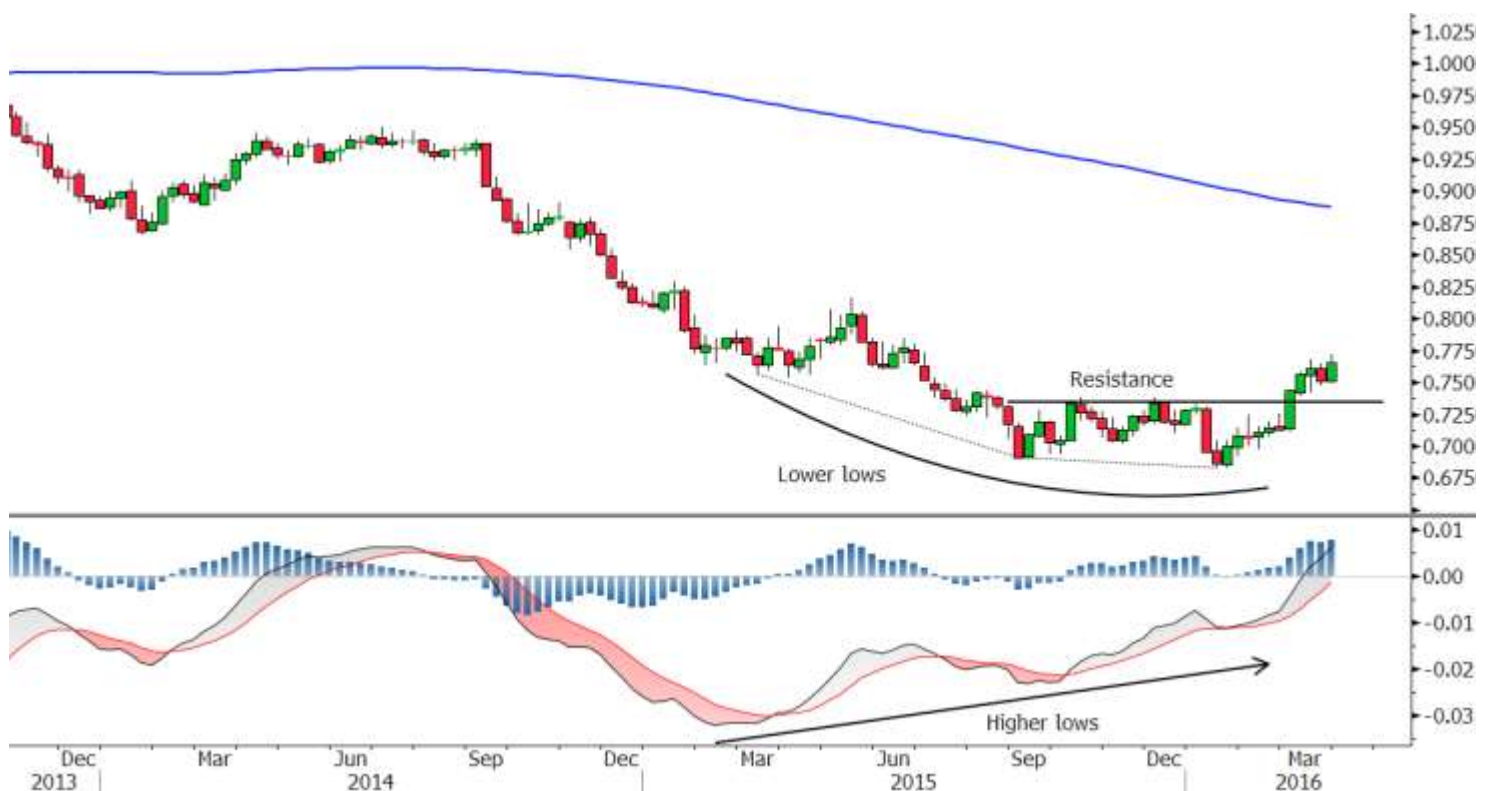Source: BofA Global Research, Bloomberg

A bullish divergence can lead to a rally

Below is an example of a three troughed bullish divergence. Price trended to lower lows three times while the MACD indicator graduated to higher lows. It wasn't until a third low in price and third higher low in MACD that the downtrend turned into an uptrend. The break of resistance in March added confirmation of an uptrend where in 4Q16 it continued to fail at resistance. Later, the MACD line crossed above zero, also indicating an uptrend.

Two vs three trough divergences

Going long in September or October 2015 near the second higher low or bullish cross would have been a reasonable attempt to take advantage of a two troughed divergence. However price action after this point did little to confirm an uptrend would begin, such as breakout higher through resistance. Due to the lack of confirmation, new longs may have chosen to exit. The decision to go long again would be considered when the third low occurred in January 2016.

Chart 40: Example of a MACD bullish divergence
Bullish MACD divergence

Source: BofA Global Research, Bloomberg

Timing a MACD cross with the MACD histogram

The prior chart also had a signal for a counter trend rally according to the MACD histogram. The MACD histogram (dark blue) measures the distance between the MACD and Signal line. When prices are declining to new lows and the MACD histogram is making higher lows, then a bullish MACD cross is approaching. This can be seen in the MACD histogram trend from September 2014 through March 2015. The MACD lines eventually crossed bullish and a rally followed. However, in this example, the rally ended with the market selling into the highs of three consecutive trading days and no break of resistance. So in this example, the MACD histogram divergence signaled a short term trend reversals where the larger trend may or may not be ending. A three troughed divergence was the final end to the downtrend.

Chart 41: Example of MACD histogram signal
Bullish MACD divergence, candle patterns and resistance

Source: BofA Global Research, Bloomberg

Example top, reversal and continuation

An uptrend was under way into the end of December 2016. A bearish price vs MACD divergence began to form and price was failing to continue its rally higher. During the first week of January, the MACD line crossed below the Signal line (Bearish cross). One more intraday rally occurred with a new high that was faded by the market (the third high of the triple top). This formed a small triple top as price plunged lower two days in a row. The MACD line also declined to a new low adding confirmation to the top and decline. A downtrend followed until a bullish MACD histogram divergence warned of a bullish MACD cross. The MACD lines did not diverge; however, a cross occurred and a rally followed. Then another bearish MACD histogram divergence formed, warning of a bearish MACD cross. The MACD line then crossed below the signal line suggesting a deeper decline to follow. Price closed at short term support and traders may use a break of that support as addition confirmation of a decline.

Chart 42: Bullish and bearish MACD crosses, divergences and histogram divergences
An uptrend that topped with a bearish MACD divergence, cross and then turned up again with a MACD histogram signal

Source: BofA Global Research, Bloomberg

Bollinger Bands

- The Bollinger Band (BB) indicator is the third most popular indicator after the Moving Average Convergence Divergence (MACD) and Relative Strength Index (RSI).

- It plots a moving average and two standard deviation bands on the price chart and two oscillators below the price chart called bandwidth and %B.

- Price tends to stay within the standard deviation bands however excessively narrow or wide bands can generate trade signals. Bandwidth and %B support trade ideas.

## The Bands are +/- 2 std dev from the 20 period average

The Bollinger bands are usually calculated with a 20-period moving average. The higher band shows the current value of two standard deviations above average. The lower band is two standard deviations below the average. The middle line is the average. The bandwidth oscillator measures the difference between the standard deviations bands. In Chart 43, we have also calculated a moving average on the bandwidth to define a narrow and wide band bias. The %b oscillator measures where price is relative to the bands. Price is above the upper band when %b is greater than 1, price is between the upper band and average when between .50-1, it is between the average and lower band when between .50-0 and below the lower band when below 0.

BB's is a mean reversion and trend breakout indicator

The BB indicator signals for mean reversion trades and breakout trades. The bands often serve as an estimate of support and resistance levels. When markets are range bound prices tend to trade between the bands. When the bands are narrow relative to the past and prices break out through a band then a new trend and trade in the direction of the breakout is signaled. Price trends with widening bands until the bands become too wide. Trades can be exited when bands are excessively wide, when price comes back inside the bands or when price reaches the moving average band.

Chart 43: Bollinger Bands example 1
The Bollinger bands are comprised of a moving average, a +2 std dev line, a -2 std dev line, a bandwidth line and % bandwidth line.
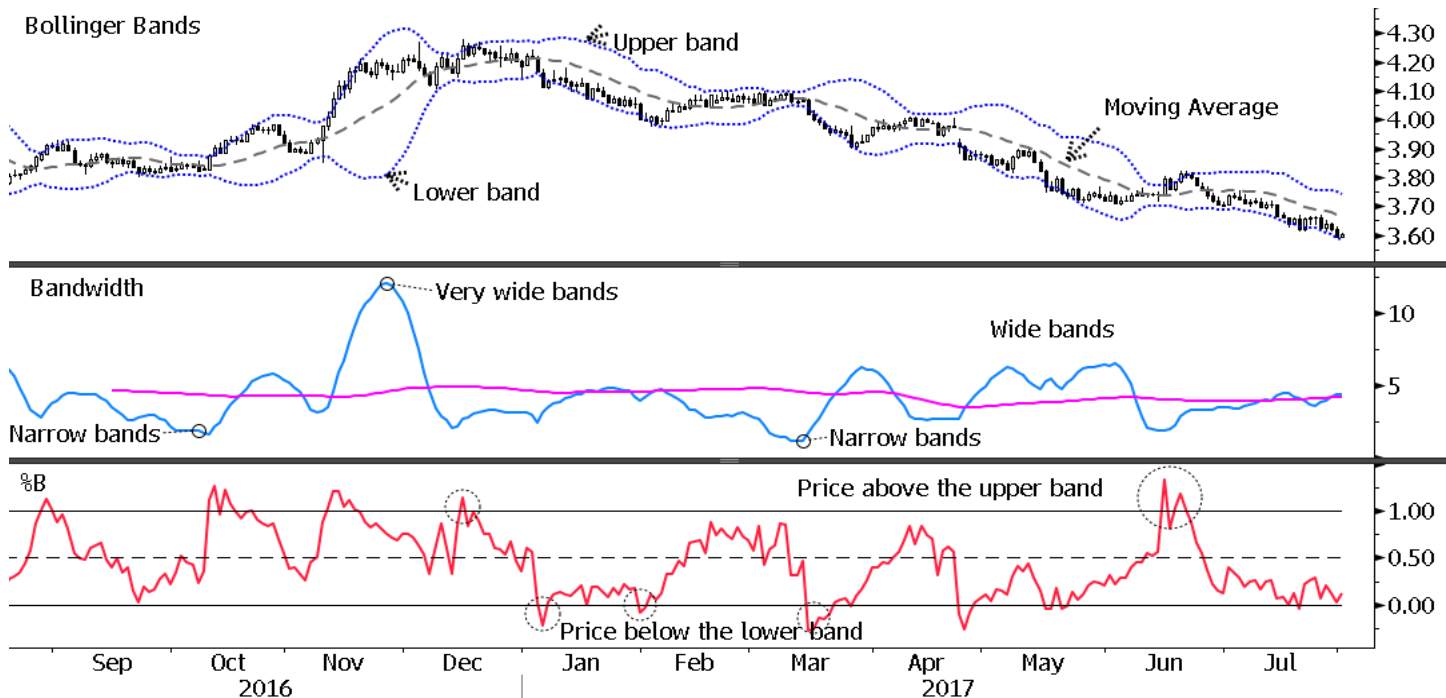
USDPLN Curncy (USD-PLN X-RATE) Bollinger bands chart 1 Daily 19AUG2016-01AUG2017   Copyright© 2022 Bloomberg Finance L.P.   21-Jan-2022 12:46:40

Source: BofA Global Research, Bloomberg

Trading with Bollinger bands

The chart below shows an example of four bullish breaks and three bearish breaks. By following the generally accepted rules five of them were winning trades and two were losing trades. We connect some examples with the candle patterns discussed previously.

Bullish breaks 1 and 2

At "Bullish break 1" the bandwidth was considered narrow as it was below the bandwidth average. Price closed above the upper band and trended higher for about nine trading days. Then it started moving sideways as the bandwidth became wide. Two doji candles formed which suggest the prior trend may be ending. Price began to revert to the mean. The bandwidth narrowed again and another bullish breakout occurred. A larger rally followed and the bands became very wide, which is often unsustainable. Price action began to move sideways and eventually reached the moving average.

Bearish break 1, 2 and 3

In January 2017, bearish break down 1 occurred with a narrow bandwidth. This trade worked as price "rode the band" lower for about a month until the bandwidth reached average width and a doji candle formed. Price then reverted to the mean. The downtrend continued at "Bearish break 2" when price closed below the lower band when the bandwidth was at its narrowest point all year. Prices declined and the bandwidth widened to its highest level since November 2016. Price then reverted to the mean. This example shows that exiting a trade at the mean often results in a late exit. Bearish break 3 worked particularly well because price never moved through the mean when it bounced in May. A rules-based technical trader or system may not have exited until early June when price reached the average, however this is subjective.

False break 1 and 2

In December 2016, a close up through the upper band with a narrow band reading occurred. This was a false break as price quickly reverted back to its mean. Similarly, in June 2017, price closed above the upper Bollinger band twice while they were narrow. A short-lived rally occurred, and then it quickly reverted to its mean.

Chart 44: Bollinger Bands example 2
Bullish and bearish Bollinger band signals
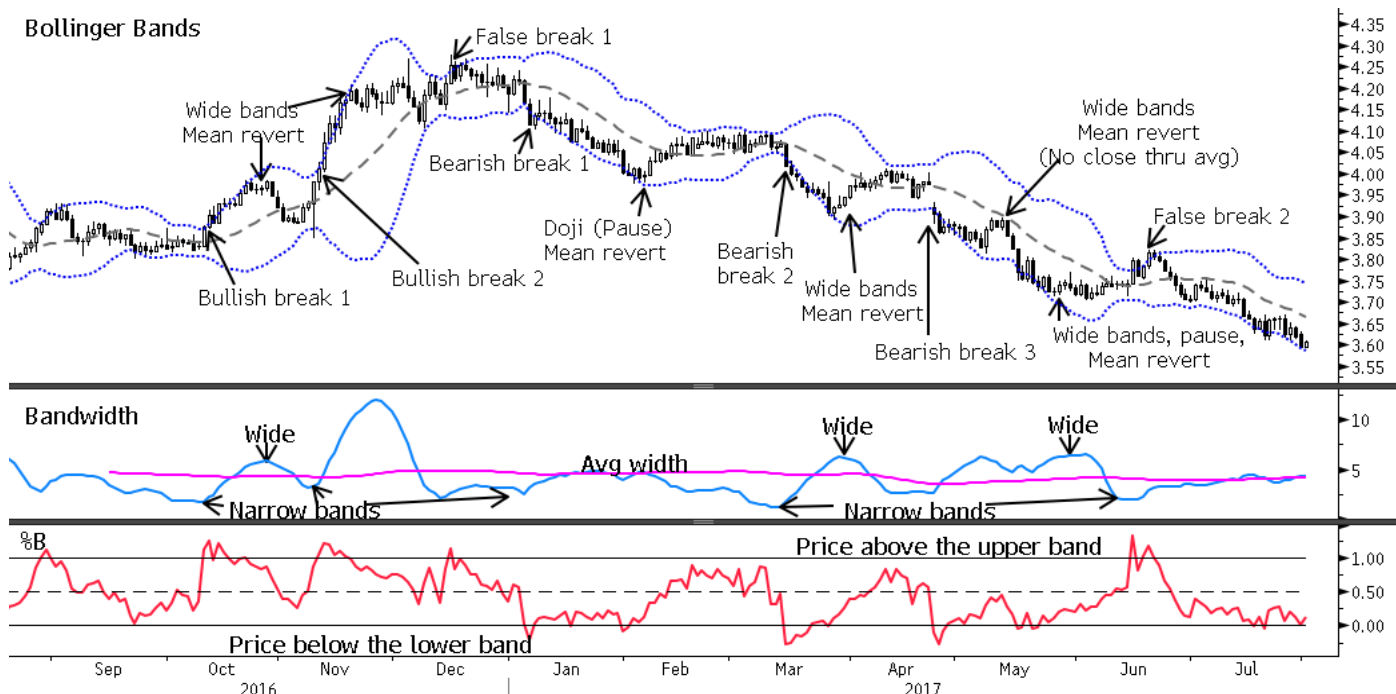
USDPLN Curncy (USD-PLN X-RATE) Bollinger bands chart 2 Daily 19AUG2016-01AUG2017   Copyright© 2022 Bloomberg Finance L.P.   21-Jan-2022 12:48:10

Source: BofA Global Research, Bloomberg

Do they work? Bollinger band breakouts in G10 FX

Bollinger bands is a popular technical indicator, but does it work? We reviewed G10 currencies versus a 26-week Bollinger band, considered bandwidth and applied a longer term average trend factor. The following is an excerpt from the following report that contains more information: Quantifying Technicals: Bollinger Bands in G10 FX

1) G10 FX tends to breakout more than mean-revert
When price first closes outside the Bollinger bands, average returns over the subsequent 1-week to 12-weeks have for the most part continued in the direction of the breakout. EURUSD and USDJPY saw the best hit ratios and average returns (Error! Reference source not found.).

2) Improve signal quality with bandwidth and trend factor
Signals tend to have higher quality when the signals occur amid a narrow bandwidth and when the signals are with the long-term trend. The top 5 signals in G10 FX have a hit ratio of 70% to 85% with average return in 8 to 12 weeks from 0.8% to 2.5%. (Exhibit 34)

3) Bearish USD breakout signals have better hit ratios
Overall, bearish USD vs G10 FX performed better than bullish signals. GBP appears to be the only exception in G10 where the signal hit ratios and average returns are higher for when the currency depreciates versus the USD. (Error! Reference source not found.)

Exhibit 34: Top 5 G10 FX technical signals derived from the Bollinger band
Top 5 signals have hit ratios ranging of 70% to 85% and average return ranging from 0.8% to 2.6%

Pair	Breakout	Horizon	# of signals	Hit Ratio	Average Return	Median Return	75th Percentile of Return	25th Percentile of Return
EURUSD	Bull or Bear	8-week	24	71%	1.2%	0.5%	2.1%	-0.3%
AUDUSD	Bull or Bear	8-week	19	79%	0.8%	1.3%	3.6%	0.7%
USDJPY	Bearish	12-week	19	70%	2.0%	1.0%	4.1%	-1.7%
USDCHF	Bearish	8-week	13	85%	2.6%	1.1%	5.0%	-1.3%
USDSEK	Bearish	12-week	17	71%	1.7%	0.9%	3.5%	-2.4%

Source: BofA Global Research, Bloomberg

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Stochastics

- The stochastics indicator is an oscillator that measures the momentum of a trend similar to the Relative Strength Index (RSI).

- In comparison to RSI, the stochastic indicator has multiple lines where the momentum measure is represented by %K and the rest are moving averages.

- The indicator measures if price is closing closer to the highs or the lows over time. When one direction persists the trend becomes overbought or oversold.

Stochastics explained

The Stochastics indicator is a momentum study similar to the Relative Strength Index (RSI). It measures whether price is consistently closing each trading session nearer to the highs or lows of the session. Depending on the speed at which one prefers to trade, there are two stochastic oscillators, a fast and a slow. The %K line is considered the stochastic indicator line while the %D line is a moving average of the %K.

Bullish and bearish stochastic signals

The indicator rises and falls on a scale between 0 and 100 where overbought is typically set at 75 and oversold at 25. When the stochastic %K and %D lines are in overbought or oversold territory, it means the prior trend is getting stretched and becoming vulnerable to a consolidation or reversal whether it be tactical or medium term. When the %K line crosses the %D line when stretched a reversal signal occurs. When these lines exit stretched territory the tactical trend change is underway as price and momentum revert.

Another way to view the stochastic lines is to seek divergences from the price trend. When prices are rising and the stochastic is making higher highs, then the trend is strong. When the stochastic starts to make lower highs while the price trend is still making higher highs then a bearish divergence has formed and price might peak soon. One example of a bearish divergence can be seen in July-August 2020 in the chart below.

Chart 45: Stochastics on the US long bond treasury future in 2020 (G 1493)
An example of a bearish divergence between rising prices and lower overbought highs in slow stochastics.

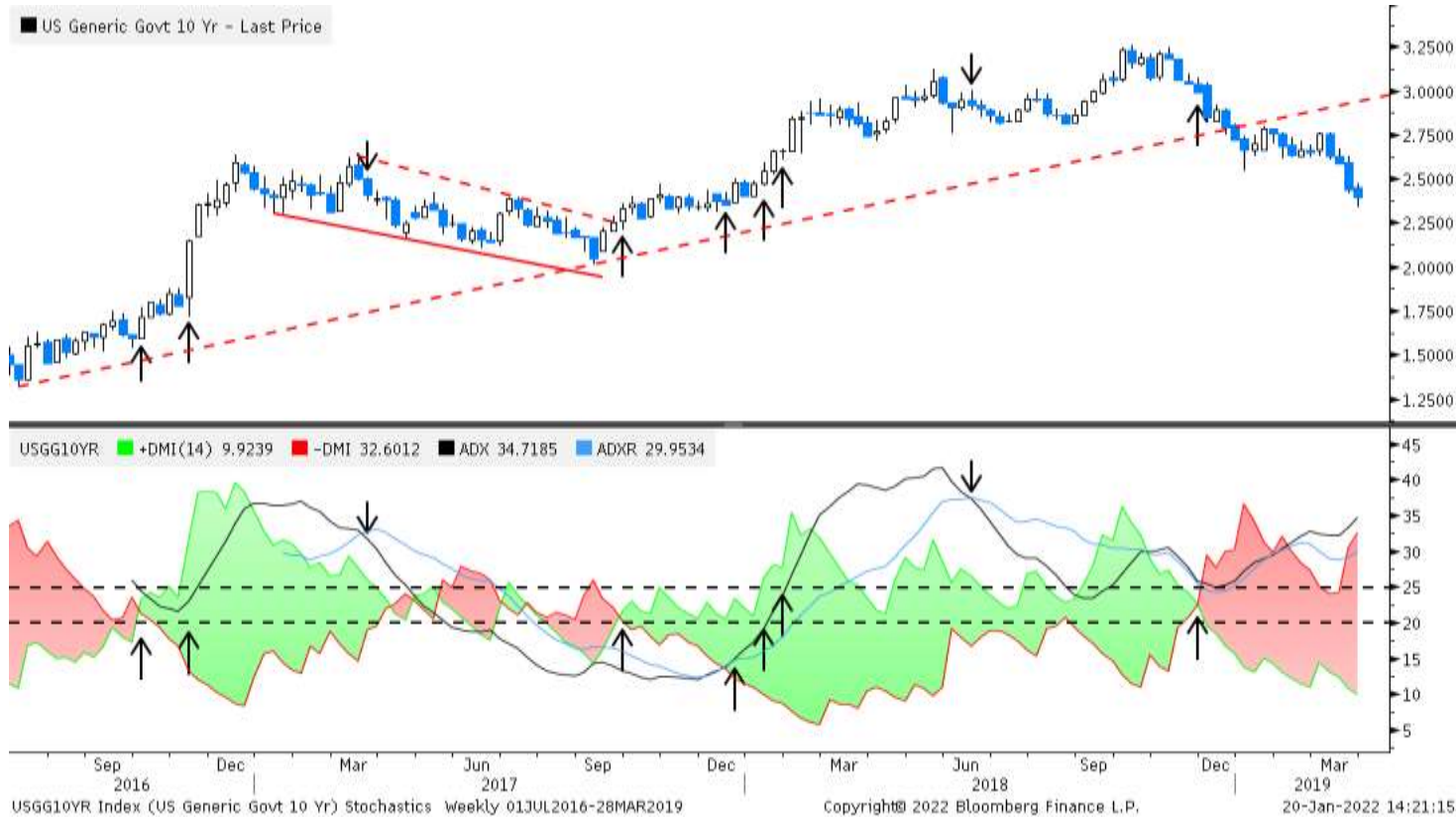Source: BofA Global Research, Bloomberg

DMI and ADX

- The Directional Movement Indicator (DMI) and Average Directional Movement indicator (ADX) define a trend as up, down or range bound.

- The DMI has two lines: The +DMI line tracks higher highs and a –DMI tracks lower highs. When the +DMI is above the –DMI, the time series is rising.

- The ADX line measures trend strength, or lack thereof. When the ADX is above 25 then price is described as trending, below 20 range bound and between is transition.

DMI and ADX Explained

The DMI indicator is comprised of two lines, a +DMI (Green) and –DMI (Red). The green line rises when prices are making higher highs and the red line rises when prices are making lower lows. When the green crosses above the red it suggests the time series is rising (October 2016, Sept 2017) and when the red crosses above the green it suggests the time series is falling (December 2018).

These lines are often used in conjunction with the ADX and ADXR lines. The ADX is a combination of the DMI lines and is used to define the path of prices as range bound or trending. When the ADX is below 20 it is said to be in a range (2H17). When the ADX rises above 20 price may be transitioning to a trend. If the +DMI is above the –DMI then the ADX crossing above 20 would suggest a transition toward an uptrend (January 2018). When it rises above 25 then price is trending (January 2018). The ADXR is a moving average of the ADX. An early indication of a trend starting is when the ADX is below 20 and crosses above the ADXR (December 2017). An indication of a trend ending is when the ADX is higher, such as 40, and crosses below the ADXR (March 2017, June 2018).

Chart 46: Example of the DMI and ADX on crude oil in 2017-2018 (G 1494)
DMI and ADX signals on US 10Y yield from 2016-2019

Source: BofA Global Research, Bloomberg

Into the cloud – Ichimoku Analysis

• Ichimoku analysis defines trend direction, support, resistance and offers many trend-changing signals.

• The cloud is the most referenced part. Signals occur when price breaks through the cloud and when the cloud lines cross.

• Additional signals are derived when the conversion line crosses the base line and based on the position of the lagging line.

Ichimoku defines trend direction, support and resistance

This indicator consists of five lines overlaid on the price chart that define the trend as up, down or range-bound, and provide estimated levels of support and resistance. It is often combined with candle pattern signals and a momentum oscillator, such as RSI. The more technically savvy may apply Heikin-ashi candles with Ichimoku.

The five lines: two sets of two and a lagging one

The five lines that comprise the Ichimoku indicator include the conversion line, base line, leading span one, leading span two, and the lagging line. The conversion line and base line are used together. Leading span one and leading span two are used together and create the "cloud." The lagging line is often compared to price and the cloud.

Chart 47: USD/JPY - Weekly Ichimoku
The five lines that comprise the Ichimoku cloud indicator

Source: BofA Global Research

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Ichimoku is a series of midpoint calculations

The conversion line is a rolling midpoint of the last nine days. The base line is a rolling midpoint of the last 26 days. Leading span one is the average of the conversion line and base line. Leading span two is the midpoint of the high and low over a look-back of twice the base line, in this case, 52 days. The leading span lines are shifted forward in the chart by the look-back period minus one (25) and form the cloud. The lagging line is shifted back in time by the same amount the leading span lines are shifted forward.

Bullish signals from Ichimoku

A variety of signals can be derived when using Ichimoku. Many market participants focus on price vs. the cloud, the cloud crosses and the thickness of the cloud. A summary of bullish signals are as follows. The opposite would be considered bearish.

Ichimoku cloud signals

- The cloud, which is the area between leading span one and leading span two, provides support in uptrends and resistance in downtrends.

- The cloud is shifted forward on the chart to estimate future levels of support and resistance and their strength. The thicker the cloud, the more support or resistance is present.

- When leading span one crosses above leading span two, it is bullish.

- If price enters the cloud, the trend is viewed as range-bound or trendless. But when price exits up through the cloud, it suggests the new trend is higher.

Chart 48: Examples of signals derived from Ichimoku
Examples of bullish and bearish signals an d of support and resistance from the Ichimoku cloud

Source: BofA Global Research

The conversion line and base line signals

- Used for short-term trend signals, just like moving averages.

- It is bullish when the conversion line crosses above the base line while above leading span one and two. It is bearish when the conversion line crosses below the base line while below leading span one and two.

- When these lines exit the cloud, it confirms a new trend.

The lagging line signals

- It is bullish when the lagging line is above the price compared at that point.

- It is bullish when the lagging line crosses up through the cloud. The cloud also can provide support or resistance to the lagging line.

TD Sequential: Green 9s and red 13s

- TD Sequential® is comprised of two parts, the TD Setup® and TD Countdown®.

- TD Setup signals short term trend exhaustion with a green 9 on the chart. It points to a consolidation or correction for one to four periods.

- TD Countdown signals indicate trend exhaustion with a red 13 on the chart. It warns of a trend change within the next 12 periods.

TD Sequential indicator signals trend exhaustion points

The primary goal of the TD Sequential indicator is to identify a short-term and long-term exhaustion point in a trend. It is comprised of two parts: TD Setup and TD Countdown. For short-term trend exhaustion signals, it will paint a green 9 on the chart. For long-term trend exhaustion signals, it will paint a red 13. When it prints a 9 or 13 above the price bars, it implies the prior up-move may be ending and turning sideways or down. When it prints a 9 or 13 below the price bars, it implies the prior down-move may be ending and turning sideways or up such as that shown in Chart 49.

The green 9 pattern is the first part = TD Setup

The TD Setup is the proper name for a green 9 signal. It is the first part of the TD Sequential indicator. It is finalized on the chart only when nine consecutive price bars have a close greater than or less than the close four bars prior. Nine consecutive closes above the close four bars prior is a sell 9 signal. Nine consecutive closes below the close four bars prior is a buy signal, like in Chart 49. The ninth bar tends to be a point where the prior trend pauses or reverses for up to four price bars

The red 13 pattern is the second part = TD Countdown

The TD Countdown is the proper name for the 13 red numbers. It is the second part of the TD Sequential pattern and can only occur after a TD Setup completes. In a downtrend like in Chart 1, it seeks 12 bars that have a close lower than the low two bars prior. The pattern does not have to occur consecutively like the TD Setup, but it could. The 13th bar has to have a low less than the low of the red 8 in the countdown. A red 13 suggests the prior is exhausted and may turn. It is recommended to find confirmation of trend exhaustion over the next 12 bars with other indicators. The chart below is an example of a bullish TD Sequential pattern where the TD setup 9 signaled a bounce and the TD countdown 13 signaled a timely trend change to up.

Chart 49: Example bullish TD Sequential signals
TD Setup 9 buy signal and TD Countdown 13 buy signal comprise the TD Sequential indicator.
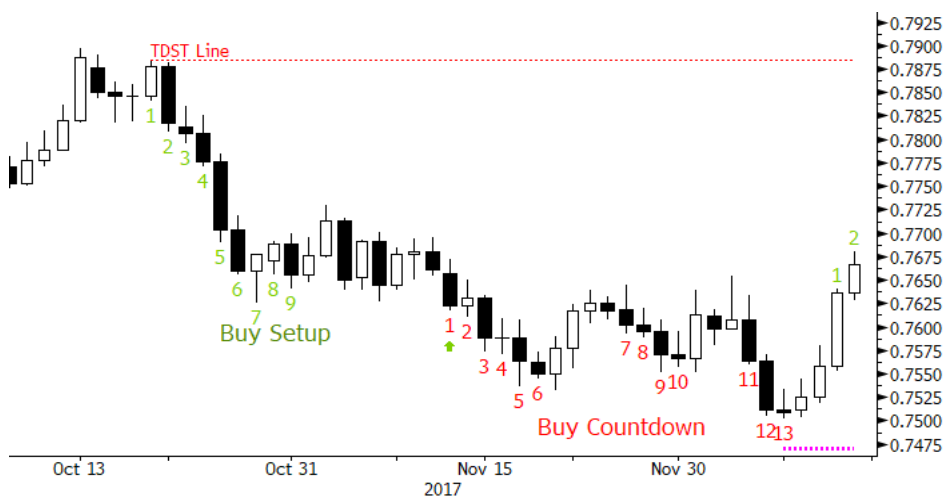
AUDUSD Curncy (AUD-USD X-RATE) TD Sequential Daily 09OCT2017-14DEC2017   Copyright© 2020 Bloomberg Finance L.P.   20-Oct-2020 17:28:47

Source: BofA Global Research, Bloomberg, DeMark Analytics

Horizontal lines

When a TD Setup completes, a red dotted line is drawn from the highest true high or a green dotted line from the lowest true low of the setup bars. This price level represents the most the trend can reverse to void the following TD Countdown from occurring. If price breaks through that line satisfying some specific rules then the line turns solid and the trend has reversed. These lines are called TDST Lines®.

A dotted magenta line is drawn on the chart when a TD sequential countdown completes. This estimates risk, or how much price may continue in the current direction. It is viewed as support in a downtrend and resistance in an uptrend. If price breaks through this level satisfying some specific rules then the line turns solid suggesting the prior trend is not exhausted after all. It is referred to as the TD Risk Level®.

Multiple setups and countdowns

Multiple TD Sequential counts can occur simultaneously. When a green 9 occurs on or near a red 13, it is thought to be a stronger signal. Also, when a 9 or a 13 occur on the daily and weekly chart it is thought to be a stronger signal.

Setup perfection arrows, recycling and plus signs

There are three other good-to-know outputs to TD Sequential. Green and red arrows apply to the setup. They suggest the setup is perfected or more complete with an arrow than without. A perfected sell setup occurs with a green 9 and when the high of bar eight or nine is greater than or equal to the high of bar six and seven. If it is not perfected, the arrow will appear later when a high exceeds bar six and seven. In Chart 49 the perfected buy setup arrow occurred nine days after the 9 buy signal.

An R symbol may occur during the countdown phase. R stands for recycle and it suggests the momentum of the trend as measured by an extended TD setup of 22 bars is too much to continue the current countdown. So it places an R on the chart and starts the countdown from the most recently completed TD Setup. (Chart 50)

A plus sign will show on the chart after a red 12 and before a red 13. It delays a 13 signal to allow for the 13 to have a high (or low) greater than or less than the close of the red 8 in the countdown. (Chart 51)

Chart 50: Recycle example
When a countdown recycles due an "R" shows on the chart.

Source: BofA Global Research, Bloomberg, DeMark Analytics

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Chart 51: Plus sign example
A + sign on the chart means an additional rule needs to be true for a 13.

Source: BofA Global Research, Bloomberg, DeMark Analytics

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Digital Assets & Technical Analysis

This section is an excerpt from the [Digital Assets Primer: Only the first inning](#) published on October 4, 2021. It provides more examples on using the aforementioned technical tools on bitcoin.

Technically explaining digital asset markets

Many technical strategies have proven valuable in timing entry into and exit from digital asset markets such as bitcoin. In this section we recap a few technical methods that have proven valuable in recent years including support and resistance levels, trend lines, a head and shoulders top pattern, Fibonacci and the Relative Strength Index (RSI). This section is meant to offer more examples of technical theories discussed in this primer. This section along with the rest of the content in this report is not forward looking.

## Bitcoin had a trend line in 2016-17 that broke in 2018

Trend lines imply trend direction and signal change

A trend line is a guide to the overall direction of the market in an upward, sideways or downward direction. It is present for four reasons:

1. Estimate support in an uptrend as price corrects the larger trend. Support is a level where buyers outnumber sellers resulting in prices turning up.

2. Estimate resistance in downtrends during relief rallies. Resistance is a level where sellers begin to outweigh buyers, which turns prices lower.

3. Create a parallel channel line based on 1 and 2. A support line in an uptrend can be used to estimate the top of a channel. The resistance line in a downtrend can be used to estimate the bottom of a channel.

4. When a trend line is broken, the trend has changed.

Chart 52: XBT/USD trend line examples
Green arrows show support, red arrows resistance, a channel formed in 2015-2017, breakouts tend to retest lines and those levels can be traded such as mid-2017 and 4Q218.

Source: BofA Global Research, Bloomberg
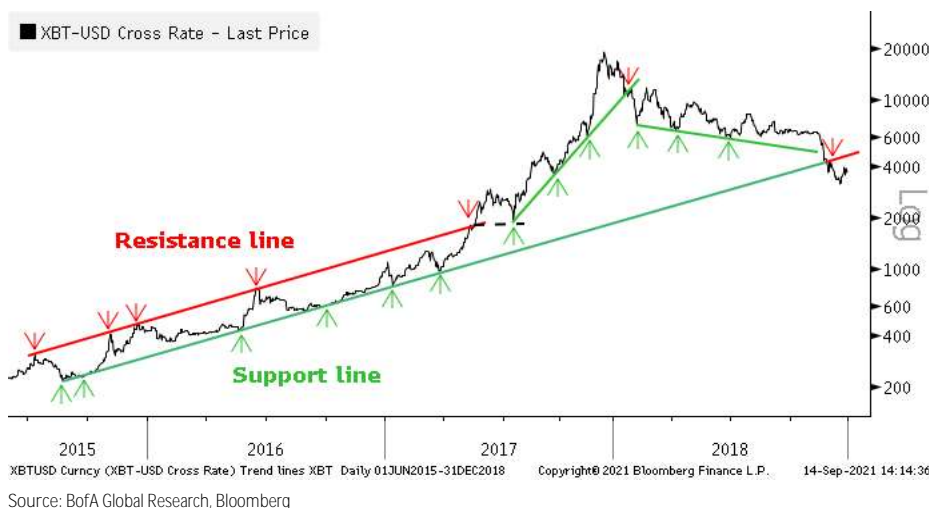
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When is a trend line broken?

A variety of characteristics help to differentiate good trend lines from not so good ones. There are also a few ways to define a trend line as broken. For more on this, please see [page 11](#) in the Terrific Trend Lines section and Chart 53 as another supporting example.

Chart 53: XBT/USD with Average True Range indicator (ATR)
When price rallied above the resistance line, the ATR was rising and confirmed the breakout higher.

Source: BofA Global Research, Bloomberg

Projecting price after a qualified trend line break

There are a few ways to calculate targets after price breaks a support or resistance line. The most straight forward way is to take the height of a prior trend and add it to the breakout point. In Chart 54 below, we take the height of the channel and add it to the breakout point to estimate an initial target. If price broke below the support line, we would take the height of the channel and subtract it from the breakdown point to estimate an initial target.

Chart 54: XBT/USD - Measured move example
The height of the channel added to the breakout point approximated a target that was reached. The breakout point also offered support in the correction following the target being reached.

Source: BofA Global Research, Bloomberg

Bitcoin had a head and shoulders top in 2021

The head and shoulders pattern is a popular chart pattern that usually implies the prior trend is changing direction. In the section called "A well massaged head and shoulders" we discussed the inputs to this pattern. Below is another example.

The basics of a head and shoulders top

The only way there is a head and shoulders top pattern is if there is an uptrend to reverse. If there is not an uptrend prior to the formation then there is not a trend to correct or change. These are the basics inputs to a top pattern.

1. Three peaks and two troughs. The first peak is the left shoulder, the second the head and the third the right shoulder. The head is always the highest high. The troughs separate the peaks from one another and help create the neckline.

2. Estimate a neckline by drawing a trend line after the second trough forms. In a top pattern, the neckline should have a slightly positive slope or at least be flat. This is important because price will be in the earlier phase of a downtrend when the neckline breaks, making the sell entry point higher.

3. The right shoulder should make a lower high than the head. It is also ideal for the right shoulder to be similar or smaller than the left shoulder.

4. A decisive move down through the neckline with greater than average volume should occur to solidify the pattern.

5. The neckline may be tested as resistance on a light volume rally and offers a second opportunity to sell. An appropriate stop is often the top of the right shoulder.

Chart 55: XBT/USD – Head and shoulders top
The May 2021 decline was preempted by a head and shoulders top pattern and target reached.

Source: BofA Global Research, Bloomberg

Calculate targets with measured moves and Fibonacci

There are three ways to calculate targets for a head and shoulders top. The first is to use a measured move projection of the height of the pattern subtracted from the breakdown point. This can be done by drawing/coping an arrow as shown in Chart 55. A second way to estimate multiple targets is to use a Fibonacci Extension annotation as shown in Chart 56. Measure the distance from the top of the head to the neckline and subtract that from the breakdown point. This will also estimate multiple target levels where the 100% line is equal to the arrow method. Shallow and deeper levels can also be estimated. A third way is to find the low and high of the uptrend preceding the head and

shoulders top. Calculating a Fibonacci retracement on this distance. For more on Fibonacci, please see section Finding Fibonacci.

Chart 56: Calculating a target with Fibonacci retracements and extensions
Fibonacci extension measuring downside target levels after a head and shoulders top

Source: BofA Global Research, Bloomberg

Bitcoin has tended to respond to RSI conditions

Measure and trade with momentum
The Relative Strength Index (RSI), which is the most popular technical indicator used on Bloomberg, measures the momentum of a trend by comparing the average size of the up periods to the average size of the down periods over a specified timeframe, such as 14 days. Common thought suggests if momentum reaches an extreme then a reversal, or at least a consolidation, will occur. While this may be the short term outcome, sometimes the trend resumes until momentum finally depletes with a bullish or bearish divergence. In this primer, we will review RSI and the signals it can generate.

The essence of the RSI calculation and levels
If price went up $1.00 for 10 of the last 14 days and down $0.25 four of the last 14 days, then we know price went up on average much more than down. However, in financial markets, the up/down relationship is rarely this clear cut. This type of market may be described as overbought and the opposite as oversold. Both mean the market moved too far too fast. RSI is normalized to fall between 0 – 100. So when it is above 70, the trend is described as overbought. When it is below 30, it is described as oversold.

The facts and myths of overbought and oversold
The terms overbought and oversold mean the market may have risen or fallen too much, especially in the short term. Exiting or reversing a position solely because the market is deemed overbought or oversold may be the right trade for a short period of time but could be the wrong trade for the intermediate-term trend. One way of filtering this is to incorporate support and resistance. In theory, momentum complements a breakout similar to greater than average volume. If price and momentum break up through resistance, the expected overbought dip could be buyable. Similarly, if price and momentum break down through support, a bounce may be sold.

Momentum trades vs momentum trends

In a trend-less market, also referred to as a sideways or range-bound trend, RSI rarely moves through overbought or oversold readings. When price reaches the high end of the range and RSI is equal to or less than its prior peaks, price can be sold. If price were to breakout to new highs and RSI is still not overbought, then the breakout lacks confirmation from RSI and may soon reverse. However, when price and RSI break out together, a new uptrend is under way, and longs could be held or added to in a dip.

Price vs RSI divergences signal a trend is changing

When prices make lower lows and the RSI indicator makes higher lows, a bullish divergence is forming. Conversely, when price makes higher highs and RSI makes lower highs, a bearish divergence is forming. Think of price as a car and RSI as the foot on the accelerator. If a car is going uphill and the foot is pushing the accelerator, then the car is moving uphill. However, if the pressure on the accelerator starts to decrease, the car will be climbing the hill at a slower speed (with less momentum). Eventually the car makes it to the top of the hill, or the peak of the uptrend, and the foot comes completely off the pedal. If the bearish divergence is correct, all that's left is for the car to go down the hill.

Adjust overbought and oversold levels for trend direction

In the below chart, another important aspect of using RSI is shown. When markets are in a downtrend, naturally they should be oversold more often than not. When markets are in uptrends, they should be overbought more often. When a clearly defined trend is present, it usually makes sense to adjust the overbought and oversold levels. In uptrends, consider using 40-80 and in downtrends 20-60. If price is in a downtrend and reverses so RSI fails at 60, it is still in a downtrend. If RSI moves through 60, the downtrend may be near an end. The same goes for an uptrend and the 40 level.

Please see the section called "Relative Strength Index is the most popular" for more.

Chart 57: RSI is the most popular technical indicator (excluding moving averages)
Historical example from March 2020 to May 2021 using RSI to confirm trend breakouts, trend tops and oversold/overbought moves.

Source: BofA Global Research, Bloomberg

January Barometer for the S&P 500

- For the S&P 500, January is a reasonably good predictor of the year.

- We review the month of January Barometer, the first 5-sessions of January Barometer, the combined first 5-sessions and month of January Barometer and the January Barometer during the Presidential Cycle.

- The January Barometer less reliable since 2000 but don't fight the Fed.

January is a reasonably good predictor of the year

January is a reasonably good predictor of the year based on S&P 500 data going back to 1928. When January is up, the year is up 79.3% of the time with an average return of 13.04%, and the rest of the year (February-December) is up 77.6% of the time with an average return of 8.57%. When January is down, the S&P 500 tends to be weaker and is up only 47.2% of the time with an average return of -0.20%, and the rest of the year is up 61.1% of the time with an average return of 3.50%. For all years back to 1928, the S&P 500 is up 67.0% of the time with an average return of 7.97%, and February-December is up 71.3% of the time with an average return of 6.63%.

Table 5: S&P 500 January Barometer from 1928 - 2021
When the SPX is up in January, the rest of the year is up 79.3% of the time with an average return of 13%.

Criteria	# of years	# of years with positive returns	Average annual return (%)	Chance of up year (%)	Average Feb-Dec return (%)	Chance of an up Feb-Dec
January up	58	46	13.04%	79.31%	8.57%	77.59%
January down	36	17	-0.20%	47.22%	3.50%	61.11%
overall	94	63	7.97%	67.02%	6.63%	71.28%

Source: BofA Global Research, Bloomberg

The First 5-sessions of January Barometer

Using the price return for the first five sessions of January as a gauge for the year and February-December is another January Barometer. Data back to 1928 suggest that S&P 500 returns are stronger for the year and February-December when index rallies over the first five trading days of January and not as strong when the index declines over the first five sessions of January. When the first five sessions of the year are up, the year is up 74.6% of the time with an 11.02% average return. When the first five sessions are down, the year is up 51.6% of the time with an average return of 1.77%.

Table 6: S&P 500 First 5-days of January Barometer from 1928 - 2021
The SPX is stronger for the year and February-December when the first five session of January are up.

Criteria	# of years	# of years with positive returns	Average annual return (%)	Chance of up year (%)	Average Feb-Dec return (%)	Chance of an up Feb-Dec
1st 5 days of Jan positive	63	47	11.02%	74.60%	8.58%	77.78%
1st 5 days of Jan negative	31	16	1.77%	51.61%	2.65%	58.06%
overall	94	63	7.97%	67.02%	6.63%	71.28%

Source: BofA Global Research, Bloomberg

Combined 1st 5-sessions & month of January Barometer

The best scenario for the S&P 500 is when the returns for the first five sessions of the year and January are both up. This has happened 46 times going back to 1928. Under this scenario the year is up 82.6% of the time with an average return of 14.59%, and February-December is up 80.4% of the time with an average return of 9.95%. All other scenarios have below average returns, but the S&P 500 is weakest when both the first five days and month of January are down with the year up 42.1% of time on an average return of -1.59% under this scenario.

Table 7: Combined first 5 sessions & month of January Barometer – 1928 - 2021
The S&P 500 tends to yield higher average returns when the first five days of the year & Jan are both up.

Criteria	# of years	# of years with positive returns	Average annual return (%)	Chance of up year (%)	Average Feb-Dec return (%)	Chance of an up Feb-Dec
1st 5 days of Jan up / month of Jan up	46	38	14.59%	82.61%	9.95%	80.43%
1st 5 days of Jan up / month of Jan down	17	9	1.35%	52.94%	4.88%	70.59%
1st 5 days of Jan down / month of Jan up	12	8	7.10%	66.67%	3.25%	66.67%
1st 5 days of Jan down / month of Jan down	19	8	-1.59%	42.11%	2.27%	52.63%
Overall	94	63	7.97%	67.02%	6.63%	71.28%

Source: BofA Global Research, Bloomberg

January Barometer and the Presidential Cycle

2022 is a Presidential Cycle Year 2, which has average annual and February-December returns for the S&P 500 of 4.32% and 3.73%, respectively. When January is up in the Presidential Cycle Year 2, the year is up 57.1% of the time with an average S&P 500 return of 9.34%, and February-December is also up 57.1% of the time with an average return of 5.67%. When January is down in Presidential Cycle Year 2, the year is up 55.6% of the time with an average return of -3.48%, and February-December is also up 66.7% of the time with an average return of 0.71%.

Table 8: January Barometer with Presidential Cycle – 1928 - 2021
The SPX tends to struggle in Presidential Cycle Year 2 but does better when January is up vs down.

Presidential Cycle Year	Criteria	# of years	# of years with positive returns	Average annual return (%)	Chance of up year (%)	Average Feb-Dec return (%)	Chance of an up Feb-Dec
Year 1	Jan. up	14	11	13.90%	78.57%	9.85%	78.57%
	Jan. down	10	3	-3.54%	30.00%	-0.32%	30.00%
	overall	24	13	6.63%	58.33%	5.61%	58.33%
Year 2	Jan. up	14	8	9.34%	57.14%	5.67%	57.14%
Mid-term Year	Jan. down	9	5	-3.48%	55.56%	0.71%	66.67%
	overall	23	13	4.32%	56.52%	3.73%	60.87%
Year 3	Jan. up	19	16	13.10%	84.21%	7.79%	78.95%
	Jan. down	4	2	15.46%	50.00%	20.32%	100.00%
	overall	23	18	13.51%	78.26%	9.97%	82.61%
Year 4	Jan. up	11	11	16.55%	100.00%	11.96%	100.00%
Election Year	Jan. down	13	7	-0.18%	53.85%	3.20%	69.23%
	overall	24	18	7.49%	75.00%	7.22%	83.33%

Source: BofA Global Research, Bloomberg

First 5 days vs the rest of January & month of January

When the S&P 500 has a positive return for the first five sessions of January, the rest of January has an average rise of 0.25%. This means that a gain over the first five sessions of January can mean a lackluster return for the rest of the month. However, the good news is that when the return for the first five sessions is up, January is up 73.02% of the time with an average gain of 2.18%. When the first five sessions of January are down, the rest of January does better with an average gain of 1.32%. This means that January tends to bullishly mean-revert after a weak start. However, January is up only 38.71% of the time with an average return if -0.78% after trading lower in the first five days.

Table 9: S&P 500 first 5 days of January as of Barometer for the rest of January & the month of January – 1928-2021
The rest of January tends to be stronger when the first five sessions of the month are negative, but the month of January is lower most of the time under this scenario.

Criteria	# of years	# of years the rest of Jan has positive returns	Average rest of Jan return (%)	Chance that the rest of Jan is up (%)	Average January return (%)	Chance of an up Jan
1st 5 days of Jan positive	63	35	0.25%	55.56%	2.18%	73.02%
1st 5 days of Jan negative	31	18	1.32%	58.06%	-0.78%	38.71%
overall	94	53	0.60%	56.38%	1.21%	61.70%

Source: BofA Global Research, Bloomberg

However, the January Barometer less reliable since 2000

The January Barometer has become less reliable in recent years. The best decade for the January Barometer was the 1950s, which was when the direction of the S&P 500 in January (up or down) had a 90% success rate of calling the direction of the year. The Barometer also worked well in the 1940s, 1960s, 1970s, 1980s, and 1990s with an 80% success rate. However, the January Barometer's success rate dropped to 60% in the 2000s and then to 50% in the 2010s, which was worst success rate since the 1930s. The 2020s are not off to a great start in terms of the January Barometer as down Januarys in 2020 and 2021 did not coincide with down years.

Don't fight the Fed

Although the January Barometer has become less reliable in recent years, January is a barometer for the year 69.1% of the time. When January is up, the year has been up 79.3% of the time. When January is down, the year has been down 52.8% of the time. However, don't fight the Fed. Since the Great Recession, the SPX has traded lower in January seven times (2009, 2010, 2014, 2015, 2016, 2020 and 2021), and only one down January preceded a down year (2015), which is a 14.2% success rate. Over that same period, the SPX has closed higher in January six times (2011, 2012, 2013, 2017, 2018 and 2019) and saw the year trade higher four times (2012, 2013, 2017 and 2019), which is a 66.7% success rate.

Table 10: January Barometer success rate through the years
The January Barometer has a success has dropped since 2000.

Years	Jan Barometer success rate for year	Jan Barometer success rate for Feb-Dec
1928-1929	0%	0%
1930s	50%	40%
1940s	80%	70%
1950s	90%	90%
1960s	80%	70%
1970s	80%	80%
1980s	80%	70%
1990s	80%	70%
2000s	60%	60%
2010s	50%	40%
2020s	0%	0%
All periods	69%	63%

Source: BofA Global Research, Bloomberg

January Barometer through the years

Table 11: January Barometer each year from 1928-2021 (January vs Year shaded)
January 2020 and January 2021 were both down, but up for the year.

Year	1st 5 days return	January return	Annual return	Feb-Dec return	1st 5 days	January	Year	Feb-Dec
1928	-0.91%	-0.51%	37.88%	38.59%	Down	Down	Up	Up
1929	-0.74%	5.71%	-11.91%	-16.67%	Down	Up	Down	Down

Table 11: January Barometer each year from 1928-2021 (January vs Year shaded)
January 2020 and January 2021 were both down, but up for the year.

Year	1st 5 days return	January return	Annual return	Feb-Dec return	1st 5 days	January	Year	Feb-Dec
1930	-0.75%	6.25%	-28.48%	-32.69%	Down	Up	Down	Down
1931	5.80%	5.54%	-47.07%	-49.85%	Up	Up	Down	Down
1932	5.54%	-2.22%	-14.78%	-12.85%	Up	Down	Down	Down
1933	3.03%	0.29%	44.08%	43.66%	Up	Up	Up	Up
1934	-2.11%	12.04%	-4.71%	-14.95%	Down	Up	Down	Down
1935	-0.32%	-4.21%	41.37%	47.58%	Down	Down	Up	Up
1936	2.01%	6.55%	27.92%	20.06%	Up	Up	Up	Up
1937	1.75%	3.43%	-38.59%	-40.63%	Up	Up	Down	Down
1938	7.30%	1.33%	24.55%	22.92%	Up	Up	Up	Up
1939	-2.66%	-6.39%	-5.18%	1.30%	Down	Down	Down	Up
1940	1.69%	-3.29%	-15.09%	-12.20%	Up	Down	Down	Down
1941	1.80%	-4.82%	-17.86%	-13.70%	Up	Down	Down	Down
1942	2.19%	1.84%	12.43%	10.40%	Up	Up	Up	Up
1943	1.54%	6.86%	19.45%	11.78%	Up	Up	Up	Up
1944	1.71%	1.54%	13.80%	12.07%	Up	Up	Up	Up
1945	2.26%	1.43%	30.72%	28.88%	Up	Up	Up	Up
1946	1.90%	6.97%	-11.87%	-17.61%	Up	Up	Down	Down
1947	0.72%	2.35%	0.00%	-2.30%	Up	Up	Down	Down
1948	0.07%	-4.05%	-0.65%	3.54%	Up	Down	Down	Up
1949	2.70%	0.13%	10.46%	10.32%	Up	Up	Up	Up
1950	1.73%	1.55%	21.68%	19.82%	Up	Up	Up	Up
1951	2.79%	6.02%	16.35%	9.74%	Up	Up	Up	Up
1952	0.21%	1.56%	11.78%	10.07%	Up	Up	Up	Up
1953	-0.90%	-0.72%	-6.62%	-5.95%	Down	Down	Down	Down
1954	0.48%	5.12%	45.02%	37.96%	Up	Up	Up	Up
1955	-1.81%	1.81%	26.40%	24.16%	Down	Up	Up	Up
1956	-2.13%	-3.65%	2.62%	6.50%	Down	Down	Up	Up
1957	-0.90%	-4.18%	-14.31%	-10.58%	Down	Down	Down	Down
1958	2.50%	4.28%	38.06%	32.40%	Up	Up	Up	Up
1959	0.34%	0.38%	8.48%	8.07%	Up	Up	Up	Up
1960	-0.65%	-7.15%	-2.97%	4.50%	Down	Down	Down	Up
1961	1.20%	6.32%	23.13%	15.81%	Up	Up	Up	Up
1962	-3.40%	-3.79%	-11.81%	-8.34%	Down	Down	Down	Down
1963	2.60%	4.91%	18.89%	13.32%	Up	Up	Up	Up
1964	1.31%	2.69%	12.97%	10.01%	Up	Up	Up	Up
1965	0.73%	3.32%	9.06%	5.56%	Up	Up	Up	Up
1966	0.77%	0.49%	-13.09%	-13.51%	Up	Up	Down	Down
1967	3.09%	7.82%	20.09%	11.38%	Up	Up	Up	Up
1968	0.16%	-4.38%	7.66%	12.60%	Up	Down	Up	Up
1969	-2.95%	-0.82%	-11.36%	-10.63%	Down	Down	Down	Down
1970	0.67%	-7.65%	0.10%	8.39%	Up	Down	Up	Up
1971	0.04%	4.05%	10.79%	6.48%	Up	Up	Up	Up
1972	1.35%	1.81%	15.63%	13.58%	Up	Up	Up	Up
1973	1.52%	-1.71%	-17.37%	-15.93%	Up	Down	Down	Down
1974	-1.47%	-1.00%	-29.72%	-29.00%	Down	Down	Down	Down
1975	2.16%	12.28%	31.55%	17.16%	Up	Up	Up	Up
1976	4.87%	11.83%	19.15%	6.54%	Up	Up	Up	Up
1977	-2.28%	-5.05%	-11.50%	-6.79%	Down	Down	Down	Down
1978	-4.69%	-6.15%	1.06%	7.69%	Down	Down	Up	Up
1979	2.80%	3.97%	12.31%	8.02%	Up	Up	Up	Up
1980	0.94%	5.76%	25.77%	18.92%	Up	Up	Up	Up
1981	-1.99%	-4.57%	-9.73%	-5.40%	Down	Down	Down	Down
1982	-2.45%	-1.75%	14.76%	16.81%	Down	Down	Up	Up
1983	3.23%	3.31%	17.27%	13.51%	Up	Up	Up	Up
1984	2.41%	-0.92%	1.40%	2.34%	Up	Down	Up	Up
1985	-1.94%	7.41%	26.33%	17.62%	Down	Up	Up	Up
1986	-1.57%	0.24%	14.62%	14.35%	Down	Up	Up	Up
1987	6.24%	13.18%	2.03%	-9.85%	Up	Up	Up	Down
1988	-1.49%	4.04%	12.40%	8.03%	Down	Up	Up	Up
1989	1.17%	7.11%	27.25%	18.80%	Up	Up	Up	Up
1990	0.11%	-6.88%	-6.56%	0.35%	Up	Down	Down	Up
1991	-4.64%	4.15%	26.31%	21.27%	Down	Up	Up	Up
1992	0.24%	-1.99%	4.46%	6.59%	Up	Down	Up	Up

Table 11: January Barometer each year from 1928-2021 (January vs Year shaded)
January 2020 and January 2021 were both down, but up for the year.

Year	1st 5 days return	January return	Annual return	Feb-Dec return	1st 5 days	January	Year	Feb-Dec
1993	-1.53%	0.70%	7.06%	6.31%	Down	Up	Up	Up
1994	0.74%	3.25%	-1.54%	-4.64%	Up	Up	Down	Down
1995	0.34%	2.43%	34.11%	30.93%	Up	Up	Up	Up
1996	0.41%	3.26%	20.26%	16.46%	Up	Up	Up	Up
1997	1.04%	6.13%	31.01%	23.44%	Up	Up	Up	Up
1998	-1.48%	1.02%	26.67%	25.40%	Down	Up	Up	Up
1999	3.73%	4.10%	19.53%	14.82%	Up	Up	Up	Up
2000	-1.89%	-5.09%	-10.14%	-5.32%	Down	Down	Down	Down
2001	-1.85%	3.46%	-13.04%	-15.95%	Down	Up	Down	Down
2002	1.10%	-1.56%	-23.37%	-22.15%	Up	Down	Down	Down
2003	3.42%	-2.74%	26.38%	29.94%	Up	Down	Up	Up
2004	1.80%	1.73%	8.99%	7.14%	Up	Up	Up	Up
2005	-2.12%	-2.53%	3.00%	5.67%	Down	Down	Up	Up
2006	3.35%	2.55%	13.62%	10.80%	Up	Up	Up	Up
2007	-0.44%	1.41%	3.53%	2.09%	Down	Up	Up	Up
2008	-5.32%	-6.12%	-38.49%	-34.48%	Down	Down	Down	Down
2009	0.72%	-8.57%	23.45%	35.02%	Up	Down	Up	Up
2010	2.68%	-3.70%	12.78%	17.11%	Up	Down	Up	Up
2011	1.10%	2.26%	0.00%	-2.22%	Up	Up	Down	Down
2012	1.84%	4.36%	13.41%	8.67%	Up	Up	Up	Up
2013	2.17%	5.04%	29.60%	23.38%	Up	Up	Up	Up
2014	-0.59%	-3.56%	11.39%	15.50%	Down	Down	Up	Up
2015	0.16%	-3.10%	-0.73%	2.45%	Up	Down	Down	Up
2016	-5.96%	-5.07%	9.54%	15.39%	Down	Down	Up	Up
2017	1.34%	1.79%	19.42%	17.32%	Up	Up	Up	Up
2018	2.77%	5.62%	-6.24%	-11.22%	Up	Up	Down	Down
2019	2.70%	7.87%	28.88%	19.48%	Up	Up	Up	Up
2020	0.69%	-0.16%	16.26%	16.45%	Up	Down	Up	Up
2021	1.83%	-1.11%	26.89%	25.06%	Up	Down	Up	Up

Source: BofA Global Research, Bloomberg

The First Five Days in FICC

- A popular equity market cycle suggests the first five trading days of the year may indicate or correlate with performance for the year.

- We reviewed this cycle on US 30Y yield, oil and the DXY and present our findings.

Do the first five trading days in FICC matter?

The January Barometer says the direction of the first five trading days of the year and/or the month of January is a good predictor for whether the S&P 500 will rise or fall that year (See prior section). Does this cycle have merit in FICC? We looked to see if the first five days of the year indicate trend for 30Y US yield, crude oil and the US dollar index (DXY) in January, Q1 or the year. This is what we found.

US 30 Year Yield

The first five trading days for 30Y yield means...

In the last 44 years, the first five trading sessions of the year saw the 30Y yield rise 28 times or 64% of the time and fall 16 times (Table 12). When yield rose in the first five sessions of the year the rest of January was down (lower yield) 71% of the time (Table 13). However the rest of Q1 saw yield rise 64% of the time (Table 14). In other words, if yield is up during the first five days, it tends to dip ending January and rise in Feb-March.

Table 12: What do the first five trading days of the year do?
US 30Y yield tends to rise in the first five trading days of the year 64% of the time for an average increase of 12bps.

	Count	Ratio	First 5 days average net change	First 5 days median net change
First five days up	28	64%	0.12	0.10
First five days down	16	36%	-0.09	-0.08
All years	44	1	0.05	0.06

Source: BofA Global Research, Bloomberg

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Table 13: Do the first five trading days of the year determine the rest of January?
When 30Y yield rises in the first five days, it tends to decline by the end of January 71% of the time.

	Count	Ratio	First 5 days average net change	Rest of January average net change
First five days up and rest of January up	8	29%	0.14	0.33
First five days up and rest of January down	20	71%	0.12	-0.16
First five days down and rest of January up	9	56%	-0.10	0.14
First five days down and rest of January down	7	44%	-0.07	-0.22

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Table 14: Do the first five trading days of the year determine the rest of Q1?
When 30Y yield rises in the first five days, the rest of Q1 was up 64% of the time.

	Count	Ratio	First 5 days average net change	Rest of Q1 average net change
First five days up and rest of Q1 up	18	64%	0.14	0.36
First five days up and rest of Q1 down	11	39%	0.12	-0.46
First five days down and rest of Q1 up	9	56%	-0.10	0.44
First five days down and rest of Q1 down	7	44%	-0.07	-0.28

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Table 15: Do the first five trading days of the year determine the rest of the year?
The first five days do not have a predictive bias for where the year ends.

	Count	Ratio	First 5 days average net change	Rest of year average net change
First five days up and rest of year up	14	50%	0.14	0.74
First five days up and rest of year down	15	54%	0.12	-1.07
First five days down and rest of year up	7	44%	-0.10	0.81
First five days down and rest of year down	9	56%	-0.07	-0.86

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

WTI Crude Oil

The first five trading days for oil **means…**

We reviewed 38 years of history and found a few patterns worth noting. The first five days of the year have been up and down 19 times each (Table 16). When the first five days of January are down the rest of January has been up 14 of 19 times or 74% of the time for an average increase of 5.09%. When the first five days of January are up, the rest of January was down 12 of 19 times or 63% of the time. (Table 17). When the first five days are up the rest of Q1 is up 15 of 19 times or 79% of the time for an average increase of 10.50%. When the first five days are down the rest of Q1 is up 63% of the time. (Table 18)

Table 16: What do the first five trading days of the year do for Crude Oil?
No pattern. The first five days of the month have been up and down 19 times each.

	Count	Ratio	First 5 days average % change	First 5 days median % change
First five days up	19	50%	4.37	3.65
First five days down	19	50%	-4.36	-3.67
All years	38	1	0.01	-0.04

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Table 17: Do the first five trading days of the year determine the rest of January?
When the first five days are down, the rest of January was up 74% of the time. When the first five days are up, the rest of January was down 63% of the time.

	Count	Ratio	First 5 days average % change	Rest of January average % change
First five days up and rest of January up	7	37%	3.90	5.22
First five days up and rest of January down	12	63%	4.65	-5.14
First five days down and rest of January up	14	74%	-4.26	5.09
First five days down and rest of January down	5	26%	-4.63	-12.56

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Table 18: Do the first five trading days of the year determine the rest of Q1?
When the first five days are up, the rest of Q1 is up 79% of the time. When the first five days are down the rest of Q1 is up 63% of the time.

	Count	Ratio	First 5 days average % change	Rest of Q1 average % change
First five days up and rest of Q1 up	15	79%	3.90	10.50
First five days up and rest of Q1 down	4	21%	4.65	-7.97
First five days down and rest of Q1 up	12	63%	-4.26	11.58
First five days down and rest of Q1 down	7	37%	-4.63	-24.64

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Table 19: Do the first five trading days of the year determine the rest of the year?
No strong pattern.

	Count	Ratio	First 5 days average % change	Rest of year average % change
First five days up and rest of year up	11	58%	3.90	32.24
First five days up and rest of year down	8	42%	4.65	-20.62
First five days down and rest of year up	11	58%	-4.26	29.57
First five days down and rest of year down	8	42%	-4.63	-26.22

Source: BofA Global Research, Bloomberg

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US Dollar Index (DXY)

The first five trading days for the DXY means…

We reviewed 50 years of history and found four patterns worth noting. First, the first five trading days of the year were up 31 times or 62% of the time. The average percent increase in the first five trading days is 1.28% and median is 0.94% (Table 20). While the first five days has had some bias to go higher, this did not provide a strong outlook for the rest of January, Q1 or the rest of the year. The rest of January is up 16 of the 31 times or 52% of the time. The rest of Q1 is up 15 times or 48% of the time. The rest of the year is up only 12 times which means it is down 61% of the time.

Second, when the first five trading days of the year are down, the rest of Q1 was up 63% of the time (Table 22). Third, when the first five trading days were up, the rest of the year was down 61% of the time (Table 23). Fourth, when the first five trading days were down, the rest of the year was up 63% of the time (Table 23).

Table 20: What do the first five trading days of the year do?
The DXY was up 29 of 45 times in the first five trading days of the year.

	Count	Ratio	First 5 days average % change	First 5 days median % change
First five days up	31	62%	1.28	0.94
First five days down	19	38%	-0.74	-0.64
All years	50	1	0.51	0.22

Source: BofA Global Research, Bloomberg

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Table 21: Do the first five trading days of the year determine the rest of January?
No discernable pattern for the rest of January based on the direction of the first five trading days

	Count	Ratio	First 5 days average % change	Rest of January average % change
First five days up and rest of January up	16	52%	1.05	1.87
First five days up and rest of January down	15	48%	1.52	-1.84
First five days down and rest of January up	11	58%	-0.84	2.76
First five days down and rest of January down	8	42%	-0.61	-1.01

Source: BofA Global Research, Bloomberg

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Table 22: Do the first five trading days of the year determine the rest of Q1?
When the first five days are down the rest of Q1 was up 63% of the time (12 of 19).

	Count	Ratio	First 5 days average % change	Rest of Q1 average % change
First five days up and rest of Q1 up	15	48%	1.05	3.91
First five days up and rest of Q1 down	16	52%	1.52	-3.61
First five days down and rest of Q1 up	12	63%	-0.84	4.76
First five days down and rest of Q1 down	7	37%	-0.61	-3.79

Source: BofA Global Research, Bloomberg

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Table 23: Do the first five trading days of the year determine the rest of the year?
When the first five days are up, the rest of the year was down 61% of the time. When the first five days are down the rest of the year was up 63% of the time.

	Count	Ratio	First 5 days average % change	Rest of year average % change
First five days up and rest of year up	12	39%	1.05	7.61
First five days up and rest of year down	19	61%	1.52	-8.04
First five days down and rest of year up	12	63%	-0.84	7.10
First five days down and rest of year down	7	37%	-0.61	-6.24

Source: BofA Global Research, Bloomberg

DXY since the euro began

Since the euro began trading the first five days for the DXY meant...

Since the euro began trading in 1999 and since it is 58% of the index, we considered what the first five trading sessions of the year meant for the DXY since 1999. The ratio of the first five days being up or down is about the same. However the ratio for when the first five days are down and the rest of Q1 up strengthens to 67% of the time. Unfortunately there are only 9 occurrences in total.

Table 24: What do the first five trading days of the year do?
Since 1999, the DXY was up 61% of the time in the first five sessions of January.

	Count	Ratio	First 5 days average % change	First 5 days median % change
First five days up	14	61%	1.02	0.83
First five days down	9	39%	-0.82	-0.64
All years	23	1	0.30	0.18

Source: BofA Global Research, Bloomberg

Table 25: Do the first five trading days of the year determine the rest of Q1?
Since 1999, when the DXY declined in the first five sessions it tended to rise to end Q1. However this is only 6 out of 9 observations.

	Count	Ratio	First 5 days average % change	Rest of Q1 average % change
First five days up and rest of Q1 up	8	57%	0.79	3.50
First five days up and rest of Q1 down	6	43%	1.33	-2.91
First five days down and rest of Q1 up	6	67%	-0.79	3.59
First five days down and rest of Q1 down	3	33%	-0.86	-3.74

Source: BofA Global Research, Bloomberg

Deb**unking "Sell in May and Go Away"**

- Seasonality says buy in May & sell in July/August. May-Oct has lowest average 6-month return but is back-end loaded.

- When the strong Nov-Apr period is above average, May-Oct does better. When Nov-Apr is below average, May-Oct does worse.

- When the SPX is in a secular bull market, May-Oct is stronger, especially when Nov-Apr is above average.

Monthly seasonality says by Feb, May and Sep dips

The ebbs and flows of monthly SPX seasonality suggest buying weakness in February, May and September and selling strength in April, July/August and December/January. It is not "sell in May and go away" but rather "buy in May and sell in July/August".

Chart 58: S&P 500 - 1-month seasonal returns – 1928 to present
Monthly SPX seasonality suggest buying weakness in February, May and September and selling strength in April, July/August and December/January.
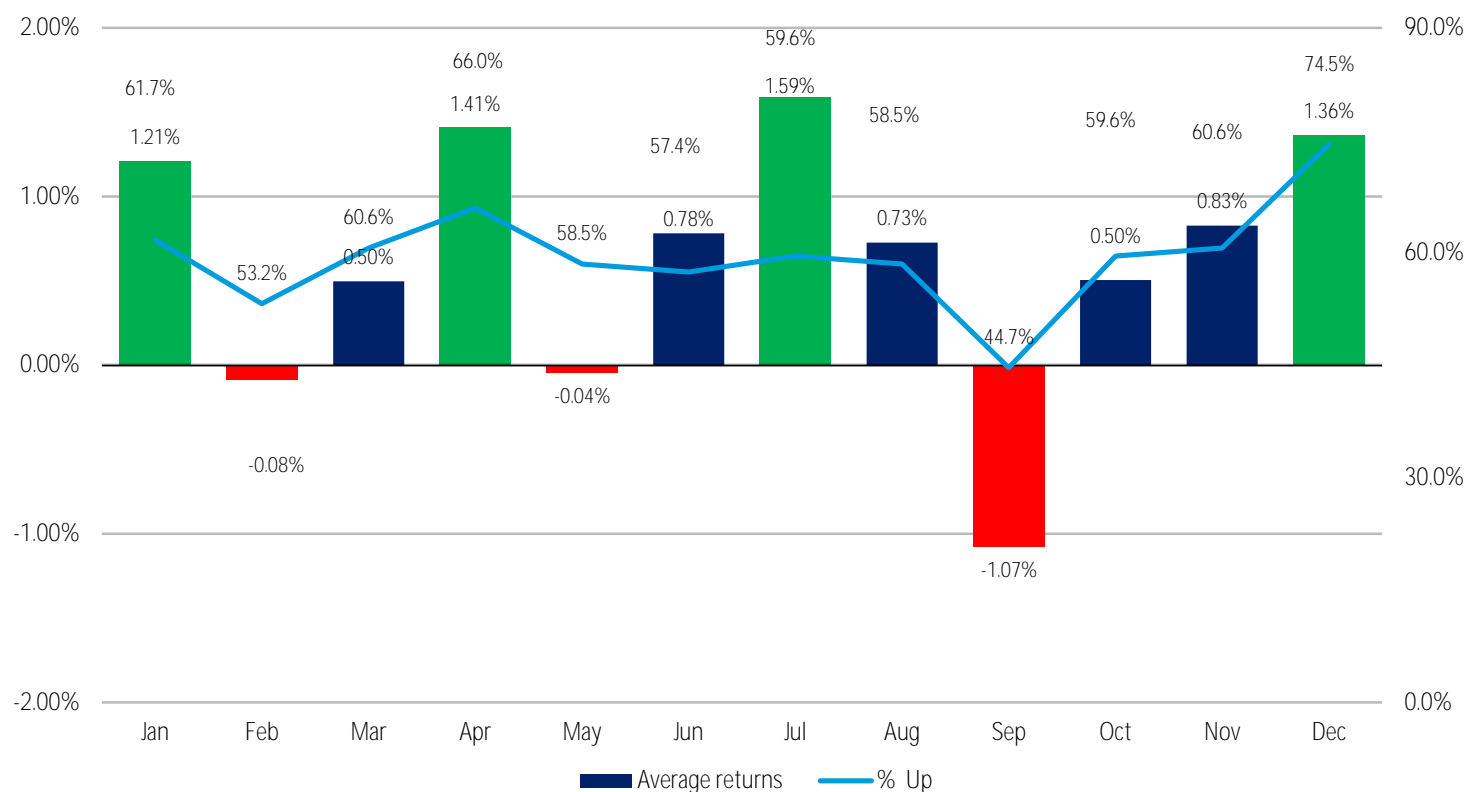
Source: BofA Global Research, Bloomberg

May-Oct: Lowest average & median returns back to 1928

When assessing the validity of "Sell in May and Go Away", we use seasonal data on the S&P 500 back to 1928. Seasonality shows that May-October is the weakest 6-month period of the year, while November-April is the strongest 6-month period of the year. May-October is up 66% of the time with average return of 2.25% (3.35% median). With positive returns, the pattern isn't necessarily "Sell in May and Go Away;" however, May-October does have the least robust S&P 500 returns of any 6-month period of the year.

Table 26: S&P 500 - 6-month seasonal returns – 1928 to present
May – Oct has the worst average S&P 500 return out of any other 6-month period.

6-month period	Average return	Median return	% of time up	Average correction	Median correction
January-June	3.85%	4.98%	64.9%	-7.60%	-5.92%
February-July	3.90%	4.45%	68.1%	-7.90%	-4.85%
March-August	4.94%	4.78%	70.2%	-7.58%	-5.39%
April-September	3.55%	3.65%	66.0%	-7.79%	-4.29%
May-October	**2.25%**	**3.35%**	**66.0%**	**-8.67%**	**-5.21%**
June-November	3.38%	4.41%	66.0%	-8.31%	-5.24%
July-December	4.15%	4.96%	67.0%	-8.28%	-4.93%
August-January	3.64%	4.95%	65.6%	-8.68%	-5.68%
September-February	3.02%	5.00%	63.4%	-8.56%	-5.29%
October-March	4.47%	5.92%	62.4%	-7.65%	-4.94%
November-April	5.26%	5.39%	71.0%	-6.76%	-4.11%
December-May	4.41%	4.74%	66.7%	-7.28%	-4.60%
Averages	3.90%	4.75%	66.43%	-7.86%	-4.92%

Source: BofA Global Research, Bloomberg

Chart 59: S&P 500 - 6-month seasonal returns – 1928 to present
May – Oct has on average S&P 500 returns at 2.25%, while Nov – Apr tends to be the best 6-month period at 5.26% on average.
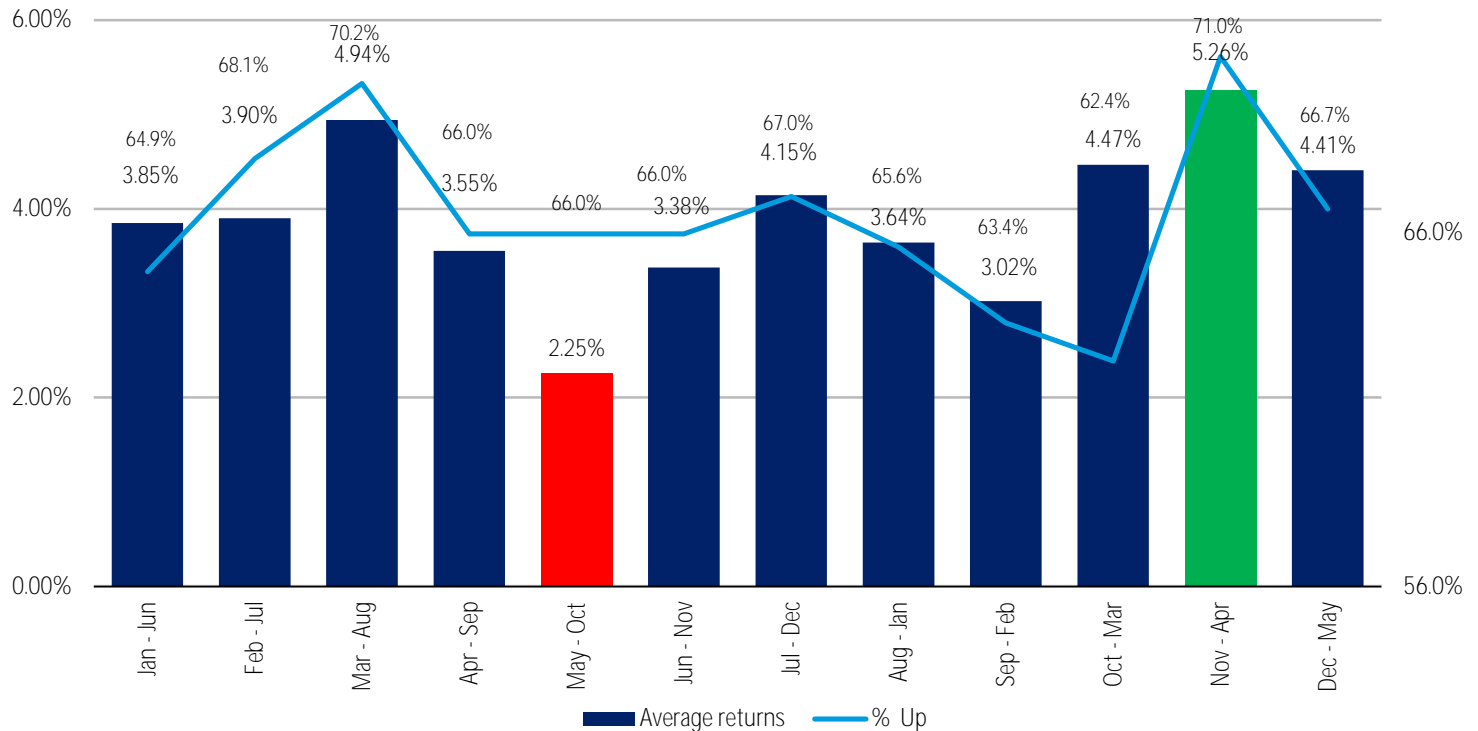
Source: BofA Global Research, Bloomberg

But May-October is back-end loaded

The average 3-month return for all 3-month periods going back to 1928 is 1.93%. As highlighted above, the second strongest 3-month period of the year is June-August with a 3.18% average return. The weakest 3-month period of the year is August-October, which returns 0.02% on average. Both of these 3-month periods are between May and October. This suggests that the weak May-October period is back-end loaded and that the pattern is often sell in July/August rather than in May.

Chart 60: S&P 500 - 3-month seasonal returns – 1928 to present
The historical pattern below suggests buying in May and then selling in July/August, rather than selling in May.
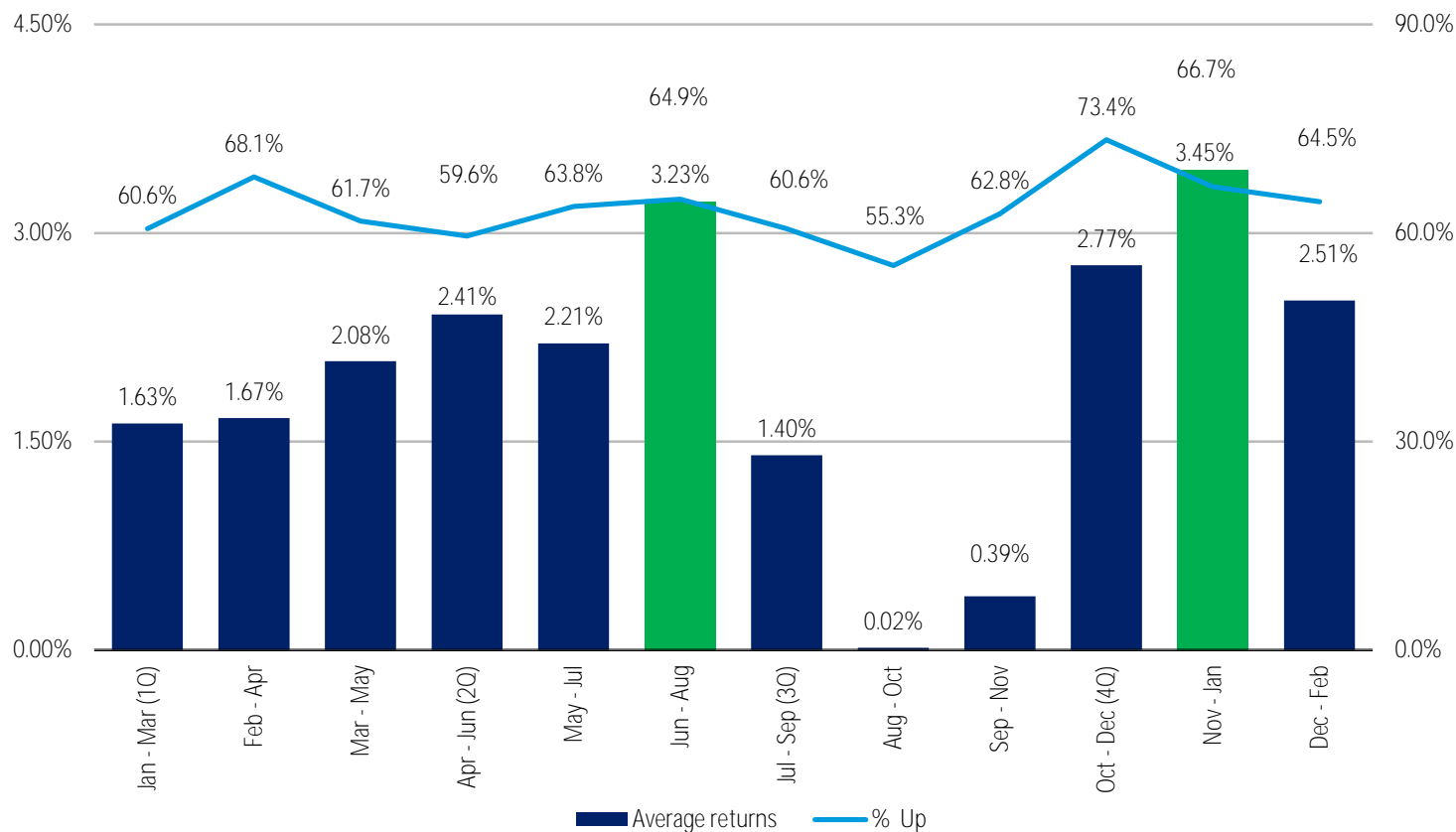
Source: BofA Global Research, Bloomberg

When Nov-Apr is strong, May-Oct does better

November-April is the strongest 6-month period of the year and is up 71% of the time with average return of 5.26% (median return of 5.39%). Trend following works! When November-April is above average, May-October is up 72.92% of the time with an average gain of 4.12% (median of 3.61%), which is much better than the average May-October. When November-April is below average, May-October tends to be below average as well and is up only 57% of the time with an average return of -0.004% (2.26% median).

May-**Oct is stronger during secular bull trends, especially...**

We continue to believe that the US equity market is in a secular bull trend. Secular bull markets tend to treat May-October more kindly. Using 1928, 1950-1965, 1980-1999, and 2013-present as secular bull market years, May-October is up 73.3% of the time with an average return of 4.24% (median of 4.75%) during these 45 years. This is much stronger than May-October during secular bear market years.

...when Nov-Apr is above average

When November-April is above average during secular bull market years, May-October is significantly stronger with the S&P 500 up 82.14% of the time (28 observations) with an average return of 5.59% (median of 6.16%). When November-April is below average during secular bull markets (17 observations), May-October tends to be below average.

Table 27: May-October & November-April for Secular Bulls & Secular Bears – 1929-present
Nov – April (secular bull) tends to be up the most at 82.22%, on average.

6-month period	Average return	Median return	% of time up	Average correction	Median correction
May-October (all periods) - 93 observations	2.17%	3.11%	65.59%	-8.62%	-5.01%
May-October (Secular Bull) - 45 observations	4.24%	4.75%	73.33%	-5.77%	-3.60%
May-October (Secular Bear) - 48 observations	0.23%	1.62%	58.33%	-11.30%	-6.49%
November-April (all periods) - 93 observations	5.26%	5.39%	70.97%	-6.68%	-4.09%
November-April (Secular Bull) - 45 observations	9.13%	8.27%	82.22%	-4.02%	-2.25%
November-April (Secular Bear) - 48 observations	1.63%	3.31%	60.42%	-9.18%	-5.76%

Source: BofA Global Research, Bloomberg

Table 28: May-October when compared to November-April within both Secular Bulls & Secular Bears
May – Oct tends to be up more when Nov – Apr S&P 500 returns are above average in a secular bull market.

May through October	Average return	Median return	% of time up	Average correction	Median correction
May-October (all periods) - 93 observations	2.17%	3.11%	65.59%	-8.62%	-5.01%
May-October (Nov-Apr above average) - 49 years	4.12%	3.61%	72.92%	-6.14%	-3.62%
May-October (Nov-Apr below average) - 44 years	-0.0041%	2.26%	56.82%	-11.46%	-7.66%
May-October (Nov-Apr above average - Secular Bull) - 28 years	5.59%	6.16%	82.14%	-4.58%	-2.85%
May-October (Nov-Apr below average - Secular Bull) - 17 years	2.01%	2.95%	58.82%	-7.72%	-7.76%
May-October (Nov-Apr above average - Secular Bear) - 21 years	2.16%	1.24%	61.90%	-8.06%	-5.97%
May-October (Nov-Apr below average - Secular Bear) - 27 years	-1.27%	2.04%	55.56%	-13.82%	-7.56%

Source: BofA Global Research, Bloomberg

Presidential Cycle back to 1872

- [A walk down Pennsylvania Avenue](#): We take a historical look at the S&P 500 within the context of the Presidential Cycle going back to 1872.

- Higher average and median returns for first term and Democrat 4-year Presidential Cycles.

- Better returns after a change in leadership at the executive branch.

Presidential political parties and S&P 500 performance

Is Mr. Market a Republican or a Democrat? There have been 27 presidents and 38 presidential cycles since 1872. While investors may ponder which political party bodes better for equity market performance, this limited number of observations makes drawing any hard and fast conclusions difficult. Further complicating matters is the changing nature of political parties in the United States. Are the Republicans of today the same small government fiscally conservative party of the first half of the 20th century? Can the Democrats of today still count post-Civil War Dixiecrats among their loyal base? While the answer to both of these questions is probably no, it can be argued that certain overarching themes and principles still lie at the heart of both political parties. With that, we provide the plain and simple facts, an overview of historic S&P 500 performance under the helm of both political parties.

S&P 500 average returns: Republican vs Democrats

The average Presidential Cycle shows a full 4-year return of 28.8% (23.2% median). Democrat Presidential cycles show a 4-year average return of 34.5% (25.9% median), while Republican cycles have a lower 4-year average return of 24.4% (median 20.1%). The average 4-year return for the S&P 500 (SPX) going back to 1875 is 26.2%.

Stronger SPX returns first term & under Democrats

With wide standard deviations and results, insignificant in terms of by-the-book statistics, data must be taken with a large grain of salt. Regardless of party, first-term Presidential cycles show stronger SPX performance vs second term with average 4-year returns of 34.5% (23.2% median) vs 16.9% (17.0% median), respectively. Democrats show stronger first terms than Republicans with an average return of 38.6% (24.4% median) vs 31.7% (23.2% median) for Republicans. Democrats also show stronger second terms than Republicans with an average return of 27.8% (41.3% median) vs 6.0% (0.2% median) for Republicans.

Table 29: S&P 500 average returns for US Presidential Cycle scenarios from 1872 to 2021
Year 2 for a 1st term Democrat President is the weakest scenario based on the average return and the percentage of time up.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term	% time up Year 1	% time up Year 2	% time up Year 3	% time up Year 4	% time up Full term	Observations (year 2-3)	Observations (Full term)	Observations (year 4)	Observations (year 1)
All terms	5.0%	3.9%	10.3%	6.4%	28.8%	57.9%	59.5%	70.3%	71.1%	75.7%	37	37	38	38
Republican	3.1%	3.0%	8.0%	6.9%	24.4%	57.1%	61.9%	71.4%	77.3%	71.4%	21	21	22	21
Democrat	7.3%	5.1%	13.3%	5.7%	34.5%	58.8%	52.9%	64.7%	58.8%	81.3%	16	16	16	17
1st term Presidencies	7.9%	-0.5%	12.4%	9.5%	34.5%	61.5%	42.3%	69.2%	80.8%	80.8%	25	25	26	26
2nd term Presidencies	-1.3%	13.0%	6.0%	-0.4%	16.9%	50.0%	91.7%	66.7%	50.0%	58.3%	12	12	12	12
Republican first term	4.3%	1.3%	10.6%	8.9%	31.7%	60.0%	53.3%	73.3%	87.5%	80.0%	15	15	16	15
Democrat first term	12.8%	-3.3%	15.0%	10.6%	38.6%	63.6%	27.3%	63.6%	63.6%	81.8%	10	10	10	11
Republican second term	0.1%	7.1%	1.4%	1.6%	6.0%	50.0%	83.3%	66.7%	50.0%	50.0%	6	6	6	6
Democrat second term	-2.7%	19.0%	10.5%	-2.5%	27.8%	50.0%	100.0%	66.7%	50.0%	66.7%	6	6	6	6

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)
T statistics in appendix

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Table 30: SPX Pres Cycle median returns 1872 to 2021
1st term Democrat Year 2 has a median return of -4.2%.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term
All terms	7.2%	2.8%	12.3%	8.3%	23.2%
Republican	3.0%	2.8%	8.5%	7.9%	20.1%
Democrat	10.3%	4.8%	15.2%	8.6%	25.9%
1st term Presidencies	7.2%	-2.5%	17.3%	8.3%	23.2%
2nd term Presidencies	-4.9%	14.1%	6.0%	3.3%	17.0%
Republican first term	3.5%	0.1%	17.3%	7.9%	23.2%
Democrat first term	19.8%	-4.2%	15.6%	10.3%	24.4%
Republican second term	-4.9%	8.4%	2.8%	4.7%	0.2%
Democrat second term	-3.8%	19.1%	15.2%	-0.3%	41.3%

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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Table 31: SPX Pres Cycle standard deviation of returns 1872 to 2021
1st term Democrat Year 2 has lower standard deviation of 8.8%.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term
All terms	19.8%	16.9%	19.3%	16.5%	46.7%
Republican	14.9%	19.3%	22.3%	18.2%	46.7%
Democrat	25.0%	13.6%	14.4%	14.4%	47.6%
1st term Presidencies	19.8%	15.4%	20.4%	12.9%	47.8%
2nd term Presidencies	23.9%	16.8%	16.6%	21.5%	43.9%
Republican first term	14.0%	18.6%	23.0%	14.1%	49.6%
Democrat first term	20.9%	8.8%	16.5%	11.3%	47.2%
Republican second term	18.0%	22.1%	20.9%	27.3%	35.9%
Democrat second term	30.5%	6.5%	10.9%	16.3%	51.8%

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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Mr. Market likes party hopping

US equity markets have shown firm average returns when leadership changes to a new political party. This hints at the market rewarding the removal of an underperforming and/or unpopular executive. The full 4-year average cycle returns for the S&P 500 under a switch from Republican to Democratic control are 43.6% (median 36.1%) and 36.7% (37.6% median) when a Republican takes control following a Democrat administration. A Democrat administration following a Democrat administration show full 4-year average S&P 500 returns of 25.5% (24.0% median) while a Republican administration following a Republican administration show average returns of 16.8% (9.5% median).

Table 32: S&P 500 US Presidential cycle for when political party retains or loses the Presidency from 1872 to 2021
The highest 4-year Presidential cycle return for the S&P 500 occurs when a Democrat takes control following a Republican administration.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term	% time up Year 1	% time up Year 2	% time up Year 3	% time up Year 4	% time up Full term	Observations (year 2-3)	Observations (Full term)	Observations (year 4)	Observations (year 1)
Republican from Democrat	0.3%	7.1%	16.6%	9.6%	36.7%	50.0%	62.5%	87.5%	100.0%	87.5%	8	8	9	8
Democrat from Republican	11.2%	-1.0%	16.2%	12.4%	43.6%	66.7%	37.5%	75.0%	75.0%	87.5%	8	8	8	9
Republican from Republican	4.8%	0.4%	2.7%	5.0%	16.8%	61.5%	61.5%	61.5%	61.5%	61.5%	13	13	13	13
Democrat from Democrat	2.9%	11.1%	10.4%	-1.0%	25.5%	62.5%	75.0%	62.5%	50.0%	75.0%	8	8	8	8

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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Table 33: Median SPX returns: Political party retains/loses the Presidency from 1872 to 2021
The highest median SPX returns occurs when a Republican takes control following a Democrat.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term
Republican from Democrat	-1.6%	7.4%	17.4%	9.0%	37.6%
Democrat from Republican	19.8%	-2.0%	15.6%	13.2%	36.1%
Republican from Republican	3.0%	2.8%	2.0%	4.5%	9.5%
Democrat from Democrat	9.7%	14.4%	15.2%	0.0%	24.0%

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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Table 34: SPX returns Standard Dev: Political party retains/loses the Presidency from 1872 to 2021
The lowest Year 2 standard deviation occurs when a Democrat takes over from a Republican.

Presidential Cycle Scenario	Year 1	Year 2	Year 3	Year 4	Full term
Republican from Democrat	12.20%	22.10%	10.70%	6.80%	31.60%
Democrat from Republican	22.40%	8.30%	17.60%	11.90%	52.20%
Republican from Republican	16.50%	17.90%	26.20%	23.20%	53.80%
Democrat from Democrat	28.40%	15.60%	10.60%	14.20%	44.00%

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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All presidencies back to 1872

The table below shows all of the Presidential terms going back to 1872.

Table 35: All Presidential terms going back to 1872
The highest full-term SPX return occurred during Franklin D. Roosevelt's presidency at 149.36%

President	Party	Term	Years	Year 1 Return	Year 2 Return	Year 3 Return	Year 4 Return	Full term Return	Ran for reelection	Reelected
Ulysses S. Grant	Republican	1	1869-1872					6.81%	Yes	Yes
Ulysses S. Grant	Republican	2	1873-1876	-12.75%	2.81%	-4.10%	-17.95%	-29.41%	No	
Rutherford B. Hayes	Republican	1	1877-1880	-9.37%	6.13%	42.96%	18.69%	63.19%	No	
James A. Garfield / Chester A. Arthur	Republican	1	1881-1884	2.98%	-2.89%	-8.51%	-18.84%	-25.74%	No	
Grover Cleveland	Democrat	1	1885-1888	19.83%	8.46%	-6.56%	-2.47%	18.45%	Yes	No
Benjamin Harrison	Republican	1	1889-1892	3.50%	-13.53%	17.61%	1.85%	7.20%	Yes	No
Grover Cleveland	Democrat	1	1893-1896	-19.96%	-2.49%	0.47%	-2.31%	-23.41%	No	
William Mckinley	Republican	1	1897-1900	12.56%	18.95%	6.55%	14.12%	62.80%	Yes	Yes
William Mckinley / Theodore Roosevelt	Republican	1	1901-1904	15.72%	1.26%	-18.39%	25.57%	20.09%	Yes	Yes
Theodore Roosevelt	Republican	2	1905-1908	15.64%	3.14%	-33.23%	37.44%	9.45%	No	
William Howard Taft	Republican	1	1909-1912	14.06%	-12.14%	0.66%	2.96%	3.88%	Yes	No
Woodrow Wilson	Democrat	1	1913-1916	-14.29%	-8.58%	28.98%	3.38%	4.48%	Yes	Yes
Woodrow Wilson	Democrat	2	1917-1920	-30.61%	16.44%	13.97%	-24.51%	-30.49%	No	
Warren G. Harding / Calvin Coolidge	Republican	1	1921-1924	7.43%	20.90%	-1.46%	18.76%	51.98%	Yes	Yes
Calvin Coolidge	Republican	1	1925-1928	23.25%	5.72%	30.91%	37.88%	135.20%	No	
Herbert Hoover	Republican	1	1929-1932	-11.91%	-28.48%	-47.04%	-15.19%	-71.71%	Yes	No
Franklin D. Roosevelt	Democrat	1	1933-1936	46.62%	-5.99%	41.51%	27.83%	149.36%	Yes	Yes
Franklin D. Roosevelt	Democrat	2	1937-1940	-38.64%	25.33%	-5.43%	-15.32%	-38.42%	Yes	yes
Franklin D. Roosevelt	Democrat	2	1941-1944	-17.86%	12.43%	19.45%	13.80%	25.53%	Yes	yes
Harry Truman	Democrat	1	1945-1948	30.72%	-11.85%	0.00%	-0.66%	14.47%	Yes	Yes
Harry Truman	Democrat	2	1949-1952	10.25%	21.78%	16.46%	11.81%	74.84%	No	
Dwight D. Eisenhower	Republican	1	1953-1956	-6.65%	45.02%	26.40%	2.62%	75.60%	Yes	Yes
Dwight D. Eisenhower	Republican	2	1957-1960	-14.31%	38.06%	8.48%	-2.97%	24.51%	No	
John F. Kennedy / Lyndon B. Johnson	Democrat	1	1961-1964	23.13%	-11.81%	18.89%	12.97%	45.84%	Yes	Yes
Lyndon B. Johnson	Democrat	1	1965-1968	9.06%	-13.09%	20.09%	7.66%	22.55%	No	
Richard M. Nixon	Republican	1	1969-1972	-11.36%	0.10%	10.79%	15.63%	13.66%	Yes	Yes
Richard Nixon / Gerald Ford	Republican	2	1973-1976	-17.37%	-29.72%	31.55%	19.15%	-8.97%	Yes	No
Jimmy Carter	Democrat	1	1977-1980	-11.50%	1.06%	12.31%	25.77%	26.34%	Yes	No
Ronald Reagan	Republican	1	1981-1984	-9.73%	14.76%	17.27%	1.40%	23.19%	Yes	Yes
Ronald Reagan	Republican	2	1985-1988	26.33%	14.62%	2.03%	12.40%	66.06%	No	
George H.W. Bush	Republican	1	1989-1992	27.25%	-6.56%	26.31%	4.46%	56.89%	Yes	No
Bill Clinton	Democrat	1	1993-1996	7.06%	-1.54%	34.11%	20.26%	70.01%	Yes	Yes
Bill Clinton	Democrat	2	1997-2000	31.01%	26.67%	19.53%	-10.14%	78.24%	No	
George W. Bush	Republican	1	2001-2004	-13.04%	-23.37%	26.38%	8.99%	-8.21%	Yes	Yes
George W. Bush	Republican	2	2005-2008	3.00%	13.62%	3.53%	-38.49%	-25.47%	No	
Barack Obama	Democrat	1	2009-2012	23.45%	12.78%	0.00%	13.41%	57.90%	Yes	Yes
Barack Obama	Democrat	2	2013-2016	29.60%	11.39%	-0.73%	9.54%	56.98%	No	No
Donald Trump	Republican	1	2017-2020	19.42%	-6.24%	28.88%	16.26%	67.77%	Yes	No
Joe Biden	Democrat	1	2021-2024	26.89%						

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

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Test statistics

Table 36: T-stat values for S&P 500 returns for US Presidential Cycle scenarios: 1872-2021
The largest full term T-stat value for SPX returns occur during a Democratic president's first term.

Presidential Cycle

Scenario	Year 1	Year 2	Year 3	Year 4	Full term
Republican	-0.59	-0.22	-0.47	0.13	-0.43
Democrat	0.39	0.35	0.84	-0.19	0.49
1st term Presidencies	0.75	-1.43	0.51	1.24	0.60
2nd term Presidencies	-0.91	1.90	-0.90	-1.10	-0.94
Republican first term	-0.20	-0.53	0.06	0.71	0.23
Democrat first term	1.24	-2.58	0.90	1.17	0.66
Republican second term	-0.67	0.36	-1.04	-0.43	-1.55
Democrat second term	-0.62	5.66	0.06	-1.33	-0.05

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

Table 37: T-stat values for SPX when political party retains/loses the Presidency: 1872-2021
The largest full term T-stat value occurs when a Democrat takes control of office from a Republican.

Presidential Cycle

Scenario	Year 1	Year 2	Year 3	Year 4	Full term
Republican from Democrat	-1.10	0.41	1.65	1.42	0.71
Democrat from Republican	0.79	-1.66	0.95	1.41	0.81
Republican from Republican	-0.04	-0.69	-1.04	-0.21	-0.80
Democrat from Democrat	-0.20	1.32	0.03	-1.47	-0.21

Source: BofA Global Research, Bloomberg, Global Financial Data (GFD)

Stock technicals for fundamental investor

How technical analysis helps the fundamental investor

This section highlights our process and identifies how technical analysis can help investors, especially the fundamental equity investor (see report - Equity technical analysis for the fundamental investor - for more). The consensus is that technical analysis is only useful for timing, but a technical overlay also assists with stock selection by identifying bullish charts to buy and bearish charts to sell or avoid. Other benefits of technical analysis include confirming if "stock" technicals are aligned with "company" fundamentals, identifying and staying with momentum stocks and risk management.

Price is King: Technical analysis is the analysis of price

Price is King. At its core, technical analysis is the analysis of price that makes an assessment of what direction and/or toward what levels price should trend to in the future. Price is what pays. If the objective of investing is to generate a positive return based on comparing the price at which a position was closed relative to the price at which a position was opened (profit or loss), then it makes sense to have a "technical analysis overlay" that focuses on price, even if you are a fundamental investor.

Separate stock technicals from company fundamentals

Having an analytical overlay that focuses on price allows investors to separate "stock" technicals from "company" fundamentals. When fundamentals and technicals are aligned, technical chart patterns recognize bullish or bearish fundamentals and increase conviction. This can provide a powerful signal. When they are not aligned, an improving or deteriorating stock chart can provide an "am I missing something" signal for an investor to do more fundamental work on a company that could identify an out of consensus fundamental reason for the improving or deteriorating stock chart.

Identify levels to buy or sell

Technical Analysis is useful for "timing" or identifying levels to buy or sell. Signals range from buying dips toward support and selling strength toward resistance to buying breakouts from bullish patterns and selling breakdowns from bearish patterns. If an investor has a bullish fundamental view on a stock and the stock holds support or breaks out from a bullish pattern, stock technicals become aligned with company fundamentals.

Identify stocks to buy and stocks to sell or avoid

The consensus is that technical analysis is only useful for timing, but it also helps investors with stock selection by identifying bullish stock charts to buy and bearish stock charts to sell or avoid. Our technical approach focuses on identifying the trend as bullish or bearish and investing with the trend. We look to buy dips within uptrends and sell strength within downtrends. We also rely on pattern recognition and favor stocks with bullish setups over stocks with bearish setups.

Identify and stay with momentum stocks

Market leadership stocks that keep going up are bullish momentum stocks. Market lagging stocks that keep going down are bearish momentum stocks. Many investors find it difficult to stay with bullish or bearish momentum stocks. Momentum stocks often move to price levels that are difficult to justify based on fundamentals. Absolute and relative trend screens across timeframes can help investors separate stock technicals from company fundamentals, or valuations, and stay invested in momentum stocks.

Identify stocks at risk to top out or form bottoms

For investors who like to pick tops and bottoms, use the relative price charts vs the S&P 500 as your guide. When a stock rises vs the S&P 500, it is leadership. When a stock declines relative to the S&P 500, it is a laggard. Tops or bottoms in the relative price often lead tops or bottoms in the absolute price. This can signal the end of a bullish or bearish momentum phase. When absolute reversals don't follow relative reversals, investor can still generate alpha relative to the S&P 500 (or another benchmark).

Help manage risk

We use the framework addressed in this Technicals Explained report in our equity technical research notes. Things can and do go wrong from time to time, so we need to manage risk accordingly. In our view, technical analysis can help investors form good habits. Good habits are part of risk management. Stock positions are less likely to go wrong when investors trade with and not against the trend, scale into and out of positions and focus on key supports and resistances as stop losses to protect capital. Combining absolute price with relative price trend analysis also helps in our view.

Weekly chart with 13, 26 and 40-week moving averages

To reduce daily "noise" we rely on weekly bar charts with 13, 26 and 40-week moving averages (MAs). We combine an analysis of absolute price (upper panel) with an analysis of the stock price relative to the S&P 500 (bottom panel). See Chart 61 below.

> See Moving Average Cross Strategies to learn more about the simple moving average, generally accepted signals, popular periods, the "golden cross" & "death cross" and the triple moving average cross or TMAC strategy.

Our timeframe is a rolling 3 to 6 month period

Many investors think in terms of quarters or quarterly performance, so we use a 13-week MA or quarterly MA. Our short to intermediate-term timeframe is a rolling 3 to 6-month period, so we combine the 13-week MA with a 26-week MA, which is a two quarter MA. A rolling timeframe helps investors stick with a longer-term core bullish or bearish view as long the trend is intact.

Our trading cycle is defined by the 26 and 40-week MAs

The direction or slope of the MA (rising or falling) is more important than whether or not the stock price is above or below the MA. We use the 26-week MA and the 40-week MA (similar to the 200-day MA) to define the trading cycle or trend. Rising 26 and 40-week MAs define a bullish trading cycle, while falling 26 and 40-week MAs define a bearish trading cycle.

A 200-week MA defines the big picture perspective

We use the 200-week MA to define the big picture or secular trend. This moving average often provides support (resistance) for cyclical pullbacks (rallies) within secular uptrends (downtrends). 200-week MAs do not generate many trading signals. But when they do, that signal can be powerful.

Chart 61: S&P 500 – Weekly Chart with the 13-week, 26-week, 40-week and 200-week moving averages
The 13-week MA defines the tactical trend. The 26-week and 40-week MAs define the trading cycle (bullish or bearish). The 200-week MA helps define the secular trend.

Source: BofA Global Research, Bloomberg

MA screens define trends across multiple timeframes

We classify four trend categories across multiple timeframes using the 13, 26, 40 and 200-week MAs. We define the absolute and relative price trends of a stock by the slope of the MA and price vs the MA. *The slope of the MA is more important than whether or not the price above or below the MA*. These four trend categories are Bullish, Bullish at risk, Bearish and Bearish at risk.

Table 38: Weekly price and moving average (13, 26, 40 and 200-week) trend positions
Price and moving average trend positions are determined by 1) the slope of the moving average and 2) the price relative (above or below) the moving average.

MA trend	Criteria used on both absolute and relative prices	Direction of MA	Price vs MA	Trend category	Action
Bullish	Weekly closing price ABOVE a RISING or bullish MA	Bullish	Bullish	Confirmed uptrend	Buy dips, hold longs, avoid shorts
Bullish at risk	Weekly closing price BELOW a RISING or bullish MA	Bullish	Bearish	Pullback in uptrend	Watch long or look to buy
Bearish	Weekly closing price BELOW a FALLING or bearish MA	Bearish	Bearish	Confirmed downtrend	Sell rallies, hold shorts, avoid longs
Bearish at risk	Weekly closing price ABOVE a FALLING or bearish MA	Bearish	Bullish	Rebound in downtrend	Watch short or look to sell

Source: BofA Global Research

MA trends follow a cycle of bullish and bearish signals

The weekly MA trend categories follow a cycle. After a period of time below a declining weekly MA, a stock can rally above the MA and a Bearish trend can improve to a Bearish at risk trend. Unless the rebound above the declining MA is short-lived, the MA will begin to rise and a Bearish at risk trend will improve to Bullish. This confirms a shift from a sell strength pattern to a buy dips pattern. After a period of time above a rising MA, a Bullish trend can deteriorate to a Bullish at risk trend. Unless the dip below a rising MA is short-lived, the MA will begin to decline and a Bullish at risk trend will deteriorate to Bearish. This confirms a shift from a buy dips to a sell strength pattern.

Chart 62: Apple Inc. (AAPL) – The 40-week MA trend cycle
The Chart below shows trend changes on AAPL using the 40-week MA as a guide.

Source: BofA Global Research, Bloomberg

Moving averages = multiple time analysis on one chart

Using the 13, 26 and 40-week MAs puts multiple timeframes on one chart (Chart 63). The 13-week MA is the tactical trend, the 26-week MA is the intermediate-term trend and the 40-week MA is the longer-term trend. Including the 200-week MA would also identify the big picture trend.

Best trends when 13, 26 and 40-week trends are in gear

The strongest trends occur when they are in gear across timeframes. The strongest bullish trends (aka positive momentum) happen when the 13, 26 and 40-week trends are Bullish (stock price above rising MAs). The weakest bearish trends (aka negative momentum) happen when the 13, 26 and 40-week trends are Bearish (stock price below falling MAs).

Multiple MA timeframes spot corrections within trends

Bullish corrections or dips occur on moves below 13 and/or 26-week MAs within bullish 40-week trends. Bearish corrections or rebounds occur on moves above 13 and/or 26-week MAs within bearish 40-week trends.

13 and 26-week trends confirm shifts in 40-week trend

The 13 and 26-week trends can help confirm shifts in the 40-week trend. Shifts to Bullish for the 13 and 26-week trends increased the potential for Bearish at risk 40-week trends to shift to Bullish 40-week trends. Shifts to Bearish for the 13 and 26-week trends increase the potential for Bullish at risk 40-week trends to shift to Bearish 40-week trends. See the circles on the chart below.

Chart 63: Apple Inc. (AAPL) – Multi-timeframe weekly MA trend cycle
The best trends are when the 13, 26 and 40-week MA trends are in gear across timeframes. 13 and 26-week MA trends can lead changes in the 40-week MA trend.

Source: BofA Global Research, Bloomberg

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Act on trend reversion signals

We are not afraid to own stocks in uptrends and not own or short stocks in downtrends. We are trend followers who believe that the trend is your friend, but some investors

favor mean reversion. Combining trend following and mean reversion advocates buying dips or consolidations in bullish trends and selling rallies or consolidations in bearish trends. Trend reversion trades take place within the trend (tailwind) and not against the trend (headwind).

Trend reversion signals have two parts

In uptrends 1) buy dips into bullish or rising longer-term MAs (26/40-week) and 2) buy breakouts back above shorter-term MAs (13/26-week) especially if the dip holds above or near the longer-term rising or bullish MA (40-week).

In downtrends 1) sell rebounds into bearish or declining 26/40-week MAs and 2) sell breakdowns back below 13/26-week MAs especially if the rally stalls below or near declining or bearish 40-week MA.

Look to buy dips within Bullish weekly MA trends

Investors like to buy dips. Bullish corrections, dips or mean reversion occur on drops below 13 and/or 26-week MAs within Bullish 40-week trends. This means that the 13-week trend can shift to Bullish at risk (or Bearish) and the 26-week trend can shift to Bullish at risk (not to Bearish in order to maintain the bullish trading cycle), but as long as the 40-week trend remains Bullish, it is likely a buyable bullish trend reversion signal.

The chart below shows the 40-week trend cycle shift from Bearish to Bearish at risk to Bullish. We flag the bullish trend transition pullback (shift to buy dips from sell strength) and the bullish pullbacks that preceded the bullish momentum phase (all three MA trends bullish).

Chart 64: Caterpillar (CAT) – Bullish trend transition, bullish pullbacks and then bullish momentum
Bullish mean reversion: This Chart shows bullish pullbacks within an improving and then an upward trend.

Source: BofA Global Research, Bloomberg

Look to sell rallies within Bearish weekly MA trends

Investors like to sell strength. Bearish corrections, rebounds or mean reversion occur on rallies above 13 and/or 26-week MAs within Bearish 40-week trends. This means that the 13-week trend can shift to Bearish at risk (or Bullish) and the 26-week trend can shift to Bearish at risk (not to Bullish in order to maintain the bearish trading cycle), but as long as the 40-week trend remains Bearish, it is likely a sellable bearish trend reversion rally.

The chart for CAT below shows the 40-week trend cycle shift from Bullish to Bearish and back to Bullish. We flag a bearish trend transition rally (shift to sell strength from

buy dips) and the bearish rallies in mid and late 2015. Other than an April-July consolidation, CAT had bearish momentum (all three MA trends bearish) in 2015.

Chart 65: Caterpillar (CAT) – Bearish trend transition, bearish rallies and then bullish trend transition
Bearish mean reversion: This Chart shows bearish rallies within a weakening and then a downward trend.

Source: BofA Global Research, Bloomberg

Buy crosses above MAs within Bullish 40-week trends

Many investors are afraid to buy strength or chart breakouts. Bullish crosses for stock price above 13 and/or 26-week MAs when the 40-week trend is Bullish can confirm or reassert a bullish trend (as well as reaffirm positive fundamentals). This occurs after bullish trend reversion on declines below 13 and/or 26-week MAs within Bullish 40-week trends and provides a bullish trend confirmation signal. The chart for DIS below shows weekly closes above 13 and/or 26-week MAs that confirmed the bullish 40-week trend.

Chart 66: Disney (DIS) – Bullish trend confirmation signals
Weekly closes above 13 and/or 26-week MAs confirm the bullish 40-week trend.

Source: BofA Global Research, Bloomberg

Sell crosses below MAs within Bearish 40-week trends

Many investors are afraid to sell weakness or chart breakdowns. Bearish crosses for stock price below 13 and/or 26-week MAs when the 40-week trend can confirm or reassert a bearish trend (as well as reaffirm negative fundamentals). This occurs after bearish trend reversion on rebounds above 13 and/or 26-week MAs within Bearish 40-week trends (highlighted above) and provides a bearish trend confirmation signal.

The chart for MMM below shows a bearish trend transition signal at the start of 2008 as well as weekly closes below 13 and/or 26-week MAs that confirmed the Bearish 40-week trend throughout 2008.

Chart 67: 3M co (MMM) – Bearish trend confirmation signals
Weekly closes below 13 and/or 26-week MAs confirm the bearish 40-week trend.

Source: BofA Global Research, Bloomberg

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Absolute and relative charts = powerful combination

We have focused on absolute trends so far, but tracking a stock's relative trend vs a benchmark along with the absolute price trend is a powerful combination. We use the S&P 500 as the benchmark index most of the time, but a benchmark is whatever index or sector that a portfolio manager, analyst and trader is trying to outperform.

How to read a relative price chart

A relative (or ratio) chart compares the price of a security relative to another. Ratio charts identify a stock's relative strength or weakness vs a benchmark (S&P 500). This is also known as comparative relative strength and is not to be confused with the Relative Strength Index or RSI, which is a price momentum indicator. When the relative chart is rising, the stock is outperforming and shows relative strength or leadership. When the relative chart is declining, the stock is underperforming and shows relative weakness or is a laggard. Since a flat relative trend means that a stock is performing in line with the market, it is not bearish for the stock if the market is in a strong uptrend and gained 20% over the last year.

Chart 68: Marriot (MAR) relative to the S&P 500
Marriot's relative ratio Chart compares the price of MAR relative to a benchmark (S&P 500).

Source: BofA Global Research, Bloomberg

Absolute and relative charts: Trends, leaders and laggards

The strongest technical pattern is a bullish absolute price trend confirmed by a bullish relative (or leadership) trend. The weakest pattern is a bearish absolute price trend confirmed by a bearish relative (or laggard) trend. We use the same techniques on absolute and relative price charts but tend to be more flexible on the relative chart with a greater emphasis on the trends of the relative moving averages.

Bullish absolute and relative set-ups for Deere (DE)

The chart below shows the weekly absolute and relative charts for DE highlighting bullish signals using the absolute and relative price trends. DE had a bullish signal from late 2016 prior to a profit taking signal in August 2017. This profit taking signal did not break the bullish trend (rising 26 and 40-week MAs), and DE embarked on a yearend 2017 into 2018 rally. The late September move back above rising 26 and 40-week MAs provided this bullish signal.

Chart 69: Deere (DE) (top) and relative to the S&P 500 (bottom) – weekly Chart with MAs
This Chart highlights bullish signals using the absolute and relative price trends.

Source: BofA Global Research, Bloomberg

Bearish absolute and relative set-ups for Qualcomm (QCOM)

Chart 70shows QCOM highlighting bearish signals using the absolute and relative price trends. The relative chart broke down in advance of the absolute chart in mid 2014. A rally for QCOM in late 2014 above the 40-week MA did not get confirmed by a move above the 40-week MA relative to the S&P 500, which was a bearish divergence. After these negative relative signals, QCOM was a bearish momentum stock from late 2014 into 2016, especially relative to the S&P 500.

Chart 70: QUALCOMM (QCOM) (top) and relative to the S&P 500 (bottom) – weekly Chart with MAs
This chart highlights bearish signals using the absolute and relative price trends.

Source: BofA Global Research, Bloomberg

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Relative reversals can precede or lead absolute reversals

Investors like to pick tops and bottoms. Tops or bottoms in the relative price trend often provide a leading indicator of tops (bearish reversals) or bottoms (bullish reversals) in the absolute price trend.

Bearish relative reversal (top) signals in absolute uptrends

Relative price signals that increase the risk for a top in an absolute price uptrend are 1) relative price diverges on lower highs as absolute price hits higher highs, 2) the relative price chart moves lower as the stock trends higher and 3) relative price is below weekly MAs while absolute price is above its corresponding weekly MAs.

Bearish relative signals preceded an absolute top on AutoZone (AZO)

The chart below shows AZO with a bearish relative divergence (lower relative highs vs higher absolute highs), a relative price breakdown in the face of a stronger absolute trend and a move above absolute price MAs without a corresponding move above the relative MAs (also a bearish divergence). This relative deterioration suggested getting more defensive on AZO in mid to late 2016 and preceded an early 2017 top breakdown for AZO. This stock was leadership in 2015.

Chart 71: AutoZone (AZO) (top) and relative to the S&P 500 (bottom) – weekly with MAs
A bearish shift on the relative Chart was a leading indicator for a top on the absolute Chart.

Source: BofA Global Research, Bloomberg

Bullish relative reversal (bottom) in absolute downtrends

Relative price signals that increase the risk for a bottom in an absolute price downtrend are 1) relative price diverges on higher lows as absolute price hits lower lows, 2) the relative price chart moves higher as the stock trends lower and 3) relative price is above weekly MAs while absolute price is below its corresponding weekly MAs.

Bullish relative signals preceded an absolute bottom on Cisco Systems (CSCO)
The chart below shows CSCO with a bullish relative divergence (higher relative lows vs lower absolute lows), a relative price upside breakout in the face of a weaker absolute trend and a move below absolute price MAs without a corresponding move below the relative MAs (also a bullish divergence). This relative improvement suggested getting more bullish (or less bearish) on CSCO in early 2009 and preceded a breakout and rally for the stock from early 2009 into 2010.

Chart 72: Cisco Systems (CSCO) (top) and relative to the S&P 500 (bottom) – weekly with MAs
A bullish shift on the relative Chart was a leading indicator for a bottom on the absolute Chart.

Source: BofA Global Research, Bloomberg

Bullish momentum stock chart

The chart below shows Jack in the Box (JACK) transitioning from a bearish period to a bullish period. A higher relative low for JACK vs the S&P 500 did not confirm a lower low for JACK in late 2011. This formed a bullish divergence that was part of a 1.5 year bottom or base for JACK. Bullish absolute and relative breakouts in mid 2012 and bullish pullback signals in 2H 2012 preceded a bullish momentum phase for JACK from 2013 and into 2014. JACK had a bullish trend reversion signal in late 2013.

Chart 73: Jack in the Box (JACK) (top) and vs the S&P 500 (bottom) **–** weekly Chart with MAs
Bullish momentum phase preceded by bullish absolute and relative breakouts and retests.

Source: BofA Global Research, Bloomberg

Bearish momentum stock chart

The chart below shows Alibaba (BABA) going from bullish momentum in 2020 to bearish momentum in 2021. A relative breakdown in late 2020 provided a warning. Bearish momentum has pressured this stock throughout much of 2021 with tactical (and sellable) rallies into declining weekly MAs.

Chart 74: Alibaba (BABA) (top) and vs the S&P 500 (bottom) **–** weekly Chart with MAs
Bearish momentum has pressured BABA throughout 2021 with tactical rallies into bearish MAs.

Source: BofA Global Research, Bloomberg

Weekly MAs and relatives boost chart pattern confidence

Weekly MAs can help increase confidence in reversal patterns (tops and bottoms) and trend continuation patterns. CVS formed a 2015-2016 top. Weakening absolute price MAs, bearish MA signals and a relative price breakdown increased the risk for a top breakdown in 2016. A weak relative trend throughout 2017 suggested that CVS was consolidating within a bearish trend (not forming a bottom) and likely to break lower. Investors short CVS during this period generated alpha relative to the S&P 500.

Chart 75: CVS Health Corp (CVS) (top) and vs the S&P 500 (bottom) **–** weekly Chart with MAs
Weekly MAs can help show reversal patterns (tops and bottoms) and trend continuation patterns.

Source: BofA Global Research, Bloomberg

Use RRG as your relative rotation radar

- Relative Rotation Graphs (RRG) visualizes relative strength across a group of securities against an index or benchmark.

- RRG gauges relative trend & momentum, showing winners & losers in 4 quadrants: Leading, Weakening, Lagging & Improving.

Visualize relative rotation through RRG

Relative Rotation Graphs™ (RRG) allow investors to visualize relative strength across a group of securities against an index or benchmark. RRG gives investors a relative rotation snapshot across a group of securities in just one chart. While most often used to show relative rotation among sectors, RRG can also show rotation for a portfolio of stocks as well as across asset classes.

Relative strength analysis

Before addressing RRG, we need to define relative strength. Relative strength analysis uses a ratio chart to compare the price performance of two securities, such as a stock vs. an index. When the relative ratio rises, the stock outperforms the index, which is bullish for the stock. When it falls, the stock underperforms, which is bearish for the stock.

RRG shows relative winners & losers in 4 quadrants

RRG compares relative strength on a scatter-plot chart using relative trend strength (JdK RS-Ratio) on the x-axis and relative trend momentum (JdK RS-Momentum) on the y-axis. RRG charts also show a trail of history to track relative rotation over time. The RRG graph breaks out relative rotation into four quadrants: Leading, Weakening, Lagging, and Improving. We view the relative trend as more important than relative momentum. This means that regardless of momentum, the right side of the RRG chart shows relative leaders and the left side shows relative laggards.

- Upper right quadrant = Leadership (positive relative trend and positive relative momentum) = RS-Ratio and RS-Momentum > 100

- Lower right quadrant = Weakening Leadership (positive relative trend and negative relative momentum) = RS-Ratio > 100 and RS-Momentum < 100

- Lower left quadrant = Laggards (negative relative trend and negative relative momentum) = RS-Ratio and RS-Momentum < 100

- Upper left quadrant = Improving Laggards (negative relative trend and positive relative momentum) = RS-Ratio < 100 and RS-Momentum > 100

Table 39: The four quadrants of the Relative Rotation Graph (RRG)
The four quadrants for the RRG moving in a clockwise direction are Improving, Leading, Weakening and Lagging.

Relative momentum (JdK RS- Momentum)	Improving = Negative Trend & Positive Momentum	Leading = Positive Trend & Positive Momentum
	Lagging = Negative Trend & Negative Momentum	Weakening = Positive Trend & Negative Momentum
	Relative trend (JdK RS Ratio)	

Source: BofA Global Research, Bloomberg, RRG Research

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Relative rotation in action

Chart 76shows a RRG chart for the S&P 500 GICs Level 1 Sectors vs. the S&P 500 benchmark with a 12 week trail. Each point on the trail represents one week and the squares mark the current or most recent week. This allows investors to visualize how the 10 GICs sectors have done over a rolling 12 week period. Moving up and to the right on the RRG graph shows improving relative strength and momentum. This is view as bullish. Moving down and to the left shows deteriorating relative strength and momentum and is interpreted as bearish.

Chart 76: Bloomberg Relative Rotation Graph (RRG) — weekly as of 12/11/15
RRG Chart for the S&P 500 GICs Level 1 Sectors vs. the S&P 500 benchmark with a 12 week trail.

Source: BofA Global Research, Bloomberg, RRG Research

Relative rotation graph (RRG) takeaways

- Leading sectors: positive relative trends and momentum (upper right quadrant): Information Technology (S5INFT) and Industrials (S5INDU)

- Lagging sectors: negative relative trends and momentum (lower left quadrant): Health Care (S5HLTH), Telecom (S5TELS), Financials (S5FINL) and Utilities (S5UTIL)

- Improving sectors: negative relative trends but positive relative momentum (upper left quadrant): Energy (S5ENRS) and Materials (S5MATR)

- Weakening sectors: positive relative trends but negative relative momentum (lower right quadrant): Consumer Discretionary (S5COND) and Consumer Staples (S5CONS)

- Bullish rotation (improving relative trend and momentum) over the last 12 weeks in order of relative trend strength from strongest to weakest: Information Technology, Industrials, Materials, and Energy

- <u>Bearish rotation</u> (deteriorating relative trend and momentum) over the last 12 weeks in order of relative trend strength from weakest to strongest: Health Care, Telecom, Utilities, Consumer Staples, and Consumer Discretionary

- <u>Relative trend ranks</u> (strongest to weakest): Information Technology, Consumer Discretionary, Consumer Staples, Industrials, Utilities, Financials, Materials, Telecom, Health Care, and Energy

- <u>Relative momentum ranks</u> (strongest to weakest): Materials, Energy, Industrials, Information Technology, Financials, Consumer Discretionary, Telecom, Consumer Staples, Health Care, and Utilities

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Trading Market Distributions

- Market profile charts compare price at time distributions to identify important levels of support, resistance and targets.

- The current and historical point of controls and value area lines are two of the most important levels.

- Trading between double distributions is a popular strategy amongst market profile practitioners.

A market profile shows price distribution

A market profile is the distribution of prices to identify a market's fair value price, trading patterns, and support and resistance levels. It is used to determine if a market is trending or range bound. It is founded on the principle that prices move slowly through time (range bound) and fast through price (trending). One of its goals is to help traders catch trending moves and stay out of choppy, range bound moves by offering key levels that define each market and signal when that market is changing.

A profile reduces dependency on time, focuses on price

The chart below consists of three distributions, each representing one month of trading. It is composed of letters that represent a time period. A letter can represent a specified number of minutes, a trading day, week, or even month. In the example below, an "A" represents the first day of the month, and each set of letters is a one-month distribution of prices. The magenta letters highlight the first two periods of a market profile and are called the initial balance. The magenta lines define 70% of the distribution. The basics of the chart suggest that when price trades above the initial balance or value area line, it may trend higher. When price trades below either, it may trend lower.

Chart 77: Three-month market profile Chart
Price action represented in a market profile chart for three months
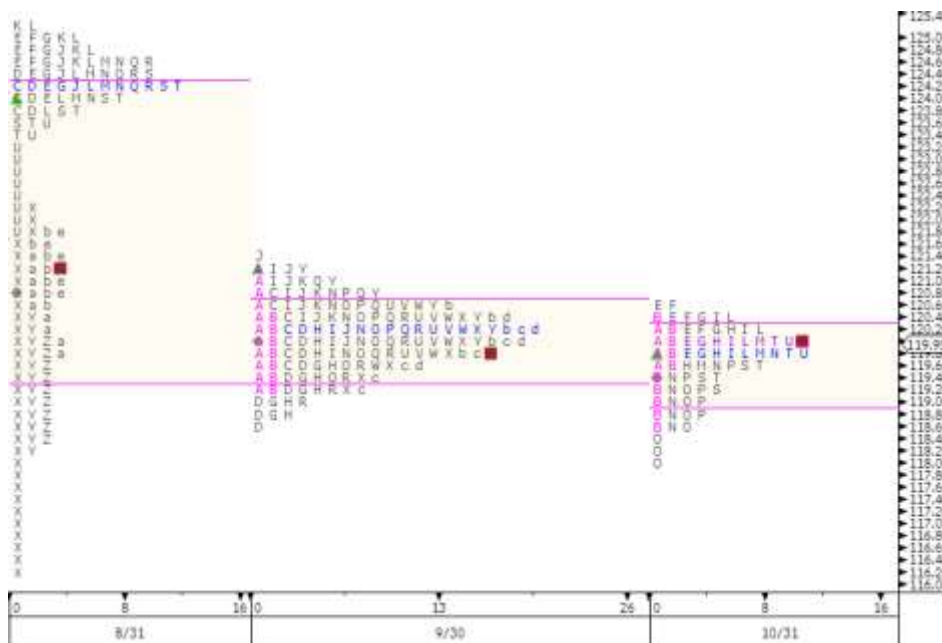
Source: BofA Global Research, Bloomberg
*The 8/31 profile does not have any A's because the first day of the month was a Saturday and there was no trading.

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Green triangles, gray diamonds, and red squares

In a default market profile chart, many symbols are present to identify important points. Most important is the point of control (POC). This is the longest horizontal row in a market profile distribution that shows the price level most often reached. It shows frequency at price or time at price, not volume at price. Historical POCs create key levels of support, resistance and targets for trends. Type MKTP<GO> on Bloomberg to see the chart in its default colors.

Chart 78: Market profile symbols and colors
Market profile symbols explained

Source: BofA Global Research

A collapsed bar chart is a market profile

Each letter in a distribution represents the high/low range for a given period. The market picture chart collapses the ranges in real time to form the distribution. The three images below compare a market profile to a split profile and to a bar chart. The split profile and bar chart look alike. Now, imagine the chart collapsing the bars to the left, forming a distribution of prices resulting in a market profile.

Chart 79: Profile distribution
A distribution with a "P" shape
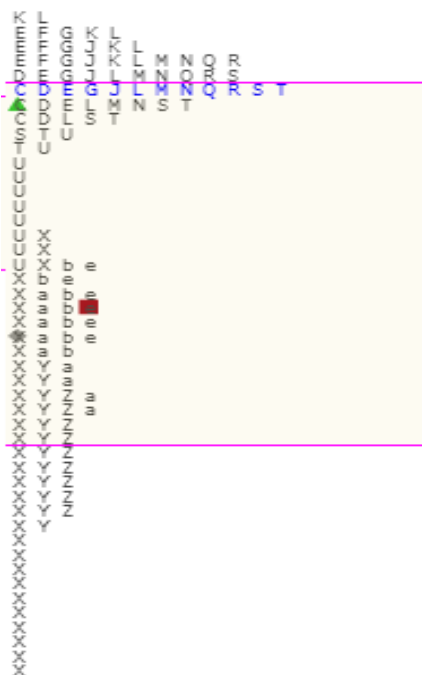
Source: BofA Global Research, Bloomberg

Chart 80: Split profile with each day separated
The "P" shape split apart by time…
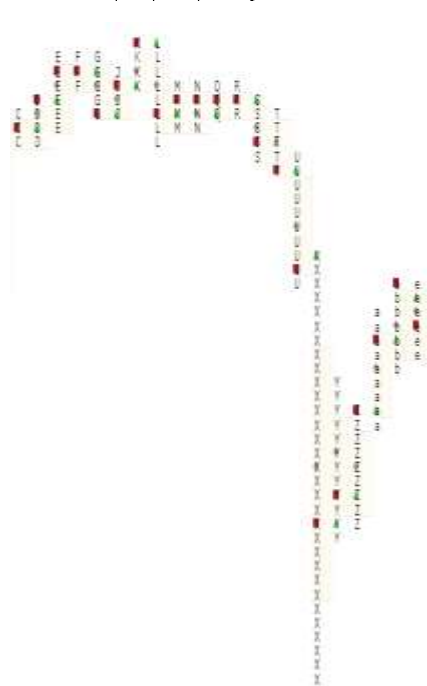
Source: BofA Global Research, Bloomberg

Chart 81: Looks like a bar Chart
…looks just like a bar chart.

Source: BofA Global Research, Bloomberg

Normal, up trend, down trend and double distributions

There are many ways price can be distributed over time. In market profile analysis, we differentiate between normal, up trend, down trend and double distributions.

Chart 82: Four types of profiles
Distribution examples
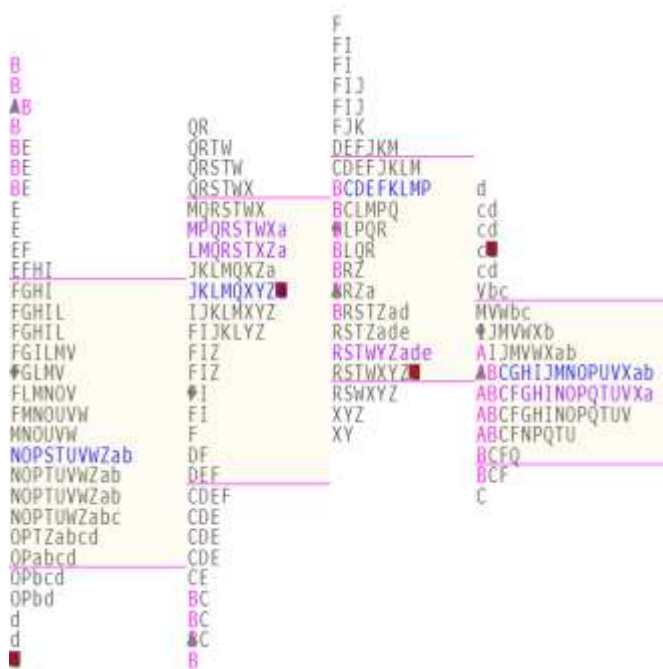
Source: BofA Global Research, Bloomberg

The image to the left presents four distribution types:

- The first profile is a down trend where the price opened at the highs, forming the initial balance. Soon thereafter, it traded below the initial balance and began its down trend, closing at the lows of the month.

- The second profile is an up trend, where the price opened and held the lows of the prior month and began trading higher above the initial balance. Price traded as high as the open of the prior distribution, formed its point of control at the value area of the prior month, and closed there.

- The third profile is a double distribution, which shows the level where sellers sold the price lower and buyers bid prices higher, forming the gap. Price closed at the lower value area line.

- The fourth is a relatively normal distribution with a POC in the center of the value area equal to the prior month's close, emphasizing the importance of that level. Toward the end of the month, price rallied to begin filling the gap in the third profile and failed at the third profile's POC.

Applying market profile analysis

The items that comprise a market profile can be used to describe market activity and generate buy and sell signals. They enable the analyst to do the following:

- Understand where price is in relation to current and historical POCs, value areas, initial balance lines, highs, lows, closes and midpoints. Use these to find breakouts and trade in the direction of the move and to identify key levels to forecast price.

- Identify a double distribution and trade with an expectation the gap may be filled. Create targets based on the double distribution value area and POCs.

- Consider a reversion trade when the market moves too far too fast in one direction and finds support or resistance at a key level. This is sometimes called a single print tail or retracement trade.

- Split and join profiles to separate trending and range bound price action to identify early breakouts, targets, and support and resistance levels.

- Analyze multiple distributions historically to see if the same defined components of a market profile appear at or near the same level. For example, if over the course of 10 distributions, multiple POCs, value area levels and symbols overlap.

Example 1

Exhibit 7 depicts an up trend distribution followed by a normal distribution. The two profiles have equal lower value areas and suggest support at that level (119.30). If price started trading below 119.30, it would be interpreted as bearish.

Joining these two distributions together creates the distribution in Exhibit 8. The double distribution has a more pronounced POC at 120.20. A bullish signal could be interpreted if price decisively traded above the POC and midpoint with anticipation of an uptrend to fill the gap in the distribution. The first target could be the top of the value area (T1) and a second could be the longest point of the upper distribution (T2).

Chart 83: Two distributions
Two distributions can make a double distribution
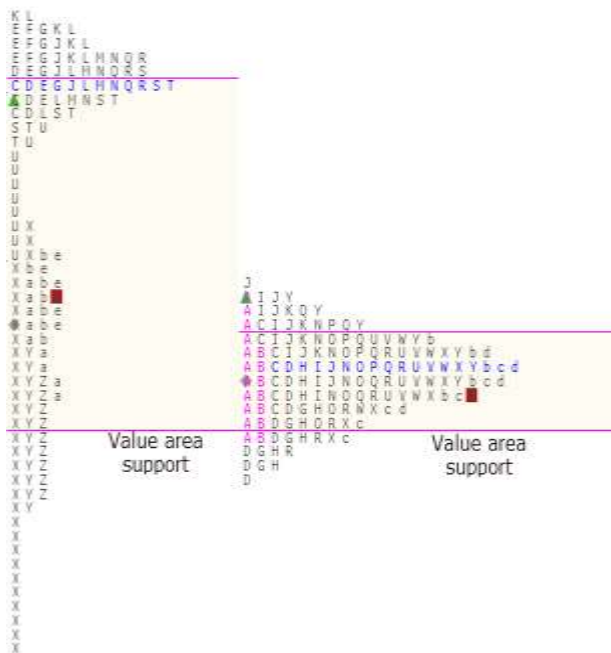
Source: BofA Global Research, Bloomberg

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Chart 84: Joined distributions
Two distributions can make a double distribution
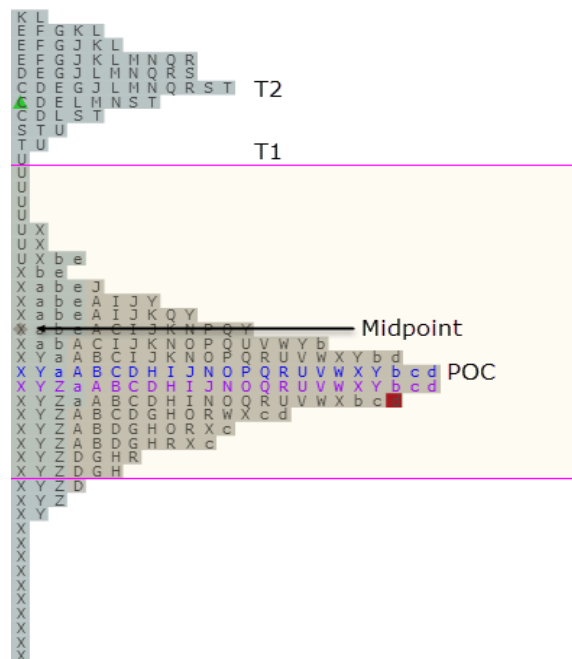
Source: BofA Global Research, Bloomberg

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Example 2

The distribution on the left joins six months of data to form a large double distribution. The POC is on the lower portion of the distribution at 120, with value area lines equal to 119.30 and 123.40.

The current distribution broke above its value area high level and the initial balance high of 120.50. This suggests a new trend may be beginning with a target of 123.40.

Chart 85: Multi-month distribution compared to the current month
When price starts filling a gap in a double distribution
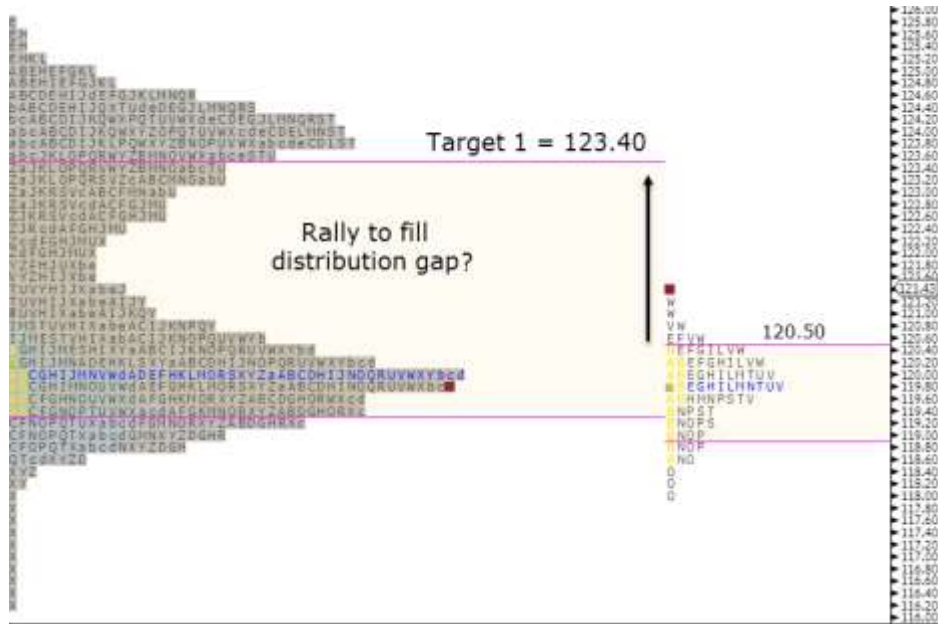
Source: BofA Global Research, Bloomberg

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Example 3

In Chart 86, the first distribution is a small double distribution, the second formed an abnormal trending distribution, and the third is a much more normal distribution. To define the important levels in this scenario, we should first split the top of the middle distribution from the rest. This forms Chart 87. Then we can join the two left distributions together and the two right distributions together. The result is Chart 88.

Chart 88 suggests the market is normally distributed and range bound. Price is trading below the POC and above the lower value area line. If the price traded below the value area, it would be bearish. If price traded above the value area, then it would be bullish. Otherwise, reversion to the POC is anticipated in a normal distribution.

When a new distribution begins, we can look to the most recent normal distribution for key levels. This includes the POC at the center of it and the two value area lines.

Chart 86: Three distributions
Splitting a distribution
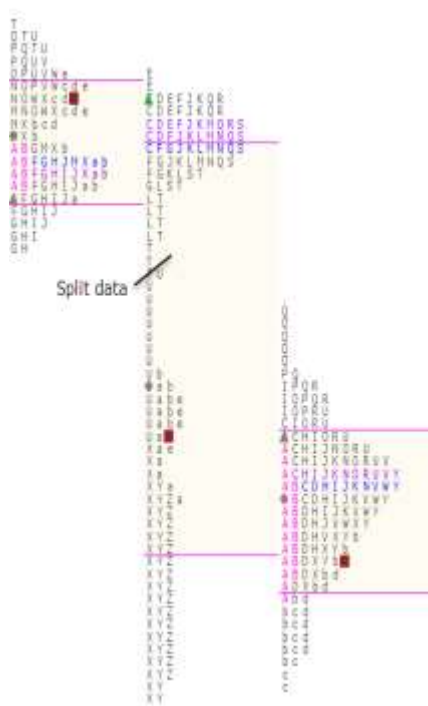
Source: BofA Global Research, Bloomberg

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Chart 87: Splitting the first
After splitting a distribution
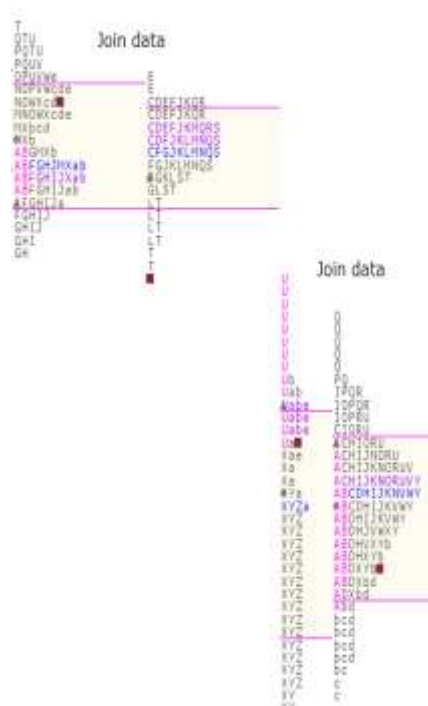
Source: BofA Global Research, Bloomberg

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Chart 88: Joining the partial distributions
Joining relevant distributions
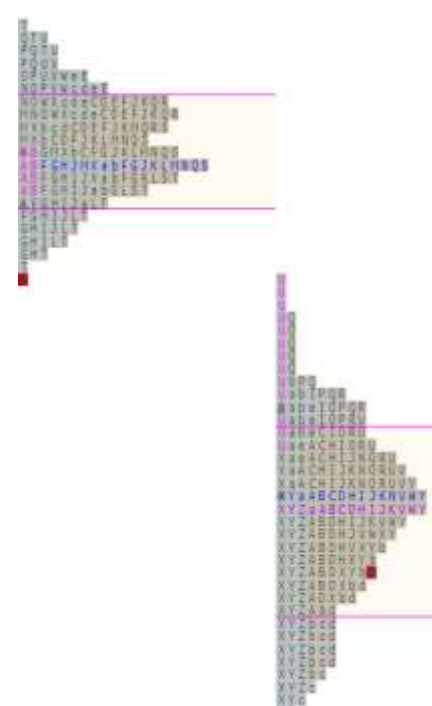
Source: BofA Global Research, Bloomberg

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Market profile accreditation and more information

Market profile was created by J. Peter Steidlmayer while working at the Chicago Board of Trade. More information can be found in his book published in 2002 called Steidlmayer on Markets: Trading with Market Profile. The Chicago Mercantile Exchange also hosts content on their website about market profile: (http://www.cmegroup.com/education/interactive/marketprofile/).

Futures positioning data

- The commitment of traders report issued by the Commodity Futures Trading Commission provides a summary of how a variety of market participants are positioned in the commodity and financial futures market, i.e. long or short.

- When market participants get too long or short, there is a greater risk of a correction or trend change. Sometimes this can occur very fast and can be useful to combine with the aforementioned technical strategies.

CFTC Commitment of Traders (COT) report

The Commitments of Traders (COT) report provide weekly positioning and flow data. More specifically, COT reports are a breakdown of each Tuesday's open interest for markets in which 20 or more traders hold positions equal to or above the reporting levels established by the Commodity Futures Trading Commission (CFTC)[1]. As of writing this information is released each week on Friday at 3:30pm EST for as of Tuesday data. Sometimes release dates move due to holidays.

"**Speculator" position**s often used as contrarian indicator

The legacy COT report divides data into two major categories: commercial and non-commercial. The commercial category represents hedgers while the non-commercial represents speculators. The speculators net position, normally measured as a percentage of the open interest, is often used as a contrarian sentiment indicator. When readings are extremely bullish (above 2 standard deviations for example), it is contrarian bearish, and vice versa. Just like any sentiment indicator, it is best combined with price trend and technical indicators.

In December of 2015 gold prices bottomed and positioning was the shortest in many years. A strong reversal/breakout and uptrend followed to take price from just below 1100 to 1400. Positioning was stretched long and reversed lower. After trading range bounce for two years the market found itself very short even more so then in 2015 but at higher price levels. This we view as a positive divergence in conjunction with a large rounded base forming and suggesting significant upside.

Chart 89: Gold future (top), Net non-commercial as % of open interest (bottom) with a mean and +/- 2 standard deviation lines. (G392)
Divergence between price trend and positioning trend can indicate trend change coming.

Source: BofA Global Research, Bloomberg

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[1] Source: http://www.cftc.gov/Marketreports/CommitmentsofTraders/index.htm
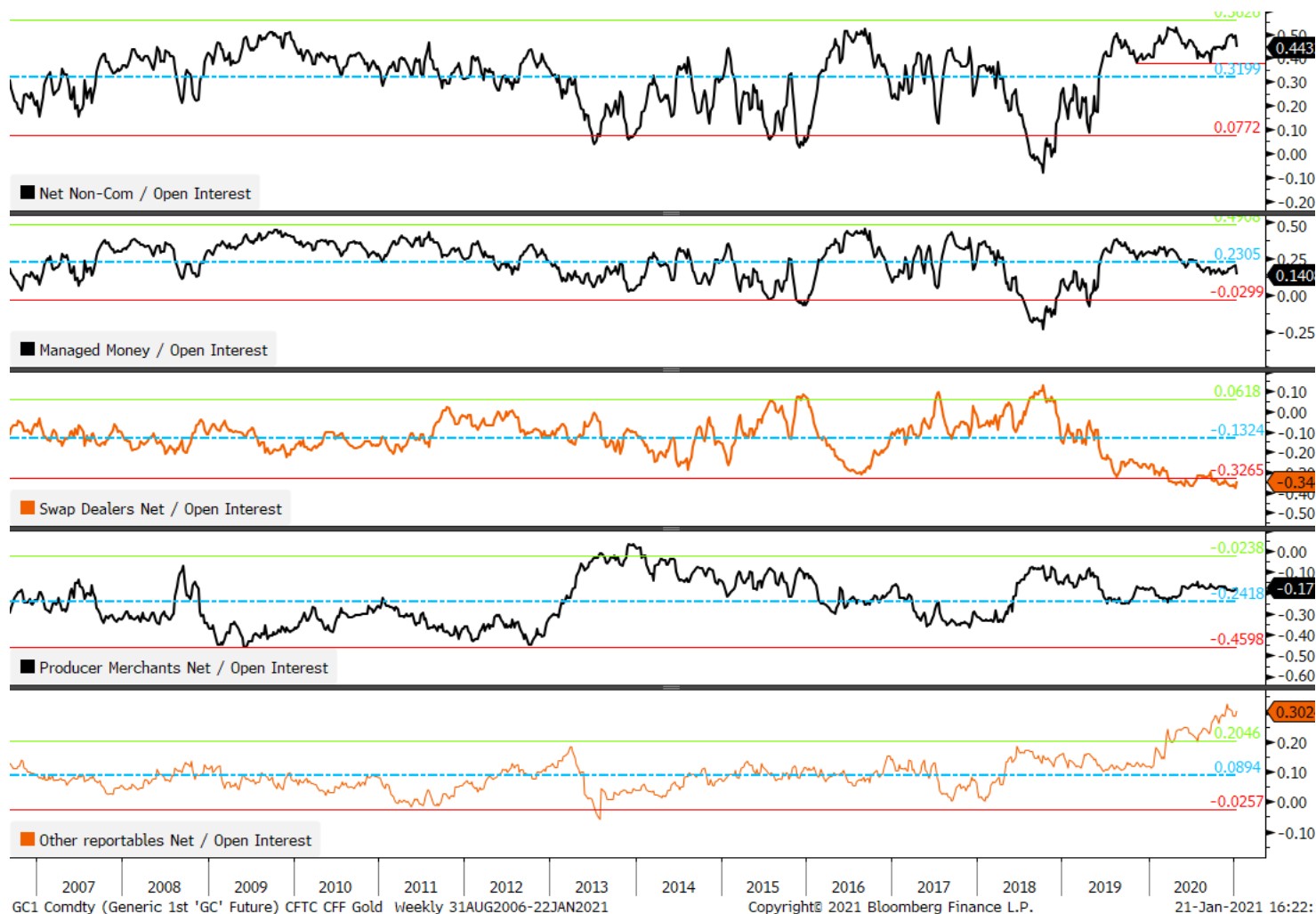
Disaggregated positioning data reveal market dynamics

To improve transparency of the most vulnerable positioned asset and/or market player, the CFTC publishes a disaggregated COT report. The disaggregated commodity report (CFF) divides data into four categories including Producer, Swap Dealers, Managed Money and Other Reportables. In financial futures the four categories are Dealer, Asset Manager, Leveraged Funds and Other Reportables.

In our technical work we tend to find net-noncommercial and the following three positioning data sets most useful in warning of a trend reversal. The latter three tend to have a relatively larger size in the market or build large positions in a trend faster than most. Adverse or surprise outcomes often lead to a dramatic shift and a need to exit. This can cause a strong trend reversal.

> CFF Managed Money = CTAs, CPOs or funds identified by CFTC
> TFF Asset Manager = institutional investors such as mutual funds
> TFF Leveraged Funds = HFs, CTAs, CPOs or funds identified by CFTC

Chart 90: Net non-commercials, managed money, swap dealers, producer merchants and other reportables
Comparing a variety of positioning data

GC1 Comdty (Generic 1st 'GC' Future) CFTC CFF Gold Weekly 31AUG2006-22JAN2021   Copyright© 2021 Bloomberg Finance L.P.   21-Jan-2021 16:22:

Source: BofA Global Research, Bloomberg

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