Technical Indicators Tutorial

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Price is the primary tool of technical analysis because it reflects every factor affecting the value of a market. However, price doesn't produce just trend lines and basic chart patterns. Analysts have expanded their research far beyond those basic elements to develop a number of technical indicators that provide more insight into price action than what you see on the surface. You may be able to see that a market is "extended" (overbought or oversold) just by looking at a bar chart, but an indicator can put a number to it and confirm your thinking.

First, a warning about indicators in general. Most analysts do not rely on only one indicator but often use several indicators together to help make a trading decision because of the misleading information one indicator might provide. An oscillator indicator is not a trading system but only provides helpful insights in certain market conditions.

Oscillators tend not to work well in markets that are in a strong trend. They can show a market at either an overbought or oversold reading for an extended period while the market continues to trend strongly. Another example of oscillators not working well is when a market trades into the upper boundary of a congestion area on the chart and then breaks out on the upside of the congestion area. At that point, it's likely that an oscillator would show the market as being overbought and possibly generate a sell signal when, in fact, the market is just beginning to show its real upside power.

From a list of literally hundreds of technical indicators, we have selected the more popular ones to illustrate what is available. These technical indicators can be put into several categories:

Strength and Sentiment Indicators

Although most technical indicators are based on price data and various manipulations of that data, a few are based on other market activity. For example, when prices make a move, how many traders are participating and who are they? Volume and open interest are indicators that reflect some basic numbers about how traders are driving the market, and *Commitments of Traders* reports reveal the caliber of participants involved.

Volume and open interest - In and of themselves, volume and open interest data may not be that valuable other than to indicate the liquidity of a market. But used in conjunction with price action, these numbers serve as a strength indicator that can provide some meaningful verification about the significance of a price move.

Volume is the number of transactions in a futures or options on futures contract made during a specified period of time, usually one trading session. One buy and one sell equals a volume of one.

Open interest is the total number of futures or options on futures contracts that have not yet been offset or fulfilled by delivery. It is an indicator of the depth or liquidity of a futures market, which influences the ability to buy or sell at or near a given price.

Open interest can be a little confusing. If a new buyer (a long) and new seller (a short) enter a trade, their orders are matched and open interest increases by one. However, if a trader who has a long position sells to a new trader who wants to initiate a long position, open interest does not change as the number of open contracts remains the same. If a trader holding a long position sells to a trader wanting to get rid of his existing short position, open interest decreases by one as there is one less open contract.

Volume and open interest are "secondary" technical indicators that help confirm other technical signals on the charts. If an upside price breakout is accompanied by heavy volume, that is a strong signal that the market may want to continue to move higher because it indicates more traders jumped on the rising prices. On the other hand, a big upside move or a move to a new high that is accompanied by light volume makes the move suspect and indicates a top or bottom may be near or in place. Also, if volume increases on price moves against the existing trend, then that trend may be nearing an end.

To validate an uptrend, volume should be heavier on up days and lighter on down days within the trend. In a downtrend, volume should be heavier on down days and lighter on up days. A general trading rule is that if both volume and open interest are increasing, then the trend will probably continue in its present direction. If volume and open interest are declining, this can be interpreted as a signal that the current trend may be about to end.

Changes in open interest can help a trader gauge how much new money is flowing into a market or if money is flowing out of a market, a valuable insight in evaluating a trending market. Open interest does have seasonal tendencies – that is, it is higher at some times of the year and lower at others in many markets. Look at the seasonal average (five-year average) of open interest in your analysis.

If prices are rising in an uptrend and total open interest is increasing more than its seasonal average, it suggests new money is flowing into the market, indicating aggressive new buying, and that is bullish. However, if prices are rising and open interest is falling by more than its seasonal average, the rally is the result of holders of losing short positions liquidating their contracts (short covering) and money is leaving the market. This is usually bearish, as the rally will likely fizzle.

Here are two more rules for open interest:

- Very high open interest at market tops can cause a steep and quick price downturn.
- Open interest that is building up during a consolidation, or "basing" period, can strengthen the price breakout when it happens.

***Commitments of Traders* Reports -** Open interest can be taken one step further by examining the *Commitments of Traders* (COT) report issued every Friday afternoon by the Commodity Futures Trading Commission (CFTC).

COT reports provide a breakdown of the preceding Tuesday's open interest for markets in which 20 or more traders or hedgers hold positions equal to, or above, reporting levels established by the CFTC.

The report breaks down open interest for large trader positions into "commercial" and "non-commercial" categories. Commercial traders are required to register with the CFTC by showing a related cash business for which futures are used as a hedge. The non-commercial category is comprised of large speculators, mainly commodity funds. The balance of open interest is qualified under the "non-reportable" classification that includes both small commercial hedgers and small speculators.

To derive the net trader position for each category, subtract the short contracts from the long contracts. A positive result indicates a net long position (more longs than shorts). A negative result indicates a net short position (more shorts than longs). The results may mean different things in different markets, so it usually takes some experience with COT numbers before you can see their value in trading.

The most important aspect of the COT report for most traders is the change in net positions of the commercial hedgers. The premise of COT analysis is that commercials are the "smart money" because they have a strong record in forecasting significant market moves, have the best fundamental supply and demand information and have the ability to move markets because of the large size they trade. That's the side of the market where you want to be.

Some traders like to take positions opposite of what the COT report suggests that small traders (non-reportable positions) are doing, assuming most small speculative traders are usually under-capitalized and/or wrong about the market.

Trend Indicators

Trend lines are the basic indicator of trend, but they are quite subjective, depending on the eye of the beholder. So analysts have refined technical indicators such as moving averages or the directional movement index to quantify the data and smooth out day-to-day fluctuations to present an overall view of price direction and the trendiness of the market.

Moving Averages - Perhaps the simplest to understand and most widely used technical indicator is a moving average, which smoothes past data to illustrate existing trends or situations where a trend may be ready to begin or is about to reverse. A moving average helps you spot market direction over time rather than being caught up in short-term erratic market fluctuations. There are three main types of moving averages:

- **Simple.** Each price point over the specified period of the moving average is given an equal weight. You just add the prices and divide by the number of prices to get an average. As each new price becomes available, the oldest price is dropped from the calculation.
- **Weighted.** More weight is given to the latest price, which is regarded as more important than older prices. If you used a three-day weighted moving average, for example, the latest price might be multiplied by 3, yesterday's price by 2 and the oldest price three days ago by 1. The sum of these figures is divided by the sum of the weighting factors – 6 in this example. This makes the moving average more responsive to current price changes.
- **Exponential.** An exponential moving average (EMA) is another form of a weighted moving average that gives more importance to the most recent prices. Instead of dropping off the oldest prices in the calculation, however, all past prices are factored into the current average. The current EMA is calculated by subtracting yesterday's EMA from today's price and then adding this result to yesterday's EMA to get today's EMA. An EMA generally produces a smoother line than other forms of moving averages, which can be an important factor in choppy market conditions.

Closing prices for a period are usually used to calculate a moving average, but you can also use the open, high or low or some combination of all of them. Moving averages are often used in crossover trading systems. A buy signal occurs when the short- or intermediate-term averages cross from below to above the longer-term average. Conversely, a sell signal is issued when the short- and intermediate-term averages cross from above to below the longer-term average.

Another trading approach is to use the "current price" method. If the current price is above the moving average, you buy. Liquidate that position when the current price crosses below your selected moving average. For a short position, sell when the current price falls below the moving average. Liquidate that position when the current price rises above the average.

Because the moving average changes constantly as the latest market data arrive, many traders test different "specified" time frames before they come up with a series of moving averages that are optimal for a particular market.

Some use combinations such as 5-day, 10-day and 20-day moving averages, taking crossovers of the shorter moving average over the longer moving average as a trading signal. Still others use longer-term moving average lines as another point of support or resistance.

In short, moving averages have a number of applications and are easy to understand, making them a clear indicator choice for many traders.

Moving Average Convergence Divergence (MACD) - MACD is a more detailed method of using moving averages to find trading signals from price charts. MACD plots the difference between a longer-term exponential moving average and a shorter exponential moving average (the chart below uses 21 days and 9 days). Then a 9-day moving average of this difference is generally used as a trigger line.

The MACD indicator is used in three ways:

- **Crossover signals.** When the MACD line crosses below the trigger line, it is a bearish signal; when it crosses above it, it's a bullish signal. Another crossover signal occurs when MACD crosses above or below the zero line.
- **Overbought-oversold.** If the shorter moving average pulls away from the longer moving average dramatically, it indicates the market may be coming over-extended and is due for a correction to bring the averages back together.
- **Divergence.** As with other studies, traders look at MACD to provide early signals or divergences between market prices and a technical indicator. If the MACD turns positive and makes higher lows while prices are still tanking, this could be a strong buy signal. Conversely, if the MACD makes lower highs while prices are making new highs, this could be a strong bearish divergence and a sell signal.

With its moving average base, MACD is a lagging indicator and requires rather strong price movement to generate a signal. Therefore, it works best in markets that make broad moves but does perform well in choppy, congested trading conditions.

Directional Movement Index - The Directional Movement Indicator (DMI), also called the Directional Movement System, is used to determine the strength of a market trend. The Average Directional Movement index, or ADX, is part of the DMI and gauges the trendiness of the market. When used with the up and down Directional Indicator (DI) values – Plus DI and Minus DI – you could have a trading system.

The basic rules for a DMI system include establishing a long position whenever the Plus DI crosses above the Minus DI. Reverse that position – liquidate the long position and establish a short position – when the Minus DI crosses below the Plus DI.

The ADX line (green on the chart below) is perhaps the focal point of the DMI for most traders. If the ADX line is trading above 30, then the market is in a strong trend, either up or down. ADX does not indicate the direction of the trend. If the ADX line is below 30, it means the trend is not a strong one. If the market is in a solid trend and scoring new highs and the ADX line shows divergence and turns down, that is a warning signal that the market trend is losing power and a market top or bottom may be close at hand.

Volatility Indicators

Volatility shows how active a market is as reflected by the size of price ranges without specifying a price direction. An indicator such as Bollinger Bands reveals changes in volatility levels, which often lead changes in prices.

Bollinger Bands - Bollinger Bands are volatility curves used to identify extreme highs or lows in relation to price. They establish trading parameters, or bands, above and below a moving average at a set number of standard deviations from this moving average. Both the length of the moving average and the number of standard deviations can be modified to fit the market.

Traders generally use Bollinger Bands to determine overbought and oversold zones, to confirm divergences between prices and other technical indicators and to project price targets. The wider the bands on a chart, the greater the market volatility; the narrower the bands, the less market volatility.

Some traders use Bollinger Bands in conjunction with another indicator such as the Relative Strength Index (RSI). If the price touches the upper band and the RSI does not confirm the upward move (i.e. there is divergence between the indicators), a sell signal is generated. If the indicator confirms the upward move, no sell signal is generated – in fact, a buy signal may be indicated. If the price touches the lower band and the RSI does not confirm the downward move, a buy signal is generated. If the indicator confirms the downward move, no buy signal is generated – in fact, a sell signal may be indicated.

Another strategy uses Bollinger Bands without another indicator. In this approach, a chart top occurring above the upper band followed by a top below the upper band generates a sell signal. Likewise, a chart bottom occurring below the lower band followed by a bottom above the lower band generates a buy signal.

Bollinger Bands also help determine overbought and oversold markets. When prices move closer to the upper band, the market is becoming overbought; as the prices move closer to the lower band, the market is becoming oversold. Price momentum should also be taken into account. You should always look for evidence of price weakening or strengthening before anticipating a market reversal.

Momentum Indicators

No market can go up or down forever, and momentum indicators reflect when a price trend may be weakening or strengthening. These indicators are usually based on a scale from 0 to 100 and produce "overbought" and "oversold" signals. Although these indicators do not perform well in extended trending markets, one of their most useful applications is the concept of "divergence" – that is, prices go in one direction and the momentum indicator in another. If prices make a new high but the indicator makes a lower high, for example, the divergence suggests internal weakness that could signal the end of the upmove in prices.

Stochastics - The basic premise of the stochastic indicator developed by George Lane revolves around the position of the close relative to the high or low of the day. During periods of price decreases, daily closes tend to accumulate near the extreme lows of the day. During periods of price increases, closes tend to accumulate near the extreme highs of the day. The stochastic study is an oscillator designed to indicate oversold and overbought market conditions.

Stochastics are measured and represented by two different lines, %K and %D, and are plotted on a scale ranging from 0 to 100. Readings above 80 suggest an overbought situation; readings below 20 an oversold zone. The %K line is the faster, more

sensitive indicator while the %D line takes more time to turn. When the %K line crosses over the %D line in overbought or oversold territory, this could be an indication that a market is about to reverse course.

Some technical analysts prefer the slow stochastic rather than the normal stochastic. The slow stochastic is simply the normal stochastic smoothed via a moving average technique. The most important signal is divergence between %D and price, which occurs when the stochastic %D line makes a series of lower highs while prices make a series of higher highs (see black lines on chart below). This signals an overbought market. An oversold market exhibits a series of lower lows while the %D makes a series of higher lows.

When one of the above patterns appears, you should anticipate a market signal. You initiate a market position when the %K crosses the %D from the right-hand side. A right-hand crossover is when the %D has bottomed or topped and is moving higher or lower and the %K crosses the %D line. The most reliable trades occur with divergence and when the %D is between 10 and 15 for a buy signal and between 85 and 90 for a sell signal.

Relative Strength Index (RSI) - The main purpose of the Relative Strength Index (RSI) created by J. Welles Wilder Jr. is to measure the market's strength or weakness. To calculate RSI, you figure out the average of the up closes and the average of the down closes for the study period (typically 14 days), then divide the average of the up closes by the average of the down closes to get a relative strength figure. Then you add 1 to that relative strength figure, divide that sum into100 and subtract that result from 100. If all that sounds complicated, remember that many analytical software programs do all those calculations for you.

A high RSI reading, above 70, suggests an overbought or weakening bull market. Conversely, a low RSI number, below 30, implies an oversold market or dying bear market. However, blindly selling when the RSI is above 70 or buying when the RSI is below 30 can be an expensive trading system. A move to those levels is a signal that market conditions are ripe for a market top or bottom, but it does not, in itself, indicate a top or a bottom.

Although you can use the RSI as an overbought and oversold indicator, like many indicators, it works best when a failure swing occurs between the RSI and market prices. For example, the market makes new highs after a bull market setback but the RSI fails to exceed its previous highs.

Commodity Channel Index (CCI) - The Commodity Channel Index (CCI) was designed to detect the beginning and ending of market trends by measuring the distance between the market price and its moving average, providing a measurement of trend strength and/or intensity. The CCI is calculated as the difference between the mean price of a market and the average of the means over a chosen period. This difference is then compared with the average difference over the time period.

Values of +100 to – 100 indicate a market with no trends. About 70%-80% of all price fluctuations fall within +100 and – 100, as measured by the index. Buy and sell signals occur only when the +100 line (buy) and the – 100 (sell) are crossed. The way this indicator works is almost the opposite of how you would use an oscillator (overbought/oversold) such as the Relative Strength Index (RSI) or Slow Stochastics.

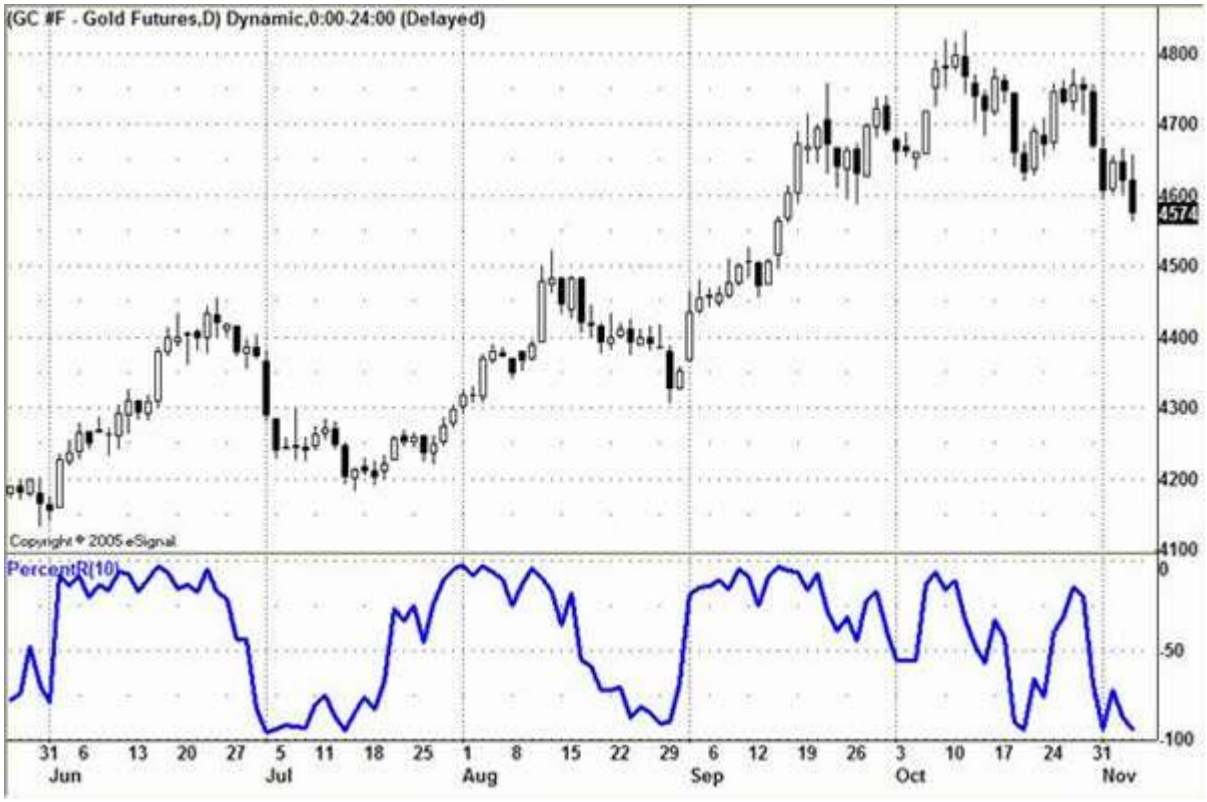
To trade using CCI, establish a long position when the CCI exceeds +100. Liquidate when the index drops below +100. Your reference point for a short position is a value of – 100. Any value less than – 100 suggests a short position, while a rise to – 85 tells you to liquidate your short position.

Percent Range - The Percent Range (%R) technical indicator, often associated with Larry Williams and called Williams %R, attempts to measure overbought and oversold market conditions. Like other indicators, %R always falls between a value of 100 and 0 and measures where the current day's closing price falls within the price range for a specified number of days.

The %R study is similar to the Stochastic indicator except that the Stochastic has internal smoothing and %R is plotted on an upside-down scale, with 0 at the top and 100 at the bottom. A value of 0 indicates the closing price is the same as the period high. Conversely, a value of 100 shows that the closing price is identical to the period low. A reading above 80 indicates an oversold condition; a reading below 20 an overbought situation.

On specifying the length of the interval for the %R study, some technicians prefer to use a value that corresponds to one-half of the normal cycle length. If you specify a small value for the length of the trading range, the study is quite volatile. Conversely, a large value smoothes the %R and generates fewer trading signals.

As with other indicators, selling just because a %R shows a market to be overbought (or buying just because it is oversold) may take a trader out of the particular market long before the price falls (or rises) because %R can remain in an overbought/ oversold condition for a long time.



Momentum or Rate of Change - The whole group of momentum oscillators involves the analysis of the rate of price change rather than the price level. The speed of price movement and the rate at which prices are moving up or down provide clues to the amount of strength the bulls or bears have at a given point in time, a key indicator regarding the viability of a trend and whether it is about to end or begin.

Momentum can be calculated by dividing the day's closing price by the closing price X number of days ago and then multiplying the quotient by 100. The momentum study is an oscillator-type indicator to interpret overbought/oversold situations. By determining the pace at which price is rising or falling, the indicator shows whether a current trend is gaining or losing momentum, whether or not a market is overbought or oversold, and whether the trend is slowing down.

Momentum is calculated by computing the continuous difference between prices at fixed intervals. That difference is either a positive or negative value plotted around a zero line. When momentum is above the zero line and rising, prices are increasing at an increasing rate. If momentum is above the zero line but declining, prices are still increasing but at a decreasing rate.

The opposite is true when momentum falls below the zero line. If momentum is falling and is below the zero line, prices are decreasing at an increasing rate. With momentum below the zero line and rising, prices are still declining but at a decreasing rate.

The normal trading rule is: Buy when the momentum line crosses from below the zero line to above. Sell when the momentum line crosses from above the zero line to below. Another possibility is to establish bands at each extreme of the momentum line. Initiate or change positions when the indicator enters either of those zones. You could modify that rule to enter a position only when the indicator reaches the overbought or oversold zone and then exits that zone.

You can specify the length of the momentum indicator based on your trading needs and methods. Some technicians argue the length of the momentum indicator should equal the normal price cycle, but you can make it more or less aggressive, depending on the market or your trading style.

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