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Chart School

Stochastic Oscillator

Overview

Developed by George C. Lane in the late 1950s, the Stochastic Oscillator is a momentum indicator that shows the location of the current close relative to the high/low range over a set number of periods. Closing levels that are consistently near the top of the range indicate accumulation (buying pressure) and those near the bottom of the range indicate distribution (selling pressure).

Formula

%K =	100 x (	$\frac{\text{Recent Close} - \text{Lowest Low (n)}}{\text{Highest High(n)} - \text{Lowest Low(n)}}$	)
%D =	3-period moving average of %K		
(n)=	Number of periods used in calculation		

Periods	High	Low	Close
1	119.50	116.00	119.13
2	119.94	116.00	116.75
3	118.44	111.63	113.50
4	114.19	110.06	111.56
5	112.81	109.63	112.25
6	113.44	109.13	110.00
7	115.81	110.38	113.50
8	117.50	114.06	117.13
9	118.44	114.81	115.63
10	116.88	113.13	114.13
11	119.00	116.19	118.81
12	119.75	117.00	117.38
13	119.13	116.88	119.13
14	119.44	114.56	115.38

%K =	100 x (	$\frac{115.38 - 109.13}{119.94 - 109.13}$	)	= 57.81

A 14-day %K (14-period Stochastic Oscillator) would use the most recent close, the highest high over the last 14 days and the lowest low over the last 14 days. The number of periods will vary according to the sensitivity and the type of signals desired. As with RSI, 14 is a popular number of periods for calculation.

%K tells us that the close (115.38) was in the 57th percentile of the high/low range, or just above the mid-point. Because %K is a percentage or ratio, it will fluctuate between 0 and 100. A 3-day simple moving average of %K is usually plotted alongside to act as a signal or trigger line, called %D.

Slow versus Fast versus Full

There are three types of Stochastic Oscillator: Fast, Slow, and Full. The Full Stochastic is discussed later. For now, let's look at Fast versus Slow. As shown above, the Fast Stochastic Oscillator is made up of %K and %D. In order to avoid confusion between the two, I'll use %K (fast) and %D (fast) to refer to those used in the Fast Stochastic Oscillator, and %K (slow) and %D (slow) to refer to those used in the Slow Stochastic Oscillator. The driving force behind both Stochastic Oscillators is %K (fast), which is found using the formula provided above.

(Click here to see a live example of Fast and Slow Stochastics)

In the CSCO example, the Fast Stochastic Oscillator is plotted in the box just below the price plot. The thick black line represents %K (fast) and the thin red line represents %D (fast). Also called the trigger line, %D (fast) is a smoothed version of %K (fast). One method of smoothing data is to apply a moving average. To smooth %K (fast) and create %D (fast), a 3-period simple moving average was applied to %K (fast). Notice how the %K (fast) line pierces the %D (fast) line a number of times during May, June and July. To alleviate some of these false breaks and smooth %K (fast), the Slow Stochastic Oscillator was developed.

The Slow Stochastic Oscillator is plotted in the lower box: the thick black line represents %K (slow) and the thin red line represents %D (slow). To find %K (slow) in the Slow Stochastic Oscillator, a 3-day SMA was applied to %K (fast). This 3-day SMA slowed (or smoothed) the data to form a slower version of %K (fast). A close examination would reveal that %D (Fast), the thin red line in the Fast Stochastic Oscillator, is identical to %K (Slow), the thick black line in the Slow Stochastic Oscillator. To form the trigger line, or %D (slow) in the Slow Stochastic Oscillator, a 3-day SMA was applied to %K (Slow).

The Full Stochastic Oscillator takes three parameters. Just as in the Fast and Slow versions, the first parameter is the number of periods used to create the initial %K line and the last parameter is the number of periods used to create the %D (full) signal line. What's new is the additional parameter, the one in the middle. It is a "smoothing factor" for the initial %K line. The %K (full) line that gets plotted is a n-period SMA of the initial %K line (where n is equal to the middle parameter).

The Full Stochastic Oscillator is more advanced and more flexible than it's Fast and Slow cousins. You can even use it to duplicate the other versions. For example, a (14, 3) Fast Stochastic is equivalent to a (14, 1, 3) Full Stochastic and a (12, 2) Slow Stochastic is equal to a (12, 3, 2) Full Stochastic.

%K and %D Recap

- %K (fast) = %K formula presented above using x periods
- %D (fast) = y-day SMA of %K (fast)
- %K (slow) = 3-day SMA of %K (fast)
- %D (slow) = y-day SMA of %K (slow)
- %K (full) = y-day SMA of %K (fast)
- %D (full) = z-day SMA of %K (full)

where x is the first parameter, y is the second parameter and (in the case of Full stochastics), z is the third parameter. In the case of Fast and Slow Stochastics, x is typically 14 and y is usually set to 3.

Use

Readings below 20 are considered oversold and readings above 80 are considered overbought. However, Lane did not believe that a reading above 80 was necessarily bearish or a reading below 20 bullish. A security can continue to rise after the Stochastic Oscillator has reached 80 and continue to fall after the Stochastic Oscillator has reached 20. Lane believed that some of the best signals occurred when the oscillator moved from overbought territory back below 80 and from oversold territory back above 20.

Buy and sell signals can also be given when %K crosses above or below %D. However, crossover signals are quite frequent and can result in a lot of whipsaws.

One of the most reliable signals is to wait for a divergence to develop from overbought or oversold levels. Once the oscillator reaches overbought levels, wait for a negative divergence to develop and then a cross below 80. This usually requires a double dip below 80 and the second dip results in the sell signal. For a buy signal, wait for a positive divergence to develop after the indicator moves below 20. This will usually require a trader to disregard the first break above 20. After the positive divergence forms, the second break above 20 confirms the divergence and a buy signal is given.

Example

In the IBM example above, it is clear that acting solely on overbought and oversold crossovers can generate false signals. Using crossovers of %D (slow) by %K (slow) can result in some good signals, but there are still whipsaws. By looking for divergences and overbought/oversold crossovers together, the 14-day Slow Stochastic Oscillator can produce fewer yet more reliable signals. The Slow Stochastic Oscillator produced 2 solid signals in IBM between Aug-99 and Mar-99. In Nov-99, a buy signal was given when the indicator formed a positive divergence and moved above 20 for the second time. Note that the double top in Nov-Dec (gray circle) was not a negative divergence -- the stock continued higher after this formed. In Jan-00, a sell signal was given when a negative divergence formed and the indicator dipped

below 80 for the second time.

SharpChart Application

In StockCharts.com's SharpCharts tool, the Slow Stochastic Oscillator uses %K (slow) and the Fast Stochastic Oscillator uses %K (fast). There are two options available for both fast or slow. The first box represents the number of periods used to calculate %K for each. The second box represents the number of periods used in the moving average to form %D. The defaults are 14 and 3. For the Slow Stochastic Oscillator, that would imply a 14-period %K (slow) with a 3-day SMA of %K (slow) to form %D (slow). The Full Stochastic uses three parameters: the period for %K (fast), the period for the SMA that smooths %K (fast), and the period of the SMA that forms %D (full). While the tool provides some excellent default values, I encourage you to test different variations to discover what fits with their particular investing style or what works with a particular security.

For more, please see our Chart School article on how to use and interpret oscillators.

Written by Arthur Hill

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