RATE OF CHANGE INDICATOR

The term “momentum” is used frequently in investing. In fundamental analysis, it can refer to strong and/or growing sales, earnings, etc. In technical analysis, it is used to describe the speed or force of price movement. Common momentum indicators measure the change in price from one period to another or the percentage change in price from one period to another. In this installment of Technically Speaking, we focus on the momentum indicator called rate of change (ROC).

The rate of change (ROC) indicator is a pure momentum oscillator that measures the percent change in price over the last \( n \) periods. In other words, the indicator compares the latest price (typically the closing price) with the (closing) price \( n \) periods ago. The resulting oscillator fluctuates above and below the zero line, indicating shifts from positive to negative. Similar to other oscillators, ROC signals include centerline crossovers and overbought/oversold conditions.

**Calculation**

The formula for rate of change is:

\[
\text{ROC} = \left( \frac{C[0]}{C[n]} \right) - 1 \times 100
\]

Where:
- \( C \) = closing price
- \( 0 \) = the latest period
- \( n \) = a specified number of periods in the past

Figure 1 is a daily price chart for Apple Inc. (AAPL) for the period December 14, 2012, through February 15, 2013, with the 12-day ROC plotted below the price chart (see the online version of this article for an illustration of how ROC was calculated.)
for AAPL over this period). When the ROC is above the zero line (positive), prices are rising. Conversely, when the ROC goes negative and crosses below the zero line, prices are falling. The stronger the momentum to the upside or downside, the more ROC advances into positive or negative territory, respectively. The ROC is not bounded on the upside, as there is no theoretical limit on prices. However, ROC is limited on the downside since securities can only decline 100%.

**Overbought/Oversold Conditions**

Besides identifying the overall direction of the underlying trend in a security’s price, we can also use oscillators such as ROC to identify overbought and oversold conditions. However, they work best when prices are fluctuating. For example, while we have shown that Apple’s stock price has experienced strong and prolonged trends over the last several years, prices do fluctuate even when trending.

A typical uptrend consists of a series of higher highs and higher lows, with occasional pullbacks from the intermediate highs. Likewise, a downtrend generally consists of lower lows and lower highs, with retracements taking place from the intermediate lows. Following the movement of ROC as prices fluctuate can alert us to levels that, historically, have preceded a reversal.

Figure 2 is a daily price chart for Microsoft Corp. (MSFT) for the period June through December of 2010, along with a 20-day ROC. Depending on your charting service, you should be able to modify the number of periods used to calculate the indicator. The “optimal” number of periods will depend on the security you are analyzing and your desired trading time frame. Three times the ROC peaked around 15%: late July, early November and late December. This means that MSFT shares had risen roughly 13% over the previous 20 trading days. On the first two occasions, the price fell approximately 10% and 7% within a month of ROC hitting its max. While not shown in the chart, following the third ROC overbought condition in December, the price trended sideways before breaking above the December high.

Lastly, in Figure 3 we plotted Chevron Corp. (CVX) on a daily basis over a year ending February 15, 2013. Here we see where the 21-day ROC bottomed out near –10% on three occasions in 2012; mid-April, early June and November. The first time, Chevron rebounded roughly 8% over the next couple of weeks; the second time, the price rebounded roughly 23%; and the third time, where ROC reached its low a little before the shares reached their bottom, the price recouped approximately 15%.

**Conclusion**

The rate of change (ROC) indicator shows you the speed at which prices are changing. An upward swing in ROC indicates that prices are moving upward at a faster rate. In contrast, a downward move in ROC indicates that prices are declining more rapidly. However, like all technical indicators, the ROC isn’t intended to be a stand-alone analysis tool. Using it in conjunction with other indicators will either confirm the signal or prevent you from acting on a false positive.