

If you want to use overbought/oversold indicators more effectively, and if you want to use some of them at all, you need to examine ways to make them more adaptive to the markets they are measuring.

Getting a handle with adaptive limits

BY DAVID SEPIASHVILI

Overbought and oversold indicators are designed to help determine the excessive boundaries of a cycle in a ranging market. To profit from cycle analysis, the benchmarks of overbought/oversold indicators must be set so that most valid signals can reach or penetrate them, providing a reliable indication of the security's overbought/oversold conditions. To work out an objective basis for assessing their performance, it's necessary to consider some essential characteristics of overbought/oversold indicators.

When considering these techniques, we need to first set a benchmark of success. We need to determine from all the signals generated by a reversal rule, how many must penetrate the overbought/oversold benchmarks.

To find out, we need to know the expected proportion between valid and false signals. The solution to the estimate of the proportion lies in the specifics of price action in a ranging market. We need to know the typical

bandwidth and duration of price moves, which will allow us to estimate the probability of the range with projected parameters.

To understand this issue in the proper light, we need to accept that the demarcation line between ranging and trending markets is conditional. Indeed, a wide-ranging market itself consists of trending and ranging price moves on a different scale. Therefore, we cannot necessarily formulate a hard and fast set of criteria for a ranging market.

That said, in a general sense, a trending market usually refers to the presence of strong mid-term or long-term trends, while short- and even shorter-term trends cover wide-ranging market environments. Thus, when we say that momentum indicators don't work well in trending markets, we mean that their application area is mainly short-term. It is more significant for our purposes to distinguish between wide ranges and narrow ranges, where false signals are usually packed.

Our study of the problem points us

to a bandwidth of 5% or less that, as a rule, constitutes an unprofitable trading range for stock market daily data. These narrow "dead" zones give little or no chance to profit, and the best strategy in these cases is to stay out of the market. Therefore, to answer the primary question, we must determine a share of time spent in wide ranging markets vs. narrow-ranging congestion or consolidation phases. "Outside the lines" (right) shows the share of time index markets spend outside a 5%-range with a duration of one week or more for some major U.S. stock market indexes.

So, what is the most effective way to use these statistics? If we assume that the market stays outside of a 5% range for one week or more about 60% of the time, then we can also assume that about 40% of all signals generated by any simple short-term trading rule must be rejected.

HOW FAR IS FAR?

This brings us to the next key step in

our analysis. We need to determine to what extent the indicator must overshoot the benchmark. In other words, we need to know what percentage of its value (points) must fall outside the overbought/oversold levels for a viable signal.

Measuring how much an indicator swings beyond the benchmarks is complicated. It's much easier to measure how many points fall outside the overbought/oversold range. Research shows that 20% to 30% of the points falling outside the benchmarks provide reliable — neither too far ahead or lagging — readings of a security's overbought/oversold condition.

MEETING THE CRITERIA

A logical question at this point would consider how well established overbought/oversold indicators capture these moves in the market. Some of the most popular are oscillators, such as the relative strength index (RSI), stochastic oscillator, Williams %R, the Commodity Channel Index (CCI) and the Bollinger band oscillator.

These can be tested throughout sufficiently long periods to investigate the correlation between the percentage of points falling outside the range of overbought/oversold levels and a share of signals penetrating overbought/oversold benchmarks. Both characteristics are given in "Reflect or refract" (page 40) and the results are discussed for each indicator below.

CCI. The indicator demonstrates very stable characteristics, though the mean values of some signals that penetrate overbought/oversold benchmarks are somewhat overrated (69.3% for Russell 2000 and 70.5% for 10-year T-notes), while absolute deviations among calculation periods from the mean values are below 5%. The correlated mean values of points falling outside the overbought/oversold range are 25.3% and 25.2%, correspondingly, with absolute deviations from the mean lying below 6%. That

OUTSIDE THE LINES							
This is the share of the time that each studied market spends outside a 5% range, with duration of one week or more.							
INDEX	DJ Indu	S&P 500	Nasdaq	Russell 3000	Russell 2000	10-year Note	Average
TEST PERIOD							
Years:	40	18	18	18	17	40	
Share of Time (%):	53.8	55.6	67.6	55.8	60.7	50.0	57.3
Source: Allcom, Inc.							

provides reliable readings of the extremes and lends support to the validity of this effective indicator.

RSI. Though the indicator demonstrates acceptable mean values of the signals penetrating overbought/oversold benchmarks, 63.2% for Russell 2000 and 59.6% for the 10-year T-note, it impermissibly ranges among calculation periods. For example, absolute deviation from the mean reaches about 25% for the Russell 2000, and 39% for the T-note. The mean values of points falling outside the overbought/oversold range for the above markets are 30.3% and 28.9%, but absolute deviations from the mean are also intolerably high — about 50%.

The errors increase, especially with a 40-day period where the 30/70 benchmarks are too wide for the narrowed RSI curve and can miss most of the overbought and oversold signals. So, among calculation periods from 10 to 40 days, RSI produces non-stable readings and doesn't meet the requirements, even for the traditional 14-day period RSI.

Bollinger band oscillator. This indicator's characteristics deviate far from the accepted overbought/oversold benchmark's penetration values and the percentage of points outside the benchmarks, which are supposed to provide reliable signals of overbought/oversold conditions. In spite of these negative results, the indicator is included in the table, as it can be easily improved by optimization of overbought/oversold benchmarks. A

more refined benchmark that satisfies the combined requirement can be (85/15) instead of conventional ones (100/0).

Stochastics and Williams % R. Almost all signals generated by centerline crossovers of these indicators, including false ones, penetrate 20/80 levels, and often not once but several times. Besides, it is usual for them to signal overbought or oversold conditions much before the reversal and to stay in the overbought or oversold zone for a long time. That's why the percentage of points falling outside the benchmarks reaches about two-thirds. Because stochastics and the Williams %R demonstrate such disappointing properties, they are non competitive as overbought/oversold indicators and for this reason are not included in the table.

Correlation. A number of signals penetrating overbought/oversold benchmarks demonstrate high correlation with the percentage of indicator's values (points) falling outside the range of overbought/oversold levels. With this in mind, the combined requirement for the benchmarks can be formulated as follows:

- The indicators must be robust and reliable.
- The benchmarks must provide penetration of overbought/oversold benchmarks for about 60% of the signals generated by the momentum indicator's crossovers with centerline.
- About 20% to 30% of the points

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REFLECT OR REFRACT

This historical assessment of the most popular overbought/oversold indicators examines the ratio of the percentage share of signals penetrating overbought/oversold benchmarks to the percentage of points falling outside the range of overbought/oversold levels. It can show us whether these indicators mirror the expected price action or muddle it.

CALCULATION PERIOD (DAYS)

	10	14	20	30	40
RUSSELL 2000 (17-YEAR TEST PERIOD)					
CCI	68.1/24.6	67.9/24.9	72.3/25.3	72.5/25.8	65.9/25.7
RSI	75.5/45.4	70.5/38.4	62.4/29.5	60.4/21.6	47.3/16.5
BB	19.4/3.4	20.8/4.3	26.0/4.6	24.0/4.9	30.9/5.2
10-YEAR T-NOTE (40-YEAR TEST PERIOD)					
CCI	69.5/24.3	71.0/24.9	71.4/25.2	70.8/25.0	69.6/26.7
RSI	77.8/44.5	73.9/36.8	64.9/29.2	45.5/20.3	36.4/13.9
BB	22.1/4.4	25.1/4.6	26.6/4.9	30.5/6.1	33.2/6.6

Source: Adam Inc.

must fall outside the range of overbought/oversold levels.

RSI MODIFICATIONS

The magnitudes of the RSI fluctuations around the centerline vary with the calculation period: The shorter the period, the wider the swing; the longer the period, the narrower the swing. There are two ways to make the RSI flexible enough to identify overbought and oversold conditions correctly, without regard to the calculation period.

We can adjust benchmarks to the RSI with variable swing. That is, we apply new, adaptive benchmarks instead of the conventional ones. Or, we adjust the RSI itself for conventional overbought and oversold levels.

In an effort to create adaptive overbought and oversold benchmarks, the volatility of RSI can be used. The volatility is calculated as the standard deviation of RSI from its mean. Then a number of standard deviations, for example, 1.8 standard deviations, is added to the centerline to create the overbought benchmark. It is subtracted from the centerline to construct the oversold benchmark.

If we choose the second alternative, we leave the conventional bench-

marks unchanged and have to construct a new RSI curve that will account for its variability caused by variable attenuation factor of stock market time series. Such an adaptive RSI widens when the amount of days used in the calculation is above 14, and narrows when the period is below 14. The formulas for estimating the attenuation factor, covering all conventional time terms, are given in the article "Expanding the usefulness of RSI," July 2004).

RATE-OF-CHANGE ADJUSTMENTS

Among other centered oscillators, the price rate-of-change (ROC) indicator is best used to identify the underlying strength and direction of momentum behind a price movement. The greater change in the price, the greater the change in ROC. As prices increase, the ROC rises. As prices fall, the ROC falls. The lower the ROC, the more oversold the security is. The higher the ROC, the more overbought the security is.

Unfortunately, in practice, there are no simple rules to determine overbought/oversold benchmarks here. Volatility again comes to the rescue. We can adjust the ROC indicator by the attribute to make it more reliable.



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AFTER THE ADJUSTMENT

We can see that our adaptive oscillators do much better capturing the true overbought/oversold conditions of the markets tested.

CALCULATION PERIOD (DAYS)

	10	14	20	30	40
RUSSELL 2000 (17-YEAR TEST PERIOD)					
RSI mod	51.5/28.4	59.3/29.4	57.3/27.3	59.6/23.4	58.5/23.6
WRSI	56.2/29.1	61.3/27.7	70.0/28.4	64.5/26.1	43.8/25.2
P-ROC-mod	58.3/28.5	60.8/29.2	59.6/27.7	71.0/25.9	75.1/26.0
BB mod	65.2/20.5	60.2/20.5	71.3/21.4	75.3/22.1	67.9/21.0
10-YEAR T-NOTE (40-YEAR TEST PERIOD)					
RSI mod	57.3/28.4	55.4/27.2	56.7/24.5	52.1/23.0	49.6/22.4
WRSI	57.5/27.3	59.8/25.8	62.6/26.9	50.2/24.2	50.3/21.8
P-ROC-mod	57.3/26.9	56.4/26.6	59.4/25.2	54.4/23.4	53.2/23.4
BB mod	65.7/20.3	68.9/20.7	68.1/21.4	66.0/21.3	65.7/22.5

Source: Alticom Inc.

Volatility is calculated as the standard deviation of ROC from its mean. Then a number of standard deviations, again, say 1.8 standard deviations, is added to the zero line to create the overbought benchmark, and it is subtracted from the zero line to get the oversold benchmark.

DIFFERENT RESULTS

"After the adjustment" (above) shows how well our indicators did when they were adjusted according to volatility. We look at the RSI with self-adjusted overbought/oversold benchmarks (50 ± 1.8 standard deviations), the wide-range RSI (WRSI) with benchmarks 75/25, the price ROC with self-adjusted overbought/oversold benchmarks (0 ± 1.8 standard deviations), and the Bollinger band oscillator with modified overbought/oversold benchmarks ($85 + 15$).

As you can see from the table, all new and improved overbought/oversold indicators show a strong ability to identify market extremes. The best of them, the RSI with self-adjusted overbought/oversold benchmarks (RSI-mod), demonstrates close to the required mean values of the share of signals penetrating overbought/over-

sold benchmarks (57.2% for Russell 2000 and 54.2% for 10-year T-note), with absolute deviations from mean values among calculation periods below 10%.

The Bollinger band oscillator with modified benchmarks shows somewhat overrated mean values (68.0% for Russell 2000 and 66.9% for the 10-year T-note) with absolute deviations from the mean values among calculation periods of below 11.5%.

The correlated percentage of points falling outside the overbought/oversold range of all tested indicators are confined to an acceptable interval of values. Testing results on a wide range of stocks, index shares and indexes in various market conditions confirm these results and show that adaptive tools can ensure clear signaling of overbought/oversold conditions.

This approach can be applied to bonds, currencies and other financial markets. **IFM**

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