



The London Academy of Trading

Professional Financial Trading
Programme

Reference Manual
Technical Analysis Indicator Formulae

Moving Averages

For a 5-event **simple moving average**,

$$SMA (5) = \frac{C_{t-4} + C_{t-3} + C_{t-2} + C_{t-1} + C_t}{5}$$

For a 5- event **weighted moving average**,

$$WMA (5) = \frac{C_{t-4} + 2C_{t-3} + 3C_{t-2} + 4C_{t-1} + 5C_t}{1 + 2 + 3 + 4 + 5}$$

C_t = Latest close (or current price)

C_{t-1} = Previous event's closing price

C_{t-2} = Closing price two events ago, etc.

For a n- event **exponential moving average**,

$$EMA_t = EMA_{t-1} + (C_t - EMA_{t-1}) \times \frac{2}{(n+1)}$$

EMA_t = Latest/current Exponential MA value

EMA_{t-1} = Previous event's Exponential MA value

C_t = Latest Closing Price (or current price)

$\frac{2}{(n+1)}$ is called the Exponential Constant

Oscillators

10-event **Momentum**:

$$MOM (10) = C_t - C_{t-10}$$

10-event **Rate of Change**:

$$ROC (10) = \frac{MOM (10)}{C_{t-10}} \times 100$$

MOM (10) = Current value of 10-event Momentum

ROC (10) = Current value of 10-event Rate of Change

C_t = Today's closing price (or current price)

C_{t-10} = Closing price 10 events ago

For an n-event **Relative Strength Index (RSI)**:

$$\text{RSI (n)} = \frac{\text{Total points gained on "up" events}}{\text{Total points gained \& lost}} \times 100$$

Note that points gained/lost are calculated on a close-to-close basis.

For a 5-3-3 **Slow Stochastic**:

$$\text{Percent Alert, \%K} = \frac{(C_t - L_5)}{(H_5 - L_5)} \times 100$$

C_t = Current price, or latest closing price

L_5 = Lowest low for the last 5 events

H_5 = Highest high for the last 5 events

$$\text{Percent Definite, \%D} = \frac{H_3}{L_3} \times 100$$

H_3 is the 3-event sum of $(C_t - L_5)$

L_3 is the 3-event sum of $(H_5 - L_5)$

Slow Stochastic, **\%Dn** = 3-event SMA of %D

On-Balance Volume (OBV)

OBV is a cumulative oscillator, with each day's volume being added to or subtracted from the previous day's OBV value.

If today's close > yesterday's close then:

$$\text{OBV}_t = \text{OBV}_{t-1} + V_t$$

If today's close < yesterday's close then:

$$\text{OBV}_t = \text{OBV}_{t-1} - V_t$$

If today's close = yesterday's close then:

$$\text{OBV}_t = \text{OBV}_{t-1}$$

OBV_t = Today's OBV

OBV_{t-1} = Yesterday's OBV

V_t = Today's volume

Weighted OBV takes the actual amount of the price move into consideration so that the greater the price move (close-to-close) the more the WOBV will be affected.

$$\text{WOBV}_t = \text{WOBV}_{t-1} + V_t (C_t - C_{t-1})$$

$WOBV_t$ = Today's Weighted OBV
 $WOBV_{t-1}$ = Yesterday's Weighted OBV
 V_t = Today's volume
 C_t = Today's closing price (or current price)
 C_{t-1} = Yesterday's closing price

Other Studies

Wilder's Parabolic SAR (Stop and Reverse)

For a new trend, the first SAR is the Extreme Point (EP) reached in the previous trend.
(i.e. the lowest low in a previous downtrend or the highest high in a previous uptrend).

To calculate the current SAR value:

$$SAR_t = SAR_{t-1} + \alpha (EP - SAR_{t-1})$$

SAR_t is the current SAR value
 SAR_{t-1} is the previous event's SAR value
EP is the Extreme Point (the highest price reached during a developing uptrend, or the lowest price reached during a developing downtrend)
 α is the acceleration factor, which usually starts at 0.02 for a new trend and rises by 0.02 as each new EP is achieved (to a maximum of 0.2)

Pivot Points

Pivot Points can be calculated in advance once the previous event's high, low and close prices are known.

$$\text{Pivot Point, PP} = \frac{(H_{t-1} + L_{t-1} + C_{t-1})}{3}$$

$$S1 = (2 \times PP) - H_{t-1}$$

$$R1 = (2 \times PP) - L_{t-1}$$

$$S2 = PP - (R1 - S1)$$

$$R2 = PP + (R1 - S1)$$

$$S3 = L_{t-1} - 2(H_{t-1} - PP)$$

$$R3 = H_{t-1} + 2(PP - L_{t-1})$$

L_{t-1} = Previous event's low
 H_{t-1} = Previous event's high
 C_{t-1} = Previous event's closing price