CHAPTER 10

Moving Trend Analysis

OVERVIEW

Trend analysis is a somewhat nebulous term when applied to the science of forecasting price movements. Some traders will probably think of J. Welles Wilder's Relative Strength Index or George Lane's stochastic oscillators. In this chapter we define a trend in terms of its most basic mathematical properties.

LINEAR REGRESSION

A linear regression is a statistical tool that traders can use to determine how closely a data set (say, a stream of sequential closing prices) fits a straight-line model. From elementary geometry, we recall the diagram and formula shown in Figure 10.1.

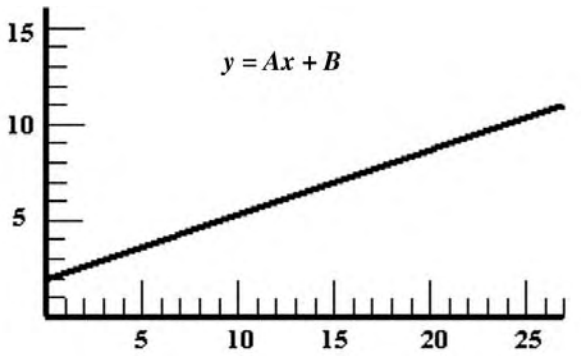

FIGURE 10.1 Straight-Line Model

The general formula for the straight-line model is:

$$y = Ax + B$$

where x = independent variable (time units)
y = dependent variable (prices)
A = slope
B = intercept

The straight-line model has only two regression coefficients: intercept and slope.

The intercept is the point where the y-axis and the straight line intersect. In this example, the intercept equals +2.

The slope is the ratio of the y-axis value less the intercept to the x-axis value for every point along the straight line:

$$\text{Slope} = \frac{(y - \text{Intercept})}{x}$$

One observed point on the straight line is $x = 15$ and $y = 7$. Therefore:

$$\begin{aligned}\text{Slope} &= \frac{(7-2)}{15} \\ &= \frac{5}{15} \\ &= \frac{1}{3} \text{ or } .333333\end{aligned}$$

In other words, for every unit of price that the model advances along the y-axis, three time units are advanced along the x-axis.

An alternate (and more accurate) definition of slope is the quotient of the *change* in the y-axis divided by the *change* in the x-axis for any two points along the straight line:

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

Note that the slope can be positive, negative, or zero.

ORDINARY LEAST SQUARES METHOD

The slope and intercept for any set of continuous data can be calculated by using the ordinary least square (OLS) regression model for a straight line seen in Figures 10.2 and 10.3.

$$\text{Slope} = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - \Sigma x \Sigma x}$$

FIGURE 10.2 Slope Regression Formula

$$\text{Intercept} = \frac{\Sigma x^2 \Sigma y - \Sigma x \Sigma xy}{n\Sigma x^2 - \Sigma x \Sigma x}$$

FIGURE 10.3 Intercept Regression Formula

$$r = \frac{n\Sigma xy - \Sigma x \Sigma y}{[(n\Sigma x^2 - \Sigma x \Sigma x)(n\Sigma y^2 - \Sigma y \Sigma y)]^{1/2}}$$

FIGURE 10.4 Coefficient of Correlation Formula

COEFFICENT OF CORRELATION

Calculating the regression coefficients for the estimated slope and intercept for a data set is only half the battle. We also need to know how well our estimated values match the raw data. For this purpose, we use another statistical tool called the coefficient of correlation or simply *r*. (See Figure 10.4.)

Any introductory text on descriptive statistics will supply traders with additional information on these and other regression techniques, their purpose and usage.

TREND OSCILLATORS

The whole purpose behind burdening traders with this refresher course in elementary statistics is to provide a method for scrutinizing trending properties in actual forex data. In Figure 10.5, we present two new oscillators: the moving slope oscillator and the moving correlation oscillator.

FIGURE 10.5 Five-Day Moving Slope and Correlation Oscillators

MOVING SLOPE OSCILLATOR

In a sufficiently large set of closing prices, the moving slope oscillator will fluctuate around a mean of zero. Positive values represent uptrends and negative values represent downtrends. The magnitude indicates how sharply the prices are trending. The vertical scale to the right of the oscillator is expressed in terms of pips in the quote currency per time units.

MOVING CORRELATION OSCILLATOR

The quality or reliability of a trend is represented by the oscillator at the bottom of the chart, the moving correlation oscillator, which has been adjusted to fluctuate between 0 and +100 as seen in the vertical scale to the right. When the correlation value drops below 85, a change in trend is normally indicated.

MOVING TREND INDEX

The moving trend index is analogous to a moving average index. It defines the number of elements to include in each sample moving across the x-axis. The same moving trend index must be used for both oscillators. In Figures 10.6 through 10.8, gradually increasing moving trend indexes are employed.

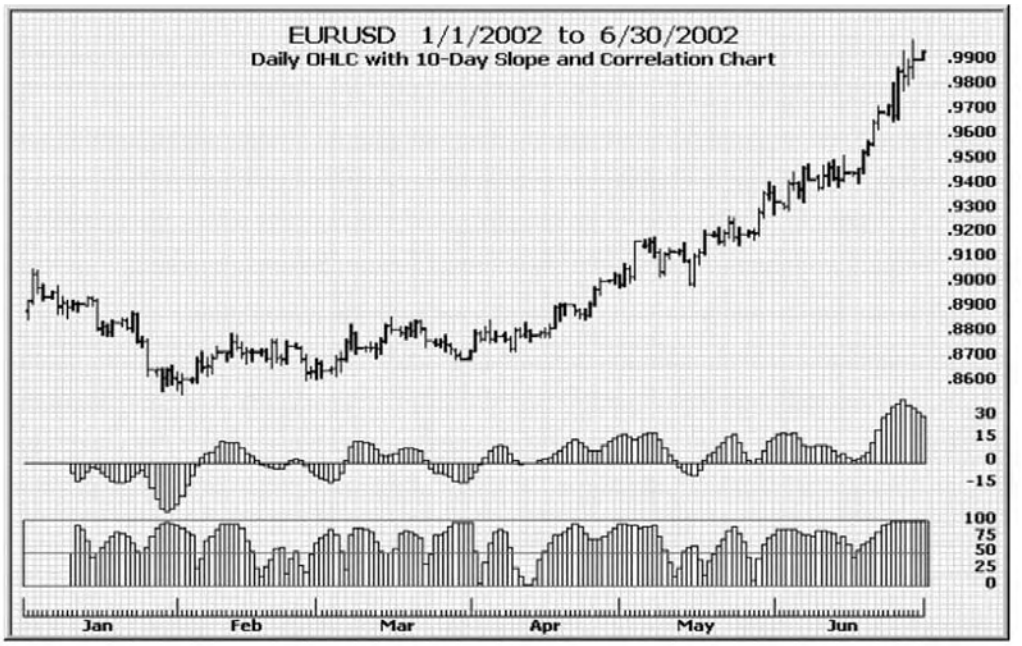

FIGURE 10.6 OHLC with 10-Day Moving Slope and Correlation Oscillators

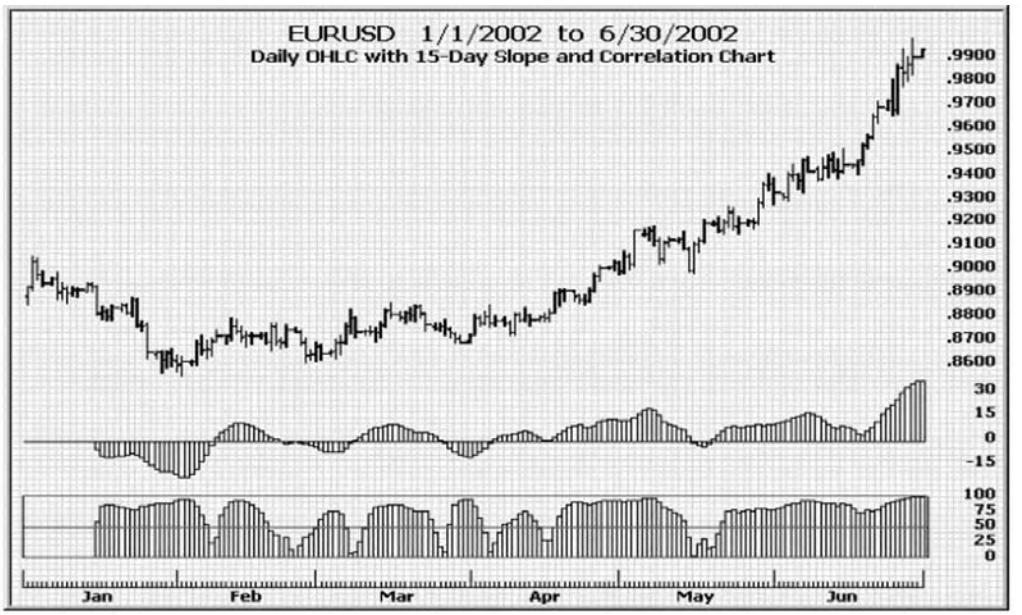

FIGURE 10.7 OHLC with 15-Day Moving Slope and Correlation Oscillators

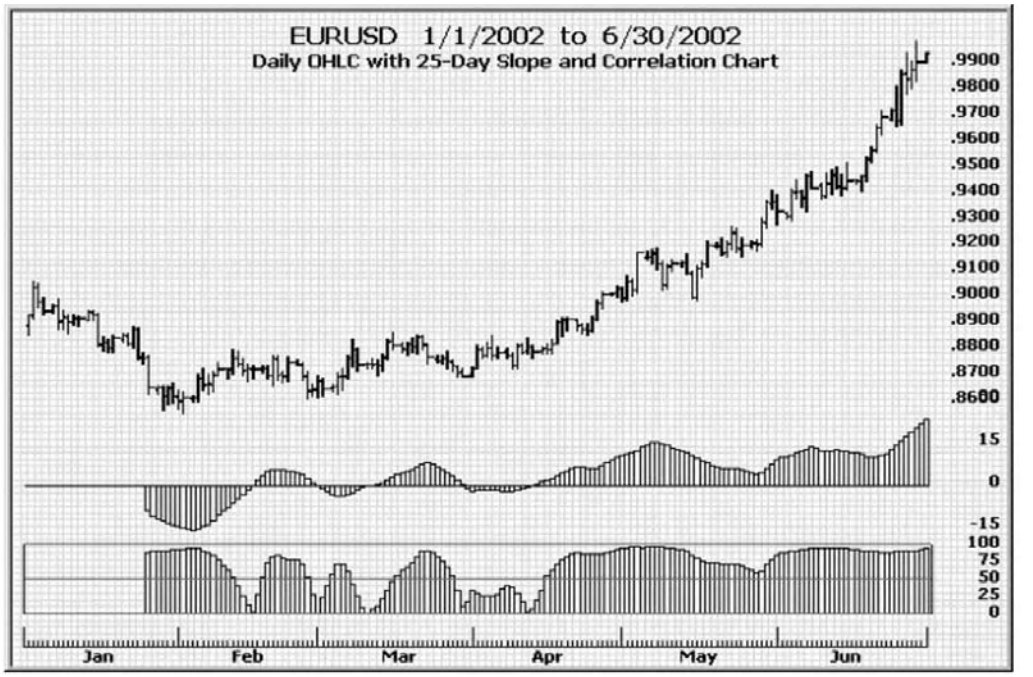

FIGURE 10.8 OHLC with 25-Day Moving Slope and Correlation Oscillators

OBSERVATIONS

The obvious effect of increasing the size of the moving trend index is a corresponding decrease in the number of peaks and valleys in the moving slope oscillator and in the moving correlation oscillator. Another rather logical result is the fact that the values for the moving slope oscillator tend to decrease as the moving trend index increases. Coincidentally, moving trend analysis may also be employed to extract information on the wavelengths of dominant cycles indigenous to the time series.