

CHAPTER 14

Technical Analysis

Introduction

There are two main approaches to analyzing stocks: fundamental analysis and technical analysis.

Fundamental analysis looks at economic, industry, and firm factors to determine the intrinsic value of a stock or index and whether it is underpriced (buy decision) or overpriced (sell decision). Technical analysis, on the other hand, looks for patterns or trends in security prices. Different from fundamental analysis that uses economic, industry, and company data, technical analysis looks at just market data: high and low prices, closing prices, volume, moving averages, short interests, and volatility.

As an alternative approach to fundamental analysis, technical analysis is based on the premise that all fundamental information is captured in the market price and that market statistics reveal all information—the market is its own best predictor. As a complement, technical analysis when used in conjunction with fundamental analysis provides a more complete picture of the stock or market. In practice, many analysts and investment firms use fundamental analysis to determine what to buy and sell and technical analysis

to determine when to buy and sell. Other market participants combine both approaches to reinforce or to check their positions.

The theory underlying technical analysis is based on fundamental supply and demand and can be summarized as follows:

- The market price is determined by supply and demand.
- Supply and demand are affected by both rational and irrational factors.
- Changes (shifts) in supply and demand change price trends.
- Price trends tend to repeat themselves—history repeats itself.

Technical analysis, in turn, tries to identify those recurring or predictable patterns and from those recurring patterns establish trading rules to obtain abnormal returns.

For technical analysis to be profitable, the market has to be inefficient. For example, suppose there is a detectable trend in the market in which a stock is consistently trading low on Monday and high on Friday. In an efficient market, technicians will see this trend and accordingly buy the stock on Monday, pushing its price up, and sell on Friday, pushing its price down. By these trades, technicians will eliminate the trend of the stock being high on Monday and low on Friday. In contrast, in the absence of that market efficiency, the trend would continue, and the technician would profit. Many advocates of technical analysis argue that fundamental and technical information is embodied in the price of the stock, but not completely; It takes time for market prices to hit their intrinsic values as well as time for the market to identify trends. Many technical advocates also point to the behavioral finance school of thought. Behavioral finance is a psychology-based branch of finance that looks at the systematic impact that human frailties and biases, such as overconfidence or a conservative bias, have on a stock's price pattern. Again, in the absence of market efficiencies, such biases in turn would lead to discernible trends that technical investors could exploit.

In this chapter, we examine technical analysis in terms of the tools and strategies that technicians employ. We begin by defining stock price trends observed by charting stock and index prices over time. We then look at price trends combined with volume information and moving averages as a way to examine the strength or the momentum of the trend, as well as to identify the possible buy and sell signals that technicians often use. We then look at other metrics that technicians use to measure momentum; these measures include the breadth of the market (advance minus declines), confidence indicators, relative strength indicators, put/call ratios, relative strength indicators, and rate of return. We extend the application of technical indicators to foreign markets, currency, commodities, and portfolios. Finally, we conclude the chapter by moving from empirical analysis to theory, looking at behavioral finance and market inefficiencies as a possible theoretical explanation of stock price trends.

Price Trends

Charts

In trying to uncover trends in security prices, technicians study line, bar, and candle charts. A simple *line chart* connects period prices (e.g., daily closing stock prices or daily opening prices) with a continuous line. Line charts can also connect moving averages (*MA*), such as a four-day moving average based on closing prices, (P_t):

$$MA_4 = \frac{P_t + P_{t-1} + P_{t-2} + P_{t-3}}{4}$$

Bar charts show a vertical bar at each time increment. The length of the bar represents the trading range between the low and high prices for that period of time (day, week, month, or year); a line cutting through the bar represents a close or open; or in some bar charts (e.g., those on Bloomberg) there is left tick on the bar showing the opening price, and right tick showing the close. Bar charts can be generated

with different periodicities, such as daily, weekly, or monthly. Compared to line charts, they provide more information. Like bar charts, *candle charts* show a candlestick at each time increment. The price information on the candle is color coded: A candle without color (or open) represents a higher closing price than the opening price; a candle with color (or solid) represents a lower close than open. The candle has two parts, a thick part or body and thin part or shadow. The body shows the open and close and will be either colored (solid) or without color (open). The shadow or thin line above the body (upper shadow) shows the high, and the shadow below (lower shadow) shows the low. Like bar charts, candle charts provide more information and can be generated for different periodicities.

Dow Theory

The Dow Theory is the most well-known theory explaining price trends. It is generally used to explain the overall market, although it can be used to explain securities and indexes. It was named after Charles Dow, the founder of the Dow Jones company, and the editor of the *Wall Street Journal*.¹ The theory explains the market in terms of three trends: primary or major, intermediate or secondary, and minor, tertiary or short-run:

- *Primary trends* are the long-run movements of prices (several months to years). They are commonly referred to as bull and bear markets and are explained by fundamental economic factors.
- *Intermediate trends* are deviations from the primary trend. They are explained as corrections, with prices reverting back to their major trend.
- *Minor trends* or short-run (day-to-day) trends are random. They are devoid of meaning. They are generally considered to be of little importance, although their movement could provide signals for changes in intermediate trends.

The three trends that make up the Dow Theory are often described in terms of an ocean analogy where the primary trend is like the ocean tide, the intermediate as a wave, and the minor as a ripple. [Exhibit 14.1](#) shows an upward primary trend or bull market for a stock occurring from time t_0 to t_1 and a downward primary trend or bear market occurring from time t_1 to t_2 . During the bull market, the price trend is characterized by each peak being higher than the previous (i.e., the tops are ascending) and with each trough being higher than the preceding trough. On trading day, t_1 , there is a reversal of the primary bull trend and the start of the bear primary trend. In the bear trend each trough is lower than the previous trough (the tops are descending). Finally, note after t_2 , the price fails to reach a new bottom, signaling the beginning of a new bull market. [Exhibit 14.1](#) shows a bull trend characterized by ascending tops and a bear trend characterized by descending top. The other possible price trend would be flat tops and bottoms. This would be a *trendless* market—a market moving sideways.²

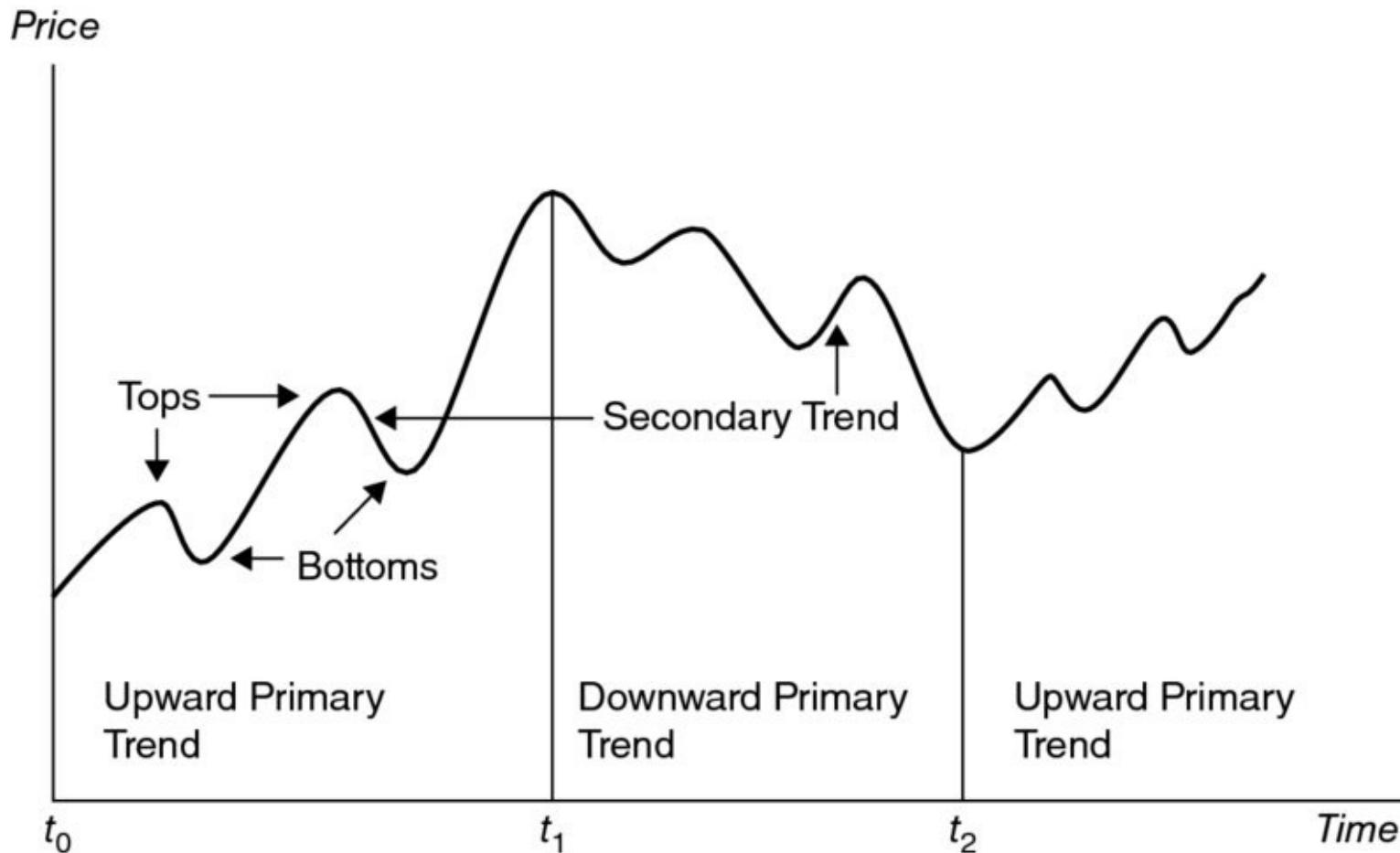


EXHIBIT 14.1 Dow Theory: Primary and Secondary Trends

Resistance and Support Levels, Channels, and Breakouts

Bull, bear, and sideways trends are also described by resistance and support levels. A *resistance level* is the ceiling above which the price is not expected to rise. When a price rises to its resistance level, an increase in selling and an excess supply is expected, causing a price reversal. A *support level* is a floor beneath which the price is not expected to fall. When the price falls to its support level, an increase in buying and an excess demand is expected, causing the price to reverse. Price trends are characterized by

prices rising until they meet their resistance level and falling back until they meet their support level. When a strong buying surge pushes the stock's price past its resistance level, it is considered a *breakout*, with the stock expected to rise to a new higher resistance level and a new support level that is often the old resistance level (see [Exhibit 14.2](#)). In contrast, when a strong selling surge pushes the stock's price below its support level, there is a breakout with the stock expected to fall until it reaches a new support level and new resistance level. Technicians, in turn, try to define trends in terms of resistance and support levels to help them identify breakouts. Often they look at volume information to confirm a breakout. That is, a stock breaking above its resistance level on heavy volume is a stronger bull sign than one breaking out on low volume.

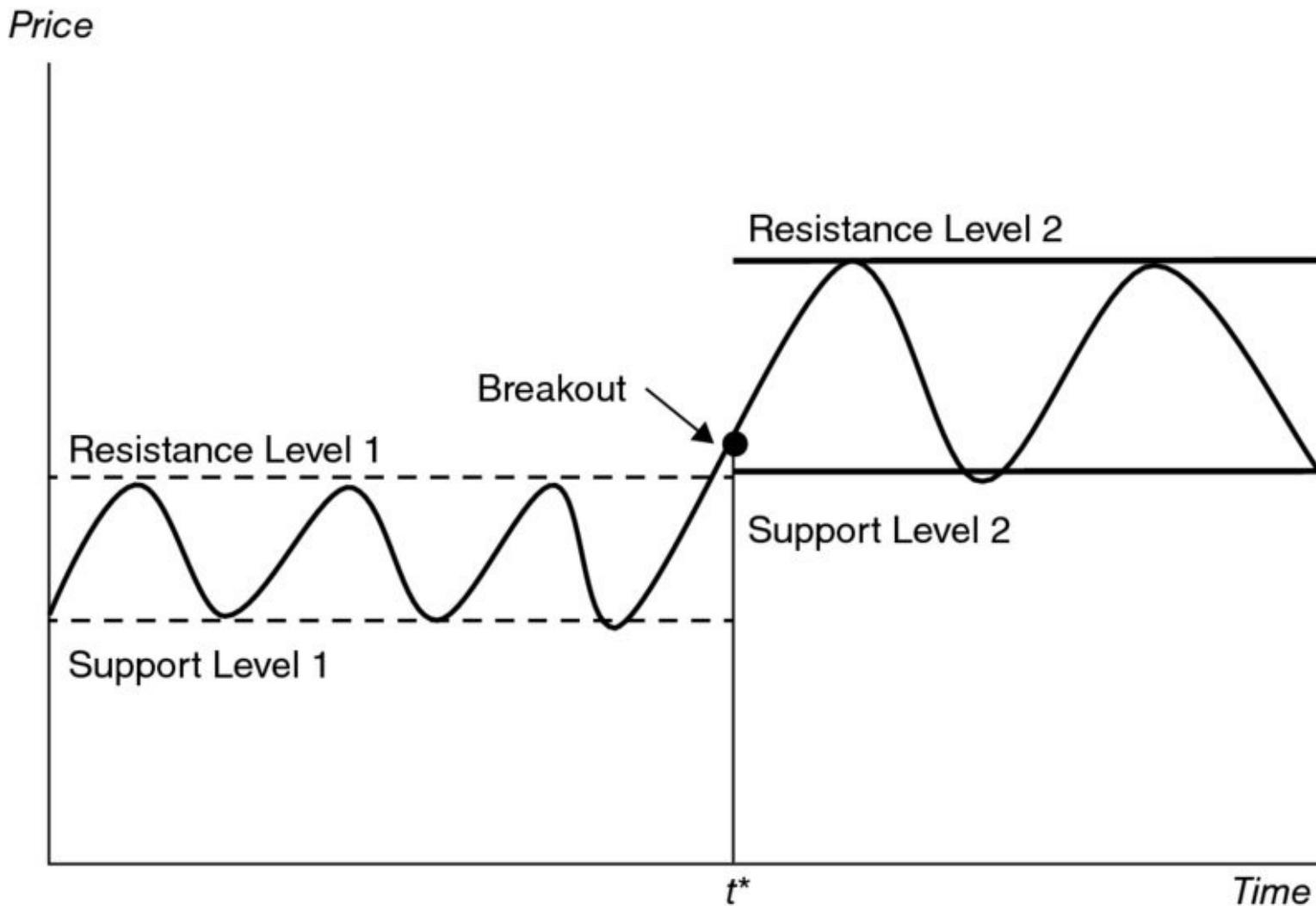


EXHIBIT 14.2 Support and Resistance Levels and Breakouts

Resistance and support levels can also be defined in terms of price ranges covering peaks and reversals and troughs and reversals. In this case, a resistance level (or ceiling level) is the price range that would lead to a reversal (from increasing to decreasing). The support line or floor line is the price range that would lead to a reversal (from decreasing to increasing). For bull markets, the support and resistance lines are positively sloped; for bear markets, they are negative; and for sideways markets they are horizontal.

zontal. Moreover, stocks tend to trade in channels or bands defined by these upper and lower resistance and support lines. Technicians, in turn, try to identify the bands and look for price breakouts as signals. Given the signals, they follow rules of when to buy or sell. One accepted rule is that a breakout occurs if the price closes on the opposite side of its support or resistance line. Another rule is to first confirm the trend change by waiting for the price to reach a specified percent (e.g., 1 percent to 3 percent) beyond the line.

Example

[Exhibit 14.3](#) shows a price graph for a stock with three channels: a *rising trend channel* or bull market, *flat trend channel* (sideways market), and *declining trend channel* or bear market. The exhibit starts with a declining trend channel that breaks out of its channel—increases above its resistance line—at t_1 , signaling a possible bull run. A technician would have identified the t_1 breakout from the bear channel's resistance level as a reversal and might confirm a bull run at point *B*, where the first trough in the bull channel is higher than the last trough in the bear channel. Thus, for the technician, point *B* is her confirmation of the reversal from a bear run to a bull run and a buy point. As shown in the exhibit, the bull trend in which the stock is in a rising trend channel lasts until t_2 where it again breaks out—decreases below its support line. The stock's price then moves sideways in a flat trend channel demarcated by a resistance line equal to the bull channel's last peak and a support line equal to the bull channel's last trough. A technician would identify the t_2 breakout from the bull channel's resistance level as a reversal but would wait for a confirmation of the reversal by waiting to see whether the stock price pushes below its new support level—confirming a reversal and signaling a sell point—or if it pushes up above its new resistance level—signaling a buy or “buy more” point. At t_3 , the stock does cut through its support level and begins a bear trend in a declining trend channel. The technician would identify point *S* as the sell point.

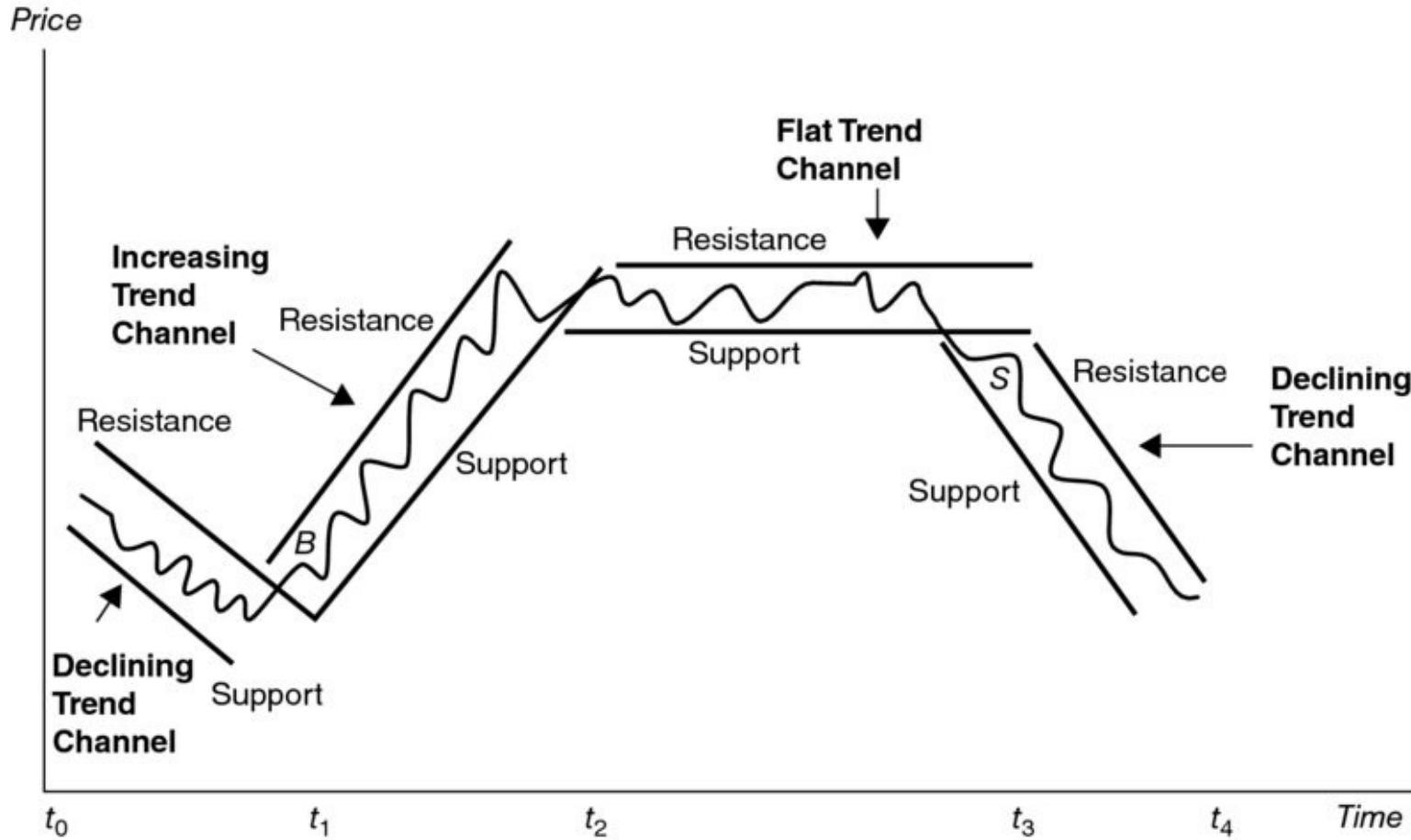


EXHIBIT 14.3 Channels and Breakouts

Trend Lines and Bands

Constructing and analyzing trend lines and channels are important to identifying if trends have been or will be broken. The resistance and support line of a channel can be thought of as points where the stock is either overbought or oversold. If a stock price breaks that level, it is a signal that something very significant is occurring and a new trend is developing. In practice, many technicians create bands around a regression trend line, moving averages, and highs and lows. A band formed using regression trends is

known as an *autoregression band*, a popular band formed with moving averages is the *Bollinger band*, and a band formed using highs and lows is referred to as a *Max/Min band*.

Autoregression Bands

An autoregression band is constructed by first identifying the price trend by regressing the stock's prices against the time periods; the band is then created by moving a certain number of standard normal deviations (e.g., +2 and -2) from the line or by setting the bands to be a certain percentage above or below the regression line. [Exhibit 14.4](#) shows a Bloomberg bar chart of daily prices for the S&P 500 from 10/30/2006 to 10/30/2013. The graph highlights four price trend periods and two confirmation periods, each described in terms of their regression lines. Period 1 spans a 267-day period that preceded the 2008 financial crash in which the S&P 500 opened at 1,426 and closed at 1,517, with the average price changing by 0.34 points per day. Period 2 shows the bear market characterizing the crash, with the market opening at 1,181 and closing at 689, a 492-point drop over a 172-day span. In this bear trend the market dropped by 2.86 points per day. Period 3 shows a rebound period in which the market opened at 938 and then increased at a rate of 0.71 points per day for 409 days to close at 1,347. Finally, period 4 shows another bull trend, with the market opening at 1,240 and then increasing at an average of 0.85 points per day for 544 days to close at 1,702. With perfect hindsight, a technician who took a long position in period 1 and then liquidated at the end of that period would have earned an annualized rate of 7.72 percent; if she later took a short position for period 2, covering the position at the end of that period, her return would have been 88.41 percent; if she then reversed and took a long position in period 3, liquidating it at the end, her return would have been 38.91 percent; and finally, if she took another long position in period 4 and liquidated it at the end, she would have earned a 25 percent annual return. This outstanding performance, however, is predicated on hindsight.



EXHIBIT 14.4 Auto Regression Bands for S&P 500, 10/31/2006 to 10/30/2013 Bloomberg: SPX <Enter>; Annotations; Regression

Bollinger Bands

Popularized by John Bollinger, Bollinger bands are formed by creating lines that are two standard normal

deviations above and below a 20-day or 30-day moving average. The usefulness of the bands is that the price of a security, in turn, should remain within the bands 95 percent of the time provided the underlying variability does not change significantly. A price breaking decidedly through either the upper (resistance) band or lower (support) band would represent significant momentum that would propel the price in the same direction of the breakout. [Exhibit 14.5](#) shows Bloomberg price graphs (bar chart) of daily prices (white line) for the S&P 500 from 11/1/2011 to 10/30/2013. Also shown are the 30-day moving average, upper Bollinger band (UBB2), and lower Bollinger band (LBB2).



[EXHIBIT 14.5](#) Bollinger Bands for S&P 500, 11/1/2011 to 10/30/2013 Bloomberg: SPX <Enter>; BOLL

Max/Min Bands

A maximum and minimum band, Max/Min band, is formed by taking the maximum price and the minimum in the last X days (e.g., 20 days or 100 days) to set the upper and lower bands. The Max/Min band is designed to point out the highest high and lowest low. Like other bands it is used to identify breakouts. If a stock is trading in a downtrend and is near a potential bottom, a break above the max line would be a confirmation of a change in trend. In contrast, if a stock is trending up, a break down below the minimum line is confirmation of a change in trend. [Exhibit 14.6](#) shows a Max/Min band formed around the S&P 500 for the period from 10/27/2006 to 10/28/2010 (a time period covering precrash, crash, and postcrash). The bands were set using the highs and lows going 100 days back. The white line shows the price movement of the S&P 500; other lines show the Max and Min bands. As shown in the exhibit, the S&P 500 is closer to the minimum (approaching or hitting the Min line) and further from the Max line for the second half of 2008 and the first quarter of 2009, indicating a number of sell breakthrough signals. By contrast, the S&P 500 is closer to the maximum (approaching or hitting it) and further from the Min line for the last three quarters of 2009 and for first quarter of 2010, indicating a high number of buy breakout signals.



EXHIBIT 14.6 Max/Min Bands for S&P 500, 10/27/2006 to 10/28/2010

BLOOMBERG CHARTS, ANNOTATIONS, TECHNICAL STUDY SCREENS, CANDLE CHART, AND POINT-AND-FIGURE CHART

CHARTS HOMEPAGE: GRAPH <ENTER>

The chart homepage has five box areas: custom charts, sample charts, new charting analytics, chart resource, and chart of the day newswire.

CUSTOM CHART, G <ENTER>

On the Custom Chart screen, you can create and customize charts representing different relationships, showing various technical studies. Charts created on other screens, such as GP, can also be

saved to the Custom Chart screen by clicking the "Save as" tab on that screen. To create a new chart click "Create Chart" tab and then select type.

ANNOTATIONS

Lines: Regression lines, bands, and other drawings can be included on a graph by clicking the "Annotate" button on the gray toolbar at the top of the price chart (GP). Clicking the button will bring up an annotations palette showing all of the tools for drawing on the chart, editing, and deleting. Trend lines, trend channels, and the regression line on the Bloomberg screen in [Exhibit 14.4](#) were drawn from the annotation palette.

News: Also on the gray toolbar is the "News" button. Clicking this button will bring up an orange vertical bar. You can move the bar to a date of interest and then click to bring up a news box of stories related to your loaded security or index.

TECHNICAL STUDY SCREENS, TECH

A number of Bloomberg screens in this chapter relating to volume, moving averages, types of bands, breadth of the market, and the like are from Bloomberg's technical studies browser. The screens for these studies can be accessed from the "Technical Study Browser" found on the Graph home page (Graph <Enter>) or directly by typing TECH: TECH <Enter>. If the technical analysis study screen is not listed on the "Technical Study Browser" you can type the name of the study (e.g., Moving Averages) in the "Find a Study" box and click the name in the dropdown to bring up the screen's description page. On the description screen, press the "Launch" tab to bring up the screen. Once you're on the screen, you may want to save the screen for future use by clicking the "Save as" tab. This will save the screen to your G Screen.

INFORMATION ON BLOOMBERG TECHNICAL SCREENS

For an excellent guide on technical analysis, see *Technical Analysis Handbook*, May 2010, Editor. Paul Ciana. This handbook and other information on technical analysis can be found on the Graphs home-

page: Graph <Enter>, click "Charts Education."

CANDLE CHARTS

As noted earlier, *candle charts* show a candlestick at each time increment: A candle body without color (or open) represents a higher closing price than the opening price; a candle body with color (or solid) represents a lower close than open. The upper shadow or thin line above the body shows the high, and the lower shadow below the body shows the low. Candle patterns are used to depict price trends. A bull market is characterized by a series of long open candles and a bear market by long solid candles. A *hammer candle*, for example, has a small body, suggesting little difference between the close and the opening, but a long lower shadow. A series of these candles following a bull trend could signify a downturn. The opposite of a hammer is the hanging man. It has a small body and a long upper shadow.

POINT-AND-FIGURE CHARTS

Bar and candle charts show ending prices. *Point-and-figure* charts show only significant price changes, irrespective of the timing. The charts are set up to record a significant price change (e.g., 2 or 3 points) and to indicate reversals. For example in constructing a point-and-figure chart for a stock currently trading at \$50, a technician using 2-point increments would do nothing if the stock increased to \$51, but would place an X in the box if it increased to \$52, and if it increased to \$54, would place an X in the \$52 box and \$54 box. If the stock dropped from \$54 to \$48, a 6-point reversal, then the technician would move to the next column and place Xs in the boxes for \$54, \$52, \$50, and \$48. Point-and-figure charts that are horizontal would be considered trendless, indicating a period of consolidation; those that are vertical and above the starting price would indicate an uptrend; those that are vertical and below the starting price would indicate a downtrend. Breakouts would be when the chart moves up or down after a trendless period.

- Bloomberg's Point-and-Figure Chart, PFP: PFP <Enter> for a loaded security.

- Box Size refers to the price scale. It can be automatic or customized.
- Reversal is set as a multiple of box size. The reversal determines when you move to a new column. If the box size is 1 and the reversal is 2, then the price would have to move against the trend by 2 points to move to the next column.
- The numbers 1–9 and the letters A, B, and C represent the months January through September and October through December.

See Bloomberg Web [Exhibit 14.1](#).

Price Trends Combined with Volume and Moving Averages

Market volume and moving averages are often used to measure the strength of a price trend. A market advance or decline is considered stronger if it also is accompanied by an increase in trading volume. Similarly, when a price breaks through its moving average from below, it is considered a bullish sign, and when it breaks through its moving average line from above, it is consider a bearish indicator.

Volume

When a strong buying surge pushes a stock's price past its resistance level on heavy volume, then one could reasonably deduct that there is bullish information that will push the price further to a new resistance level. By contrast, if a price decrease surges past the support level on heavy volume, it is a strong sell signal.

In addition to identifying buy and sell points, volume information also is used to better define the price trend. Typically, increasing volume and increasing price is a strong uptrend; increasing volume and falling

price is a strong downtrend; decreasing volume and increasing price is a weak rally, and decreasing volume and decreasing price is a weak pullback. Recall, the Dow Theory defined a bull market as one characterized by ascending peaks, where each peak is higher than the previous, and a bear market as one characterized by descending peaks, where each trough is lower than the previous. These definitions can be refined by including volume. Specifically, a bull market is characterized by (1) each peak being higher than the previous, (2) the price increases being accompanied by heavier volume (strong uptrend), and (3) the price decreases being accompanied by lower volume (weak pullback). A bear market, in turn, is characterized by (1) each trough being lower than the previous, (2) the price decreases being accompanied by heavier volume (strong downturn), and (3) the price increases being accompanied by lower volume (weak rally).

In general, volume patterns help technicians to confirm the direction of the price trend and provide signals. One always needs to be cautious, however, in interpreting signals. A price decrease accompanied by heavy volume is generally interpreted as a strong downturn and a sell signal. However, a bear market with very heavy volume could also mean that the last of the bearish investors are selling and that the downward trend is reaching a *selling climax*. Thus, a heavy volume surge in a downtrend in which volume had been increasing could be a breakout signal and a possible buy point. Similarly, in the case of a strong uptrend in which price and volume are increasing, a strong surge in volume may push the price to its final peak in the bull trend. This last surge in volume in a bull run is referred to as a *speculative blow off*. It would mark the end of the run with the large volume increase signaling a sell point or a hold point.

Volume Measures

Volume at Time Measure

For a stock or market index, volume momentum is often measured in terms of actual volume to an average volume based on a specified number of periods back. [Exhibit 14.7](#) shows Bloomberg's *Volume at Time* chart for Macy's for the period from 7/15/2013 to 10/31/2013. The top panel shows Macy's bar chart, the white histogram in the middle panel shows Macy's trading volume with the line graph showing Macy's 30-day moving average of volume, and the bottom panel shows the volume differentials between daily volume and average volume. Note that on 8/14, there was a surge in volume (the white histogram exceeding the average line), with 17.05 million shares traded compared to a 30-day average volume of 5.327. As shown in the exhibit, Macy's closed on 8/13 at \$48.50 and opened on 8/14 at \$46.69 before closing the day at \$46.33. On 8/15, the stock opened lower at \$45.85, but closed the day up at \$46.30. It is interesting that the top news related to Macy's on 8/13 was a financial report that retail sales growth had fallen short of expectation. The next noticeable volume surge shown in [Exhibit 14.7](#) occurred on 10/16. On 10/15, Macy's closed at \$42.48, and on 10/16, it closed at \$43.79, with 8.338 million shares traded on that day compared to an average 30-day volume of 5.69 million shares. On 10/17 the stock closed at \$44.46 with the momentum in volume slowing. The top news on 10/15 was Macy's announcement that it was giving up its long tradition of being closed on Thanksgiving.

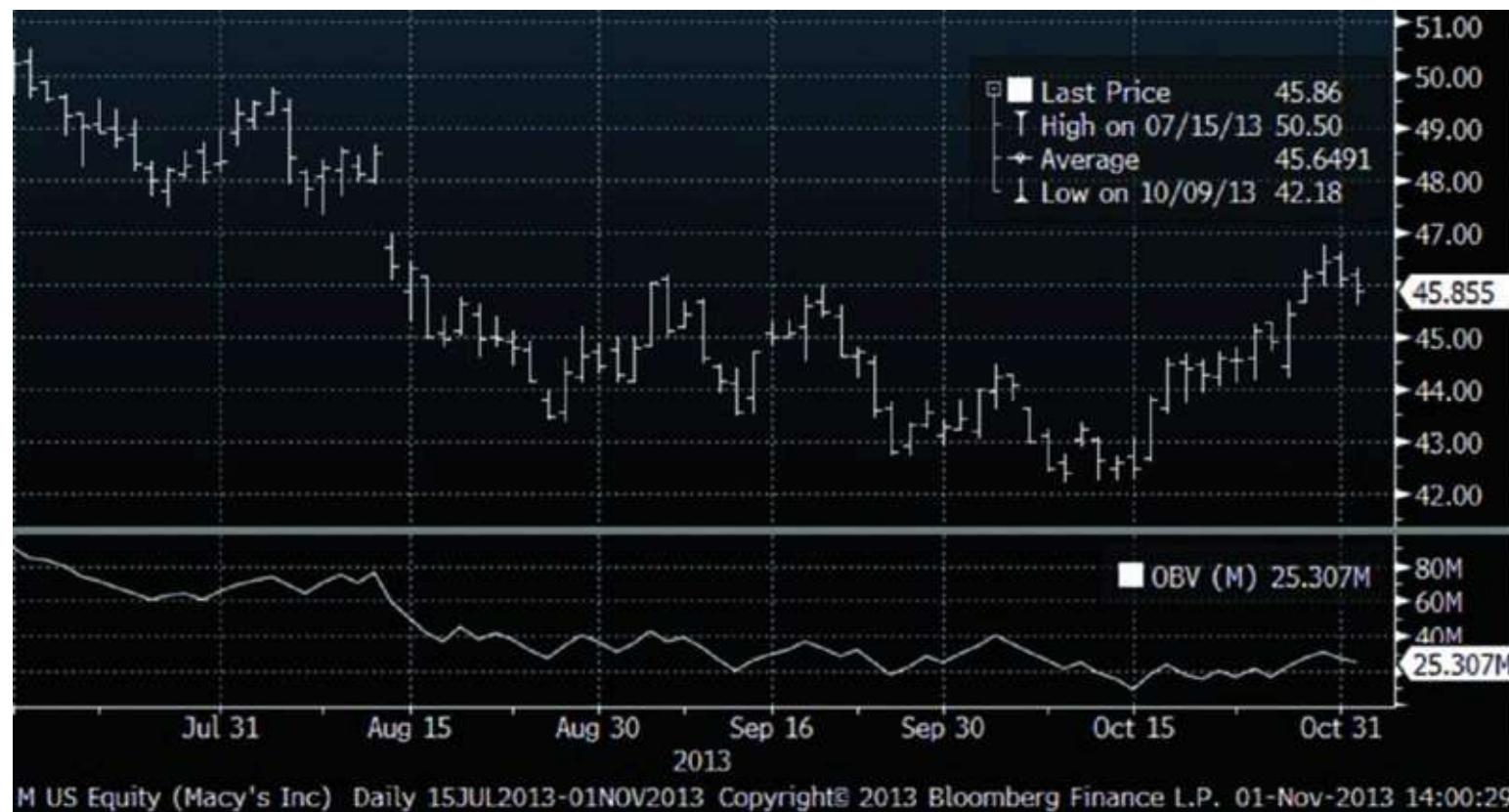


EXHIBIT 14.7 Bloomberg Volume-At-Time Screen, VAT Macy's Price, Volume, and 30-day Moving Average Volume, 7/15/2013–10/31/2013

On-Balance Volume Measure

Another measure of volume momentum is the *on-balance volume* (OBV) statistic. Popularized by Joe

Granville, the OBV measure is calculated by adding a previous day's volume to a cumulative volume if the stock closed higher the previous day and subtracting the previous day's volume if the stock closed lower the previous day. The measure can be used to gauge the overall strength of a trend, such as a strong bull run with prices and OBV lines increasing. Some technicians look at the price and OBV lines for forecasting or for confirmation of a reversal.³ [Exhibit 14.8](#) shows the Bloomberg block charts and OBV graph for Macy's for the 7/15/2013 to 10/31/2013 period.



[EXHIBIT 14.8](#) Bloomberg On-Balance Volume Screen, Macy's Price and OBV Measure, 7/15/2013-10/31/2013

Market Volume Measures

A common measure of volume momentum for the overall market or a sector is the volume of stocks that have increased to the volume of stocks that have decreased. The market is considered overbought when the ratio exceeds 1.5, and oversold when the ratio is less than 0.75. A similar measure is the *Trin ratio*. The ratio measures the average volume in declining issues to the average volume in advancing issues:

$$\text{Trin Ratio} = \frac{\text{Volume Declining}/\text{Number Declining}}{\text{Volume Advancing}/\text{Number Advancing}}$$

A Trin ratio above 1 is considered a bearish trend with selling pressure.

BLOOMBERG PRICE AND VOLUME SCREENS

VOLUME AT TIME, VAT

VAT screen shows prices along with trading volume, a moving average of volume, and the difference between volume and the average. You can select the number of days back to determine the moving average. To bring up the VAT screen for stock or index, type VAT. See [Exhibit 14.7](#).

ON BALANCE VOLUME, OBV

OBV measures the strength of momentum and signs for shifts in sentiment. OBV adds a previous day's volume to a cumulative volume if the stock closed higher the previous day and subtracts the previous day's volume if the stock closed lower the previous day. To bring up the OBV screen for a stock or index, type OBV.

ACCESSING OBV FROM TECHNICAL STUDY SCREENS

The OBV screen like the one shown in [Exhibit 14.8](#) and other screens used in technical studies can be accessed from the "Technical Study Browser" found on the Graph home page (Graph <Enter>) or directly by typing TECH: TECH <Enter>. See the previous Bloomberg exhibit box for more information.

VOLUME BAR DISTRIBUTION SCREEN, VBAR

VBAR shows volume at price over time. A total volume histogram is shown at the bottom of the screen; it will highlight in green if the volume is greater than the average and red if it is less than the average. You can use the chart to see the range in volume each day. To bring up the VBAR screen for a loaded stock or index, type VBAR.

VOLUME-WEIGHTED AVERAGE PRICE, VWAP

VWAP provides historical and real-time information on price, volume, and other trades for the selected security. You can select the source(s) of the data, including an exchange or a combination of

exchanges and use different price, volume, and time/date filters. The screen displays the volume-weighted average price, number of trades, and average trade size for a specified time, price, and volume range. To bring up the VWAP screen for a loaded stock or index, type VWAP.

BLOCK TRADES

- MBTR monitors block trades for stocks composing an index or portfolio.
 - GIMB: Block money flow chart.
-

Moving Averages

There are several types of moving averages. A *simple moving average* is the average price of a stock or an index over a given interval, with the average recalculated each new time increment by adding the latest observation and deleting the oldest. With a simple moving average, equal weight is given to each observation. A *weighted moving average* weighs newer observations more than older. For example, a 30-day weighted moving average would weigh the most recent date by 30, the day before by 29, and so on. A *triangular moving average* weighs the data in the middle dates more. When used as signals for price trend changes, a weighted moving average generates the first signal, followed by the simple moving average, and then the triangular average. Other types of moving averages are exponential averages and variable moving averages that incorporate volatility. Moving averages also vary by the length of the time intervals (30-day or 100-day), with shorter intervals reflecting shorter trends, and they vary by periodicity (e.g., 52-week average and a 30-day average).

Moving average lines are used to determine the overall price trend. If the overall trend is decreasing, then the moving average line is above the price line because it averages the new lower prices with previous higher prices. When the overall price trend is increasing, the moving average line is below the price

line. Technicians identify price trend reversals whenever a price line breaks its moving average line. Specifically, a signal to a technician of a reversal of a declining trend would be when prices start increasing such that the price line breaks through the moving average line from below. A technician might see this as a strong signal if it breaks the moving average line from below on heavy volume. A signal of a reversal of a rising trend would be when prices start decreasing such that the price line breaks through the moving average line from above. Again, if the breakthrough is accompanied with heavy volume, then the reverse signal may be considered a strong indicator. [Exhibit 14.9](#) shows the bar chart, 30-day moving price average line, total volume, and 30-day moving volume average (lower pane) for the S&P 500 from 11/2/2006 to 11/4/2010 (period covering before and after the crash). As indicated in the graph, there are a number of periods from the third quarter of 2007 to the first quarter of 2009 where there are bear signals in which the price line cuts the moving average from above followed by a bear trend. From the second quarter of 2009 through 2010, there are several bull signals in which the price line cuts the moving average line from below.



EXHIBIT 14.9 Bloomberg GP Graph: Price, 30-Day Moving Average, and Volume: S&P 500, 11/2/2006 to 11/4/2010

Price reversal signals can vary with the length of time over which the moving average is calculated. Technicians often compare moving averages with different intervals, such as comparing a 30-day moving average with a 200-day moving average. Comparing short-run moving averages with long run may help a technician discern whether or not an issue is overbought or oversold. For example, a bullish trend market, where the 30-day moving average is above the 200-day and where the gap is widening, could be taken as an indicator of a fast run up in prices and an indication the stock is overbought. As noted previously, technicians also compare simple moving average lines with weighted and triangular lines for signals as well. It is worth keeping in mind that an early signal does not mean it is a correct signal.

Moving Average Bands

Recall, the Bollinger band is formed by adding and subtracting two standard normal deviations to a 20-day or 30-day moving average. Moving average bands, also called *moving average envelopes*, can be constructed from different moving average intervals, from weighted and triangular moving averages, and with different percentage increases and decreases from the averages. As discussed, bands help to identify resistance and support levels. They also can be used to confirm a price reversal. For example, a strong buy signal in a downtrend market would be when the price increases in that trend cause the stock's price line to first cut its moving average line from below and then to cut its upper resistance level (maybe on heavy volume). If, however, the price cuts its moving average line, but fails to push past its resistance line, then the stock would be reverting back to either its downward trend or a new sideways trend; it could also decrease past its support line, indicating a strengthening of the downward trend. Thus, the resistance line helps the technician confirm if a movement past the moving average is or is not a reversal. Similarly, a strong sell signal in an uptrend market would occur when a stock's price decreases cause its price line to first cut its moving average line from above and then cut its lower support level (maybe on heavy volume). If, however, the price cuts its moving average line, but fails to push below its support line, then the stock would revert back to either its upward trend, a new sideways trend, or a stronger uptrend if it pushes past its resistance line. In this case, the support line helps the technician confirm if a movement past the moving average is or is not a reversal.

[Exhibit 14.10](#) shows Bloomberg's Moving Average Envelopes chart (GPO MAENV) for Macy's for the period from 7/22/2013 to 11/1/2013. The screen shows Macy's bar chart, 30-day moving average, and upper bound and lower bound set at 3 percent of the 30-day moving average (1.03 X MA and 0.97 X MA). We earlier discovered using Macy's volume-at-time graph ([Exhibit 14.7](#)) that on August 14, there was a surge in volume with 17.05 million shares traded compared to a 30-day average volume of 5.327. Also recall that the news on the August 13 was the report of lower department store sales. Examining the moving

average band, we see that Macy's also crossed its moving average support line from above on the August 14 and continued its downtrend to August 28. The stock hit a low for this period on October 15. It then started an upward trend, crossing its 30-day moving average on October 17 and its resistance level on October 28. Note that if the moving average bands had been set at 2 percent instead of 3 percent, then it would have crossed the upper band on October 24.

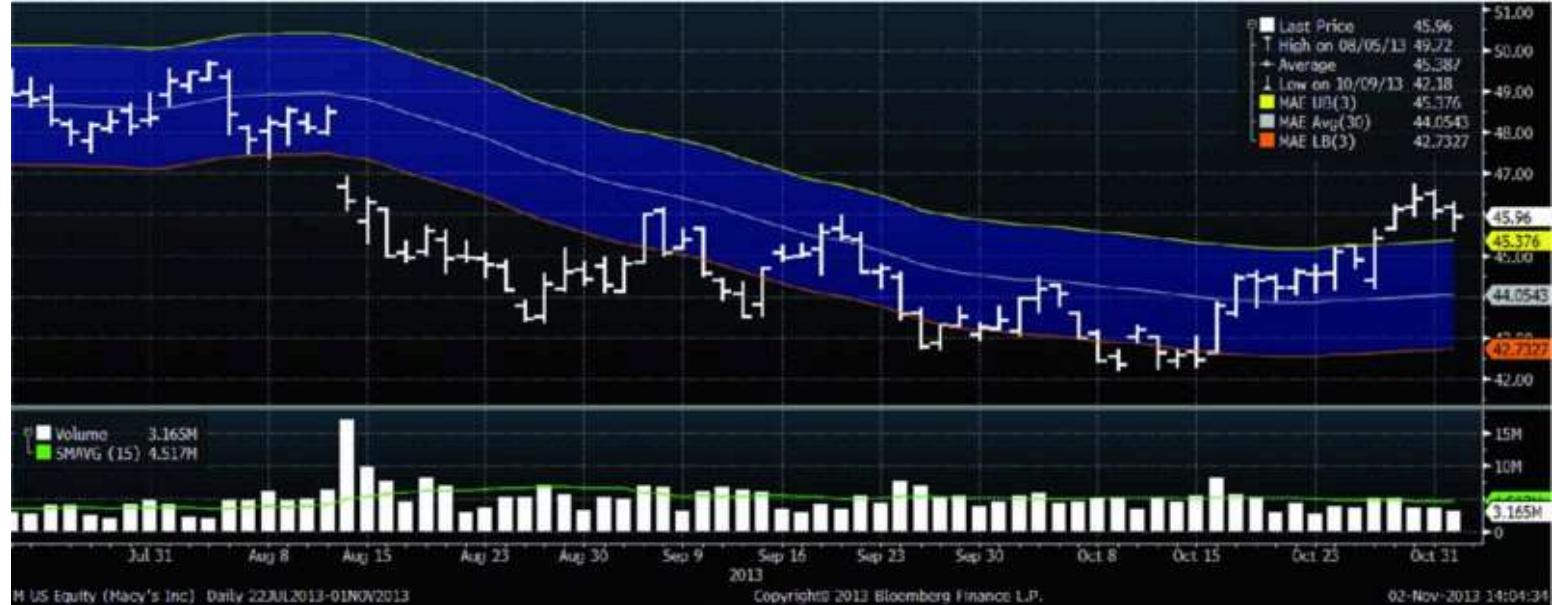


EXHIBIT 14.10 Bloomberg Moving Average Envelope, GPO MAENV Macy's Price, 30-day Moving Average, 7/22/2013–11/1/2013

BLOOMBERG MOVING AVERAGE SCREENS

- GPO MA: Moving average screen for simple moving average. For a loaded security or index, type GPO MA.
- GPMA is a moving average price graph screen. For a loaded security or index, type GPMA.

MOVING AVERAGE ENVELOPES: GPO MAENV

Similar to Bollinger bands, moving average envelopes are plotted by calculating percentage bands above and below a moving average. To bring up the screen for a loaded stock or index, type GPO MAENV. See [Exhibit 14.10](#).

ACCESSING MOVING AVERAGE AND OTHER TECHNICAL STUDY SCREENS

Moving average screens used for studies can be accessed from the "Technical Study Browser" found on the Graph home page (Graph <Enter>) or directly by typing TECH: TECH <Enter>.

See Bloomberg Web [Exhibit 14.2](#).

Market and Stock Metrics

Breadth of the Market

The breadth of the market refers to the degree of market participation or pervasiveness in an overall market trend. A bull (bear) market in which there are a large number of stocks increasing (decreasing) would be considered a strong bull (bear) market compared to one in which a small number are advancing (falling). In fact, an uptrend (downtrend) market in which the number of stocks participating in the increase (decrease) is decreasing is often taken as a signal of a directional change.

Advances minus declines, cumulative net advances, and moving cumulative averages are metrics used to measure the breadth of the market. The advances minus declines measure is the spread between the number of stocks that have advanced (A) and the number that have declined (D) in price: $A - D$. When the market is increasing and advances exceed declines by a large margin, then the uptrend is considered strong, especially if the widening positive spread is accompanied by heavy volume. When the market is in a decreasing trend and declines exceed advances by a large margin, the downtrend market is considered strong, especially if the widening negative spread is accompanied by large volume. Finally, a sign of an end to either an uptrend or downtrend is when the positive or negative spread begins to narrow.

In addition to net advance, some analysts use a moving cumulative measure of advances minus decline, adding the day's net advances to previous days going back X number of days: $\sum(A - D)$. Analysts also use a moving average of cumulative spreads. Both provide a measure of the broader trend of the market's depth. [Exhibit 14.11](#) shows the price graph and cumulative advance-declines graph for the S&P 500 for the period from 11/6/2006 to 11/4/2013.



[EXHIBIT 14.11](#) Bloomberg Price and Advance minus Declines Graphs for the S&P 500, 11/6/2006-11/4/2013

Number of Stocks Above or Below Their Moving Averages

In addition to the breadth of the market, technicians also try to determine the strength of the market and

when it could be overbought or oversold. As we noted earlier, when the market or a stock hits a resistance level, it may be overbought, and when it hits its support level, it may be oversold. A measure used to determine if the overall market is near its resistance or support level is the number of stocks above their moving averages as a percentage of the total number of stocks. For example, the total number of stocks in the S&P 500 that are above their 200-day moving average as a percentage of the total number of stocks in the S&P 500. As a general rule, the market is considered overbought and subject to a reversal (negative correction) when more than 80 percent of the stocks are above their 200-day moving average; it is considered oversold and subject to a reversal (positive correction) when the percentage is less than 20 percent.

Uptick-Downtick Index

Another market gauge is a comparison of upticks to downticks. When a stock's price increases above the previous price—an *uptick*—it can be assumed the price was initiated by a buyer; when the price decreases below the previous price—a *downtick*—it can be assumed the price was initiated by a seller. An uptick-to-downtick spread, or a ratio of upticks to downticks, can be used as a measure of investors' sentiment. Many indexes and exchanges calculate an *uptick-downtick index*. The index is equal to the number of securities in the index or listed on the exchange trading on an uptick minus the number trading on a downtick.

[Exhibit 14.12](#) shows graphs of the S&P 500 and its uptick-downtick index from 7/5/2012 to 11/2/2013. The graph shows the uptick-downtick index hitting a peak of 378 on 5/10/13 before the market hits its peak (for that trend) of 1,669 on 5/21. The tick index hits a trough of -318 on 5/29, just before the market hits its low on its downtrend of 1,588 on 6/24. A perusal of [Exhibit 14.12](#) shows other times when the index leads the market.



EXHIBIT 14.12 S&P 500 Uptick-Downtick Index and S&P 500, 7/5/2012-11/2/2013 TIKX = TIKX <Index>

Since a large percentage of the volume of many markets is from institutional trades, another gauge of the market is the activities of block trades. Several exchanges track the direction of price changes that accompany a block trade. One measure of institutional sentiment is the *uptick-downtick block ratio* of the number of security blocks traded on a downtick to the number traded on an uptick. The market is considered oversold when the ratio is below 0.4 and overbought when the ratio exceeds one.

CBOE Put/Call Ratio

The put/call ratio is the ratio of the total volume of put option contracts to call option contracts. The general rule is that if the option market is bullish, then call volume will exceed put volume and the put/call ratio will be decreasing; if the market is bearish, then put volume will exceed call and the ratio will be increasing. Note that when the market is bearish the increase in put purchases can be driven not only by speculators, but also by hedgers who use long put positions to hedge their portfolios. A very low

ratio is a signal of an overbought stock market, and a very high a ratio is a signal of an oversold one. The CBOE's put/call ratio is a commonly followed ratio of the option markets' sentiment that is used as an indicator of the overall stock market. Up or down deviation from the CBOE put/call ratio from 65 percent is considered a signal of market movements. [Exhibit 14.13](#) shows the CBOE put/call ratio and prices for the S&P 500 from 11/1/2005 to 11/1/2013. For the period, the ratio hit its high of 1.34 on 3/11/2008 (prior to the crash), with the market hitting its low of 676.53 on 3/4/2009; the put/call ratio hit its low of 0.32 on 4/20/2010, and the market hit its high of 1,771.95 on 10/24/2013.



[EXHIBIT 14.13](#) CBOE Put/Call Ratio and S&P 500, 11/1/2005-11/1/2013 CBOE Put/Call Ratio = PCUSEQTR <Index>

In addition to using the option market's put/call ratio to evaluate the stock market, the put/call ratio of individual stocks are also used as a measure and indicator of that stock's trends. [Exhibit 14.14](#) shows the Bloomberg's *Erlanger put/call ratio* for Macy's for the period between 7/22/2013 and 11/1/2013 that was analyzed earlier using volume-in-time graphs ([Exhibit 14.7](#)) and moving-average envelopes ([Exhibit](#)

[14.10](#)). In examining the graphs, notice how the put/call ratio increases as Macy's stock decreases and how the how the ratio decreases as its stock goes up.



[EXHIBIT 14.14](#) Bloomberg's Erlanger Put/Call Ratio Screen for Macy's 7/22/2013–11/1/2013, GPO ERPCR

Confidence Index

In addition to the option market, technicians also look to the bond market for indicators of the overall stock market. An indicator of the economy and the equity market is the yield on high-quality bonds to low-quality ones. When investors are confident in the economy or start to see signs of improvement (e.g., leading economic indicators rising), they often make a quality swap of their bond portfolios, swapping their higher-grade bonds for lower-grade ones to increase their portfolio's expected yield. In the bond market, these swaps, in turn, cause the prices of lower quality bonds to increase and their yields to fall, and the prices of higher quality bonds to decrease and their yield to increase. As a result, the quality spread between the low-quality yield and the high-quality yield begins to narrow. Stock market analysts

study the bond market, in the same way they do the option market, for indicators of the direction of the overall stock market. In assessing the bond market, analysts look at quality spreads between high- and low-quality bond yields and also the ratio of high-quality to low-quality bond yields. Such ratios are called *confidence indexes*:

$$\text{Confidence Index} = \frac{\text{Average Yield of High-Grade Bonds}}{\text{Average Yield of Low-Grade Bonds}}$$

One of the older and still popular of these indexes is Barron's Confidence Index, which is the ratio of the average yield on 10 high-grade bonds at time t to the average yield of the Dow Jones 40 Bond bonds at time t .

At one time, the confidence index was thought to be a leading indicator of the stock market. As a leading indicator, technicians would look for divergences in which the confidence index and the market were moving in opposite directions. For example, if the confidence index was increasing (signaling that bond investors were confident) and the stock market was in a declining trend, a technician would predict a stock market reversal. Like most indicators, a confidence index provides a measure that can be used to confirm a trend. However, it may not be a leading indicator.

Short Interests

Another group of investors that technicians follow for monitoring the overall stock market, as well as stocks, are the market participants with short positions. A measure of short positions for a stock or the market is the short-interest ratio. *Short interest* is the cumulative number of outstanding shares being shorted by investors (i.e., shares borrowed that have not been covered). The *short-interest ratio* is equal to short interest divided by the average daily volume of trading. For the overall market, the ratio is equal to the number of shares shorted for stocks on an index (or on an exchange) to the average volume of

trading on the index (or exchange). In general, if the short-ratio is increasing (decreasing), it would be an indication of a bearish (bullish) sentiment in the market. [Exhibit 14.15](#) shows the short-interest ratios for the S&P 500 for all stocks in the index and by industry from 7/31/2013 to 10/15/2013, and [Exhibit 14.16](#) shows the Bloomberg short-interest screen (SI) for Macy's. As shown in Macy's short-interest exhibit, Macy's short-interest ratio peaked on 7/31/2013, and its price hit a bottom on 8/30. The short-interest ratio, however, decreases during Macy's downtrend.

Industry	07/31	08/15	08/30	09/13	09/30	10/15
All Securities	4.13	4.44	4.91	4.66	4.29	4.42
Energy	3.47	3.51	4.18	3.70	3.87	3.83
Materials	3.80	4.41	4.92	4.86	4.02	4.54
Industrials	4.37	4.74	5.60	5.23	4.80	4.89
Consumer Discretionary	4.73	4.55	4.91	4.92	4.60	4.53
Consumer Staples	4.79	4.74	4.63	4.60	4.14	4.61
Health Care	4.09	4.98	5.72	5.05	4.56	4.41
Financials	3.78	4.35	4.47	4.50	3.96	4.18
Information Technology	3.41	4.10	4.49	4.19	3.90	3.96
Telecommunication Services	9.06	8.48	12.78	10.55	10.02	10.21
Utilities	4.01	3.73	3.98	3.58	3.62	4.19

Source: Bloomberg, SIA Screen; SIA <Enter>

EXHIBIT 14.15 Short-Interest Ratio for S&P 500 by Industry, 7/31/2013-10/15/2013

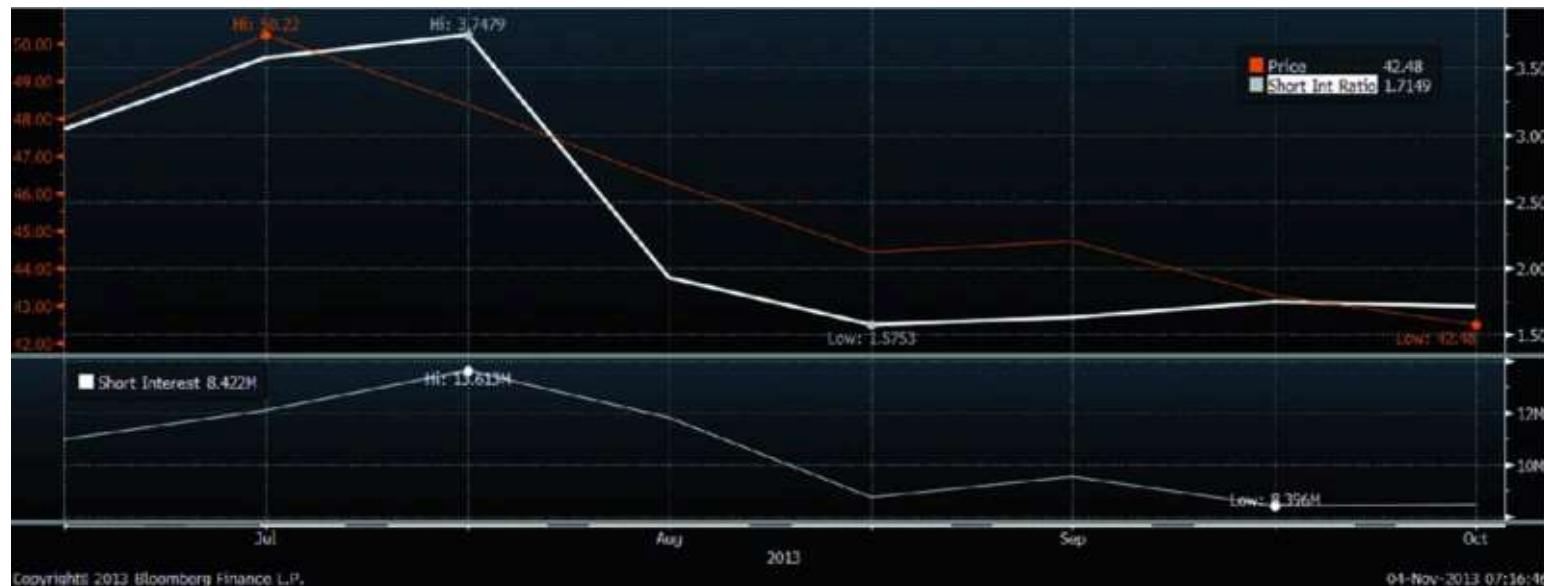


EXHIBIT 14.16 Bloomberg Short-Interest Screen for Macy's 7/22/2013-11/4/2013, SI

Relative Strength

Relative strength analysis measures the performance of a security to a benchmark. The most common *relative strength index* (RSI) is the ratio of stock price to the price of an index:

$$RSI = \frac{\text{Price of Stock } i}{\text{Price of an Index}}$$

When the index is rising, the stock is outperforming or leading the market, and when it is decreasing, the stock is underperforming or lagging the market. The index applies to both uptrend and downtrend markets. In an uptrend market, the stock's RSI will be increasing if its price continues to increase more than the market; in a downtrend, a stock's RSI will be increasing if its price decreases less than the market.

The RSI index can be applied to an industry (price of industry index/price of market index) or to a stock relative to its industry (price of stock/price of industry index). The RSI is used to measure trends. If the prices of a stock, industry, or group of stocks are outperforming the market, it may continue to do so for some period of time. [Exhibit 14.17](#) shows the RSI for Apple stock from 11/4/2006 to 11/4/2013. Apple's RSI increased for most of the period, hitting its maximum strength on 9/21/2012. However, from 9/21/2012 to 11/4/2013, Apple's RSI declined. In contrast, the RSI for P&G, shown in [Exhibit 14.18](#), peaked on 12/10/2008 and then declined for the next five years.



EXHIBIT 14.17 RSI Index for Apple: Price of Apple/Price of S&P 500, 11/4/2006-11/4/2013



EXHIBIT 14.18 RSI Index for Procter and Gamble: Price of P&G/Price of S&P 500, 11/4/2006-11/4/2013

BLOOMBERG MARKET METRICS

BREADTH OF THE MARKET

- **Advances Minus Declines Line, (ADL Line):** For a loaded index (e.g., S&P 500), type GPO ADL. The line can also be accessed from the "Technical Study Browser": TECH <Enter>, search for ADL or advances minus declines. See [Exhibit 14.11](#).
- **Bloomberg NSE Advances-Declines Index:** NYADDEC <Index> <Enter>; GP.
- **McClellan Oscillator, MCCL:** McClellan Oscillator Screen shows a smooth line of the difference between advances and declines. Applicable for some indexes. For a loaded index (e.g., S&P 500) enter: MCCL <Enter>.

UPTICK-DOWNTICK INDEXES:

- **TICK Index:** TICK <Index> <Enter>: Tick is equal to the number of NYSE securities trading on an uptick minus the number trading on a downtick.
- **TIKX Index:** TIKX <Index> Enter: The TIKX index is equal to the number of S&P 500 stocks trading on an uptick minus the number trading on a downtick. See [Exhibit 14.12](#).
- **TIKI Index:** TIKI <Index> Enter: The TIKI index is equal to the number of Dow Jones stocks trading on an uptick minus the number trading on a downtick.
- **TICKUSE Index:** TICKUSE <Index> Enter: The TICKUSE index is equal to the number of all U.S. stocks trading on an uptick minus the number trading on a downtick.

PUT/CALL RATIO

- **CBOE Put/Call Ratio:** PCUSEQTR <Index>. See [Exhibit 14.13](#).
- **Erlanger Put/Call Ratio:** For a loaded stock, type GPO ERPCR. See [Exhibit 14.14](#).

BLOCK TRADE SCREENS

- **BTM:** Block Trade Monitor.

- **MBTR:** Block Trade Recap.

SHORT INTEREST

- **SI:** Short Interest and Short-Interest Ratios for a stock. For a loaded stock: SI <Enter>. See [Exhibit 14.16](#).
- **SIA:** Short Interest platform for market indexes and exchanges.

CUSTOMIZE GRAPHS

- The graphs in Exhibits 14.17 and 14.18 were generated using Bloomberg's customized chart screen found on the Graphs or Charts Homepage: Charts <Enter> or Graph <Enter>; Click "Two-Security Spread or Ratio."

See Bloomberg Web [Exhibit 14.3](#).

Technical Analysis of Other Markets and Portfolios

Our examples of trends and applications of technical tools in this chapter have so far been limited to U.S. indexes and stocks. The same analysis can be extended to foreign stock indexes and stocks, as well as exchange rates, commodity prices, fixed-income prices and yields, and economic indexes.

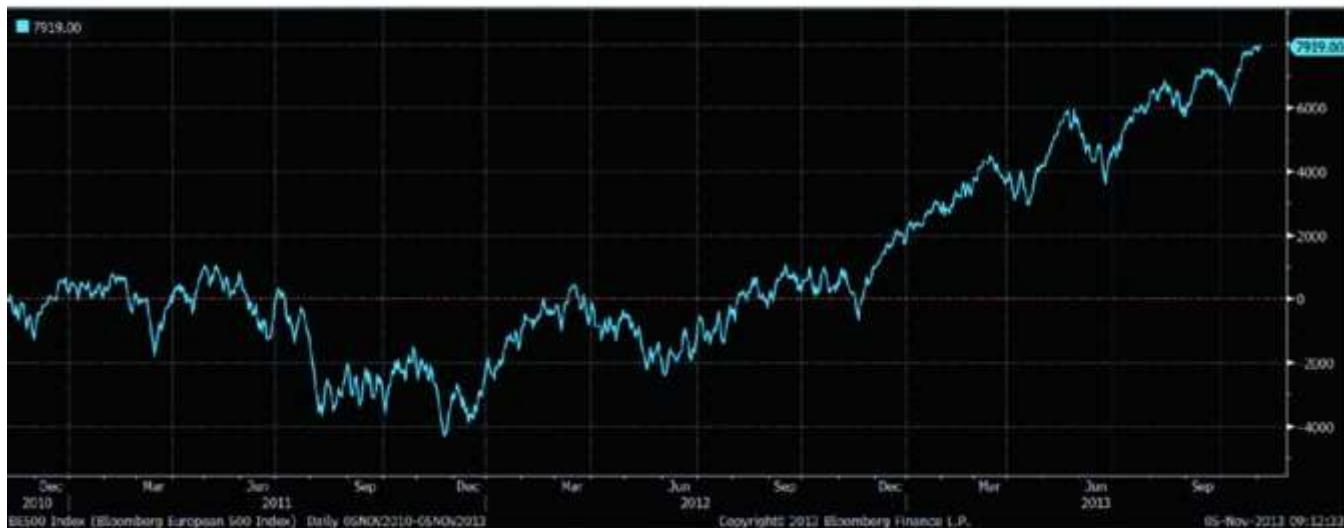
Foreign Markets and Stocks

[Exhibit 14.19](#) shows the bar chart for Bloomberg's European 500 index (BE500) for the period from 11/8/2010 to 11/4/2013, along with its 30-day moving average, moving average envelope (GPO MAENV), volume, 30-day moving volume average (middle pane), and cumulative advances minus declines (lower pane; GPO ADL). As indicated in the graph, there are a number of periods where there are bear signals in

which the price line cuts the moving average from above, on heavy volume exceeding the 30-day moving average, and with cumulative advances minus declines decreasing; these signals are then followed by a bear trend. There are also several bull signals in which the price line cuts the moving average line from below, on relatively high volume, and with cumulative advances minus declines increasing.



(a)

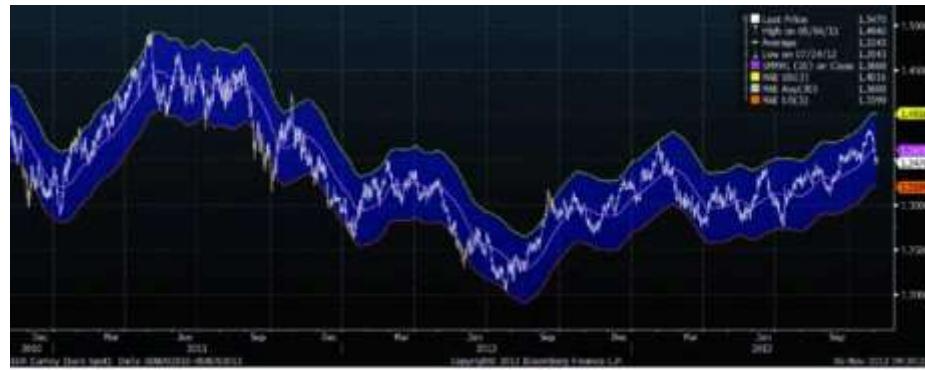


(b)

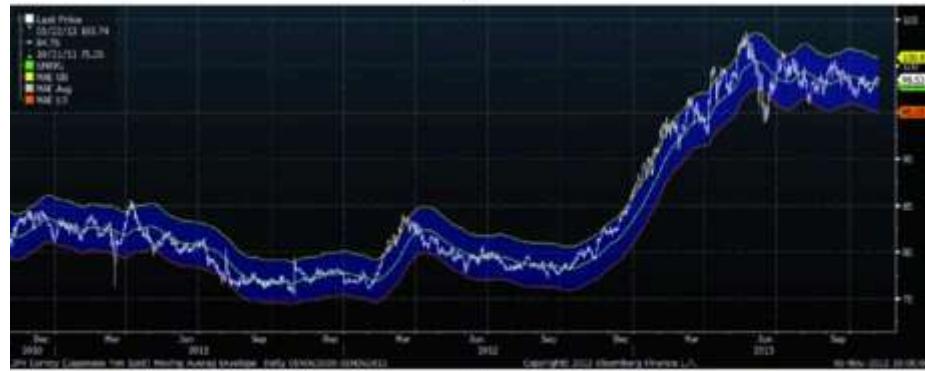
EXHIBIT 14.19 Bloomberg European 500, BE500 <Index> Bloomberg Moving Average Envelope (GPO MAENV), 30-day Moving Average, Volume, and Cumulative Advances Minus Declines (GPO ADL) 11/8/2010-11/4/2013

Exchange Rates

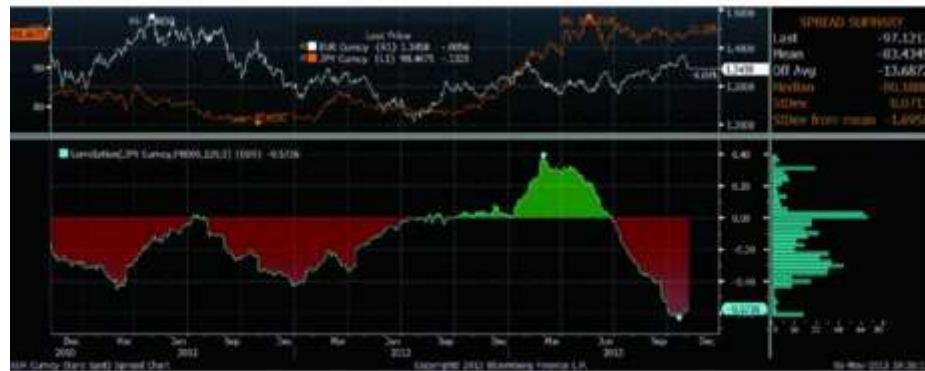
[**Exhibit 14.20**](#) shows the bar chart, moving averages, and 3 percent moving average bands for the U.S. dollar price of the euro (top panel) and Japanese yen (middle panel) from 11/8/2010 to 11/5/2013. The uptrend and downtrend for the euro is similar to the European 500 index. A currency trader using just the moving average line would find a number of signals for reversals. There are only a few confirmation points, however, where the exchange rate moves past its support and resistance levels, at least based on a 3 percent band. For the same period, the yen is characterized by a sideways trend for 2010 to the beginning of the third quarter of 2012, where it begins a significant uptrend. During both trends, the yen trades most of the time within its channel. The lower panel in [**Exhibit 14.20**](#) shows a plot of both exchange rates and a correlation plot. For the period, the average correlation was -0.7731. For currency traders who use the options, futures, and forward markets, these technical trends are important in helping to identify long and short futures positions and long and short call or put positions.



(a)



(b)



(c)

EXHIBIT 14.20 Euro and Japanese Yen Bloomberg Moving Average Envelope and Correlation 11/5/2010–11/5/2013.

(a) Euro: EUR <Currency>; GPO MAENV <Enter>. (b) Yen: JPY <Currency>; GPO MAENV <Enter>. (c) The graph is generated from Bloomberg's customized chart: Charts Homepage: Charts <Enter>; Click "Two-Security Spread or Ratio."

Commodities

[Exhibit 14.21](#) shows the bar chart and price charts, moving averages, and 3 percent moving average bands for spot crude oil prices (WIT cushing crude oil spot price, USCRWTIC <Index>) and corn spot prices (yellow kennel corn, dollar per bushel, CORNILNC <Index>) for the period from 11/5/2010 to 11/5/2013. For this three-year period, crude oil prices ranged between approximately \$80 and \$112 and had three significant peaks, each near \$110, and three significant bottoms, each near \$80. For the same period, corn prices ranged from \$8.44 per bushel to \$4.43 per bushel, with a two moderate uptrends from 11/5/2010 to 7/20/2012 and a significant downtrend for the period from 7/20/2012 to 11/4/2013.

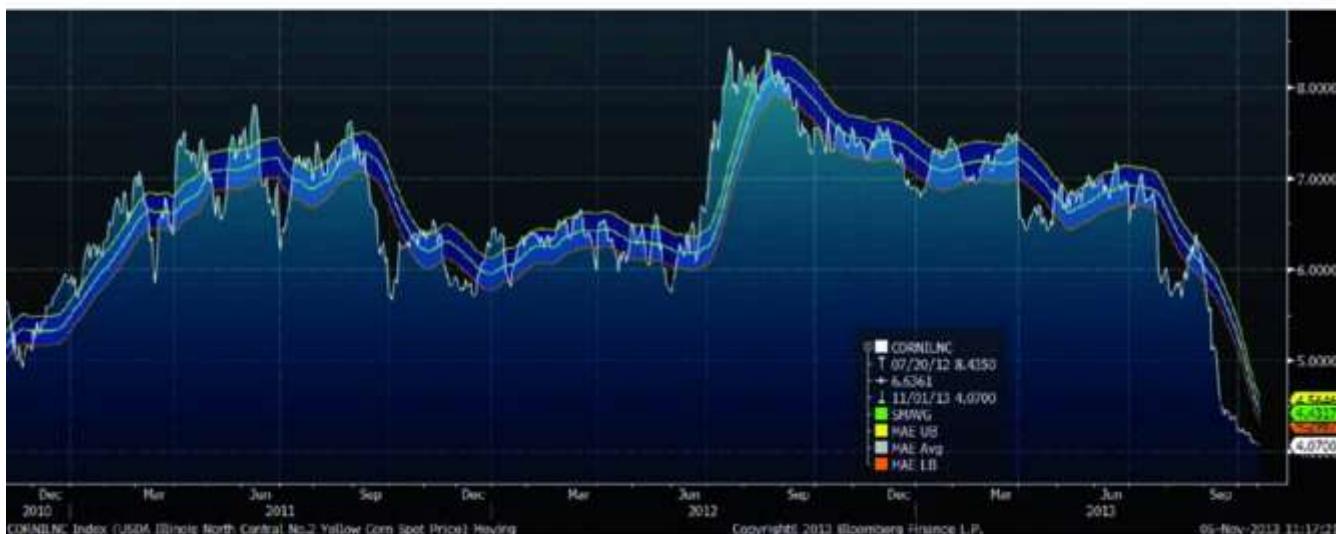
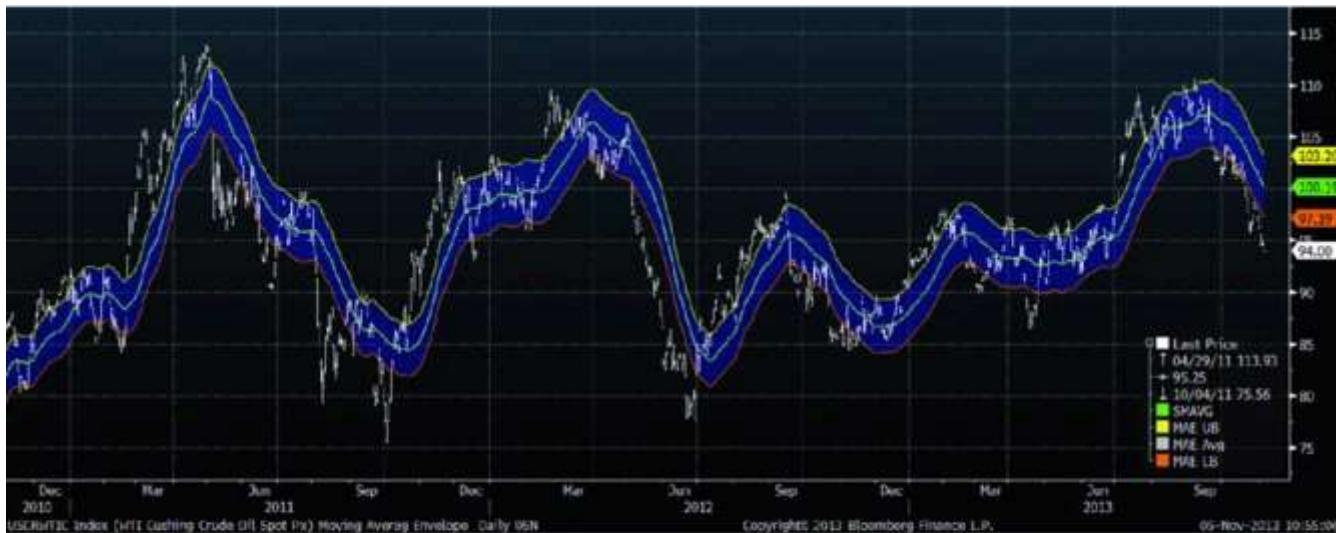


EXHIBIT 14.21 Crude Oil and Corn Spot Prices Bloomberg Moving Average Envelope 11/5/2010-11/5/2013.

(a) Crude Oil: WIT Cushing Crude Oil Spot Price USCRWTIC <Index>; GPO MAENV <Enter>.

(b) Corn: Corn Spot Prices CORNILNC <Index>; GPO MAENV <Enter>.

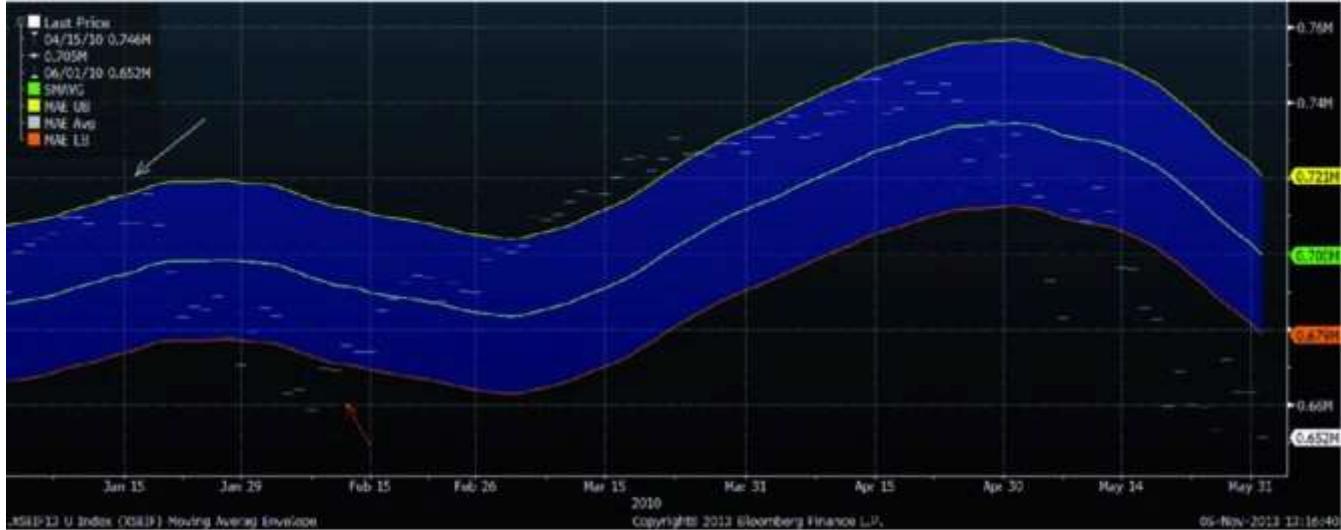
Portfolio Management Using Technical Metrics

As noted in the introduction, technical analysis when used in conjunction with fundamental analysis provides a more complete picture of the stock or market. In practice, many analysts and investment firms use fundamental analysis to determine what to buy and sell and technical analysis to determine when to buy and sell. Other market participants combine both approaches to reinforce or to check their positions.

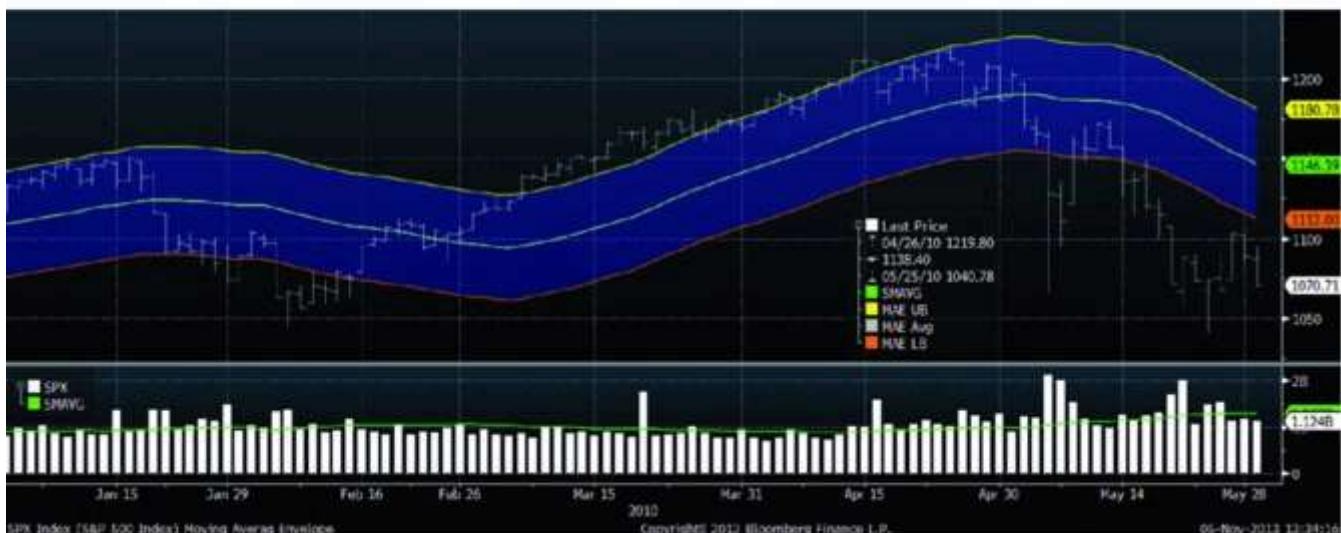
In managing and monitoring an active portfolio, portfolio managers who combine financial and economic information with technical tools are better able to confirm their overall equity allocation decisions and to reinforce their buy, hold, and sell stock recommendations. In Chapter 12, we analyzed Macy's in terms of its fundamentals—sales, earnings, margins, growth rates, and investment opportunities. Such analysis is only enhanced when technical indicators such as price trends, volume, put/call ratios, short-interest ratio, and relative strength indicators are included as part of the analysis. Even when the fundamentals and technical signs conflict, they still provide a useful red flag that forces an analyst to ask questions and to look deeper.

In the last chapter, we presented the investment decisions made in the first quarter of 2010 of a student investment fund that focused on fundamentals. Recall, that in January and February, the fund managers became concerned with a possible correction in the stock market. They decided to adjust the portfolio by selling some of their stocks meeting their sell criteria based on fundamentals. Based on their technical monitors of these stocks, a number of stocks sold were also near their 52-week high and near their 2007 peak. [Exhibit 14.22](#) shows the student fund's portfolio values and the S&P 500 from the beginning of January to June of 2010, along with the fund's 30-day moving average and moving average envelopes (GPO MAENV). As shown in the exhibit, the fund and the market were both close to their resistance levels on January 18, reinforcing the decision to sell some stocks and increase the fund's cash position. The January 1 portfolio subsequently crossed its support level at the beginning of February. At that time, the

fund managers increased their stock holdings by 5 percent (from the cash position) by purchasing Kohl's, Archer Daniels Midland, Abbott, Tiffany, Progress, Devon, and SalesForce.com. Each of the stocks was considered to be underpriced and a good buy based on the fundamentals. In addition, four of the stocks had very strong buy technical indicators, such as rising relative strength indexes (see [Exhibit 14.23](#)).



(a)



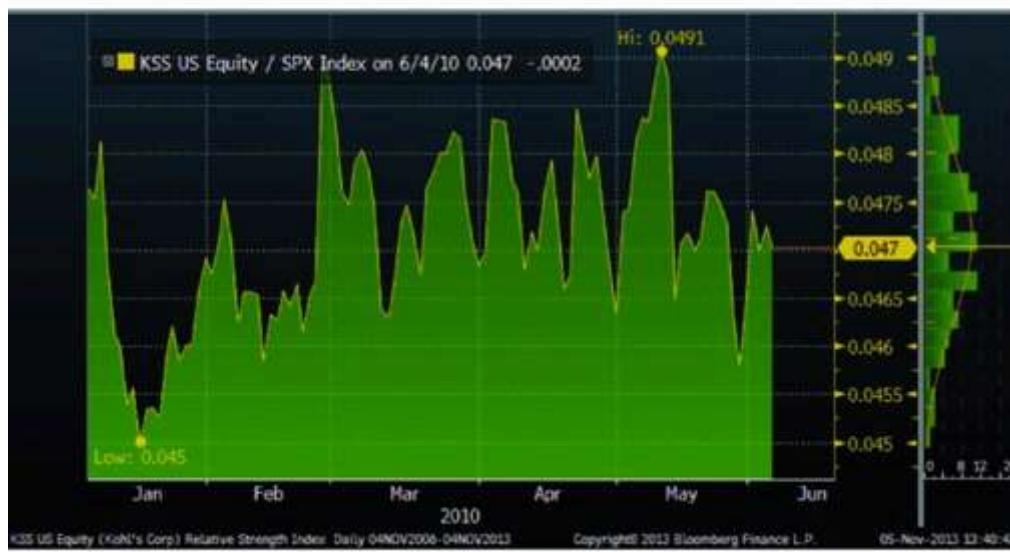
(b)

EXHIBIT 14.22 Student Investment Fund and S&P 500 Bloomberg Moving Average Envelope 1/1/2010–6/4/2010.

(a) Investment Fund: XSEIF13 <Index> the Bloomberg CIXB screen was used to make the fund an index. (b) S&P 500: SPX <Index>



(a)



(b)



(c)

EXHIBIT 14.23 RSI Index: Salesforce.com Inc, Kohl's, and Progress, 1/1/2010–6/4/2010

(a) Salesforce.com Inc. (b) Kohl's. (c) Progress.

BLOOMBERG: OTHER TECHNICAL INDEXES

There are numerous other indicators that technicians use. Some of note on Bloomberg include Rate of Change, Money Flow, Relative Strength Analysis, and True Range.

RATE OF CHANGE

The rate of change (ROC) is the percentage change in price from N-periods back to the current: $ROC = (\text{Current Price}/\text{Price N-Periods back}) - 1$. For most price trends, the price and ROC will move together. When there is a divergence, the ROC is considered the strong indicator. Thus, if the price is increasing and ROC is decreasing, it is a signal that price will reverse and decrease.

- ROC: For loaded stock or index, type ROC.

RELATIVE STRENGTH ANALYSIS

Bloomberg's relative strength index (RSI) was developed by Wells Wilder. The index is based on the average of up closes to the average of down closes:

$$\text{RSI} = 100 - [100 / (2 + (\text{Average Up} / \text{Average Down}))]$$

- RSI: For loaded stock or index, type RSI.

MONEY FLOW

A money flow is equal to price multiplied by volume. For most upticks, the money flow will increase, and for most downticks the flow will decrease. The technical theory is that the money flow will lead price. If prices are decreasing (increasing) and money flow is increasing (decreasing), then price will go up (down).

- GM: For a loaded stock, type GM.

TRUE RANGE

True range compares a security's high and low to the preceding day's close instead of that day's opening.

- Average True Range screen, ATR, can be accessed from the "Technical Study Browser": TECH <Enter>; search for ATR.

BLOOMBERG: EXCEL TEMPLATES FOR TECHNICAL ANALYSIS

Bloomberg has a number of Excel templates for conducting technical analysis. Use DAPI to see a listing and to download: DAPI <Enter>; Click "Excel Template Library"; Click "Technicals."

Templates of note:

- Historical Technical Analysis, XGDX.XLS.

- Multi Technical Analysis Screen, XMCD.XLS.
- Trader's Technical Analysis Dashboard, XTAS3.XLS.
- Above/Below Ratio, XABR.XLS.
- Intraday RSI Monitor, XRSI.XLS.
- Market Breadth Monitor, XMBM.XLS.
- Trader's Technical Analysis Dashboard for Commodities, XTAC.XLS.

See Bloomberg Web [Exhibit 14.4](#).

Behavioral Finance

Bubbles

From the beginning of 1995 to April 2000, the S&P 500 increased 230 percent from 461 to 1,523; even more impressive, the NASDAQ 100 index (NDX (<Index>)) increased 1,082 percent, from 398 to 4,704. This was the Dot-Com boom period, described by Fed Chair, Alan Greenspan, at the time as one of "irrational exuberance." After peaking in April of 2000, the market crashed. One year later, the S&P was at 1,100 and the NASDAQ 100 index had decreased to approximately 1,400; by April 2002, it had declined to approximately 1,000—the bubble had burst (see [Exhibit 14.24](#)).

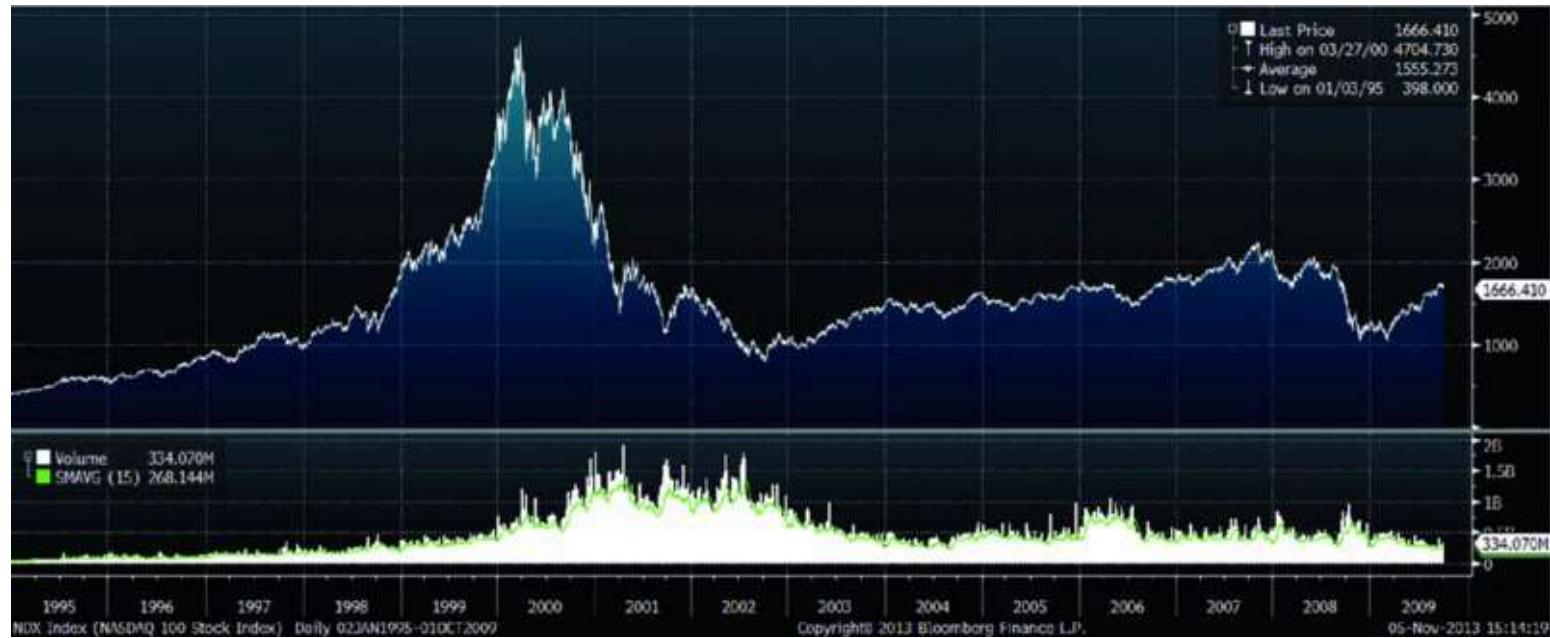


EXHIBIT 14.24 NASDAQ 100 Index (NDX <Index>), 1995-2009

In general, a speculative bubble occurs when the price of an asset, such as stock, gold, or houses, increases beyond a level that can be justified on economic grounds, and once past that level it still continues to rise. History is replete with speculative bubbles. Whether it is the South Sea Bubble, the Internet bubble, or the more recent housing bubble, bubbles tend to have stages: an initial period in which an event, development, or invention changes expectations; next a period of abnormal returns for early investors, which attracts other investors; third, a boom period in which prices increase as more investors try to get rich even though fundamentals no longer make sense; fourth, the bust. In his book, *Dot.Com*, John Cassidy captures the essence of the Internet bubble with the story of Priceline.com:

"In March 1999, Priceline.com ... was preparing to do an initial public offering ... The word on Wall Street was that Priceline.com would follow the path of America Online, Yahoo!, and eBay to become an "internet blue chip." The only question people in the investment community were asking was how much stock they would be able to lay their hands on On the morning of March 30, 10 million shares of Priceline.com opened on the Nasdaq National Market at \$16 each, but the price immediately jumped to \$85. At the close of trading, the stock stood at \$68; it had risen 425 percent on that day. Priceline.com was valued at almost \$10 billion—more than United Airlines, Continental Airlines, and Northwest Airlines combined.... Priceline.com started operating on April 6, 1998. By the end of the year it had sold slightly more than \$35 million worth of airline tickets, which cost it \$36.5 million The loss did not include any of the money Priceline.com spent developing its web site A few weeks after Priceline.com's IPO, its stock reached \$150, at which point the tiny company was worth more than the entire U.S. airline industry. Two years later, the stock was trading at less than \$2, and the entire capitalization of Priceline.com would not have covered the cost of two Boeing 747s." (Cassidy, Dot.Com, pp. 2-8)

Behavioral Finance Models

As noted in the introduction, behavioral finance is a psychology-based branch of finance that looks at the systematic impact human frailties and biases have on stock price patterns. In the absence of market efficiencies, behaviorists try to show how such biases lead to anomalies and discernible trends that technical investors, as well as fundamentalists, could exploit. Some of these biases include conservativeness, overconfidence, framing, and memory biases.

Conservative Bias

A *conservative bias* refers to individuals that are slow to change their positions or beliefs in the presence of new evidence. A market with a conservative bias would be slow to react to information. This bias would lead to a pattern in which it takes time for new information to be fully reflected in the price. For example, suppose an oil company just finds its oil reserves are three times greater than originally estimated and reports that the firm's earnings will be three times greater than the current level as a result of the discovery. When the company announces the reserve increase, the market would push up the company's stock price. Suppose that after the announcement is made it takes two weeks for the stock price to increase from its current level of \$50 to its new equilibrium level of \$75. This gradual increase in share prices may be due to the presence of a *learning lag* in which some investors respond immediately to the auspicious earnings information, but others with a conservative bias take more time to react. Since it takes some time before the impact of the information is fully reflected in the stock's price, a trend would emerge in which the stock begins to slowly trade away from its initial level to its new equilibrium one.

Overconfidence

Overconfidence occurs when individuals overestimate their knowledge, skill, or abilities. In the financial market, a dominance of overconfident investors would lead to overshooting.

For example, in the case of the new oil reserve, suppose the market is dominated by overconfident investors who overestimate the impact or exaggerate the favorable information and by their buying activities push the stock price to \$80. Later, after reassessing, the market pushes the price back to its new equilibrium price of \$75.

Framing Bias

Framing bias refers to how decisions or actions are influenced by how the choices are framed. A market influenced by investors with a gain-oriented frame of mind, and therefore overconfident, would tend to overshoot. On the other hand, a market influenced by investors with a loss-oriented frame of mind, and therefore conservative, would tend to lag. The frame of mind may also be different with respect to gains and losses. For example, some individuals may be more gain-oriented when it comes to gains, thus becoming more risk-seeking and aggressive as the market goes up, and then be more loss-oriented when it comes to losses, in turn becoming more risk-averse as the market declines. However, it may be the opposite, where investors become more risk-averse the more they gain, and more risk-seeking the more they lose.⁴

Another form of framing bias is mental accounting in which an investor separates decisions, for example, investors that are risk seeking when it comes to certain types of investments and risk-averse to others.

Memory Bias

Memory bias refers to individuals who place too much weight on more recent events instead of their beliefs or convictions. For example, an investor that places more weight on a forecast of good earnings than to his knowledge of the company's poor long-term prospects or his knowledge of the company's declining market share.

Behavioral Finance and Efficient Markets

As a school of thought, *Behavioral Finance* develops behavioral models that provide some support for technical analysis, provided the markets are inefficient. Behavioral biases that impact the market are ir-

relevant if markets are efficient. For example, in the oil well scenario where a conservative bias led to a learning lag, a technician studying such trends would be able to earn abnormal returns by buying the stock a day or two after it begins to trade away from its historical level (\$50), then selling it when it stabilizes two weeks later around its new equilibrium (\$75). Excess profit in this case is realized by technicians who profit from discerning learning lag trends in the market. However, if the market is efficient, then such technicians by their actions would push the price up before the laggards enter the market, thereby eliminating the trend.

Behaviorists counter the efficient market argument by pointing to *fundamental risk* that limits investors from taking advantage of mispricing. That is, a stock that is considered to be underpriced by fundamentalists would earn an abnormal return if the stock moves to its intrinsic value. The fundamental risk, however, is that the stock could continue to be underpriced. Recall, the example of Macy's in Chapter 12, in which we applied fundamental analysis to determine Macy's intrinsic value. In that example, Macy's was underpriced, but our gain from buying it depended on the market pushing its price toward its future intrinsic value. Behavioral advocates contend that because of fundamental risk, it takes time for a stock to reach its intrinsic value. They also point to how such risk explains bubbles. Consider an analyst during the dot-com bubble who argued that Priceline.com was overpriced at \$68 and recommended a sell or no buy, only to later see it reach \$150! Contrast her to the analyst who said Priceline.com is overpriced, but we still should buy. It is worth noting the epilogue to the Priceline.com story: From 2002 to 2008, Priceline.com traded between \$50 and \$65. From 2009 to 2013, the stock's price skyrocketed. On 11/6/2013, it was trading at \$1,082! So maybe the technician was right. In the next chapter, we examine the efficient market theory in more detail.

Conclusion

Technical analysis looks for price trends combined with volume information, moving averages, the breadth of the market, confidence indicators, and other indicators to identify trading opportunities. As an alternative approach to fundamental analysis, technical analysis assumes that all fundamental information is captured in the market price and that market statistics reveal all information. As a complement, technical analysis when used in conjunction with fundamental analysis provides a more complete picture of the stock or market.

The Hurst exponent is a time-series measure named after Harold Hurst (1880–1978). The exponent was originally used in hydraulic engineering to study the volatility patterns of rain observed over a long period of time. In finance, the Hurst exponent is used to identify price patterns hidden within seemingly random stock price trends. In general, a time series can be persistent, with a tendency to continue its up or down pattern; antipersistent, in which it has a higher tendency to reverse its current pattern; or random. Bloomberg's Hurst screen (GPO KAOS) is based on the work of Christopher May who applied the Hurst exponent to nonlinear price patterns. Bloomberg's Hurst exponent screen can be used to test for randomness. If a price trend is random, the Hurst coefficient would continuously have a value close to 0.5. If not, then there is pattern to the stock price movement. For the period 2000–2013, Bloomberg's Hurst exponent value for the S&P 500 averaged 0.735 ([Exhibit 14.25](#)). Using the Hurst screen for other stocks, one will find more often than not that the stocks' price patterns have Hurst exponent values higher or lower than 0.5, suggesting patterns to their movements and providing an argument for the use of technical analysis.

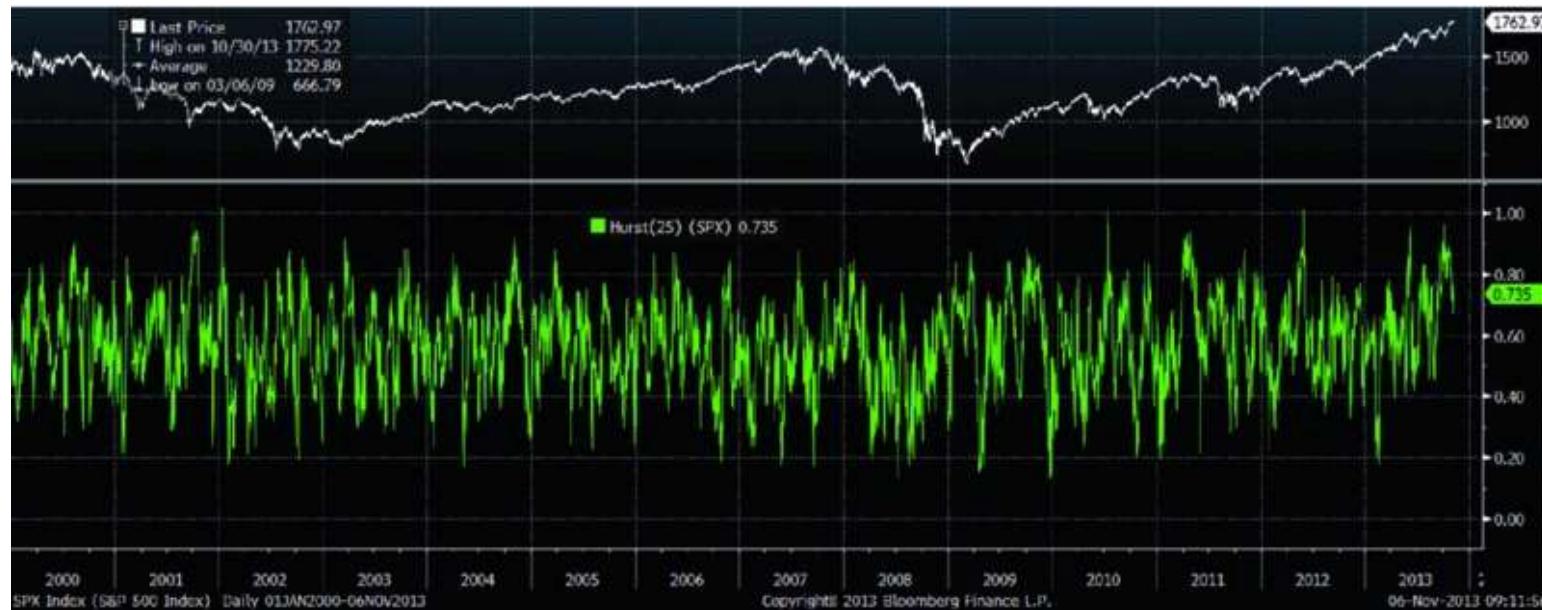


EXHIBIT 14.25 Bloomberg's Hurst Exponent Value for the S&P 500, 2000-2013

BLOOMBERG ALERTS FOR TECHNICAL STUDIES

Alerts: ALRT<Enter>: The ALRT screen monitors up to 3,000 security alerts on prices, recommendations, corporate actions and filings, ratings changes, earnings, economic events, and the like. For technical analysis, you can set alerts on a number of indicators. Alerts can also be set on the G screen for a security you're analyzing.

BACKTESTING

Backtesting, BTST: BTST <Enter>: The BTST screen backtests a number of different technical studies and compares them to a naive buy-and-hold strategy. The tests are done on a daily basis for up to 5 years, a weekly basis for up to 25 years, and a monthly basis for up to 100 years.

Each technical study can be adjusted for respective buy, sell, short, and cover signals, including multiple actions at once. On BTST, click the pencil icon to bring up a box for setting the conditions of the test. For example, click the Simple Moving Average Icon; in the condition box, set the conditions, such as long when the closing price crosses the moving average line from below and short when it crosses the line from above.

See Bloomberg Web [Exhibit 14.5](#).

Web Site Information

For financial information on securities, market trends, and analysis, see the following:

- <http://bigcharts.marketwatch.com>
- www.Finance.Yahoo.com
- <http://www.hoovers.com>
- <http://www.bloomberg.com>
- <http://online.wsj.com/public/us>

Notes

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1. Charles Dow wrote the initial articles about price trends. After his death in 1902, William Hamilton became editor of the *Wall Street Journal* and developed the theory further. His work is explained in his book, *The Stock Market Barometer*, published in 1932. Later, Charles Rhea delineated the theory and gave it the name, "Dow Theory"—the title of his 1932 book.

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- 2.** In addition to the Dow Theory, another often-cited price trend is a *head-and-shoulders trend*. The trend has a left shoulder stage where the stock price is pushed up to a new peak before there is slowdown in volume. This is followed by a surge in buying that pushes prices to another new level before there is another slowdown in volume. This is followed by a modest rally that pushes prices up again, before retreating. The last stage is the right shoulder, in which prices fall below their support level.
-
- 3.** For example, suppose the market is one in which institutional block trades initially drive the trend, followed by smaller retail investors who provide the final increments in demand. For a bull market, the OBV would be increasing with the large block and institutional purchases but would start to increase at a decreasing rate when retail investors start to buy; finally, it would decrease when institutional investors begin to sell. In most cases, OBV changes before the price change. A technician would therefore read the slowing of the OBV measure when the market is increasing as a sign of an impending peak and might sell when he sees a divergence with the price still rising and the OBV decreasing. As noted previously, it may be that the last surge in volume in a bull run is large—speculative blow; in this case, the OBV would be increasing at an increasing rate before hitting its resistance level.
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- 4.** A behavior in which investors become risk averse when their wealth increases, and become risk seeking when their wealth decreases can be explained in terms of prospect theory. The premise of prospect theory is that utility depends on changes in wealth, not on the level of wealth.
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Bloomberg Exercises

1. Select a stock of interest and evaluate its price trends on Bloomberg's GP screen over a certain period of time (e.g., the most recent two years or the period before and after the financial crisis).
 1. On the GP screen, use the "Annotate" button on the gray toolbar at the top of the price chart to bring up the annotations palette. On the palette, select regression from the pointer box (top right corner of the palette), span the regression pointer over the time period of interest, and then click to create the regression band. Create several regression bands and study their beginning and end-

ing prices and regression slope. To obtain information in a band area, move your cursor to the band line to bring up an information box with price and regression information.

2. Select the peak and trough points on your graph and study the important news at those times. To find news, click the "News" button on the gray toolbar to bring up an orange vertical bar. Move the bar to a date of interest and then click to bring up a news box.
3. Examine some of the other drawing tools on the palette.
2. There have been two speculative-type bubbles over the last 20 years: the 1995–2000 Dot-Com bubble and the 2008 financial crisis. Using the GP graph, analyze the price trends of the Dow or S&P 500 around these periods.
 1. On the GP screen, select moving averages and identify points where the price lines cross the moving average lines.
 2. On the GP graph, select volume (dropdown box in right corner) and identify the volume at different breakout points.
 3. Create an autoregression band for the flat trends, downtrends, and uptrends. Click the "Annotate" button on the gray toolbar at the top of the price chart to bring up the annotations palette. On the palette, select regression from the pointer box (top right corner of the palette), span the regression pointer over the time period of interest and then click to create the regression band.
 4. Select primary reversal points on your graph and study the important news at those times. To find news, click the "News" button on the gray toolbar to bring up an orange vertical bar. Move the bar to a date of interest and then click to bring up a news box.
 5. Save your graph to the G screen from the "Save as" tab.
3. On the Custom Chart Screen, you can create and customize charts representing different relationships. Use the Spread Chart screen to create a relative-strength ratio for a stock of interest: G <Enter>; click "Create Charts"; select "Spread Charts" and click next; in the Chart Wizard box, input your stock and market index (e.g., S&P 500, SPX), select ratio in the dropdown box, select time period, and then click finish. To save your graph to the G screen, click "Chart Library" in the "Actions" tab.

4. Bollinger bands are formed by creating lines that are two standard normal deviations above and below a 20-day or 30-day moving average. The usefulness of the bands is that the price of a security should remain within the bands 95 percent of the time, provided the underlying variability does not change significantly. Create Bollinger bands for a stock or index of interest and a time period of interest. To bring up a Bollinger screen for a loaded stock or index, enter: Boll <Enter>. On the Bollinger screen, change the standard normal deviation from 2 to a lower deviation (e.g., 1.5 or 1) to see if the stock breaks away from its support or resistance. Lengthen and shorten the moving average from 30 days to see if there are any breakouts.

5. Point-and-figure charts show only significant price changes, irrespective of the timing. The charts are set up to record significant price changes (e.g., 2 or 3 points) and indicate reversals. Point-and-figure charts that are horizontal would be considered trendless; those that are vertical and above the starting price would be an uptrend; those that are vertical and below the starting price would be a downtrend. Breakouts would occur when the chart moves up or down after a trendless period. On Bloomberg's Point-and-Figure Chart (PFP: PFP <Enter> for a loaded security), the "Box" size refers to the price scale (automatic or customized), and the "Reversal" is equal to a multiple of the box size and determines when you move to a new column. If the box size is 1 and the reversal is 2, then the price would have to move against the trend by 2 points to move to the next column. The numbers 1-9 and the letters A, B, and C on the PFP screen represent the months January through September and October through December.

Use the Bloomberg point-and-figure chart screen to evaluate the price trends of a stock or index of interest. For a loaded stock, type PFP and click <Enter>. Experiment with the PFP screen by changing the size of box and reversal multiplier.

6. Volume information can be used to better define the price trend. Typically, increasing volume and increasing price is a strong uptrend; increasing volume and falling price is a strong downtrend; decreasing volume and increasing price is a weak rally, and decreasing volume and decreasing price is a weak pullback. Select a stock or index of interest and a time period of interest and examine its price and

volume to determine the strength or weakness of a trend. In examining price trends and volume, use the following screens.

1. GP screen with the volume panel.
2. Volume-at-time (VAT) screen: This screen shows prices, along with trading volume, a moving average of volume, and the difference between volume and the average. You can select the number of days back to determine the moving average. To bring up the VAT screen for a loaded stock or index, type VAT.
7. When a strong buying surge pushes the price of a stock or index past its resistance level on heavy volume, then one could reasonably deduct that there is bullish information that will push the price further to a new resistance level. By contrast, if a price decrease surges past the support level on heavy volume, it is a strong sell signal. Select a stock or index of interest and a time period of interest and examine the volume patterns at breakout points (GPO MAENV). In retrospect, are the breakout signals correct? Study the important news around a breakout point by clicking the "News" button on the gray toolbar to bring up an orange vertical bar. Move the bar to dates around the breakouts and then click to bring up a news box.
8. There are different types of volume measure, as well as technical studies that use volume. Volume screens used for studies can be accessed from Bloomberg's "Technical Study Browser" screen found on the Graph home page (Graph <Enter>) or directly by typing TECH: TECH <Enter> and then typing "volume" in the find box. Use the Technical Browser screen to identify the different types of volume studies. To bring up a particular screen, press the launch tab.
9. Technicians identify a possible price trend reversal whenever a price line breaks its moving average line; for instance, a reversal of a declining trend would be when prices start increasing such that the price line breaks through the moving average line from below. Moving averages can vary by length (30 days or 200 days) and periodicity (day or week). Use Bloomberg's moving average screen to create a moving average for a stock or index and a time period of interest. For a loaded stock or index,

type GPO MA or use the GPMA screen (type GPMA). Once created, identify trends and reversals by comparing the price and moving average lines.

10. Moving average bands are used to identify resistance and support levels and to confirm a price reversal. Using Bloomberg's moving average envelope screen for a stock or index of interest, create a moving average band or envelope for a time period of interest and identify any breakouts from the band. To bring up the screen for a loaded stock or index, type GPO MAENV. Once created, look for trends and reversals. You may want to save your graph to the G screen; to do so, click the "Save as" tab.
11. There are different types of moving averages, such as simple, weighted, triangular, and exponential, as well as different technical studies that use moving averages. Moving average screens used for studies can be accessed from Bloomberg's "Technical Study Browser" screen found on the Graph home page (Graph <Enter>) or directly by typing TECH: TECH <Enter> and typing "moving average" in the find box. Use the Technical Browser screen to identify the different types of moving averages and moving average studies. To bring up a particular screen, click launch.
12. Breadth of the market, uptick-to-downtick index, and the CBOE put/call ratio are technical measurements used to gauge the strength or weakness of the overall market. Do an in-depth technical analysis of the overall market (use S&P 500 or Dow) for a period of interest that includes the moving average bands and volume, as well as the breadth, upticks-to-downticks ratio, and put/call volume measures. Possible Bloomberg screens to include are the following:
 1. Bands, Moving-Average Envelopes Screen: For loaded index, type GPO MAENV.
 2. Volume: Volume-at-Time Screen: For loaded index, type VAT.
 3. Advance minus Decline: For loaded index, type GPO ADL.
 4. CBOE Put/Call Ratio Screen: PCUSEQTR <Index>; GP.
 5. Uptick-to-Downtick Index Price Graph Screen: For S&P 500: TIKX <Index>; GP; for Dow: TIKI <Index>; GP.

Note: You may want to save these screens to the G screen so that you can apply them to other indexes, exchange rates, and the like.

13. Relative strength, the Erlanger put/call ratio, and the short-interest ratio are technical measures used to gauge the strength or weakness of a stock's price trend. Do an in-depth technical analysis of a stock of interest for a time period of interest that includes the stock's moving average band and volume, as well as the relative strength, put/call volume, and short-interest measures. Possible Bloomberg screens to include the following:

1. Bands, Moving-Average Envelopes Screen: For a loaded stock, type GPO MAENV. You may want to save your moving average envelope screen to the G Screen.
2. Volume: Volume-at-Time Screen: For a loaded stock, type VAT.
3. Erlanger Put/Call Ratio Screen: For loaded stock, type GPO ERPCR.
4. Short-Interest Screen: For loaded stock, type SI.
5. Relative Strength Ratio: Create the ratio of the price of the stock to the index using the G Screen: G <Enter>; click "Create Charts"; select Spread Charts," and click next; in the Chart Wizard box, input your stock and market index (e.g., S&P 500, SPX), select ratio in the dropdown box, select time period, and then click finish. Note: If you completed Exercise 3, you may already have this chart on your G screen. If not, you may want to save the screen in the G Screen.

14. Technical analysis can be applied to study trends and breakouts for other exchanges, indexes, currencies, commodity prices, and portfolios. Select an index representing a foreign stock market or an exchange rate and construct a moving average band for a time period of interest. For a moving-average envelope for a loaded index or currency, type GPO MAENV. See if there are reversal and confirmation signals.

15. Technical analysis when used in conjunction with fundamental analysis provides a more complete picture of the stock or market. Portfolio managers and security analysts use various technical metrics to identify new stocks and to monitor their existing holdings.

1. Select a portfolio you have created in PRTU and create an index of the portfolio using CIXB. From the index menu for your portfolio, construct a moving average band (type GPO MAENV). See how your portfolio is currently trending.

2. Evaluate several of the stocks in your portfolio in terms of their relative strength. If you saved your relative strength screen to the G screen, use that screen to evaluate the relative strength of your stocks (see Exercise 13.e above).
 3. Evaluate several of the stocks in your portfolio in terms of their price trends within their moving average bands (type GPO MAENV). Save your MAENV screen to the G screen so that you can evaluate other stocks.
 4. Evaluate several of the stocks in your portfolio in terms of the Erlanger put/call ratio (GPO ERPCR) and the short-interest ratio (SI).
 5. Consider creating a Launchpad for your portfolio consisting of some of these technical measures as monitors. On your Launchpad, include some intraday graphs: BLP <Enter>; on the toolbar create a new view; on your other Bloomberg screens, use the Export dropdown (upper right corner) to export the screen to Launchpad.
 6. Consider setting up alerts for some of your stocks or all of your stocks using the Bloomberg ALRT screen: ALRT <Enter>.
16. Use Bloomberg's Backtest screen (BTST <Enter>) to back test a simple moving average trading strategy on a stock or index of interest. For example, set up a rule to buy when the stock cuts its moving average from below and sell or short when the stock cuts its moving average from above. On the BTST screen, click the Simple Moving Average's "Edit strategy icon" (pencil icon) to bring up a box for setting the conditions for your trade.
17. The chart homepage has five information and chart areas: Custom charts, sample G charts, Chart Resource section, and Chart of the Day. Explore some of the information on this homepage: CHART <Enter>.
18. Bloomberg's Hurst screen (GPO KAOS) is based on the work of Christopher May, who applied the Hurst exponent to nonlinear price patterns. Bloomberg's Hurst Exponent screen can be used to test for randomness. If a price trend is random, the Hurst coefficient would continuously have a value close to 0.5. If not, then there is pattern to the stock price movement. Use the Hurst screen to test

whether the price patterns of some of the stocks or indexes that you have used in some of the exercises in this chapter are truly random.