Charting

From Perry J. Kaufman, *Trading Systems and Methods + Website,* 5th Edition (Hoboken, New Jersey: John Wiley & Sons, 2013), Chapter 3.

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Learning Objective Statements

- Explain the six basic tenants of Dow Theory
- Interpret a chart data using various chart types (line, bar, candle, etc)
- Classify a given trend as primary, secondary, or minor fluctuations
- Analyze breakout signals for use in forecasting
- Recognize evidence for improving confidence in breakout signals
- Compare and explain trend signals over multiple time frames
- Draw valid trend lines
- Interpret the significance of trend line breaks

It is very likely that all trading systems began with a price chart, and we come back to a chart whenever we want a clear view of where the market is going. Nowhere can a picture be more valuable than in price forecasting. Elaborate theories and complex formulas may ultimately be successful, but the loss of perspective is easily corrected with a simple chart. We should remember the investor who, anxious after a long technical presentation by a research analyst, could only blurt out, "But is it going up or down?" Even with the most sophisticated market strategies, the past buy and sell signals should be seen on a chart. The appearance of an odd trade can save you a lot of aggravation and money.

Through the mid-1980s technical analysis was considered only as chart interpretation. In the equities industry, that perception is still strong. Most traders begin as chartists, and many return to it or use it even while using other methods. William L. Jiler, a great trader and founder of Commodity Research Bureau, wrote:

> One of the most significant and intriguing concepts derived from intensive chart studies by this writer is that of characterization, or habit. Generally speaking, charts of the same commodity tend to have similar pattern sequences which may be different from those of another commodity. In other words, charts of one particular commodity may appear to have an identity or a character peculiar to that commodity. For example, cotton charts display many round tops and bottoms, and even a series of these

> constructions, which are seldom observed in soybeans and wheat. The examination of soybean charts over the years reveals that triangles are especially favored. Head and shoulders formations abound throughout the wheat charts. All commodities seem to favor certain behavior patterns.[1]

In addition to Jiler's observation, the cattle futures market is recognized as also having the unusual occurrence of "V" bottoms. Until recently, both the silver and pork belly markets have tendencies to look very similar, with long periods of sideways movement and short-lived but violent *price shocks,* where prices leap rather than trend to a new level. The financial markets have equally unique personalities. The S&P traditionally makes new highs, then immediately falls back; it has fast, short-lived drops and slower, steadier gains. Currencies show intermediate trends bounded by noticeable major stopping levels while interest rates and bonds have long-term trends.

Charting remains the most popular and practical form for evaluating price movement, and numerous works have been written on methods of interpretation. This chapter will summarize some of the accepted approaches to charting and the trading rules normally associated with these patterns. Some conclusions are drawn as to what is most likely to work and why.

Finding Consistent Patterns

A price chart is often considered a representation of human behavior. The goal of any chart analyst is to find consistent, reliable, and logical patterns that can be used to predict price movement. In the classic approaches to charting, there are consolidations, trend channels, top-and-bottom formations, and a multitude of other patterns that are created by the repeated action of large groups of people in similar circumstances or with similar objectives. The most important of all the chart patterns is the *trendline*.

Only recently have computer programs been able to interpret chart patterns; and only one book, Bulkowski's *Encyclopedia of Chart Patterns*[2] has managed to show a comprehensive analysis of chart formations. In all fairness, there can be numerous valid interpretations of the same chart. In order to identify a chart price formation, it is first necessary to select the data frequency (for example, daily or weekly), then the starting date and a time horizon (long-term or short-term), before a chart interpretation can begin. Given the wide range of choices, it should be surprising that any two analysts see the same patterns at the same time.

Chart analyses, frequently published in magazines, may themselves be the cause of the repeated patterns. Novice speculators approach the problem with great enthusiasm and often some rigidity in an effort to follow the rules. They will sell double and triple tops, buy breakouts, and generally do everything to propagate the survival of standard chart formations. Because of their following, it is wise to know the most popular techniques, if only as a defensive measure.

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[1] William L. Jiler, "How Charts Are Used in Commodity Price Forecasting," *Commodity Research Publications* (New York, 1977).

[2] Thomas N. Bulkowski, *Encyclopedia of Chart Patterns* (New York: John Wiley & Sons, 2000).

What Causes Chart Patterns?

Speculators have many habits, which, taken in large numbers, cause recognizable chart patterns. The typical screen trader (not on the exchange floor), or an investor placing his or her own orders, will usually choose an even number—for example, buy Microsoft at $26.00, rather than at $26.15. If even dollar values are not used, then 50¢ and 25¢ are the next most likely increments, in that order. And, as the share prices get higher, the increments get farther apart. With Berkshire Hathaway (BKA) trading at $125,000 per share, placing an order at a $10 increment would seem very precise. In futures trading, the same is true. There are far more orders placed in the S&P Index at 1310.00 than at 1306.50, or 10-year Treasury notes at $115\frac{16}{32}$ instead of $115\frac{19}{32}$.

The public is also said to always enter into the bull markets at the wrong time. When the television financial news, syndicated newspapers, and radio carry stories of dangerously low oil supplies, a new cancer treatment drug, or the devastation of the nation's wheat crop, the infrequent speculator enters in what W. D. Gann calls the *grand rush,* causing the final runaway move before the collapse or the final sell-off before the rally; this behavior is easily identifiable on a chart. Gann also talks of *lost motion,* the effect of momentum that carries prices slightly past its goal. Professional traders recognize that a fast, volatile price may move as much as 10% farther than its objective. A downward swing in the U.S. dollar/Japanese yen from par at 1.0000 to a support level of 0.8000 could overshoot the bottom by 0.0100 without being considered significant.

The behavioral aspects of prices appear rational. In the great bull markets, the repeated price patterns and divergence from chance movement are indications of the effects of mass psychology. The classic source of information on this topic is Mackay's *Extraordinary Popular Delusions and the Madness of Crowds* originally published in 1841.[3] In the preface to the 1852 edition the author says:

> We find that whole communities suddenly fix their minds on one object, and go mad in its pursuit; that millions of people become simultaneously impressed with one delusion. . . .

In 1975, sugar was being rationed in supermarkets at the highest price ever known, 50¢ per pound. The public was so concerned that there would not be enough at any price that they bought and horded as much as possible. This extreme case of public demand coincided with the price peak, and shortly afterwards the public found itself with an abundant supply of high-priced sugar in a rapidly declining market. The world stock markets are often the target of acts of mass psychology. While U.S. traders watched at a distance the collapse of the Japanese stock market from its heights of 38,957 at the end of December 1989 to its lows of 7,750 in 2003, a drop of 80%, they were able to experience their own *South Sea Bubble* when the NASDAQ 100 fell 83.5% from its highs of 4,816 in March 2000 to 795 in October 2002. And, while the subprime crisis has taken years to play out, the

[3] Reprinted in 1995 by John Wiley & Sons.

unparalleled drop in value of nearly all investments at the same time, September 2008, was clearly an act of investor panic. Prices seem to drop suddenly at the time when buyers are most confident, then start the long climb up again. It should not be difficult to understand why contrary thinking has developed a strong following.

Charting is a broad topic to be studied in detail; the chart paper itself and its scaling are sources of controversy. A standard bar chart (or line chart) representing highs and lows can be plotted for daily, weekly, or monthly intervals in order to smooth out the price movement over time. Bar charts have been drawn on semilog and exponential scales,[4] where the significance of greater volatility at higher price levels is put into proportion with the quieter movement in the low ranges by using percentage changes. Each variation gives the chartist a unique representation of price action. The shape of the chart box and its ratio of height/width will alter interpretations that are based on angles. Standard charting techniques may draw trendlines at 45° or 30° angles across the chart; therefore, expanding or compressing a chart on a screen will change the angles. This chapter uses traditional daily price charts and square boxes.

It may be a concern to today's chartist that the principles and rules that govern chart interpretation were based on the early stock market, using averages instead of individual stocks or futures contracts. This is discussed in the next section. For now, refer to Edwards and Magee, who removed this problem by stating that "anything whose market value is determined solely by the free interplay of supply and demand" will form the same graphic representation. They continued to say that the aims and psychology of speculators in either a stock or commodity environment would be essentially the same, that the effect of postwar government regulations have caused a "more orderly" market in which these same charting techniques can be used.[5]

What Causes the Major Price Moves and Trends?

Prices can move higher for many months or even years, creating a *bull market*. They can also move down, creating a *bear market*. Although price moves can be as short as a few minutes or as long as decades (as happened with interest rates and gold), it is how each chartist defines a "trend" that is most important. Once recognized, the price trend forms a bias for trading decisions that can make the difference between success and failure. The long-term direction of prices is driven by four primary factors:

1. *Government policy.* When economic policy targets a growth rate of 4%, and the current growth rate is 1%, the Federal Reserve (the "Fed" or any central bank) lowers interest rates to encourage growth. Lowering rates stimulates business activity. The Fed raises interest rates and dampens economic activity to control inflation. Changing interest rates has a profound impact on the flow of investment money between countries, on international trade, on the value of currencies, and on business activity.

[4] R.W. Schabacker, *Stock Market Theory and Practice*, Forbes (New York, 1930), 595–600.

[5] Robert D. Edwards and John Magee, *Technical Analysis of Stock Trends* (Springfield, MA: John Magee, 1948), Chapter 16.

2. *International trade*. When the United States imports goods, it pays for it in dollars. That is the same as *selling* the dollar. It weakens the currency. A country that continually imports more than it exports increases its trade deficit and weakens its currency. A country that increases its exports strengthens its currency and its economy.
3. *Expectation*. If investors think that stock prices will rise, they buy, causing prices to rise. Expectations can lead an economic recovery although there is no statistical data to support a recovery. *Consumer confidence* is a good measure of how the public feels about spending. The economy is active when consumer confidence is high. A lack of public confidence following the subprime collapse dampened all economic activity and delayed the recovery for years.
4. *Supply and demand*. A shortage, or anticipated shortage, of any product causes its price to rise. An oversupply of a product results in declining prices. These trends develop as news makes the public aware of the situation. A shortage of a product that cannot be replaced causes a prolonged effect on its price, although the jump to a higher price may happen quickly.

The Bar Chart and Its Interpretation by Charles Dow

The *bar chart*, also called the *line chart,* became known through the theories of Charles H. Dow, who expressed them in the editorials of the *Wall Street Journal.* Dow first formulated his ideas in 1897 when he created the stock averages in order to have a more consistent measure of price movement for stock groups. After Dow's death in 1902, William P. Hamilton succeeded him and continued the development of his work into the theory that is known today. Those who have used charts extensively and understand their weak and strong points might be interested in just how far our acceptance has come. In the 1920s, a New York newspaper was reported to have written:

> One leading banker deplores the growing use of charts by professional stock traders and customers' men, who, he says, are causing unwarranted market declines by purely mechanical interpretation of a meaningless set of lines. It is impossible, he contends, to figure values by plotting prices actually based on supply and demand; but, he adds, if too many persons play with the same set of charts, they tend to create the very unbalanced supply and demand which upsets market trends. In his opinion, all charts should be confiscated, piled at the intersection of Broad and Wall and burned with much shouting and rejoicing.[6]

This attitude seems remarkably similar to the comments about program trading that followed the stock market plunge in October 1987, where it was condemned as the cause of the crash. In 2011 we again had comments about high frequency trading "manipulating" the markets, and in Europe they have banned short sales to stem

[6] Richard D. Wyckoff, *Stock Market Technique, Number One* (New York: Wyckoff, 1933), 105.

volatility in the equity index markets. Of course, volatility continued to be high, but liquidity dropped. It's politics, not logic.

Charting has become an integral part of trading. The earliest authoritative works on chart analysis are long out of print, but the essential material has been recounted in newer publications. If, however, a copy should cross your path, read the original *Dow Theory* by Robert Rhea;[7] most of all, read Richard W. Schabacker's outstanding work *Stock Market Theory and Practice*, which is probably the basis for most subsequent texts on the use of the stock market for investment or speculation. The most available book that is both comprehensive and well written is *Technical Analysis of Stock Trends* by Edwards and Magee, now in its ninth edition.[8] It is focused on chart analysis with related management implications and a small section on commodities. For the reader who prefers concise information with few examples, the monograph by W. L. Jiler, *Forecasting Commodity Prices with Vertical Line Charts,* and a complementary piece, *Volume and Open Interest: A Key to Commodity Price Forecasting,* can still be found.[9] Two more recent publications that are widely read are John Murphy's *Technical Analysis of the Financial Markets* and Jack Schwager's *Schwager on Futures: Technical Analysis*, part of a two-volume set.

The Dow Theory

The Dow Theory[10] is still the foundation of chart interpretation and applies equally to stocks, financial markets, commodities, and the wide variety of investment vehicles used to trade them. It is part investor psychology supported by chart analysis. It is impressive that it has withstood the tests of more than 100 years. Charles Dow was the first to create an index of similar stocks—the Industrials and the Railroads, although today's components are very different from those in 1897. The purpose of the index was to smooth out erratic price movement and find consistency by combining less active stocks. Thin trading causes unreliable price patterns.

Dow's work can be viewed in two parts: his theory of price movement and his method of implementation. Both are inseparable to its success. Dow determined that the stock market moved as the ocean, in three waves, called *primary, secondary,* and *daily fluctuations.* The major advances and declines, lasting for extended periods, were compared to the tides. These tides were subject to secondary reactions called *waves,* and the waves were comprised of *ripples.* Readers familiar with other charting methods will recognize these patterns as the foundation of Elliott Wave analysis. In 1897,

[7] Arthur Sklarew, *Techniques of a Professional Chart Analyst* (Commodity Research Bureau, 1980).

[8] Robert D. Edwards and John Magee, *Technical Analysis of Stock Trends*, 9th ed. (Snowball Publishing, 2010).

[9] Two other works worth studying are Gerald Appel, *Winning Market Systems: 83 Ways to Beat the Market* (Great Neck, NY: Signalert, 1974); and Gerald Appel and Martin E. Zweig, *New Directions in Technical Analysis* (Great Neck, NY: Signalert, 1976).

[10] The rules of the Dow Theory in this section are based on a fine article by Ralph Acampora and Rosemarie Pavlick, "A Dow Theory Update," originally published in the *MTA Journal* (January 1978, reprinted in the *MTA Journal*, Fall–Winter 2001). Other parts of this section are drawn from Kaufman, *A Short Course in Technical Trading* (Hoboken, NJ: John Wiley & Sons, 2003).

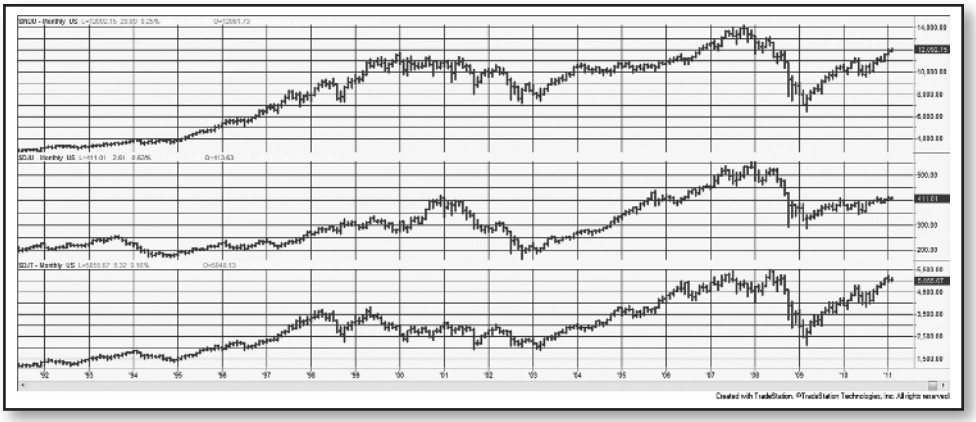

FIGURE 1.1 Dow Industrial, Utilities, and Transportation Indexes, 1991–2010. Dow originally created the industrial and railway averages to hide the large, erratic price moves caused by price manipulation and lack of liquidity. Dow Theory has been adapted to use the current versions of the major indexes, the Industrials (top panel), the Utilities (center panel), and the Transportation Index (bottom panel). Although these indexes represent different aspects of the economy, they have become highly correlated.

Dow published two sets of averages in the *Wall Street Journal*, the *Industrials* and the *Railroads,* in order to advance his ideas. These are now the *Dow Jones Industrial Average* and the *Transportation Index.* Figure 1.1 shows more than 20 years of history for the three most important averages the Industrials, the Transportation, and the Utilities.

The Basic Tenets of the Dow Theory

There are six fundamental principles of the Dow Theory that fully explain its operation.

1. The Averages Discount Everything (except "acts of God") At the turn of the twentieth century there was considerably less liquidity and regulation in the market; therefore, manipulation was common. By creating averages, Dow could reduce the frequency of "unusual" moves in a single stock, that is, those moves that seemed unreasonably large or out of character with the rest of the market. Dow's Industrials average the share value of 30 companies (adjusted for splits); therefore, an odd move in one of those prices would only be $\frac{1}{30}$ of the total, reducing its importance so that it would not distort the results. The average also represented far greater combined liquidity than a single stock. The only large moves that would appear on a chart of the average price were price shocks, or "acts of God."

2. Classifications of Trends There are three classifications of trends: primary trends, secondary swings, and minor day-to-day fluctuations. The primary trend, also called the *wave,* is the trend on a grand scale. When there is a wave of rising prices we have a *bull market*; when prices are declining there is a *bear market*. A wave is a major move over an extended period of time, generally measured in years. A clear bull market can be seen in the previous Dow charts (Figure 1.1) throughout all of the 1990s ending at the beginning of 2000, and again from 2003 through mid-2007.

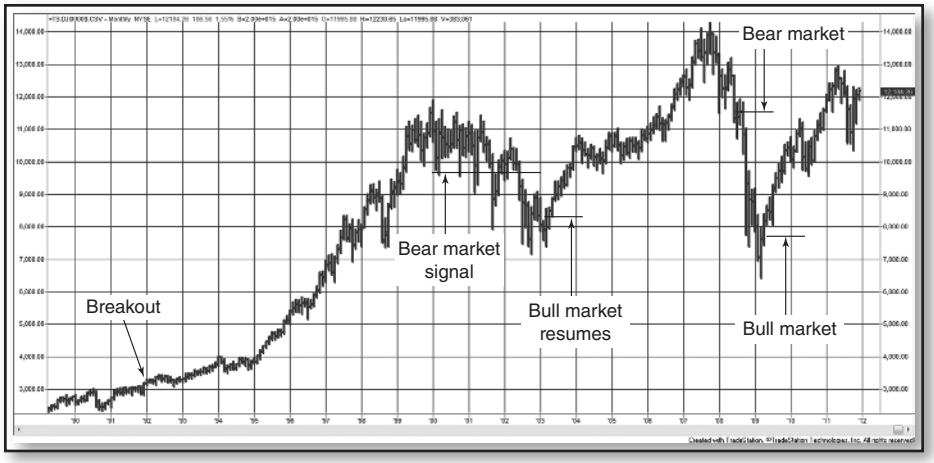

FIGURE 1.2 Bull and Bear Market Signals Are Traditional Breakout Signals, but on a Larger Scale.

Bull and Bear Market Formation (for Monthly or Weekly Prices)

The beginning of a bull or bear market is determined using a *breakout signal*, shown in Figure 1.2, based on large swings in the index value. The *bull market signal* occurs at the point where prices confirm the uptrend by moving above the high of the previous rally. The *bear market signal* occurs on a break below the low of the previous decline.

It is commonly accepted that a bull or bear market begins when prices reverse 20% from their lows or highs. In order to get an upwards breakout signal needed for a new bull market, we want to look at support and resistance levels (the previous intermediate high and low prices) separated by approximately a 10% price move based on the index value. This type of signal is called *swing trading.* At the top of Figure 1.2 the horizontal broken line should occur at about 20% below the absolute price highs, and the second peak should be approximately 10% higher than the previous swing low.

It is interesting to note that both bull and bear markets start with a price reversal of 20%. But 20% from the highs can be much greater than 20% from the lows. For example, in the sell-off in September 2008, the S&P was measured from its high of about 14,000 in late 2007. A decline to 11,200, or 2,800 points, triggered the bear market. In the first quarter of 2009, the S&P reached its lows of about 6,500. A new bull market began at 7,800, a rally of only 1,300 points. Thus the number of points needed to "officially" start a bull market was only 46% of the bear market trigger, showing a significant bias toward bull markets.

Bull and Bear Market Phases

In Dow Theory, the primary trends develop in three distinct phases, each characterized by investor action. These phases can be seen in the NASDAQ bull market of the late 1990s and the subsequent bear market (Figure 1.3).

The Bull Market

Phase 1: Accumulation. Cautious investors select only the safest and best-valued stocks to buy. They limit purchases to deeply discounted stocks at depressed

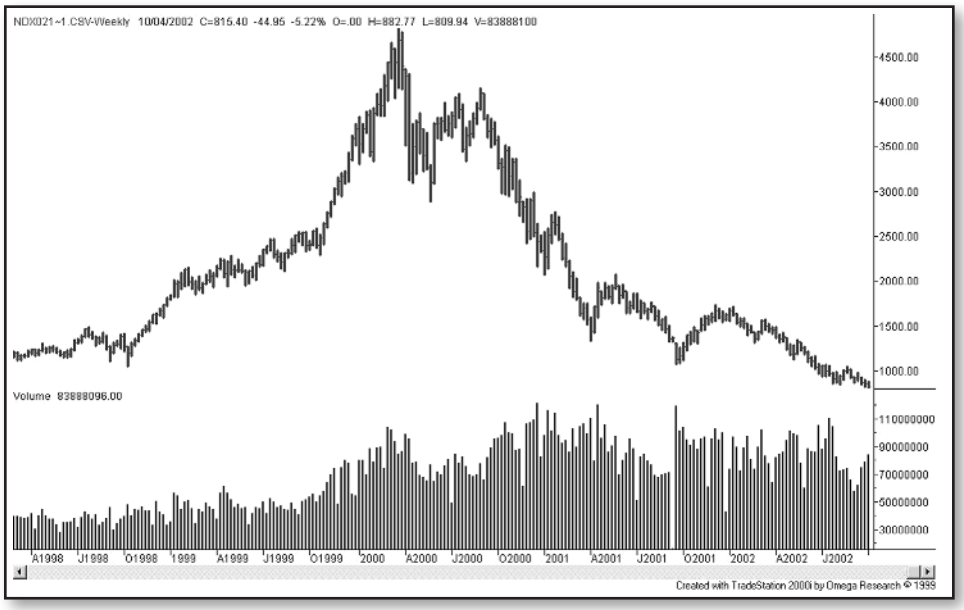

FIGURE 1.3 NASDAQ from April 1998 through June 2002. A clear example of a bull and bear market with a classic pattern of volume.

price levels and consider only primary services and industries, most often buying utilities and high yielding stocks.

Phase 2: Increasing volume. Greater investor participation causes increasing volume, rising prices, and an improving economic picture. A broader range of investors enters the market convinced that the market has seen its lowest prices. Secondary stocks become popular.

Phase 3: Final explosive move. Excessive speculation and an elated general population result in a final explosive move. Everyone is talking about the stock market; people who have never considered investing directly now enter the market. The public is convinced that profits will continue and buying becomes indiscriminate. Investors borrow to buy stocks. Value is unimportant because prices keep rising. Earnings and dividends are ignored.

The Bear Market

Phase 1: Distribution. Professionals begin selling while the public is in the final stages of buying. Stocks are distributed from stronger to weaker hands. The change of ownership is facilitated by less experienced investors who enter the bull market too late and pay what turn out to be unreasonably high prices.

Phase 2: Panic. Prices decline faster than at any time during the bull market and fail to rally. The news constantly talks about the end of the bull market. The public sees an urgency to liquidate. Investors who borrowed money to invest late in the bull market, trading on margin or leverage, now speed up the process. Some are forced to liquidate because their portfolio value has dropped below the critical point. The divesting of stocks takes on a sense of panic.

Phase 3: Lack of buying interest. The final phase in the sustained erosion of prices results from the lack of buying by the public. After taking losses, investors are not interested in buying even the strongest companies at extremely undervalued prices. All news is viewed as negative. Pessimism prevails. It is the summer of 2002.

Schabacker's Rules

Schabacker also had a simple guideline to identify the end of both a bull and a bear market.[11]

End of a Bull Market

1. Trading volume increases sharply.
2. Popular stocks advance significantly while some other companies collapse.
3. Interest rates are high.
4. Stocks become a popular topic of conversation.
5. Warnings about an overheated stock market appear on the news.

End of a Bear Market

1. Trading volume is low.
2. Commodity prices have declined.
3. Interest rates have declined.
4. Corporate earnings are low.
5. Stock prices have been steadily declining and bad news is everywhere.

Secondary Trends (Secondary Reactions Using Weekly or Daily Prices)

Secondary reactions are also called *corrections* or *recoveries* and can be identified using smaller swing values. Corrections in bull markets are attributed to the prudent investor taking profits. This profit phase can have an erratic start but is considered complete when prices rise above the previous secondary rally. The bull market is back in force when a new high occurs (see Figure 1.4), the point where a trader can enter a new long position. *Lines* may be substituted for secondary movements. In Dow Theory, a *line* is a sideways movement lasting from two to three weeks to months, trading in about a 5% range.

Characteristics of a Secondary Reaction

- There are a number of clear downswings.
- The movement is more rapid in the reversal (down during a bull market) than in the primary move.
- The reactions last from three weeks to three months.
- If the volume during the price drop is equal to or greater than the volume just prior to the decline, then a bear market is likely. If volume declines during the drop, then a reaction is confirmed.

[11] Adapted from James Maccaro, "The Early Chartists: Schabacker, Edwards, Magee," *Technical Analysis of Stocks & Commodities* (November 2002).

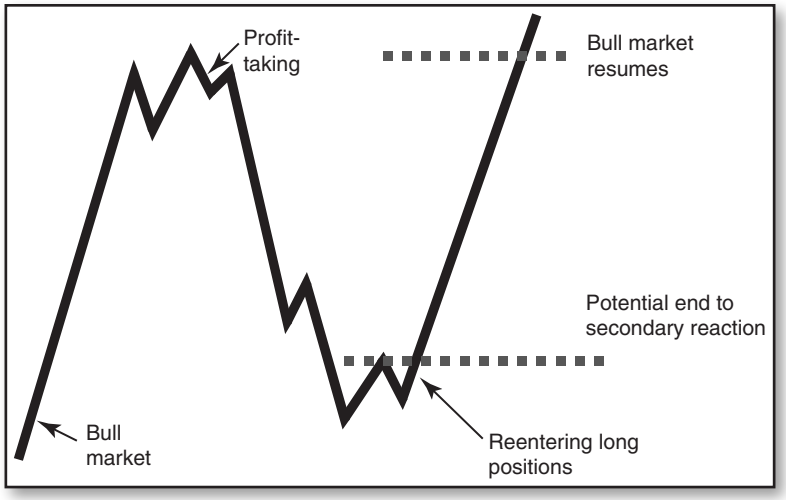

FIGURE 1.4 Secondary Trends and Reactions. A reaction is a smaller swing in prices that ends when a new high reinstates the bull market.

- The atmosphere surrounding the decline is important. If there is a lot of speculation, then a bear market may develop.

Minor Trends (Using Daily Prices)

In Dow Theory, minor trends are the only trends that can be manipulated. They are usually under six days in duration. Because they are considered market noise, not affecting the major price direction, they are seen as frequent up and down movements.

3. The Principle of Confirmation For a bull or bear market to exist, two of the three major averages (the Industrials, the Transportation, and the Utilities) must confirm the direction. When first created, the Dow Theory required the confirmation on only the Utilities and the Railroads. Although much has changed since Dow devised this rule, the purpose is to assure that the bull or bear market is a widespread economic phenomenon and not a narrower industry-related event.

4. Volume Goes with the Trend Volume confirms the price move. Volume must increase as the trend develops, whether it is a bull or bear market. It is greatest at the peak of a bull market or during the panic phase of a bear market.

5. Only Closing Prices Are Used Dow had a strong belief that the closing price each day was the most important price. It was the point of evening-up. Not only do day traders liquidate all of their positions before the close of trading, reversing their earlier impact, but many investors and hedge funds execute at the close. Although liquidity was a problem during Dow's time, even actively traded stocks in today's market show increased price swings when a larger order is executed during a quiet period. There is always high volume at the close of trading, when investors with short and long time frames come together to decide the fair price.

Some traders believe that there is no closing price anymore, given the access to 24-hour trading; however, that is not yet true. Every market has a settlement price. This is usually at the end of the primary trading session (previously the *pit* or *open outcry session*). The settlement price is necessary to reconcile all accounts, post profits and losses, and trigger needed margin calls. Banks could not operate without an official closing time and settlement price.

6. The Trend Persists *A trend should be assumed to continue in effect until its reversal has been signaled.* This rule forms the basis of all trend-following principles. It considers the trend as a long-term price move, and positions are entered only in the trend direction. The Dow Theory does not express expectations of how long a trend will continue. It simply follows the trend until a signal occurs that indicates a change of direction.

Interpreting Today's S&P Using Dow Theory

After 110 years, can the Dow Theory correctly interpret the major market index, the S&P? Figure 1.5 shows the S&P 500, using continuous, back-adjusted futures prices, from 1994 through the middle of 2003. The sustained bull market that began in 1987, or possibly 1984, peaks near the end of the first quarter of 2000. There is a steady increase in volume, as Dow had foreseen, although volume does not peak at the top of the market—it starts to decline noticeably about three months before the top. We will see in the study of volume that volume spikes occur at extremes, but a longer-term volume confirmation is very important. Declining volume at the beginning of 2000 signals a divergence in sentiment that foretells the end of the bull market. Volatility increases as prices move towards the end of the uptrend, another predictable pattern. The price move from 1994 through the peak in 2000 shows both Phase 2 and Phase 3 of the bull market.

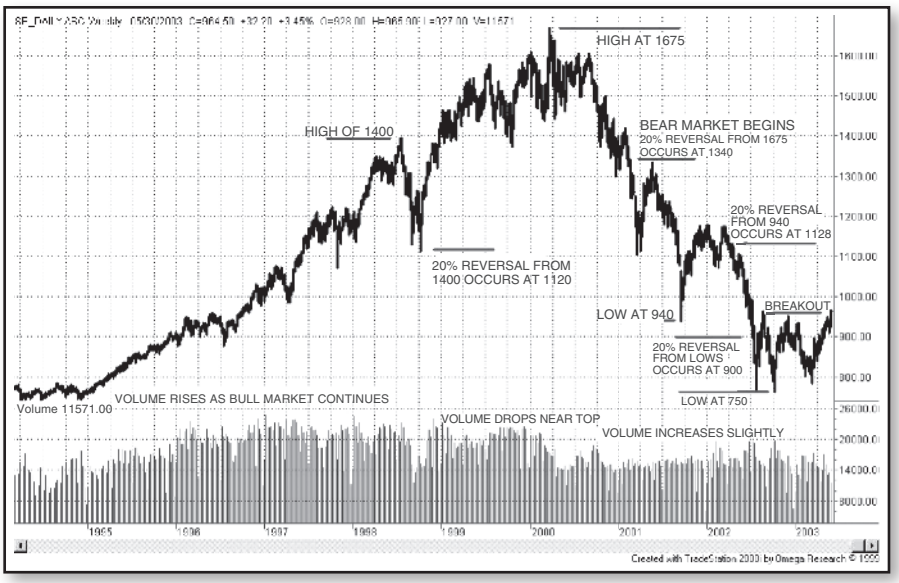

FIGURE 1.5 Dow Theory Applied to the S&P. Most of Dow's principles apply to the current marketplace, but some experience and interpretation is necessary.

The price decline in the third quarter of 1998 addresses the issue: Are there exceptions to the 20% rule that changes a bull market to a bear market? A 20% drop from a high of 1400 is 1120, very close to the point where prices stopped their decline and reversed. Dow never used the number 20%, and analysts would claim that, because of the speed of the decline and the quick recovery, this was not a bear market signal. Some of these decisions require judgment, some experience, and just a little bit of hindsight. Realistically, we cannot expect every Dow signal to always be correct, just as we cannot expect to be profitable on every trade. Long-term success is the real goal.

Transition from Bull to Bear in the S&P Looking again for a 20% reversal from the S&P highs of 1675, we target the price of 1340. This time, volume has declined into the highs and continues to decline quickly. From the second quarter of 2000 through the first quarter of 2001 prices fall sharply, giving back the gains from mid-1997, nearly three years. When prices break below 1300 they confirm the previous low at the end of 2000, making it clear that a bear market is underway.

During the subsequent decline, prices attempted to rally. There are four cases of a sharp "V" bottom followed by a significant move higher. After the low at 940 at the end of September 2001, prices move to about 1180, above the 20% reversal of 1128. However, after the first reversal to 1075 prices fail to move back above the highs, finally breaking below 1180 and continuing on to make new lows. Although the recovery exceeded 20%, the lack of a confirming breakout can be interpreted as a bull market failure. Not every pattern falls neatly into a rule.

We come to the last year of the S&P chart, where prices have resisted going below 750, and now appear to be moving above the level of 970 and about to confirm a bullish breakout. Is it the end of the bear market? Volume was the highest at the two lowest price spikes, and then declined. Many stocks are undervalued, according to experts, yet those same experts see no reason for the market to rally further because the recent rise has already reflected reasonable expectations for profits and growth in the next year. Who would be correct, Charles Dow or the talking heads of the financial news networks? It was Dow.

Dow Theory and Futures Markets

The principles of the Dow Theory are simple to understand. Major price moves are most important when they are confirmed by volume. They follow a pattern created by investor action that seems to be universal when seen from a distance. In order to implement his theory, Dow created an index that minimized the erratic moves in individual stocks due to lack of liquidity and price manipulation.

The primary features of the Dow Theory should hold for any highly liquid, actively traded market. This applies to index futures and most financial futures markets, as well as foreign exchange, which have enormous volume and reflect major economic trends. Because of the variety of products traded as futures and ETFs, an investor may be able to apply Dow's principle of confirmation using any two related financial markets, such as the S&P Index, 10-year Treasury notes, or the U.S. dollar index, in the same way that the Industrials, Utilities, and Transportation indexes were used for stocks. A strong

economic trend often begins with interest rate policy and has a direct impact on the value of the currency, and a secondary effect on the stock market. Stock prices can be stimulated by lower rates or dampened by raising rates; therefore, confirmation from these three sectors is reasonable. When trading in futures, the nearby contract (the one closest to delivery) is most often used; however, the total volume of all futures contracts traded for each market must be used rather than volume for a single contract.

Chart Formations

While Dow Theory is a macro view of price movement, more often chart analysis deals with much shorter time periods. Most traders hold positions from a few days to a few weeks; however, they apply the same patterns to both shorter or longer intervals.

Chart analysis uses straight lines and geometric formations on price charts. It analyzes volume only in the most general terms of advancing and declining phases. Chart patterns can be classified into the broad groups of:

- Trendlines and channels
- One-day patterns
- Continuation patterns
- Accumulation and distribution (tops and bottoms)
- Retracements
- Other patterns

Of these, the most important is the *trendline*.

The Trend in Retrospect

It is easier to see the trend on a chart after it has occurred. Trying to identify the trend as it is developing is much more difficult. The monthly chart in Figure 1.6 shows a sustained upwards trend, but there is a slowing of that trend toward the end. Will the upward trend continue? Will prices begin a downward trend? Will they move sideways? The purpose of charting is to apply tools that provide the best chance of identifying the future direction of prices. If wrong, these tools also control the size of the loss.

The time interval is a key element when identifying a trend. Weekly and monthly charts show the major trends more clearly than daily charts. Longer-term charts remove much of the noise that interferes with seeing the bigger picture. Many chartists start by evaluating a weekly or monthly chart, then apply the lines and values developed on those charts to a daily chart. The weekly chart provides direction or biases the direction of trades while the daily chart, or even a 15-minute chart, is used for timing entries and exits.

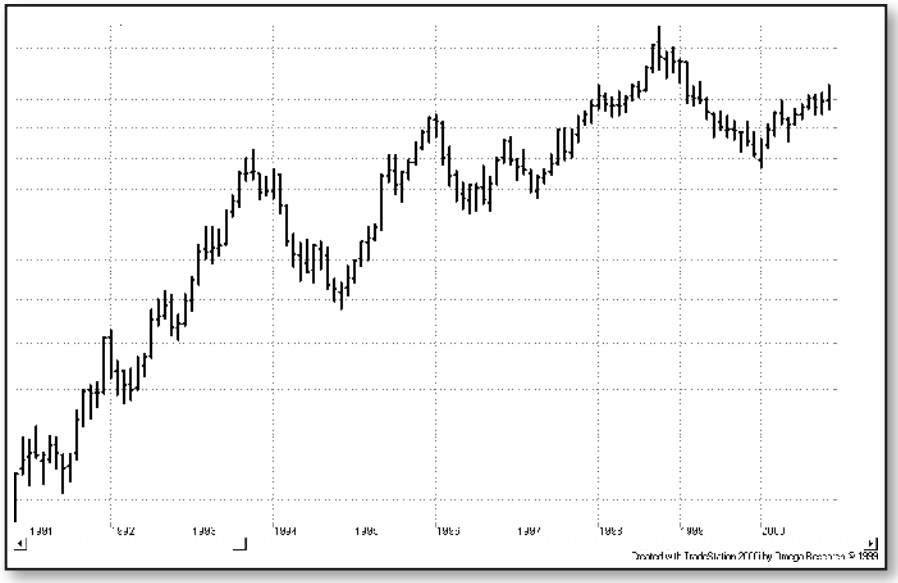

FIGURE 1.6 The Trend Is Easier to See after It Has Occurred. While the upwards trend is clear, are prices going to continue higher, or is this the end of the trend?

Trendlines

The trendline determines the current direction of price movement, and often identifies the specific point at which that direction will change. The trendline is the most popular and recognized tool of chart analysis. Most analysts will agree that *the trend is your friend*; that is, it is always safer to take a position in the direction of the trend.

- An *upwards trendline* is drawn across the lowest prices in a rising market.
- A *downwards trendline* is drawn across the highest prices in a declining market.

Figure 1.7 shows a classic downwards trendline, *A*, drawn on a chart of Intel. It connects the highest price of $22 with price peaks at 18.00, 16.75, and 16.15 before ending at 15.50. When prices move through the trendline heading higher, the downtrend has been *penetrated*. This may end the downtrend or cause a new downtrend line to be drawn. In this case it was the end of the downtrend.

Redrawing Trendlines

Most trendlines are not as long-lived or clear as the downtrend in Intel, which was drawn after the fact. Instead, we will treat the uptrend as it develops. The first uptrend line, *B*, is drawn when the first reversal shows a second low point. The upwards trendline *B* is drawn across the lows of points 1 and 2. Although prices do not decline through trendline *B,* rising prices pull back to points 3 and 4, well above the trendline. At that point, we choose to redraw the upwards trendline connecting point 2 with 3 and 4, forming what appears to be a stronger trendline. Trendlines are considered more important when they touch more points. However, prices move up

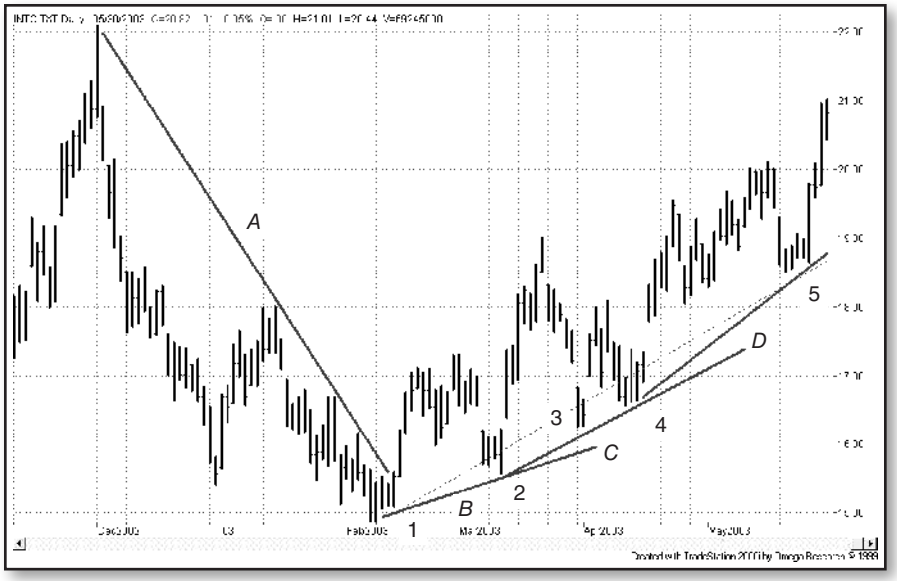

FIGURE 1.7 Upwards and Downwards Trendlines Applied to Intel, November 2002 through May 2003.

quickly, and we decide to redraw the trendline connecting points 4 and 5. It is very common to redraw trendlines as price patterns develop. Care must be taken to draw the lines in a way that touches the most points, although some chart analysts would draw a line that connects points 1 and 5, crossing through points 2, 3, and 4, because the final picture seems to represent the dominant upwards price pattern. This can be seen as the broken line in Figure 1.7.

Support and Resistance Lines

Price movement creates patterns that reflect the combined perception that all investors have of the current economic situation. Trends result from confidence or concern about the health of business or the supply and demand of a product. When there is no dominant opinion, prices move sideways in a price range determined by current volatility levels—sometimes wide, sometimes narrow. Because there are always buyers and sellers, prices do not stand still. Investment funds continue to add and withdraw money from the market.

Periods of uncertainty form a sideways price pattern. The top of this pattern is called the *resistance level,* and the bottom is the *support level.* Once established, the support and resistance levels become key to identifying whether a trend is still in force.

A *horizontal support line* is drawn horizontally to the right of the lowest price in a sideways pattern. It is best when drawn through two or more points and may cross above the lowest price if it makes the pattern clear. It represents a firm price level that has withheld market penetration (or allowed minor penetration). It may be the most significant of all chart lines. In the chart of gold futures prices (Figure 1.8), the support line is drawn across the bottom of a sideways period, beginning at the first low price on the left but crossing slightly above the next lowest point. The support

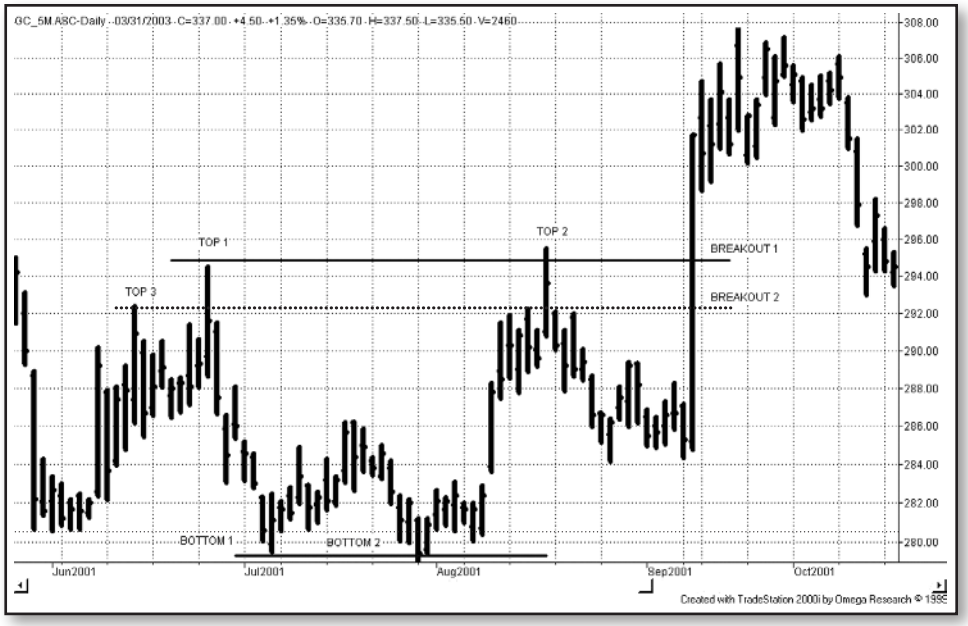

FIGURE 1.8 Horizontal Support and Resistance Lines Shown on Gold Futures Prices.

line could have been drawn at $280.50 to include the first cluster of low prices and crossing above the lows bars but representing a clear support level.

A *horizontal resistance line* serves the same purpose as the support line and is drawn across the highest highs of the sideways interval. It represents the price that has resisted upwards movement. Resistance lines are not normally as clear as support lines because they are associated with higher volatility and erratic price movement. In Figure 1.8 there are two choices for the horizontal resistance line. The most common selection would be the line that begins at top 1 and crosses below the high of top 2. In the same spirit as the support line, a resistance line could have been drawn much lower, beginning at top 3 and crossing above a cluster of highs while penetrating through the bars with tops 1 and 2.[12]

Note the Position of the Closing Price of the Bar A price bar that has the high price penetrating upwards through resistance but closes lower is considered a *failed breakout* and confirms the sideways pattern. The same is true for a failed penetration of the support level. You may choose to raise the resistance line to the high of that failed bar, but most chartists ignore it, keeping the resistance line at its original position. Then we can expect to see a number of high prices penetrate through the resistance lines as shown by the *breakout 2* line in Figure 1.8.

Resistance Becomes Support, and Support Becomes Resistance Horizontal support and resistance lines are strong indicators of change. If prices are moving

[12] In Carol Oster, "Support for Resistance: Technical Analysis and Intraday Exchange Rates," *FRBNY Economic Policy Review* (July 2000), the author shows that support and resistance levels specified by six trading firms over three years were successful in predicting intraday price interruptions. In addition, these levels were valid for about five days after they were noted.

sideways because investors are unsure of direction, then a move through either support or resistance is usually associated with new information that causes investors to act. Whatever the cause, the market interprets this as a new event. Having moved out of the sideways pattern, prices have a tendency to remain above resistance to confirm the change. If prices have moved higher, then the resistance line becomes a support line. If prices fall below the resistance line, the price move is considered a failed breakout. In the right part of Figure 1.8, prices break out above the resistance levels and then come back to test those levels. In this example, prices seem to confirm that the *breakout 2* line was the more realistic resistance line.

A Trendline Is a Support or Resistance Line The angled trendlines in Figure 1.7 are also called support and resistance lines. An upwards trendline, drawn across the lows, is a *bullish support line* because it defines the lowest price allowed in order to maintain the upwards trend. The downward trendline, drawn across the highs, is a *bearish resistance line*. These angled trendlines are most reliable when used to identify major price trends. Horizontal lines work well for shorter time frames.

Back-Adjusted Data All traders use online services to display charts. They can draw support and resistance lines using various tools supplied by the service and can convert daily data to weekly or monthly with a single click. When looking at prices that go back many years, the analyst must be sure that the older data is not *back-adjusted* in any way. For example, futures trade in contracts of limited maturity, and are most liquid during the last few months before expiration. Long-term charts put contracts together by back-adjusting the prices, so that the older data does not give the actual price at that time, but is altered by accumulated roll difference. Using those older prices as a guide for support or resistance doesn't make any sense.

This same problem exists for stocks that have split. The old price that you see on the chart may not be the actual price traded at that time. Floor traders are good at remembering the last major high or low and will trade against those prices, or buy and sell breakouts. When plotting the support and resistance lines, look for the data option that creates a history of prices without back-adjusting.

Rules for Trading Using Trendlines

The simplest formations to recognize are the most commonly used and most important: horizontal support and resistance lines, bullish and bearish support and resistance lines, and channels created using those lines. Proper use of these basic lines is essential for identifying the overall direction of the market and understanding the patterns formed as prices move from one level to another. Many traders will generate their buy and sell orders directly from their chart analysis. Other, more computer-oriented analysts have automated the more important trendlines, particularly horizontal support and resistance, which has become the basic breakout system. Major chart patterns create the underlying profitability of chart trading; the more complex formations, as we will discuss further, may enhance good performance but rarely compensate for losses resulting from being on the wrong side of the trend.

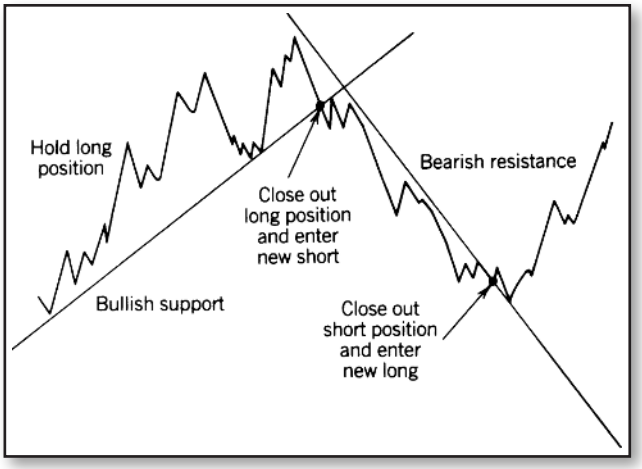

FIGURE 1.9 Basic Sell and Buy Signals using Trendlines.

Once the support and resistance lines have been drawn, a price penetration of those lines creates the basic trend signal (Figure 1.9). The bullish support line defines the upward trend, and the bearish resistance line denotes the downward one. For long-term charts and major trends, this is often sufficient. Some traders add the additional rule that once the price has penetrated a trendline, it must remain penetrated for some time period in order to confirm the new trend. Most false penetrations correct quickly.

Confirming the New Trend Direction In actual trading, the price crossing the trendline is not as clean as in Figure 1.8. Most often prices that have been moving higher will cross below the trendline, then recross moving higher, then move lower again. The trendline is an important turning point, and there may be indecision that is reflected in a sideways price movement before prices reestablish a trend. To deal with this situation, traders may:

- *Wait a set time period* to confirm that prices remain on the new side of the trendline.
- *Wait for a reversal* after the penetration, then enter a trade in the new direction even if the reversal crosses the trendline again.
- *Create a small safety zone* (called a *band* or *channel*) around the trendline and enter the new trade if prices move through the trendline and through the safety zone.

Each of these techniques requires a delay before entering. A delay normally benefits the trader by giving a better entry price; however, if prices fall quickly through an upwards trendline and do not reverse or slow down, then any delay will result in a much worse entry price. Unfortunately, most of the biggest profits result from breakouts that never pull back. Catching only one of these breakouts can compensate for all the small losses due to false signals. Many professional traders wait for a better entry price. They may be steady winners, but they do not often profit from the biggest moves.

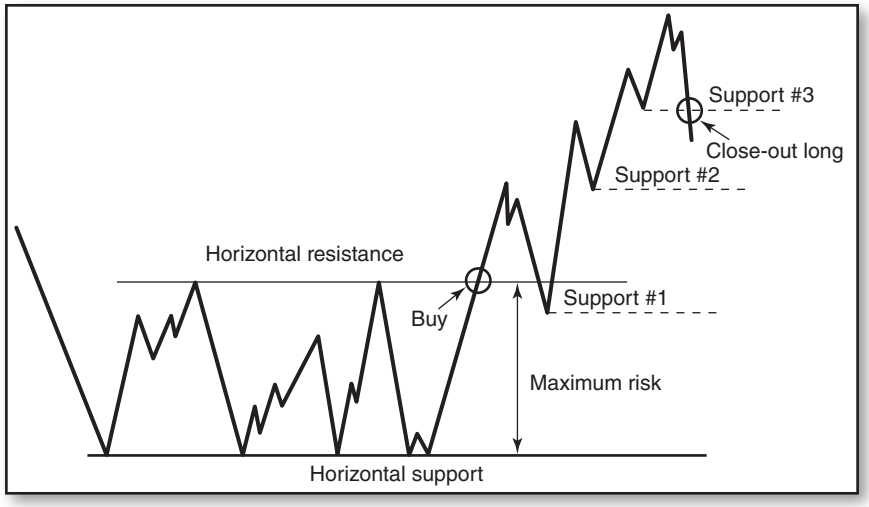

FIGURE 1.10 Trading Rules for Horizontal Support and Resistance Lines.

Trading Rules for Horizontal Support and Resistance Levels

As with angled trendlines, horizontal support and resistance lines show clear points for buying and selling. Also similar to angled trendlines, the horizontal lines become increasingly important when longer time intervals and more points are used to form the lines. The technique for entering trades using horizontal lines is similar to that using angled trendlines; however, the maximum risk of the trade is clearly defined.

- *Buy* when prices move above the horizontal resistance line
- *Sell* when prices move below the horizontal support line

Once a long position has been entered, it is not closed out until prices move below the support line. The maximum risk of the trade is the difference between the support and resistance lines. As prices move higher, each swing reversal forms a low from which a new horizontal support line is drawn. After the initial entry, single points are most often used to create the horizontal support and raise the level at which the trade will be closed out. Figure 1.10 shows the pattern of horizontal support and resistance lines as the trade develops. For a swing low to form, prices must reverse by more than some threshold number of points or percentage. Not every small reversal qualifies as a swing low.

Note that the first pullback in Figure 1.10 shows prices crossing below the original resistance line. This is a common occurrence, but the original line no longer holds the importance it had before it was broken. While it should provide support for the pullback (a resistance, once broken, becomes a support), it is more important to record the bottom of the new pullback as the support level. These new support levels need only one price point. After the third support level is drawn, prices rally but then fall back through the third level, at which point the long position is closed out. A short position, if any, is not entered until a new sideways price pattern is established and horizontal support and resistance lines can be drawn across more than one point.

Identifying Direction from Consolidation Patterns It is said that markets move sideways about 80% of the time, which means that sustained directional breakouts do not occur often, or that most breakouts are false and fail to identify a new market direction. Classic accumulation and distribution formations, which occur at long-term lows and highs, attempt to find evolving changes in market sentiment. Because these formations occur only at extremes, and may extend for a long time, they represent the most obvious consolidation of price movement. Even a rounded or saucer-shaped bottom may have a number of false starts; it may seem to turn up in a uniform pattern, then fall back and begin another slow move up. In the long run, the pattern looks as if it is a somewhat irregular, extended rounded bottom; however, using this pattern to enter a trade in a timely fashion can be disappointing. It is easier to average *in*, where smaller positions are entered at fixed intervals as long as the developing formation remains intact.

Most other consolidation formations are best viewed in the same way as a simple horizontal sideways pattern, bounded above by a resistance line and below by a support line. If this pattern occurs at reasonably low prices, we can eventually expect a breakout upwards when the fundamentals change. Occasionally, prices seem to become less volatile within the sideways pattern, and chartists take this opportunity to redefine the support and resistance levels so that they are narrower. Breakouts based on these more sensitive lines tend to be less reliable because they represent a temporary quiet period inside the larger, normal level of market noise; however, there are two distinct camps, one that believes that breakouts are more reliable after a period of low volatility and the other that prefers breakouts associated with high volatility.

Creating a Channel with Trendlines

A *channel* is formed by a trendline and another line drawn parallel to the trendline enclosing a sustained price move. The purpose of the channel is to define the volatility of the price move and establish reasonable entry and exit points. Up to now, the trendline has only been used to identify the major price direction. A long position is entered when the price crosses a downward trendline moving higher. The trade is held until the price moves below the upwards trendline. However, it is more common to have a series of shorter trades. While the biggest profits come from holding one position throughout a sustained trend, a series of shorter trades each has far less risk and is preferred by the active trader. Be aware that trendlines using very little data are essentially analyzing noise and have limited value.

Before a channel can be formed, the bullish or bearish trendline must be drawn. A clear uptrend line requires at least two, and preferably three or more major low points on the chart, as shown in Figure 1.11, where points 1, 2, and 3 are used. These points do not have to fall exactly on the line. Once the trendline is drawn, the highest high, point *B,* can be used to draw another line parallel to the upwards trendline. The area in between the two parallel lines is the *channel*.

In theory, trading a channel is a simple process. We buy as prices approach the support line (in this case the upwards trendline), and we sell as prices near the resistance line. These buy and sell zones should be approximately the bottom and top

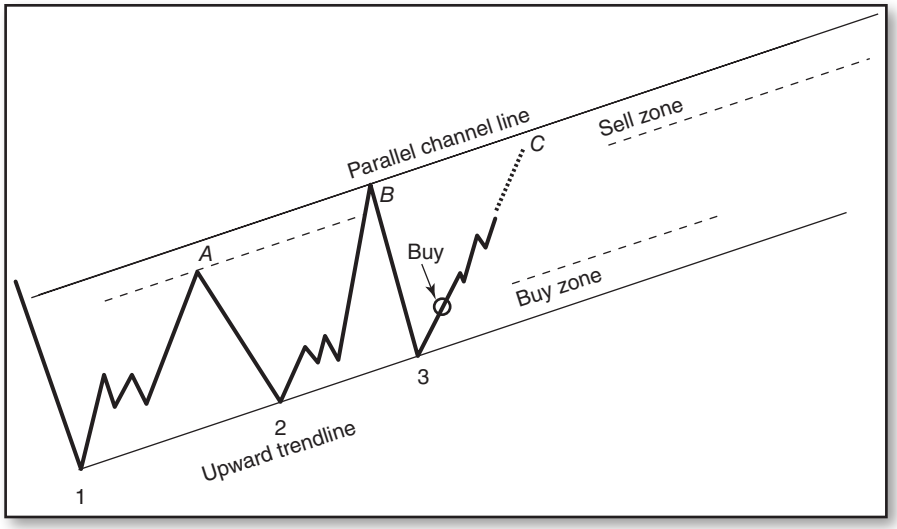

FIGURE 1.11 Trading a Price Channel. Once the channel has been drawn, buying is done near the support line and selling near the resistance line.

20% of the channel. Because the channel line is used to determine price targets, you might choose to draw the broken line across point *A*. The use of point *A* creates a channel that is narrower than the one formed using the higher point *B* and recognizes the variability of price movement. This allows you to take profits sooner.

If prices continue through the lower trendline after a long position has been set, the trade is exited. The trend direction has changed, and a new bearish resistance line, the downward trendline, needs to be drawn using points *B* and *C*, shown in Figure 1.12. Once the first pull-back occurs leaving a low at point 4, a parallel line is drawn crossing point 4, forming the downward channel. In a downward trending channel, it is best to sell short in the upper zone and cover the short in the lower zone. Buying in the lower zone is not recommended; trades are safest when they are entered in the direction of the trend.

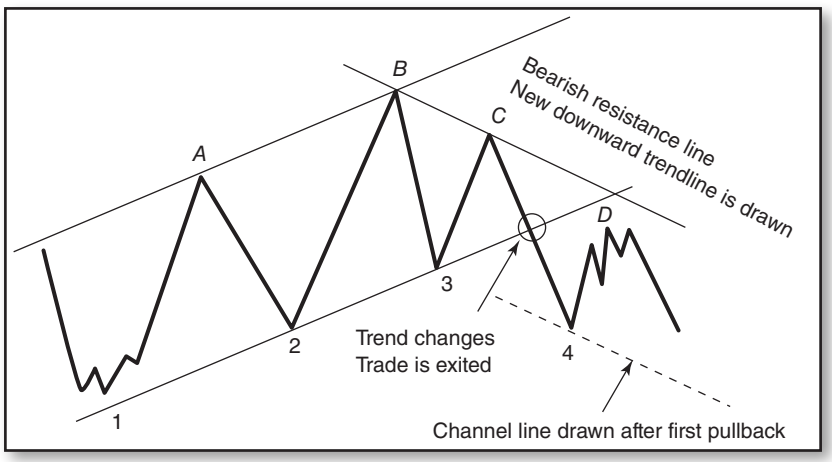

FIGURE 1.12 Turning from an Upward to a Downward Channel. Trades are always entered in the direction of the trend.

When the support and resistance lines are relatively horizontal, or sideways, the channel is called a *trading range*. There is no directional bias in a trading range; therefore, you can enter new long positions in the support zone and enter new shorts in the sell zone. In both cases, penetration of either the support or resistance lines forces liquidation of the trade and establishes a new trend direction.

One-Day Patterns

The easiest of all chart patterns to recognize occur in one day. They include gaps, spikes, island reversals, reversal days, inside days, outside days, wide-ranging days, and, to a lesser extent, thrust days. Some of these patterns are important at the moment they occur, and others must be confirmed by other factors.

Gaps

Price *gaps* occur when important news influences the market at a time when the exchange is closed. Orders accumulate to be executed on the next open. An *upwards gap* exists when the low of the current day is higher than the high of the previous day. If all trading were 24 hours, then we would see a fast, volatile move, but not a gap. For example, there are three popular ways to trade the S&P 500 index,

1. Futures, traded in the Chicago Mercantile Exchange pit from 8:30 a.m. to 3:15 p.m. (Central time)
2. Spyders (SPY) on the AMEX during the same hours
3. The electronic S&P mini-futures contract which trades nonstop from Sunday evening at 6 p.m. until Friday afternoon at 3:15 p.m. on the Globex platform

Gaps only exist when using the primary trading session (the *pit* session). Most afterhours trading is on light volume and may be ignored for charting purposes. An exception is in Europe where they have an extended session from the original 4 p.m. close (European time) to 10 p.m. or 10:30 p.m. to allow trading at the same time the U.S. markets are open. The markets then close and reopen when the normal European business day begins. For European markets it is best to use the combined sessions that start at about 9 a.m. and continue until about 10 p.m.

Economic reports are released by the U.S. government at 7:30 a.m. (Central time); therefore, they occur before the S&P pit trading and the SPDRs begin trading, but during the electronic *e*mini S&P session. There is no gap in electronic trading, but the other markets will open sharply higher or lower to adjust to the current *e*mini price. When the financial news shows give the expected open of the stock market, they are using the difference between the previous NYSE closing price and the current price of the electronic session. This creates frequent opening gaps in those markets.

Gaps can also occur because of a large cluster of orders placed at the point where the stock or futures market penetrates support or resistance. It is possible to have a gap during the trading session, immediately following bullish economic report, or

FIGURE 1.13 Price Gaps Shown on a Chart of Amazon.com.

concurrent with an anticipated news release of consequence, when there are a large number of buyers and few sellers. There is also the rarer case of an event shock such as September 11, 2001.

In charting, gaps are interpreted differently based on where they occur in the current price pattern. In some cases, a gap signals a continued move and in other situations it is expected to be the end of a price move. The four primary gap formations are shown on a chart of Amazon.com in Figure 1.13. They are:

1. The *common gap,* which appears as a space on a chart and has no particular attributes—that is, it does not occur at a point associated with any particular significance. A common gap appears in May 1999 during a downward move.
2. A *breakaway gap* occurs at a point of clear resistance or support. It occurs when there are a large number of buy orders just above a major resistance line, or sell orders below a support line. Most often this is seen after a prolonged period of sideways price movement when most chartists can draw the same horizontal support and resistance lines. The clearer the formation, and the longer the sideways period, the more likely there will be a large breakaway gap. The term *breakaway* requires some hindsight because it is applied only when the gap is followed by a sustained price move.

   There are two breakaway gaps in Figure 1.13, the first shortly after prices make a new high, the second in the middle of the chart when prices break upwards through a steep downward trendline, and the last near the right of the chart when prices gap through a clear downwards trendline.

   In order to trade a gap, a position must be entered in advance of the gap, as prices approach the support or resistance level. Once a long position is set and

prices *gap up* you gain *free exposure,* which is the profit caused by the gap or by a fast market move in your favor. If prices do not gap up, they most often drift lower. The position can be exited with a small loss and reentered later.

3. An *exhaustion gap* occurs at the end of a sustained and volatile price move and confirms the reversal. Exhaustion gaps usually occur on the day after the highest price of the upwards move; however, in the Amazon chart, it is one day later. Because it signifies a clustering of orders anxious to exit the long side, it has all the signs associated with an exhaustion gap.
4. A *runaway gap* occurs at different points during a clear trend and confirms the trend. It does not appear to have any practical use because the trend can stop and reverse just after a runaway gap and it will be renamed an *island top,* or some other formation. When holding a long position, an upwards runaway gap quickly adds profits, but also signifies extreme risk.

Gaps can also be a hindrance to trading. A long position held when a downward breakaway gap occurs guarantees that any stop-loss order is executed far away from the order price. If the upwards breakaway gap occurs on light volume, it may be a false breakout. If a short is held, and if you are lucky, prices will fall back to the breakout level and then continue lower. If unlucky, you will be executed at the high of the move. In the final analysis, if the gap breakout represents a major change, a trade should be entered immediately *at the market*. The poor executions will be offset by the one time when prices move quickly and no pullback occurs. A breakaway gap on high volume is usually indicative of a strong move and a sustained change.

Filling the Gap Tradition states that prices will retrace to *fill the gap* that occurred sometime earlier. Naturally, given enough time, prices will return to most levels; therefore, nearly all gaps will eventually be filled. The most important gaps are not filled for some time.

The gap represents an important point at which prices move out of their previous pattern and begin a new phase. The breakaway gap will often occur just above the previous normal, or established, price level. With commodities, once the short-term demand imbalance has passed, prices should return to near-normal (perhaps slightly above the old prices given inflation), but also slightly below the gap. When a stock price gaps higher based on earnings, a new product announcement, or a rumor of an acquisition, the price may not return to the previous level.

Trading Rules for Gaps

- A *common gap* is small and occurs with low volume and for no specific reason; that is, it is not the result of an obvious, surprising news release. Active traders will take a position counter to the direction of the gap, expecting the move to reverse and fill the gap, at which point they will take profits. If the gap is not filled within a few days, the trade is liquidated.

- A *breakaway gap* is the result of bunched orders at an obvious support or resistance area. When a clear sideways pattern has developed, place a buy order just under the resistance level in order to benefit from the jump in prices (free exposure) when the breakout occurs. If a gap occurs on the breakout, then prices should continue higher.
- A *runaway gap* is often found in the middle of a significant move. It is considered a good point to add to your position because the runaway gap confirms the move and offers additional potential profits.
- An *exhaustion gap* is best traded as it is being filled, and, even at that stage, it is highly risky. Sell during the move upwards, placing a stop above the previous high of the move. If this pattern fails, prices could move higher in an explosive pattern. If you are successive, profits could also be large.

Bulkowski on Gaps Bulkowski includes an extensive study of breakaway, continuation, and exhaustion gaps. The statistics developed for these three cases all conform to the expected patterns, as shown in Table 1.1. Almost by definition, we expect a breakaway gap, one that occurs when prices move out of a sideways range, to mark the beginning of a new trend, and the exhaustion gap (which actually can't be seen until it reverses) to be the end of a trend. The continuation gap is somewhere in between and is only defined within the context of an existing trend.

The results of the breakaway gap, only 1% and 6% retracements, confirm that the breakouts often continue the trend direction. Strategies that take advantage of this are the *N*-day breakout, swing trading, and pivot point breakouts, providing that the observation period is greater than 40 days, the minimum considered to be a macrotrend.

Spikes

A *spike* is a single, highly volatile day where the price moves much higher or lower than it has in the recent past. A spike can only be recognized one day later because trading range of the following day must be much lower. It is easiest to show spikes in markets, such as U.S. 30-year Treasury bonds, that react to frequent economic reports. In Figure 1.14 there is a series of three spikes about four weeks apart.

An upward spike, as shown in Figure 1.14, is always a *local top* because a spike is a day with above-average volatility and must be bracketed by two lower days. In all three cases shown, the spike represented the high price for at least one week. Because the spike is a clear top, when prices begin to rise again, they usually meet resistance at the top of the spike. Chartists draw a horizontal resistance line using the high price of the spike,

TABLE 1.1 Percentage of Time Gaps Are Closed within One Week, Based on a Sample of 100 Stocks

Gap Type	Uptrends	Downtrends
Breakaway	1	6
Continuation	11	10
Exhaustion	58	72

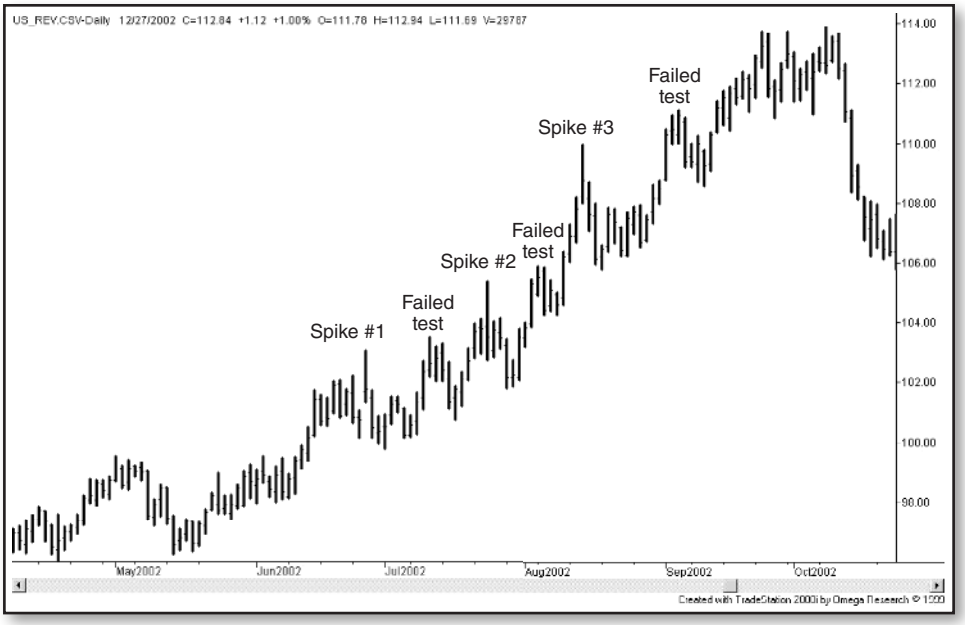

FIGURE 1.14 A Series of Spikes in Bonds. From June through October 2002, U.S. bonds show three spikes that represent local tops. The spikes represent clear resistance levels that cause a unique pattern in the upwards move.

which encourages selling at that level. After each spike the chart is marked with "failed test," showing the price level where resistance, based on the previous spike, slowed the advance. The spike did not stop the trend, but it did cause a unique pattern.

Quantifying Spikes A spike has only one dominant feature: a price high or low much higher or lower than recent prices. It must therefore also have high volatility. The easiest way to identify an upside spike is to compare the trading range on the day of the spike to previous ranges and to the subsequent day. This can be programmed in TradeStation by using the *true range* function and satisfying the conditions that the high on the day of the spike is greater than the previous and subsequent highs by the amount of $k \times$ *average true range* over n days,

```
Spike = high[1] - highest(high,n)[2] > k*average(truerange,n)[2]
                                  and
          high[1] - high > k*average(truerange,n)[2]
```

In this code, *spike* is a logical variable (true-false). A spike that occurs yesterday (where [1] indicates yesterday and [2] two days ago) is tested to see that the high of the spike is greater than the high of the previous n days, greater than the average true range of the same n days by a factor of k, and also greater than the high of today by the same factor k. Note that the use of [2] ends the true range calculation on the day before the spike. The value of k should be greater than 0.75. Spikes satisfying $k > 1$ are more desirable but less frequent.

In Excel, the true range is

```
TRn = Max(Hn - Ln,Hn - Cm,Cm - Ln)
```

where n is the current row, m is the previous row ($n - 1$), and the high, low, and close (H, L, can C) are in columns B, C, and D.

Island Reversals

An *island reversal* or an *island top* is a single price bar, or group of bars, sitting at the top of a price move and isolated by a gap on both sides, before and after the island formation. Combined with high volatility, this formation has the reputation of being a major turning point. The gap on the right side of the island top can be considered an exhaustion gap. In Figure 1.15, showing AMR during the first part of 2003, there is one island reversal in mid-April. This single, volatile day has a low that is higher than both the previous day and the following day. It remains the high for the next week but eventually gives way to another volatile price rise. *Island bottoms* also occur, but are less frequent.

Pivot Point Reversals and Swings A *pivot point* is a trading day, or price bar, that is higher or lower than the bars that come before and after. If the entire bar is above the previous day and the following day, the pivot point reversal is the same as the island reversal. If it is a very volatile upwards day but the low price is not above the high of the surrounding bars, then it is a spike. If it is not a volatile day, then it is a weaker form of a spike. If you were plotting swing highs and lows, the high of an upwards pivot point reversal day would often become the swing high. It is common to locate a *swing high* by comparing the high of any day with two or more days before and after. The patterns

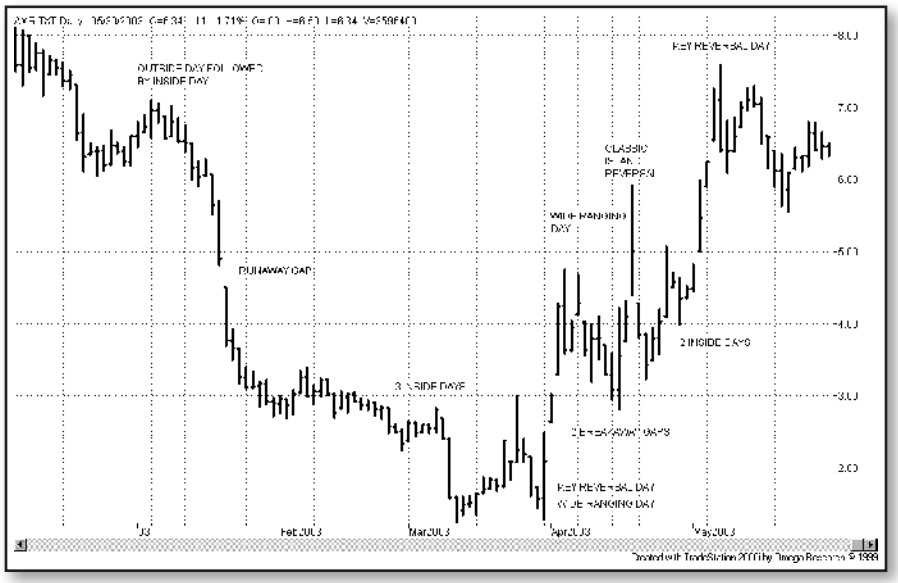

FIGURE 1.15 AMR in Early 2003 Showing a Classic Island Reversal with Examples of Other One-Day Patterns.

of the days on either side of the high bar are not important as long as the middle bar has the highest high. When more days are used to identify pivot points, these reversals are expected to be more significant; however, they take longer to identify.

According to tests by Colby and Meyers,[13] entries that occur based on a breakout of the highs or lows of the pivot points, called *pivot point channels,* are much more reliable than simply entering in the direction of the reversal based on the close of the last bar of the pivot point formation. For traders not interested in this very short-term strategy, a pivot point may help entry timing for any longer term method.

More recently, Colby[14] tested a *Pivot Point Reverse Trading System,* using the following rules:

- *Buy* (and close out short positions) when a pivot point bottom occurs and the close is higher than the previous close.
- *Sell* (and close out long positions) when a pivot point top occurs and the close is lower than the previous close.

Applying these rules to the Dow Jones Industrials (DJIA) for 101 years ending December 2000 showed nearly 7,000 trades (70 per year) with significant profits.

Cups and Caps Another name given to the pivot point reversals are *cups* and *caps,* each determined by only three price bars, although another formation with the same name, *cup with handle*, is similar to a longer-term rounded bottom followed by a sideways or slight downward trend and a breakout to the upside. These two short-term formations are associated with trading rules that are identical to pivot point channels applied to the shortest time frame. Although some literature uses these formations backwards, a cap formation identifies a sell signal when the trend is up, while a cup is a setup for a buy signal in a downtrend. Once an uptrend is clear, a cap formation is found using either the daily closes or daily lows. For any three consecutive days, the middle day must have the highest close or the highest low. In a cup pattern, the middle day must have the lowest low or the lowest close of the three-day cluster. In both cases, the positioning of the highs and lows of the other two days are not important as long as the middle day is lower for the cup and higher for the cap.

The cup will generate a buy signal if:

- The cup formation is the lowest point of the downtrend
- The buy signal occurs within three days of the cup formation
- The current price closes above the highest high (middle bar) of the cup formation

The signal is false if prices reverse and close below the low of the cup formation, resuming the previous downtrend. This pattern is only expected to forecast a

[13] Tests of pivot point reversals and pivot point channels can be found in Robert W. Colby and Thomas A. Meyers, *The Encyclopedia of Technical Market Indicators* (Homewood, IL: Dow Jones-Irwin, 1988).
[14] Robert W. Colby, *The Encyclopedia of Technical Market Indicators* (New York: McGraw-Hill, 2003), 510–514.

downward price move of two days; however, every change of direction must start somewhere, and this formation could offer an edge. A cap formation is traded with the opposite rules.

Reversal Days and Key Reversal Days

A day in which there is a new high followed by a lower close is a *downwards reversal day.* An *upwards reversal day* is a new low followed by a higher close. A reversal day is a common formation, as seen in Figure 1.16, the Russell 2000 futures. Some of these days are identified; however, you can find many other examples in Figures 1.13 through 1.16. There have been many studies to determine the importance of reversal days for trading, but these are inconclusive. A reversal day by itself is not significant unless it can be put into context with a larger price pattern, such as a clear trend with sharply increasing volatility, or a reversal that occurs at the highest or lowest price of the past few weeks.

Key Reversals A *key reversal day* is a more selective pattern, and has been endowed with great forecasting power. It is also called an *outside reversal day,* and is a weaker form of an island reversal. A *bearish key reversal* is formed in one day by first making a new high in an upward trend, reversing to make a low that is lower than the previous low, and then closing below the previous close. It should be associated with higher volatility. Examples of key reversal days can be seen in Figures 1.14 and 1.15. It is considered more reliable when the trend is well-established.

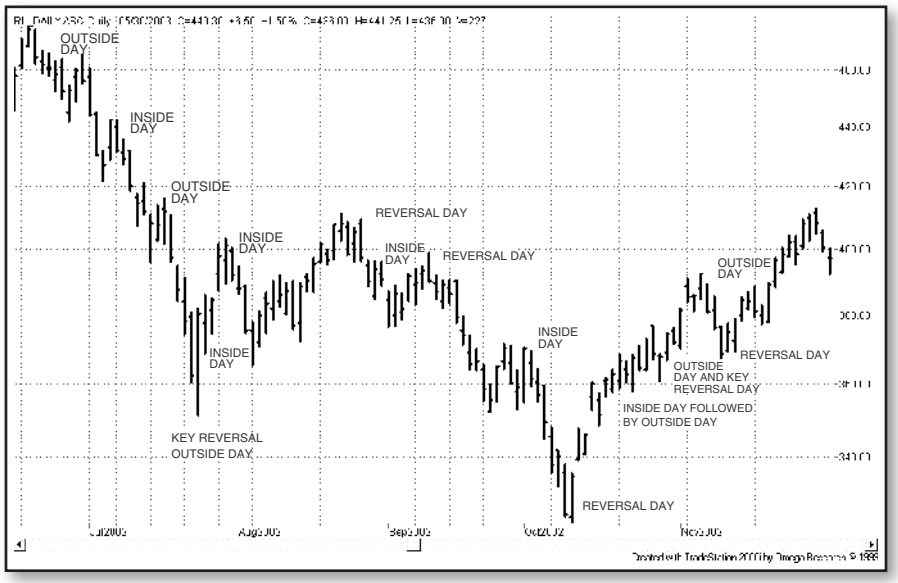

FIGURE 1.16 Russell 2000 during the Last Half of 2002 Showing Reversal Days, Key Reversal Days, Inside Days, and Outside Days.

As with reversal days, studies have shown mixed results using the key reversal as a sole trading indicator. The most complete analysis,[15] similar to others, concluded that the performance was "strikingly unimpressive." Even though tests have not proved its importance, traders still pay close attention to key reversals. Because this pattern has kept its importance, we can conclude that other factors unconsciously enter into the selection of key reversal days for trading. A successful trader's senses should not be underestimated; the extent and speed of the prior trend, a change in liquidity, a quieter market *tone,* or some external news may be essential in confirming the important reversals. The job of a system developer is to find those factors that will turn this pattern into a successful indicator. The best place to start is by assuming the attitude of those traders who see a reversal day as an important pattern.

Figure 1.16 shows a number of reversal days during the rapid drop of the Russell 2000 in January 2002. Three patterns of particular interest are the reversal days at the two extreme lows in July and October 2002, and the high in between, during August. Although there are many other reversal days embedded within other parts of the price move, the reversals off the lows are clearly at higher volatility than most other days, and follow very sharp, accelerating price drops. The reversal day that ends the intermediate high during August does not share these attributes; however, it tops a pattern that is not the dominant trend, but an upwards reaction within a previous sustained downtrend. If we focus on the characteristics of those reversal days that mark price extremes, rather than all reversal days, we should expect successful results.

Programming Key Reversal Days A key reversal day can be recognized and tested using a computer program. In TradeStation's *EasyLanguage* the instructions for downward key reversal are

```
KeyReversalDown = 0;
if close[1] > average(close[1],n) and high >= highest(high[1],n) and
    low < low[1] and close < close[1] then KeyReversalDown = 1;
```

where the first term tests for an uptrend over *n*-days, the second term tests that the current day is the highest price of the same *n*-days, the third term verifies that a lower low has occurred, and the last term tests for a lower close. This can be done in Excel by using the *max* and *min* functions instead of *highest* and *lowest*. A TradeStation function to identify key reversals is *TSM Key Reversals* and can be found on the Companion Website along with an Excel spreadsheet of the same name.

Adding a volatility factor, so that the key reversal day has noticeably higher volatility than the previous days seems to select more significant patterns. In the spreadsheet, which uses heating oil from 2005 through 2011 as an example, the basic rules gave marginal gains, but a filter that took only trades where today's true range was greater than 1.5 × *average prior* 20-*day true range* was much better.

[15] Eric Evans, "Why You Can't Rely on 'Key Reversal Days,'" *Futures* (March 1985).

2-Bar Reversal Patterns Martin Pring[16] has called attention to a special 2-bar reversal pattern that frequently precedes a strong directional change. This pattern consists of two days that are essentially the mirror image of one another. Consider a market in which prices have been moving steadily higher. The first day of the pattern shows a volatile upwards move with prices opening near the lows and closing near the highs. On the following day, prices open where they had closed, trade slightly higher (nearly matching the previous day's highs), then fall sharply to close near the lows, giving back all of the previous day's move.

Following the 2-bar reversal to the downside, the next few days should not trade above the midpoint of the 2-bar reversal pattern. The smaller the retracement, the more likely there will be a good sell-off.

It is easy to explain the psychology of this pattern. The first bar represents the strong bullish feeling of the buyers, while the second bar is seen as complete discouragement at the inability to follow through to even higher levels. It will take some days before traders are willing to test the highs again. More traders may view this as a potential major reversal. High volume can confirm the reversal. The nature of the move to follow depends on the extent of the previous trend and the volatility. Four key factors in predicting a strong reversal are:

1. Stronger preceding trends
2. Wider, more volatile 2-bar patterns
3. Greater volume than in previous days
4. Smaller retracements following the 2-bar pattern

Wide-Ranging Days, Inside Days, and Outside Days

A *wide-ranging day* is a day of much higher volatility than recent days, but no requirement that it is higher or lower than other days. An *outside day* must have both a higher high and lower low than the previous day. *Inside days* are an example of *volatility compression*. All three patterns are very common but indicate that something special has happened. Examples of these patterns are shown in Figure 1.17, a one-year, active trading period for Tyco ending in July 2000, before any accounting scandal surfaced.

Wide-Ranging Days A *wide-ranging day* is likely to be the result of a price shock, unexpected news, or a breakout in which many orders trigger one another, causing a large increase in volatility. A wide-ranging day could turn out to be a spike or an island reversal. Because very high volatility cannot be sustained, we can expect that a wide-ranging day will be followed by a reversal, or at least a pause. When a wide-ranging day occurs, the direction of the close (if the close is near the high or low) is a strong indication of the continued direction.

A wide-ranging day is easily seen on a chart because it has at least twice, or three times the volatility of the previous trading days. There is no requirement that it

[16] Martin Pring, "Twice as Nice: The Two-Bar Reversal Pattern," *Active Trader* (March 2003).

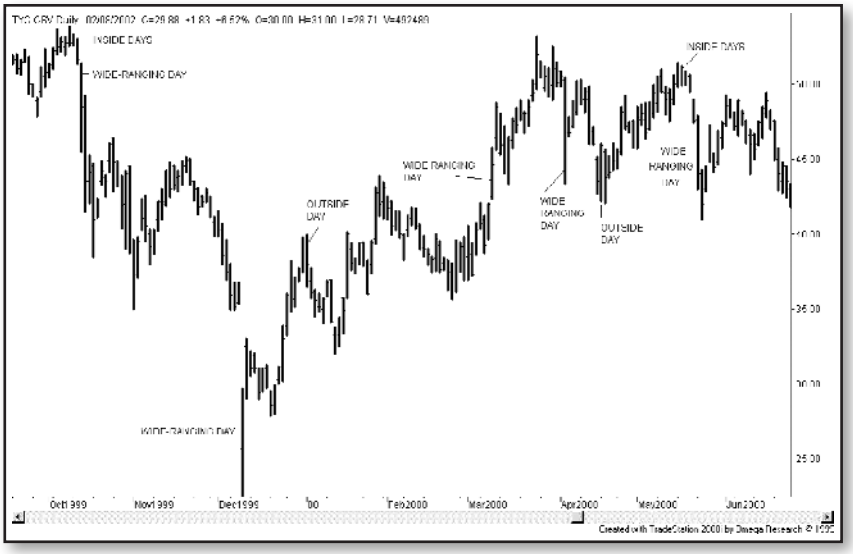

FIGURE 1.17 Wide-Ranging Days, Outside Days, and Inside Days for Tyco.

makes a new high or low relative to a recent move, or that it closes higher or lower. It is simply a very volatile day.

Outside Days An *outside day* often precedes a reversal. An outside day can also be a wide-ranging day if the volatility is high, but when volatility is low and the size of the bar is slightly longer than the previous bar, it is a weak signal. As with so many other chart patterns, if one day has an unusually small trading range, followed by an outside day of normal volatility, there is very little information in the pattern. Selection is important.

Inside Days An *inside day* is one where the high is lower than the previous high and the low is higher than the previous low. That is, an inside day is one where both the highs and lows are inside the previous day's trading range.

An inside day represents consolidation and lower volatility. In turn, lower volatility is most often associated with the end of a price move. After a burst of activity and a surge of upward direction, prices have reached a point where the buyers are already in and the price has moved too far to attract more buyers. Volume drops, volatility drops, and we get an inside day. An inside day is often followed by a change of direction, but that is not guaranteed. We only know that the event that drove prices up is now over. If more news surfaces to ignite prices, the next move could just as easily be up as down

In Figure 1.17 there are two inside days at the price peak on the top left of the Tyco chart. The first inside day is followed by a small move lower, then a small move higher, followed by another inside day. This last inside day precedes a major sell-off. On the right top of the chart there are two inside days immediately before another sharp drop.

Some analysts believe that a breakout from low volatility is more reliable than one following high volatility.

Some Notes about 1-Day Patterns One-day patterns are very common; therefore, traders tend to be selective about when they are used. Taken as a group, patterns that are repeated frequently are less reliable and need to be combined with other patterns. Those that occur during periods of high or low volatility or volume may also be less dependable.

While a reversal day is clearly a 1-day formation and can be identified at the end of the trading day, and an opening gap is recognized instantly, most other 1-day patterns are not clear until the day after. An upwards spike and a downwards pivot point reversal both require the high of the next day to be much lower than the high of the spike or pivot day; and the island reversal must show a gap on the following day. Although they cannot be used at the end of the day on which they occur, these formations are reasonably timely for an active trader.

Continuation Patterns

Continuation patterns occur during a trend and help to explain the stage of development of that trend. A continuation pattern that occurs within a long-term trend is expected to be resolved by continuing in the direction of the trend. If prices fail to move in the direction of the trend following a major continuation pattern, then the trend is considered over. The primary continuation patterns are triangles, flags, pennants, and wedges. The larger formations of these patterns are more important than the smaller ones.

Symmetric, Descending, and Ascending Triangles

Triangles tend to be larger formations that occur throughout a trend. A *symmetric triangle* is most likely to occur at the beginning of a trend when there is greater uncertainty about direction. A symmetric triangle is formed by a price consolidation, where uncertainty of buyers and sellers results in decreasing volatility in such a way that prices narrow to the center of the previous trading range. In Figure 1.18 the symmetric triangle is formed at about the level of the previous support. The breakout from a symmetric triangle often marks the beginning of a longer-term trend.

Formation of a Descending Triangle

Even during a clear downward trend, prices will rally. Because the trend is clear, sellers are anxious to step in and sell these upwards moves, looking for the trend to continue. The top of this mid-trend rally is likely to be the last support point where prices broke out of a previous pattern. In Figure 1.18, the top of the first descending triangle comes very close to the breakout level of the symmetric triangle, and the larger descending triangle towards the lower right of the chart has its high point at the breakout of another descending triangle.

The recent lows of the new trend form a temporary support level, and prices may bounce off that level while short-term traders play for small profits. This action forms a *descending triangle*. As more traders are convinced that prices are still heading lower, rallies off the support level are sold sooner, causing a narrower pattern, until

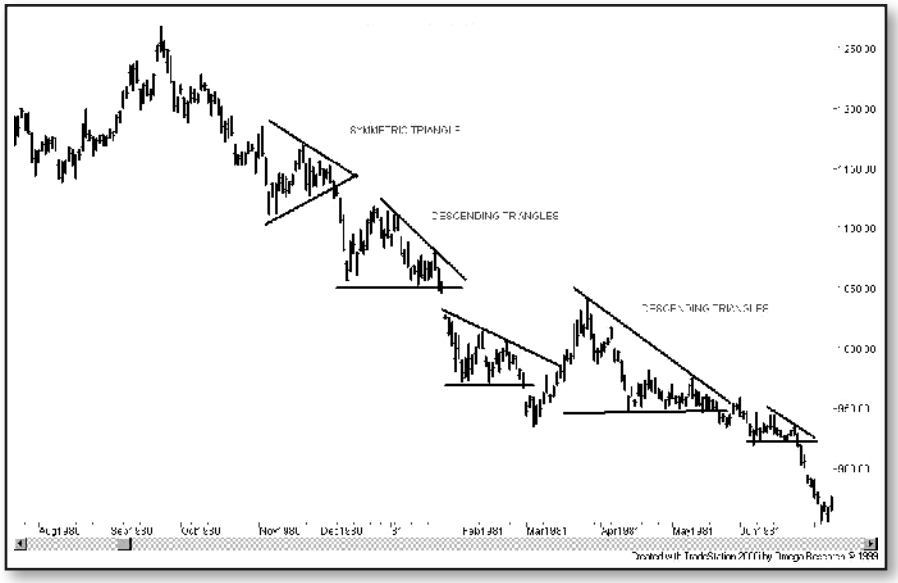

FIGURE 1.18 Symmetric and Descending Triangles and a Developing Bear Market in Gold Futures.

prices finally break below support. The descending triangle is complete. In an upwards trend an *ascending triangle* would be formed.

Size of the Triangles A triangle should take no less than two weeks to form; however, they can span a much longer period, occasionally up to three months. Larger formations represent periods of greater uncertainty. They may be followed by another symmetric triangle, again indicating that traders are undecided about direction. If the symmetric triangle is resolved in the current trend direction, the trend is in full force, and a large price move is expected.

Triangles can be consistent indicators of investor confidence. Because they reflect human behavior, they are not always perfect in appearance and not always consistent in pattern. It takes experience to identify the formation in a timely manner.

Flags

A *flag* is a smaller pattern than a triangle, generally less than three months for the long-term trader, and is formed by a correction in a bull market or a rally in a bear market. A flag is a congestion area that leans away from the direction of the trend and typically can be isolated by drawing parallel lines across the top and bottom of the formation. At the beginning of a trend, the flags may not lean away from the direction of the new trend as clearly as during a well-established trend. If the first flag after an upwards breakout leans down, it confirms the new upwards trend.

Figure 1.19 shows an assortment of triangles, flags, and pennants. There are two small flags, one in the middle of the chart and one in the lower right, each leaning upwards as expected in a downtrend. A larger flag slightly below center could also have been a symmetric triangle. Both patterns are resolved by a continuation of the trend.

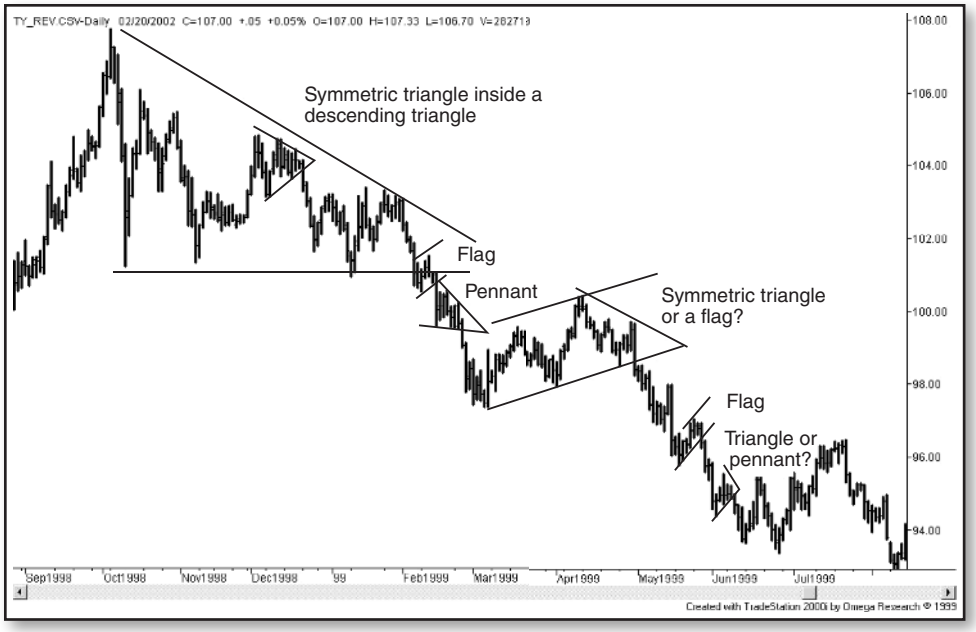

FIGURE 1.19 An Assortment of Continuation Patterns. These patterns are all resolved by prices moving lower. A downward pennant can be found in the middle of the chart.

Pennants

Pennants are irregular triangles normally leaning toward the trend, similar to a descending triangle in a downtrend but without a horizontal support line. A typical pennant can be seen in the middle of Figure 1.19. During a sustained trend, triangles are large, clear formations, with horizontal support or resistance lines, while pennants are consolidation formations requiring only that the lines converge. They usually lean in the direction of the trend, but that is not a requirement. A larger pennant should lean in the direction of the trend in a manner similar to a descending triangle; however, a small pennant may serve the same purpose as a flag and lean away from the trend.

Wedges

A pattern that looks as if it is a large pennant, with both sides angling in the same direction, but does not come to a point, is a *wedge.* In an upwards-trending market, the wedge should be rising as shown on the right side of the General Electric chart, Figure 1.20, near the end of 1999. The earlier wedge has nearly a horizontal upper line, bridging the pattern between a wedge and a rising triangle. A rising wedge is formed in the same way as an ascending triangle. Investors, convinced that the share price will rise, will buy smaller and smaller reversals even as prices make new highs. In the end, prices continue in the direction of the trend. In a typical rising wedge the lower line has a steeper angle than the upper line.

The angle of the wedge should be steeper as the trend becomes clear. The earlier wedge formation shown in Figure 1.20 is nearly symmetric. If we study the bigger

FIGURE 1.20 Wedge. A weaker wedge formation is followed by a strong rising wedge near the end of 1999 in this chart of General Electric.

picture, we can see that the uncertainty at the beginning of the trend is reflected in the symmetric formation, while the rising wedge occurs after the trend is well established and investors anticipate a continuation.

Run Days

Triangles, flags, pennants, and wedges represent the best of the continuation patterns. They can be identified clearly while they are still being formed and the direction of the breakout can be anticipated and traded. Other formations, such as *run days,* are not as timely. A run day occurs when the low of that day is higher than the previous *n* days, and the high of the day is lower than the subsequent *n* highs. When it occurs, this pattern confirms that a trend is in effect. The more days used to define the run day, the stronger the pattern. Therefore, a 5-day run day requires 11 days to identify, 5 before the run day and 5 after. Unlike the other continuation patterns, which have a breakout level that can be used as a trading signal, entering a long position after 11 days of a strong upwards move is not likely to be a good entry point. There are no trading rules or trading action associated with run days. They simply confirm what you have already seen on charts—that prices have been trending.

Basic Concepts in Chart Trading

Having covered the fundamental chart patterns, there are some additional concepts that should be discussed in order to keep the proper perspective. Charting involves a great deal of subjective pattern identification; therefore, there may be a choice

of patterns within the same time interval. There are also many cases where prices nearly form a pattern, but the shape does not fit perfectly into the classic definition.

Major and Minor Formations

In the study of charting, the same patterns will appear in short- as well as long-term charts. An upwards trendline can be drawn across the bottom of a price move that only began last week, or it can identify a sustained 3-year trend in the financial markets, or a 6-month move in Amazon.com. In general, formations that occur over longer time intervals are more significant. All-time highs and lows, well-defined trading ranges, trendlines based on weekly charts, and head-and-shoulder formations are carefully watched by traders. Obscure patterns and new formations are not of interest to most chartists, and cannot be resolved consistently unless traders buy and sell at the right points. Charting is most successful when formations are easy to see; therefore, the most obvious buy and sell points are likely to attract a large number of orders.

Market Noise

All markets have a normal level of noise. The stock index markets have the greatest amount of irregular movement due their extensive participation, the high level of anticipation built into the prices, the uncertain way in which economic reports and news will impact prices, and because it is an index. This is contrasted to short-term interest rates, such as Eurodollars, which have large participation but little anticipation because it has strong ties to the underlying cash market, governed by the central bank. The normal level of noise can be seen in the consistency of the daily or weekly trading range on a chart of the Dow or S&P. When volatility declines below the normal level of noise, the market is experiencing short-term inactivity. An increase in volatility back to normal levels of noise should not be confused with a breakout.

This same situation can be applied to a triangular formation, which has traditionally been interpreted as a consolidation, or a pause, within a trend. This pattern often follows a fast price change and represents a short period of declining volatility. If volatility declines in a consistent fashion, it appears as a triangle; however, if the point of the triangle is smaller than the normal level of market noise, then a breakout from this point is likely to restore price movement to a range typical of noise, resulting in a flag or pennant formation. Both of these latter patterns have uniform height that can include a normal level of noise, but they would not be reliable signals.

Accumulation and Distribution—Bottoms and Tops

Most of the effort in charting, and the largest payout in trading, goes into the identification of tops and bottoms. For long-term traders, those trying to take advantage of major bull and bear markets, these formations can unfold over fairly long periods. These prolonged phases, which represent the cyclic movement in the economy, are called *accumulation* when prices are low and investors slowly buy into their position, and *distribution* at the top, where the invested positions are sold off.

The same formations can occur over shorter periods and are very popular among all traders; however, they are not as reliable. There are many top and bottom formations that are popular and easily recognized. In order of increasing complexity, they are the *V*-top or *V*-bottom, the double or triple top or bottom, the common rounded top or bottom, the broadening top or bottom, the head-and-shoulders formation, and the complex top or bottom.

V-Tops and V-Bottoms

The *V-top* (actually an inverted "V"), which may also have a spike on the final day, is the easiest pattern to see afterwards, but the most difficult top formation to anticipate and trade. There have been times, such as in 1974, 1980, and 2000, when the frequency of *V*-tops were deceiving. *V*-tops are preceded by critical shortage and demand, and magnified by constant news coverage. In 1974, it was a combination of domestic crop shortage, severe pressure on the U.S. dollar abroad, and foreign purchases of U.S. grain that combined to draw public attention to a potential shortage in wheat. The news was so well publicized that novice commodity traders withdrew their funds from their declining stock portfolios and bought any commodity available as a hedge against inflation.

It could not continue for long. When the top came in soybeans, silver, and most other commodities, there was no trading for days in locked-limit markets; paper profits dwindled faster than they were made, and the latecomers found their investments unrecoverable. The public often seems to enter at the wrong time.

The most dramatic of all price moves was the technology bubble of the 1990s, ending with a peak in the NASDAQ index during March 2000. As you can see in Figure 1.21, prices rose faster near the end of the bull market, then collapsed just as quickly. It would have been reasonable to expect the move up to end any time after prices penetrated through 3,000, and difficult to expect them to reach 5,000.

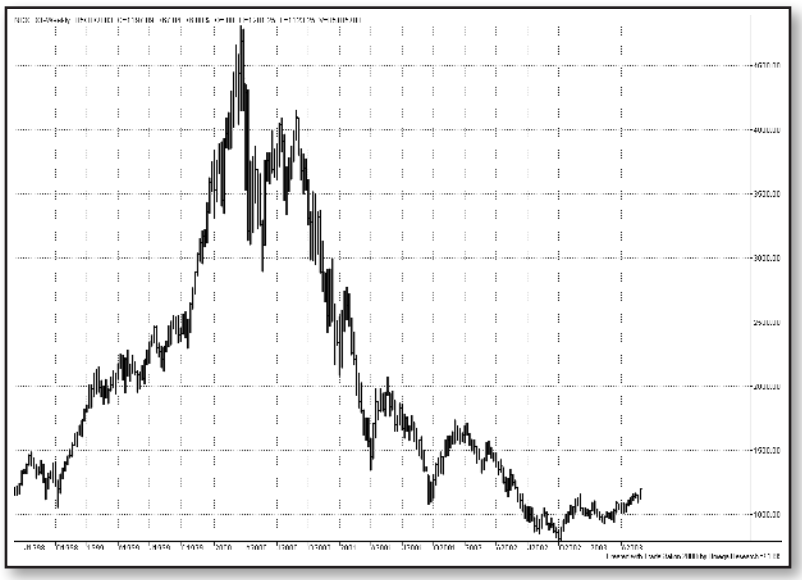

FIGURE 1.21 A V-top in the NASDAQ Index, March 2000.

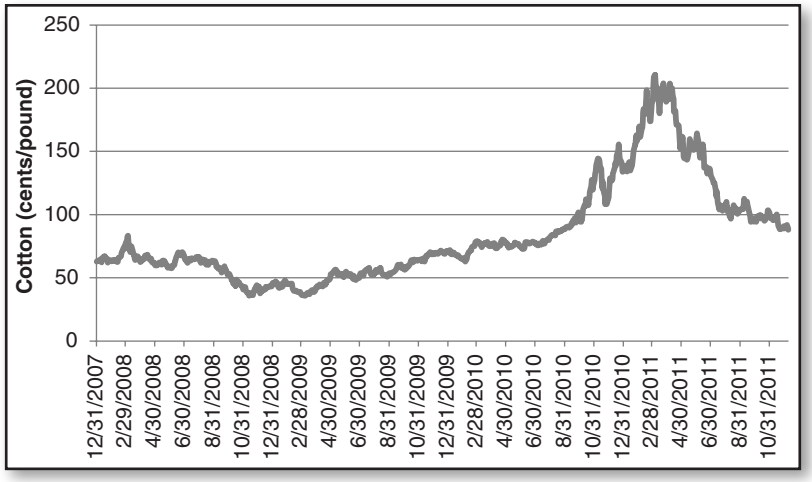

FIGURE 1.22 Cash Cotton Prices Showing V-Top in Early 2011.

Recently, there have been runs in many commodities, but cotton stands out as exceptional. Flooding in both Pakistan and Egypt has greatly reduced the supply causing prices to soar. Figure 1.22 shows prices in February 2011 at levels four times the normal price and a top has not yet formed. Normally, supply shortages in agricultural markets correct by the next season, but the current run has been so extensive that it may take more time to resolve. Inevitably, it will be solved in the same way, over one or two crop years.

The psychology of the runaway market is fascinating. In some ways, every *V*-top shares a similarity with the examples in Mackay's *Extraordinary Popular Delusions and the Madness of Crowds*. When beef is in short supply, the result of higher feed costs, the consumers do not tend to consider pork, fowl, or fish as an adequate substitute and will accept increased costs longer than expected. This is called *inelastic demand*. As prices near the top, the following changes occur:

- The cost becomes an increasing factor in the standard household budget.
- Rising prices receive more publicity.
- Movements for public beef boycotts begin.
- Grain prices decline due to the new harvest.

This becomes a matter explained by the *Theory of Elasticity*. It can be applied to the 1973 soybean, 1980 silver, and the recent cotton markets. The theory is based on the principle that when prices get high enough, four phenomena occur:

1. Previously higher-priced substitutes become practical (synthetics for cotton, reclaimed silver).
2. Competition becomes more feasible (corn sweetener as a sugar substitute, alternate energy).
3. Inactive operations start up (Southwest gold mines, marginal production of oil).
4. Consumers avoid the products (beef, bacon, silver, cotton).

Consequently, the demand suddenly disappears (the same conclusion arrived at by economists).

Announcements of additional production, more acreage, new products, boycotts, and a cancellation of orders all coming at once cause highly inflated prices to reverse sharply. These factors form a *V*-top that is impossible to anticipate with reasonable risk. There is a natural reluctance to cash in on profits while they are still increasing every day. The situation becomes even more perilous at the end of the move when more investors join the party. These latecomers who entered their most recent positions near the top will show a loss immediately and will need to get out of the trade first; they cannot afford a continued adverse move. Once a reversal day is recognized, there is a mad rush to liquidate. The large number of investors and speculators trying to exit at the same time causes the sharpness in the *V*-top and extends the drop in prices. There is a liquidity void at many points during the decline where there are no buyers and a long line of sellers. A *V*-top or *V*-bottom is always accompanied by high volatility and usually high volume. When the *V*-top is particularly extreme, it is commonly called a *blow-off*. A true *V*-top or *V*-bottom will become an important medium- or long-term high or low for that market.

Two V-Tops in Amazon.com There is a classic *V*-top in Amazon.com during January 1999, shown in Figure 1.23, and another potential, smaller formation in April. This second one looked as though it was a *V*-top for two days, then quickly disappeared into a broader formation of no particular pattern. A *V*-top cannot be recognized after only a 1-day downturn. The final peak seen in Amazon in late April 1999 is broader than a classic *V*-top but could still be labeled the same.

FIGURE 1.23 Classic V-Top in Amazon, January 1999, and Two Other Tops.

When trading, you would expect rising prices to fail when they approach the level of a previous clear *V*-top, which forms significant resistance. In Figure 1.23, where prices began the second *V*-top, declined for two days, rallied for the next three days, then dropped sharply for two days, we would normally expect a further decline. In this case, prices made another attempt to break the highs, succeeded, then collapsed. After the last peak, it will be necessary to wait until the price falls below the support level at $75 in order to confirm the downward break, having been fooled on the previous move.

***V*-Bottoms** *V-bottoms* are much less common than their upside counterparts. They occur more often in commodity markets where supply and demand can change dramatically and leverage causes surges of buying and selling. Both *V*-tops and *V*-bottoms should be read as a sign that prices have gone too far, too fast. Both buyers and sellers need time to reevaluate the fundamentals to decide where prices should be. *V*-bottoms are usually followed by a rebound and then a period of sideways movement. Two good examples can be found in the crude oil chart, Figure 1.24, and in the stock market crash of October 1987.

Double and Triple Tops and Bottoms

The experienced trader is most successful when prices are testing a major support or resistance level, especially an all-time high in a stock or a contract or seasonal high or low in futures. The more often those levels are tested, the clearer they become and the less likely prices will break through to a new level without additional fuel. This fuel comes in the form of higher earnings or a change in the fundamental supply and demand factors.

A *double top* is a price peak followed, a few days or weeks later, by another peak, and stopping very close to the same level. A *double bottom*, more common than a double

FIGURE 1.24 Two V-Bottoms in Crude Oil.

top, occurs when two price valleys show lows at nearly the same level. Because prices are more likely to settle for awhile at a lower price than a high one, prices often test a previous support level causing a double bottom.

Tops and bottoms occur at the same level because traders believe that the same reason that caused prices to fail to go higher the first time will be the reason they fail the second time. The exceptionally high or low prices are the result of speculation rather than fundamentals. In the same way that some stocks will trade at price/earnings ratios far above any rational assessment of business prospects in the near future, commodity prices can be pushed to extremes by crowd psychology without regard to value. Traders, looking for a place to sell an unreasonably high price, target the previous point where prices failed. Although a classic double top is thought to peak at exactly the same price, selling in anticipation of the test of the top may cause the second peak to be lower than the first. Figure 1.25 shows one type of double top in crude oil. While some double tops are two sharp peaks, this one looks as though it was gathering energy. It penetrated slightly above the previous high, but could not sustain higher prices. Double tops are rarely perfect.

Double Bottoms Bottoms are more orderly than tops. They should be quiet rather than volatile. They are caused by prices reaching a level that is low enough for the normal investor to recognize that there is little additional downside potential. Economists might call this the *point of equilibrium.* Neither buyers nor sellers are convinced that prices will continue to move lower. They wait for further news.

Double bottoms will often test the same price level because large-position traders and commercial users of commodities accumulate more physical inventory, or

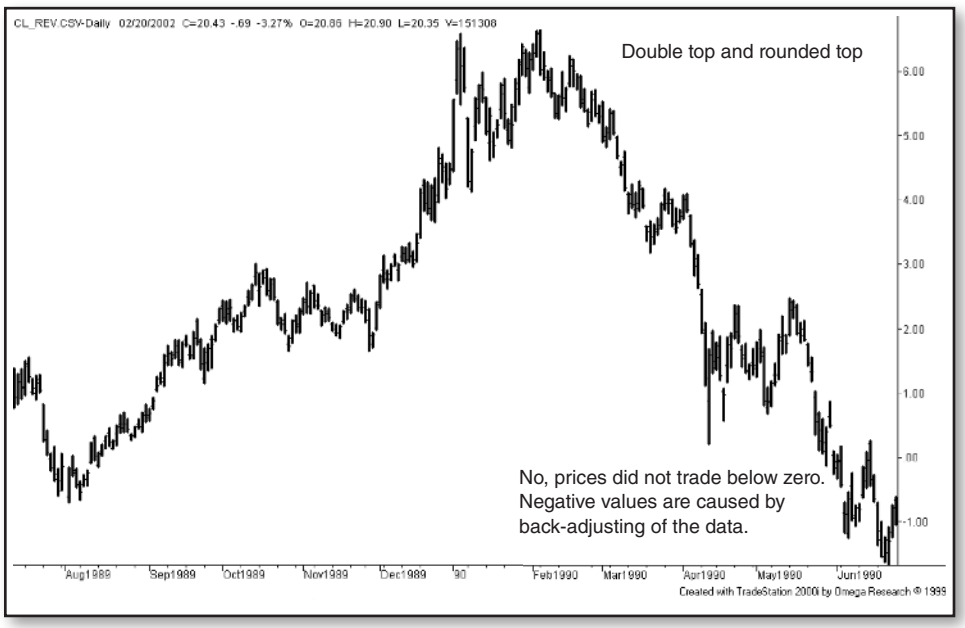

FIGURE 1.25 A Double Top in Crude Oil.

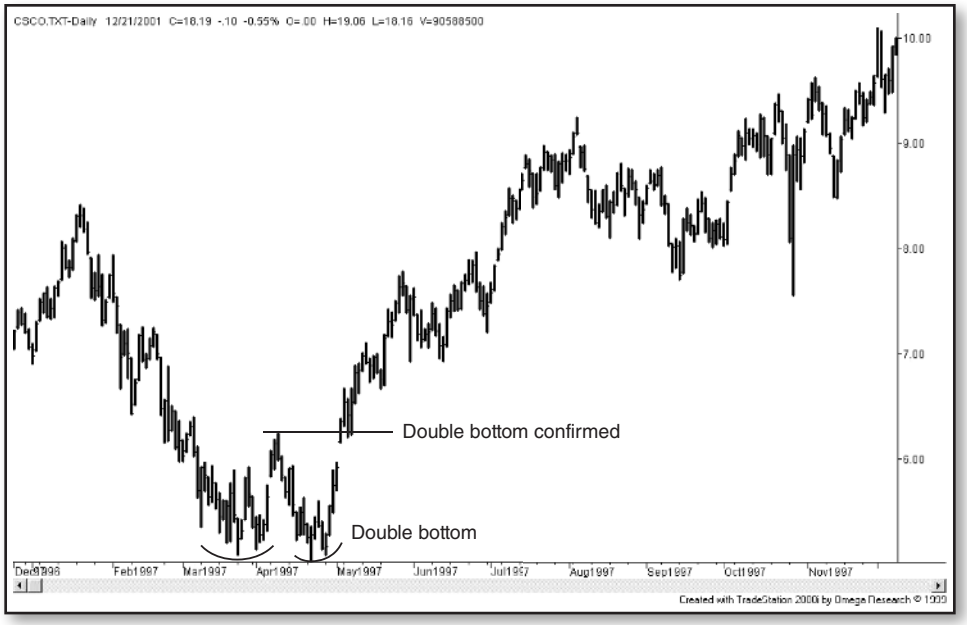

FIGURE 1.26 A Double Bottom in Cisco.

increase their futures position, each time the price falls to their target level. Once prices are low, there is less chance of absolute loss. Selling a double top can be very risky. The greatest risk when buying a double bottom is that your timing is wrong. If prices do not rally soon, you have used your capital poorly.

Cisco shows a double bottom in Figure 1.26, although it lacks the clear decline in volatility that we would like to see, and which accompanies commodities when they reach a price level near the cost of production. The small spikes down show four attempts to go lower, followed by a faster move up. When prices cross above the highs formed between the two bottom patterns, we have a completion, or *confirmation,* of the double bottom.

Traders will start to buy a double bottom when prices slow near previous low levels. They will also look for declining volume or confirmation in the stock price of another related company or a related sector ETF. Waiting for the breakout above the highs of the bottom formation is a safer signal for a conservative trader, but lost opportunity for a more active one.

Triple Tops and Bottoms *Triple tops* and *triple bottoms* are considerably less common than double tops and bottoms; however, of the two, bottoms can be found more readily. Figure 1.27 shows a classic triple top in natural gas. A triple top can be formed from a *V*-top, but in this case, the first peak is an island reversal, the second is a spike, and the third an extended top that ends the move.

If we did not have the advantage of seeing the triple top afterwards, each of the individual tops would look as if it were the end of the move. After the first island reversal prices dropped $2; after the second peak there was another large gap down and a 1-day loss of more than $1. High volatility is normally associated with an extreme top. By waiting for a confirmation of a decline after the single or double top,

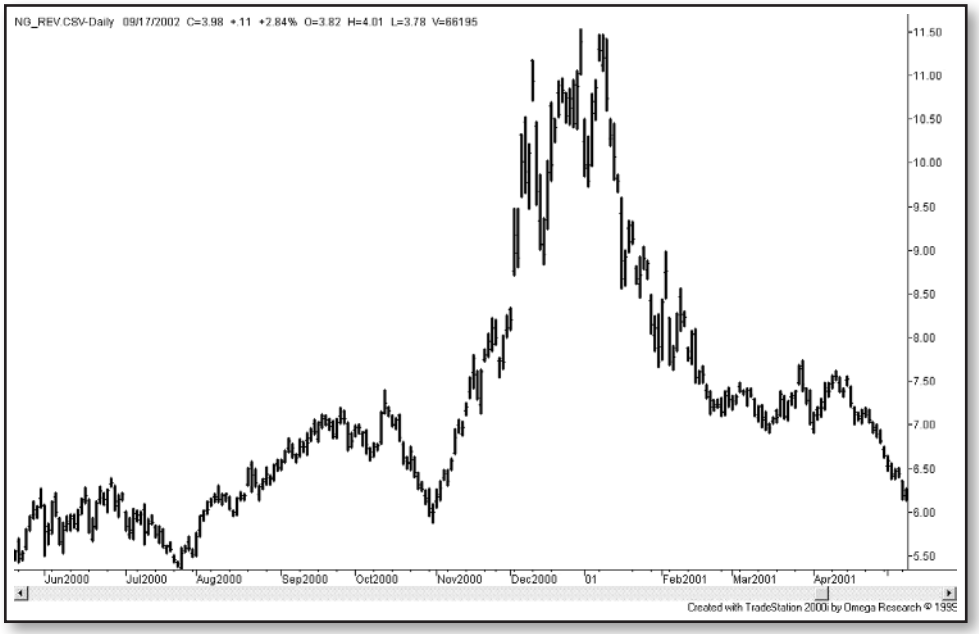

FIGURE 1.27 Natural Gas Shows a Classic Triple Top.

the trade would have been entered $1.50 to $2.50 below the top, and that position would be held while prices reversed to test the highs. Selling tops is risky business.

A triple bottom that can be traded is most likely to occur at low prices and low volatility, much the same as a double bottom. They show an inability to go lower because investors are willing to accumulate a position at a good value. For commodities, it is a good place for a processor to accumulate inventory.

The Danger of Trading Double and Triple Tops There are many examples of double tops and a smaller number of triple tops. Ideally, there is a lot of money to be made by selling tops at the right place. However, the likelihood of this good fortune happening is less than it appears. Consider why a triple top is so rare. It is because prices continue higher and the potential triple top disappears into a strong bull market pattern.

This happens even more often with double tops. Every time a price pulls back from new highs, then starts moving up again, there is a potential double top. In a prolonged bull market, many double tops disappear in the move higher. Selection of the double top becomes important. This is done using volume, volatility, support, and resistance, and sometimes common sense. These confirming indicators are discussed throughout this book. Until then, it is important to recognize the difficulty of deciding whether the current pattern will be a single, double, or triple top, or simply a pause in a bull market. Although we would all like to be a seller at the highs, these tops are best sold after they are confirmed, that is, after a decline proves that the top has occurred. Even then, a new high should cause a fast exit from the trade.

As with other chart patterns, declining volume would be a welcome confirmation after the formation of the first top and would accompany each additional test of the top.

Extended Rectangle Bottom

Many of the important chart formations can be traded using a penetration of one of the support or resistance lines as a signal. Those with the most potential profitability occur on breakouts from major top or bottom formations. The simplest of all bottom formations, as well as one that offers great opportunities, is the *extended rectangle* at long-term low price levels. Fortunes have been made by applying patience, some available capital, and the following plan:

1. Find a market with a long consolidating base and low volatility. In July 2002 Amazon.com reaches a low with volatility declining. In futures, crude oil remained at low prices for 13 years, as seen in Figure 1.28. The bottom can be confirmed by a decrease in the open interest. When evaluating interest rates, consider using the yield rather than the price.
2. *Buy* whenever there is a test of its major support level, placing a stop-loss to liquidate all positions on a new low price. Increasing volume should confirm the buying, and with futures markets the upside breakout should be accompanied by increasing open interest. For crude oil, the resistance was between $21 and $22 because OPEC had set its OGSP (*Official Government Selling Price*) between $18 and $22.
3. After the initial breakout, buy again when prices pull back to the original resistance line (now a support level). Crude rallied from the lows to just under $40 before pulling back to the old resistance level at $19. Close out all positions if prices penetrate back into the consolidation area and start again at Step 2.
4. Buy whenever there is a major price correction in the bull move. These adjustments, or pullbacks, will become shorter and less frequent as the move

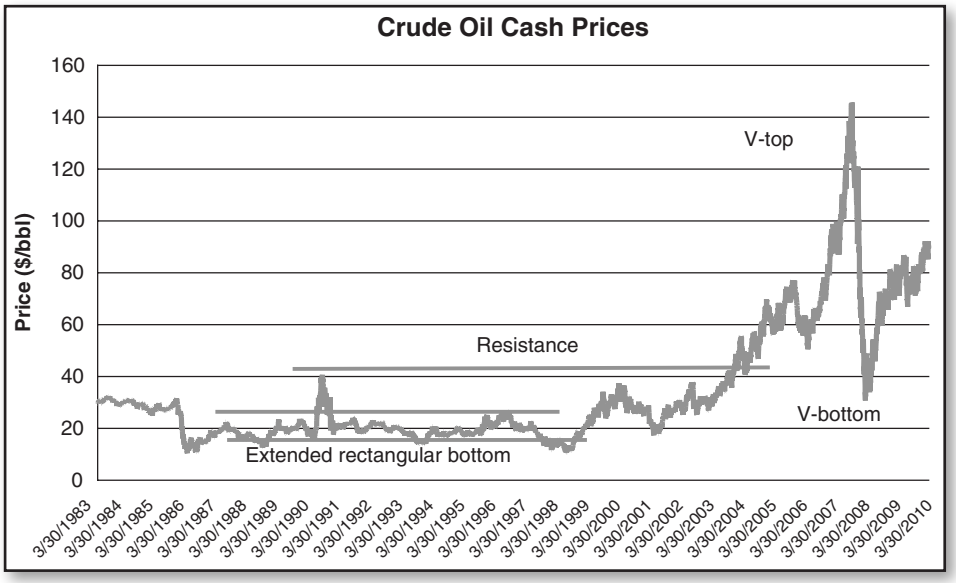

FIGURE 1.28 An Extended Rectangular Bottom in Crude Oil from 1986 through 1999.

develops. They will usually be proportional to current volatility or the extent of the price move as measured from the original breakout.

5. Liquidate all positions at a prior major resistance point, a top formation, or the breaking of a major bullish support line.

Building positions in this way can be done with a relatively small amount of capital and risk. The closer the price comes to major support, the shorter the distance from the stop-loss; however, fewer positions can be placed. In his book *The Professional Commodity Trader*, Stanley Kroll discussed "The Copper Caper—How We're Going to Make a Million," using a similar technique for building positions. It can be done, but it requires patience, planning, and capital. The opportunities continue to be there.

This example of patiently building a large position does not usually apply to bear markets. Although there is a great deal of money to be made on the short side of the market, prices move faster and may not permit the accumulation of a large position. There can also be exceptionally high risk caused by greater volatility. The only pattern that allows for the accumulation of a large short position is the rounded top, discussed in the next section. Within consolidation areas for commodities at low levels, there are a number of factors working in your favor: the underlying demand for a product, the cost of production, government price support (for agricultural products), and low volatility itself. There is also a clear support level that may have been tested many times. A careful position trader will not enter a large short-sale position at an anticipated top when volatility is high, but instead will join the buyers who contribute to the growing volume and open interest at a well-defined major support level.

Rounded Tops and Bottoms

When prices change direction over a longer time period they can create a rounded top or bottom pattern. A *rounded top* reflects a gradual change in market forces from buyers to sellers. In the stock market it is also called *distribution*. It is a clear sign that any attempt to move prices higher has been abandoned. Rounded tops often lead to faster and faster price drops as more investors liquidate their long positions or initiate shorts.

In Figure 1.29 we see two classic rounded tops in the German DAX stock index. The first is an example of gathering downside momentum as more investors become aware of the decline. Prices drop faster after a break of the double bottom. The rounded top offers a rare opportunity to accumulate a short position with relatively low volatility.

Rounded Bottom A rounded bottom, similar to a rounded top, is an extended formation where prices gradually turn from down to up. In Figure 1.30 we see a rounded bottom in the Japanese yen followed by a breakaway gap. Similar to the extended rectangle, the rounded bottom offers traders an opportunity to accumulate a large long position. In this case, the sharp rally as prices move through the high of the rounded bottom, followed by a runaway gap, clearly marks the end of

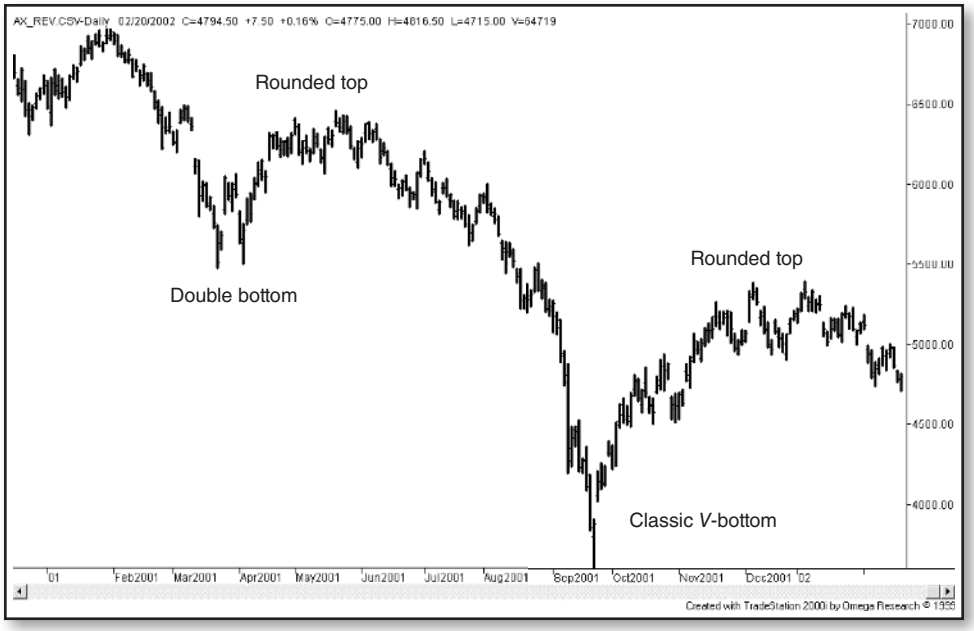

FIGURE 1.29 Two Rounded Tops in the German DAX Stock Index.

the rounded bottom. The breakout can be interpreted as a change in the supply and demand balance. A breakout, whether in stocks or futures, indicates that something new has entered the picture.

FIGURE 1.30 A Classic Rounded Bottom in the Japanese Yen.

Wedge Top and Bottom Patterns

We have seen a wedge formation as a continuation pattern in Figure 1.20, but a large ascending wedge can mark the top of a move and a large descending wedge the bottom. The dominant characteristic of the wedge is that volatility is declining towards the end. In Figure 1.31 there is a declining wedge in the Japanese yen. Volatility compresses until a breakout is inevitable. If the breakout had been to the downside, this wedge would have been interpreted as a continuation pattern. In this example, a breakout in the opposite direction is a strong indicator of a major reversal.

Head-and-Shoulders Formation

The classic top and bottom formation is the *head and shoulders,* accepted as a major reversal indicator. This pattern, well known to chartists, appears as a left shoulder, a head, and a right shoulder, seen in Figure 1.32. The head-and-shoulders top is developed with the following five characteristics:

1. A strong upward breakout reaching new highs on increasing volume. The pattern appears to be the continuation of a long-term bull move.
2. A consolidation area formed with declining volume. This can look much like a descending flag predicting an upwards breakout, or a descending triangle indicating a downwards breakout.
3. Another upwards breakout on continued reduced volume forms the head. This is the key point of the formation. The new high is not confirmed by increased volume, and prices drop quickly.

FIGURE 1.31 A Large Declining Wedge Followed by an Upside Breakout in the Japanese Yen.

FIGURE 1.32 Head-and-Shoulders Top Pattern in the Japanese Nikkei Index.

4. Another descending flag or triangle is formed on further reduced volume, followed by a minor breakout without increased volume. This last move forms the right shoulder and is the third attempt at new highs for the move.
5. The lowest points of the two flags, pennants, or triangles become the *neckline* of the formation. A short sale is indicated when this neckline is broken.

Trading Rules for Head and Shoulders There are three approaches to trading a head-and-shoulders top formation involving increasing degrees of anticipation:

1. *Wait for a confirmation.*
   a. Sell when the final dip of the right shoulder penetrates the neckline. This represents the completion of the head-and-shoulders formation. Place a stop-loss just above the entry if the trade is to be held only for a fast profit, or place the stop-loss above the right shoulder or above the head in order to liquidate on new strength, allowing a longer holding period.
   b. Sell on the first rally after the neckline is broken. (Although more conservative, the lost opportunities may outweigh the improved entry prices.) Use the same stops as in Step la.
2. *Anticipation of the final shoulder.*
   a. Sell when the right shoulder is being formed. A likely place would be when prices have retraced their way half the distance to the head. A stop-loss can be placed above the top of the head.

b. Wait until the top of the right shoulder is formed and prices appear to be declining. Sell and place a stop either above the high of the right shoulder or above the high of the head.

Both steps 2a and 2b allow positions to be taken well in advance of the neckline penetration with logical stop-loss points. Using the high of the head for a protective stop is considered a conservative approach because it allows the integrity of the pattern to be tested before the position is exited.

3. *Early anticipation of the head.*
Sell when the right part of the head is forming, on the downwards price move, with a stop-loss at about the high of the move. Although this represents a small risk, it has less chance of success. This approach is for traders who prefer to anticipate tops and are willing to suffer frequent small losses to do it. Even if the current prices become the head of the formation, there may be numerous small corrections that will look like the market top to an anxious seller.

Volume was a recognized part of the classic definition of the head-and-shoulders formation and appeared in Robert D. Edwards and John Magee's *Technical Analysis of Stock Trends,* published in 1948. This is no longer considered as important. There are many examples of successful head-and-shoulders formations that do not satisfy the volume criterion. Nevertheless, declining volume on the head or the right shoulder of a top formation must be seen as a strong confirmation of a failing upwards move, and is consistent with the normal interpretation of volume.

Episodic Patterns

There is little argument that all prices change quickly in response to unexpected news. The transition from one major level to another is termed an *episodic pattern*; when these transitions are violent, they are called *price shocks.* Until the late 1990s, there were very few price shocks in the stock market, the greatest being the one resulting from the terrorist attacks of September 11, 2001. Otherwise, price shocks can be caused by a surprising election result, the unexpected raising of interest rates by the Federal Reserve, the devaluation of a currency by an important Third World nation, sudden crop loss or natural disaster, or an assassination (or what we now call a *geopolitical event*). While price shocks are most common in futures markets, all markets are continually adjusting to new price levels, and all experience occasional surprises. Each news article, government economic release, or earnings report can be considered a mini-shock. A common price shock occurs when a pharmaceutical company's application for a new drug is unexpectedly rejected by the U.S. Department of Agriculture (USDA).

The pattern that results from episodic movement is exactly what one might expect. Following the sharp price movement, there is a period when volatility declines from its highs, narrowing until a normal volatility level is found and remaining at that level. In the Raytheon reaction to 9/11, the upwards price shock, shown in Figure 1.33 is followed by a volatile, unstable few days and then a steady decline in volatility as some level of equilibrium is found. The Raytheon price reacted opposite to most

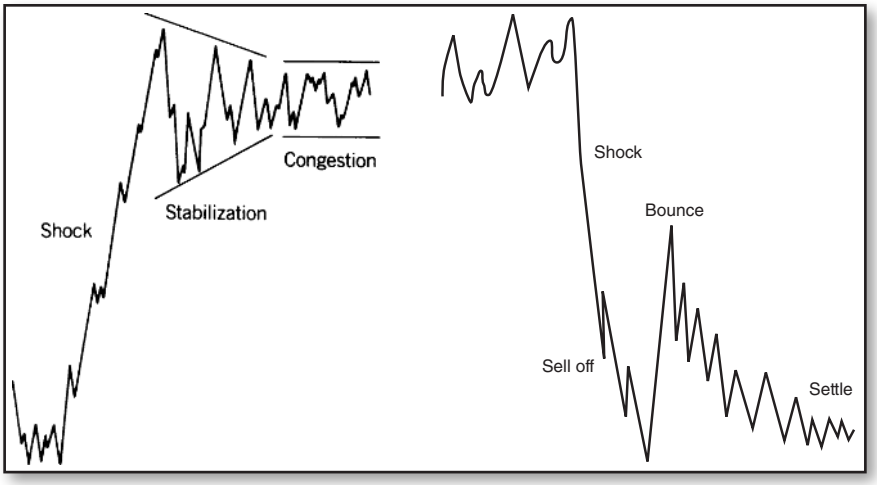

FIGURE 1.33 Episodic Pattern Shown in an Upward Price Shock in Raytheon Following 9/11/2001.

other stocks because it is a defense contractor, and a terrorist attack implies an increased amount of business from the government.

Unless the news that caused the price shock was an error, in which case prices immediately move back to levels prior to the news, prices will settle in a new trading range near the extreme highs or lows. It will take time for the market to absorb the consequences of the news, and many traders will find the risk too high to participate.

Price shocks have become the focus of much analytic work. Because a price shock is an unpredictable event, it cannot be forecast. This has a critical effect on the way in which systems are developed, especially with regard to the testing procedures. We understand at the time of the price shock that the event was entirely unexpected. However, years later, when the same prices are analyzed using a computer program, you might find that a trend or charting pattern *predicted* this move. The analysis records the profits as though they were predictable and you are now basing your conclusions on a false premise.

Price Objectives for Bar Charting

Most traders set price objectives and use them to assess the risk and reward of a potential trade. Objectives are most reasonable for short-term trading and successful objectives are based on straightforward concepts and not complex calculations. There is also a noticeable similarity between the price objectives for different chart patterns.

The simplest and most logical price objective is a major support or resistance level established by previous trading. When entering a long position, look at the most well-defined resistance levels above the entry point. These have been discussed in previous sections of this chapter. When those prior levels are tested, there is generally a technical adjustment or a reversal. The more well-established the support or resistance level, the more likely prices will stop. In the case of a strong upwards move,

volatility often causes a small penetration before the setback occurs. A penetration of support or resistance, followed by a return to the previous trading range is considered a confirmation of the old range and a false breakout. Placing the price objective for a long position below the identifiable major resistance level will always be safe. The downside objective can be identified in a similar manner: Find the major support level and exit just above it.

When trading with chart patterns, it pays to be flexible. Regardless of which method you use to identify a profit target, be prepared to take profits sooner if the market changes. For example, you have entered a long in IBM at $160 and set your profit objective at $200. Prices move as predicted and reach $195 when volume starts to drop and the price pattern seems to move sideways. An experienced trader will say "close enough" and take the profit. Profit objectives are not perfect, only good guidelines. If you have set a single price target for a long position, and it falls slightly above a resistance level, then the lower resistance level should be used as the price objective.

Rather than rely on a single point, traders will fan out their target points around the most likely objective, dividing their goal into three or five levels. As each profit-target is reached the risk of the current trade is reduced as is the likelihood of turning a profit into a loss.

While waiting for prices to reach the objective, remember to watch for a violation of the current trend; trend changes take priority over profit objectives. If the trade is successful, and the goal is reached as expected, watch for a new pattern. If prices decline after the trade is closed out, then reverse and break through the previous highs or lows, the position may be reentered on the breakout and a new price objective calculated.

Common Elements of Profit Objectives

Most chart formations have a price objective associated with them. The common ground for all of them is volatility. Each chart pattern is larger or smaller because of the current price volatility; therefore, the price targets derived from these formations are also based on volatility. In general, the *price objective reflects the same volatility as the chart formation* and is measured from the point where prices break out of the pattern.

Profit Targets for Consolidation Areas and Channels

The most basic of all formations is the horizontal consolidation area, bounded on the top and bottom by a horizontal resistance and support lines. There are two possible profit targets, shown in Figure 1.34.

1. For any *horizontal consolidation pattern,* the target is above the breakout of the resistance line at a point equal to the height of the consolidation area (the resistance level minus the support level added to the resistance level). That makes the expected move equal to the extreme volatility of the consolidation area.
2. With *extended rectangular formations,* the upwards profit target is calculated as the width of the consolidation pattern added to the support level.

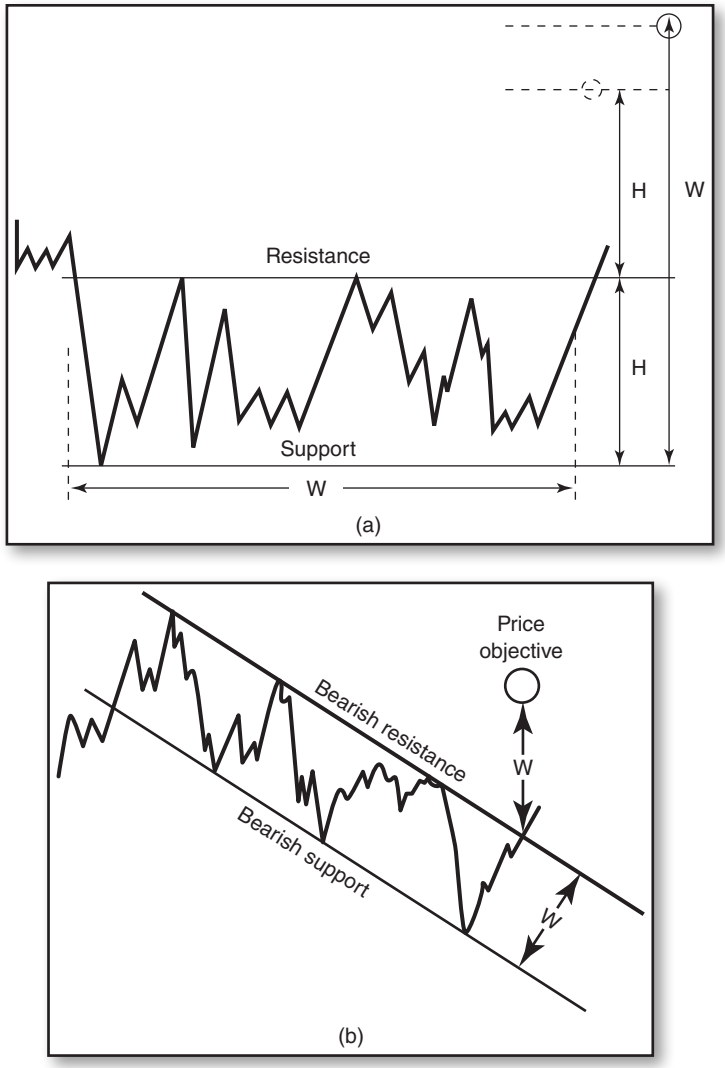

FIGURE 1.34 Price Objectives for Consolidation Patterns and Channels. (a) Two objectives for consolidation patterns. (b) Price objective for a channel.

Although price objective (2) is a well-known and popular calculation, it is unrealistic when the extended formation is very prolonged. The standard calculation, given in (1), is more reasonable. A third objective is more conservative but even more practical:

3. Use the average volatility of the consolidation formation, or reduce the target in (1) above by 20% to remove the extremes from influencing the objectives. A closer price target will be reached more often.

The price objective for a channel is the same as the traditional objective for a horizontal consolidation pattern. Because the channel is at an angle, it is necessary

to measure the width of the channel as perpendicular to the angled support and resistance channel lines; then project that width upwards from the point of breakout. The length of the channel does not change the profit target. Again, you may want to make the target slightly smaller than the original channel.

Changing Price Objectives Using Channels Price objectives can be found as trends change and new channels are formed. Figure 1.35 shows the change from an upwards to a downwards trend. Once a breakout of an upwards channel has occurred (marked "First point of reversal"), we wait until the low is reached at *a*, followed by the reaction back up to *b*. A resistance line, 1*R,* can be drawn from the prior high *h* to the top of the latest move *b*. A line, 1*S,* can be constructed parallel to 1*R* passing through point *a*, forming the initial downward channel. Price objective 1 is on line 1*S* of the new channel and is used once the top at point *b* is determined. Price objective 1 cannot be expected to be too precise due to the early development of the channel. If prices continue to point *c* and then rally to *d,* a more reasonable channel can now be defined using trendlines 2*R* and 2*S*. The support line will again become the point where the new price objective is placed. The upper and lower trendlines can be further refined as the new high and low reactions occur. The primary trendline is always drawn first; then the new price objective becomes a point on the parallel trendline.

Targeting Profits after Tops and Bottoms

Because profit targets are based on the volatility of the underlying pattern, the profit targets for all top and bottom formations will seem very much the same. Looking back at Figure 1.27, natural gas, there is a triple top formation. Between each top is a reversal marking an important support level. The first pullback after the island reversal brought prices to 8.20, followed by a test of the top that formed the second peak. The second retracement stopped at 9.00 and was followed by the third peak. When prices finally drop through the highest support level at 9.00, we can treat it as a breakout and sell short.

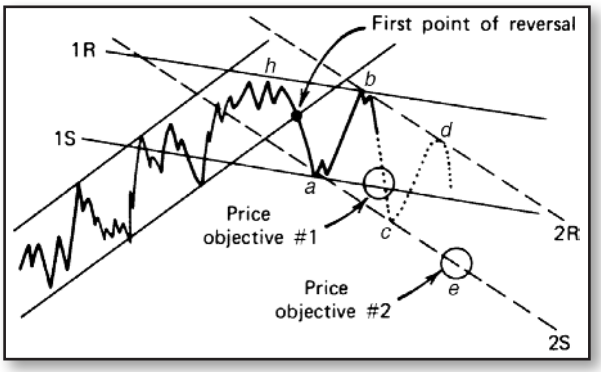

FIGURE 1.35 Forming New Channels to Determine Objectives.

If this chart showed a double top, then the point where prices fall below the support between two tops *confirms the top.* Breaking this support level indicates that the topping formation is completed. But this was not a double top; therefore, we can take the lower of the two support levels between the three tops as the major confirmation of the pattern. In the natural gas chart, the lower support was at 8.20. Using either support level gives a measurement of the triple top pattern based on the volatility of prices.

Calculating the Profit Target for a Top Formation

The profit target is found by measuring the height of the top formation and projecting it downwards from the point where the top is confirmed, that is, the break of the support level. For this example, profit targets will be calculated based on each of the support levels. The highest price of the move is 10.75. Let's examine two profit targets:

1. Using the support level of 9.00, the height of the top is 10.75 – 9.00, or 1.75. Projecting that downwards from the breakout point of 9.00 gives a profit objective of 7.25. The first major pause in the price drop stopped at about 7.00, still showing high volatility.
2. Based on the second support level of 8.20, the height of the top is 2.65, and the profit objective, measured from the break at 8.20, is 5.55. Prices reach 5.55, but only after stalling at about 6.50.

The first target is very achievable and realistic. Prices are very volatile, and a drop of 1.75 could occur very quickly. The second target is less realistic. When targeting a much larger decline, and beginning at a much lower point, it is unrealistic to expect volatility to continue at the same high level. In the decline of natural gas from January through March, volatility also declines, so that by March it appears as though the move is over. Although price targets can often be correct, those that are far away will be less reliable.

Profit Targets after a Bottom Formation The same principle can be applied to calculate the profit target for bottom formations. The distance from the lowest price of the bottom to the confirmation point is projected upwards from the breakout. This method can be applied to any type of bottom formation. In Figure 1.26, the double bottom in Cisco spanned the price range from about 5.00 to 6.25. The volatility of the bottom pattern, 1.25, is projected upwards from the breakout at 6.25 to get the target of 7.50. Because volatility should expand as prices rise, the exact volatility calculation can be used as a conservative measure.

The Head-and-Shoulders Price Objective In keeping with other price targets, the head-and-shoulders top has a downside objective, which is also based on its volatility. This objective is measured from the point where the right shoulder penetrates the neckline and is equal to the distance from the top of the head to the neckline (Figure 1.36). For a major top, this goal seems modest, but it will be a good measure of the initial reaction and is generally safe, even if a new high price is reached later.

A very similar example can be found in the Japanese yen (Figure 1.30). The neckline also angles up and to the right, and the price target finds the bottom of the first

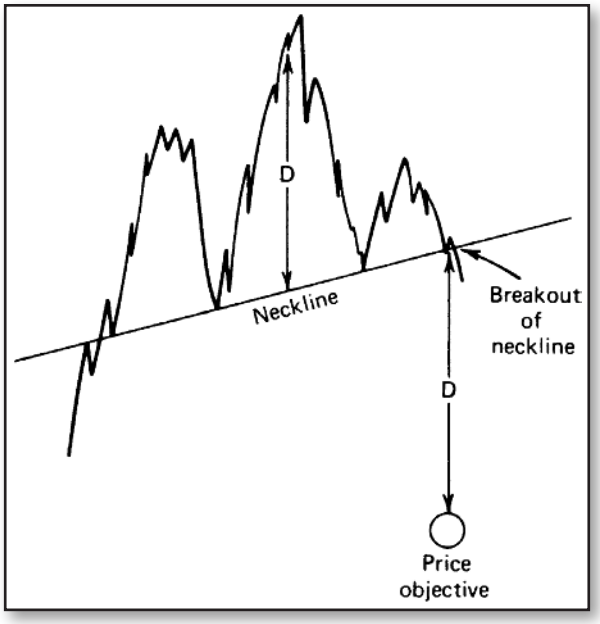

FIGURE 1.36 Head-and-Shoulders Top Price Objective.

major support level following the break of the right shoulder. The position of the price objective is so significant that the subsequent drop in prices creates a breakaway gap.

Triangles and Flags *Triangles* and *flags* have objectives based on volatility in a manner consistent with other patterns. The triangle objective is equal in size to the initial reaction, which formed the largest end of the triangle (Figure 1.37a). It may also be viewed as a developing channel rather than a triangle, with the ascending leg of the triangle forming the primary bullish trendline. The price objective then becomes the same as those used for channels.

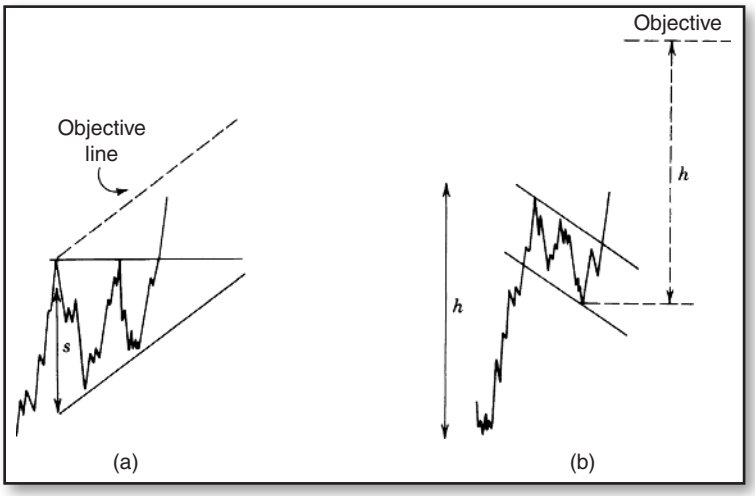

FIGURE 1.37 Triangle and Flag Objectives. (a) Triangle objective is based on the width of the initial sides. (b) Flag objective is equal to the move prior to the flag formation.

The flag is assumed to occur midway in a price move; therefore, the objective of a new breakout must be equal to the size of the move preceding the flag (Figure 1.37b). Recalling the comments on the problems associated with the decreasing volatility of the triangular formation, the use of the first reaction as a measure of volatility is a safe way to avoid problems. Using this technique with subsequent flags in a bull move will cause objectives to move farther away, becoming unrealistic.

The Rule of Seven Another measurement of price objectives, the *Rule of Seven*, is credited to Arthur Sklarew.[17] It is based on the volatility of the prior consolidation formation and computes three successive price objectives in proportion to one another. The Rule of Seven is not symmetric for both uptrends and downtrends. Sklarew believes that, after the initial leg of a move, the downtrend reactions are closer together than the reactions in a rising market. Because the downside of a major bear market is limited, it is usually characterized by consolidation. Major bull markets tend to expand as they develop.

To calculate the objectives using the Rule of Seven, first measure the length L of the initial leg of a price move (from the previous high or low, the most extreme point before the first pullback). The objectives are:

1. In an *uptrend*:
   Upwards objective 1 = prior low + ($L \times 7/4$)
   Upwards objective 2 = prior low + ($L \times 7/3$)
   Upwards objective 3 = prior low + ($L \times 7/2$)
2. In a *downtrend*:
   Downwards objective 1 = prior high − ($L \times 7/5$)
   Downwards objective 2 = prior high − ($L \times 7/4$)
   Downwards objective 3 = prior high − ($L \times 7/3$)

The three objectives apply most clearly to major moves. During minor price swings, it is likely that the first two objectives will be bypassed. In Sklarew's experience, regardless of whether any one objective is missed, the others still remain intact.

Implied Strategies in Candlestick Charts

For a technique that is reported to have been used as early as the mid-1600s, Japanese candle charts were slow to find their way into the western method of analysis. Candle charts can be related to bar charts but offer additional visual interpretation. The *candles* are created simply by *shading* the piece of the bar between the opening and closing prices: white if the close is higher than the open and black if the close is lower than the open. The shaded area is called the *body* and the extended lines above and below the body are the *shadows*. With this simple change, we get an entirely new way of looking at and interpreting charts. The patterns become much clearer than the Western style of line chart.

[17] Arthur Sklarew, *Techniques of a Professional Chart Analyst* (Commodity Research Bureau, 1980).

Although many candlestick patterns have equivalent bar chart formations, there is an implied strategy in many of them. The following summary uses the traditional candlestick names representing the significance of the formation (see Figure 1.38):

- *Doji,* in which the opening and closing prices are the same. This represents indecision, a temporary balancing point. It is neither bullish nor bearish. A *double doji,* where two dojis occur successively, implies that a significant breakout will follow.
- *Engulfing patterns* seem at first to be the same as outside days in bar charting, but the pattern only refers to the part of the bar between the opening and closing prices. Engulfing patterns are considered exceptionally strong signals of price change. A *bullish engulfing pattern* has a black candle followed by a white, indicating a wide range with a higher close. The *bearish engulfing pattern* is white followed by black, showing a lower close on the engulfing day.

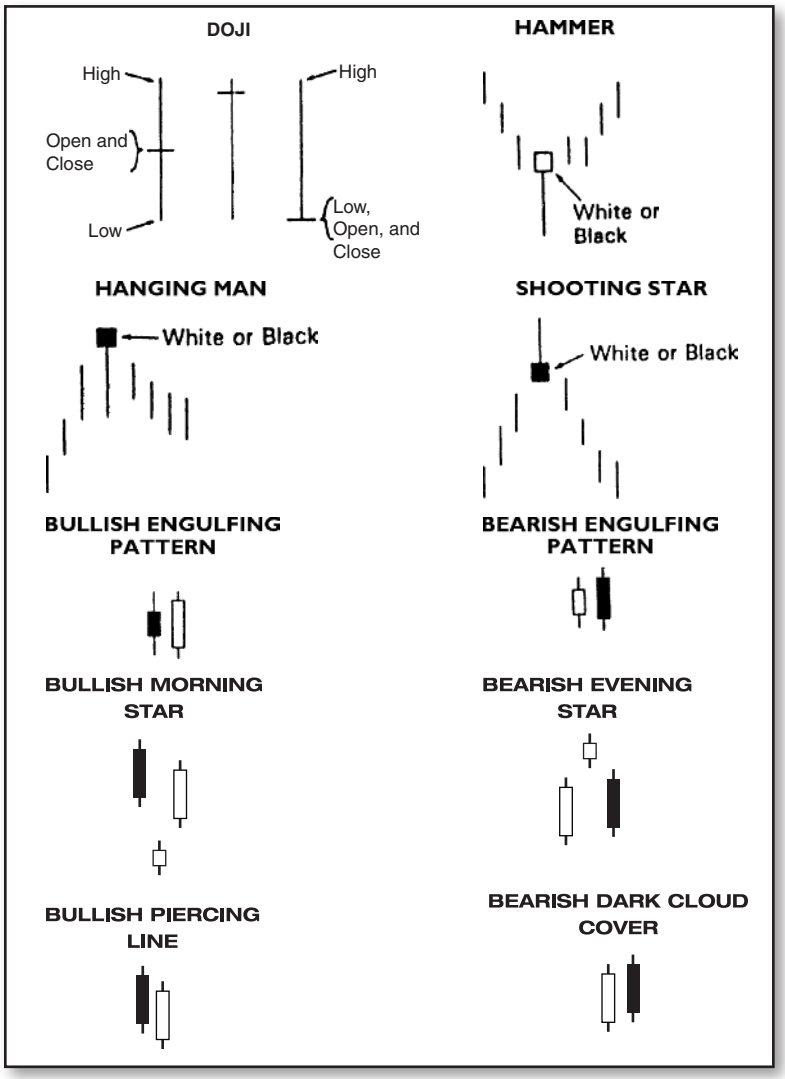

FIGURE 1.38 Popular Candle Formations.

- *Morning star* and *evening star* are 3-day patterns that show a similarity to an island reversal, but are more specific. In the morning star, a bullish reversal pattern, the first day has a lower close than the open, the second day (called the *star,* similar to the island bottom) has a higher close, and the final reversal day has an even higher close. The bearish reversal is just the opposite, with two higher closes followed by a reversal day with a lower close. If the star is also a doji, then the pattern has more significance.
- *Piercing line* and *dark cloud cover* are bullish and bearish reversals. The piercing line, a bullish reversal, begins with a black candle (a lower close) and is followed by a white candle in which the open is below the previous day's low and the close is above the midpoint of the previous day's body (the open-close range). The dark cloud cover is a bearish formation, the opposite of the piercing line.
- *Hammer*, a bullish reversal signal, showing the bottom of a swing, where the body is at the top of the candle, indicating an upwards change of direction, and the shadow is below the body. The body may be black or white.
- *Hanging man*, a bearish reversal pattern where the body of the candle represents the high of a swing, and the shadow lies below in the direction of the reversal. The body may be black or white.
- *Shooting star*, a bearish signal, also occurs at the top of a swing and has its body at the bottom of the candle with the shadow above. The body may be black or white.

Although these patterns are similar to Western bar chart formations, none of them are exactly the same. The hammer, hanging man, and shooting star are reversal patterns but can only be compared to the simple pivot point where the middle day is higher or lower than the bars on either side. None of these candle formations is exactly the same as a key reversal day or island reversal. The engulfing pattern is stronger than the typical outside day because the spanning of the prior day's range must be done only by the current day's open-close range.

The analysis of candle charts is a skill involving the understanding of many complex and interrelated patterns. For full coverage, Steve Nison's, *Japanese Candlestick Charting Techniques,* second edition, is recommended, as well as a selection of newer books, which can be found on Amazon.

Quantifying Candle Formations

The preciseness of the candle formations allow some patterns to be tested. The popular engulfing patterns can be defined exactly for a computer program as

Bullish engulfing pattern = Previous open > previous close and today's open < previous close and today's close > previous open

Bearish engulfing pattern = Previous close > previous open and today's open > previous close and today's close < previous open

Another technique uses the shadows as confirmation of direction. We can interpret an increase in the size of the upper shadows as strengthening resistance (prices

are closing lower each day); an increase in the size of the lower shadows represents more support. One way to look at this is by defining

Upper shadow (white) = high − close	Lower shadow (white) = open − low
Upper shadow (black) = high − open	Lower shadow (black) = close − low

The sequences of upper and lower shadows can be smoothed separately using a moving average to find out whether they are rising or falling.[18]

A method for determining whether black or white candles dominate recent price movement is to use only the body of the candle, $B = close - open$, and apply a momentum calculation:

$$Body\ momentum = \frac{B_{up}}{B_{up} + B_{down}}$$

where B_{up} = the sum of the days where $B > 0$ (body is white)
B_{down} = the sum of the days where $B < 0$ (body is black)
14 = the recommended number of days

When the body momentum is greater than 70, the whites dominate; when the value is below 20 the blacks dominate. These thresholds indicate a built-in upwards bias.

Morning Star and Evening Star Two formations that are easily programmed are the *morning star* (a bullish signal) and *evening star* (a bearish signal). Using the morning star as an example, the rules call for a long downward (black) candle followed by a lower (the open of the next bar less than the close of the previous long bar), less volatile white candle, and finally an upward thrust shown as a gap up body with the close higher than the open (another white candle).

When programmed (see *TSM Morning Star* and *TSM Evening Star* in the Companion Website), there are very few signals when we put restriction on the size of the bodies of the three days. Instead, we only required that the body of the first day be greater than the 20-day average, the second day less, and the third day greater. While there are still only a modest number of trades, the S&P performs well on the day following both patterns.

Qstick

As a way of quantifying the Candle formations, Tuschar Chande[19] created *Qstick*, a moving average of the body of the candle. It is intended to be an aid interpreting the charts but has simple trading rules as well.

$$\text{If } Body_t = Close_t - Open_t$$

and

$Q_t = average(period1, body)$, where *period1* is suggested as 8 days
$AvgQ_t = average(period2, Q)$, where *period2* is also 8 days

[18] Both "shadow trends" and "body momentum" are adapted from Tushar Chande and Stanley Kroll, *The New Technical Trader* (New York: John Wiley & Sons, 1994).
[19] Tushar Chande and Stanley Kroll, *The New Technical Trader* (New York: John Wiley & Sons, 1994).

Then the trading rules are

Buy when Q_t moves above $AvgQ_t$
Sell when Q_t moves below $AvgQ_t$

Pivot Points and Candle Charts

John L. Person suggests that the strategies inherent in candle formations can be combined with support and resistance levels derived from pivot points.[20] He uses the following calculations:

1. Pivot point, $P = (high + low + close)/3$
2. First resistance level, $R1 = (P \times 2) - low$
3. Second resistance level, $R2 = P + high - low$
4. First support level, $S1 = (P + 2) - high$
5. Second support level, $S2 = P - high + low$

Once a key formation for a top or bottom is recognized using candle charts, support and resistance levels calculated based on pivot points can be a strong indication of the extent of the following price move. Person used Dow futures to support his study.

The Best of the Candles

Bulkowski has summarized his own research in the success of various candles[21] as

- The best-performing candles had closing prices within $\frac{1}{3}$ of the bar low, followed by the middle and high, respectively.
- Candle patterns in a bear market outperform other markets, regardless of the breakout direction.
- Most candles perform best on days with higher volume.
- Candles with unusually long wicks outperform.
- Unusually tall candles outperform.

Practical Use of the Bar Chart

Trends Are Easier to See in Retrospect

As important as it is to identify the direction of price movement, it is much easier to see the trend afterward than at the moment it is needed. There is no doubt that all stocks and futures markets have short-term swings and longer-term bull and bear markets. Unfortunately, at the time you are ready to trade, it is not going to be clear

[20] John L. Person, "Pivot Points and Candles," *Futures* (February 2003).
[21] Thomas Bulkowski, "What You Don't Know About Candlesticks," *Technical Analysis of Stocks & Commodities* (March 2011).

whether the current price trend is a short-term pattern that is about to change or long-term persistent trend experiencing a temporary reversal.

The ease of seeing charts on a screen has made the past patterns clear. It seems natural to expect prices to trend in the future as clearly as they appear on a chart; however, it is not easy to do it in a timely fashion. The eye has a remarkable way of simplifying the chart patterns. The purpose of drawing a trendline is to recognize the direction even though prices can swing violently up and down during that trending interval. A new trend signal to buy or sell always occurs as the trend is changing; therefore, it is at the point of greatest uncertainty.

Success in systematic trading, whether using charts or mathematics, relies on consistency. In the long run, it comes down to probabilities. Success can be achieved by recognizing the trend in 60% of the cases. In a typical trend-following system, because individual profits are much larger than losses, it is only necessary to be correct 30% or 35% of the time.

Long-Term Trends Are More Reliable than Short-Term Trends

Charting is not precise, and the construction of the trendlines, other geometric formations, and their interpretation can be performed with some liberties. When using the simplest trendline analysis, it often happens that there is a small penetration of the channel or trendline followed by a movement back into the channel. Some think that this inaccuracy with respect to the rules makes charting useless; however, many experienced analysts interpret this action as confirmation of the trend. The trendline is not redrawn so that the penetration becomes the new high or low of the trend; it is left in its original position.

We must always step back and look for the underlying purpose in each method of analysis, whether interpretive or fully systematic. The trendline is an attempt to identify the direction of prices over some time period. Chartists can use a simple straight line to visualize the direction; they draw the uptrend by connecting the lowest prices in a rising market, even though each point used may represent varying levels of volatility and unique conditions. The chance of these points aligning perfectly, or forecasting the exact price support level, is small. A trendline is simply a guide; it may be too conservative at one time and too aggressive at another; and you won't know until after the trade is completed. Applied rigorously, charting rules should produce many incorrect signals but be profitable in the most important cases. The challenge of the chartist is to interpret the pattern of prices in context with the bigger picture.

Many price moves are called trends, but the most important and sustained trends are those resulting from government policy, in particular those that affect interest rates. Therefore, the most reliable trends are long-term phenomena because government policy develops slowly and is often long-term. During a period of recession, as we saw in 2001 and 2002, the Federal Reserve continued to lower interest rates incrementally, causing a major bull market in all fixed-income maturities. It is easiest to see this trend by looking at a weekly chart of the 10-year Treasury note, rather than an intraday, 1-hour chart. The more detail there is, the more difficult it is to see the long-term trend. Following the subprime collapse of 2008, the Fed and other central banks decided to lower rates to the

absolute minimum and keep them there as long as necessary to stimulate the economy. Ultimately, this will result in a protracted bull market in both stocks and commodities.

The average daily impact of the long-term trend on prices is very small. For example, if yields were to drop a staggering 2% in one year, a rise of approximately 16 full points in price, the net effect each day would be a change of .064%, or $\frac{2}{32}$ in price. If prices move nearly one full point, $\frac{1}{32}$ or 1%, each day, that upwards bias would be overwhelmed by the daily market noise. It would be difficult to draw a trendline on a daily price chart until prices had drifted higher for a few months. Using a weekly chart removes much of this noise and makes the trend easier to see.

Multiple Signals

Some of the impreciseness of charting can be offset with confirming signals. A simultaneous breakout of a short-term trendline and a long-term trendline is a much stronger signal than either one occurring at different times. The break of a head-and-shoulders neckline that corresponds to a previous channel support line is likely to receive much attention. Whenever there are multiple signals converging at, or near, a single price, whether based on moving averages, Gann lines, cycles, or phases of the moon, that point gains significance. In chart analysis, the occurrence of multiple signals at one point can compensate for the quality of the interpretation.

Pattern Failures

The failure to adhere to a pattern is equally as important as the continuation of that pattern. Although a trader might anticipate a reversal as prices near a major support line, a break of that trendline is significant in continuing the downward move. A failure to stop at the support line should result in setting short positions and abandoning plans for higher prices.

A head-and-shoulders formation that breaks the neckline, declines for a day or two, then reverses and moves above the neckline is another pattern failure. *Postpattern activity* must confirm the pattern. Failure to do so means that the market refused to follow through; therefore, it should be traded in the opposite direction. This is not a case of identifying the wrong pattern; instead, price action actively opposed the completion of the pattern. Wyckoff calls this "effort and results," referring to the effort expended by the market to produce a pattern that explains the price direction. If this pattern is not followed by results that confirm the effort, the opposite position is the best option.

Change of Character Thompson[22] discusses the completion of a pattern or price trend by identifying a *change of character* in the movement. As a trend develops, the reactions, or pullbacks, tend to become smaller. Traders looking to enter the trend wait for reactions to place their orders; as the move becomes more obvious, these reactions get smaller, and the increments of trend movement become larger. When the reaction

[22] Jesse H. Thompson, "What Textbooks Never Tell You," *Technical Analysis of Stocks & Commodities* (November/December 1983).

suddenly is larger, the move is ending; the change in the character of the move signals a prudent exit, even if prices continue erratically in the direction of the trend.

A similar example occurs in the way that prices react to economic reports or government action. The first time the Federal Reserve acts to raise rates after a prolonged decline, the market is not prepared, and interest rate prices react sharply lower. Before the next meeting of the Fed, the market may be more apprehensive, but is likely to be neutral with regard to expectation of policy. However, once there is a pattern of increasing rates following signs of inflation, the market begins to anticipate the action of the Fed. A sharp move in the opposite direction occurs when the government fails to take the expected action.

Bull and Bear Traps While it is not much of a consolation to those who have gotten caught, a failed downside breakout is called a *bear trap,* and a failed upwards breakout is a *bull trap.* A bear trap occurs when prices fall below a clear support line, generating sell signals. After a few days, prices move back above the support line, often accelerating upwards. A bull trap is a failed breakout of a resistance level. In both cases, prices appear to be continuing in the trend direction, but the final picture is a reversal. Although there is no advice on how to avoid bull and bear traps, the failed reversal should be recognized as soon as possible and the position should be reversed. Bull and bear traps often precede significant price reversals.

As with other top and bottom patterns, a confirmation of the bear trap is complete when prices move above the next higher resistance level. In the case of a failed flag formation in a downward trend, prices break lower, as expected, then reverse. The confirmation occurs when prices move above the top of the failed flag pattern. The same principle would be true of other failed chart formations; the failure is confirmed when prices retrace the entire pattern.[23]

Testing Your Skill

Recognizing a pattern is both an art and science. Not everyone has an eye for patterns; others see formations where no one else does. The first decision may be the most important: How much of the chart do you use? It is perfectly normal for different time intervals to show different trends. In some cases, arbitrarily cutting the chart at some previous date might cause a clear trend to disappear. The price scale (the vertical axis) of the chart is another variable not considered by some chartists. When applying methods requiring specific angles, the chart paper is expected to have square boxes. Because of the shape of the box, the formations may appear different from one piece of chart paper, or computer screen, to another.

The timeliness of the pattern identification is the most serious problem. Can the formation be interpreted in time to act on a breakout, or is the pattern only seen afterwards? At different stages of development, the lines may appear to form different

[23] See Christopher Narcouzi, "Winning with Failures," *Technical Analysis of Stocks & Commodities* (November 2001).

patterns. Before using your charting skills to trade, practice simulating the day-to-day development of prices using the following steps:

1. Hold a piece of the paper over the right side of the chart, covering the most recent months, or better still, have someone else give you the partial chart.
2. Analyze the formations.
3. Determine what action will be based on your interpretation. Be specific.
4. Move the paper one day to the right, or have someone else give you the next day's price.
5. Record any orders that would have been filled based on the prior day's analysis. Don't cheat.
6. Determine whether the new day's price would have altered your interpretation and trade.
7. Return to Step 3 until finished.

This simple exercise might save a lot of money but may be discouraging. With practice you will become better at finding and using formations and will learn to select the ones that work best. Very few traders base their trading decisions entirely on bar charts. Many refer to charts for confirmation of separate technical or fundamental analysis; others use only the most obvious major trendlines, looking for points at which multiple indicators converge. The general acceptance of bar charting analysis makes it a lasting tool.

Evolution in Price Patterns

A change has occurred in the stock market because of the S&P 500 index, SPDRs, and other index markets. If you think that stock prices are about to fall because of a pending interest rate announcement by the Fed, you can protect your portfolio by selling an equivalent amount of S&P futures. Afterwards, when you have decided that prices have stabilized, you can lift your hedge and profit from rising prices. It is an easy and inexpensive way to achieve portfolio insurance. You can also speculate in the S&P, NASDAQ, Dow, or sectors, rather than trade individual stocks.

When institutions and traders buy or sell large quantities of S&P futures, the futures price will drift away from the S&P cash index, which represents the weighted average of the actual component stock prices. *Program trading* is the process that keeps the price of futures and ETFs aligned with the cash price of the stocks that comprise those index markets. If you have enough capital, and the difference between the S&P futures price and the S&P cash index is sufficiently large, with the futures higher than the cash, you can sell the S&P futures and buy all of the stocks in the S&P 500 cash index. It is a classic arbitrage that brings prices back together. It is all done electronically in seconds.

But the ability to buy or sell all the stocks in the S&P at the same time has changed the patterns of individual stocks that are part of the S&P index. While at one time these stocks moved largely due to their own fundamentals, they now all move together. It no longer matters that IBM is fundamentally stronger than GE, or that Xerox is at a resistance level and Ford is at support, or even if a company is under investigation. When you buy the S&P futures, you buy all of the stocks at the same time.

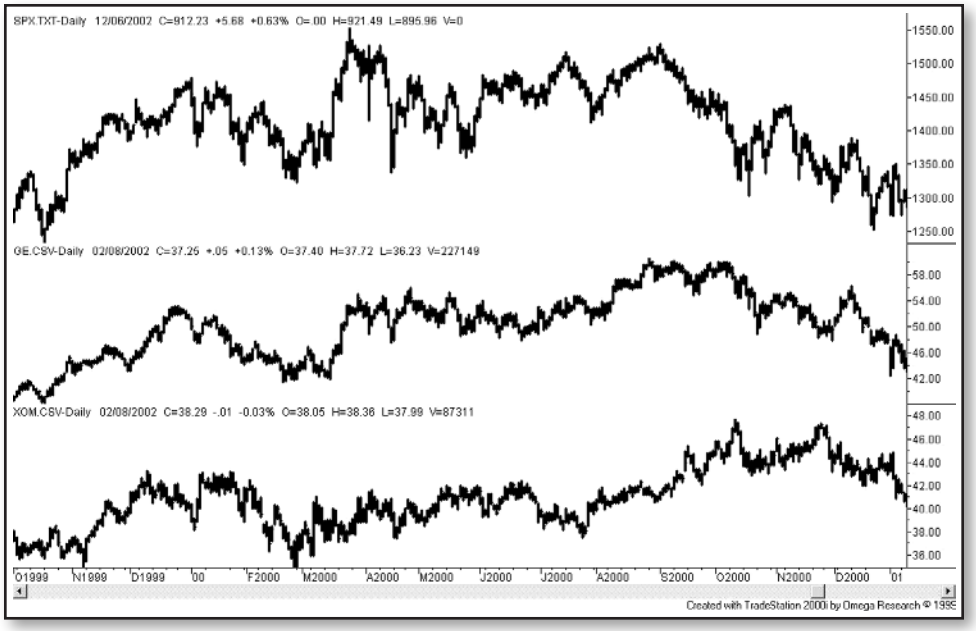

FIGURE 1.39 Similar Patterns in the S&P, GE, and Exxon.

Today's technical trader must keep one eye on the individual stock and the other eye on the index. Apple may have moved above its recent resistance level but stopped because the S&P Index is at its own resistance level, and there are more traders watching the S&P than even Apple. In today's market, you can anticipate when a stock will find support and resistance by looking at the S&P chart rather than at the individual stock chart.

Figure 1.39 shows the S&P 500 index, GE, and Exxon (prior to its collapse) over the same period from October 1999 through December 2000. Fundamentally, these three markets have little in common; however, the overall pattern of the three markets is remarkably similar, with most tops and bottoms occurring at nearly the same time. Because it is unlikely that the fundamentals of each company would result in such a similar price pattern, we can conclude that the S&P futures, combined with program trading, forces the patterns to be materially the same. This change in the way stocks are traded reduces the ability to get diversification by trading across sectors and increases risk.

Globalization: The Similarity of Asian Markets

There has been a noticeable and justifiable shift to Asian markets during the past five years. Their economies are booming while the United States and Europe are still trying to recover from the financial crisis. Although not all of the Asian stock markets are open to foreign investors, globalization has not passed them by. Figure 1.40 shows the equity index markets for Hong Kong (HSI), Singapore (SSG), Taiwan (STW), the Philippines (PHI), and Malaysia (KLI) as downloaded from Bloomberg. The patterns seem similar but the price levels are very different, making a comparison difficult.

By volatility-adjusting each price series and starting each at 100 on the first date (January 1, 2005), the five series look remarkably the same, as shown in Figure 1.41.

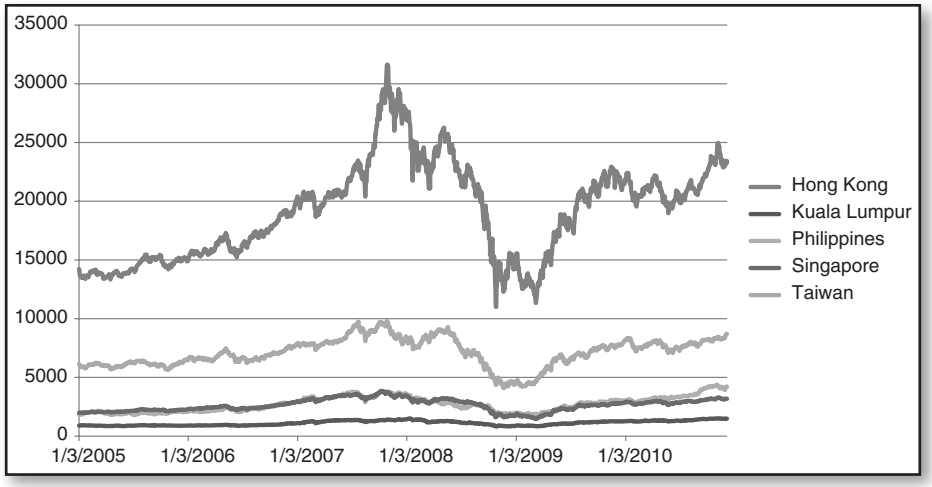

FIGURE 1.40 Equity Index Prices for Five Asian Countries.
Data from Bloomberg.

It is understandable that, as trading partners, these countries are somewhat dependent upon one another, yet the similarity is surprisingly close. One possible explanation would be the traders. If traders believe that a poor economic sign in one country means that others will also share in bad times, then they sell the equity index markets, or individual stocks, in each country. That would be similar to Hewlett-Packard announcing worse than expected earnings and having traders sell Dell expecting the same. Often the closer relationships caused by traders show that the movement of money is more important than the fundamentals. This was clearly the case for the subprime collapse in September 2008, when all markets moved the same way as investors withdrew their funds as quickly as possible.

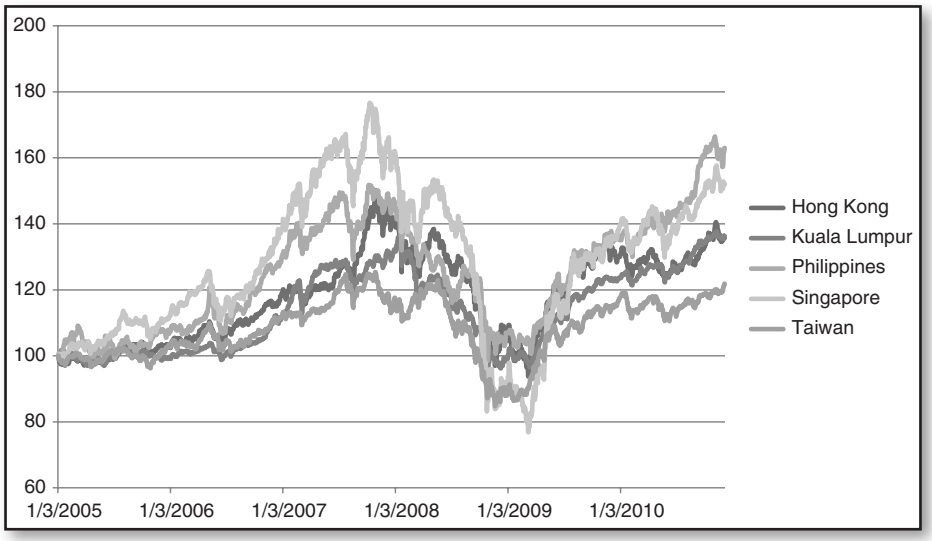

FIGURE 1.41 Asian Equity Index Markets Adjusted to the Same Volatility Level and Started at the Value 100.
Data from Bloomberg.