19

BEHAVIORAL FINANCE AND TECHNICAL ANALYSIS

AFTER STUDYING THIS CHAPTER YOU SHOULD BE ABLE TO:

- Understand the principles of behavioral finance.
- Identify reasons why technical analysis may be profitable.
- Use the Dow theory to identify situations that technicians would characterize as buy or sell opportunities.
- Use indicators such as volume, put/call ratios, breadth, short interest, or confidence indexes to measure the "technical conditions" of the market.

Related Websites

http://www.decisionpoint.com

This site is directed toward technical analysis.

http://bigcharts.marketwatch.com

The above site gives you substantial capabilities to chart stocks and compare them to trends and other market variables.

http://www.firstcap.com

This site offers free information and also subscription services. It features many technical trading tools.

http://www.thegumpinvestor.com/stocks/technical_analysis/default.asp

This site provides information on charting and other technical indicators.

http://finance.yahoo.com

This site has extensive charting capability along with information on many technical indicators.

The Capital Asset Pricing Model (CAPM) explains security prices by assuming rational behavior on the part of investors. Components of this behavior, like mean-variance optimization, suggest investors must be able to solve complicated equations to construct optimal portfolios. Obviously, this assumption is unrealistic. The standard response to this criticism is that a large number of investors intuitively behave in a reasonable way which, on average, is similar to mean-variance optimization. Yet observations cannot confirm that this is the case either. The Arbitrage Pricing Theory (APT) provides another line of defense for the idea that rational behavior will dominate capital asset price formation. This theory proposes that it will take few professionals deploying large investment funds to dominate price formation in security markets. The evidence of persistent anomalies in asset prices, as catalogued in Chapter 8, leaves us with a conundrum: Are these anomalies just sampling phenomena, are they driven by institutional trade friction, or are they a result of persistent, widespread behavior that is inconsistent with the assumption of economic theory? Behavioral finance is a growing specialization in pursuit of a coherent theory that explains market anomalies. We describe some of the major tenets of this emerging theory at the top of the chapter.

Regardless of origin, as long as anomalies in asset pricing persist, technical analysis may be considered a defensible tool to exploit observed, inefficient prices. As such, technical analysis is part of the study of active portfolio management. Its test is in its ability to generate abnormal profits in this pursuit. Technical analysis focuses more on past price movements of a company or an index than on the underlying fundamental determinants of future profitability. Technicians believe that past price and volume data signal future price movements. As we lay out the basics of technical analysis in the second part of this chapter, we point out the contradictions between the assumptionson which these strategies are based and the notion of well-functioning capital markets with rational and informed investors.

19.1 WHAT IS BEHAVIORAL FINANCE?

The premise of behavioral finance is that conventional financial theory ignores people, and that people make a difference. Supporters suggest one reason for this failure is that data on prices and returns are easy to come by but studying behavior is more difficult. The objective of behavioral finance is to consider *all* explanations in the search for understanding security returns.

The search for explanations of price series that stand in contradiction to conventional models is difficult. As in any science, new theories come up short on occasion and often remain controversial for some time. We point out such examples in the field of behavioral finance. Yet a field of science should never be judged a failure as long as its reason for being—explaining puzzling data—is still valid. Behavioral finance is an infant science, yet it is important for anyone interested in finance to be knowledgeable about its essential developments.

19.2 INDIVIDUAL BEHAVIOR

One of the major tenets of rational behavior is selfishness. This is to say that the individual attempts to maximize his or her own welfare, with little attention paid to others' welfare. Yet even casual observations confirm that this is not the case. The summary provided here draws heavily on Thaler (1992, 1993).

Cooperation and Altruism

We begin our analysis of cooperation with the famous "prisoner's dilemma." Two felons are caught and separated from each other. If both refuse to confess, they can be convicted on only minor charges and will each receive a one-year sentence. If both confess, each will receive a sentence of five years. If only one confesses and gives evidence against the other, he goes free and the other receives a 10-year sentence. Examination of the possible outcomes shows that the dominant strategy, that is, the best strategy not knowing what the other felon will do, is to confess. Thus, the rational strategy leads to a worse outcome than cooperation would have.

Another example of suboptimal results due to lack of cooperation is called the tragedy of the commons. A community of fishermen lives off a fertile strip of (common) fishing grounds. A fisherman's daily catch depends on investment in equipment. The aggregate investment determines whether the fishing grounds will be depleted over time. If each fisherman maximizes the net present value (NPV) of investment, they will deplete the grounds in a hurry. No fisherman takes into account the fact that his take reduces the stock of fish available to other fishermen. As a result, the grounds are over-fished. It is the common "ownership" of fishing grounds that induces a prisoner's dilemma. The declining state of the world's fishing grounds is testimony to the force of this dynamic.

It turns out, however, that under a variety of conditions, individuals do cooperate and will defy predictions of this economic theory. A manifestation of such behavior is shown in various forms of the ultimatum game. Here, individual *A* is given \$100 to divide with another individual *B*. *A* makes an offer to *B*, say \$10. *B* has a choice of taking the offer, in which case *A* takes home \$90 and *B*, \$10. If *B* refuses the offer, both players get nothing. Conventional rational behavior would induce *B* to accept any offer, since the alternative is zero. Knowing this, *A*'s rational offer is very small. But experiments clearly show that many deviate from this rational dictum. You can explain this either by *A*'s anticipation that *B* will be insulted and hence reject a small offer, or by an altruistic motive of *A* to induce a reasonably fair allocation. The degree to which people deviate from rational behavior varies greatly and is materially affected by circumstances. But the fact remains that investor decision making is often perturbed by various motives extraneous to conventional rationality.

Bidding and the Winner's Curse

How much should you bid on an auctioned item whose value, *you believe,* is equally likely to be anywhere in the range of $6 to $10? Should your bid depend on who else is bidding? Intuition calls for bidding the expected value of $8, regardless of how many participate in the auction. The logic of this solution, however, misses this important question: What is the value of the item, *conditional* on your winning the bid? Assuming all participants bid their expected values, this question is really: What is the expected value of the item given that you win the auction, i.e., that the *maximum* of N independent bids is your bid of $8? Surely, this expected value depends on the number of estimates. The larger the number of estimates, the lower is the expected value given that you win the auction with a bid of $8. Thus, if you hold your bid at your expected value while the number of bidders grows, the probability that if you win, you have overbid grows and so does your expected loss. This is the winner's curse: if you win the auction, everyone else must think the asset is worth less than you do, so you likely have overpaid.

Armed with this insight, you must bid less than your estimate of the expected value; in game-theory parlance you must "shave your bid." The optimal bid depends on the distribution of the true value, the number of bidders, and the degree of independence of their estimates. If everyone bids optimally, the winner can expect to pay a fair value and, more generally, assets traded in auctions would fetch a fair price. Can we assume this to be the case? Economic theorists would answer in the affirmative. Faced with the observation that most bidders do not have the knowledge required to derive the optimal bid, they would argue that rules of thumb derived from experience eventually lead traders to avoid the winner's curse.

Experiments appear to contradict this assertion, however. Findings suggest that the learning curve of participants in auctions is flat. Moreover, even managers in the construction industry, where bidding is the normal way of lending contracts, did not show savvy in avoiding the winner's curse. This leaves open the question of whether assets priced in auctions fetch a fair value.

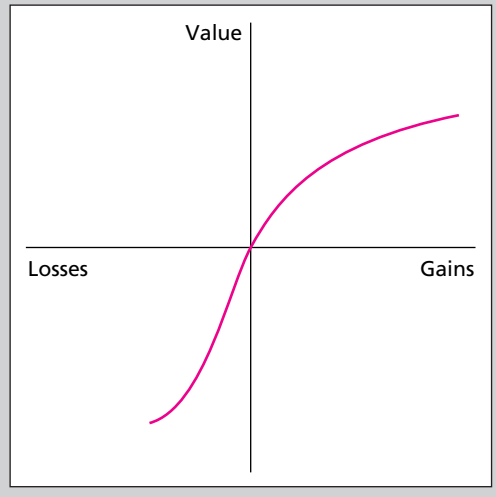
The Endowment Effect, the Status Quo Bias, and Loss Aversion

What is the value of an item, say a Harley Davidson, to an individual? Economic theory takes this value to be unambiguous given the individual's tastes and resources. It turns out this isn't so. When asked to bid on the item, an individual may bid $5,000. Once in possession of an item, however, that same individual may not be willing to sell it for less than $6,000. This ambiguous preference is called the *endowment effect,* whereby an individual's preference for a good increases by virtue of ownership. This ambiguity is part of a broader phenomenon called the *status quo bias.* Individuals appear to prefer the status quo over a new position even if, a priori, the new position would have been preferred to the current position.

Researchers explain the endowment effect and the status quo bias by a type of preference called *loss aversion,* shown in Figure 19.1. In any given position, potential losses are given more weight than gains as conventional utility theory would predict. But the slope and origin of the preference function will abruptly change with a change in wealth, that is, preferences continuously vary as fortunes change, leading to decisions that are inconsistent with predictions from economic theory. One result is that opportunity costs are not equal to out-of-pocket costs. That is, forgone opportunities are valued less than perceived losses and investors will not update portfolios to account for changes in security values in the manner predicted from mean-variance considerations.

Observed inconsistent behavior also manifests itself in intertemporal choices, producing ambiguity in the time value of money. For example, it has been estimated that individuals consistently assign excessive discount rates (from 25% to as high as 300%) to savings on energy

FIGURE 19.1
Loss aversion preference function



cost when they can invest in items such as insulation or energy-efficient appliances. But, researchers also find that individuals implicitly assign too low, even negative, time value when they choose the timing of a lottery prize. Studies of individual choices show significant inconsistency in assigning discount rates for consumption that changes with the timing and magnitude of future cash flows. More generally, refuting the theory of life-cycle consumption, it appears that young and old people consume too little and middle-aged people consume too much relative to predictions of conventional theory. Moreover, consumption appears to be too highly correlated with income and too little correlated with various forms of wealth such as home equity and pension accumulation.

Mental Accounts

The behaviorists' explanation of various inconsistencies in consumption and investment behavior is based on a system of "mental accounts" in which individuals mentally segregate assets into independent accounts rather than viewing them as part of a single portfolio. One such set of accounts is equity in assets, current income, and future income. With this breakdown, the marginal propensity to consume (MPC) out of wealth, that is, the amount consumed from an increase of $1 in wealth depends on the "account" where the extra dollar appears. MPC from current income is close to 1.0, MPC from future income is close to zero, and MPC from equity is in-between. As discussed in the nearby box, this separation of mental accounts serves to impose discipline on consumption behavior despite impatience to consume—future income and equity in assets accounts are preserved while consumption binges are limited to current income.

The "disposition effect," another outcome of mental accounts and loss aversion, refers to the tendency to sell winners too early in order to increase cash accounts and to hang on to losers for too long to avoid realizing losses. The fact that the demand of "disposition investors" for a stock depends too heavily on the price history of the stock means that prices may close in on fundamentals only over time, imparting momentum to price evolution. Grinblatt and Han (2001) show that disposition effects can lead to momentum in stock prices even if fundamentals follow a random walk.

We All Make Irrational Decisions, But That May Not Be a Bad Thing

The perfect is the enemy of the good.

I write a lot about rational investing. But none of us is completely rational. We trade too much. We chase hot funds. We take a flier on dubious stocks. And, more often than not, we end up hurting our performance.

But I am unwilling to dismiss this behavior as mere foolishness. Why not? Seemingly foolish behavior can help us with our struggle. Consider: from "Why not?" to "Seemingly foolish."

Saving Ourselves

When saving for financial goals, we are supposed to figure out how much each goal will cost, make a reasonable estimate of what return we are likely to earn and then diligently save the appropriate sum every month.

Sound like the way you go about saving money? Me neither. Saving is a messy business, because of the constant temptation to spend.

To compensate for our lack of self-control, we often fall back on mental games. For instance, we might have a chunk of cash sitting in a money-market fund earning 1%, which we have earmarked for our toddler's college education. But right now, we need a new car.

Financially, it would make sense to "borrow" from the college fund and then pay the money back. But instead, we take out a car loan, even though the loan will likely cost us far more than we are earning on the money-market fund.

Why do we go this route? Mentally, we have earmarked the money-market fund for the kid's college education, and we don't trust ourselves to replenish the account if we dip into it.

"Lots of us know that we won't make those payments to ourselves," says John Nofsinger, author of "Investment Madness" and a finance professor at Washington State University in Pullman, Wash. "Mental accounting helps us stay disciplined."

Winning by Losing

The evidence is undeniable: Market-tracking index funds outperform actively managed stock funds. Despite this lackluster performance, actively managed funds still account for 91% of all stock-fund assets. Why do we continue to bank so heavily on a losing proposition?

It seems we like having the chance, however slim, to beat the market. In fact, it makes us more inclined to invest in stocks. We also find it comforting when professional stock pickers watch over our money. Their oversight gives us added confidence in our strategy and makes us more tenacious during rough markets.

To be sure, all this is likely to cost us, with the price paid in market-lagging performance. But when we suffer this performance penalty, maybe we are getting our money's worth.

Seeking Solace

Studies suggest you won't beat the market by following the advice of newsletter writers and stock analysts.

Yet, as we try to summon the nerve necessary to buy individual stocks, we often latch onto the recommendations of these experts.

Are we misguided? Maybe not. "Even if the stocks don't turn out to be better than other stocks, at least it gives us the courage to get started," Prof. Nofsinger notes.

Injecting Fun

While many investors struggle to find the courage to buy stocks, some folks have too much confidence. These investment junkies buy and sell stocks like crazy, thereby incurring exorbitant trading costs and taking unnecessary risks.

Still, such enthusiasm isn't all bad. After all, if we are enthused about investing, we are probably more keenly aware of how much money we need for retirement and thus we are more likely to save enough.

The trick is to make sure our enthusiasm for trading doesn't do too much damage.

"If you must trade and invest in foolish stocks, allocate $10,000 or 5% of your money, whichever is smaller, to a fun-money account," suggests Meir Statman, a finance professor at Santa Clara University in California. "And then, very much like in Vegas, try to make the money last as long as possible.

Playing the Percentages

We should all decide what portion of our portfolio we want in stocks and then stick with this percentage through thick and thin. But as many folks have discovered, this advice can be tough to follow.

Inevitably, some investors get skittish, and start dancing in and out of the stock market. This isn't a smart strategy. But it will probably lead to better results than simply leaving everything in a money-market fund.

SOURCE: Jonathan Clements, "We All Make Irrational Decisions, But That May Not Be a Bad Thing." Abridged from *The Wall Street Journal* online, March 26, 2002.

In sum, while economic theory relies on rational expectations and rational behavior, behaviorists have documented evidence and explanations of fundamentals of behavior that are inconsistent with this theory. However, the test of success of the efforts of the behaviorists is in explaining deviations of assets prices from predictions of classic theory. In the next section we provide an assessment of these efforts.

19.3 ASSET RETURNS AND BEHAVIORAL EXPLANATIONS

It is natural for behaviorists to concentrate on documented anomalies in asset prices and attempt to explain them by behavior that is excluded by economic theory. Here are the mainstream of these anomalies and offered explanations.

Calendar Effects

Calendar effects are prominent among the anomalies documented in Chapter 8 on market efficiency. An extraordinary pattern of abnormal returns occurs around the turn of the year and turn of months. Behaviorists point to the following explanations:

1. The timing of the flow of funds into the market is derived, at least in part, by the flow of funds to individual and institutional investors. These tend to be concentrated around calendar turns.
2. "Window dressing" by institutional investors refers to trades timed to load quarterly balance sheets with stocks of recently successful firms and rid them of stocks that have recently stumbled.
3. The publication of good and bad news under the control of the proprietors is mostly issued around calendar turns.

Cash Dividends

Dividend irrelevance in the absence of taxes and transaction costs is a fundamental tenet of financial theory. Tax-code discrimination against dividend income should, if anything, punish high-yield stocks. Finally, the clientele effect predicts that, if investors exhibited preference for dividends over capital gains, supply of dividends by corporations would materialize so as to eliminate risk-adjusted differentials in expected returns. Nevertheless, high dividends seem to endow stocks with a price premium.

Preference for cash dividends can be justified by mental accounts, since dividends increase current income at the expense of the higher "self control" equity account. As evidence for such bias in the population, Lease, Lewellen, and Schlarbaum (1976) compiled Table 19.1, which shows that older and retired investors, those with the most funds to invest, value dividends more highly and concentrate their (better diversified!) portfolios in high income securities.

Overraction and Mean Reversion

Perhaps the most notable influence of behavioral finance in explaining as set returns can be found in the literature of overreaction and mean reversion. Investors assign a probability distribution to future asset returns based on a relevant history of previous returns. Appropriate reaction to an unexpected event (return) is to update one's prior probability distribution by assigning a weight to the most recent event. Overreaction results when investors assign too

TABLE 19.1
Importance of alternative investment goals to various demographic groups as measured by average rating (4 = very important goal, 1 = low-priority goal) and percent of portfolio in income securities

	(1) Young Unmarried Professionals & Managers	(2) Highly Educated Young Professional Men	(3) Older Males, Still at Work	(4) Females, Mostly Retired	(5) Retired Males
Investment Goal Rating:					
Short term capital gains	2.19	2.00	1.86	1.50	1.53
Long-term capital gains	3.61	3.54	3.63	3.46	3.45
Dividend income	2.04	2.30	2.46	3.36	3.39
Percent of portfolio in income securities	27%	34%	39%	57%	56%
Average number of securities in portfolio	9.4	10.4	11.6	12.1	12.1

Source: *Lease, Lewellen, and Schlarbaum,* "Market Segmentation: Evidence on the Individual Investor," *Financial Analysts Journal* (1976), 53–60.

large a weight on the most recent event. Thus, if investors overreact, a negative event would drive a stock price too low until additional developments lead investors to revalue the price in line with fundamentals.

In the presence of regular overreaction to changes in fundamentals, prices would tend to reverse themselves as investors correct for the overreaction. This tendency is called *mean reversion* and can be detected by negative serial correlation in asset returns. Numerous studies have uncovered negative correlation measured from weekly to five-year holding-period returns. Moreover, while anomalies such as calendar and dividend effects do not appear strong enough to allow abnormal profits, the degree of serial correlation in stock returns is such that profit opportunities appear plausible. Using return histories, portfolios constructed by buying losers and selling winners would have returned significant positive returns. Thus, overreaction suggested by mean reversion in stock returns appears to lend credibility to behavioral finance; using predictions from behavioral analysis apparently can lead to profitable portfolio strategies.

19.4 CONTROVERSIAL EXPLANATIONS FROM BEHAVIORAL FINANCE

Empirical explanations from new fields of science often engender controversy and resistance before they become conventional wisdom. Behavioral explanations of asset returns are no exception, and we provide two examples.

Closed-end Funds

The average closed-end fund sells at a discount of about 10% from its net asset value and discounts of individual funds are quite volatile. Such significant discounts have long been considered a puzzle. It is no wonder that closed-end fund discounts have attracted explanations from behavioral finance.

Stephen A. Ross (2002) illustrates that observed discounts of closed-end fund values can easily be explained by the funds' expenses. As a simple example, suppose a closed-end fund invests its net asset value, NAV, in the market index (and hence adds no value from superior management). The index has an excepted return of r, and pays out an annual dividend yield

of δ. Using the constant growth dividend discount model, the value of the fund is given by $P = \delta\,\text{NAV}/(r - g)$, where δ NAV is the next dollar dividend and g is the growth rate of the fund's assets. The growth rate of the fund will be $g = r - \delta$ because the portfolio earns a rate r and pays out δ. Thus, $P = \delta\,\text{NAV}/(r - r + \delta) = \text{NAV}$ as expected from a fund that provides no added value. Now suppose the fund charges the portfolio an annual fee at a rate of ϵ. In this case, the growth rate of the fund's portfolio is reduced to $g = r - (\delta + \epsilon)$, and the value of the fund is reduced to: $P = \text{NAV}/\delta/(r - r + \delta + \epsilon) = \text{NAV}\delta/(\delta + \epsilon)$. Thus, the discount of price from the net asset value of the portfolio will be $(\text{NAV} - P)/\text{NAV} = \epsilon/(\delta + \epsilon)$. With an annual dividend yield of 2% and expense ratio of .5%, the discount will be 20% (.5/(2 + .5) = .2). By this calculation, observed discounts are not extraordinary.

Obviously, closed-end funds are initiated and successfully sold when investors expect the fund management to do better than the market. For example, if the portfolio's expected return is $r + u$ and its risk is similar to that of the market index, then the required rate of return is r and the growth rate of assets will be $g = r + u - (\delta + \epsilon)$. If the expected abnormal return, u, is greater than the expense ratio, ϵ, the fund will sell at a premium.[1] This explains why IPOs (initial public offerings) of closed-end funds are at a premium; if investors do not expect u to exceed ϵ, they won't purchase the fund shares. The fact that in most cases the premium turns into a discount indicates how difficult it is for management to fulfill these expectations in a nearly efficient market.

We can expect the abnormal expected return, u, to vary quite a bit as investors ingest the volatile actual returns of the fund, and hence the discount itself will be volatile. Also, it is not surprising that u (hence the discount) is correlated across closed-end funds, as well as with market returns and investor sentiment variables.

An interesting question is why the same logic does not apply to open-end funds, since they charge similar expense ratios. The reason is that investors can always redeem open-end fund shares at the NAV. Thus, the expense ratio is a period cost that accumulates to those who hold on to their shares, but the stream of future expenses is not capitalized in the price of the fund shares. Investors in closed-end funds do not have this option so the stream of future expenses must be capitalized in the NAV, resulting in a discount from the portfolio value.

When a discount of a closed-end fund becomes large, indicating that investors expect u to be negative, the question arises: Why don't investors purchase the fund and liquidate the portfolio at net asset value to instantly gain the discount? Investors can reasonably expect that management will not readily consent to the liquidation of the fund and hence such an event will not be likely (or inexpensive). Therefore, the possibility that the fund will be liquidated may not severely limit the size of potential discounts.

Excessive Volatility of Stock Market Prices

Robert J. Shiller (1981) rocked the world of economists and financial practitioners when he produced evidence suggesting that the stock market is excessively volatile. If true, this finding would be an outright refutation of the efficient market hypothesis (EMH) and must result from irrational investment behavior. Excessive volatility would be a natural outcome of overreaction and lead to mean reversion. It is consistent with predictions from behavioral finance as explained earlier.

To demonstrate that stock prices are excessively volatile Shiller used a long time series of value and annual dividends on the S&P (the market) portfolio over the period 1871–1979,

[1]When u is too large, that is, $g = r + u - (\delta + \epsilon) > r$, then the dividend growth model is not valid. In other words, it is not plausible that u can be sustained in the long run. In that case, we can recast the model as $P = \text{NAV}\delta/(\delta + \epsilon) + M$, where M is the present value of future abnormal returns, with the same results.

denoted by $P_1, P_2, \ldots, P_T,$, and $D_1, D_2, \ldots D_T$, respectively. For each year, starting in 1871, Shiller used a reasonable estimate of a discount factor to compute the present value of all future dividends plus the present value of the terminal price and arrived at a rational price for the market portfolio for that year. This method of generating rational prices assumes that investor expectations for future dividends and terminal price were in fact equal to the actual values. Having calculated rational stock prices, P_t^*, for all periods, Shiller compared the volatility of the series of actual prices, P, to that of the rational prices, P^*. The standard deviation of actual prices was more than five times that of rational prices. Shiller argued that the excess volatility of actual over rational prices could not be explained by data problems or by model assumptions, and several subsequent studies came to similar conclusions, even when allowing for a time-varying discount rate.

Shiller's model assumes that volatility of dividends represents the volatility of stock fundamentals. It is true that expected future dividends (knowing the appropriate discount rate) are sufficient to compute a rational stock value, and it is plausible to take actual dividends to represent expected dividends. It is not obvious, however, that the *volatility* of actual dividends represents the volatility of stock fundamentals and, therefore, it is not obvious that the variance of the series of computed rational prices represents the variance we should expect from actual prices.

Consider an alternative model that derives the rational price from discounted future earnings. If it turned out that firms actually paid out a fixed proportion of earnings, then the discounted earnings model would yield the same dividends as in Shiller's model and identical rational prices. But in this case, the volatility of earnings will be the same as the volatility of dividends and we would all agree that the volatility of the computed rational prices captures the volatility of fundamentals.

Of course, in reality firms do not pay out a fixed proportion of earnings, and thus the two models will not yield the same results. In fact, since earnings are far more volatile than dividends, the volatility of rational prices will be much larger in the discounted earnings model and will indicate that actual prices do not exhibit excess volatility. While it may appear that the discounted dividends model is the right one because it captures the actual payout ratios, we should ask: Why then do firms vary payout ratios? The answer is that firms tend to smooth dividends, and herein lies the problem with Shiller's model. The use of actual dividends to compute rational prices and their volatility would be justified only if the dividend smoothing were a response to *transitory* changes in earnings. In that case, but only in that case, the volatility of dividends would capture the volatility of fundamentals and the resultant volatility of the computed rational prices would still be a valid benchmark for the volatility of actual prices. This, however, is the less likely situation. Research suggests that managers do not quickly adjust dividends to changes in fundamentals, particularly to worsening fundamentals (explaining why reaction of stock prices to dividend cuts is so violent). Hence, the dividend series is likely too smooth for tests of excessive volatility. It appears, therefore, that explanations from behavioral finance for "excess volatility" may have jumped the gun.

As of now, then, behavioral theories successfully demonstrate that individual behavior is not well approximated by standard utility analysis of economic theory. But with the possible exception of overreaction of stock prices, behavioral finance has yet to make its mark in explaining asset returns.

19.5 TECHNICAL ANALYSIS

Technical analysis is in most instances an attempt to exploit recurring and predictable patterns in stock prices to generate abnormal trading profits. In the words of one of its leading practitioners,

> the technical approach to investment is essentially a reflection of the idea that the stock market moves in trends which are determined by the changing attitudes of investors to a variety of economic, monetary, political, and psychological forces. The art of technical analysis, for it is an art, is to identify changes in such trends at an early stage and to maintain an investment posture until a reversal of that trend is indicated.[2]

Technicians do not necessarily deny the value of fundamental information, such as we have discussed in the three past chapters. Many technical analysts believe stock prices eventually "close in on" their fundamental values. Technicians believe, nevertheless, that shifts in market fundamentals can be discerned before the impact of those shifts is fully reflected in prices. As the market adjusts to a new equilibrium, astute traders can exploit these price trends.

Technicians also believe that market fundamentals can be perturbed by irrational or behavioral factors. More or less random fluctuations in price will accompany any underlying trend. If these fluctuations dissipate slowly, they can be taken advantage of for abnormal profits.

These presumptions, of course, clash head-on with those of the EMH and with the logic of well-functioning capital markets. According to the EMH, a shift in market fundamentals should be reflected in prices immediately. According to technicians, though, that shift will lead to a gradual price change that can be recognized as a trend. Such exploitable trends in stock market prices would be damning evidence against the EMH, as they would indicate profit opportunities that market participants had left unexploited.

A more subtle version of technical analysis holds that there are patterns in stock prices that can be explained, but that once investors identify and attempt to profit from these patterns, their trading activity affects prices, thereby altering price patterns. This means the patterns that characterize market prices will be constantly evolving, and only the best analysts who can identify new patterns earliest will be rewarded. We call this phenomenon *self-destructing* patterns and explore it in some depth in the chapter.

The notion of evolving patterns is consistent with almost but not-quite efficient markets. It allows for the possibility of temporarily unexploited profit opportunities, but it also views market participants as aggressively exploiting those opportunities once they are uncovered. The market is continually groping toward full efficiency, but it is never quite there.

This is in some ways an appealing middle position in the ongoing debate between technicians and proponents of the EMH. Ultimately, however, it is an untestable hypothesis. Technicians will always be able to identify trading rules that would have worked in the past but need not work any longer. Is this evidence of a once viable trading rule that has now been eliminated by competition? Perhaps. But it is far more likely the trading rule could have been identified only after the fact.

Until technicians can offer rigorous evidence that their trading rules provide *consistent* trading profits, we must doubt the viability of those rules. As you saw in the chapter on the efficient market hypothesis, the evidence on the performance of professionally managed funds generally does not support the efficacy of technical analysis.

19.6 CHARTING

Technical analysts are sometimes called *chartists* because they study records or charts of past stock prices and trading volume, hoping to find patterns they can exploit to make a profit. In this section, we examine several specific charting strategies.

[2]Martin J. Pring, *Technical Analysis Explained,* 2nd ed. (New York: McGraw-Hill Book Company, 1985), p. 2.

The Dow Theory

Dow theory

A technique that attempts to discern long- and short-term trends in stock market prices.

The **Dow theory,** named after its creator Charles Dow (who established *The Wall Street Journal*), is the grandfather of most technical analysis. While most technicians today would view the theory as dated, the approach of many more statistically sophisticated methods are essentially variants of Dow's approach. The aim of the Dow theory is to identify long-term trends in stock market prices. The two indicators used are the Dow Jones Industrial Average (DJIA) and the Dow Jones Transportation Average (DJTA). The DJIA is the key indicator of underlying trends, while the DJTA usually serves as a check to confirm or reject that signal.

The Dow theory posits three forces simultaneously affecting stock prices:

1. The *primary trend* is the long-term movement of prices, lasting from several months to several years.
2. *Secondary* or *intermediate trends* are caused by short-term deviations of prices from the underlying trend line. These deviations are eliminated via *corrections* when prices revert back to trend values.
3. *Tertiary* or *minor trends* are daily fluctuations of little importance.

Figure 19.2 represents these three components of stock price movements. In this figure, the primary trend is upward, but intermediate trends result in short-lived market declines lasting a few weeks. The intraday minor trends have no long-run impact on price.

support level

A price level below which it is supposedly unlikely for a stock or stock index to fall.

Figure 19.3 depicts the course of the DJIA during 1988. The primary trend is upward, as evidenced by the fact that each market peak is higher than the previous peak (point F versus D versus B). Similarly, each low is higher than the previous low (E versus C versus A). This pattern of upward-moving "tops" and "bottoms" is one of the key ways to identify the underlying primary trend. Notice in Figure 19.3 that, despite the upward primary trend, intermediate trends still can lead to short periods of declining prices (points B through C, or D through E).

resistance level

A price level above which it is supposedly unlikely for a stock or stock index to rise.

The Dow theory incorporates notions of support and resistance levels in stock prices. A **support level** is a value below which the market is relatively unlikely to fall. A **resistance level** is a level above which it is difficult to rise. Support and resistance levels are determined by the recent history of prices. In Figure 19.3, the price at point D would be viewed as a

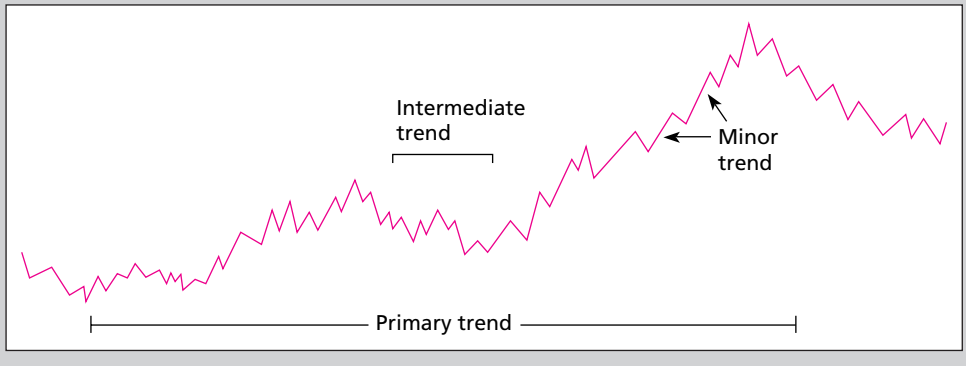


FIGURE **19.2**
Dow theory trends

Source: From Melanie F. Bowman and Thom Hartle, "Dow Theory," *Technical Analysis of Stocks and Commodities,* September 1990, p. 690.

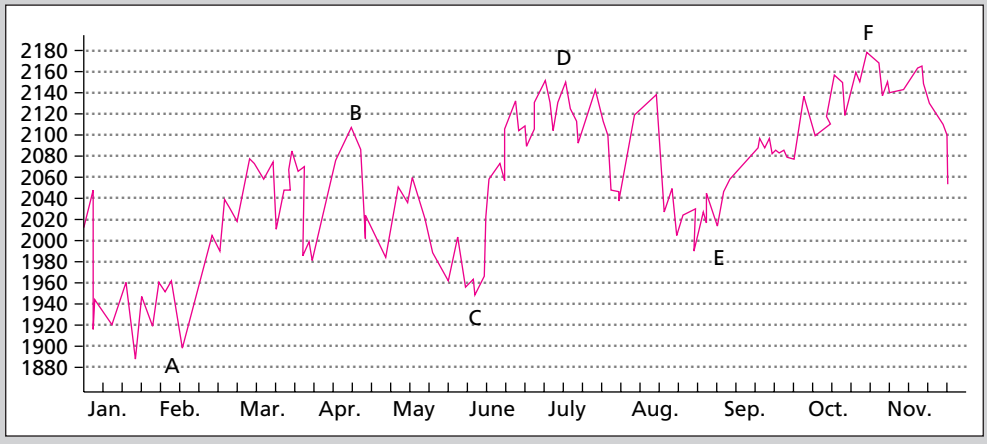


FIGURE **19.3**
Dow Jones Industrial Average in 1988

Source: From Melanie F. Bowman and Thom Hartle, "Dow Theory," *Technical Analysis of Stocks and Commodities,* September 1990, p. 690.

resistance level because the recent intermediate-trend high price was unable to rise above C. Hence, piercing the resistance point is a bullish signal.

Technicians see resistance and support levels as resulting from common psychological investor traits. Consider, for example, stock XYZ, which traded for several months at a price of $72 and then declined to $65. If the stock eventually begins to increase in price, $72 will be a natural resistance level because the many investors who originally bought at $72 will be eager to sell their shares as soon as they can break even on their investment. Therefore, whenever prices near $72, a wave of selling pressure will develop. Such activity imparts to the market a type of "memory" that allows past price history to influence current stock prospects.

Concept CHECK

1. Describe how technicians might explain support levels.

In evaluating the Dow theory, don't forget the lessons of the efficient market hypothesis. The Dow theory is based on a notion of predictably recurring price patterns. Yet the EMH holds that if any pattern is exploitable, many investors would attempt to profit from such predictability, which would ultimately move stock prices and cause the trading strategy to self-destruct. While Figure 19.3 certainly appears to describe a classic upward primary trend, one always must wonder whether we can see that trend only *after* the fact. Recognizing patterns as they emerge is far more difficult.

Recent variations on the Dow theory are the Elliott wave theory and the theory of Kondratieff waves. Like the Dow theory, the idea behind Elliott waves is that stock prices can be described by a set of wave patterns. Long-term and short-term wave cycles are superimposed and result in a complicated pattern of price movements, but by interpreting the cycles, one can, according to the theory, predict broad movements. Similarly, Kondratieff waves are named after a Russian economist who asserted that the macroeconomy (and therefore the stock market) moves in broad waves lasting between 48 and 60 years. The Kondratieff waves are therefore analogous to Dow's primary trend, although they are of far longer duration. Kondratieff's assertion is hard to evaluate empirically, however, because cycles that last about 50 years provide only two full data points per century, which is hardly enough data to test the predictive power of the theory.

Other Charting Techniques

The Dow theory posits a particular, and fairly simple, type of pattern in stock market prices: long-lasting trends with short-run deviations around those trends. Not surprisingly, several more involved patterns have been identified in stock market prices. If stock prices were to actually follow any of these patterns, profit opportunities would result. The patterns are reasonably straightforward to discern, meaning future prices can be extrapolated from current prices.

A variant on pure trend analysis is the *point and figure chart* depicted in Figure 19.4. This figure has no time dimension. It simply traces significant upward or downward movements in stock prices without regard to their timing. The data for Figure 19.4 come from Table 19.2.

Suppose, as in Table 19.2, that a stock's price is currently $40. If the price rises by at least $2, you put an X in the first column at $42 in Figure 19.4. Another increase of at least $2 calls for placement of another X in the first column, this time at the $44 level. If the stock then falls by at least $2, you start a new column and put an O next to $42. Each subsequent $2 price fall results in another O in the second column. When prices reverse yet again and head upward, you begin the third column with an X denoting each consecutive $2 price increase.

The single asterisks in Table 19.2 mark an event resulting in the placement of a new X or O in the chart. The daggers denote price movements that result in the start of a new column of Xs or Os.

Sell signals are generated when the stock price *penetrates* previous lows, and buy signals occur when previous high prices are penetrated. A *congestion area* is a horizontal band of Xs and Os created by several price reversals. These regions correspond to support and resistance levels and are indicated in Figure 19.5, which is an actual chart for Atlantic Richfield.

One can devise point and figure charts using price increments other than $2, but it is customary in setting up a chart to require reasonably substantial price changes before marking pluses or minuses.

2. Draw a point and figure chart using the history in Table 19.2 with price increments of $3.

Concept CHECK

Another graphical technique used to summarize price data and aid in the identification of trends is the so-called *candlestick chart,* illustrated in Figure 19.6. The box with the vertical line drawn through it allows the chartist to ascertain the open and close price for the day, as

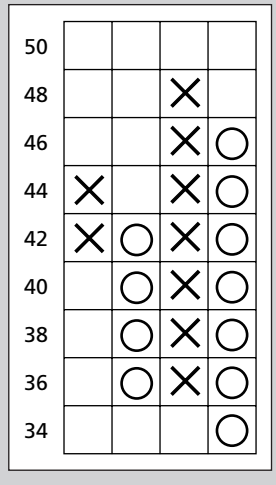


FIGURE 19.4
Point and figure chart for Table 19.2

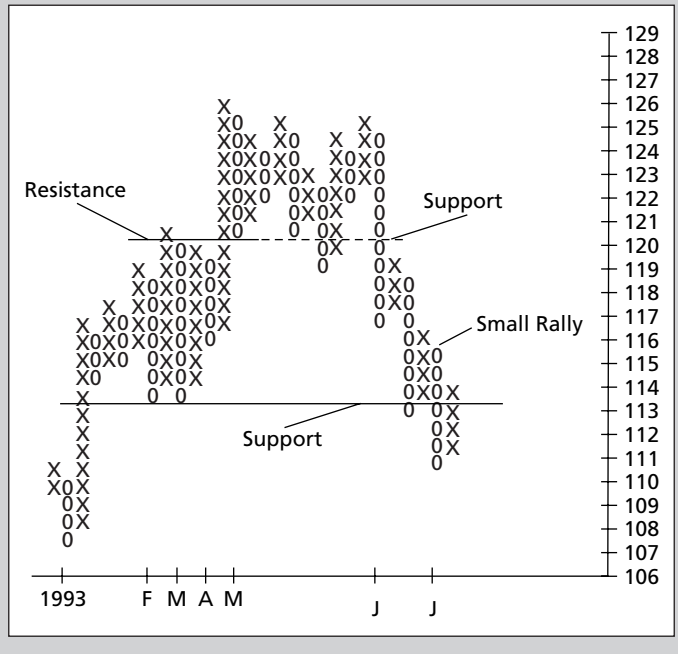
TABLE 19.2
Stock price history

Date	Price	Date	Price
January 2	$40	February 1	$40*
January 3	40.50	February 2	41
January 4	41	February 5	40.50
January 5	42*	February 6	42*
January 8	41.50	February 7	45*
January 9	42.50	February 8	44.50
January 10	43	February 9	46*
January 11	43.75	February 12	47
January 12	44*	February 13	48*
January 15	45	February 14	47.50
January 16	44	February 15	46†
January 17	41.50†	February 16	45
January 18	41	February 19	44*
January 19	40*	February 20	42*
January 22	39	February 21	41
January 23	39.50	February 22	40*
January 24	39.75	February 23	41
January 25	38*	February 26	40.50
January 26	35*	February 27	38*
January 29	36†	February 28	39
January 30	37	March 1	36*
January 31	39*	March 2	34*

*Indicates an event that has resulted in a stock price increase or decrease of at least $2.

†Denotes a price movement that has resulted in either an upward or downward reversal in the stock price.

FIGURE 19.5
Point and figure chart for Atlantic Richfield



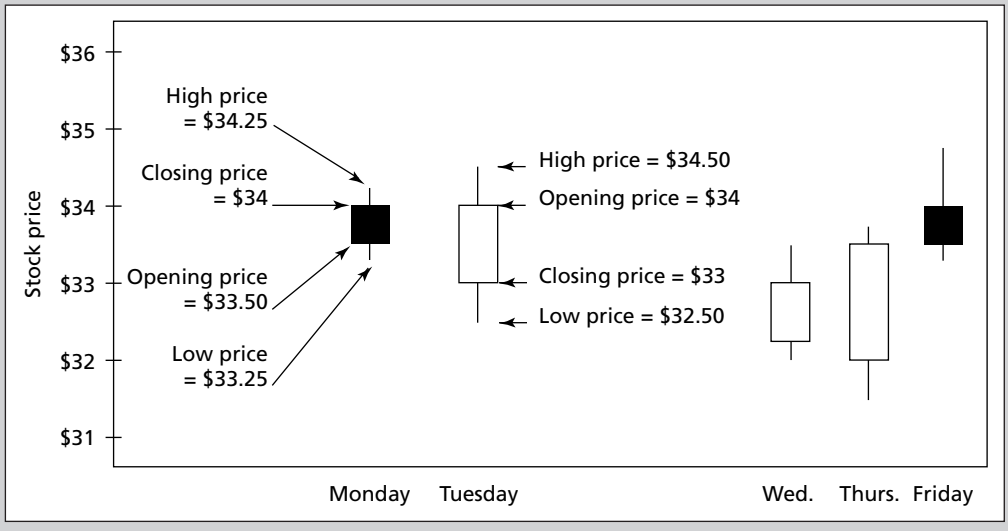


FIGURE **19.6**
Candlestick chart

well as the high and low price. The top and bottom of each vertical line represent the high and low price, respectively. If the price increases during the day (e.g., Monday in Figure 19.6), the box is shaded, so the analyst knows that the closing price is at the top of the box and the opening price is at the bottom. If the box is left unshaded (e.g., Tuesday), the stock price is understood to have fallen, and the closing price is at the bottom of the box. The vertical lines extend from the daily high to the daily low price. The chart thus conveys a considerable amount of information about recent stock price history. Obviously, candlestick charts can be drawn using either shorter or longer time periods than one-day returns, for example, using intraday or weekly prices.

A Warning

The search for patterns in stock market prices is nearly irresistible, and the ability of the human eye to discern apparent patterns is remarkable. Unfortunately, it is possible to perceive patterns that really don't exist. Consider Figure 19.7, which presents simulated and actual values of the Dow Jones Industrial Average during 1956 taken from a famous study by Harry Roberts (1959). In Figure 19.7B, it appears as though the market presents a classic head-and-shoulders pattern where the middle hump (the head) is flanked by two shoulders. When the price index "pierces the right shoulder"—a technical trigger point—it is believed to be heading lower, and it is time to sell your stocks. Figure 19.7A also looks like a "typical" stock market pattern.

Can you tell which of the two graphs is constructed from the real value of the Dow and which from the simulated data? Figure 19.7A is based on the real data. The graph in B was generated using "returns" created by a random number generator. These returns *by construction* were patternless, but the simulated price path that is plotted appears to follow a pattern much like that of A.

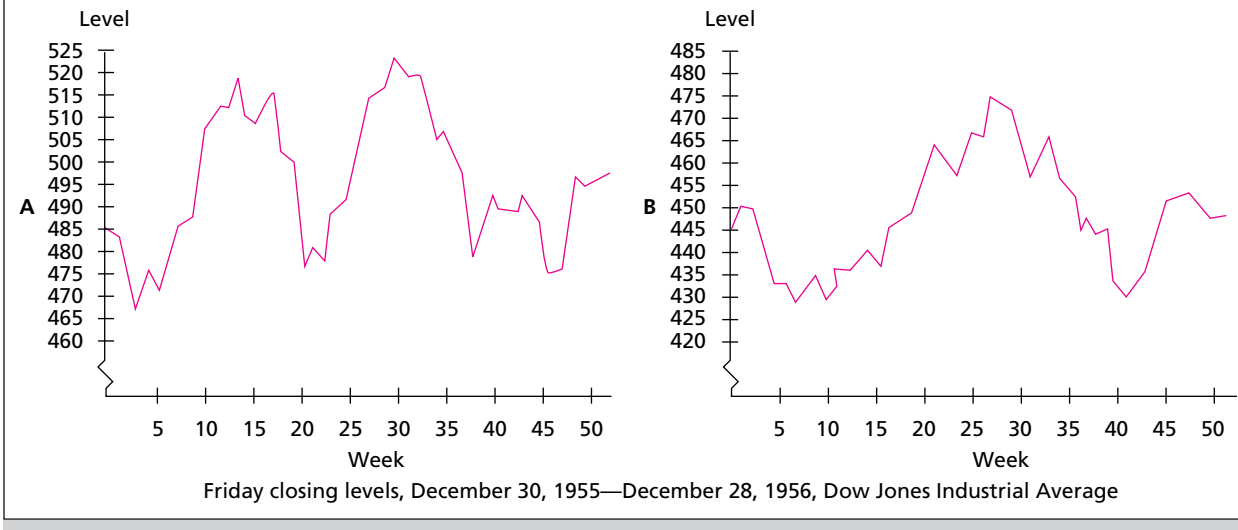


FIGURE **19.7**

Actual and simulated levels for stock market prices of 52 weeks

Note: Friday closing levels, December 30, 1955–December 28, 1956, Dow Jones Industrial Average.
Source: From Harry Roberts, "Stock Market Patterns and Financial Analysis: Methodological Suggestions," *Journal of Finance,* March 1959, pp. 5–6.

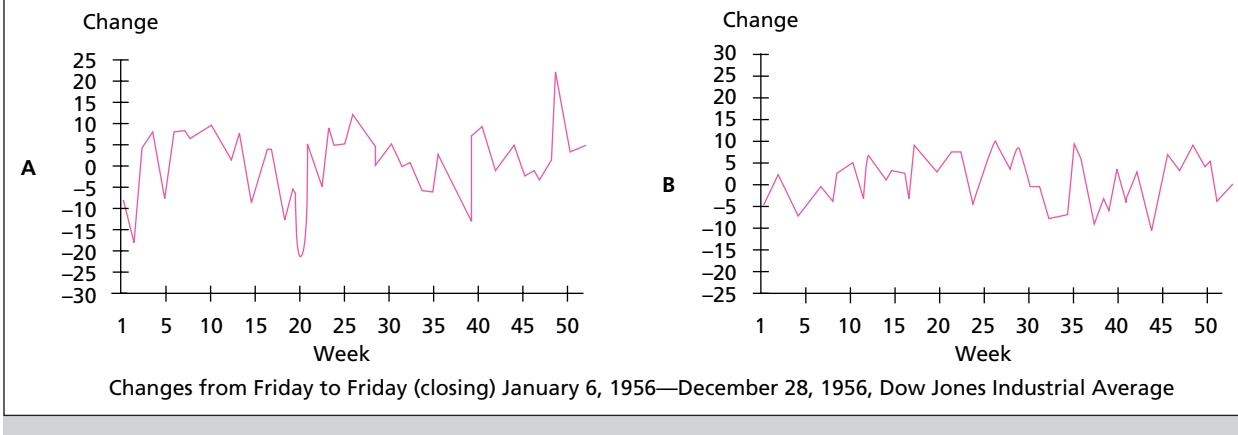


FIGURE **19.8**

Actual and simulated changes in weekly stock prices for 52 weeks

Note: Changes from Friday to Friday (closing) January 6, 1956–December 28, 1956, Dow Jones Industrial Average.
Source: From Harry Roberts, "Stock Market Patterns and Financial Analysis: Methodological Suggestions," *Journal of Finance,* March 1959, pp. 5–6.

Figure 19.8 shows the weekly price *changes* behind the two panels in Figure 19.7. Here the randomness in both series—the stock price as well as the simulated sequence—is obvious.

A problem related to the tendency to perceive patterns where they don't exist is data mining. After the fact, you can always find patterns and trading rules that would have generated

TABLE 19.3
The Superbowl as a predictor of stock market returns

Year	Winning Conference	S&P 500 Return	Year	Winning Conference	S&P 500 Return	Year	Winning Conference	S&P 500 Return
1967	N	+	1979	A	+	1991	N	+
1968	N	+	1980	A	+	1992	N	+
1969	A	−	1981	A	−	1993	N	+
1970	A	+	1982	N	+	1994	N	+
1971	A	+	1983	N	+	1995	N	+
1972	N	+	1984	A	+	1996	N	+
1973	A	−	1985	N	+	1997	N	+
1974	A	−	1986	N	+	1998	A	+
1975	A	+	1987	N	−	1999	A	+
1976	A	+	1988	N	+	2000	N	−
1977	A	−	1989	N	+	2001	A	−
1978	N	+	1990	N	+	2002	A	?

Note: N = National Football League or Conference

A = American Football League or Conference

"+" means the S&P 500 return (including dividends) in the 12 months (February through February) following the Superbowl was positive.

"−" means the S&P 500 return was negative.

enormous profits. If you test enough rules, some will have worked in the past. Unfortunately, picking a theory that would have worked after the fact carries no guarantee of future success.

In this regard, consider an investment rule that worked with uncanny precision between 1967 and 1997. Suppose that in years when an original National Football League team won the Superbowl (played in mid-to-late January) you had bet on the S&P 500 rising in the following 12 months, and in years when a team from the American Football Conference won, you bet on a market decline. You would have won this bet in 23 out of 31 of those years.

Given the impressive success rate of this strategy, would you have used it to invest your money? We hope not. If you had, Table 19.3 shows that you would have lost this bet in three of the four years ending in 2001.

In evaluating trading rules, you should always ask whether the rule would have seemed reasonable *before* you looked at the data. If not, you might be buying into the one arbitrary rule among many that happened to have worked in the recent past. The hard but crucial question is whether there is reason to believe that what worked in the past should continue to work in the future.

19.7 TECHNICAL INDICATORS

Technical analysts use technical indicators besides charts to assess prospects for market declines or advances. There are three types of technical indicators: sentiment indicators, flow of funds indicators, and market structure indicators. *Sentiment indicators* are intended to measure the expectations of various groups of investors, for example, mutual fund investors, corporate insiders, or NYSE specialists. *Flow of funds indicators* are intended to measure the potential for various investor groups to buy or sell stocks in order to predict the price pressure from those actions. Finally, *market structure indicators* monitor price trends and cycles. The charting techniques described in the last section are examples of market structure indicators. We will examine a few more market structure indicators in this section.

Sentiment Indicators

Trin statistic Market volume is sometimes used to measure the strength of a market rise or fall. Increased investor participation in a market advance or retreat is viewed as a measure of the significance of the movement. Technicians consider market advances to be a more favorable omen of continued price increases when they are associated with increased trading volume. Similarly, market reversals are considered more bearish when associated with higher volume. The *trin statistic* is the ratio of the number of advancing to declining issues divided by the ratio of volume in advancing versus declining issues.

$$\text{Trin} = \frac{\text{Number advancing/Number declining}}{\text{Volume advancing/Volume declining}}$$

This expression can be rearranged as

$$\text{Trin} = \frac{\text{Volume declining/Number declining}}{\text{Volume advancing/Number advancing}}$$

Therefore, trin is the ratio of average volume in declining issues to average volume in advancing issues. Ratios above 1.0 are considered bearish because the falling stocks would then have higher average volume than the advancing stocks, indicating net selling pressure. *The Wall Street Journal* reports trin every day in the market diary section, as in Figure 19.9.

Note, however, that for every buyer, there must be a seller of stock. Rising volume in a rising market should not necessarily indicate a larger imbalance of buyers versus sellers. For example, a trin statistic above 1.0, which is considered bearish, could equally well be interpreted as indicating that there is more *buying* activity in declining issues.

Odd-lot trading Just as short-sellers tend to be larger institutional traders, odd-lot traders are almost always small individual traders. (An odd lot is a transaction of fewer than 100 shares; 100 shares is one round lot.) The **odd-lot theory** holds that these small investors tend to miss key market turning points, typically buying stock after a bull market has already run its course and selling too late into a bear market. Therefore, the theory suggests that when odd-lot traders are widely buying, you should sell, and vice versa.

odd-lot theory

The theory that net buying of small investors is a bearish signal for a stock.

The Wall Street Journal publishes odd-lot trading data every day. You can construct an index of odd-lot trading by computing the ratio of odd-lot purchases to sales. A ratio substantially above 1.0 is bearish because it implies small traders are net buyers.

FIGURE 19.9
Market diary

Source: From *The Wall Street Journal*, January 28, 2002. Reprinted by permission of Dow Jones & Company, Inc. via Copyright Clearance Center, Inc. © 2002 Dow Jones & Company, Inc. All Rights Reserved Worldwide.

DIARIES

NYSE	FRI	THU	WK 1/25
Issues traded	3,314	3,348	3,467
Advances	1,606	1,736	1,817
Declines	1,488	1,394	1,522
Unchanged	220	218	128
New highs	112	114	255
New lows	25	15	87
zAdv vol (000)	712,318	903,130	3,093,261
zDecl vol (000)	582,866	578,597	2,399,354
zTotal vol (000)	1,338,009	1,501,576	5,592,453
Closing tick[1]	+626	+137	....
Closing Arms[2] (trin)	.88	.80	....
zBlock trades	25,661	29,593	y107,442

Confidence index *Barron's* computes a confidence index using data from the bond market. The presumption is that actions of bond traders reveal trends that will emerge soon in the stock market.

The **confidence index** is the ratio of the average yield on 10 top-rated corporate bonds divided by the average yield on 10 intermediate-grade corporate bonds. The ratio will always be below 100% because higher rated bonds will offer lower promised yields to maturity. When bond traders are optimistic about the economy, however, they might require smaller default premiums on lower rated debt. Hence, the yield spread will narrow, and the confidence index will approach 100%. Therefore, higher values of the confidence index are bullish signals.

confidence index

Ratio of the yield of top-rated corporate bonds to the yield on intermediate-grade bonds.

3. Yields on lower rated debt will rise after fears of recession have spread through the economy. This will reduce the confidence index. Should the stock market now be expected to fall or will it already have fallen?

Concept CHECK

Put/call ratio Call options give investors the right to buy a stock at a fixed "exercise" price and therefore are a way of betting on stock price increases. Put options give the right to sell a stock at a fixed price and therefore are a way of betting on stock price decreases.[3] The ratio of outstanding put options to outstanding call options is called the **put/call ratio.** Typically, the put/call ratio hovers around 65%. Because put options do well in falling markets while call options do well in rising markets, deviations of the ratio from historical norms are considered to be a signal of market sentiment and therefore predictive of market movements.

put/call ratio

Ratio of put options to call options outstanding on a stock.

Interestingly, however, a change in the ratio can be given a bullish or a bearish interpretation. Many technicians see an increase in the ratio as bearish, as it indicates growing interest in put options as a hedge against market declines. Thus, a rising ratio is taken as a sign of broad investor pessimism and a coming market decline. Contrarian investors, however, believe that a good time to buy is when the rest of the market is bearish because stock prices are then unduly depressed. Therefore, they would take an increase in the put/call ratio as a signal of a buy opportunity.

Mutual fund cash positions Technical traders view mutual fund investors as being poor market timers. Specifically, the belief is that mutual fund investors become more bullish after a market advance has already run its course. In this view, investor optimism peaks as the market is nearing its peak. Given the belief that the consensus opinion is incorrect at market turning points, a technical trader will use an indicator of market sentiment to form a contrary trading strategy. The percentage of cash held in mutual fund portfolios is one common measure of sentiment. This percentage is viewed as moving in the opposite direction of the stock market, since funds will tend to hold high cash positions when they are concerned about a falling market and the threat that investors will redeem shares.

Flow of Funds

Short interest **Short interest** is the total number of shares of stock currently sold short in the market. Some technicians interpret high levels of short interest as bullish, some as bearish. The bullish perspective is that, because all short sales must be covered (i.e., short-sellers eventually must purchase shares to return the ones they have borrowed), short interest represents latent future demand for the stocks. As short sales are covered, the demand created by the share purchase will force prices up.

short interest

The total number of shares currently sold short in the market.

[3]Puts and calls were defined in Chapter 2, Section 2.5.

The bearish interpretation of short interest is based on the fact that short-sellers tend to be larger, more sophisticated investors. Accordingly, increased short interest reflects bearish sentiment by those investors "in the know," which would be a negative signal of the market's prospects.

Credit balances in brokerage accounts Investors with brokerage accounts will often leave credit balances in those accounts when they plan to invest in the near future. Thus, credit balances may be viewed as measuring the potential for new stock purchases. As a result, a buildup of balances is viewed as a bullish indicator for the market.

Market Structure

Moving averages The moving average of a stock index is the average level of the index over a given interval of time. For example, a 52-week moving average tracks the average index value over the most recent 52 weeks. Each week, the moving average is recomputed by dropping the oldest observation and adding the latest. Figure 19.10 is a moving average chart for Microsoft. Notice that the moving average plots (the colored curves) are "smoothed" versions of the original data series (black curve) and that the longer moving average (the 200-day average) smooths the data more than the shorter (50-day) average.

After a period in which prices have generally been falling, the moving average will be above the current price (because the moving average "averages in" the older and higher prices). When prices have been rising, the moving average will be below the current price.

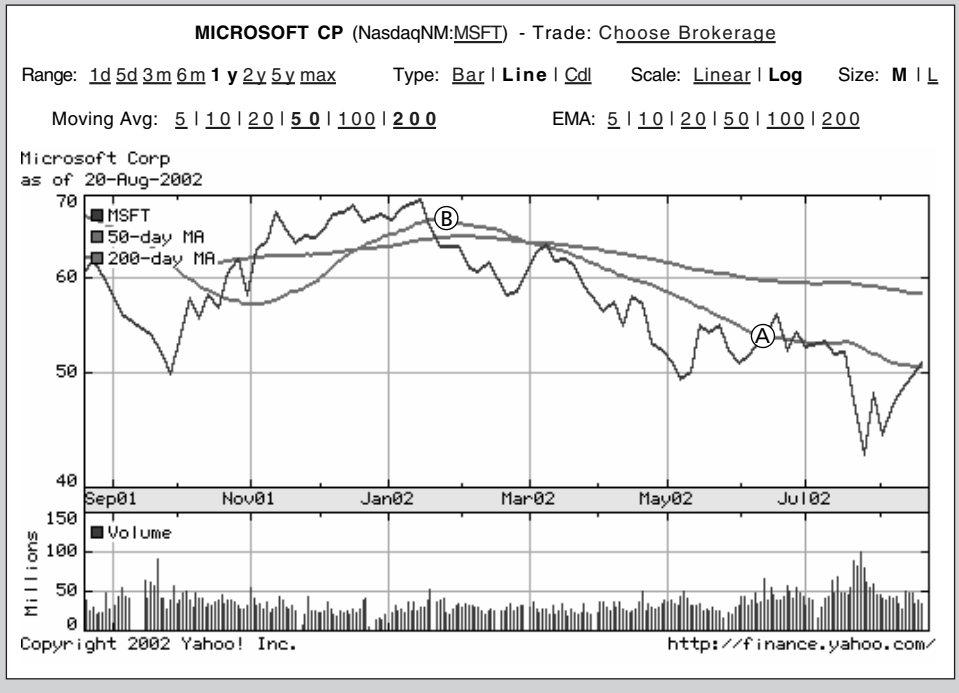


FIGURE **19.10**
Moving average for Microsoft
Source: Yahoo!, February 5, 2002.

When the market price breaks through the moving average line from below, as at point A in Figure 19.10, it is taken as a bullish signal because it signifies a shift from a falling trend (with prices below the moving average) to a rising trend (with prices above the moving average). Conversely, when prices fall below the moving average as at point B, it's considered time to sell. (In this instance, however, the buy and sell signals turned out to be faulty.)

There is some variation in the length of the moving average considered most predictive of market movements. Two popular measures are 200-day and 53-week moving averages.

A study by Brock, Lakonishok, and LeBaron (1992) actually supports the efficacy of moving average strategies. They find that stock returns following buy signals from the moving average rule are higher and less volatile than those after sell signals. However, a more recent paper by Ready (1997), which uses intraday price data, finds that the moving average rule would not be able to provide profits in practice because of trading costs and the fact that stock prices would already have moved adversely by the time the trader could act on the signal.

EXAMPLE 19.1
Moving Averages

Consider the following price data. Each observation represents the closing level of the Dow Jones Industrial Average (DJIA) on the last trading day of the week. The five-week moving average for each week is the average of the DJIA over the previous five weeks. For example, the first entry, for week 5, is the average of the index value between weeks 1 and 5: 9,290, 9,380, 9,399, 9,379, and 9,450. The next entry is the average of the index values between weeks 2 and 6, and so on.

Week	DJIA	5-Week Moving Average	Week	DJIA	5-Week Moving Average
1	9,290		11	9,590	9,555
2	9,380		12	9,652	9,586
3	9,399		13	9,625	9,598
4	9,379		14	9,657	9,624
5	9,450	9,380	15	9,699	9,645
6	9,513	9,424	16	9,647	9,656
7	9,500	9,448	17	9,610	9,648
8	9,565	9,481	18	9,595	9,642
9	9,524	9,510	19	9,499	9,610
10	9,597	9,540	20	9,466	9,563

Figure 19.11 plots the level of the index and the five-week moving average. Notice that while the index itself moves up and down rather abruptly, the moving average is a relatively smooth series, since the impact of each week's price movement is averaged with that of the previous weeks. Week 16 is a bearish point according to the moving average rule. The price series crosses from above the moving average to below it, signifying the beginning of a downward trend in stock prices.

Breadth The **breadth** of the market is a measure of the extent to which movement in a market index is reflected widely in the price movements of all the stocks in the market. The most common measure of breadth is the spread between the number of stocks that advance and decline in price. If advances outnumber declines by a wide margin, then the market is viewed as being stronger because the rally is widespread. These breadth numbers also are reported daily in *The Wall Street Journal* (see Figure 19.9).

breadth
The extent to which movements in broad market indexes are reflected widely in movements of individual stock prices.

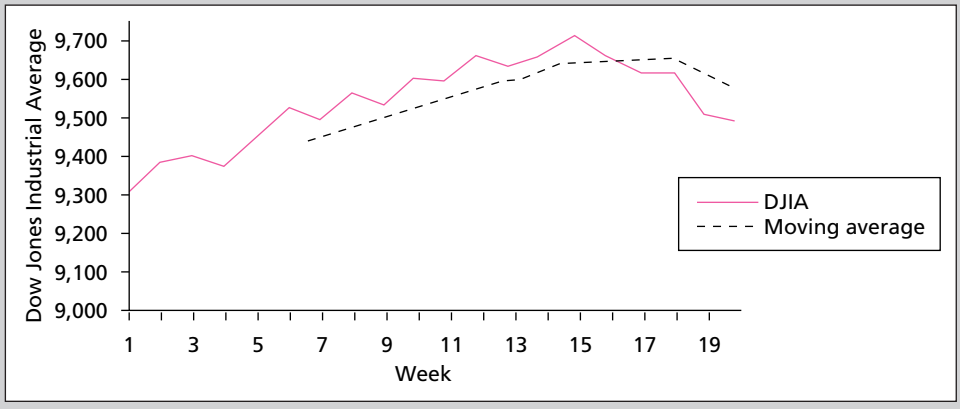


FIGURE 19.11
Moving averages

TABLE 19.4
Breadth

Day	Advances	Declines	Net Advances	Cumulative Breadth
1	802	748	54	54
2	917	640	277	331
3	703	772	−69	262
4	512	1122	−610	−348
5	633	1004	−371	−719

Note: The sum of advances plus declines varies across days because some stock prices are unchanged.

Some analysts cumulate breadth data each day as in Table 19.4. The cumulative breadth for each day is obtained by adding that day's net advances (or declines) to the previous day's total. The direction of the cumulated series is then used to discern broad market trends. Analysts might use a moving average of cumulative breadth to gauge broad trends.

relative strength

Recent performance of a given stock or industry compared to that of a broader market index.

Relative strength **Relative strength** measures the extent to which a security has outperformed or underperformed either the market as a whole or its particular industry. Relative strength is computed by calculating the ratio of the price of the security to a price index for the industry. For example, the relative strength of Ford versus the auto industry would be measured by movements in the ratio of the price of Ford divided by the level of an auto industry index. A rising ratio implies Ford has been outperforming the rest of the industry. If relative strength can be assumed to persist over time, then this would be a signal to buy Ford.

Similarly, the relative strength of an industry relative to the whole market can be computed by tracking the ratio of the industry price index to the market price index.

Some evidence in support of the relative strength strategy is provided in a study by Jegadeesh and Titman (1993). They ranked firms according to stock market performance in a six-month base period and then examined returns in various follow-up periods ranging from 1 to 36 months. They found that the best performers in the base period continued to outperform other stocks for several months. This pattern is consistent with the notion of persistent relative strength. Ultimately, however, the pattern reverses, with the best base-period performers giving up their initial superior returns. Figure 19.12 illustrates this pattern. The graph shows the

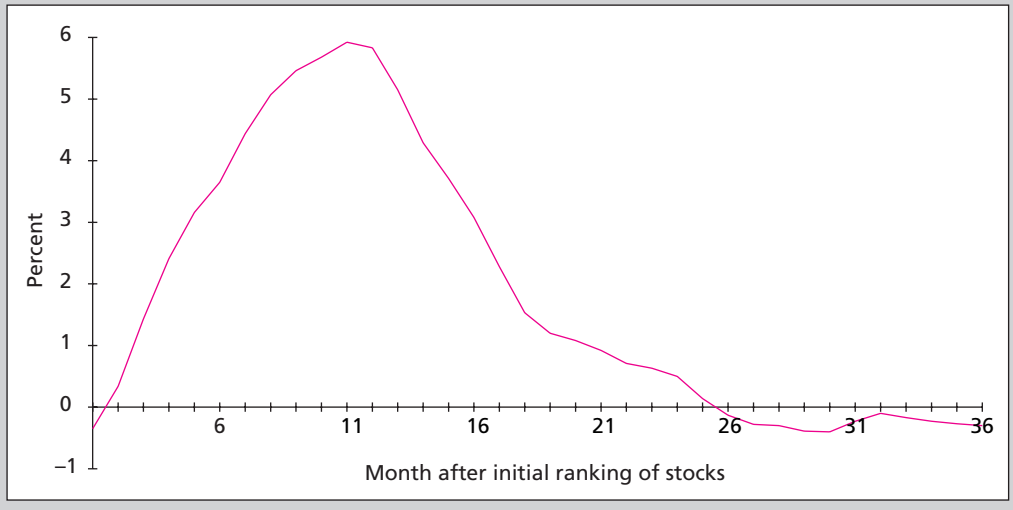


FIGURE 19.12
Cumulative difference in returns of previously best-performing and worst-performing stocks in subsequent months
Source: Jegadeesh and Titman (1993).

cumulative difference in return between the 10% of the sample of stocks with the best base-period returns and the 10% with the worst base-period returns. Initially, the curve trends upward, indicating that the best performers continue to outperform the initial laggards. After about a year, however, the curve turns down, suggesting that abnormal returns on stocks with momentum are ultimately reversed.

EXAMPLE 19.2
Relative Strength

The middle two columns of the following table present data on the levels of an auto industry index and a broad market index. Does the auto industry exhibit relative strength? That can be determined by examining the last column, which presents the ratio of the two indexes. Despite the fact that the auto industry as a whole has exhibited positive returns, reflected in the rising level of the industry index, the industry has *not* shown relative strength. The falling ratio of the auto industry index to the market index shows that the auto industry has underperformed the broad market.

Week	Auto Industry	Market Index	Ratio
1	165.6	447.0	0.370
2	166.7	450.1	0.370
3	168.0	455.0	0.369
4	166.9	459.9	0.363
5	170.2	459.1	0.371
6	169.2	463.0	0.365
7	171.0	469.0	0.365
8	174.1	473.2	0.368
9	173.9	478.8	0.363
10	174.2	481.0	0.362

19.8 THE VALUE LINE SYSTEM

Value Line is the largest investment advisory service in the world. Besides publishing the *Value Line Investment Survey,* which provides information on investment fundamentals for approximately 1,700 publicly traded companies, Value Line also ranks each of these stocks according to their anticipated price appreciation over the next 12 months. Stocks ranked in group 1 are expected to perform the best, while those in group 5 are expected to perform the worst. Value Line calls this "ranking for timeliness."

Figure 19.13 shows the performance of the Value Line ranking system over the 25 years from 1965 to March 1990. Over the total period, the different groups performed just as the rankings predicted, and the differences were quite large. The total 25-year price appreciation for the group 1 stocks was 3,083% (or 14.8% per year) compared to 15% (or 0.5% per year) for group 5.

How does the Value Line ranking system work? As Bernhard (1979) explains it, the ranking procedure has three components: (1) relative earnings momentum, (2) earnings surprise, and (3) a value index. Most (though not all) of the Value Line criteria are technically oriented, relying on either price momentum or relative strength. Points assigned for each factor determine the stock's overall ranking.

The relative earnings momentum factor is calculated as each company's year-to-year change in quarterly earnings divided by the average change for all stocks.

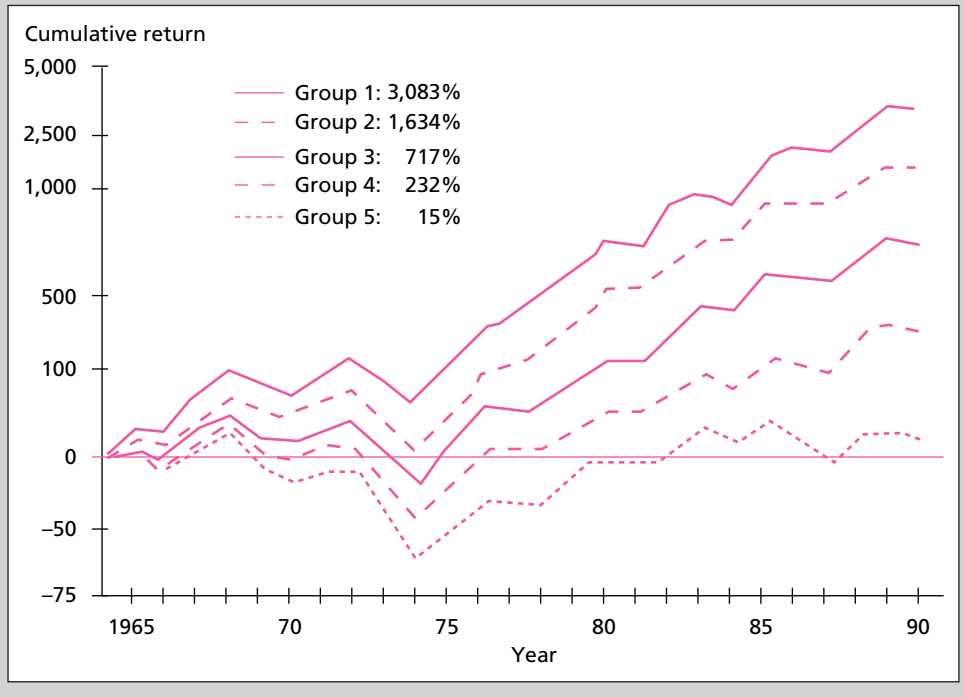


FIGURE 19.13

Record of Value Line ranking for timeliness (without allowing for changes in rank, 1965–1990)

Source: From *Value Line Investment Survey,* "Selection & Opinion," April 20, 1990. Copyright 1994 by Value Line Publishing, Inc. Reprinted by permission: All Rights Reserved.

The earnings surprise factor has to do with the difference between actual reported quarterly earnings and Value Line's estimate. The points assigned to each stock increase with the percentage difference between reported and estimated earnings.

The value index is calculated from the following regression equation

$$V = a + b_1x_1 + b_2x_2 + b_3x_3$$

where

x_1 = A score from 1 to 10 depending on the relative earnings momentum ranking, compared with the company's rank for the last 10 years;

x_2 = A score from 1 to 10 based on the stock's relative price, with ratios calculated in a similar way to the earnings ratio;

x_3 = The ratio of the stock's latest 10-week average relative price (stock price divided by the average price for all stocks) to its 52-week average relative price; and a, b_1, b_2, and b_3 are the coefficients from the regression estimated on 12 years of data.

Finally, the points for each of the three factors are added, and the stocks are classified into five groups according to the total score.

Investing according to this system does seem to produce superior results on paper, as Figure 19.13 shows. Yet, as the nearby box points out, in practice, things are not so simple—Value Line's own mutual funds have not kept up even with the broad market averages. The box illustrates that even apparently successful trading rules can be difficult to implement in the market.

19.9 CAN TECHNICAL ANALYSIS WORK IN EFFICIENT MARKETS?

Self-Destructing Patterns

It should be abundantly clear from our presentations that most of technical analysis is based on ideas totally at odds with the foundations of the efficient market hypothesis. The EMH follows from the idea that rational profit-seeking investors will act on new information so quickly that prices will nearly always reflect all publicly available information. Technical analysis, on the other hand, posits the existence of long-lived trends that play out slowly and predictably. Such patterns, if they exist, would violate the EMH notion of essentially unpredictable stock price changes.

An interesting question is whether a technical rule that seems to work will continue to work in the future once it becomes widely recognized. A clever analyst may occasionally uncover a profitable trading rule, but the real test of efficient markets is whether the rule itself becomes reflected in stock prices once its value is discovered.

Suppose, for example, the Dow theory predicts an upward primary trend. If the theory is widely accepted, it follows that many investors will attempt to buy stocks immediately in anticipation of the price increase; the effect would be to bid up prices sharply and immediately rather than at the gradual, long-lived pace initially expected. The Dow theory's predicted trend would be replaced by a sharp jump in prices. It is in this sense that price patterns ought to be *self-destructing*. When a useful technical rule (or price pattern) is discovered, it ought to be invalidated once the mass of traders attempts to exploit it, thereby forcing prices to their "correct" levels.

Thus, the market dynamic is one of a continual search for profitable trading rules, followed by destruction by overuse of those rules found to be successful, followed by yet another search for yet-undiscovered rules.

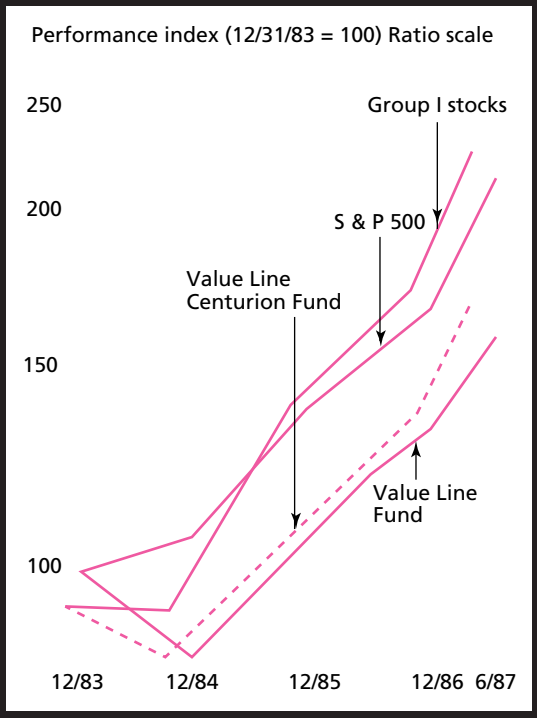
Paying the Piper

ON PAPER, VALUE LINE'S PERFORMANCE IN PICKING STOCKS IS NOTHING SHORT OF DAZZLING . . . FOR AN INVESTOR TO CAPITALIZE ON THAT PERFORMANCE IS A DIFFERENT MATTER

Value Line, Inc., publishes the *Value Line Investment Survey,* that handy review of 1,652 companies. Each week the survey rates stocks from I (best buys) to V (worst). Can you beat the market following these rankings? Value Line tracks the performance of group I from April 1965, when a new ranking formula went into effect. If you bought group I then and updated your list every week, you would have a gain of 15,391% by June 30. That means $10,000 would have grown to about $1.5 million, dividends excluded. The market is up only 245% since 1965, dividends excluded.

Quite an impressive record. There is only one flaw: It ignores transaction costs. Do transaction costs much matter against a performance like that? What does the investor lose in transaction costs? A percentage point a year? Two percent?

None other than Value Line provides an answer to this question, and the answer is almost as startling as the paper performance. Since late 1983, Value Line has run a mutual fund that attempts to track group I precisely. Its return has averaged a dismal 11 percentage points a year worse than the hypothetical results in group I. The fund hasn't even kept up with the market (*see chart*).



What went wrong? "Inefficiencies and costs of implementation," says Mark Tavel, manager of the fund, Value Line Centurion.

SUMMARY

- Behavioral finance seeks to identify behavior patterns that are inconsistent with standard economic theory and can explain observed anomalies in asset prices.
- So far, a rich set of "irrational" behavior has been documented. But with the possible exception of overreaction, none has been shown to clearly explain asset returns.
- Technical analysis is the search for recurring patterns in stock market prices. It is based essentially on the notion that market prices adjust slowly to new information and, thus, is at odds with the efficient market hypothesis.
- The Dow theory is the earliest chart-based version of technical analysis. The theory posits the existence of primary, intermediate, and minor trends that can be identified on a chart and acted on by an analyst before the trends fully dissipate. Other trend-based theories are based on relative strength, the point and figures chart, and the candlestick diagram.
- Technicians believe high volume and market breadth accompanying market trends add weight to the significance of a trend.
- Odd-lot traders are viewed as uninformed, which suggests informed traders should pursue trading strategies in opposition to their activity. In contrast, short-sellers are viewed as informed traders, lending credence to their activity.
- Value Line's ranking system uses technically based data and has shown great ability to discriminate between stocks with good and poor prospects, but the Value Line mutual fund

The Value Line Centurion Fund's turnover is 200% a year. That's quite a bit of turnover—although by no means the highest in the business. The turnover is high because in a typical week, 4 of the 100 group I stocks drop down in rank and have to be replaced with new group I stocks. It's not impossible for traders like Centurion to beat the market, but they start out with a handicap.

What are these inefficiencies and costs? And what do they tell investors about the perils of in-and-out trading?

Fund overhead is not a big item. At the $244 million Centurion, which is available only through variable life and annuity policies sold by Guardian Life, the annual expense ratio averages 0.6%. Nor are brokerage commissions large. Funneled at about 5 cents a share mostly to a captive Value Line broker, commissions eat up 0.4% of Centurion's assets per year.

So far we have 1%. Where's the other 10% of the shortfall? Bid–ask spreads, for one. A stock quoted at 39 to sellers might cost a buyer 39½—or even 41 or 42 if the buyer wants a lot of it. With about 95 of the 100 group I stocks at any given time in the Centurion portfolio, Tavel needs to amass an average $2.5 million position in each. Some of these companies have $150 million or less in outstanding shares. The very smallest Tavel doesn't even try to buy.

Timing explains some of the gulf between hypothetical and actual results. The hypothetical performance assumes a purchase at the Wednesday close before publication of the new rankings. Most subscribers get their surveys on Friday morning, however, and buy at the Friday opening—if they are lucky. An internal Value Line rule forbids the funds to act on rank changes before Friday morning.

A day makes all the difference. A 1985 study by Scott Stickel showed that almost all of the excess return on a group I stock is concentrated on three days, almost evenly divided: the Friday when subscribers read about the stock's being promoted into group I, the Thursday before, and the Monday following. Wait until Tuesday to buy and you might as well not subscribe.

Why are prices moving up on Thursday, the day before publication? Eisenstadt suspects the Postal Service of acting with uncharacteristic efficiency in some parts of the country, giving a few subscribers an early start. Another reason for an uptick: Enough is known about the Value Line formula for smart investors to anticipate a rank change by a few days. The trick is to watch group II (near-top) stocks closely. If a quarterly earnings report comes in far better than the forecast published in *Value Line*, grab the stock. "What happens if you're wrong? You're stuck with a group II stock with terrific earnings," says Eisenstadt.

that uses this system most closely has been only a mediocre performer, suggesting that implementation of the Value Line timing system is difficult.

- New theories of information dissemination in the market suggest there may be a role for the examination of past prices in formulating investment strategies. They do not, however, support the specific charting patterns currently relied on by technical analysts.

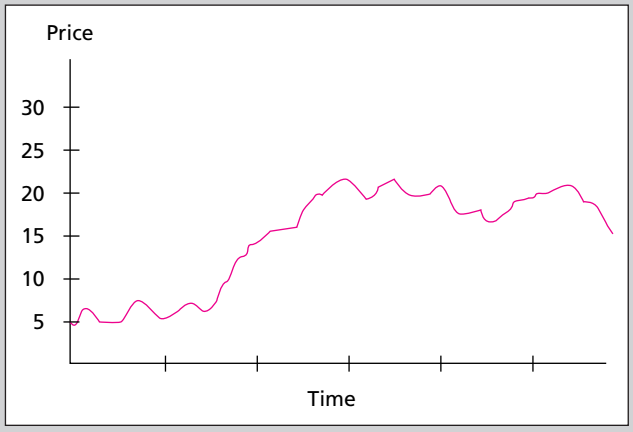
KEY TERMS

breadth, 000
confidence index, 000
Dow theory, 000
odd-lot theory, 000
put/call ratio, 000
relative strength, 000
resistance level, 000
short interest, 000
support level, 000

PROBLEM SETS

1. Consider the graph of stock prices over a two-year period in Figure 19.14. Identify likely support and resistance levels.
2. Use the data from *The Wall Street Journal* in Figure 19.9 to construct the trin ratio for the market. Is the trin ratio bullish or bearish?
3. Calculate market breadth using the data in Figure 19.9. Is the signal bullish or bearish?
4. Collect data on the DJIA for a period covering a few months. Try to identify primary trends. Can you tell whether the market currently is in an upward or downward trend?
5. Baa-rated bonds currently yield 9%, while Aa-rated bonds yield 8%. Suppose that due to an increase in the expected inflation rate, the yields on both bonds increases by 1%. What would happen to the confidence index? Would this be interpreted as bullish or bearish by a technical analyst? Does this make sense to you?

FIGURE 19.14
Simulated stock price over time



6. Using Figure 19.15 from *The Wall Street Journal,* determine whether market price movements and volume patterns were bullish or bearish around the following dates: September 17, November 5, and January 5. In each instance, compare your prediction to the subsequent behavior of the DJIA in the following few weeks.
7. Table 19.5 presents price data for Computers, Inc., and a computer industry index. Does Computers, Inc., show relative strength over this period?
8. Use the data in Table 19.5 to compute a five-day moving average for Computers, Inc. Can you identify any buy or sell signals?

STANDARD &POOR'S

1. Find the weekly price for the most recent two years for a firm from the Market Insight database (www.mhhe.com/edumarketinsight). Also, collect the level of the S&P 500 Index for the same period.
   a. Calculate the eight-week moving average of both the stock and the S&P 500 over time. For each series, use Excel to plot the moving average against the actual level of the stock price or index. Examine the instances where the moving average and price series cross. Is the stock more or less likely to increase when the price crosses through the moving average? Does it matter whether the price crosses the moving average from above or below? How reliable would an investment rule based on moving averages be? Perform your analysis for both the stock price and the S&P 500.
   b. Calculate and plot the relative strength of the stock compared to the S&P 500 over your sample period. Find all instances in which relative strength of the stock increases by more than 10 percentage points (e.g., an increase in the relative strength index from .93 to 1.03) and all those instances in which relative strength of the stock decreases by more than 10 percentage points. Is the stock more or less likely to outperform the S&P in the following two weeks when relative strength has increased or to underperform when relative strength has decreased? In other words, does relative strength continue? How reliable would an investment rule based on relative strength be?
2. Obtain weekly price data for a one-year period for a stock from the Market Insight database (www.mhhe.com/edumarketinsight). Use the price data to construct a point and figure chart with price intervals of $2. Do you observe any buy or sell signals? If so, what percentage of times do these signals turn out to be correct?

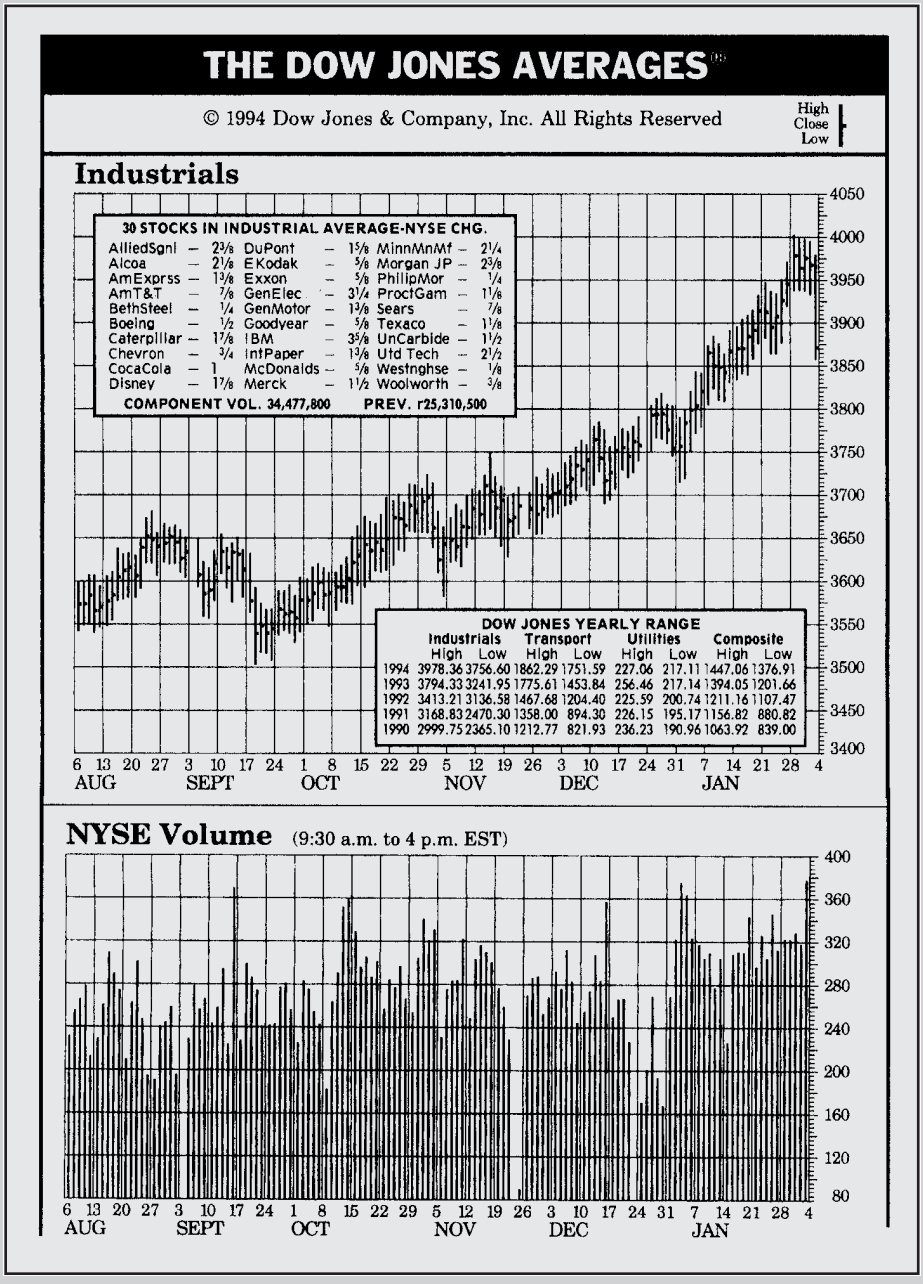


FIGURE 19.15
Dow Jones Industrial Average and market volume

Source: From *The Wall Street Journal*, February 7, 1994, p. C3. Reprinted by permission of Dow Jones & Company, Inc. via Copyright Clearance Center, Inc. © 1994 Dow Jones & Company, Inc. All Rights Reserved Worldwide.

9. Construct a point and figure chart for Computers, Inc., using the data in Table 19.5. Use $2 increments for your chart. Do the buy or sell signals derived from your chart correspond to those derived from the moving average rule (see problem 8)?
10. Yesterday, the Dow Jones industrials gained 54 points. However, 1,704 issues declined in price while 1,367 advanced. Why might a technical analyst be concerned even though the market index rose on this day?
11. Table 19.6 contains data on market advances and declines. Calculate cumulative breadth and decide whether this technical signal is bullish or bearish.

TABLE **19.5**
Computers, Inc., stock price history

Trading Day	Computers, Inc.	Industry Index
1	19.63	50.0
2	20	50.1
3	20.50	50.5
4	22	50.4
5	21.13	51.0
6	22	50.7
7	21.88	50.5
8	22.50	51.1
9	23.13	51.5
10	23.88	51.7
11	24.50	51.4
12	23.25	51.7
13	22.13	52.2
14	22	52.0
15	20.63	53.1
16	20.25	53.5
17	19.75	53.9
18	18.75	53.6
19	17.50	52.9
20	19	53.4
21	19.63	54.1
22	21.50	54.0
23	22	53.9
24	23.13	53.7
25	24	54.8
26	25.25	54.5
27	26.25	54.6
28	27	54.1
29	27.50	54.2
30	28	54.8
31	28.50	54.2
32	28	54.8
33	27.50	54.9
34	29	55.2
35	29.25	55.7
36	29.50	56.1
37	30	56.7
38	28.50	56.7
39	27.75	56.5
40	28	56.1

12. If the trading volume in advancing shares on day 1 in the previous problem was 330 million shares, while the volume in declining issues was 240 million shares, what was the trin statistic for that day? Was trin bullish or bearish?
13. Is the confidence index rising or falling?

	This Year	Last Year
Yield on top-rated corporate bonds	8%	9%
Yield on intermediate-grade corporate bonds	9	10

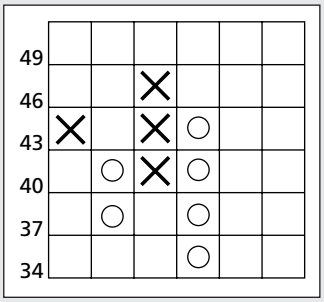
TABLE 19.6
Market advances and declines

Day	Advances	Declines
1	906	704
2	653	986
3	721	789
4	503	968
5	497	1095
6	970	702
7	1002	609
8	903	722
9	850	748
10	766	766

SOLUTIONS TO Concept CHECKS

1. Suppose a stock had been selling in a narrow trading range around $50 for a substantial period and later increased in price. Now the stock falls back to a price near $50. Potential buyers might recall the price history of the stock and remember that the last time the stock fell so low, they missed an opportunity for large gains when it later advanced. They might then view $50 as a good opportunity to buy. Therefore, buying pressure will materialize as the stock price falls to $50, which will create a support level.

2.



3. By the time the news of recession affects bond yields, it also ought to affect stock prices. The market should fall *before* the confidence index signals that the time is ripe to sell.

WEBMASTER

Charting and Technical Analysis

Go to http://finance.yahoo.com. Compare the charts and short interest ratios for GE and SWY. For each of the companies, compare a one-year chart to the 50- and 200-day average as well as the S&P 500 Index. Under the charting function, you can specify comparisons by choosing the technical analysis tab. Short interest ratios are found under the company profile report.

After you have secured the reports, discuss the following questions:

1. Which if either of the companies is priced above its 50- and 200-day averages?
2. Would you consider its chart as bullish or bearish? Explain.
3. What are the short ratios for the two companies?
4. Has the short interest displayed any significant trend?