Chapter 9 Behavioral Finance and Technical Analysis

Learning Objectives

- Describe several behavioral biases, and explain how they could lead to anomalies in stock market prices and returns.
- Explain why limits to arbitrage might allow anomalies due to behavioral biases to persist over time.
- Identify reasons why technical analysis may be profitable.
- Use indicators such as volume, put/call ratios, breadth, short interest, or confidence indexes to measure the "technical conditions" of the market.

9.1 THE BEHAVIORAL CRITIQUE

- The premise of **behavioral finance** is that conventional financial theory ignores how real people make decisions and that people make a difference.

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  - A growing number of economists have come to interpret the anomalies literature as consistent with several "irrationalities" that seem to characterize individuals making complicated decisions.
  - These irrationalities fall into two broad categories:
    - ✓ First, investors do not always process information correctly and therefore infer incorrect probability distributions about future rates of return.
    - ✓ Second, even given a probability distribution of returns, they often make inconsistent or systematically suboptimal decisions.
- Of course, the existence of irrational investors would not by itself be sufficient to render capital markets inefficient.
  - If such irrationalities did affect prices, then sharp-eyed arbitrageurs taking advantage of profit opportunities might be expected to push prices back to their proper values.

- Thus, the second leg of the behavioral critique is that in practice the actions of such arbitrageurs are limited and therefore insufficient to force prices to match intrinsic value.

- This leg of the argument is important.
  - Virtually everyone agrees that if prices are right (i.e., price = intrinsic value), then there are no easy profit opportunities.
    - ✓ But the converse is not necessarily true.
      - ➢ If behaviorists are correct about limits to arbitrage activity, then the absence of profit opportunities does not necessarily imply that markets are efficient.
- We will start our summary of the behavioral critique with the first leg of the argument, surveying a sample of the informational processing errors uncovered by psychologists in other areas.
- We next examine a few of the behavioral irrationalities that seem to characterize decision makers.
- Finally, we look at limits to arbitrage activity and conclude with a tentative assessment of the import of the behavioral debate.

Information Processing

- Errors in information processing can lead investors to misestimate the true probabilities of possible events or associated rates of return.
  - Several such biases have been uncovered. Here are four of the more important ones.

FORECASTING ERRORS

- A series of experiments by Kahneman and Tversky (1972, 1973) indicate that people give too much weight to recent experience compared to prior beliefs when making forecasts (sometimes dubbed a *memory bias*) and tend to make forecasts that are too extreme given the uncertainty inherent in their information.
- De Bondt and Thaler (1990) argue that the P/E effect can be explained by earnings expectations that are too extreme.
  - In this view, when forecasts of a firm's future earnings are high, perhaps due to favorable recent performance, they tend to be *too* high relative to the objective prospects of the firm.
  - This results in a high initial P/E (due to the optimism built into the stock price) and poor subsequent performance when investors recognize their error.

- Thus, high P/E firms tend to be poor investments.

OVERCONFIDENCE

- People tend to overestimate the precision of their beliefs or forecasts, and they tend to overestimate their abilities.
  - In one famous survey, 90% of drivers in Sweden ranked themselves as better-than-average drivers.
  - Such overconfidence may be responsible for the prevalence of active versus passive investment management—itself an anomaly to adherents of the efficient market hypothesis.
    - ✓ Despite the growing popularity of indexing, only about 20% of the equity in the mutual fund industry is held in indexed accounts.
    - ✓ The dominance of active management in the face of the typical underperformance of such strategies (consider the generally disappointing performance of actively managed mutual funds reviewed in Chapter 4 as well as in the previous chapter) is consistent with a tendency to overestimate ability.

- An interesting example of overconfidence in financial markets is provided by Barber and Odean (2001), who compare trading activity and average returns in brokerage accounts of men and women.
  - They find that men (in particular, single men) trade far more actively than women, consistent with the greater overconfidence among men well-documented in the psychology literature.
  - They also find that trading activity is highly predictive of poor investment performance.
    - ✓ The top 20% of accounts ranked by portfolio turnover had average returns seven percentage points lower than the 20% of the accounts with the lowest turnover rates.
    - ✓ As they conclude, "trading [and by implication, overconfidence] is hazardous to your wealth."

- Overconfidence appears to be a widespread phenomenon, also showing up in many corporate finance context.
  - For example, overconfident CEOs are more likely to overpay for target firms when making corporate acquisitions (Malmendier and Tate, 2008).
  - Just as overconfidence can degrade portfolio investments, it also lead such firms to make poor investments in real assets.

CONSERVATISM

- A **conservatism bias** means that investors are too slow (too conservative) in updating their beliefs in response to new evidence.
  - This means that they might initially underreact to news about a firm, so that prices will fully reflect new information only gradually.
    - ✓ Such a bias would give rise to momentum in stock market returns.

SAMPLE-SIZE NEGLECT AND REPRESENTATIVENESS

- The notion of **representativeness bias** holds that people commonly do not take into account the size of a sample, acting as if a small sample is just as representative of a population as a large one.

- They may therefore infer a pattern too quickly based on a small sample and extrapolate apparent trends too far into the future.
- It is easy to see how such a pattern would be consistent with overreaction and correction anomalies.
  - ✓ A short-lived run of good earnings reports or high stock returns would lead such investors to revise their assessments of likely future performance and thus generate buying pressure that exaggerates the price run-up.
  - ✓ Eventually, the gap between price and intrinsic value becomes glaring and the market corrects its initial error.

giving out or reflecting a strong or dazzling light.

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- Interestingly, stocks with the best recent performance suffer reversals precisely in the few days surrounding management earnings forecasts or actual earnings announcements, suggesting that the correction occurs just as investors learn that their initial beliefs were too extreme (Chopra, Lakonishok, and Ritter, 1992).

Behavioral Biases

- Even if information processing were perfect, many studies conclude that individuals would tend to make less-than-fully rational decisions using that information.
  - These behavioral biases largely affect how investors frame questions of risk versus return, and therefore make risk-return trade-offs.

FRAMING

- Decisions seem to be affected by how choices are **framed.**
  - For example, an individual may reject a bet when it is posed in terms of the risk surrounding possible gains but may accept that same bet when described in terms of the risk surrounding potential losses.
    - ✓ In other words, individuals may act risk averse in terms of gains but risk seeking in terms of losses.
  - But in many cases, the choice of how to frame a risk venture—as involving gains or losses—can be arbitrary.

- Example 9.1: *Framing*
  - Consider a coin toss with a payoff of $50 for tails. Now consider a gift of $50 that is bundled with a bet that imposes a loss of $50 if that coin toss comes up heads.
    - ✓ In both cases, you end up with zero for heads and $50 for tails.
    - ✓ But the former description frames the coin toss as posing a risky gain while the latter frames the coin toss in terms of risky losses.
    - ✓ The difference in framing can lead to different attitudes toward the bet.

MENTAL ACCOUNTING

set apart from the rest or from each other; isolate or divide.

- **Mental accounting** is a specific form of framing in which people segregate certain decisions.
  - For example, an investor may take a lot of risk with one investment account, but establish a very conservative position with another account that is dedicated to her child's education.
  - Rationally, it might be better to view both accounts as part of the investor's overall portfolio with the risk-return profiles of each integrated into a unified framework.

- Nevertheless, Statman (2008) points out that a central distinction between conventional and behavioral finance theory is that the behavioral approach views investors as building their portfolios in "distinct mental account layers in a pyramid of assets," where each layer may be tied to particular goals and elicit different levels of risk aversion.
- In another paper, Statman (1997) argues that mental accounting is consistent with some investors' irrational preference for stocks with high cash dividends (they feel free to spend dividend income, but would not "dip into capital" by selling a few shares of another stock with the same total rate of return) and with a tendency to ride losing stock positions for too long (because "behavioral investors" are reluctant to realize losses).
  - ✓ In fact, investors are more likely to sell stocks with gains than those with losses, precisely contrary to a tax-minimization strategy (Shefrin and Statman, 1985; Odean, 1998).

- Mental accounting effects also can help explain momentum in stock prices.
  - The *house money effect* refers to gamblers' greater willingness to accept new bets if they currently are ahead.
    - ✓ They think of (i.e., frame) the bet as being made with their "winnings account," that is, with the casino's and not with their own money, and thus are more willing to accept risk.
    - ✓ Analogously, after a stock market run-up, individuals may view investments as largely funded out of a "capital gains account," become more tolerant of risk, discount future cash flows at a lower rate, and thus further push up prices.

REGRET AVOIDANCE

- Psychologists have found that individuals who make decisions that turn out badly have more regret (blame themselves more) when that decision was more unconventional.
  - For example, buying a blue-chip portfolio that turns down is not as painful as experiencing the same losses on an unknown start-up firm.
    - ✓ Any losses on the blue-chip stocks can be more easily attributed to bad luck rather than bad decision making and cause less regret.

denoting companies or their shares considered to be a reliable investment

- De Bondt and Thaler (1987) argue that such **regret avoidance** is consistent with both the size and book-to-market effect.
  - Higher book-to-market firms tend to have depressed stock prices.
    - ✓ These firms are "out of favor" and more likely to be in a financially precarious position.

      dangerously likely to fall or collapse.
  - Similarly, smaller, less-well-known firms are also less conventional investments.
    - ✓ Such firms require more "courage" on the part of the investor, which increases the required rate of return.
  - Mental accounting can add to this effect.
    - ✓ If investors focus on the gains or losses of individual stocks, rather than on broad portfolios, they can become more risk averse concerning stocks with recent poor performance, discount their cash flows at a higher rate, and thereby create a value-stock risk premium.

AFFECT

- Conventional models of portfolio choice focus on asset risk and return.

- But behavioral finance focuses as well on *affect*, which is a feeling of "good" or "bad" that consumers may attach to potential purchase or investors to a stock.
  - For example, firms with reputations for socially responsible policies or attractive working conditions, or those products, may generate higher affect in public perception.
    - ✓ If investors favor stocks with good affect, that might drive up prices and drive down average rates of return.
- Statman, Fisher, and Anginer (2008) look for evidence that affect influences security pricing.
  - They find that stocks ranked high in *Fortune*'s survey of most admired companies (i.e., with high affect) tended to have lower average risk-adjusted returns than the least admired firms, suggesting that their prices have been bid up relative to their underlying profitability and, therefore, that their expected future returns are lower.

PROSPECT THEORY

- **Prospect theory** modifies the analytic description of rational risk-averse investors found in standard financial theory.
- Figure 9.1, panel A, illustrates the conventional description of a risk-averse investor.
  - Higher wealth provides higher satisfaction or "utility," but at a diminishing rate (the curve flattens as the individual becomes wealthier).
  - This gives rise to risk aversion: A gain of $1,000 increases utility by less than a loss of $1,000 reduces it; therefore, investors will reject risky prospects that don't offer a risk premium.
- Figure 9.1, panel B, shows a competing description of preferences characterized by "loss aversion."
  - Utility depends not on the *level* of wealth as in panel A, but on *changes* in wealth from current levels.
  - Moreover, to the left of zero (zero denotes no change from current wealth), the curve is convex rather than concave. This has several implications.

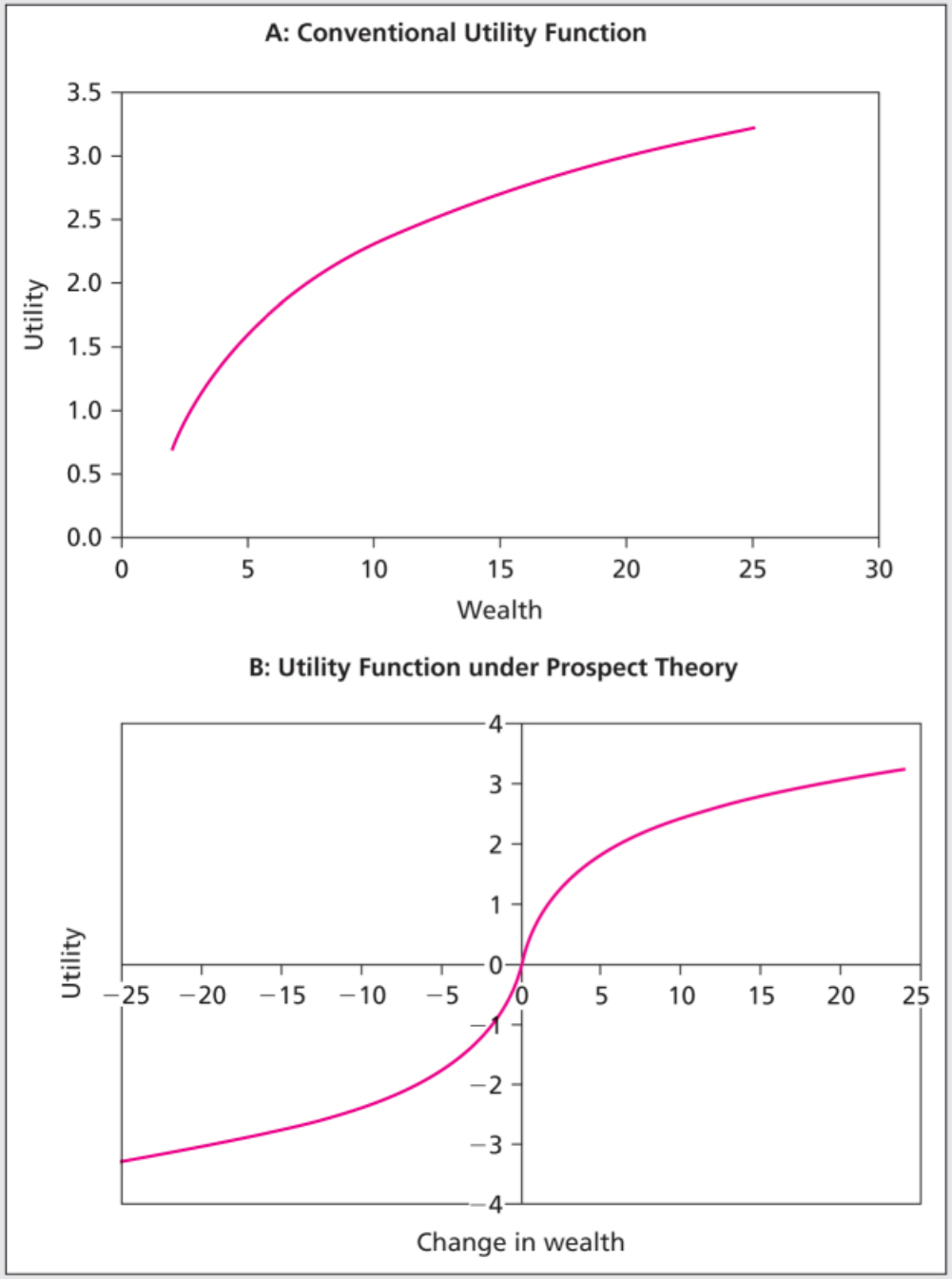


FIGURE 9.1

Prospect theory.
Panel A: A conventional utility function is defined in terms of wealth and is concave, resulting in risk aversion.
Panel B: Under loss aversion, the utility function is defined in terms of changes from current wealth. It is also convex to the left of the origin, giving rise to risk-seeking behavior in terms of losses.

- ✓ Whereas many conventional utility functions imply that investors may become less risk averse as wealth increases, the function in panel B always recenters on current wealth, thereby ruling out such decreases in risk aversion and possibly helping to explain high average historical equity risk premiums.
- ✓ Moreover, the convex curvature to the left of the origin in panel B will induce investors to be risk seeking rather than risk averse when it comes to losses.

■ Consistent with loss aversion, traders in the T-bond futures contract have been observed to assume significantly greater risk in afternoon sessions following morning sessions in which they have lost money (Coval and Shumway, 2005).

● Limits to Arbitrage

■ Behavioral biases would not matter for stock pricing if rational arbitrageurs could fully exploit the mistakes of behavioral investors.

◆ Trades of profit-seeking investors would correct any misalignment of prices.

■ However, behavioral advocates argue that in practice, several factors limit the ability to profit from mispricing.

FUNDAMENTAL RISK

- Suppose that a share of IBM is underpriced.
  - Buying it may present a profit opportunity, but it is hardly risk-free because the presumed market underpricing can get worse.
- While price eventually should converge to intrinsic value, this may not happen until after the trader's investment horizon.
  - For example, the investor may be a mutual fund manager who may lose clients (not to mention a job!) if short-term performance is poor or a trader who may run through her capital if the market turns against her, even temporarily.
  - A comment often attributed to the famous economist John Maynard Keynes is that "markets can remain irrational longer than you can remain solvent."
- The *fundamental risk* incurred in exploiting the apparent profit opportunity presumably will limit the activity of the traders.

- Example 9.2: *Fundamental Risk*
  - Early in this decade, the NASDAQ index fluctuated at a level around 2,700. From that perspective, the value the index had reached in 2000, around 5,000, seemed obviously crazy.
  - Surely some investors living through the Internet "bubble" of the late 1990s must have identified the index as grossly overvalued, suggesting a good selling opportunity.
    - ✓ But this hardly would have been a riskless arbitrage opportunity.
  - Consider that NASDAQ may also have been overvalued in 1999 when it first crossed above 3,500 (more than double its value in 2008).
    - ✓ An investor in 1999 who believed that NASDAQ was overvalued at 3,500 and decided to sell it short would have suffered enormous losses as the index increased by another 1,500 points before finally peaking at 5,000.
  - While the investor might have derived considerable satisfaction at eventually being proven right about the overpricing, by entering a year before the market "corrected," he might also have gone broke.

IMPLEMENTATION COSTS

- Exploiting overpricing can be particularly difficult.
  - Short-selling a security entails costs; short-sellers may have to return the borrowed security on little notice, rendering the horizon of the short sale uncertain.
  - Other investors such as many pension or mutual fund managers face strict limits on their discretion to short securities.
    - ✓ This can limit the ability of arbitrage activity to force prices to fair value.

MODEL RISK

- One always has to worry that an apparent profit opportunity is more apparent than real.
  - Perhaps you are using a faulty model to value the security, and the price actually is right.
- Mispricing may make a position a good bet, but it is still a risky one, which limits the extent to which it will be pursued.

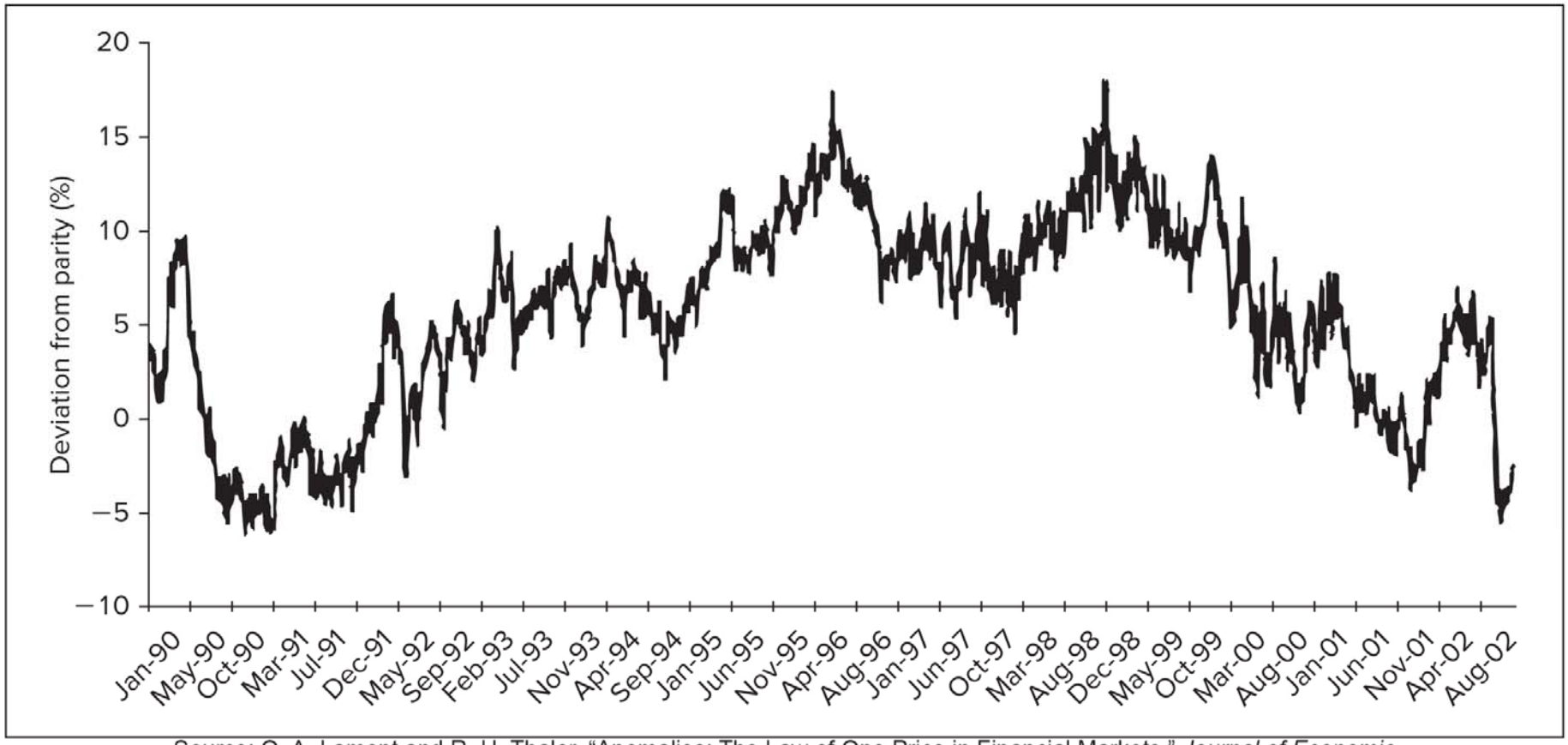
Limits to Arbitrage and the Law of One Price

- While one can debate the implications of much of the anomalies literature, surely the Law of One Price (positing that effectively identical assets should have identical prices) should be satisfied in rational markets.
  - Yet there are several instances where the law seems to have been violated.
    - ✓ These instances are good case studies of the limits to arbitrage.

"SIAMESE TWIN" COMPANIES

- In 1907, Royal Dutch Petroleum and Shell Transport merged their operations into one firm.
  - The two original companies, which continued to trade separately, agreed to split all profits from the joint company on a 60/40 basis.
    - ✓ Shareholders of Royal Dutch receive 60% of the cash flow, and those of Shell receive 40%.
  - One would therefore expect that Royal Dutch should sell for exactly 60/40 =1.5 times the price of Shell.
    - ✓ But this is not the case.

◆ Figure 9.2 shows that the relative value of the two firms has departed considerably from this "parity" ratio for extended periods of time.



Source: O. A. Lamont and R. H. Thaler, "Anomalies: The Law of One Price in Financial Markets," *Journal of Economic Perspectives* 17 (Fall 2003), pp. 191–202

- Doesn't this mispricing give rise to an arbitrage opportunity?
  - If Royal Dutch sells for more than 1.5 times Shell, why not buy relatively underpriced Shell and short-sell overpriced Royal?
- This seems like a reasonable strategy, but if you had followed it in February 1993 when Royal sold for about 10% more than its parity value, Figure 9.2 shows that you would have lost a lot of money as the premium widened to about 17% before finally reversing after 1999.
  - As in Example 9.2, this opportunity posed fundamental risk.

EQUITY CARVE-OUTS

- Several equity carve-outs also have violated the Law of One Price.
- To illustrate, consider the case of 3Com, which in 1999 decided to spin off its Palm division.
  - It first sold 5% of its stake in Palm in an IPO, announcing that it would distribute the remaining 95% of its Palm shares to 3Com shareholders 6 months later in a spinoff.
  - Each 3Com shareholder would receive 1.5 shares of Palm in the spinoff.

- Once Palm shares began trading, but prior to the spinoff, the share price of 3Com should have been *at least* 1.5 times that of Palm.
  - After all, each share of 3Com entitled its owner to 1.5 shares of Palm *plus* an ownership stake in a profitable company.
  - Instead, Palm shares at the IPO actually sold for *more* than the 3Com shares.
  - The *stub value* of 3Com (i.e., the value of each 3Com share net of the value of the claim to Palm represented by that share) could be computed as the price of 3Com minus 1.5 times the price of Palm.
    - ✓ This calculation, however, implies that 3Com's stub value was negative, this despite the fact that it was a profitable company with cash assets alone of about $10 per share.
- Again, an arbitrage strategy seems obvious. Why not buy 3Com and sell Palm?
  - The limit to arbitrage in this case was the inability of investors to sell Palm short.
  - Virtually all available shares in Palm were already borrowed and sold short, and the negative stub values persisted for more than 2 months.

CLOSED-END FUNDS

- We noted in Chapter 4 that closed-end funds often sell for substantial discounts or premiums from net asset value.
  - This is "nearly" a violation of the Law of One Price because one would expect the value of the fund to equal the value of the shares it holds.
- We say nearly, because in practice, there are a few wedges between the value of the closed-end fund and its underlying assets.
  - One is expenses.
    - ✓ The fund incurs expenses that ultimately are paid for by investors, and these will reduce share price.
  - On the other hand, if managers can invest fund assets to generate positive risk-adjusted returns, share price might exceed net asset value.

- Lee, Shleifer, and Thaler (1991) argue that the patterns of discounts and premiums on closed-end funds are driven by changes in investor sentiment.
  - They note that discounts on various funds move together and are correlated with the return on small stocks, suggesting that all are affected by common variation in sentiment.
  - One might consider buying funds selling at a discount from net asset value and selling those trading at a premium, but discounts and premiums can widen, subjecting this strategy too to fundamental risk.
  - Pontiff (1996) demonstrates that deviations of price from net asset value in closed-end funds tend to be higher in funds that are more difficult to arbitrage, for example, those with more idiosyncratic volatility.

- Closed-end fund discounts are a good example of so-called anomalies that also may have rational explanations.
  - Ross (2002) demonstrates that they can be reconciled with rational investors even if expenses or fund abnormal returns are modest.
    - ✓ He shows that if the fund has a dividend yield of δ, an alpha (risk-adjusted abnormal return) of α, and expense ratio of ε, then using the constant-growth dividend discount model (see Chapter 13), the premium of the fund over its net asset value will be

$$\frac{\text{Price} - \text{NAV}}{\text{NAV}} = \frac{\alpha - \varepsilon}{\delta + \varepsilon - \alpha}$$

    - ✓ If the fund manager's performance more than compensates for expenses (i.e., $\alpha > \varepsilon$), the fund will sell at a premium to NAV; otherwise it will sell at a discount.
      - ➢ For example, suppose $\alpha = .015$, the expense ratio is $\varepsilon = .0125$, and the dividend yield is $\delta = .02$. Then the premium will be .14 or 14%.

- But if the market turns sour on the manager and revises its estimate of α downward to .005, that premium quickly turns into a discount of 43%.

- This analysis might explain why the public is willing to purchase closed-end funds at a premium; if investors do not expect that α to exceed ε, they won't purchase shares in the fund.
- But the fact that most premiums eventually turn into discounts indicates how difficult it is for management to fulfill these expectations.

Bubbles and Behavioral Economics

- In Example 9.2, we pointed out that the stock market run-up of the late l990s, and even more spectacularly, the run-up of the technology-heavy NASDAQ market, seems in retrospect to have been an obvious bubble.
  - In a six-year period beginning in 1995, the NASDAQ index increased by a factor of more than 6.

- Former Fed Chairman Alan Greenspan famously characterized the dot-com boom as an example of "irrational exuberance," and his assessment turned out to be correct.
  - By October 2002, the index fell to less than one-fourth the peak value it had reached only two and a half years earlier.
    - ✓ This episode seems to be a case in point for advocates of the behavioral school, exemplifying a market moved by irrational investor sentiment.
    - ✓ Moreover, in accord with behavioral patterns, as the dot-com boom developed, it seemed to feed on itself, with investors increasingly confident of their investment prowess (overconfidence bias) and apparently willing to extrapolate short-term patterns into the distant future (representativeness bias).
- Only five year later, another bubble, this time in housing prices, was under way.
  - As in the dot-com bubble, expectations of continued price increases fueled speculative demand by purchasers.
  - Shortly thereafter, of course, housing prices stalled and then fell.
    - ✓ The bursting bubble set off the worst financial crisis in 75 years.

- On the other hand, bubbles are a lot easier to identify as such once they are over.
  - While they are going on, it is not as clear that prices are irrationally exuberant, and, indeed, many financial commentators at the time justified the boom as consistent with glowing forecasts for the "new economy."
    - ✓ A simple example shows how hard it can be to tie down the fair value of stock investments.
- Example 9.3: *A Stock Market Bubble?*
  - In 2000, near the peak of the dot-com boom, the dividends paid by the firms included in the S&P 500 totaled $154.6 million.
    - ✓ If the discount rate for the index was 9.2% and the expected dividend growth rate was 8%, the value of these shares according to the constant-growth dividend discount model (see Chapter 13 for more on this model) would be

$$\text{Value} = \frac{\text{Dividend}}{\text{Discount rate} - \text{Growth rate}} = \frac{\$154.6}{.092 - .08} = \$12{,}883 \text{ million}$$

    - ✓ This was quite close to the actual total value of those firms at the time.

- But the estimate is highly sensitive to the input values, and even a small reassessment of their prospects would result in a big revision of price.
  - ✓ Suppose the expected dividend growth rate fell to 7.4%. This would reduce the value of the index to

$$\text{Value} = \frac{\text{Dividend}}{\text{Discount rate} - \text{Growth rate}} = \frac{\$154.6}{.092 - .074} = \$8,589 \text{ million}$$

    which was about the value to which the S&P 500 firms had fallen by October 2002.
- In light of this example, the run-up and crash of the 1990s seems easier to reconcile with rational behavior.

■ Still, other evidence seems to tag dot-com boom as at least partially irrational.

- Consider, for example, the results of a study by Rau, Dimitrov, and Cooper (2001) documenting that firms adding ".com" to the end of their names during this period enjoyed a meaningful stock price increase.
  - ✓ That doesn't sound like rational valuation.

Evaluating the Behavioral Critique

- As investors, we are concerned with the existence of profit opportunities.
  - The behavioral explanations of efficient market anomalies do not give guidance as to how to exploit any irrationality.
  - For investors, the question is still whether there is money to be made from mispricing, and the behavioral literature is largely silent on this point.
- However, as we have emphasized above, one of the important implications of the efficient market hypothesis is that security prices serve as reliable guides to the allocation of real capital.
  - If prices are distorted, then capital markets will give misleading signals (and incentives) as to where the economy may best allocate resources.
  - In this crucial dimension, the behavioral critique of the efficient market hypothesis is certainly important irrespective of any implication for investment strategies.

- There is considerable debate among financial economists concerning the strength of the behavioral critique.
  - Many believe that the behavioral approach is too unstructured, in effect allowing virtually any anomaly to be explained by some combination of irrationalities chosen from a laundry list of behavioral biases.
  - While it is easy to "reverse engineer" a behavioral explanation for any particular anomaly, these critics would like to see a consistent or unified behavioral theory that can explain a *range* of anomalies.
- More fundamentally, others are not convinced that the anomalies literature as a whole is a convincing indictment of the efficient market hypothesis.
  - Fama (1998) reviews the anomalies literature and poses a challenge to the behavioral school. He notes that the anomalies are inconsistent in terms of their support for one type of irrationality versus another.
    - ✓ For example, some papers document long-term corrections (consistent with overreaction), while others document long-term continuations of abnormal returns (consistent with underreaction).

- ✓ Moreover, the statistical significance of many of these results is hard to assess.
  - ➢ Even small errors in choosing a benchmark against which to compare returns can cumulate to large apparent abnormalities in long-term returns.
  - ➢ Therefore, many of the results in these studies are sensitive to small benchmarking errors, and Fama argues that seemingly minor changes in methodology can have big impacts on conclusions.

■ The behavioral critique of full rationality in investor decision making is well taken, but the extent to which limited rationality affects asset pricing is controversial.

◆ Whether or not investor irrationality affects asset prices, however, behavioral finance already makes important points about portfolio management.

- ✓ Investors who are aware of the potential pitfalls in information processing and decision making that seem to characterize their peers should be better able to avoid such errors.

- Ironically, the insights of behavioral finance may lead to some of the same policy conclusions embraced by efficient market advocates.
  - For example, an easy way to avoid some behavioral minefields is to pursue passive, largely indexed, portfolio strategies.
  - It seems that only rare individuals can consistently beat passive strategies; this conclusion may hold true whether your fellow investors are behavioral or rational.

9.2 TECHNICAL ANALYSIS AND BEHAVIORAL FINANCE

- Technical analysis attempts to exploit recurring and predictable patterns in stock prices to generate superior investment performance.
  - Technicians do not deny the value of fundamental information, but believe that prices only gradually close in on intrinsic value.
  - As fundamentals shift, astute traders can exploit the adjustment to a new equilibrium.
- For example, one of the best-documented behavioral tendencies is the *disposition effect*, which refers to the tendency of investors to hold on to losing investments.
  - Behavioral investors seem reluctant to realize losses.
  - Grinblatt and Han (2005) show that the disposition effect can lead to momentum in stock prices even if fundamental values follow a random walk.
  - The fact that the demand of "disposition investors" for a company's shares depends on the price history of those shares means that prices close in on fundamental values only over time, consistent with the central motivation of technical analysis.

- Behavioral biases may also be consistent with technical analysts' use of volume data.
  - An important behavioral trait noted above is overconfidence, a systematic tendency to overestimate one's abilities.
    - ✓ As traders become overconfident, they may trade more, inducing an association between trading volume and market returns (Gervais and Odean, 2001).
  - Technical analysis thus uses volume data as well as price history to direct trading strategy.
- Finally, technicians believe that market fundamentals can be perturbed by irrational or behavioral factors, sometimes labeled sentiment variables.
  - More or less random price fluctuations will accompany any underlying price trend, creating opportunities to exploit corrections as these fluctuations dissipate.

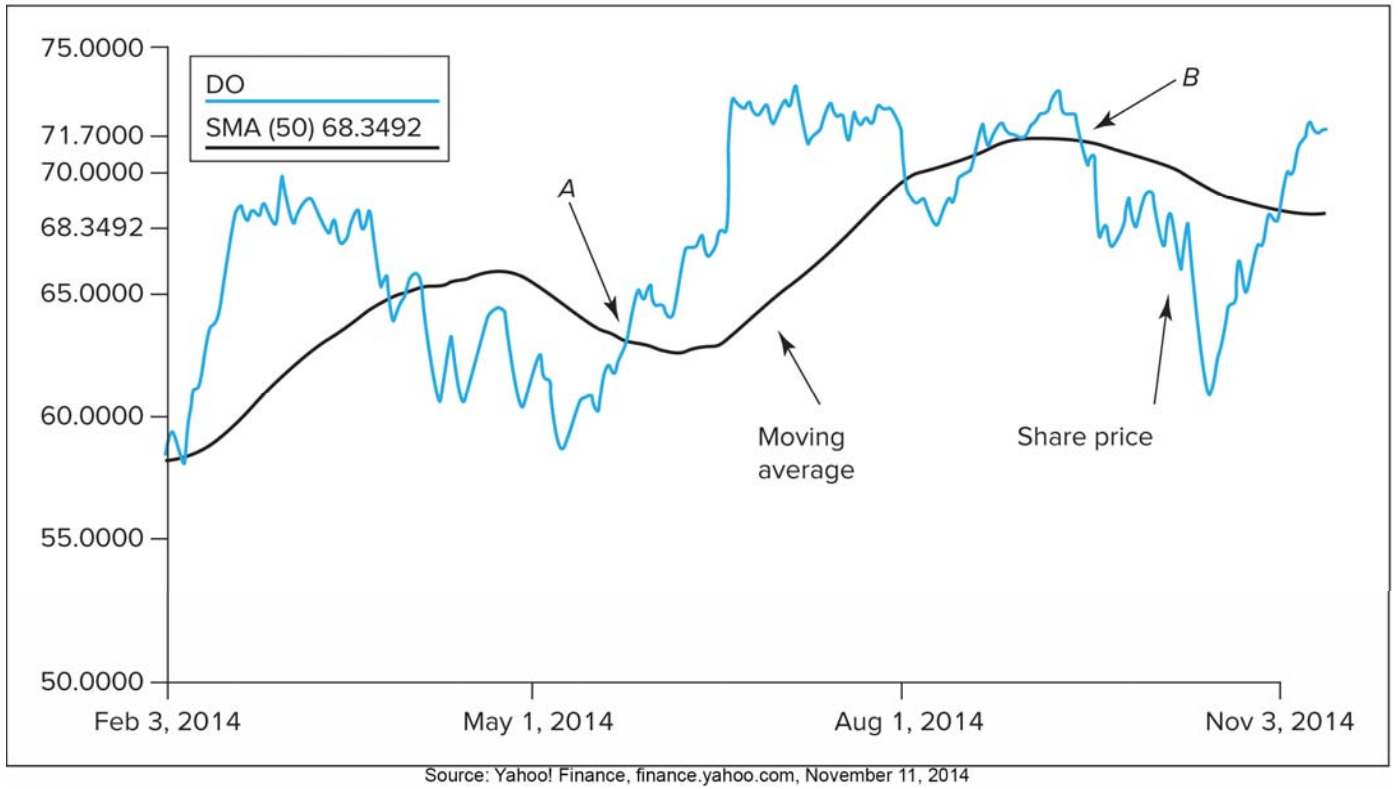
Trends and Corrections

- Much of technical analysis seeks to uncover trends in market prices.
  - This is in effect a search for momentum.
    - ✓ Momentum can be absolute, in which case one searches for upward price trends, or relative, in which case the analyst looks to invest in one sector over another (or even take on a long-short position in the two sectors).
      - ➢ Relative strength statistics (discussed later in this chapter) are designed to uncover these cross-sector potential opportunities.

MOMENTUM AND MOVING AVERAGES

- While we all would like to buy shares in firms whose prices are trending upward, this begs the question of how to identify the underlying direction of prices, if in fact such trends actually exists.
  - A primary tool for this purpose is the moving average.

- The moving average of a stock price is the average price over a given interval, where that interval is updated as time passes.
  - For example, a 50-day moving average traces the average price over the previous 50 days. The average is recomputed each day by dropping the oldest observation and adding the newest.
- Figure 9.3 is a moving-average chart for Adobe.



Source: Yahoo! Finance, finance.yahoo.com, November 11, 2014

- Notice that the moving average (the blue curve) is a “smoothed” version of the original data series (the jagged red curve).
- After a period in which prices have been falling, the moving average will be above the current price (because the moving average continues to “average in” the older and higher prices until they leave the sample period).
- In contrast, when prices have been rising, the moving average will be below the current price.
- Breaking through the moving average from below, as at point *A* in Figure 9.3, 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 drop below the moving average, as at point *B*, analysts might conclude that market momentum has become negative.

- Other techniques also are used to uncover potential momentum in stock prices.
  - Two of the more famous ones are Elliott wave theory and Kondratieff waves.
  - Both posit the existence of long-term trends in stock market prices that may be disturbed by shorter-term trends as well as daily fluctuations of little importance.
- Elliott wave theory superimposes long-term and short-term wave cycles in an attempt to describe the complicated pattern of actual price movements.
  - Once the longer-term waves are identified, investors presumably can buy when the long-term direction of the market is positive.
  - While there is considerable noise in the actual evolution of stock prices, by properly interpreting the wave 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.

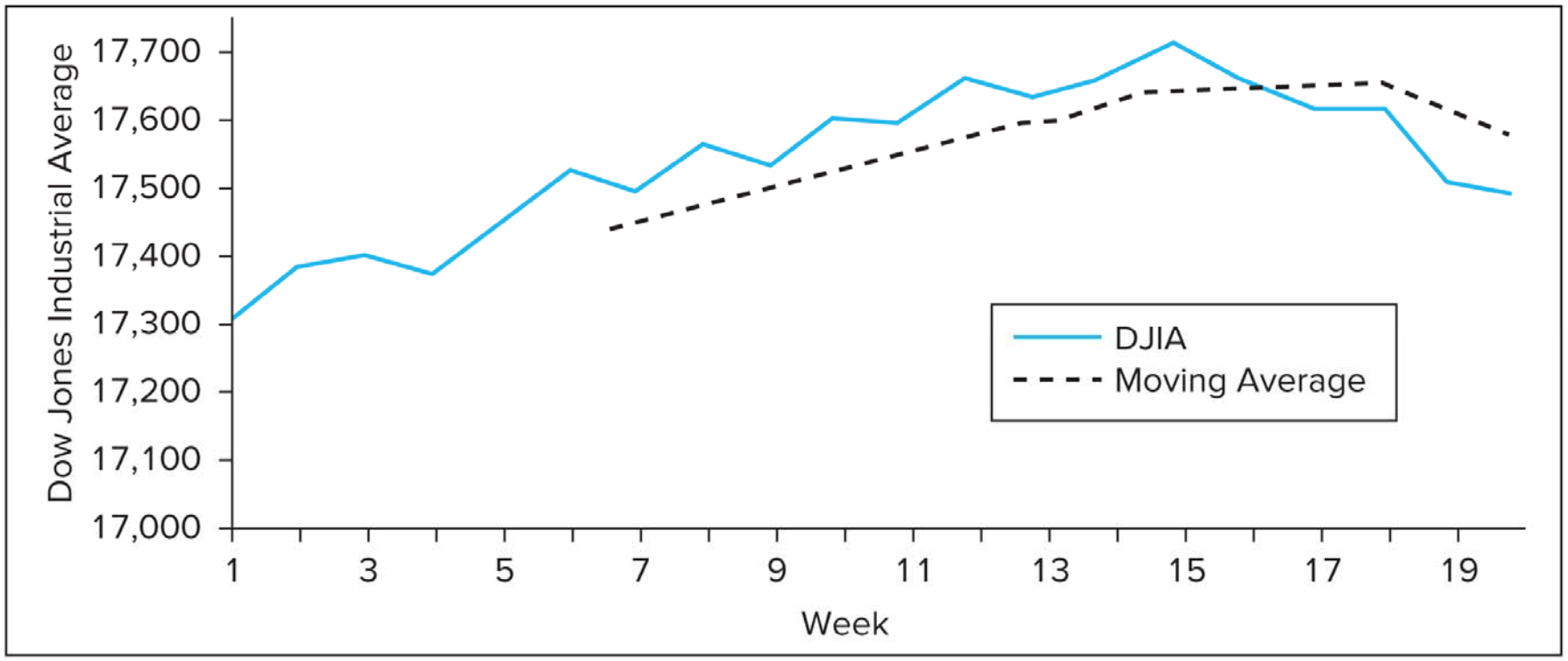
- Kondratieff's assertion is hard to evaluate empirically, however, because cycles that last about 50 years provide only two independent data points per century, which is hardly enough data to test the predictive power of the theory.

■ Example 9.4: *Moving Averages*

- Consider the price data in the following table. Each observation represents the closing level of the Dow Jones Industrial Average (DJIA) on the last trading day of the week.

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

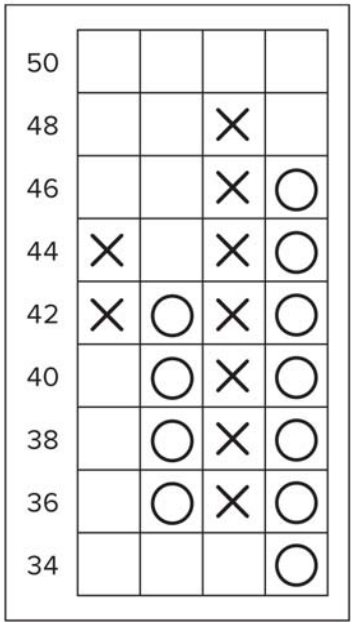
- The five-week moving average for each week is the average of the DJIA over the previous five weeks.
  - ✓ For example, the first entry, for week 5, is the average of the index value between weeks 1 and 5: 17,290, 17,380, 17,399, 17,379, and 17,450. The next entry is the average of the index values between weeks 2 and 6, and so on.
  - ✓ Figure 9.4 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, because 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.

POINT AND FIGURE CHARTS

- ■ A variant on pure trend analysis is the *point and figure chart* depicted in Figure 9.5.



- 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 9.5 come from Table 9.1.

■ Suppose, as in Table 9.1, 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 9.5. 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 9.1 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.

TABLE 9.1 Stock price history

Date	Price	Date	Price
January 2	$40.00	February 1	$40.00*
January 3	40.50	February 2	41.00
January 4	41.00	February 5	40.50
January 5	42.00*	February 6	42.00*
January 8	41.50	February 7	45.00*
January 9	42.50	February 8	44.50
January 10	43.00	February 9	46.00*
January 11	43.75	February 12	47.00
January 12	44.00*	February 13	48.00*
January 15	45.00	February 14	47.50
January 16	44.00	February 15	46.00†
January 17	41.50†	February 16	45.00
January 18	41.00	February 19	44.00*
January 19	40.00*	February 20	42.00*
January 22	39.00	February 21	41.00
January 23	39.50	February 22	40.00*
January 24	39.75	February 23	41.00
January 25	38.00*	February 26	40.50
January 26	35.00*	February 27	38.00*
January 29	36.00†	February 28	39.00
January 30	37.00	March 1	36.00*
January 31	39.00*	March 2	34.00*

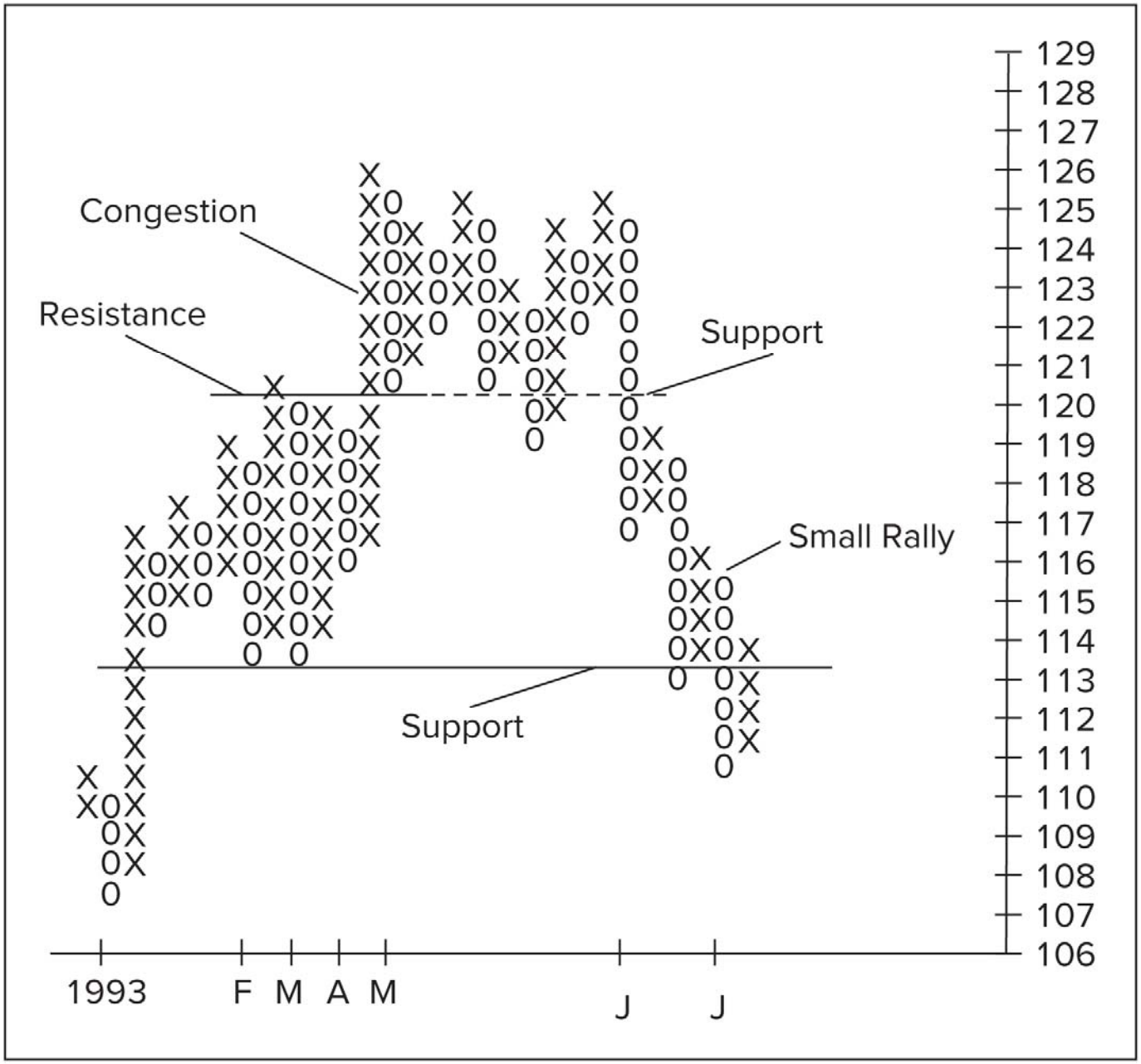
*Indicates an event that has resulted in a stock price increase or decrease of at least $2.

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

- 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 9.6, which is an actual chart with congestion and resistance levels marked.
- 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.

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 are reported daily in *The Wall Street Journal* (see Figure 9.7).


Congestion
Resistance
Support
Small Rally
Support
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Markets Diary Issues	NYSE	NASDAQ	NYSE MKT
Advances	1,602	1,264	186
Declines	1,534	1,421	185
Unchanged	124	129	23
Issues at			
New Highs	210	122	7
New Lows	38	52	10
Share Volume			
Total	2,920,523,915	1,636,186,210	88,729,633
Advancing	1,515,532,381	829,508,757	49,187,491
Declining	1,332,273,976	754,643,461	35,798,206

Source: *The Wall Street Journal Online*, November 11, 2014

- Some analysts cumulate breadth data each day as in Table 9.2.
  - 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.

TABLE 9.2 Breadth

Day	Advances	Declines	Net Advances	Cumulative Breadth
1	1,802	1,748	54	54
2	1,917	1,640	277	331
3	1,703	1,772	−69	262
4	1,512	2,122	−610	−348
5	1,633	2,004	−371	−719

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

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 Toyota versus the auto industry would be measured by movements in the ratio of the price of Toyota divided by the level of an auto industry index.

- ✓ A rising ratio implies Toyota 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 Toyota.

- 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.

Sentiment Indicators

- Behavioral finance devotes considerable attention to market "sentiment," which may be interpreted as the general level of optimism among investors.
  - Technical analysts have devised several measures of sentiment; we review a few of them.

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 defined as

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

  - Therefore, trin is the ratio of average trading volume in declining issues to average volume in advancing issues.
  - Ratios above 1 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 Online* provides the data necessary to compute trin in its Markets Diary section.
  - Using the data in Figure 9.7, trin for the NYSE on this day was:

$$\text{Trin} = \frac{\$1,332,273,976 / 1,534}{\$1,515,532,381 / 1,602} = .918$$

- 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, which is considered bearish, could equally well be interpreted as indicating that there is more *buying* activity in declining issues.

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.

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.

- ✓ 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.

PUT/CALL RATIO

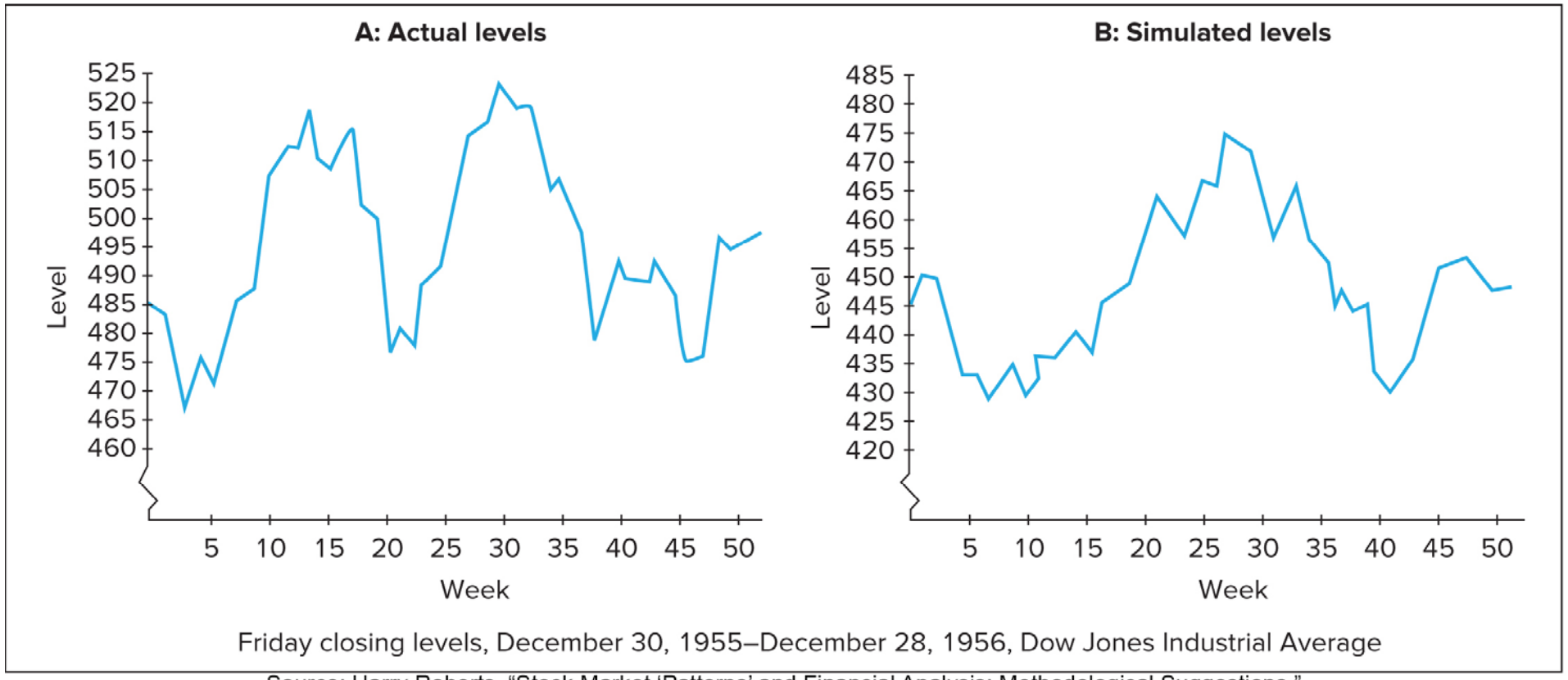
- Call options give investors the right to buy a stock at a fixed "exercise" price and therefore are a way of betting on stock price increases.
- Put options give the right to sell a stock at a fixed price and therefore are a way of betting on stock price decreases.
- The ratio of outstanding put options to outstanding call options is called the **put/call ratio.**
- 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.

- 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.

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 9.8, which presents simulated and actual values of the Dow Jones Industrial Average during 1956 taken from a famous study by Harry Roberts (1959).



Friday closing levels, December 30, 1955–December 28, 1956, Dow Jones Industrial Average

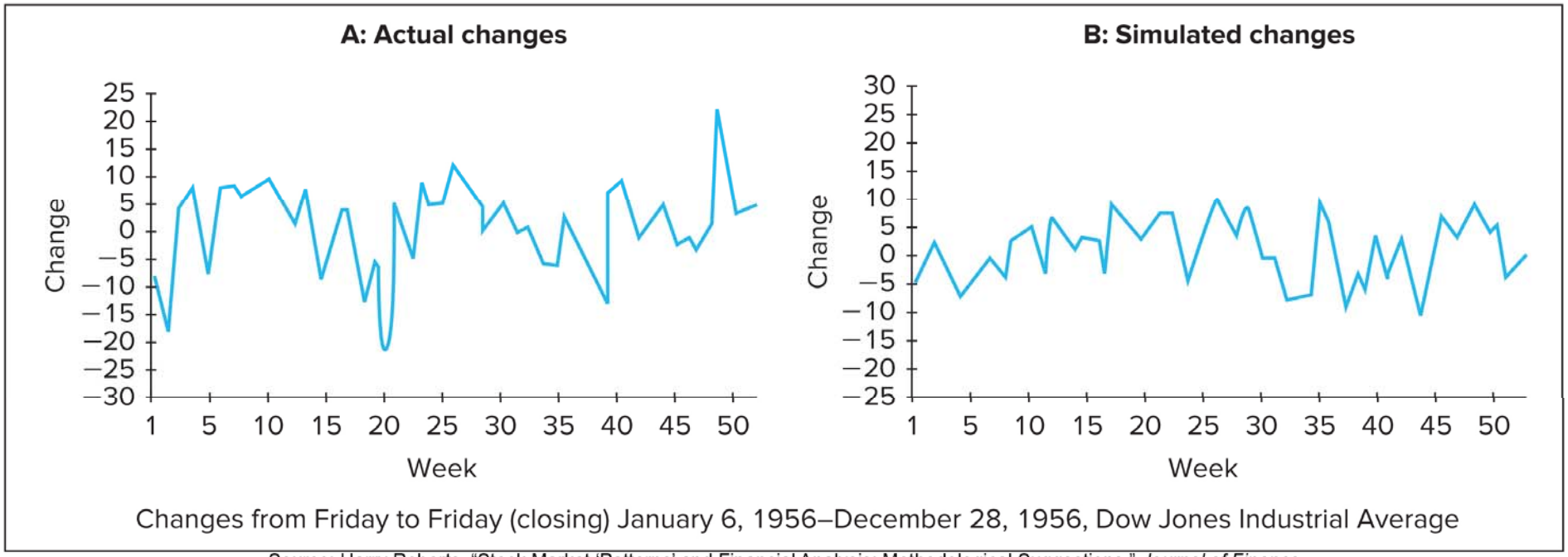
Source: Harry Roberts, "Stock Market 'Patterns' and Financial Analysis: Methodological Suggestions," *Journal of Finance* 14 (March 1959), pp. 1–10

- In Figure 9.8, Panel B, 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 9.8, Panel A 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 9.8, Panel A is based on the real data.
- The graph in panel 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 panel A.

- Figure 9.9 shows the weekly price *changes* behind the two panels in Figure 9.8.



Changes from Friday to Friday (closing) January 6, 1956–December 28, 1956, Dow Jones Industrial Average

Source: Harry Roberts, "Stock Market 'Patterns' and Financial Analysis: Methodological Suggestions," *Journal of Finance* 14 (March 1959), pp. 1–10

  - 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 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 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.