CHAPTER 12 Macroeconomic and Industry Analysis

AFTER STUDYING THIS CHAPTER YOU SHOULD BE ABLE TO:

- **Predict the effect of monetary and fiscal policies on key macroeconomic variables such as gross domestic product, interest rates, and the inflation rate.**
- **Use leading, coincident, and lagging economic indicators to describe and predict the economy's path through the business cycle.**
- **Predict which industries will be more or less sensitive to business cycle fluctuations.**
- **Analyze the effect of industry life cycles and structure on industry earnings prospects over time.**

fundamental analysis
The analysis of determinants of firm value, such as prospects for earnings and dividends.

To determine a proper price for a firm's stock, the security analyst must forecast the dividends and earnings that can be expected from the firm. This is the heart of fundamental analysis, that is, the analysis of determinants of value such as earnings prospects. Ultimately, the business success of the firm determines the dividends it can pay to shareholders and the price it will command in the stock market. Because the prospects of the firm are tied to those of the broader economy, however, valuation analyses must consider the business environment in which the firm operates. For some firms, macroeconomic and industry circumstances might have a greater influence on profits than the firm's relative performance within its industry. In other words, investors need to keep the big economic picture in mind.

Therefore, in analyzing a firm's prospects it often makes sense to start with the broad economic environment, examining the state of the aggregate economy and even the international economy. From there, one considers the implications of the outside environment on the industry in which the firm operates. Finally, the firm's position within the industry is examined.

This chapter examines the broad-based aspects of fundamental analysis—macroeconomic and industry analysis. The following two chapters cover firm-specific analysis. We begin with a discussion of international factors relevant to firm performance and move on to an overview of the significance of the key variables usually used to summarize the state of the economy. We then discuss government macroeconomic policy and the determination of interest rates. We conclude the analysis of the macroeconomic environment with a discussion of business cycles. Next, we move to industry analysis, treating issues concerning the sensitivity of the firm to the business cycle, the typical life cycle of an industry, and strategic issues that affect industry performance.

Related Web sites for this chapter are available at www.mhhe.com/bkm.

12.1 THE GLOBAL ECONOMY

A top-down analysis of a firm's prospects must start with the global economy. The international economy might affect a firm's export prospects, the price competition it faces from foreign competitors, or the profits it makes on investments abroad. Certainly, despite the fact that the economies of most countries are linked in a global macroeconomy, there is considerable variation in economic performance across countries at any time. Consider, for example, Table 12.1, which presents data on several major economies. The table documents striking variation in growth rates of economic output. For example, while the Chinese economy grew by 10.4% in 2006 (see last column), output in Japan grew by only 1.6%. Similarly, there has been considerable variation in stock market returns in these countries in recent years, as documented in the first two columns of the table.

These data illustrate that the national economic environment can be a crucial determinant of industry performance. It is far harder for businesses to succeed in a contracting economy than in an expanding one. This observation highlights the role of a big-picture macroeconomic analysis as a fundamental part of the investment process.

TABLE 12.1
Economic performance, 2006

	Stock Market Return (%)		Growth in GDP (%)
	In Local Currency	In U.S. Dollars	
Brazil	32.9	45.2	3.2
Britain	12.5	27.3	2.7
Canada	12.7	12.5	2.5
China	130.6	138.4	10.4
France	19.0	33.1	1.9
Germany	23.7	38.4	2.8
India	49.1	51.3	9.2
Japan	6.9	5.7	1.6
Mexico	49.5	47.8	4.6
Russia	56.3	70.7	6.5
Singapore	29.4	40.4	5.9
Switzerland	17.6	26.7	2.4
Thailand	20.9	22.5	4.7
U.S.	13.5	13.5	3.0
Venezuela	162.6	99.0	10.2

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In addition, the global environment presents political risks of far greater magnitude than are typically encountered in U.S.-based investments. In the last decade, we have seen several instances where political developments had major impacts on economic prospects. For example, the biggest international economic story in late 1997 and 1998 was the turmoil in several Asian economies, notably Thailand, Indonesia, and South Korea. These episodes also highlighted the close interplay between politics and economics, as both currency and stock values swung with enormous volatility in response to developments concerning the prospects for aid for these countries from the International Monetary Fund. In August 1998, the shock waves following Russia's devaluation of the ruble and default on some of its debt created havoc in world security markets, ultimately requiring a rescue of the giant hedge fund Long Term Capital Management to avoid further major disruptions. In the current environment, stock prices are highly sensitive to developments in Iraq and the security of energy supplies.

Other political issues that are less sensational but still extremely important to economic growth and investment returns include issues of protectionism and trade policy, the free flow of capital, and the status of a nation's workforce.

exchange rate

The rate at which domestic currency can be converted into foreign currency.

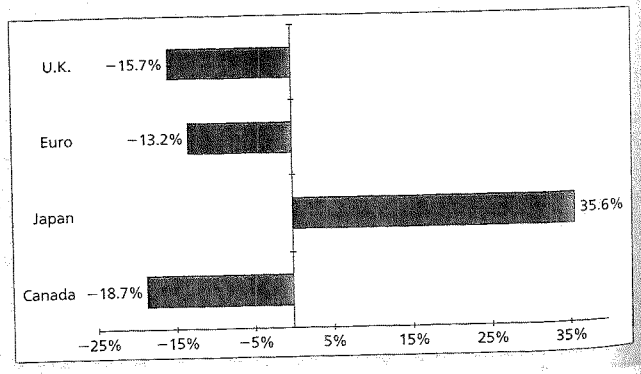
One obvious factor that affects the international competitiveness of a country's industries is the exchange rate between that country's currency and other currencies. The **exchange rate** is the rate at which domestic currency can be converted into foreign currency. For example, in early 2007, it took about 114 Japanese yen to purchase one U.S. dollar. We would say that the exchange rate is ¥114 per dollar, or equivalently, $0.0088 per yen.

As exchange rates fluctuate, the dollar value of goods priced in foreign currency similarly fluctuates. For example, in 1980, the dollar–yen exchange rate was about $0.0045 per yen. Since the exchange rate in 2007 was $0.0088 per yen, a U.S. citizen would have needed almost twice as many dollars in 2007 to buy a product selling for ¥10,000 as would have been required in 1980. If the Japanese producer were to maintain a fixed yen price for its product, the price expressed in U.S. dollars would have to double. This would make Japanese products more expensive to U.S. consumers, however, and result in lost sales. Obviously, appreciation of the yen creates a problem for Japanese producers such as automakers that must compete with U.S. producers.

Figure 12.1 shows the change in the purchasing power of the U.S. dollar relative to the purchasing power of several major currencies in the period between 1999 and 2006. The ratio of purchasing powers is called the "real" or inflation-adjusted exchange rate. The change in the real exchange rate measures how much more or less expensive foreign goods have become to U.S. citizens, accounting for both exchange rate fluctuations and inflation differentials across countries. A positive value in Figure 12.1 means that the dollar has gained purchasing power relative to another currency; a negative number indicates a depreciating dollar. Therefore, the figure shows that goods priced in terms of British pounds, euros, or Canadian dollars became more expensive to U.S. consumers in the last four years but that goods priced in yen became cheaper. Conversely, goods priced in U.S. dollars became more expensive to Japanese consumers, but more affordable to Canadian consumers.

FIGURE 12.1

Change in real exchange rate: U.S. dollar versus major currencies, 1999–2006



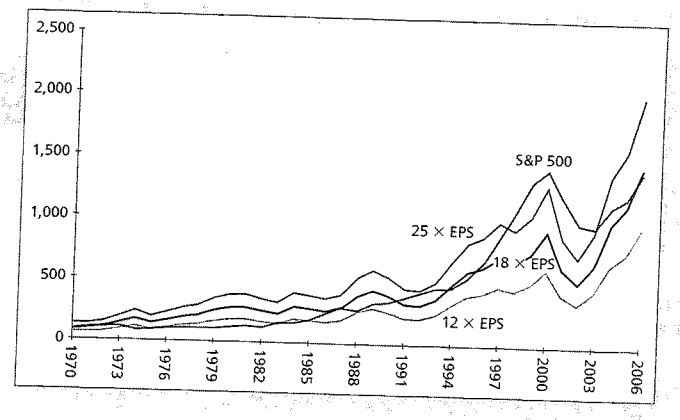


FIGURE 12.2

S&P 500 Index versus earnings per share

Source: Authors' calculations using data from: *The Economic Report of the President*, 2007.

12.2 THE DOMESTIC MACROECONOMY

The macroeconomy is the environment in which all firms operate. The importance of the macroeconomy in determining investment performance is illustrated in Figure 12.2, which compares the level of the S&P 500 stock price index to estimates of earnings per share of the S&P 500 companies. The graph shows that stock prices tend to rise along with earnings. While the exact ratio of stock price to earnings per share varies with factors such as interest rates, risk, inflation rates, and other variables, the graph does illustrate that, as a general rule, the ratio has tended to be in the range of 12 to 25. Given "normal" price-to-earnings ratios, we would expect the S&P 500 Index to fall within these boundaries. While the earnings-multiplier rule clearly is not perfect—note the dramatic increase in the P/E multiple in the 1990s—it also seems clear that the level of the broad market and aggregate earnings do trend together. Thus, the first step in forecasting the performance of the broad market is to assess the status of the economy as a whole.

The ability to forecast the macroeconomy can translate into spectacular investment performance. But it is not enough to forecast the macroeconomy well. One must forecast it *better* than one's competitors to earn abnormal profits.

In this section, we will review some of the key economic statistics used to describe the state of the macroeconomy.

Gross Domestic Product

Gross domestic product, or GDP, is the measure of the economy's total production of goods and services. Rapidly growing GDP indicates an expanding economy with ample opportunity for a firm to increase sales. Another popular measure of the economy's output is *industrial production*. This statistic provides a measure of economic activity more narrowly focused on the manufacturing side of the economy.

gross domestic product (GDP)

The market value of goods and services produced over a period of time.

Employment

unemployment rate
The ratio of the number of people classified as unemployed to the total labor force.

The **unemployment rate** is the percentage of the total labor force (i.e., those who are either working or actively seeking employment) yet to find work. The unemployment rate measures the extent to which the economy is operating at full capacity. The unemployment rate is a statistic related to workers only, but further insight into the strength of the economy can be gleaned from the employment rate of other factors of production. Analysts also look at the factory *capacity utilization rate,* which is the ratio of actual output from factories to potential output.

Inflation

inflation
The rate at which the general level of prices for goods and services is rising.

Inflation is the rate at which the general level of prices is rising. High rates of inflation often are associated with "overheated" economies, that is, economies where the demand for goods and services is outstripping productive capacity, which leads to upward pressure on prices. Most governments walk a fine line in their economic policies. They hope to stimulate their economies enough to maintain nearly full employment, but not so much as to bring on inflationary pressures. The perceived trade-off between inflation and unemployment is at the heart of many macroeconomic policy disputes. There is considerable room for disagreement as to the relative costs of these policies as well as the economy's relative vulnerability to these pressures at any particular time.

Interest Rates

High interest rates reduce the present value of future cash flows, thereby reducing the attractiveness of investment opportunities. For this reason, real interest rates are key determinants of business investment expenditures. Demand for housing and high-priced consumer durables such as automobiles, which are commonly financed, also is highly sensitive to interest rates because interest rates affect interest payments. In Section 12.3 we will examine the determinants of real interest rates.

Budget Deficit

budget deficit
The amount by which government spending exceeds government revenues.

The **budget deficit** of the federal government is the difference between government spending and revenues. Any budgetary shortfall must be offset by government borrowing. Large amounts of government borrowing can force up interest rates by increasing the total demand for credit in the economy. Economists generally believe excessive government borrowing will "crowd out" private borrowing and investing by forcing up interest rates and choking off business investment.

Sentiment

Consumers' and producers' optimism or pessimism concerning the economy are important determinants of economic performance. If consumers have confidence in their future income levels, for example, they will be more willing to spend on big-ticket items. Similarly, businesses will increase production and inventory levels if they anticipate higher demand for their products. In this way, beliefs influence how much consumption and investment will be pursued and affect the aggregate demand for goods and services.

CONCEPT check 12.1

Consider an economy where the dominant industry is automobile production for domestic consumption as well as export. Now suppose the auto market is hurt by an increase in the length of time people use their cars before replacing them. Describe the probable effects of this change on (*a*) GDP, (*b*) unemployment, (*c*) the government budget deficit, and (*d*) interest rates.

12.3 INTEREST RATES

The level of interest rates is perhaps the most important macroeconomic factor to consider in one's investment analysis. Forecasts of interest rates directly affect the forecast of returns in the fixed-income market. If your expectation is that rates will increase by more than the consensus view, you will want to shy away from longer term fixed-income securities. Similarly, increases in interest rates tend to be bad news for the stock market. Unanticipated increases in rates generally are associated with stock market declines. Thus, a superior technique to forecast rates would be of immense value to an investor attempting to determine the best asset allocation for his or her portfolio.

Unfortunately, forecasting interest rates is one of the most notoriously difficult parts of applied macroeconomics. Nonetheless, we do have a good understanding of the fundamental factors that determine the level of interest rates:

1. The supply of funds from savers, primarily households.
2. The demand for funds from businesses to be used to finance physical investments in plant, equipment, and inventories.
3. The government's net supply and/or demand for funds as modified by actions of the Federal Reserve Bank.
4. The expected rate of inflation.

Although there are many different interest rates economywide (as many as there are types of securities), these rates tend to move together, so economists frequently talk as though there were a single representative rate. We can use this abstraction to gain some insights into determining the real rate of interest if we consider the supply and demand curves for funds.

Figure 12.3 shows a downward-sloping demand curve and an upward-sloping supply curve. On the horizontal axis, we measure the quantity of funds, and on the vertical axis, we measure the real rate of interest.

The supply curve slopes up from left to right because the higher the real interest rate, the greater the supply of household savings. The assumption is that at higher real interest rates, households will choose to postpone some current consumption and set aside or invest more of their disposable income for future use.

The demand curve slopes down from left to right because the lower the real interest rate, the more businesses will want to invest in physical capital. Assuming that businesses rank projects by the expected real return on invested capital, firms will undertake more projects the lower the real interest rate on the funds needed to finance those projects.

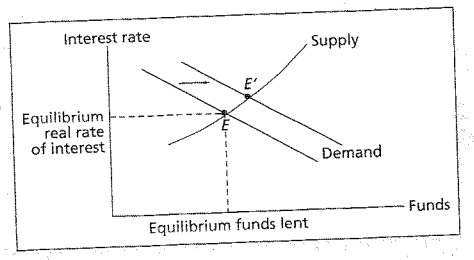
Equilibrium is at the point of intersection of the supply and demand curves, point E in Figure 12.3.

The government and the central bank (the Federal Reserve) can shift these supply and demand curves either to the right or to the left through fiscal and monetary policies. For example, consider an increase in the government's budget deficit. This increases the government's borrowing demand and shifts the demand curve to the right, which causes the equilibrium real interest rate to rise to point E'. That is, a forecast that indicates higher than previously expected government borrowing increases expectations of future interest rates. The Fed can offset such a rise through an increase in the money supply, which will increase the supply of loanable funds, and shift the supply curve to the right.

Thus, while the fundamental determinants of the real interest rate are the propensity of households to save and the expected productivity (or we could say profitability) of firms' investment in physical capital, the real rate can be affected as well by government fiscal and monetary policies.

The supply and demand framework illustrated in Figure 12.3 is a reasonable first approximation to the determination of the real interest rate. To obtain the *nominal* interest rate, one needs to add the expected inflation rate to the equilibrium real rate. As we discussed in Section 5.4, the inflation premium is necessary for investors to maintain a given real rate of return on their investments.

FIGURE 12.3
Determination of the equilibrium real rate of interest



While monetary policy can clearly affect nominal interest rates, there is considerable controversy concerning its ability to affect real rates. There is widespread agreement that, in the long run, the ultimate impact of an increase in the money supply is an increase in prices with no permanent impact on real economic activity. A rapid rate of growth in the money supply, therefore, ultimately would result in a correspondingly high inflation rate and nominal interest rate, but it would have no sustained impact on the real interest rate. However, in the shorter run, changes in the money supply may well have an effect on the real interest rate.

12.4 DEMAND AND SUPPLY SHOCKS

demand shock
An event that affects the demand for goods and services in the economy.

supply shock
An event that influences production capacity and costs in the economy.

A useful way to organize your analysis of the factors that might influence the macroeconomy is to classify any impact as a supply or demand shock. A **demand shock** is an event that affects the demand for goods and services in the economy. Examples of positive demand shocks are reductions in tax rates, increases in the money supply, increases in government spending, or increases in foreign export demand. A **supply shock** is an event that influences production capacity and costs. Examples of supply shocks are changes in the price of imported oil; freezes, floods, or droughts that might destroy large quantities of agricultural crops; changes in the educational level of an economy's workforce; or changes in the wage rates at which the labor force is willing to work.

Demand shocks usually are characterized by aggregate output moving in the same direction as interest rates and inflation. For example, a big increase in government spending will tend to stimulate the economy and increase GDP. It also might increase interest rates by increasing the demand for borrowed funds by the government as well as by businesses that might desire to borrow to finance new ventures. Finally, it could increase the inflation rate if the demand for goods and services is raised to a level at or beyond the total productive capacity of the economy.

Supply shocks usually are characterized by aggregate output moving in the opposite direction as inflation and interest rates. For example, a big increase in the price of imported oil will be inflationary because costs of production will rise, which eventually will lead to increases in prices of finished goods. The increase in inflation rates over the near term can lead to higher nominal interest rates. Against this background, aggregate output will be falling. With raw materials more expensive, the productive capacity of the economy is reduced, as is the ability of individuals to purchase goods at now-higher prices. GDP, therefore, tends to fall.

How can we relate this framework to investment analysis? You want to identify the industries that will be most helped or hurt in any macroeconomic scenario you envision. For example, if you forecast a tightening of the money supply, you might want to avoid industries such as automobile producers that might be hurt by the likely increase in interest rates. We caution you again that these forecasts are no easy task. Macroeconomic predictions are notoriously unreliable. And again, you must be aware that in all likelihood your forecast will be made using only publicly available information. Any investment advantage you have will be a result only of better analysis—not better information.

12.5 FEDERAL GOVERNMENT POLICY

As the previous section would suggest, the government has two broad classes of macroeconomic tools—those that affect the demand for goods and services and those that affect their supply. For much of postwar history, demand-side policy has been of primary interest. The focus has been on government spending, tax levels, and monetary policy. Since the 1980s, however, increasing attention has also been focused on supply-side economics. Broadly interpreted, supply-side concerns have to do with enhancing the productive capacity of the economy, rather than increasing the demand for the goods and services the economy can produce. In practice, supply-side economists have focused on the appropriateness of the incentives to work, innovate, and take risks that result from our system of taxation. However, issues such as national policies on education, infrastructure (such as communication and transportation systems), and research and development also are properly regarded as part of supply-side macroeconomic policy.

Fiscal Policy

fiscal policy
The use of government spending and taxing for the specific purpose of stabilizing the economy.

Fiscal policy refers to the government's spending and tax actions and is part of "demand-side management." Fiscal policy is probably the most direct way either to stimulate or to slow the economy. Decreases in government spending directly deflate the demand for goods and services. Similarly, increases in tax rates immediately siphon income from consumers and result in fairly rapid decreases in consumption.

Ironically, although fiscal policy has the most immediate impact on the economy, the formulation and implementation of such policy is usually painfully slow and involved. This is because fiscal policy requires enormous amounts of compromise between the executive and legislative branches. Tax and spending policy must be initiated and voted on by Congress, which requires considerable political negotiations, and any legislation passed must be signed by the president, requiring more negotiation. Thus, while the impact of fiscal policy is relatively immediate, its formulation is so cumbersome that fiscal policy cannot in practice be used to fine-tune the economy.

Moreover, much of government spending, such as that for Medicare or Social Security, is nondiscretionary, meaning that it is determined by formula rather than policy and cannot be changed in response to economic conditions. This places even more rigidity into the formulation of fiscal policy.

A common way to summarize the net impact of government fiscal policy is to look at the government's budget deficit or surplus, which is simply the difference between revenues and expenditures. A large deficit means the government is spending considerably more than it is taking in by way of taxes. The net effect is to increase the demand for goods (via spending) by more than it reduces the demand for goods (via taxes), therefore, stimulating the economy.

Monetary Policy

monetary policy
Actions taken by the Board of Governors of the Federal Reserve System to influence the money supply or interest rates.

Monetary policy refers to the manipulation of the money supply to affect the macroeconomy and is the other main leg of demand-side policy. Monetary policy works largely through its impact on interest rates. Increases in the money supply lower short-term interest rates, ultimately encouraging investment and consumption demand. Over longer periods, however, most economists believe a higher money supply leads only to a higher price level and does not have a permanent effect on economic activity. Thus, the monetary authorities face a difficult balancing act. Expansionary monetary policy probably will lower interest rates and thereby stimulate investment and some consumption demand in the short run, but these circumstances

ultimately will lead only to higher prices. The stimulation/inflation trade-off is implicit in all debate over proper monetary policy.

Fiscal policy is cumbersome to implement but has a fairly direct impact on the economy, while monetary policy is easily formulated and implemented but has a less immediate impact. Monetary policy is determined by the Board of Governors of the Federal Reserve System. Board members are appointed by the president for 14-year terms and are reasonably insulated from political pressure. The board is small enough and often sufficiently dominated by its chairperson that policy can be formulated and modulated relatively easily.

Implementation of monetary policy also is quite direct. The most widely used tool is the open market operation, in which the Fed buys or sells Treasury bonds for its own account. When the Fed buys securities, it simply writes a check, thereby increasing the money supply. (Unlike us, the Fed can pay for the securities without drawing down funds at a bank account.) Conversely, when the Fed sells a security, the money paid for it leaves the money supply. Open market operations occur daily, allowing the Fed to fine-tune its monetary policy.

Other tools at the Fed's disposal are the *discount rate,* which is the interest rate it charges banks on short-term loans, and the *reserve requirement,* which is the fraction of deposits that banks must hold as cash on hand or as deposits with the Fed. Reductions in the discount rate signal a more expansionary monetary policy. Lowering reserve requirements allows banks to make more loans with each dollar of deposits and stimulates the economy by increasing the effective money supply.

While the discount rate is under the direct control of the Fed, it is changed relatively infrequently. The *federal funds rate* is by far the better guide to Federal Reserve policy. The federal funds rate is the interest rate at which banks make short-term, usually overnight, loans to each other. These loans occur because some banks need to borrow funds to meet reserve requirements, while other banks have excess funds. Unlike the discount rate, the fed funds rate is a market rate, meaning that it is determined by supply and demand rather than being set administratively. Nevertheless, the Federal Reserve Board targets the fed funds rate, expanding or contracting the money supply through open market operations as it nudges the fed funds to its targeted value. This is the benchmark short-term U.S. interest rate, and as such has considerable influence over other interest rates in the U.S. and the rest of the world.

Monetary policy affects the economy in a more roundabout way than fiscal policy. While fiscal policy directly stimulates or dampens the economy, monetary policy works largely through its impact on interest rates. Increases in the money supply lower interest rates, which stimulate investment demand. As the quantity of money in the economy increases, investors will find that their portfolios of assets include too much money. They will rebalance their portfolios by buying securities such as bonds, forcing bond prices up and interest rates down. In the longer run, individuals may increase their holdings of stocks as well and ultimately buy real assets, which stimulates consumption demand directly. The ultimate effect of monetary policy on investment and consumption demand, however, is less immediate than that of fiscal policy.

CONCEPT check 12.2

Suppose the government wants to stimulate the economy without increasing interest rates. What combination of fiscal and monetary policy might accomplish this goal?

Supply-Side Policies

Fiscal and monetary policy are demand-oriented tools that affect the economy by stimulating the total demand for goods and services. The implicit belief is that the economy will not by itself arrive at a full employment equilibrium and that macroeconomic policy

can push the economy toward this goal. In contrast, supply-side policies treat the issue of the productive capacity of the economy. The goal is to create an environment in which workers and owners of capital have the maximum incentive and ability to produce and develop goods.

Supply-side economists also pay considerable attention to tax policy. While demand-siders look at the effect of taxes on consumption demand, supply-siders focus on incentives and marginal tax rates. They argue that lowering tax rates will elicit more investment and improve incentives to work, thereby enhancing economic growth. Some go so far as to claim that reductions in tax rates can lead to increases in tax revenues because the lower tax rates will cause the economy and the revenue tax base to grow by more than the tax rate is reduced.

CONCEPT check 12.3

Large tax cuts in 2001 were followed by relatively rapid growth in GDP. How would demand-side and supply-side economists differ in their interpretations of this phenomenon?

12.6 BUSINESS CYCLES

We've looked at the tools the government uses to fine-tune the economy, attempting to maintain low unemployment and low inflation. Despite these efforts, economies repeatedly seem to pass through good and bad times. One determinant of the broad asset allocation decision of many analysts is a forecast of whether the macroeconomy is improving or deteriorating. A forecast that differs from the market consensus can have a major impact on investment strategy.

The Business Cycle

The economy recurrently experiences periods of expansion and contraction, although the length and depth of these cycles can be irregular. These recurring patterns of recession and recovery are called **business cycles.** Figure 12.4 presents graphs of several measures of production and output. The production series all show clear variation around a generally rising trend. The bottom graph of capacity utilization also evidences a clear cyclical (although irregular) pattern.

business cycles
Repetitive cycles of recession and recovery.

The transition points across cycles are called peaks and troughs, identified by the boundaries of the shaded areas of the graph. A **peak** is the transition from the end of an expansion to the start of a contraction. A **trough** occurs at the bottom of a recession just as the economy enters a recovery. The shaded areas in Figure 12.4 all represent periods of recession.

peak
The transition from the end of an expansion to the start of a contraction.

trough
The transition point between recession and recovery.

As the economy passes through different stages of the business cycle, the relative profitability of different industry groups might be expected to vary. For example, at a trough, just before the economy begins to recover from a recession, one would expect that **cyclical industries,** those with above-average sensitivity to the state of the economy, would tend to outperform other industries. Examples of cyclical industries are producers of durable goods, such as automobiles or washing machines. Because purchases of these goods can be deferred during a recession, sales are particularly sensitive to macroeconomic conditions. Other cyclical industries are producers of capital goods, that is, goods used by other firms to produce their own products. When demand is slack, few companies will be expanding and purchasing capital goods. Therefore, the capital goods industry bears the brunt of a slowdown but does well in an expansion.

cyclical industries
Industries with above-average sensitivity to the state of the economy.

In contrast to cyclical firms, **defensive industries** have little sensitivity to the business cycle. These are industries that produce goods for which sales and profits are least sensitive to the state of the economy. Defensive industries include food producers and processors, pharmaceutical firms, and public utilities. These industries will outperform others when the economy enters a recession.

defensive industries
Industries with below-average sensitivity to the state of the economy.

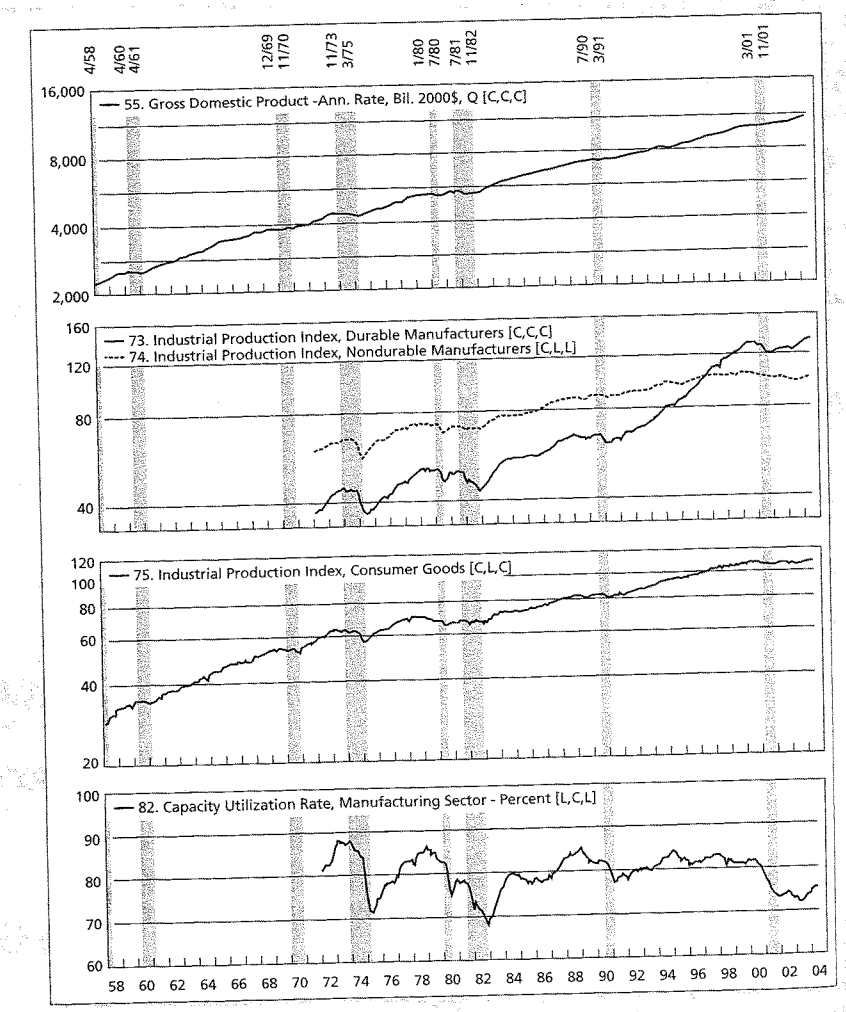


FIGURE 12.4
Cyclical indicators, 1958–2004

Source: The Conference Board, *Business Cycle Indicators*, vol. 9, no 8, August 2004, p.10.

The cyclical/defensive classification corresponds well to the notion of systematic or market risk introduced in our discussion of portfolio theory. When perceptions about the health of the economy become more optimistic, for example, the prices of most stocks will increase as forecasts of profitability rise. Because the cyclical firms are most sensitive to such developments, their stock prices will rise the most. Thus, firms in cyclical industries

will tend to have high-beta stocks. In general, then, stocks of cyclical firms will show the best results when economic news is positive, but they will also show the worst results when that news is bad. Conversely, defensive firms will have low betas and performance that is comparatively unaffected by overall market conditions.

If your assessments of the state of the business cycle were reliably more accurate than those of other investors, choosing between cyclical and defensive industries would be easy. You would choose cyclical industries when you were relatively more optimistic about the economy, and you would choose defensive firms when you were relatively more pessimistic. As we know from our discussion of efficient markets, however, attractive investment choices will rarely be obvious. It is usually not apparent that a recession or expansion has started or ended until several months after the fact. With hindsight, the transitions from expansion to recession and back might seem obvious, but it is often quite difficult to say whether the economy is heating up or slowing down at any moment.

Economic Indicators

Given the cyclical nature of the business cycle, it is not surprising that to some extent the cycle can be predicted. The Conference Board publishes a set of cyclical indicators to help forecast, measure, and interpret short-term fluctuations in economic activity. **Leading economic indicators** are those economic series that tend to rise or fall in advance of the rest of the economy. Coincident and lagging indicators, as their names suggest, move in tandem with or somewhat after the broad economy.

leading economic indicators
Economic series that tend to rise or fall in advance of the rest of the economy.

Ten series are grouped into a widely followed composite index of leading economic indicators. Similarly, four coincident and seven lagging indicators form separate indexes. The composition of these indexes appears in Table 12.2.

Figure 12.5 graphs these three series. The numbers on the charts near the turning points of each series indicate the length of the lead time or lag time (in months) from the

TABLE 12.2
Indexes of economic indicators

A. Leading indicators
1. Average weekly hours of production workers (manufacturing).
2. Initial claims for unemployment insurance.
3. Manufacturers' new orders (consumer goods and materials industries).
4. Fraction of companies reporting slower deliveries.
5. New orders for nondefense capital goods.
6. New private housing units authorized by local building permits.
7. Yield curve: spread between 10-year T-bond yield and federal funds rate.
8. Stock prices, 500 common stocks.
9. Money supply (M2) growth rate.
10. Index of consumer expectations.

B. Coincident indicators
1. Employees on nonagricultural payrolls.
2. Personal income less transfer payments.
3. Industrial production.
4. Manufacturing and trade sales.

C. Lagging indicators
1. Average duration of unemployment.
2. Ratio of trade inventories to sales.
3. Change in index of labor cost per unit of output.
4. Average prime rate charged by banks.
5. Commercial and industrial loans outstanding.
6. Ratio of consumer installment credit outstanding to personal income.
7. Change in consumer price index for services.

Source: The Conference Board, *Business Cycle Indicators*, January 2007.

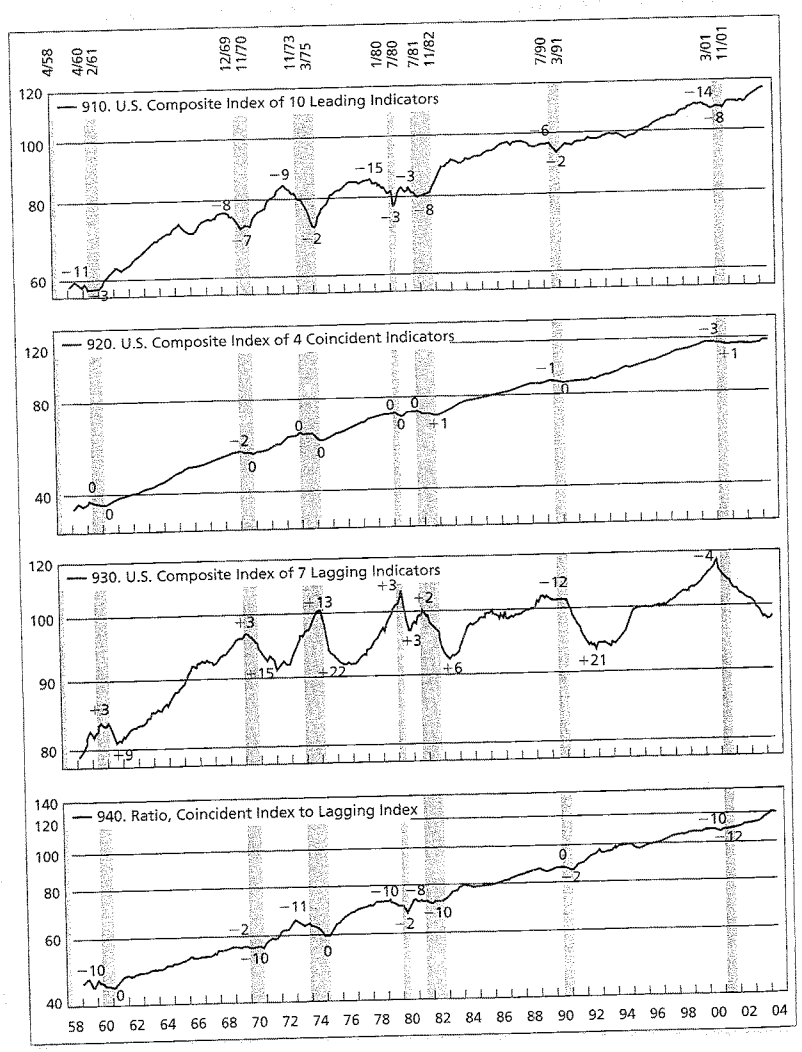


FIGURE 12.5
Indexes of leading, coincident, and lagging indicators

Source: The Conference Board, *Business Cycle Indicators*, August 2004, p. 3.

turning point to the designated peak or trough of the corresponding business cycle. While the index of leading indicators consistently turns before the rest of the economy, the lead time is somewhat erratic. Moreover, the lead time for peaks is consistently longer than that for troughs.

The stock market price index is a leading indicator. This is as it should be, as stock prices are forward-looking predictors of future profitability. Unfortunately, this makes the series of leading indicators much less useful for investment policy—by the time the series predicts an upturn, the market has already made its move. While the business cycle may be somewhat predictable, the stock market may not be. This is just one more manifestation of the efficient market hypothesis.

The money supply is another leading indicator. This makes sense in light of our earlier discussion concerning the lags surrounding the effects of monetary policy on the economy. An expansionary monetary policy can be observed fairly quickly, but it might not affect the economy for several months. Therefore, today's monetary policy might well predict future economic activity.

Other leading indicators focus directly on decisions made today that will affect production in the near future. For example, manufacturers' new orders for goods, contracts and orders for plant and equipment, and housing starts all signal a coming expansion in the economy.

A wide range of economic indicators are released to the public on a regular "economic calendar." Table 12.3 lists the public announcement dates and sources for about 20 statistics of interest. These announcements are reported in the financial press, for example, *The Wall Street Journal,* as they are released. They also are available at many sites on the Web, for

TABLE 12.3
Economic calendar

Statistic	Release Date*	Source	Web Site (www.)
Auto and truck sales	2nd of month	Commerce Department	commerce.gov
Business inventories	15th of month	Commerce Department	commerce.gov
Construction spending	1st business day of month	Commerce Department	commerce.gov
Consumer confidence	Last Tuesday of month	Conference Board	conference-board.org
Consumer credit	5th business day of month	Federal Reserve Board	federalreserve.gov
Consumer price index (CPI)	13th of month	Bureau of Labor Statistics	bls.gov
Durable goods orders	26th of month	Commerce Department	commerce.gov
Employment cost index	End of first month of quarter	Bureau of Labor Statistics	bls.gov
Employment record (unemployment, average workweek, nonfarm payrolls)	1st Friday of month	Bureau of Labor Statistics	bls.gov
Existing home sales	25th of month	National Association of Realtors	realtor.org
Factory orders	1st business day of month	Commerce Department	commerce.gov
Gross domestic product	3rd–4th week of month	Commerce Department	commerce.gov
Housing starts	16th of month	Commerce Department	commerce.gov
Industrial production	15th of month	Federal Reserve Board	federalreserve.gov
Initial claims for jobless benefits	Thursdays	Department of Labor	dol.gov
International trade balance	20th of month	Commerce Department	commerce.gov
Index of leading economic indicators	Beginning of month	Conference Board	conference-board.org
Money supply	Thursdays	Federal Reserve Board	federalreserve.gov
New home sales	Last business day of month	Commerce Department	commerce.gov
Producer price index	11th of month	Bureau of Labor Statistics	bls.gov
Productivity and costs	2nd month in quarter (approx. 7th day of month)	Bureau of Labor Statistics	bls.gov
Retail sales	13th of month	Commerce Department	commerce.gov
Survey of purchasing managers	1st business day of month	Institute for Supply Management	ism.ws

*Many of these release dates are approximate.

Last Week / Next Week

Date	Time (ET)	Statistic	For	Actual	Briefing Forecast	Market Expects	Prior	Revised From
Feb 12	2:00 PM	Treasury Budget	Jan	$38.2B	$40.0B	$40.0B	$21.0B	–
Feb 13	8:30 AM	Trade Balance	Dec	–$61.2B	–$59.7B	–$59.5B	–$58.1B	–$58.2B
Feb 14	8:30 AM	Retail Sales	Jan	0.0%	0.5%	0.3%	1.2%	0.9%
Feb 14	10:00 AM	Business Inventories	Dec	0.0%	–0.1%	0.1%	0.2%	0.4%
Feb 14	10:30 AM	Crude Inventories	02/09	–589K	NA	NA	–449K	–

FIGURE 12.6
Economic calendar at Yahoo!

Source: Yahoo! Briefing Economic Calendar, **biz.yahoo.com/c/e.html**, February 14, 2007. Reproduced with permission of Yahoo! Inc. © 2007 by Yahoo! Inc. Yahoo! and the Yahoo! logo are trademarks of Yahoo! Inc.

example, at Yahoo!'s site. Figure 12.6 is an excerpt from a recent Economic Calendar page at Yahoo!. The page gives a list of the announcements released during the week of February 12, 2007. Notice that recent forecasts of each variable are provided along with the actual value of each statistic. This is useful, because in an efficient market, security prices will already reflect market expectations. The *new* information in the announcement will determine the market response.

Other Indicators

You can find lots of important information about the state of the economy from sources other than the official components of the economic calendar or the components of business cycle indicators. Table 12.4, which is derived from some suggestions in *Inc.* magazine, contains a few.[1]

TABLE 12.4
Useful economic indicators

CEO polls **www.brtable.org**	The business roundtable surveys CEOs about planned spending, a good measure of their optimism about the economy.
Temp jobs Search for "Temporary Help Services" at **www.bls.gov**	A useful leading indicator. Businesses often hire temporary workers as the economy first picks up, until it is clear that an upturn is going to be sustained. This series is available at the Bureau of Labor Statistics Web site.
Wal-Mart sales **www.walmartstores.com**	Wal-Mart sales are a good indicator of the retail sector. It publishes its same-store sales weekly.
Commercial and industrial loans **www.federalreserve.gov**	These loans are used by small and medium-sized firms. Information is published weekly by the Federal Reserve.
Semiconductors **www.semi.org**	The book-to-bill ratio (i.e., new sales versus actual shipments) indicates whether demand in the technology sector is increasing (ratio > 1) or falling. This ratio is published by Semiconductor Equipment and Materials International.
Commercial structures **www.bea.gov**	Investment in structures is an indicator of businesses' forecasts of demand for their products in the near future. This is one of the series compiled by the Bureau of Economic Analysis as part of its GDP series.

[1]Gene Sperling and Illustrations by Thomas Fuchs, "The Insider's Guide to Economic Forecasting," *Inc.*, August 2003, p. 96.

WEB master

Leading Economic Indicators

This exercise will give you a chance to examine data on some of the leading economic indicators.

1. Download the data for new privately owned housing units authorized by building permits from **www.census.gov/const/www/C40/table1.html.** Choose the seasonally adjusted data for the United States in an Excel format. Graph the "Total" series.
2. Download the last five years of data for manufacturers' new orders of nondefense capital goods from the St. Louis Federal Reserve site at **research.stlouisfed.org/fred2/series/NEWORDER.** Graph the data.
3. Locate data for the average weekly hours of production workers in manufacturing, available at **www.bls.gov/lpc/lpcover.htm#Data.** Select the historical time series link and then choose the Index data. Choose manufacturing as the sector and average weekly hours as the measure. Retrieve the report for the past five years. Use the options for a table format, non-HTML, and a space as a delimiter. This will give you both quarterly data and annual averages. When you copy the data into Excel you can use the Data, Text to Columns menu to put the data into a usable format. Create a graph of the data that shows the quarterly trend over the last five years.
4. The data series you retrieved are all leading economic indicators. Based on the tables and your graphs, what is your opinion of where the economy is heading in the near future?

12.7 INDUSTRY ANALYSIS

Industry analysis is important for the same reason that macroeconomic analysis is: Just as it is difficult for an industry to perform well when the macroeconomy is ailing, it is unusual for a firm in a troubled industry to perform well. Similarly, just as we have seen that economic performance can vary widely across countries, performance also can vary widely across industries. Figure 12.7 illustrates the dispersion of industry performance. It shows return on equity for several major industry groups. ROE ranged from 10.6% for electronic equipment to 29.2% for the cigarette industry.

Given this wide variation in profitability, it is not surprising that industry groups exhibit considerable dispersion in their stock market performance. Figure 12.8 illustrates the stock price performance of several industries in 2006. The market as a whole was up dramatically, but the spread in annual returns was remarkable, ranging from a –20.7% return for the home construction industry to a 61.7% return in the steel industry.

Even small investors can easily take positions in industry performance using mutual funds or exchange-traded funds with an industry focus. For example, Fidelity offers over 30 Select funds, each of which is invested in a particular industry, and there are dozens of industry-specific ETFs available to retail investors.

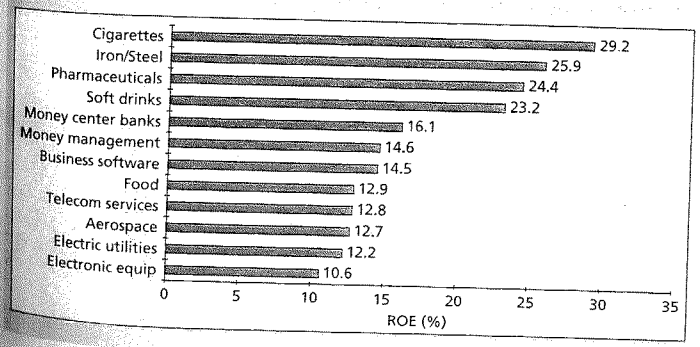


FIGURE 12.7
Return on equity

Source: Yahoo! Finance (**finance.yahoo.com**), February 6, 2007. Reproduced with permission of Yahoo! Inc. © 2000–2007 by Yahoo! Inc. Yahoo! and the Yahoo! logo are trademarks of Yahoo! Inc.

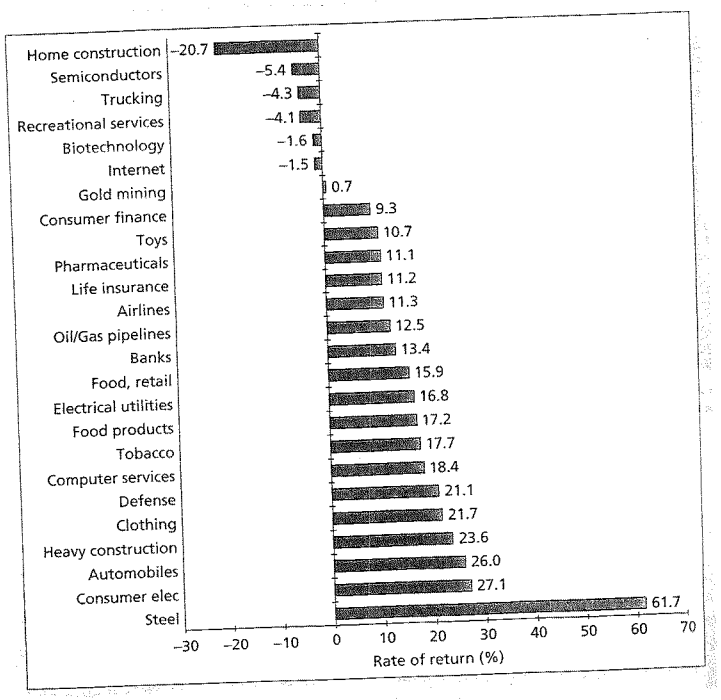


FIGURE 12.8
Industry stock price performance, 2006

Source: *The Wall Street Journal*, January 2, 2007.

Defining an Industry

While we know what we mean by an industry, it can be difficult in practice to decide where to draw the line between one industry and another. Consider, for example, one of the industries depicted in Figure 12.7, money-center banks. There is substantial variation within this group by size, focus, and region, and one might well be justified in further dividing these banks into distinct subindustries. Their differences may result in considerable dispersion in financial performance. Figure 12.9 shows ROE for a sample of the banks included in this industry, and performance did indeed wary widely: from 12.3% for Sun Trust to 26.8% for PNC Financial.

A useful way to define industry groups in practice is given by the North American Industry Classification System, or NAICS codes.[2] These are codes assigned to group firms for statistical analysis. The first two digits of the NAICS codes denote very broad industry classifications. For example, Table 12.5 shows that the codes for all construction firms start with 23. The next digits define the industry grouping more narrowly. For example, codes starting with 236 denote *building* construction, 2361 denotes *residential* construction, and 236115 denotes *single-family* construction. Firms with the same 4-digit NAICS codes are commonly taken to be in the same industry.

NAICS codes

Classification of firms into industry groups using numerical codes to identify industries.

Industry classifications are never perfect. For example, both J.C. Penney and Neiman Marcus might be classified as department stores. Yet the former is a high-volume "value" store, while the latter is a high-margin elite retailer. Are they really in the same industry? Still, these classifications are a tremendous aid in conducting industry analysis since they provide a means of focusing on very broadly or fairly narrowly defined groups of firms.

[2] These codes are used for firms operating inside the NAFTA (North American Free Trade Agreement) region, which includes the U.S., Mexico, and Canada. NAICS codes have replaced the Standard Industry Classification or SIC codes previously used in the U.S.

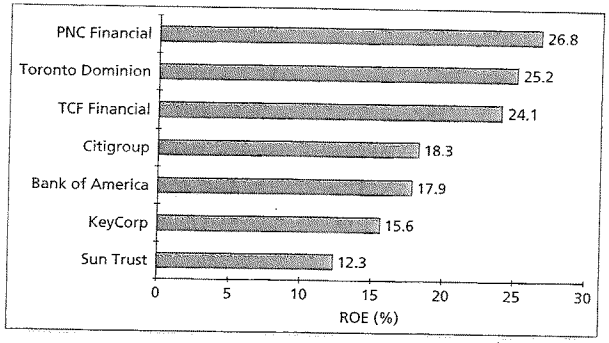


FIGURE 12.9
ROE of major banks

Source: Yahoo! Finance, February 6, 2007. Reproduced with permission of Yahoo! Inc. © 2007 by Yahoo! Inc. Yahoo! and the Yahoo! logo are trademarks of Yahoo! Inc.

Several other industry classifications are provided by other analysts, for example, Standard & Poor's reports on the performance of about 100 industry groups. S&P computes stock price indexes for each group, which is useful in assessing past investment performance. The *Value Line Investment Survey* reports on the conditions and prospects of about 1,700 firms, grouped into about 90 industries. Value Line's analysts prepare forecasts of the performance of industry groups as well as of each firm.

Sensitivity to the Business Cycle

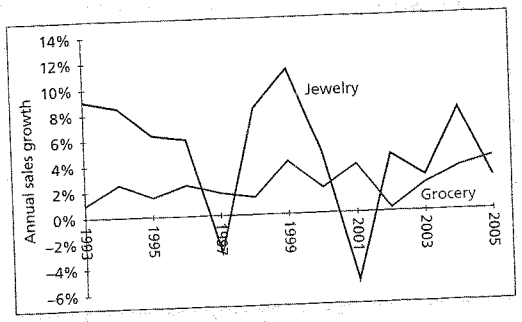
Once the analyst forecasts the state of the macroeconomy, it is necessary to determine the implication of that forecast for specific industries. Not all industries are equally sensitive to the business cycle. For example, consider Figure 12.10, which plots changes in retail sales (year over year) in two industries: jewelry and grocery stores. Clearly, sales of jewelry, which is a luxury good, fluctuate more widely than those of grocery stores. The downturn in jewelry sales in 2001 when the economy was in a recession is notable. In contrast, sales growth in the grocery industry is relatively stable, with no years in which sales decline. These patterns reflect the fact that jewelry is a discretionary good, whereas most grocery products are staples for which demand will not fall significantly even in hard times.

Three factors will determine the sensitivity of a firm's earnings to the business cycle. First is the sensitivity of sales. Necessities will show little sensitivity to business conditions. Examples of industries in this group are food, drugs, and medical services. Other industries with

TABLE 12.5
Examples of NAICS industry codes

NAICS Code	NAICS Title
23	Construction
236	Construction of Buildings
2361	Residential Building Construction
23611	Residential Building Construction
236115	New Single-Family Housing Construction
236116	New Multifamily Housing Construction
236117	New Housing Operative Builders
236118	Residential Remodelers
2362	Nonresidential Building Construction
23621	Industrial Building Construction
236210	Industrial Building Construction
23622	Commercial and Institutional Building Construction
236220	Commercial and Institutional Building Construction

FIGURE 12.10
Industry cyclicality. Growth in sales, year over year, in two industries.



low sensitivity are those for which income is not a crucial determinant of demand. Tobacco products are examples of this type of industry. Another industry in this group is movies, because consumers tend to substitute movies for more expensive sources of entertainment when income levels are low. In contrast, firms in industries such as machine tools, steel, autos, and transportation are highly sensitive to the state of the economy.

The second factor determining business cycle sensitivity is operating leverage, which refers to the division between fixed and variable costs. (Fixed costs are those the firm incurs regardless of its production levels. Variable costs are those that rise or fall as the firm produces more or less product.) Firms with greater amounts of variable as opposed to fixed costs will be less sensitive to business conditions. This is because, in economic downturns, these firms can reduce costs as output falls in response to falling sales. Profits for firms with high fixed costs will swing more widely with sales because costs do not move to offset revenue variability. Firms with high fixed costs are said to have high operating leverage, as small swings in business conditions can have large impacts on profitability.

The third factor influencing business cycle sensitivity is financial leverage, which is the use of borrowing. Interest payments on debt must be paid regardless of sales. They are fixed costs that also increase the sensitivity of profits to business conditions. We will have more to say about financial leverage in Chapter 14.

Investors should not always prefer industries with lower sensitivity to the business cycle. Firms in sensitive industries will have high-beta stocks and are riskier. But while they swing lower in downturns, they also swing higher in upturns. As always, the issue you need to address is whether the expected return on the investment is fair compensation for the risks borne.

Sector Rotation

sector rotation
An investment strategy that entails shifting the portfolio into industry sectors that are expected to outperform others based on macroeconomic forecasts.

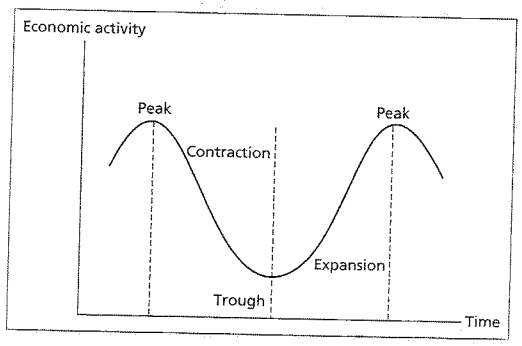
One way that many analysts think about the relationship between industry analysis and the business cycle is the notion of **sector rotation.** The idea is to shift the portfolio more heavily into industry or sector groups that are expected to outperform based on one's assessment of the state of the business cycle.

Figure 12.11 is a stylized depiction of the business cycle. Near the peak of the business cycle, the economy might be overheated with high inflation and interest rates and price pressures on basic commodities. This might be a good time to invest in firms engaged in natural resource extraction and processing such as minerals or petroleum.

Following a peak, when the economy enters a contraction or recession, one would expect defensive industries that are less sensitive to economic conditions, for example, pharmaceuticals, food, and other necessities, to be the best performers. At the height of the contraction, financial firms will be hurt by shrinking loan volume and higher default rates. Toward the end of the recession, however, contractions induce lower inflation and interest rates, which favor financial firms.

At the trough of a recession, the economy is poised for recovery and subsequent expansion. Firms might thus be spending on purchases of new equipment to meet anticipated increases in

FIGURE 12.11
A stylized depiction of the business cycle



demand. This, then, would be a good time to invest in capital goods industries, such as equipment, transportation, or construction.

Finally, in an expansion, the economy is growing rapidly. Cyclical industries such as consumer durables and luxury items will be most profitable in this stage of the cycle. Banks might also do well in expansions, since loan volume will be high and default exposure low when the economy is growing rapidly.

The nearby box is an abridged sector rotation analysis from Standard & Poor's, which notes that the industries that performed best when investors were defensive concerning the economy were relative noncyclical industries such as consumer staples or health care. Given its forecast of an expansion, however, S&P recommends investments in more cyclical industries such as materials and technology.

Let us emphasize again that sector rotation, like any other form of market timing, will be successful only if one anticipates the next stage of the business cycle better than other investors. The business cycle depicted in Figure 12.11 is highly stylized. In real life, it is never as clear how long each phase of the cycle will last, nor how extreme it will be. These forecasts are where analysts need to earn their keep.

CONCEPT check 12.4

In which phase of the business cycle would you expect the following industries to enjoy their best performance?
(a) Newspapers; (b) Machine tools; (c) Beverages; (d) Timber.

Industry Life Cycles

Examine the biotechnology industry and you will find many firms with high rates of investment, high rates of return on investment, and very low dividends as a percentage of profits. Do the same for the electric utility industry and you will find lower rates of return, lower investment rates, and higher dividend payout rates. Why should this be?

The biotech industry is still new. Recently available technologies have created opportunities for the highly profitable investment of resources. New products are protected by patents, and profit margins are high. With such lucrative investment opportunities, firms find it advantageous to put all profits back into the firm. The companies grow rapidly on average.

Eventually, however, growth must slow. The high profit rates will induce new firms to enter the industry. Increasing competition will hold down prices and profit margins. New technologies become proven and more predictable, risk levels fall, and entry becomes even easier. As internal investment opportunities become less attractive, a lower fraction of profits is reinvested in the firm. Cash dividends increase.

On the MARKET FRONT

A CYCLICAL TAKE ON PERFORMANCE

Where are we in the current economic cycle, and which sectors, as a result, are poised to outperform? Those questions are at the heart of sector investing. Breaking expansions into early, middle, and late phases, and analyzing the performances of different industries during these periods, suggests a pattern of sector rotation, illustrated in the figure below.

This diagram offers a map to when sectors historically had their "day in the sun" during a typical economic cycle. But historical performances should always be viewed as a guide and not gospel. First, there's no guarantee that what worked in the past will work in the future. Moreover, economic cycles are rarely "typical." And finally, although investors frequently want to use the economic cycle as a guide to likely stock market performance, it might be more effective to look at things from the opposite perspective. Since the stock market is a leading indicator of future economic growth, wouldn't it be wiser to use the stock market as a guide to where the economic cycle may be headed?

That said, where does S&P think the U.S. is in the current cycle, and which sectors are expected to perform well in the coming months?

STILL GROWING

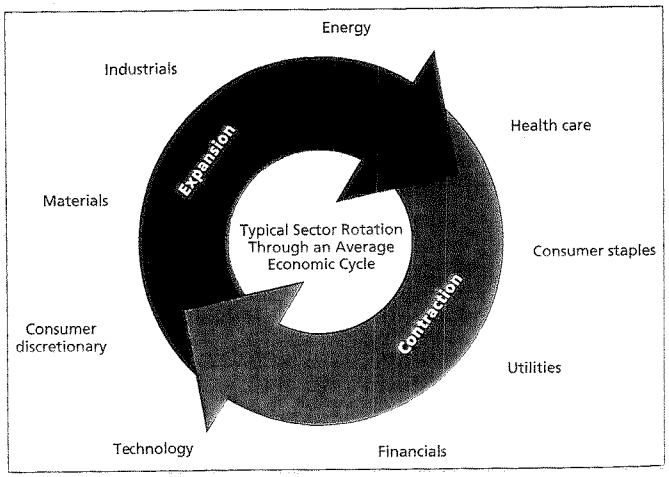
Through mid-May, S&P's consumer staples, energy, and health care sectors offered leadership. The market's embrace of these defensive sectors—consistent with the rotational wheel—was, in our view, the result of investor concern that the impending start of a rising interest rate environment, exacerbated by unrest in the Middle East and high oil prices, would ultimately throw the U.S. economy into the next recession.

But investors' concern about an economic recession may have been premature. S&P thinks the U.S. is midway into an expansion. First, we project GDP growth to last for two years. Second, the jobs picture has only recently improved, indicating that the current expansion has just finally taken hold. Third, even though we think the Federal Reserve will eventually raise the Fed funds rate, we believe it will be in an attempt to stop stimulating—rather than an effort to slow—the overall rate of growth of the U.S. economy. This analysis holds clues as to which sectors might be set to do well.

AREAS OF OPPORTUNITY

S&P analysts believe investment opportunities can still be found in economically sensitive (i.e., cyclical) sectors. Earnings leadership is projected to come from the materials, technology, and consumer discretionary sectors, while relative weakness is expected in telecommunications services, utilities, and consumer staples.

SOURCE: Sam Stovall, *BusinessWeek Online*, "A Cyclical Take on Performance." Reprinted with special permission from the July 8, 2004 issue of *BusinessWeek*. © 2004 McGraw-Hill Companies, Inc.



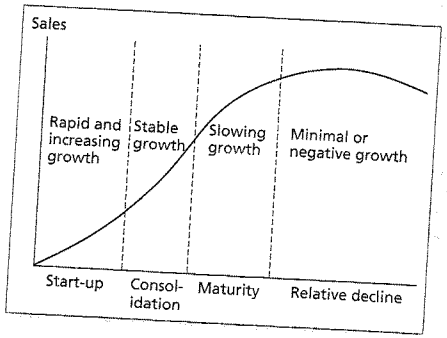


FIGURE 12.12
The industry life cycle

Ultimately, in a mature industry, we observe "cash cows," firms with stable dividends and cash flows and little risk. Their growth rates might be similar to that of the overall economy. Industries in early stages of their life cycles offer high-risk/high-potential-return investments. Mature industries offer lower risk, lower return combinations.

This analysis suggests that a typical **industry life cycle** might be described by four stages: a start-up stage characterized by extremely rapid growth; a consolidation stage characterized by growth that is less rapid but still faster than that of the general economy; a maturity stage characterized by growth no faster than the general economy; and a stage of relative decline, in which the industry grows less rapidly than the rest of the economy, or actually shrinks. This industry life cycle is illustrated in Figure 12.12. Let us turn to an elaboration of each of these stages.

industry life cycle
Stages through which firms typically pass as they mature.

Start-up stage The early stages of an industry are often characterized by a new technology or product, such as VCRs or personal computers in the 1980s, cell phones in the 1990s, or flat-screen televisions today. At this stage, it is difficult to predict which firms will emerge as industry leaders. Some firms will turn out to be wildly successful, and others will fail altogether. Therefore, there is considerable risk in selecting one particular firm within the industry. For example, in the flat-screen television industry, there is still a battle among competing technologies, such as LCD versus plasma screens, and it is still difficult to predict which firms or technologies ultimately will dominate the market.

At the industry level, however, sales and earnings will grow at an extremely rapid rate since the new product has not yet saturated its market. For example, in 1990 very few households had cell phones. The potential market for the product therefore was huge. In contrast to this situation, consider the market for a mature product like refrigerators. Almost all households in the U.S. already have refrigerators, so the market for this good is primarily composed of households replacing old refrigerators. Obviously, the growth rate in this market in the next decade will be far lower than for flat-screen TVs.

Consolidation stage After a product becomes established, industry leaders begin to emerge. The survivors from the start-up stage are more stable, and market share is easier to predict. Therefore, the performance of the surviving firms will more closely track the performance of the overall industry. The industry still grows faster than the rest of the economy as the product penetrates the marketplace and becomes more commonly used.

Maturity stage At this point, the product has reached its potential for use by consumers. Further growth might merely track growth in the general economy. The product has become far more standardized, and producers are forced to compete to a greater extent on the basis of price. This leads to narrower profit margins and further pressure on profits. Firms at this stage sometimes are characterized as "cash cows," firms with reasonably stable cash flow but

offering little opportunity for profitable expansion. The cash flow is best "milked from" rather than reinvested in the company.

We pointed to VCRs as a start-up industry in the 1980s. By the mid-1990s it was a mature industry, with high market penetration, considerable price competition, low profit margins, and slowing sales. By the late 1990s, VCR sales were giving way to DVD players, which were in their own start-up phase. By today, one would have to judge DVDs as already having entered a maturity stage, with standardization, price competition, and considerable market penetration.

Relative decline In this stage, the industry might grow at less than the rate of the overall economy, or it might even shrink. This could be due to obsolescence of the product, competition from new products, or competition from new low-cost suppliers, as illustrated by the steady displacement of VCRs by DVDs.

At which stage in the life cycle are investments in an industry most attractive? Conventional wisdom is that investors should seek firms in high-growth industries. This recipe for success is simplistic, however. If the security prices already reflect the likelihood for high growth, then it is too late to make money from that knowledge. Moreover, high growth and fat profits encourage competition from other producers. The exploitation of profit opportunities brings about new sources of supply that eventually reduce prices, profits, investment returns, and finally, growth. This is the dynamic behind the progression from one stage of the industry life cycle to another. The famous portfolio manager Peter Lynch makes this point in *One Up on Wall Street.* He says:

> Many people prefer to invest in a high-growth industry, where there's a lot of sound and fury. Not me. I prefer to invest in a low-growth industry. . . . In a low-growth industry, especially one that's boring and upsets people [such as funeral homes or the oil-drum retrieval business], there's no problem with competition. You don't have to protect your flanks from potential rivals . . . and this gives [the individual firm] the leeway to continue to grow. [page 131]

In fact, Lynch uses an industry classification system in a very similar spirit to the lifecycle approach we have described. He places firms in the following six groups:

1. *Slow Growers.* Large and aging companies that will grow only slightly faster than the broad economy. These firms have matured from their earlier fast-growth phase. They usually have steady cash flow and pay a generous dividend, indicating that the firm is generating more cash than can be profitably reinvested in the firm.
2. *Stalwarts.* Large, well-known firms like Coca-Cola or Colgate-Palmolive. They grow faster than the slow growers but are not in the very rapid growth start-up stage. They also tend to be in noncyclical industries that are relatively unaffected by recessions.
3. *Fast Growers.* Small and aggressive new firms with annual growth rates in the neighborhood of 20 to 25%. Company growth can be due to broad industry growth or to an increase in market share in a more mature industry.
4. *Cyclicals.* These are firms with sales and profits that regularly expand and contract along with the business cycle. Examples are auto companies, steel companies, or the construction industry.
5. *Turnarounds.* These are firms that are in bankruptcy or soon might be. If they can recover from what might appear to be imminent disaster, they can offer tremendous investment returns. A good example of this type of firm would be Chrysler in 1982, when it required a government guarantee on its debt to avoid bankruptcy. The stock price rose fifteenfold in the next five years.
6. *Asset Plays.* These are firms that have valuable assets not currently reflected in the stock price. For example, a company may own or be located on valuable real estate that is worth as much or more than the company's business enterprises. Sometimes the hidden asset can be tax-loss carryforwards. Other times the assets may be intangible. For example, a cable company might have a valuable list of cable subscribers. These assets do not immediately generate cash flow and so may be more easily overlooked by other analysts attempting to value the firm.

Industry Structure and Performance

The maturation of an industry involves regular changes in the firm's competitive environment. As a final topic, we examine the relationship between industry structure, competitive strategy, and profitability. Michael Porter (1980, 1985) has highlighted these five determinants of competition: threat of entry from new competitors, rivalry between existing competitors, price pressure from substitute products, the bargaining power of buyers, and the bargaining power of suppliers.

Threat of entry New entrants to an industry put pressure on price and profits. Even if a firm has not yet entered an industry, the potential for it to do so places pressure on prices, since high prices and profit margins will encourage entry by new competitors. Therefore, barriers to entry can be a key determinant of industry profitability. Barriers can take many forms. For example, existing firms may already have secure distribution channels for their products based on long-standing relationships with customers or suppliers that would be costly for a new entrant to duplicate. Brand loyalty also makes it difficult for new entrants to penetrate a market and gives firms more pricing discretion. Proprietary knowledge or patent protection also may give firms advantages in serving a market. Finally, an existing firm's experience in a market may give it cost advantages due to the learning that takes place over time.

Rivalry between existing competitors When there are several competitors in an industry, there will generally be more price competition and lower profit margins as competitors seek to expand their share of the market. Slow industry growth contributes to this competition since expansion must come at the expense of a rival's market share. High fixed costs also create pressure to reduce prices since fixed costs put greater pressure on firms to operate near full capacity. Industries producing relatively homogeneous goods also are subject to considerable price pressure since firms cannot compete on the basis of product differentiation.

Pressure from substitute products Substitute products means that the industry faces competition from firms in related industries. For example, sugar producers compete with corn syrup producers. Wool producers compete with synthetic fiber producers. The availability of substitutes limits the prices that can be charged to customers.

Bargaining power of buyers If a buyer purchases a large fraction of an industry's output, it will have considerable bargaining power and can demand price concessions. For example, auto producers can put pressure on suppliers of auto parts. This reduces the profitability of the auto parts industry.

Bargaining power of suppliers If a supplier of a key input has monopolistic control over the product, it can demand higher prices for the good and squeeze profits out of the industry. One special case of this issue pertains to organized labor as a supplier of a key input to the production process. Labor unions engage in collective bargaining to increase the wages paid to workers. When the labor market is highly unionized, a significant share of the potential profits in the industry can be captured by the workforce.

The key factor determining the bargaining power of suppliers is the availability of substitute products. If substitutes are available, the supplier has little clout and cannot extract higher prices.

SUMMARY

- Macroeconomic policy aims to maintain the economy near full employment without aggravating inflationary pressures. The proper trade-off between these two goals is a source of ongoing debate.
- The traditional tools of macropolicy are government spending and tax collection, which comprise fiscal policy, and manipulation of the money supply via monetary policy. Expansionary fiscal policy can stimulate the economy and increase GDP but tends to increase interest rates. Expansionary monetary policy works by lowering interest rates.
- The business cycle is the economy's recurring pattern of expansions and recessions. Leading economic indicators can be used to anticipate the evolution of the business cycle because their values tend to change before those of other key economic variables.

SOLUTIONS TO CONCEPT checks

12.1. The downturn in the auto industry will reduce the demand for the product in this economy. The economy will, at least in the short term, enter a recession. This would suggest that:
   a. GDP will fall.
   b. The unemployment rate will rise.
   c. The government deficit will increase. Income tax receipts will fall, and government expenditures on social welfare programs probably will increase.
   d. Interest rates should fall. The contraction in the economy will reduce the demand for credit. Moreover, the lower inflation rate will reduce nominal interest rates.

12.2. Expansionary fiscal policy coupled with expansionary monetary policy will stimulate the economy, with the loose monetary policy keeping down interest rates.

12.3. A traditional demand-side interpretation of the tax cuts is that the resulting increase in after-tax income increased consumption demand and stimulated the economy. A supply-side interpretation is that the reduction in marginal tax rates made it more attractive for businesses to invest and for individuals to work, thereby increasing economic output.

12.4. *a.* Newspapers will do best in an expansion when advertising volume is increasing.
   b. Machine tools are a good investment at the trough of a recession, just as the economy is about to enter an expansion and firms may need to increase capacity.
   c. Beverages are defensive investments, with demand that is relatively insensitive to the business cycle. Therefore, they are good investments if a recession is forecast.
   d. Timber is a good investment at a peak period, when natural resource prices are high and the economy is operating at full capacity.

CHAPTER 13

Equity Valuation

AFTER STUDYING THIS CHAPTER YOU SHOULD BE ABLE TO:

- Calculate the intrinsic value of a firm using either a constant growth or multistage dividend discount model.
- Calculate the intrinsic value of a stock using a dividend discount model in conjunction with a price/earnings ratio.
- Assess the growth prospects of a firm from its P/E ratio.
- Value a firm using free cash flow models.

You saw in our discussion of market efficiency that finding undervalued securities is hardly easy. At the same time, there are enough chinks in the armor of the efficient market hypothesis that the search for such securities should not be dismissed out of hand. Moreover, it is the ongoing search for mispriced securities that maintains a nearly efficient market. Even infrequent discoveries of minor mispricing justify the salary of a stock market analyst.

This chapter describes the ways stock market analysts try to uncover mispriced securities. The models presented are those used by *fundamental analysts*, those analysts who use information concerning the current and prospective profitability of a company to assess its fair market value. Fundamental analysts are different from *technical analysts*, who essentially use trend analysis to uncover trading opportunities.

We start with a discussion of alternative measures of the value of a company. From there, we progress to quantitative tools called dividend discount models that security analysts commonly use to measure the value of a firm as an ongoing concern. Next, we turn to price–earnings, or P/E, ratios, explaining

(continued)

why they are of such interest to analysts but also highlighting some of their shortcomings. We explain how P/E ratios are tied to dividend valuation models and, more generally, to the growth prospects of the firm. We close the chapter with a discussion and extended example of free cash flow models used by analysts to value firms based on forecasts of the cash flows that will be generated from the firm's business endeavors. We apply the several valuation tools covered in the chapter to a real firm and find that there is some disparity in their conclusions—a conundrum that will confront any security analyst—and consider reasons for these discrepancies.

Related Web sites for this chapter are available at www.mhhe.com/bkm.

13.1 VALUATION BY COMPARABLES

The purpose of fundamental analysis is to identify stocks that are mispriced relative to some measure of "true" value that can be derived from observable financial data. Of course, true value can only be estimated. In practice, stock analysts use models to estimate the fundamental value of a corporation's stock from observable market data and from the financial statements of the firm and its competitors. These valuation models differ in the specific data they use and in the level of their theoretical sophistication. But at their heart, most of them use the notion of valuation by comparables: They look at the relationship between price and various determinants of value for similar firms, and then extrapolate that relationship to the firm in question.

The Internet makes it convenient to obtain relevant data. For U.S. companies, the Securities and Exchange Commission provides information available to the public at its EDGAR Web site **www.sec.gov/edgar.shtml**. The SEC requires all public companies (except foreign companies and companies with less than $10 million in assets and 500 shareholders) to file registration statements, periodic reports, and other forms electronically through EDGAR.

Many Web sites, such as **finance.yahoo.com**, also provide analysis and data derived from the EDGAR reports. Another source available to users of this text is Standard & Poor's Market Insight service. Table 13.1 shows an excerpt from Market Insight of financial highlights for Microsoft Corporation.

The price of a share of Microsoft common stock is shown as $29.46, and the total market value of all 9,777 million shares outstanding was $288,030 million. Under the heading "Valuation," Table 13.1 reports the ratios of Microsoft's stock price to four different items taken from its latest financial statements (each divided by the number of outstanding shares): operating earnings, book value, sales revenue, and cash flow. Microsoft's price-to-earnings (P/E) ratio is 23.6, price-to-book value is 7.9, and price-to-sales is 6.3. Such comparative valuation ratios are used to assess the valuation of one firm versus others in the same industry; we will consider all of these ratios later in the chapter. In the column to the right in Table 13.1 are comparable ratios for the average firm in the PC software industry.

For example, an analyst might compare the P/E ratio for Microsoft, 23.6, to the industry average ratio of 23.2. By comparison with this standard, Microsoft appears to be priced pretty much in line with industry norms. Its price-to-sales ratio is a bit higher than the industry average, but this ratio is more useful for firms and industries that are in a start-up phase. Earnings figures for start-up firms are often negative and not reported, so analysts shift their focus from earnings per share to sales revenue per share.

The market price of a share of Microsoft stock was 7.9 times its book value at the end of December 2006. **Book value** is the net worth of a company as reported on its balance sheet. For the average firm in the PC software industry, the market-to-book ratio was 5.6. By comparison with this standard, Microsoft was valued somewhat aggressively.

book value
The net worth of common equity according to a firm's balance sheet.

TABLE 13.1
Microsoft Corporation, financial highlights, year-end, 2006.

Current Quarter Ended:	December 2006	Current Year Ended:	June 2006
Miscellaneous			
Current Price	29.460000	Comn Shareholdrs (actual)	148993
Comn Shares Outstdg (mil)	9777.000	Employees (actual)	71000
Market Capitalization (mil)	288030.420	S&P Issuer Credit Rating	AA
Latest 12 Months	**Company**		**1 Yr Chng (%)**
Sales (mil)	46057.000		11.4
EBITDA (mil)	17515.000		−2.3
Net Income (mil)	11909.000		−8.8
EPS from Ops	1.25		0.0
Dividends/Share	0.370000		15.6
Valuation	**Company**		**Industry Avg**
Price/EPS from Ops	23.6		23.2
Price/Book	7.9		5.6
Price/Sales	6.3		5.6
Price/Cash Flow	22.2		21.0
Profitability (%)			
Return on Equity	32.5		22.7
Return on Assets	17.9		12.4
Oper Profit Margin	35.7		31.9
Net Profit Margin	25.9		22.9
Financial Risk			

Source: Standard & Poor's Market Insight (**www.mhhe.com/edumarketinsight**), February 2007. Access available through this text's Online Learning Center.

Limitations of Book Value

The book value of a firm is the result of applying accounting rules that spread the acquisition cost of assets over a specified number of years, whereas the market price of a stock takes account of the firm's value as a going concern. In other words, the market price reflects the present value of its expected future cash flows. It would be unusual if the market price of a stock were exactly equal to its book value.

Can book value represent a "floor" for the stock's price, below which level the market price can never fall? Although Microsoft's book value per share is considerably less than its market price, other evidence disproves this notion. While it is not common, there are always some firms selling at a market price below book value. Typically, these are firms in considerable distress.

A better measure of a floor for the stock price is the firm's **liquidation value** per share. This represents the amount of money that could be realized by breaking up the firm, selling its assets, repaying its debt, and distributing the remainder to the shareholders. The reasoning behind this concept is that if the market price of equity drops below the liquidation value of the firm, the firm becomes attractive as a takeover target. A corporate raider would find it profitable to buy enough shares to gain control and then actually liquidate because the liquidation value exceeds the value of the business as a going concern.

liquidation value
Net amount that can be realized by selling the assets of a firm and paying off the debt.

Another balance sheet concept that is of interest in valuing a firm is the **replacement cost** of its assets less its liabilities. Some analysts believe the market value of the firm cannot get too far above its replacement cost for long because, if it did, competitors would try to replicate the firm. The competitive pressure of other similar firms entering the same industry would drive down the market value of all firms until they came into equality with replacement cost.

replacement cost
Cost to replace a firm's assets.

Tobin's q
Ratio of market value of the firm to replacement cost.

This idea is popular among economists, and the ratio of market price to replacement cost is known as **Tobin's *q***, after the Nobel Prize–winning economist James Tobin. In the long run, according to this view, the ratio of market price to replacement cost will tend toward 1, but the evidence is that this ratio can differ significantly from 1 for very long periods of time.

Although focusing on the balance sheet can give some useful information about a firm's liquidation value or its replacement cost, the analyst usually must turn to the expected future cash flows for a better estimate of the firm's value as a going concern. We now examine the quantitative models that analysts use to value common stock in terms of the future earnings and dividends the firm will yield.

13.2 INTRINSIC VALUE VERSUS MARKET PRICE

The most popular model for assessing the value of a firm as a going concern starts from the observation that the return on a stock investment comprises cash dividends and capital gains or losses. We begin by assuming a one-year holding period and supposing that ABC stock has an expected dividend per share, $E(D_1)$, of \$4; that the current price of a share, P_0, is \$48; and that the expected price at the end of a year, $E(P_1)$, is \$52. For now, don't worry about how you derive your forecast of next year's price. At this point we ask only whether the stock seems attractively priced *today* given your forecast of *next year's* price.

The expected holding-period return is $E(D_1)$ plus the expected price appreciation, $E(P_1) - P_0$, all divided by the current price P_0.

$$\text{Expected HPR} = E(r) = \frac{E(D_1) + [E(P_1) - P_0]}{P_0}$$

$$= \frac{4 + (52 - 48)}{48} = 0.167 = 16.7\%$$

Note that $E(\ )$ denotes an expected future value. Thus, $E(P_1)$ represents the expectation today of the stock price one year from now. $E(r)$ is referred to as the stock's expected holding-period return. It is the sum of the expected dividend yield, $E(D_1)/P_0$, and the expected rate of price appreciation, the capital gains yield, $[E(P_1) - P_0]/P_0$.

But what is the required rate of return for ABC stock? We know from the capital asset pricing model (CAPM) that when stock market prices are at equilibrium levels, the rate of return that investors can expect to earn on a security is $r_f + \beta[E(r_M) - r_f]$. Thus, the CAPM may be viewed as providing the rate of return an investor can expect to earn on a security given its risk as measured by beta. This is the return that investors will require of any other investment with equivalent risk. We will denote this required rate of return as k. If a stock is priced "correctly," it will offer investors a "fair" return, i.e., its *expected* return will equal its *required* return. Of course, the goal of a security analyst is to find stocks that are mispriced. For example, an underpriced stock will provide an expected return greater than the required return.

Suppose that $r_f = 6\%$, $E(r_M) - r_f = 5\%$, and the beta of ABC is 1.2. Then the value of k is

$$k = 6\% + 1.2 \times 5\% = 12\%$$

The rate of return the investor expects exceeds the required rate based on ABC's risk by a margin of 4.7%. Naturally, the investor will want to include more of ABC stock in the portfolio than a passive strategy would dictate.

intrinsic value
The present value of a firm's expected future net cash flows discounted by the required rate of return.

Another way to see this is to compare the intrinsic value of a share of stock to its market price. The **intrinsic value**, denoted V_0, of a share of stock is defined as the present value of all cash payments to the investor in the stock, including dividends as well as the proceeds from the ultimate sale of the stock, discounted at the appropriate risk-adjusted interest rate, k.

Whenever the intrinsic value, or the investor's own estimate of what the stock is really worth, exceeds the market price, the stock is considered undervalued and a good investment. In the case of ABC, using a one-year investment horizon and a forecast that the stock can be sold at the end of the year at price $P_1 = \$52$, the intrinsic value is

$$V_0 = \frac{E(D_1) + E(P_1)}{1 + k} = \frac{\$4 + \$52}{1.12} = \$50$$

Equivalently, at a price of \$50, the investor would derive a 12% rate of return—just equal to the required rate of return—on an investment in the stock. However, at the current price of \$48, the stock is underpriced compared to intrinsic value. At this price, it provides better than a fair rate of return relative to its risk. In other words, using the terminology of the CAPM, it is a positive-alpha stock, and investors will want to buy more of it than they would following a passive strategy.

In contrast, if the intrinsic value turns out to be lower than the current market price, investors should buy less of it than under the passive strategy. It might even pay to go short on ABC stock, as we discussed in Chapter 3.

market capitalization rate
The market-consensus estimate of the appropriate discount rate for a firm's cash flows.

In market equilibrium, the current market price will reflect the intrinsic value estimates of all market participants. This means the individual investor whose V_0 estimate differs from the market price, P_0, in effect must disagree with some or all of the market consensus estimates of $E(D_1)$, $E(P_1)$, or k. A common term for the market consensus value of the required rate of return, k, is the **market capitalization rate**, which we use often throughout this chapter.

CONCEPT check 13.1

You expect the price of IBX stock to be \$59.77 per share a year from now. Its current market price is \$50, and you expect it to pay a dividend one year from now of \$2.15 per share.

a. What is the stock's expected dividend yield, rate of price appreciation, and expected holding-period return?
b. If the stock has a beta of 1.15, the risk-free rate is 6% per year, and the expected rate of return on the market portfolio is 14% per year, what is the required rate of return on IBX stock?
c. What is the intrinsic value of IBX stock, and how does it compare to the current market price?

13.3 DIVIDEND DISCOUNT MODELS

Consider an investor who buys a share of Steady State Electronics stock, planning to hold it for one year. The intrinsic value of the share is the present value of the dividend to be received at the end of the first year, D_1, and the expected sales price, P_1. We will henceforth use the simpler notation P_1 instead of $E(P_1)$ to avoid clutter. Keep in mind, though, that future prices and dividends are unknown, and we are dealing with expected values, not certain values. We've already established that

$$V_0 = \frac{D_1 + P_1}{1 + k} \qquad (13.1)$$

While this year's dividend is fairly predictable given a company's history, you might ask how we can estimate P_1, the year-end price. According to Equation 13.1, V_1 (the year-end value) will be

$$V_1 = \frac{D_2 + P_2}{1 + k}$$

If we assume the stock will be selling for its intrinsic value next year, then $V_1 = P_1$, and we can substitute this value for P_1 into Equation 13.1 to find

$$V_0 = \frac{D_1}{1+k} + \frac{D_2 + P_2}{(1+k)^2}$$

This equation may be interpreted as the present value of dividends plus sales price for a two-year holding period. Of course, now we need to come up with a forecast of P_2. Continuing in the same way, we can replace P_2 by $(D_3 + P_3)/(1+k)$, which relates P_0 to the value of dividends plus the expected sales price for a three-year holding period.

More generally, for a holding period of H years, we can write the stock value as the present value of dividends over the H years, plus the ultimate sales price, P_H.

$$V_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_H + P_H}{(1+k)^H} \qquad \textbf{(13.2)}$$

Note the similarity between this formula and the bond valuation formula developed in Chapter 10. Each relates price to the present value of a stream of payments (coupons in the case of bonds, dividends in the case of stocks) and a final payment (the face value of the bond or the sales price of the stock). The key differences in the case of stocks are the uncertainty of dividends, the lack of a fixed maturity date, and the unknown sales price at the horizon date. Indeed, one can continue to substitute for price indefinitely to conclude

$$V_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \ldots \qquad \textbf{(13.3)}$$

dividend discount model (DDM)
A formula for the intrinsic value of a firm equal to the present value of all expected future dividends.

Equation 13.3 states the stock price should equal the present value of all expected future dividends into perpetuity. This formula is called the **dividend discount model** (DDM) of stock prices.

It is tempting, but incorrect, to conclude from Equation 13.3 that the DDM focuses exclusively on dividends and ignores capital gains as a motive for investing in stock. Indeed, we assume explicitly in Equation 13.1 that capital gains (as reflected in the expected sales price, P_1) are part of the stock's value. At the same time, the price at which you can sell a stock in the future depends on dividend forecasts at that time.

The reason only dividends appear in Equation 13.3 is not that investors ignore capital gains. It is instead that those capital gains will be determined by dividend forecasts at the time the stock is sold. That is why in Equation 13.2 we can write the stock price as the present value of dividends plus sales price for *any* horizon date. P_H is the present value at time H of all dividends expected to be paid after the horizon date. That value is then discounted back to today, time 0. The DDM asserts that stock prices are determined ultimately by the cash flows accruing to stockholders, and those are dividends.

The Constant Growth DDM

Equation 13.3 as it stands is still not very useful in valuing a stock because it requires dividend forecasts for every year into the indefinite future. To make the DDM practical, we need to introduce some simplifying assumptions. A useful and common first pass at the problem is to assume that dividends are trending upward at a stable growth rate that we will call g. Then if $g = 0.05$, and the most recently paid dividend was $D_0 = 3.81$, expected future dividends are

$$\begin{aligned} D_1 &= D_0(1+g) = 3.81 \times 1.05 = 4.00 \\ D_2 &= D_0(1+g)^2 = 3.81 \times (1.05)^2 = 4.20 \\ D_3 &= D_0(1+g)^3 = 3.81 \times (1.05)^3 = 4.41 \text{ etc.} \end{aligned}$$

Using these dividend forecasts in Equation 13.3, we solve for intrinsic value as

$$V_0 = \frac{D_0(1+g)}{1+k} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \ldots$$

This equation can be simplified to

$$V_0 = \frac{D_0(1+g)}{k-g} = \frac{D_1}{k-g} \qquad \textbf{(13.4)}$$

Note in Equation 13.4 that we divide D_1 (not D_0) by $k - g$ to calculate intrinsic value. If the market capitalization rate for Steady State is 12%, we can use Equation 13.4 to show that the intrinsic value of a share of Steady State stock is

$$\frac{\$4.00}{.12 - .05} = \$57.14$$

constant growth DDM
A form of the dividend discount model that assumes dividends will grow at a constant rate.

Equation 13.4 is called the **constant growth DDM** or the Gordon model, after Myron J. Gordon, who popularized the model. It should remind you of the formula for the present value of a perpetuity. If dividends were expected not to grow, then the dividend stream would be a simple perpetuity, and the valuation formula for such a nongrowth stock would be $P_0 = D_1/k$.[1] Equation 13.4 is a generalization of the perpetuity formula to cover the case of a *growing* perpetuity. As g increases, the stock price also rises.

EXAMPLE 13.1 *Preferred Stock and the DDM*

Preferred stock that pays a fixed dividend can be valued using the constant growth dividend discount model. The constant growth rate of dividends is simply zero. For example, to value a preferred stock paying a fixed dividend of $2 per share when the discount rate is 8%, we compute

$$V_0 = \frac{\$2}{.08 - 0} = \$25$$

EXAMPLE 13.2 *The Constant Growth DDM*

High Flyer Industries has just paid its annual dividend of $3 per share. The dividend is expected to grow at a constant rate of 8% indefinitely. The beta of High Flyer stock is 1.0, the risk-free rate is 6%, and the market risk premium is 8%. What is the intrinsic value of the stock? What would be your estimate of intrinsic value if you believed that the stock was riskier, with a beta of 1.25?

Because a $3 dividend has just been paid and the growth rate of dividends is 8%, the forecast for the year-end dividend is $\$3 \times 1.08 = \$3.24$. The market capitalization rate is $6\% + 1.0 \times 8\% = 14\%$. Therefore, the value of the stock is

$$V_0 = \frac{D_1}{k-g} = \frac{\$3.24}{.14 - .08} = \$54$$

If the stock is perceived to be riskier, its value must be lower. At the higher beta, the market capitalization rate is $6\% + 1.25 \times 8\% = 16\%$, and the stock is worth only

$$\frac{\$3.24}{.16 - .08} = \$40.50$$

[1] Recall from introductory finance that the present value of a $1 per year perpetuity is $1/k$. For example, if $k = 10\%$, the value of the perpetuity is $\$1/.10 = \$10$. Notice that if $g = 0$ in Equation 13.4, the constant growth DDM formula is the same as the perpetuity formula.

The constant growth DDM is valid only when g is less than k. If dividends were expected to grow forever at a rate faster than k, the value of the stock would be infinite. If an analyst derives an estimate of g that is greater than k, that growth rate must be unsustainable in the long run. The appropriate valuation model to use in this case is a multistage DDM such as those discussed below.

The constant growth DDM is so widely used by stock market analysts that it is worth exploring some of its implications and limitations. The constant growth rate DDM implies that a stock's value will be greater:

1. The larger its expected dividend per share.
2. The lower the market capitalization rate, k.
3. The higher the expected growth rate of dividends.

Another implication of the constant growth model is that the stock price is expected to grow at the same rate as dividends. To see this, suppose Steady State stock is selling at its intrinsic value of \$57.14, so that $V_0 = P_0$. Then

$$P_0 = \frac{D_1}{k - g}$$

Note that price is proportional to dividends. Therefore, next year, when the dividends paid to Steady State stockholders are expected to be higher by $g = 5\%$, price also should increase by 5%. To confirm this, note

$$D_2 = \$4(1.05) = \$4.20$$
$$P_1 = D_2/(k - g) = \$4.20/(.12 - .05) = \$60.00$$

which is 5% higher than the current price of \$57.14. To generalize

$$P_1 = \frac{D_2}{k - g} = \frac{D_1(1 + g)}{k - g} = \frac{D_1}{k - g}(1 + g)$$
$$= P_0(1 + g)$$

Therefore, the DDM implies that, in the case of constant expected growth of dividends, the expected rate of price appreciation in any year will equal that constant growth rate, g. Note that for a stock whose market price equals its intrinsic value ($V_0 = P_0$) the expected holding-period return will be

$$E(r) = \text{Dividend yield} + \text{Capital gains yield}$$
$$= \frac{D_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{D_1}{P_0} + g \qquad (13.5)$$

This formula offers a means to infer the market capitalization rate of a stock, for if the stock is selling at its intrinsic value, then $E(r) = k$, implying that $k = D_1/P_0 + g$. By observing the dividend yield, D_1/P_0, and estimating the growth rate of dividends, we can compute k. This equation is known also as the *discounted cash flow (DCF) formula.*

This is an approach often used in rate hearings for regulated public utilities. The regulatory agency responsible for approving utility pricing decisions is mandated to allow the firms to charge just enough to cover costs plus a "fair" profit, that is, one that allows a competitive return on the investment the firm has made in its productive capacity. In turn, that return is taken to be the expected return investors require on the stock of the firm. The $D_1/P_0 + g$ formula provides a means to infer that required return.

EXAMPLE 13.3 *The Constant Growth Model*

Suppose that Steady State Electronics wins a major contract for its revolutionary computer chip. The very profitable contract will enable it to increase the growth rate of dividends from 5% to 6% without reducing the current dividend from the projected value of \$4.00 per share. What will happen to the stock price? What will happen to future expected rates of return on the stock?

The stock price ought to increase in response to the good news about the contract, and indeed it does. The stock price jumps from its original value of \$57.14 to a postannouncement price of

$$\frac{D_1}{k - g} = \frac{\$4.00}{.12 - .06} = \$66.67$$

Investors who are holding the stock when the good news about the contract is announced will receive a substantial windfall.

On the other hand, at the new price the expected rate of return on the stock is 12%, just as it was before the new contract was announced.

$$E(r) = \frac{D_1}{P_0} + g = \frac{\$4.00}{\$66.67} + .06 = .12, \text{ or } 12\%$$

This result makes sense, of course. Once the news about the contract is reflected in the stock price, the expected rate of return will be consistent with the risk of the stock. Since the risk of the stock has not changed, neither should the expected rate of return.

CONCEPT check 13.2

a. IBX's stock dividend at the end of this year is expected to be \$2.15, and it is expected to grow at 11.2% per year forever. If the required rate of return on IBX stock is 15.2% per year, what is its intrinsic value?
b. If IBX's current market price is equal to this intrinsic value, what is next year's expected price?
c. If an investor were to buy IBX stock now and sell it after receiving the \$2.15 dividend a year from now, what is the expected capital gain (i.e., price appreciation) in percentage terms? What is the dividend yield, and what would be the holding-period return?

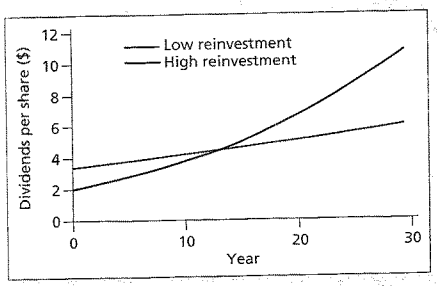
Stock Prices and Investment Opportunities

Consider two companies, Cash Cow, Inc., and Growth Prospects, each with expected earnings in the coming year of \$5 per share. Both companies could in principle pay out all of these earnings as dividends, maintaining a perpetual dividend flow of \$5 per share. If the market capitalization rate were $k = 12.5\%$, both companies would then be valued at $D_1/k = \$5/.125 = \$40$ per share. Neither firm would grow in value, because with all earnings paid out as dividends, and no earnings reinvested in the firm, both companies' capital stock and earnings capacity would remain unchanged over time; earnings[2] and dividends would not grow.

Now suppose one of the firms, Growth Prospects, engages in projects that generate a return on investment of 15%, which is greater than the required rate of return, $k = 12.5\%$. It would be foolish for such a company to pay out all of its earnings as dividends. If Growth Prospects retains or plows back some of its earnings into its highly profitable projects, it can earn a 15% rate of return for its shareholders, whereas if it pays out all earnings as dividends, it forgoes

[2]Actually, we are referring here to earnings net of the funds necessary to maintain the productivity of the firm's capital, that is, earnings net of "economic depreciation." In other words, the earnings figure should be interpreted as the maximum amount of money the firm could pay out each year in perpetuity without depleting its productive capacity. For this reason, the net earnings number may be quite different from the accounting earnings figure that the firm reports in its financial statements. We will explore this further in the next chapter.

FIGURE 13.1
Dividend growth for two earnings reinvestment policies



dividend payout ratio
Percentage of earnings paid out as dividends.

plowback ratio or earnings retention ratio
The proportion of the firm's earnings that is reinvested in the business (and not paid out as dividends).

the projects, leaving shareholders to invest the dividends in other opportunities at a fair market rate of only 12.5%. Suppose, therefore, Growth Prospects chooses a lower **dividend payout ratio** (the fraction of earnings paid out as dividends), reducing payout from 100% to 40%, and maintaining a **plowback ratio** (the fraction of earnings reinvested in the firm) of 60%. The plowback ratio also is referred to as the **earnings retention ratio.**

The dividend of the company, therefore, will be $2 (40% of $5 earnings) instead of $5. Will the share price fall? No, it will rise! Although dividends initially fall under the earnings reinvestment policy, subsequent growth in the assets of the firm because of reinvested profits will generate growth in future dividends, which will be reflected in today's share price.

Figure 13.1 illustrates the dividend streams generated by Growth Prospects under two dividend policies. A low reinvestment rate plan allows the firm to pay higher initial dividends but results in a lower dividend growth rate. Eventually, a high reinvestment rate plan will provide higher dividends. If the dividend growth generated by the reinvested earnings is high enough, the stock will be worth more under the high reinvestment strategy.

How much growth will be generated? Suppose Growth Prospects starts with plant and equipment of $100 million and is all-equity-financed. With a return on investment or equity (ROE) of 15%, total earnings are ROE × $100 million = 0.15 × $100 million = $15 million. There are 3 million shares of stock outstanding, so earnings per share are $5, as posited above. If 60% of the $15 million in this year's earnings is reinvested, then the value of the firm's capital stock will increase by 0.60 × $15 million = $9 million, or by 9%. The percentage increase in the capital stock is the rate at which income was generated (ROE) times the plowback ratio (the fraction of earnings reinvested in more capital), which we will denote as b.

Now endowed with 9% more capital, the company earns 9% more income and pays out 9% higher dividends. The growth rate of the dividends, therefore, is[3]

$$g = \text{ROE} \times b = 15\% \times 0.60 = 9\%$$

If the stock price equals its intrinsic value, and this growth rate can be sustained (i.e., if the ROE and payout ratios are consistent with the long-run capabilities of the firm), then the stock should sell at

$$P_0 = \frac{D_1}{k - g} = \frac{\$2}{.125 - .09} = \$57.14$$

[3]We can derive this relationship more generally by noting that with a fixed ROE, earnings (which equal ROE × Book value) will grow at the same rate as the book value of the firm. Abstracting from net new investment in the firm, the growth rate of book value equals reinvested earnings/book value. Therefore,

$$g = \frac{\text{Reinvested earnings}}{\text{Book value}} = \frac{\text{Reinvested earnings}}{\text{Total earnings}} \times \frac{\text{Total earnings}}{\text{Book value}} = b \times \text{ROE}$$

When Growth Prospects pursued a no-growth policy and paid out all earnings as dividends, the stock price was only $40. Therefore, you can think of $40 as the value per share of the assets the company already has in place.

When Growth Prospects decided to reduce current dividends and reinvest some of its earnings in new investments, its stock price increased. The increase in the stock price reflects the fact that planned investments provide an expected rate of return greater than the required rate. In other words, the investment opportunities have positive net present value. The value of the firm rises by the NPV of these investment opportunities. This net present value is also called the **present value of growth opportunities,** or **PVGO.**

present value of growth opportunities (PVGO)
Net present value of a firm's future investments.

Therefore, we can think of the value of the firm as the sum of the value of assets already in place, or the no-growth value of the firm, plus the net present value of the future investments the firm will make, which is the PVGO. For Growth Prospects, PVGO = $17.14 per share:

$$\begin{aligned} \text{Price} &= \text{No-growth value per share} + \text{PVGO} \\ P_0 &= \frac{E_1}{k} + \text{PVGO} \\ \$57.14 &= \$40 + \$17.14 \end{aligned} \qquad (13.6)$$

We know that in reality, dividend cuts almost always are accompanied by steep drops in stock prices. Does this contradict our analysis? Not necessarily: Dividend cuts are usually taken as bad news about the future prospects of the firm, and it is the *new information* about the firm—not the reduced dividend yield per se—that is responsible for the stock price decline.

In one well-known case, Florida Power & Light announced a cut in its dividend, not because of financial distress, but because it wanted to better position itself for a period of deregulation. At first, the stock market did not believe this rationale—the stock price dropped 14% on the day of the announcement. But within a month, the market became convinced that the firm had in fact made a strategic decision that would improve growth prospects, and the share price actually rose *above* its preannouncement value. Even including the initial price drop, the share price outperformed both the S&P 500 and the S&P utility index in the year following the dividend cut.

It is important to recognize that growth per se is not what investors desire. Growth enhances company value only if it is achieved by investment in projects with attractive profit opportunities (i.e., with ROE > k). To see why, let's now consider Growth Prospects' unfortunate sister company, Cash Cow. Cash Cow's ROE is only 12.5%, just equal to the required rate of return, k. Therefore, the NPV of its investment opportunities is zero. We've seen that following a zero-growth strategy with $b = 0$ and $g = 0$, the value of Cash Cow will be $E_1/k = \$5/.125 = \$40$ per share. Now suppose Cash Cow chooses a plowback ratio of $b = 0.60$, the same as Growth Prospects' plowback. Then g would be

$$g = \text{ROE} \times b = .125 \times .60 = .075$$

but the stock price is still

$$P_0 = \frac{D_1}{k - g} = \frac{\$2}{.125 - .075} = \$40$$

no different from the no-growth strategy.

In the case of Cash Cow, the dividend reduction that frees funds for reinvestment in the firm generates only enough growth to maintain the stock price at the current level. This is as it should be: If the firm's projects yield only what investors can earn on their own, then NPV is zero, and shareholders cannot be made better off by a high reinvestment rate policy. This demonstrates that "growth" is not the same as growth opportunities. To justify reinvestment, the firm must engage in projects with better prospective returns than those shareholders

can find elsewhere. Notice also that the PVGO of Cash Cow is zero: PVGO = $P_0 - E_1/k = 40 - 40 = 0$. With ROE = k, there is no advantage to plowing funds back into the firm; this shows up as PVGO of zero. In fact, this is why firms with considerable cash flow, but limited investment prospects, are called "cash cows." The cash these firms generate is best taken out of or "milked from" the firm.

EXAMPLE 13.4 *Growth Opportunities*

Takeover Target is run by entrenched management that insists on reinvesting 60% of its earnings in projects that provide an ROE of 10%, despite the fact that the firm's capitalization rate is $k = 15\%$. The firm's year-end dividend will be \$2 per share, paid out of earnings of \$5 per share. At what price will the stock sell? What is the present value of growth opportunities? Why would such a firm be a takeover target for another firm?

Given current management's investment policy, the dividend growth rate will be

$$g = \text{ROE} \times b = 10\% \times .6 = 6\%$$

and the stock price should be

$$P_0 = \frac{\$2}{.15 - .06} = \$22.22$$

The present value of growth opportunities is

$$\begin{aligned}\text{PVGO} &= \text{Price per share} - \text{No-growth value per share} \\ &= \$22.22 - E_1/k = \$22.22 - \$5/.15 = -\$11.11\end{aligned}$$

PVGO is *negative*. This is because the net present value of the firm's projects is negative: The rate of return on those assets is less than the opportunity cost of capital.

Such a firm would be subject to takeover, because another firm could buy the firm for the market price of \$22.22 per share and increase the value of the firm by changing its investment policy. For example, if the new management simply paid out all earnings as dividends, the value of the firm would increase to its no-growth value, $E_1/k = \$5/.15 = \$33.33$.

CONCEPT check 13.3

a. Calculate the price of a firm with a plowback ratio of .60 if its ROE is 20%. Current earnings, E_1, will be \$5 per share, and $k = 12.5\%$.

b. What if ROE is 10%, which is less than the market capitalization rate? Compare the firm's price in this instance to that of a firm with the same ROE and E_1, but a plowback ratio of $b = 0$.

Life Cycles and Multistage Growth Models

As useful as the constant growth DDM formula is, you need to remember that it is based on a simplifying assumption, namely, that the dividend growth rate will be constant forever. In fact, firms typically pass through life cycles with very different dividend profiles in different phases. In early years, there are ample opportunities for profitable reinvestment in the company. Payout ratios are low, and growth is correspondingly rapid. In later years, the firm matures, production capacity is sufficient to meet market demand, competitors enter the market, and attractive opportunities for reinvestment may become harder to find. In this mature phase, the firm may choose to increase the dividend payout ratio, rather than retain earnings. The dividend level increases, but thereafter it grows at a slower rate because the company has fewer growth opportunities.

Table 13.2 illustrates this profile. It gives Value Line's forecasts of return on assets, dividend payout ratio, and three-year growth rate in earnings per share of a sample of the firms included in the computer software and services industry versus those of East Coast electric

TABLE 13.2
Financial ratios in two industries

	Return on Assets (%)	Payout Ratio (%)	Growth Rate 2007–2009
Computer Software			
Adobe Systems	14.5%	0.0%	16.8%
Cognizant	19.5	0.0	19.7
Compuware	10.5	0.0	11.2
Intuit	23.0	0.0	9.7
Microsoft	35.0	31.0	15.8
Novell	6.0	0.0	24.8
Oracle	28.5	0.0	17.7
Red Hat	9.5	0.0	28.9
Parametric Tech	17.0	0.0	19.1
SAP	22.5	25.0	11.4
Median	18.3%	0.0%	17.3%
Electric Utilities			
Central Hudson G&E	5.5%	71.0%	4.5%
Central Vermont	6.0	58.0	2.2
Consolidated Edison	6.0	78.0	1.7
Duquesne Light	8.0	68.0	7.7
Energy East	5.5	72.0	8.9
Northeast Utilities	5.5	56.0	5.4
Nstar	9.0	58.0	8.6
Pennsylvania Power	12.0	51.0	14.2
Public Services Enter.	8.5	49.0	2.1
United Illuminating	5.5	89.0	4.7
Median	6.0%	63.0%	5.1%

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utilities. (We compare return on assets rather than return on equity because the latter is affected by leverage, which tends to be far greater in the electric utility industry than in the software industry. Return on assets measures operating income per dollar of total assets, regardless of whether the source of the capital supplied is debt or equity. We will return to this issue in the next chapter.)

By and large, software firms have attractive investment opportunities. The median return on assets of these firms is forecast to be 18.3%, and the firms have responded with quite high plowback ratios. Most of these firms pay no dividends at all. The high returns on assets and high plowback ratios result in rapid growth. The median growth rate of earnings per share in this group is projected at 17.3%.

In contrast, the electric utilities are more representative of mature firms. Their median return on assets is lower, 6.0%; dividend payout is higher, 63%; and average growth rate is lower, 5.1%.

We conclude that the higher payouts of the electric utilities reflect their more limited opportunities to reinvest earnings at attractive rates of return. Consistent with this analysis, Microsoft's announcement in 2004 that it would sharply increase its dividend and initiate multibillion dollar stock buybacks was widely seen as an indication that the firm was maturing into a lower-growth stage. It was generating far more cash than it had the opportunity to invest attractively, and so was paying out that cash to its shareholders.

To value companies with temporarily high growth, analysts use a multistage version of the dividend discount model. Dividends in the early high-growth period are forecast and their

two-stage DDM

Dividend discount model in which dividend growth is assumed to level off only at some future date.

combined present value is calculated. Then, once the firm is projected to settle down to a steady growth phase, the constant growth DDM is applied to value the remaining stream of dividends.

We can illustrate this with a real-life example using a **two-stage DDM.** Figure 13.2 is a *Value Line Investment Survey* report on Honda Motor Co. Some of Honda's relevant information in 2007 is highlighted.

Honda's beta appears at the circled A, its recent stock price at the B, the per-share dividend payments at the C, the ROE (referred to as "return on shareholder equity") at the D, and the dividend payout ratio (referred to as "all dividends to net profits") at the E.[4] The rows ending at C, D, and E are historical time series. The boldfaced italicized entries under 2007 are estimates for that year. Similarly, the entries in the far right column (labeled 09–11) are forecasts for some time between 2009 and 2011, which we will take to be 2010.

Value Line projects rapid growth in the near term, with dividends rising from $.59 in 2007 to $.85 in 2010. This rapid growth rate cannot be sustained indefinitely. We can obtain dividend inputs for this initial period by using the explicit forecasts for 2007 and 2010 and linear interpolation for the years between:

2007	$.59
2008	$.67
2009	$.76
2010	$.85

Now let us assume the dividend growth rate levels off in 2010. What is a good guess for that steady-state growth rate? Value Line forecasts a dividend payout ratio of 0.22 and an ROE of 12.5%, implying long-term growth will be

$$g = \text{ROE} \times b = 12.5\% \times (1 - 0.22) = 9.75\%$$

Our estimate of Honda's intrinsic value using an investment horizon of 2010 is therefore obtained from Equation 13.2, which we restate here

$$V_{2006} = \frac{D_{2007}}{(1+k)} + \frac{D_{2008}}{(1+k)^2} + \frac{D_{2009}}{(1+k)^3} + \frac{D_{2010} + P_{2010}}{(1+k)^4}$$
$$= \frac{.59}{(1+k)} + \frac{.67}{(1+k)^2} + \frac{.76}{(1+k)^3} + \frac{.85 + P_{2010}}{(1+k)^4}$$

Here, P_{2010} represents the forecast price at which we can sell our shares of Honda at the end of 2010, when dividends enter their constant growth phase. That price, according to the constant growth DDM, should be

$$P_{2010} = \frac{D_{2011}}{k-g} = \frac{D_{2010}(1+g)}{k-g} = \frac{.85 \times 1.0975}{k - .0975}$$

The only variable remaining to be determined to calculate intrinsic value is the market capitalization rate, k.

One way to obtain k is from the CAPM. Observe from the Value Line data that Honda's beta is .80. The risk-free rate on longer term bonds in 2007 was about 5%. Suppose that the

[4]Because Honda is a Japanese firm, Americans would hold its shares via ADRs, or American Depository Receipts. ADRs are not shares of the firm, but are *claims* to shares of the underlying foreign stock that are then traded in U.S. security markets. Value Line notes that each Honda ADR is a claim on one common share, but in other cases, each ADR may represent a claim to either multiple shares, or even fractional shares.

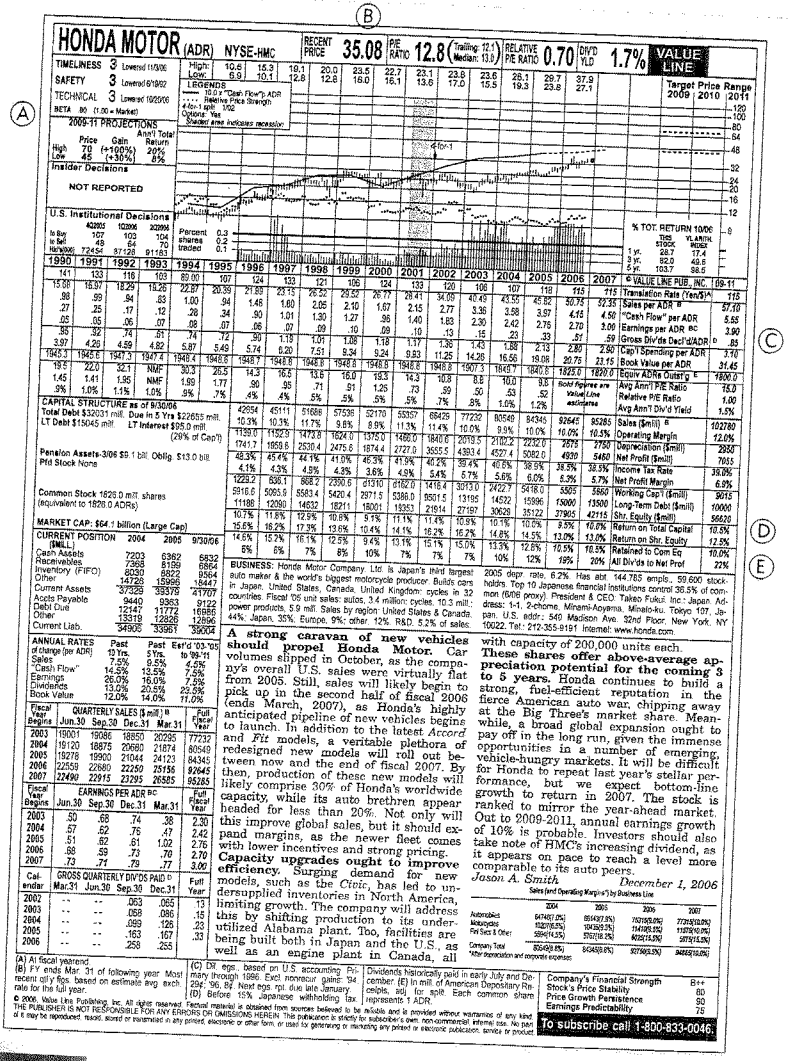


FIGURE 13.2
Value Line Investment Survey report on Hondo Motor Co.

Source: *From Value Line Investment Survey*, December 1, 2006. Reprinted with permission of Value Line Investment Survey. © 2006 Value Line Publishing, Inc. All rights reserved.

market risk premium were forecast at 8%, roughly in line with its historical average. This would imply that the forecast for the market return was

$$\text{Risk-free rate} + \text{Market risk premium} = 5\% + 8\% = 13\%$$

Therefore, we can solve for the market capitalization rate for Honda as

$$\begin{aligned} k &= r_f + \beta[E(r_M) - r_f] \\ &= 5\% + .80\ (13 - 5) = 11.4\% \end{aligned}$$

Our forecast for the stock price in 2010 is thus

$$P_{2010} = \frac{\$.85 \times 1.0975}{.114 - .0975} = \$56.54$$

and today's estimate of intrinsic value is

$$V_{2006} = \frac{.59}{1.114} + \frac{.67}{(1.114)^2} + \frac{.76}{(1.114)^3} + \frac{.85 + 56.54}{(1.114)^4} = \$38.88$$

We know from the Value Line report that Honda's actual price was $35.08 (at the circled B). Our intrinsic value analysis indicates Honda was underpriced by about 9%. Should we increase our holdings of Honda stock?

Perhaps. But before betting the farm, stop to consider how much confidence you should place in this estimate. We've had to guess at dividends in the near future, the ultimate growth rate of those dividends, and the appropriate discount rate. Moreover, we've assumed Honda will follow a relatively simple two-stage growth process. In practice, the growth of dividends can follow more complicated patterns. Even small errors in these approximations could upset a conclusion.

For example, we saw in Chapter 7 that betas are typically estimated with considerable imprecision. Suppose that Honda's beta is actually .9 rather than .8. Then its risk premium will be larger, and its market capitalization rate will be 12.2%. At this higher capitalization rate, the intrinsic value of the firm based on the two-stage model falls to $26.16, which is considerably *less* than its recent stock price. Our conclusion regarding mispricing is reversed.

The exercise highlights the importance of assessing the sensitivity of your analysis to changes in underlying assumptions when you attempt to value stocks. Your estimates of stock values are no better than your assumptions. Sensitivity analysis will highlight the inputs that need to be most carefully examined. For example, we just found that changes in the estimated risk premium of the stock result in big changes in intrinsic value. Similarly, small changes in the assumed growth rate change intrinsic value substantially. On the other hand, reasonable changes in the dividends forecast between 2007 and 2010 have a small impact on intrinsic value.

CONCEPT check 13.4 Confirm that the intrinsic value of Honda using the same data as in our example, but assuming its beta is .9, is $26.16. (*Hint:* First calculate the discount rate and stock price in 2010. Then calculate the present value of all interim dividends plus the present value of the 2010 sales price.)

Multistage Growth Models

The two-stage growth model that we just considered for Honda is a good start toward realism, but clearly we could do even better if our valuation model allowed for more flexible patterns of growth. Multistage growth models allow dividends per share to grow at several different

SPREADSHEET 13.1
A three-stage growth model for Honda

	A	B	C	D	E	F	G	H	I
1	Inputs			Year	Dividend	Div growth	Term value	Investor CF	
2	beta	0.8		2007	0.59			0.59	
3	mkt_prem	0.08		2008	0.68			0.68	
4	rf	0.05		2009	0.76			0.76	
5	k_equity	0.114		2010	0.85			0.85	
6	plowback	0.78		2011	0.96	0.1300		0.96	
7	roe	0.125		2012	1.08	0.1268		1.08	
8	term_gwth	0.0975		2013	1.22	0.1235		1.22	
9				2014	1.36	0.1203		1.36	
10				2015	1.52	0.1170		1.52	
11				2016	1.69	0.1138		1.69	
12	Value line			2017	1.88	0.1105		1.88	
13	forecasts of			2018	2.08	0.1073		2.08	
14	annual dividends			2019	2.30	0.1040		2.30	
15				2020	2.53	0.1008		2.53	
16				2021	2.78	0.0975		2.78	
17	Transitional period			2022	3.05	0.0975	202.86	205.91	
18	with slowing dividend								
19	growth							45.02	= PV of CF
20		Beginning of constant				E17 * (1+ F17)/(B5 – F17)			
21		growth period						NPV(B5,H2:H17)	

rates as the firm matures. Many analysts use three-stage growth models. They may assume an initial period of high dividend growth (or instead make year-by-year forecasts of dividends for the short term), a final period of sustainable growth, and a transition period in between, during which dividend growth rates taper off from the initial rapid rate to the ultimate sustainable rate. These models are conceptually no harder to work with than a two-stage model, but they require many more calculations and can be tedious to do by hand. It is easy, however, to build an Excel spreadsheet for such a model.

Spreadsheet 13.1 is an example of such a model. Column B contains the inputs we have used so far for Honda. Column E contains dividend forecasts. In cells E2 through E5 we present the Value Line estimates for the next four years. Dividend growth in this period is rapid, about 13% annually. Rather than assume a sudden transition to constant dividend growth starting in 2010, we assume instead that the dividend growth rate in 2010 will be 13%, and that it will decline linearly through 2021 (see column F), finally reaching the constant terminal growth rate of 9.75% in 2021. Each dividend in the transition period is the previous year's dividend times that year's growth rate. Terminal value once the firm enters a constant growth stage (cell G17) is computed from the constant-growth DDM. Finally, investor cash flow in each period (column H) equals dividends in each year plus the terminal value in 2022. The present value of these cash flows is computed in cell H19 as $45.02, well above the value we found in the two-stage model. We obtain a greater intrinsic value in this case because we assume that dividend growth only gradually declines to its steady-state value.

13.4 PRICE–EARNINGS RATIOS

The Price–Earnings Ratio and Growth Opportunities

price–earnings multiple
The ratio of a stock's price to its earnings per share.

Much of the real-world discussion of stock market valuation concentrates on the firm's price–earnings multiple, the ratio of price per share to earnings per share, commonly called the P/E ratio. In fact, one common approach to valuing a firm is to use an earnings multiplier. The value of the stock is obtained by multiplying projected earnings per share by a forecast of the P/E ratio. This procedure seems simple, but its apparent simplicity is deceptive. First, forecasting earnings is challenging. As we saw in the previous chapter, earnings will depend on international, macroeconomic, and industry as well as firm-specific factors, many of which

are highly unpredictable. Second, forecasting the P/E multiple is even more difficult. P/E ratios vary across industries and over time. Nevertheless, our discussion of stock valuation provides some insight into the factors that ought to determine a firm's P/E ratio.

Recall our discussion of growth opportunities, in which we compared two firms, Growth Prospects and Cash Cow, each of which had earnings per share of \$5. Growth Prospects reinvested 60% of its earnings in prospects with an ROE of 15%, while Cash Cow paid out all of its earnings as dividends. Cash Cow had a price of \$40, giving it a P/E multiple of 40/5 = 8.0, while Growth Prospects sold for \$57.14, giving it a multiple of 57.14/5 = 11.4. This observation suggests the P/E ratio might serve as a useful indicator of expectations of growth opportunities. We can see this explicitly by rearranging Equation 13.6 to

$$\frac{P_0}{E_1} = \frac{1}{k}\left[1 + \frac{\text{PVGO}}{E_1/k}\right] \tag{13.7}$$

When PVGO = 0, Equation 13.7 shows that $P_0 = E_1/k$. The stock is valued like a nongrowing perpetuity of EPS_1. The P/E ratio is just $1/k$. However, as PVGO becomes an increasingly dominant contributor to price, the P/E ratio can rise dramatically. The ratio of PVGO to E/k has a simple interpretation. It is the ratio of the component of firm value reflecting growth opportunities to the component of value reflecting assets already in place (i.e., the no-growth value of the firm, E/k). When future growth opportunities dominate the estimate of total value, the firm will command a high price relative to current earnings. Thus, a high P/E multiple appears to indicate that a firm is endowed with ample growth opportunities.

EXAMPLE 13.5

P/E Ratios and Growth Opportunities

Return again to Takeover Target, the firm we first encountered in Example 13.4. Earnings are \$5 per share, and the capitalization rate is 15%, implying that the no-growth value of the firm is E_1/k = \$5/.15 = \$33.33. The stock price actually is \$22.22, implying that the present value of growth opportunities equals −\$11.11. This implies that the P/E ratio should be

$$\frac{P_0}{E_1} = \frac{1}{k}\left[1 + \frac{\text{PVGO}}{E/k}\right] = \frac{1}{.15}\left[1 + \frac{-\$11.11}{\$33.3}\right] = 4.44$$

In fact, the stock price is \$22.22 and earnings are \$5 per share, so the P/E ratio is \$22.22/\$5 = 4.44.

Let's see if P/E multiples do vary with growth prospects. Between 1988 and 2006, for example, Limited Brands' P/E ratio averaged about 18.4 while Consolidated Edison's average P/E was only 12.3. These numbers do not necessarily imply that Limited was overpriced compared to Con Ed. If investors believed Limited would grow faster than Con Ed, the higher price per dollar would be justified. That is, investors might well pay a higher price per dollar of *current earnings* if they expect that earnings stream to grow more rapidly. In fact Limited's growth rate has been consistent with its higher P/E multiple. In this period, its earnings per share grew fivefold, while Con Ed's earnings grew by only 13%. Figure 13.4 (on page 424) shows the EPS history of the two companies.

Clearly, it is differences in expected growth opportunities that justify particular differentials in P/E ratios across firms. The P/E ratio is in large part a reflection of the market's optimism concerning a firm's growth prospects. In their use of a P/E ratio, analysts must decide whether they are more or less optimistic than the market. If they are more optimistic, they will recommend buying the stock.

There is a way to make these insights more precise. Look again at the constant growth DDM formula, $P_0 = D_1/(k - g)$. Now recall that dividends equal the earnings that are *not* reinvested in the firm: $D_1 = E_1(1 - b)$. Recall also that $g = \text{ROE} \times b$. Hence, substituting for D_1 and g, we find that

$$P_0 = \frac{E_1(1 - b)}{k - (\text{ROE} \times b)}$$

implying that the P/E ratio for a firm growing at a long-run sustainable pace is

$$\frac{P_0}{E_1} = \frac{1 - b}{k - (\text{ROE} \times b)} \tag{13.8}$$

It is easy to verify that the P/E ratio increases with ROE. This makes sense, because high ROE projects give the firm good opportunities for growth.[5] We also can verify that the P/E ratio increases for higher plowback, b, as long as ROE exceeds k. This too makes sense. When a firm has good investment opportunities, the market will reward it with a higher P/E multiple if it exploits those opportunities more aggressively by plowing back more earnings into those opportunities.

Remember, however, that growth is not desirable for its own sake. Examine Table 13.3, where we use Equation 13.8 to compute both growth rates and P/E ratios for different combinations of ROE and b. While growth always increases with the plowback ratio (move across the rows in Panel A of Table 13.3), the P/E ratio does not (move across the rows in Panel B). In the top row of Table 13.3B, the P/E falls as the plowback rate increases. In the middle row, it is unaffected by plowback. In the third row, it increases.

This pattern has a simple interpretation. When the expected ROE is less than the required return, k, investors prefer that the firm pay out earnings as dividends rather than reinvest earnings in the firm at an inadequate rate of return. That is, for ROE lower than k, the value of the firm falls as plowback increases. Conversely, when ROE exceeds k, the firm offers superior investment opportunities, so the value of the firm is enhanced as those opportunities are more fully exploited by increasing the plowback ratio.

Finally, where ROE just equals k, the firm offers "break-even" investment opportunities with a fair rate of return. In this case, investors are indifferent between reinvestment of earnings in the firm or elsewhere at the market capitalization rate, because the rate of return in either case is 12%. Therefore, the stock price is unaffected by the plowback ratio.

One way to summarize these relationships is to say the higher the plowback ratio, the higher the growth rate, but a higher plowback ratio does not necessarily mean a higher P/E ratio. A higher plowback ratio increases P/E only if investments undertaken by the firm offer an expected rate of return higher than the market capitalization rate. Otherwise, higher plowback hurts investors because it means more money is sunk into prospects with inadequate rates of return.

TABLE 13.3 Effect of ROE and plowback on growth and the P/E ratio

ROE	Plowback Ratio (b) = 0	0.25	0.50	0.75
	A. Growth Rate, g			
10%	0%	2.5%	5.0%	7.5%
12	0	3.0	6.0	9.0
14	0	3.5	7.0	10.5
	B. P/E Ratio			
10%	8.33	7.89	7.14	5.56
12	8.33	8.33	8.33	8.33
14	8.33	8.82	10.00	16.67

Note: Assumption: k = 12% per year.

[5]Note that Equation 13.8 is a simple rearrangement of the DDM formula, with ROE × b = g. Because that formula requires that $g < k$, Equation 13.8 is valid only when ROE × $b < k$.

PEG ratio

Ratio of P/E multiple to earnings growth rate.

Notwithstanding these fine points, P/E ratios commonly are taken as proxies for the expected growth in dividends or earnings. In fact, a common Wall Street rule of thumb is that the growth rate ought to be roughly equal to the P/E ratio. In other words, the ratio of P/E to g, often called the **PEG ratio,** should be about 1.0. Peter Lynch, the famous portfolio manager, puts it this way in his book *One Up on Wall Street:*

> The P/E ratio of any company that's fairly priced will equal its growth rate. I'm talking here about growth rate of earnings. . . . If the P/E ratio of Coca-Cola is 15, you'd expect the company to be growing at about 15% per year, etc. But if the P/E ratio is less than the growth rate, you may have found yourself a bargain.

Let's try his rule of thumb.

EXAMPLE 13.6

P/E Ratio versus Growth Rate

Assume:

r_f = 8% (about the value when Peter Lynch was writing)

$r_M - r_f$ = 8% (about the historical average market risk premium)

b = 0.4 (a typical value for the plowback ratio in the U.S.)

Therefore, r_M = r_f + Market risk premium = 8% + 8% = 16%, and k = 16% for an average (β = 1) company. If we also accept as reasonable that ROE = 16% (the same value as the expected return on the stock) we conclude that

$$g = \text{ROE} \times b = 16\% \times .4 = 6.4\%$$

and

$$\text{P/E} = \frac{1 - .4}{.16 - .064} = 6.26$$

Thus the P/E ratio and g are about equal using these assumptions, consistent with the rule of thumb. However, note that this rule of thumb, like almost all others, will not work in all circumstances. For example, the value of r_f today is more like 5%, so a comparable forecast of r_M today would be:

$$r_f + \text{Market risk premium} = 5\% + 8\% = 13\%$$

If we continue to focus on a firm with β = 1, and ROE still is about the same as k, then

$$g = 13\% \times .4 = 5.2\%$$

while

$$\text{P/E} = \frac{1 - .4}{.13 - .052} = 7.69$$

The P/E ratio and g now diverge and the PEG ratio is now 1.5. Nevertheless, lower-than-average PEG ratios are still widely seen as signalling potential underpricing.

Whatever its shortcomings, the PEG ratio is widely followed. The PEG ratio for the S&P over the last 20 years typically has fluctuated within the range between 1.0 and 1.5.

CONCEPT check 13.5

ABC stock has an expected ROE of 12% per year, expected earnings per share of $2, and expected dividends of $1.50 per share. Its market capitalization rate is 10% per year.

a. What are its expected growth rate, its price, and its P/E ratio?

b. If the plowback rate were 0.4, what would be the firm's expected dividend per share, growth rate, price, P/E, and PEG ratio?

On the MARKET FRONT

GURGLE

Google's share price peaked at $475, on January 11th. After slipping during the rest of the month, the price plunged to $343 on February 14th. In barely a month, some $38 billion has been wiped off the firm's market capitalization. Is there a good reason for this?

A serious debate about how to value Internet shares is long overdue. Since the disappointing months after Google's initial public offering in August 2004, when the shares appeared to have been overpriced at $85, they had risen inexorably. Yet some bulls think there remains plenty of upside: Mark Stahlman of Caris & Co, a brokerage firm, has $2,000 as a long-term target, on the assumption that Google eventually wins a 1% share of the global digital-services business.

Mary Meeker of Morgan Stanley is keen to be seen as prudent in her bullishness. Yet like most of her peers, she thinks the shares are worth more than $400. Discounting expected cash flow for the coming ten years, she calculates a fair price of $413. Using other valuation techniques, she gets as high as $597. But these valuations all rely on Google delivering the now expected future performance—which, as is clear from its current high ratio of share price to profits of 68 (compared with an average of 18 for the S&P 500), means spectacular growth. Whether it will achieve this growth is frankly anyone's guess, especially given how rapidly its market is evolving—a risk factor that surely argues for a far larger discount rate to be applied to future cash flow than the 11.5% in the Meeker model.

On the other hand, as Ms. Meeker points out, Google has so far consistently beaten her forecasts, both for revenues and for profit margins. Strikingly, just after Google went public, she predicted that it would generate revenues of $7 per user in 2005, up from $2 in 2002. In fact, it generated $10 per user—a number that, she plausibly argues, can be greatly improved on as ever more advertising dollars shift to new media from old.

SOURCE: *The Economist*, February 16, 2006.

The importance of growth opportunities is nowhere more evident than in the Internet boom of the late 1990s. Many companies that had yet to turn a profit were valued by the market at billions of dollars. The value of these companies was *exclusively* growth opportunities. For example, the online broker E-Trade, with *no* earnings in 1998, had a stock market value of $10 billion, while a traditional brokerage firm, Paine Webber, had 1998 earnings of $473 million but a market value of only $6.2 billion. Similarly, the online auction firm eBay had 1998 profits of $2.4 million, far less than the $45 million profit earned by the traditional auctioneer Sotheby's; yet eBay's market value was more than 10 times greater: $22 billion versus $1.9 billion. (As it turns out, the market was quite right to value eBay so much more aggressively than Sotheby's. By 2006, its net income was over $1 billion, more than 15 times that of Sotheby's, and still growing.)

Of course, when company valuation is determined primarily by growth opportunities, those values can be very sensitive to reassessments of such prospects. When the market became more skeptical of the business prospects of most Internet retailers at the close of the 1990s, that is, as it revised the estimates of growth opportunities downward, their stock prices plummeted.

The nearby box is an analysis of the fair price for Google. The box highlights the importance of growth prospects for the valuation analysis. As perceptions of Google's future prospects have waxed and waned, its share price has swung wildly. The box illustrates how hard it is to quantify growth prospects; ultimately however, those prospects drive the value of the most dynamic firms in the economy.

P/E Ratios and Stock Risk

One important implication of any stock valuation model is that (holding all else equal) riskier stocks will have lower P/E multiples. We can see this quite easily in the context of the constant growth model by examining the formula for the P/E ratio (Equation 13.8):

$$\frac{P}{E} = \frac{1 - b}{k - g}$$

Riskier firms will have higher required rates of return (i.e., higher values of k). Therefore, their P/E multiples will be lower. This is true even outside the context of the constant growth

model. For *any* expected earnings and dividend stream, the present value of those cash flows will be lower when the stream is perceived to be riskier. Hence the stock price and the ratio of price to earnings will be lower.

Of course, if you scan *The Wall Street Journal,* you will observe many small, risky, start-up companies with very high P/E multiples. This does not contradict our claim that P/E multiples should fall with risk: Instead, it is evidence of the market's expectations of high growth rates for those companies. This is why we said that high risk firms will have lower P/E ratios *holding all else equal.* Given a growth projection, the P/E multiple will be lower when risk is perceived to be higher.

Pitfalls in P/E Analysis

No description of P/E analysis is complete without mentioning some of its pitfalls. First, consider that the denominator in the P/E ratio is accounting earnings, which are influenced by somewhat arbitrary accounting rules such as the use of historical cost in depreciation and inventory valuation. In times of high inflation, historic cost depreciation and inventory costs will tend to underrepresent true economic values because the replacement cost of both goods and capital equipment will rise with the general level of prices. As Figure 13.3 demonstrates, P/E ratios have tended to be lower when inflation has been higher. This reflects the market's assessment that earnings in these periods are of "lower quality," artificially distorted by inflation, and warranting lower P/E ratios.

earnings management

The practice of using flexibility in accounting rules to improve the apparent profitability of the firm.

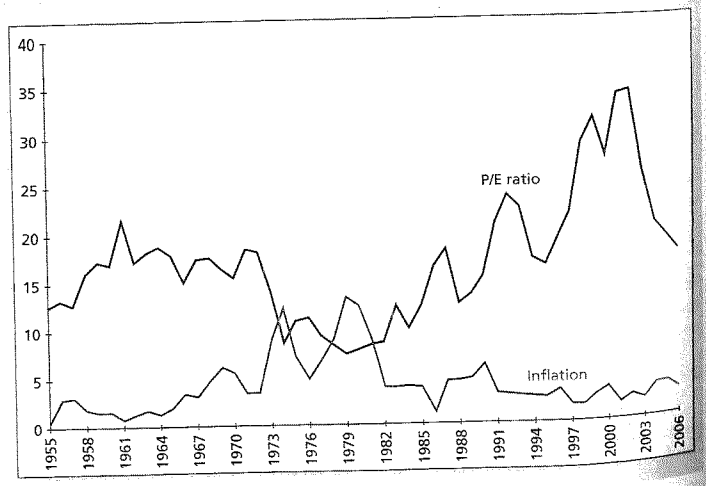
Earnings management is the practice of using flexibility in accounting rules to improve the apparent profitability of the firm. We will have much to say on this topic in the next chapter on interpreting financial statements. A version of earnings management that became common in recent years was the reporting of "pro forma earnings" measures. These measures are sometimes called *operating earnings,* a term with no precise generally accepted definition.

Pro forma earnings are calculated ignoring certain expenses, for example, restructuring charges, stock-option expenses, or write-downs of assets from continuing operations. Firms argue that ignoring these expenses gives a clearer picture of the underlying profitability of the firm.

But when there is too much leeway for choosing what to exclude it becomes hard for investors or analysts to interpret the numbers or to compare them across firms. The lack of standards gives firms considerable leeway to manage earnings.

FIGURE 13.3

P/E ratio of the S&P 500 Index and inflation



Even GAAP allows firms considerable discretion to manage earnings. For example, in the late 1990s, Kellogg took restructuring charges, which are supposed to be one-time events, nine quarters in a row. Were these really one-time events, or were they more appropriately treated as ordinary expenses? Given the available leeway in reporting earnings, the justified P/E multiple becomes difficult to gauge.

In the wake of the accounting questions raised by the Enron, WorldCom, and Global Crossing bankruptcies, there is a new focus on transparency in accounting statements. In 2003, the SEC adopted Regulation G, which requires public companies that report non-GAAP financial measures to present with those measures both the most directly comparable GAAP measure as well as a reconciliation of those measures with the comparable GAAP figure. The motivation is to ensure that investors receive sufficient information to evaluate the true import of financial statistics even when those statistics are computed out of compliance with GAAP.

Another confounding factor in the use of P/E ratios is related to the business cycle. We were careful in deriving the DDM to define earnings as being net of *economic* depreciation, that is, the maximum flow of income that the firm could pay out without depleting its productive capacity. And reported earnings, as we note above, are computed in accordance with generally accepted accounting principles and need not correspond to economic earnings. Beyond this, however, notions of a normal or justified P/E ratio, as in Equation 13.7 or 13.8, assume implicitly that earnings rise at a constant rate, or, put another way, on a smooth trend line. In contrast, reported earnings can fluctuate dramatically around a trend line over the course of the business cycle.

Another way to make this point is to note that the "normal" P/E ratio predicted by Equation 13.8 is the ratio of today's price to the trend value of future earnings, E_1. The P/E ratio reported in the financial pages of the newspaper, by contrast, is the ratio of price to the most recent *past* accounting earnings. Current accounting earnings can differ considerably from future economic earnings. Because ownership of stock conveys the right to future as well as current earnings, the ratio of price to most recent earnings can vary substantially over the business cycle, as accounting earnings and the trend value of economic earnings diverge by greater and lesser amounts.

As an example, Figure 13.4 graphs the earnings per share of Limited Brands and Consolidated Edison since 1988. Note that Limited's EPS fluctuate around its trend line considerably. This reflects the company's higher sensitivity to macroeconomic conditions. Value Line

WEB *master*

Stock Valuation

The actually expected return on a stock based on estimates of future dividends and future price can be compared to the "required" or equilibrium return given its risk. If the expected return is greater than the required return, the stock may be an attractive investment.

1. First calculate the expected holding period return (HPR) on Target Corporation's stock based on its current price, its expected price, and its expected dividend.
   a. Go to **moneycentral.msn.com/investor/home.asp** and link to the Stock Research Wizard. Enter TGT to find information about Target Corporation. Find the average estimated target price for the next fiscal year.
   b. Click on the "Company Report" link and collect information about today's price and the dividend rate. Calculate the company's expected dividend in dollars for the next fiscal year.
   c. Use these inputs to calculate Target's expected HPR for the next year.
2. Calculate the required return based on the Capital Asset Pricing Model (CAPM).
   a. Use a risk-free rate from **moneycentral.msn.com/investor/market/treasuries.aspx**
   b. Use the beta coefficient shown in Target's Company Report.
   c. Calculate the historical return on a broad-based market index of your choice. You may use any time period that you deem appropriate. Your goal is to derive an estimate of the expected return on the market index for the coming year.
   d. Use the data you've collected as inputs for the CAPM to find the required rate of return for Target Corporation.
3. Compare the expected HPR you calculated in Part 1 to the required CAPM return you calculated in Part 2. What is your best judgment about the stock's current status—do you think it is selling at an appropriate price?

FIGURE 13.4
Earnings growth for two companies

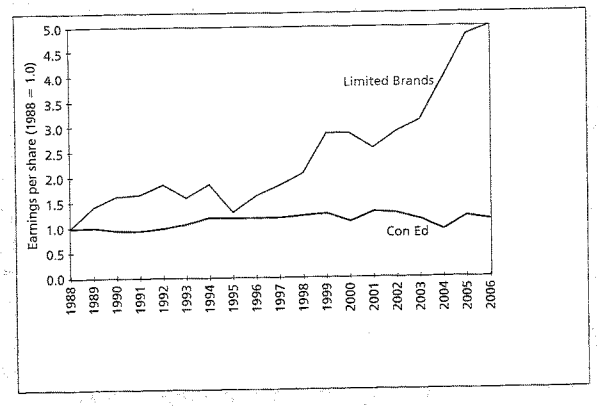
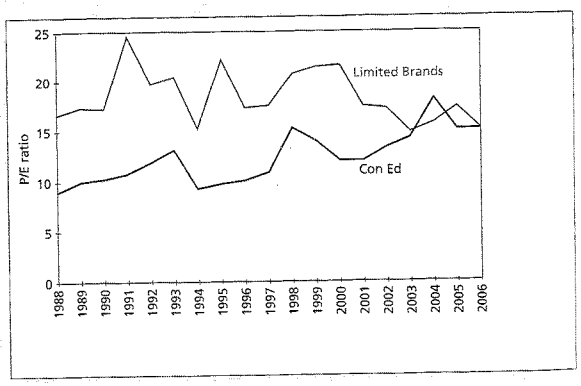


FIGURE 13.5
Price–earnings ratios



estimates its beta at 1.15. Con Ed, by contrast, shows much less variation in earnings per share around a smoother and flatter trend line. Its beta was only 0.75.

Because the market values the entire stream of future dividends generated by the company, when earnings are temporarily depressed, the P/E ratio should tend to be high—that is, the denominator of the ratio responds more sensitively to the business cycle than the numerator. This pattern is borne out well.

Figure 13.5 graphs the P/E ratios of the two firms. Limited, with the more volatile earnings profile, also has a more volatile P/E profile. For example, in 1995, when its earnings fell below the trend line (Figure 13.4), the P/E ratio correspondingly jumped (Figure 13.5). The market clearly recognized that earnings were depressed only temporarily. Similarly, the only year in which Con Ed's P/E ratio exceeded Limited's was in 2004, one of the rare years in which Con Ed's earnings fell below its trend line to a meaningful degree.

This example shows why analysts must be careful in using P/E ratios. There is no way to say a P/E ratio is overly high or low without referring to the company's long-run growth prospects, as well as to current earnings per share relative to the long-run trend line.

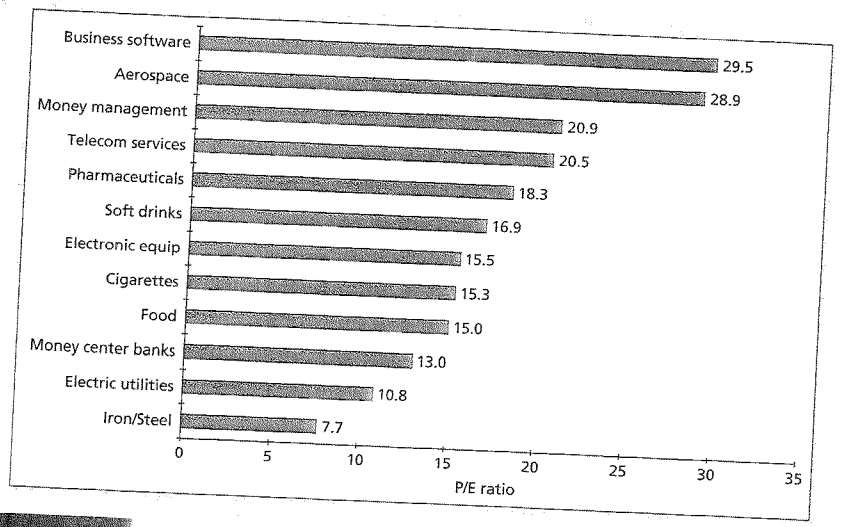


FIGURE 13.6
P/E ratios

Source: Yahoo! Finance, February 6, 2007. Reproduced with permission of Yahoo! Inc. © 2007 by Yahoo! Inc. Yahoo! and the Yahoo! logo are trademarks of Yahoo! Inc.

Nevertheless, Figures 13.4 and 13.5 demonstrate a clear relationship between P/E ratios and growth. Despite considerable short-run fluctuations, Limited's EPS clearly trended upward over the period. Its compound rate of growth in the 1988–2006 period was 9.4%. Con Edison's earnings grew far less rapidly, with a compound growth rate of 0.7%. The growth prospects of Limited are reflected in its consistently higher P/E multiple.

This analysis suggests that P/E ratios should vary across industries and, in fact, they do. Figure 13.6 shows P/E ratios for a sample of industries. Notice that the industries with the highest multiples—business software and aerospace—have attractive investment opportunities and relatively high growth rates, whereas the industries with the lowest multiples—electric utilities and iron/steel manufacturers—are in more mature industries with limited growth prospects. The relationship between P/E and growth is not perfect, which is not surprising in light of the pitfalls discussed in this section, but it is clear that as a general rule, the P/E multiple tracks growth opportunities.

Combining P/E Analysis and the DDM

Some analysts use P/E ratios in conjunction with earnings forecasts to estimate the price of stock at an investor's horizon date. The Honda analysis in Figure 13.2 shows that Value Line forecasted a P/E ratio for 2010 of 15. EPS for 2010 were forecast at $3.90, implying a price in 2010 of $15 \times \$3.90 = \$58.50$. Given an estimate of $58.50 for the 2010 sales price, we would compute Honda's intrinsic value as

$$V_{2006} = \frac{.59}{(1.114)} + \frac{.67}{(1.114)^2} + \frac{.76}{(1.114)^3} + \frac{.85 + \$58.50}{(1.114)^4} = \$40.16$$

Other Comparative Valuation Ratios

The price–earnings ratio is an example of a comparative valuation ratio. Such ratios are used to assess the valuation of one firm versus another based on a fundamental indicator such as earnings. For example, an analyst might compare the P/E ratios of two firms in the same industry to test whether the market is valuing one firm "more aggressively" than the other. Other such comparative ratios are commonly used.

Price-to-book ratio This is the ratio of price per share divided by book value per share. As we noted earlier in this chapter, some analysts view book as a useful measure of value and therefore treat the ratio of price-to-book value as an indicator of how aggressively the market values the firm.

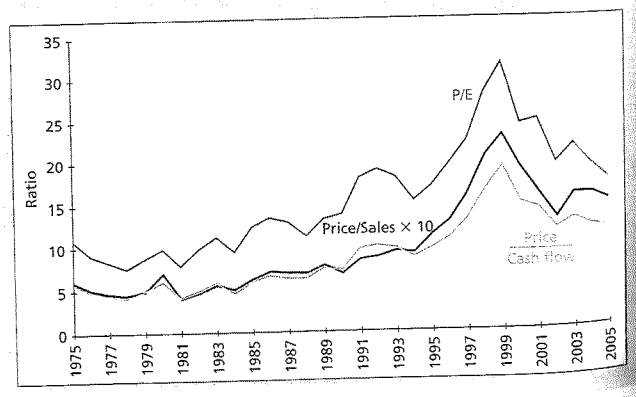
Price-to-cash flow ratio Earnings as reported on the income statement can be affected by the company's choice of accounting practices and thus are commonly viewed as subject to some imprecision and even manipulation. In contrast, cash flow—which tracks cash actually flowing into or out of the firm—is less affected by accounting decisions. As a result, some analysts prefer to use the ratio of price to cash flow per share rather than price to earnings per share. Some analysts use operating cash flow when calculating this ratio; others prefer free cash flow, that is, operating cash flow net of new investment.

Price-to-sales ratio Many start-up firms have no earnings. As a result, the P/E ratio for these firms is meaningless. The price-to-sales ratio (the ratio of stock price to the annual sales per share) is sometimes taken as a valuation benchmark for these firms. Of course, price-to-sales ratios can vary markedly across industries, since profit margins vary widely.

Figure 13.7 presents the behavior of these valuation measures for the S&P 500. While the levels of these ratios differ considerably, for the most part they track each other fairly closely, with upturns and downturns at the same times.

Be creative Sometimes a standard valuation ratio will simply not be available, and you will have to devise your own. In the 1990s, some analysts valued retail Internet firms based on the number of Web hits their sites received. In retrospect, they valued these firms using too generous "price-to-hits" ratios. Nevertheless, in a new investment environment, these analysts used the information available to them to devise the best valuation tools they could.

FIGURE 13.7
Valuation ratios for the S&P 500



13.5 FREE CASH FLOW VALUATION APPROACHES

An alternative approach to the dividend discount model values the firm using free cash flow, that is, cash flow available to the firm or the equity holders net of capital expenditures. This approach is particularly useful for firms that pay no dividends, for which the dividend discount model would be difficult to implement. But free cash flow models are valid for any firm, and can provide useful insights about firm value beyond the DDM.

One approach is to discount the *free cash flow* for the *firm* (FCFF) at the weighted-average cost of capital to obtain the value of the firm, and then subtract the then-existing value of debt to find the value of equity. Another is to focus from the start on the free cash flow to *equity holders* (FCFE), discounting those directly at the cost of equity to obtain the market value of equity.

The free cash flow to the firm is given as follows:

$$\text{FCFF} = \text{EBIT}(1 - t_c) + \text{Depreciation} - \text{Capital expenditures} - \text{Increase in NWC} \quad \textbf{(13.9)}$$

where

EBIT = earnings before interest and taxes
t_c = the corporate tax rate
NWC = net working capital

This is the cash flow that accrues from the firm's operations, net of investments in capital and net working capital. It includes cash flows available to both debt and equity holders.[6]

Alternatively, we can focus on cash flow available to equity holders. This will differ from free cash flow to the firm by after-tax interest expenditures, as well as by cash flow associated with net issuance or repurchase of debt (i.e., principal repayments minus proceeds from issuance of new debt).

$$\text{FCFE} = \text{FCFF} - \text{Interest expense} \times (1 - t_c) + \text{Increases in net debt} \quad \textbf{(13.10)}$$

The free cash flow to the firm approach discounts year-by-year cash flows plus some estimate of terminal value, P_T. In Equation 13.11,we use the constant growth model to estimate terminal value. The appropriate discount rate is the weighted average cost of capital.

$$\text{Firm value} = \sum_{t=1}^{T} \frac{1 + \text{FCFF}_t}{(1 + \text{WACC})^t} + \frac{P_T}{(1 + \text{WACC})^T} \quad \textbf{(13.11)}$$

where

$$P_T = \frac{\text{FCFF}_{T+1}}{\text{WACC} - g}$$

To find equity value, we subtract the existing market value of debt from the derived value of the firm.

Alternatively, we can discount free cash flows to *equity* (FCFE) at the cost of *equity*, k_E,

$$\text{Market value of equity} = \sum_{t=1}^{T} \frac{\text{FCFE}_t}{(1 + k_E)^t} + \frac{P_T}{(1 + k_E)^T} \quad \textbf{(13.12)}$$

where

$$P_T = \frac{\text{FCFE}_{T+1}}{k_E - g}$$

[6]This is firm cash flow assuming all-equity financing. Any tax advantage to debt financing is recognized by using an after-tax cost of debt in the computation of weighted average cost of capital. This issue is discussed in any introductory corporate finance text.

SPREADSHEET 13.2

Free cash flow valuation of Honda

eXcel

Please visit us at www.mhhe.com/bkm

	A	B	C	D	E	F	G	H	I	J	K	L	M
1			2006	2007	2008	2009	2010						
2	**A. Value Line data**												
3	P/E		9.80	11.10	12.40	13.70	15.00						
4	Cap spending/shr		2.80	2.90	2.97	3.03	3.10						
5	LT Debt		15000	13500	12333	11167	10000						
6	Shares		1825	1820	1813	1807	1800						
7	EPS		2.70	3.00	3.30	3.60	3.90						
8	Working Capital		5505	5660	6778	7897	9015						
9													
10	**B. Cash flow calculations**												
11	Profits (after tax)		4930.0	5460.0	5991.7	6523.3	7055.0						
12	Interest (after tax)		503.3	452.8	413.8	374.6	335.5	= r_debt × (1-tax) × LT Debt					
13	Chg Working Cap			155.0	1118.3	1118.3	1118.3						
14	Depreciation			2675.0	2750.0	2858.3	2950.0						
15	Cap Spending			5278.0	5378.7	5479.3	5580.0						
16								Terminal value					
17	FCFF			3154.9	2658.5	3158.6	3642.2	127451.8					
18	FCFE			1202.0	1078.0	1617.3	2140.0	116148.0		assumes fixed debt ratio after 2010			
19													
20	**C. Discount rate calculations**									from Value Line			
21	Current beta	0.8								current beta /[1 + (1-tax)*debt/equity)]			
22	Unlevered beta	0.673											
23	Terminal growth	0.07								from Value Line			
24	tax_rate	0.39								YTM in 2007 on A rated LT debt			
25	r_debt	0.055											
26	risk-free rate	0.05											
27	market risk prem	0.08								Row 3 × Row 11			
28	MV equity		48314	60606	74297	89370	105825			Row 5 / (Row 5 + Row 28)			
29	Debt/Value		0.24	0.18	0.14	0.11	0.09			unlevered beta × [1 + (1-tax)*debt/equity]			
30	Levered beta		0.800	0.764	0.741	0.724	0.711			from CAPM and levered beta			
31	k_equity		0.114	0.111	0.109	0.108	0.107	0.107		(1-t)*r_debt*D/V + k_equity*(1-D/V)			
32	WACC		0.095	0.097	0.098	0.100	0.101	0.101		Discount each year at WACC			
33	PV factor for FCFF		1.000	0.912	0.830	0.755	0.686	0.686		Discount each year at k_equity			
34	PV factor for FCFE		1.000	0.900	0.811	0.732	0.662	0.662					
35										Intrinsic val	Equity val	Intrin/share	
36	**D. Present values**									97356	82356	45.13	
37	PV(FCFF)			2876	2206	2384	2497	87393		81399	81399	44.60	
38	PV(FCFE)			1082	875	1184	1416	76842					

As in the dividend discount model, free cash flow models use a terminal value to avoid adding the present values of an infinite sum of cash flows. That terminal value may simply be the present value of a constant-growth perpetuity (as in the formulas above) or it may be based on a multiple of EBIT, book value, earnings, or free cash flow. As a general rule, estimates of intrinsic value depend critically on terminal value.

Spreadsheet 13.2 presents a free cash flow valuation of Honda using the data supplied by Value Line in Figure 13.2. We start with the free cash flow to the firm approach given in Equation 13.9. Panel A of the spreadsheet lays out values supplied by Value Line. (Entries for middle years are interpolated from beginning and final values.) Panel B calculates free cash flow. The sum of after-tax profits in row 11 plus after-tax interest payments in row 12 [that is, interest expense $\times (1 - t_c)$] equals EBIT$(1 - t_c)$. In row 13 we subtract the change in net working capital, in row 14 we add back depreciation, and in row 15 we subtract capital expenditures. The result in row 17 is the free cash flow to the firm, FCFF, for each year between 2007 and 2010.

To find the present value of these cash flows, we will discount at WACC, which is calculated in panel C. WACC is the weighted average of the after-tax cost of debt and the cost of equity in each year. When computing WACC, we must account for the change in leverage forecasted by Value Line. To compute the cost of equity, we will use the CAPM as in our

earlier (dividend discount model) valuation exercise, but account for the fact that equity beta will decline each year as the firm reduces leverage.[7]

A reasonable approximation to Honda's cost of debt, which was rated A in 2006, is the yield to maturity on comparably rated long-term debt, approximately 5.5% (cell B25). Honda's debt-to-value ratio is computed in row 29 (assuming that its debt is selling near par value), and WACC is computed in row 32. WACC increases slightly over time as the debt-to-value ratio steadily declines between 2006 and 2010. The present value factor for cash flows accruing in each year is the previous year's factor divided by (1 + WACC) for that year. The present value of each cash flow (row 37) is the free cash flow times the cumulative discount factor.

The terminal value of the firm (cell H17) is computed from the constant-growth model as $FCFF_{2010} \times (1 + g)/(WACC_{2010} - g)$, where g (cell B23) is the assumed value for the steady growth rate.[8] We assume in the spreadsheet that $g = .07$, which is perhaps a bit higher than the long-run growth rate of the broad economy.[9] Terminal value is also discounted back to 2006 (cell H37), and the intrinsic value of the firm is thus found as the sum of discounted free cash flows between 2007 and 2010 plus the discounted terminal value. Finally, the value of debt in 2006 is subtracted from firm value to arrive at the intrinsic value of equity in 2006 (cell K37), and value per share is calculated in cell L37 as equity value divided by number of shares in 2006.

The free cash flow to equity approach yields a similar intrinsic value for the stock. FCFE (row 18) is obtained from FCFF by subtracting after-tax interest expense and net debt repurchases. The cash flows are then discounted at the equity rate. Like WACC, the cost of equity changes each period as leverage changes. The present value factor for equity cash flows is presented in row 34. Equity value is reported in cell J38, which is put on a per share basis in cell L38.

Spreadsheet 13.2 is available at the Online Learning Center, **www.mhhe.com/bkm.**

Comparing the Valuation Models

In principle, the free cash flow approach is fully consistent with the dividend discount model and should provide the same estimate of intrinsic value if one can extrapolate to a period in which the firm begins to pay dividends growing at a constant rate. This was demonstrated in two famous papers by Modigliani and Miller (1958, 1961). However, in practice, you will find that values from these models may differ, sometimes substantially. This is due to the fact

[7] Call β_L the firm's equity beta at the initial level of leverage as provided by Value Line. Equity betas reflect both business risk and financial risk. When a firm changes its capital structure (debt/equity mix), it changes financial risk, and therefore equity beta changes. How should we recognize the change in financial risk? As you may remember from an introductory corporate finance class, you must first unleverage beta. This leaves us a beta that reflects only business risk. We use the following formula to find unleveraged beta, β_U, (where D/E is the firm's current debt-equity ratio):

$$\beta_U = \frac{\beta_L}{1 + (D/E)(1 - t_c)}$$

Then, we re-leverage beta in any particular year using the forecast capital structure (which reintroduces the financial risk associated with that year's capital structure):

$$\beta_L = \beta_U[1 + (D/E)(1 - t_c)]$$

[8] Over the 2006–2010 period, Value Line predicts that Honda will retire a considerable fraction of its outstanding debt. The implied debt repurchases are a use of cash and reduce the cash flow available to equity. Such repurchases cannot be sustained indefinitely, however, for debt outstanding would soon be run down to zero. Therefore, in our estimate of terminal value, we compute the final cash flow assuming that by 2010 Honda will begin *issuing* enough debt to maintain its debt-to-value ratio unchanged. This approach is consistent with the assumption of constant growth and constant discount rates after 2010.

[9] In the long run a firm can't grow forever at a rate higher than the aggregate economy. So by the time we assert that growth is in a stable stage, it seems reasonable that the growth rate should not be significantly greater than that of the overall economy (although it can be less if the firm is in a declining industry).

that in practice, analysts are always forced to make simplifying assumptions. For example, how long will it take the firm to enter a constant-growth stage? How should depreciation best be treated? What is the best estimate of ROE? Answers to questions like these can have a big impact on value, and it is not always easy to maintain consistent assumptions across the models.

We have now valued Honda using several approaches, with estimates of intrinsic value as follows:

Model	Intrinsic Value
Two-stage dividend discount model	$38.88
DDM with earnings multiple terminal value	40.16
Three-stage DDM	45.02
Free cash flow to the firm	45.13
Free cash flow to equity	44.60
Market price in 2006	35.08

What should we make of these differences? The two-stage dividend discount model is the most conservative of the estimates, probably because it assumes that Honda's dividend growth rate will fall to its terminal value after only three years. In contrast, the 3-stage DDM allows growth to taper off over a longer period. The 3-stage model gives a value that is almost identical to those of both free cash flow models. But all three of these estimates are $10 higher than the actual stock price, a difference of 28%. The DDM with a terminal value provided by the earnings multiple is closer, but still $5 higher than the stock price. Perhaps the assumed terminal growth rate used in our valuation exercise is too high, or perhaps the stock is indeed underpriced compared to intrinsic value.

This valuation exercise shows that finding bargains is not as easy as it seems. While these models are easy to apply, establishing proper inputs is more of a challenge. This should not be surprising. In even a moderately efficient market, finding profit opportunities will be more involved than analyzing Value Line data for a few hours. The models are extremely useful to analysts, however. They provide ballpark estimates of intrinsic value. More than that, they force rigorous thought about underlying assumptions and highlight the variables with the greatest impact on value and the greatest payoff to further analysis.

13.6 THE AGGREGATE STOCK MARKET

The most popular approach to forecasting the overall stock market is the earnings multiplier approach applied at the aggregate level. The first step is to forecast corporate profits for the coming period. Then we derive an estimate of the earnings multiplier, the aggregate P/E ratio, based on a forecast of long-term interest rates. The product of the two forecasts is the estimate of the end-of-period level of the market.

The forecast of the P/E ratio of the market is sometimes derived from a graph similar to that in Figure 13.8, which plots the *earnings yield* (earnings per share divided by price per share, the reciprocal of the P/E ratio) of the S&P 500 and the yield to maturity on 10-year Treasury bonds. The figure shows that both yields rose dramatically in the 1970s. In the case of Treasury bonds, this was because of an increase in the inflationary expectations built into interest rates. The earnings yield on the S&P 500, however, probably rose because of inflationary distortions that artificially increased reported earnings. We have already seen that P/E ratios tend to fall when inflation rates increase. When inflation moderated in the 1980s, both Treasury and earnings yields fell. For most of the last 30 years, the earnings yield has been within about one percentage point of the T-bond rate.

One might use this relationship and the current yield on 10-year Treasury bonds to forecast the earnings yield on the S&P 500. Given that earnings yield, a forecast of earnings could be used to predict the level of the S&P in some future period. Let's consider a simple example of this procedure.

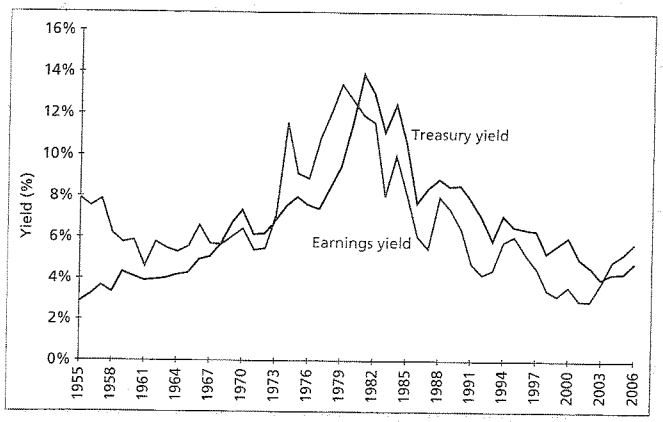


FIGURE 13.8 Earnings yield of S&P 500 versus 10-year Treasury bond yield

TABLE 13.4 S&P 500 index forecasts under various scenarios

	Most Likely Scenario	Pessimistic Scenario	Optimistic Scenario
Treasury bond yield	4.8%	5.3%	4.3%
Earnings yield	5.8%	6.3%	5.3%
Resulting P/E ratio	17.2	15.9	18.9
EPS forecast	86	86	86
Forecast for S&P 500	1,483	1,365	1,623

Note: The forecast for the earnings yield on the S&P 500 equals the Treasury bond yield plus 1%. The P/E ratio is the reciprocal of the forecasted earnings yield.

EXAMPLE 13.7 *Forecasting the Aggregate Stock Market*

The early 2007 forecast for 12-month forward earnings per share for the S&P 500 portfolio was about $86. The 10-year Treasury bond yield at this time was about 4.8%. Since the earnings yield on the S&P 500 is most recently about 1% above the 10-year Treasury yield, a first guess for the earnings yield on the S&P 500 might be 5.8%. This would imply a P/E ratio of $1/.058 = 17.24$. Our forecast for the level of the S&P 500 index would then be $17.24 \times 86 = 1483$.

Of course, there is uncertainty regarding all three inputs into this analysis: the actual earnings on the S&P 500 stocks, the level of Treasury yields at year-end, and the spread between the Treasury yield and the earnings yield. One would wish to perform sensitivity or scenario analysis to examine the impact of changes in all of these variables. To illustrate, consider Table 13.4, which shows a simple scenario analysis treating possible effects of variation in the Treasury bond yield. The scenario analysis shows that the forecast level of the stock market varies inversely and with dramatic sensitivity to interest rate changes.

Some analysts use an aggregate version of the dividend discount model rather than an earnings multiplier approach. All of these models, however, rely heavily on forecasts of such macroeconomic variables as GDP, interest rates, and the rate of inflation, which are difficult to predict accurately.

Because stock prices reflect expectations of future dividends, which are tied to the economic fortunes of firms, it is not surprising that the performance of a broad-based stock index like the S&P 500 is taken as a leading economic indicator, that is, a predictor of the performance of the aggregate economy. Stock prices are viewed as embodying consensus forecasts of economic activity and are assumed to move up or down in anticipation of movements in the economy. The government's index of leading economic indicators, which is taken to predict the progress of the business cycle, is made up in part of recent stock market performance. However, the predictive value of the market is far from perfect. A well-known joke, often attributed to Paul Samuelson, is that the market has forecast eight of the last five recessions.

SUMMARY

- One approach to firm valuation is to focus on the firm's book value, either as it appears on the balance sheet or adjusted to reflect the current replacement cost of assets or the liquidation value. Another approach is to focus on the present value of expected future dividends.
- The dividend discount model holds that the price of a share of stock should equal the present value of all future dividends per share, discounted at an interest rate commensurate with the risk of the stock.
- The constant growth version of the DDM asserts that, if dividends are expected to grow at a constant rate forever, then the intrinsic value of the stock is determined by the formula

$$V_0 = \frac{D_1}{k - g}$$

This version of the DDM is simplistic in its assumption of a constant value of g. There are more sophisticated multistage versions of the model for more complex environments. When the constant growth assumption is reasonably satisfied, the formula can be inverted to infer the market capitalization rate for the stock:

$$k = \frac{D_1}{P_0} + g$$

- Stock market analysts devote considerable attention to a company's price–earnings ratio. The P/E ratio is a useful measure of the market's assessment of the firm's growth opportunities. Firms with no growth opportunities should have a P/E ratio that is just the reciprocal of the capitalization rate, k. As growth opportunities become a progressively more important component of the total value of the firm, the P/E ratio will increase.
- Many analysts form their estimates of a stock's value by multiplying their forecast of next year's EPS by a predicted P/E multiple. Some analysts mix the P/E approach with the dividend discount model. They use an earnings multiplier to forecast the terminal value of shares at a future date and add the present value of that terminal value with the present value of all interim dividend payments.
- The free cash flow approach is the one used most in corporate finance. The analyst first estimates the value of the firm as the present value of expected future free cash flows to the entire firm and then subtracts the value of all claims other than equity. Alternatively, the free cash flows to equity can be discounted at a discount rate appropriate to the risk of the stock.
- The models presented in this chapter can be used to explain or to forecast the behavior of the aggregate stock market. The key macroeconomic variables that determine the level of stock prices in the aggregate are interest rates and corporate profits.

KEY TERMS

book value, 402
constant growth DDM, 407
dividend discount model (DDM), 406
dividend payout ratio, 410
earnings management, 422
earnings retention ratio, 410
intrinsic value, 404
liquidation value, 403
market capitalization rate, 405
PEG ratio, 420
plowback ratio, 410
present value of growth opportunities (PVGO), 411
price–earnings multiple, 417
replacement cost, 403
Tobin's *q*, 404
two-stage DDM, 414

PROBLEM SETS

Select problems are available in McGraw-Hill's Homework Manager®. Please see the packaging options section of the preface for more information.

1. A common stock pays an annual dividend per share of $2.10. The risk-free rate is 7% and the risk premium for this stock is 4%. If the annual dividend is expected to remain at $2.10, what is the value of the stock?
2. Which of the following assumptions does the constant growth dividend discount model require? CFA® PROBLEMS
   a. Dividends grow at a constant rate.
   b. The dividend growth rate continues indefinitely.
   c. The required rate of return is less than the dividend growth rate.
3. *a.* Computer stocks currently provide an expected rate of return of 16%. MBI, a large computer company, will pay a year-end dividend of $2 per share. If the stock is selling at $50 per share, what must be the market's expectation of the growth rate of MBI dividends?
   b. If dividend growth forecasts for MBI are revised downward to 5% per year, what will happen to the price of MBI stock? What (qualitatively) will happen to the company's price–earnings ratio?
4. Explain why the following statements are true/false/uncertain.
   a. With all else held constant, a firm will have a higher P/E if its beta is higher.
   b. P/E will tend to be higher when ROE is higher (assuming plowback is positive).
   c. P/E will tend to be higher when the plowback rate is higher.
5. Even Better Products has come out with a new and improved product. As a result, the firm projects an ROE of 20%, and it will maintain a plowback ratio of 0.30. Its earnings this year will be $2 per share. Investors expect a 12% rate of return on the stock.
   a. At what price and P/E ratio would you expect the firm to sell?
   b. What is the present value of growth opportunities?
   c. What would be the P/E ratio and the present value of growth opportunities if the firm planned to reinvest only 20% of its earnings?
6. *a.* MF Corp. has an ROE of 16% and a plowback ratio of 50%. If the coming year's earnings are expected to be $2 per share, at what price will the stock sell? The market capitalization rate is 12%.
   b. What price do you expect MF shares to sell for in three years?
7. At Litchfield Chemical Corp. (LCC), a director of the company said that the use of dividend discount models by investors is "proof" that the higher the dividend, the higher the stock price. CFA® PROBLEMS
   a. Using a constant growth dividend discount model as a basis of reference, evaluate the director's statement.
   b. Explain how an increase in dividend payout would affect each of the following (holding all other factors constant):
      i. Sustainable growth rate.
      ii. Growth in book value.

CHAPTER 14 Financial Statement Analysis

AFTER STUDYING THIS CHAPTER YOU SHOULD BE ABLE TO:

- Use a firm's income statement, balance sheet, and statement of cash flows to calculate standard financial ratios.
- Calculate the impact of taxes and leverage on a firm's return on equity using ratio decomposition analysis.
- Measure a firm's operating efficiency by using various asset utilization ratios.
- Identify likely sources of biases in conventional accounting data.

In the previous chapter, we explored equity valuation techniques. These techniques take as inputs the firm's dividends and earnings prospects. While the valuation analyst is interested in economic earnings streams, only financial accounting data are readily available. What can we learn from a company's accounting data that can help us estimate the intrinsic value of its common stock?

In this chapter, we show how investors can use financial data as inputs into stock valuation analysis. We start by reviewing the basic sources of such data: the income statement, the balance sheet, and the statement of cash flows. We next discuss the difference between economic and accounting earnings. While economic earnings are more important for issues of valuation, whatever their shortcomings, accounting data still are useful in assessing the economic prospects of the firm. We show how analysts use financial ratios to explore the sources of a firm's profitability and evaluate the "quality" of its earnings in a systematic fashion. We also examine the impact of debt policy on various financial ratios. Finally, we conclude with a discussion of the limitations of financial statement analysis as a tool in uncovering mispriced securities. Some of these limitations are due to differences in firms' accounting procedures. Others arise from inflation-induced distortions in accounting numbers.

Related Web sites for this chapter are available at www.mhhe.com/bkm.

14.1 THE MAJOR FINANCIAL STATEMENTS

The Income Statement

income statement
A financial statement showing a firm's revenues and expenses during a specified period.

The income statement is a summary of the profitability of the firm over a period of time, such as a year. It presents revenues generated during the operating period, the expenses incurred during that same period, and the company's net earnings or profits, which are simply the difference between revenues and expenses.

It is useful to distinguish among four broad classes of expenses: cost of goods sold, which is the direct cost attributable to producing the product sold by the firm; general and administrative expenses, which correspond to overhead expenses, salaries, advertising, and other costs of operating the firm that are not directly attributable to production; interest expense on the firm's debt; and taxes on earnings owed to federal and local governments.

Table 14.1 presents a 2006 income statement for Hewlett-Packard. At the top are revenues from standard operations. Next come operating expenses, the costs incurred in the course of generating these revenues, including a depreciation allowance. The difference between operating revenues and operating costs is called operating income. Income from other, primarily nonrecurring, sources is then added to obtain earnings before interest and taxes (EBIT), which is what the firm would have earned if not for obligations to its creditors and the tax authorities. EBIT is a measure of the profitability of the firm's operations abstracting from any interest burden attributable to debt financing. The income statement then goes on to subtract net interest expense from EBIT to arrive at taxable income. Finally, the income tax due the government is subtracted to arrive at net income, the "bottom line" of the income statement.

Analysts also commonly prepare a *common-size income statement,* in which all items on the income statement are expressed as a fraction of total revenue. This makes it easier to compare firms of different sizes. The right-hand column of Table 14.1 is HP's common-size income statement.

TABLE 14.1
Consolidated Statement of Income for Hewlett-Packard, 2006

	$ Million	Percent of Revenue
Operating revenues		
Net sales	$91,658	100.0%
Operating expenses		
Cost of goods sold	$66,825	72.9%
Selling, general, and administrative expenses	11,266	12.3
Research and development expenses	3,591	3.9
Depreciation	2,353	2.6
Other expenses	814	0.9
Operating income	$ 6,809	7.4%
Other income	631	0.7
Earnings before interest and income taxes	$ 7,440	8.1%
Interest expense	249	0.3
Taxable income	$ 7,191	7.8%
Taxes	993	1.1
Net income	$ 6,198	6.8%
Allocation of net income		
Dividends	894	1.0
Addition to retained earnings	5,304	5.8

Note: Sums subject to rounding error.
Source: Hewlett-Packard Annual Report.

TABLE 14.2
Consolidated Balance Sheet for Hewlett-Packard, 2006

Assets	$ Million	Percent of Total Assets
Current assets		
Cash and marketable securities	$16,400	20.0%
Receivables	22,699	27.7
Inventories	7,750	9.5
Other current assets	1,415	1.7
Total current assets	$48,264	58.9%
Fixed Assets		
Tangible fixed assets		
Property, plant, and equipment	$ 6,863	8.4%
Long Term Investments	2,340	2.9
Total tangible fixed assets	$ 9,203	11.2%
Intangible fixed assets		
Goodwill	$16,853	20.6%
Other intangible assets	3,352	4.1
Total intangible fixed assets	$20,205	24.6%
Total fixed assets	$29,408	35.9%
Other assets	$ 4,309	5.3%
Total assets	$81,981	100.0%
Liabilities and Shareholders' Equity	**$ Million**	**Percent of Total Assets**
Current liabilities		
Debt due for repayment	$ 2,705	3.3%
Accounts payable	25,688	31.3
Other current liabilities	7,457	9.1
Total current liabilities	$35,850	43.7%
Long-term debt	$ 2,490	3.0%
Deferred liabilities	1,750	2.1
Other long-term liabilities	3,747	4.6
Total liabilities	43,837	53.5
Shareholders' equity		
Common stock and other paid-in capital	17,993	21.9
Retained earnings	20,151	24.6
Total shareholders' equity	$38,144	46.5%
Total liabilities and shareholders' equity	$81,981	100.0%

Note: Column sums subject to rounding error.
Source: Hewlett-Packard Annual Report.

The Balance Sheet

balance sheet
An accounting statement of a firm's financial position at a specified time.

While the income statement provides a measure of profitability over a period of time, the balance sheet provides a "snapshot" of the financial condition of the firm at a particular time. The balance sheet is a list of the firm's assets and liabilities at that moment. The difference in assets and liabilities is the net worth of the firm, also called *stockholders' equity* or, equivalently, *shareholders' equity*. Like income statements, balance sheets are reasonably standardized in presentation. Table 14.2 is HP's balance sheet for year-end 2006.

The first section of the balance sheet gives a listing of the assets of the firm. Current assets are presented first. These are cash and other items such as accounts receivable or inventories that will be converted into cash within one year. Next comes a listing of long-term or "fixed" assets, which usually consists primarily of the company's property, plant, and equipment. The other major fixed asset on HP's balance sheet is "goodwill." This is an accounting asset created when one company purchases another. The amount paid in excess of the book value of the acquired assets and liabilities is recorded as goodwill and is classified as an "intangible" fixed asset. HP's value of goodwill is particularly high because of its acquisition of Compaq Computer a few years ago. (If the value of these acquisitions later falls, then they are deemed to be impaired, and the decline in value must then be charged off as an expense.)

The liability and shareholders' equity section is arranged similarly. Listed first are short-term or "current" liabilities, such as accounts payable, accrued taxes, and debts that are due within one year. Long-term debt and other liabilities due in more than a year follow. The difference between total assets and total liabilities is shareholders' equity. This is the net worth or book value of the firm. Shareholders' equity is divided into par value of stock, capital surplus (additional paid-in capital), and retained earnings, although this division is usually unimportant. Briefly, par value plus capital surplus represents the proceeds realized from the sale of stock to the public, while retained earnings represent the buildup of equity from profits plowed back into the firm. Even if the firm issues no new equity, book value will increase each year due to reinvested earnings.

The first column of numbers in the balance sheet in Table 14.2 presents the dollar value of each asset. To make it easier to compare firms of different sizes, analysts often present each item on the balance sheet as a percentage of total assets. This is called a *common-size balance sheet* and is presented in the last column of the table.

The Statement of Cash Flows

statement of cash flows
A financial statement showing a firm's cash receipts and cash payments during a specified period.

The income statement and balance sheets are based on accrual methods of accounting, which means revenues and expenses are recognized at the time of a sale even if no cash has yet been exchanged. In contrast, the statement of cash flows recognizes only transactions in which cash changes hands. For example, if goods are sold now, with payment due in 60 days, the income statement will treat the revenue as generated when the sale occurs, and the balance sheet will be immediately augmented by accounts receivable, but the statement of cash flows will not recognize the transaction until the bill is paid and the cash is in hand.

Table 14.3 is the 2006 statement of cash flows for HP. The first entry listed under cash flows from operations is net income. The following entries modify that figure for components of income that have been recognized but for which cash has not yet changed hands. Increases in accounts receivable, for example, mean income has been claimed on the income statement, but cash has not yet been collected. Hence, increases in accounts receivable reduce the cash flows realized from operations in this period. Similarly, increases in accounts payable mean expenses have been incurred, but cash has not yet left the firm. Any payment delay increases the company's net cash flows in this period.

Another major difference between the income statement and the statement of cash flows involves depreciation, which accounts for a substantial addition in the adjustment section of the statement of cash flows in Table 14.3. The income statement attempts to "smooth" large capital expenditures over time. The depreciation expense on the income statement is a way of doing this by recognizing capital expenditures over a period of many years rather than at the specific time of those expenditures. In contrast, the statement of cash flows recognizes the cash implication of a capital expenditure when it occurs. It will ignore the depreciation "expense" over time but will account for the full capital expenditure when it is paid.

Rather than smooth or allocate expenses over time, as in the income statement, the statement of cash flows reports cash flows separately for operations, investing, and financing activities. This way, any large cash flows such as those for big investments can be recognized as such without affecting the measure of cash flow generated by operating activities.

The second section of the statement of cash flows is the accounting of cash flows from investing activities. These entries are investments in the assets necessary for the firm to maintain or enhance its productive capacity.

Finally, the last section of the statement lists the cash flows realized from financing activities. Issuance of securities will contribute positive cash flows, while redemption of outstanding securities will use up cash. For example, HP repurchased $5,241 million of its shares of stock in 2006, which was a major use of cash. Its dividend payments, $894 million, also used cash. In total, HP's financing activities in 2006 absorbed $6,077 million.

To summarize, HP's operations generated a cash flow of $11,353 million. Some of that cash, $2,787 million, went to pay for new investments. Another part, $6,077 million, went to

TABLE 14.3 Statement of Cash Flows for Hewlett-Packard, 2006

	$ Million
Cash provided by operations	
Net income	$ 6,198
Adjustments to net income	
Depreciation	2,353
Changes in working capital	
Decrease (increase) in accounts receivable	(882)
Decrease (increase) in inventories	(1,109)
Increase (decrease) in taxes payable	(513)
Increase (decrease) in accounts payable	1,879
Other adjustments	3,427
Total adjustments	$ 5,155
Cash provided by operations	$11,353
Cash flows from investments	
Investments in tangible fixed assets	$ (1,980)
Investments in business acquisitions	(855)
Investment in other assets	48
Cash provided by (used for) investments	$ (2,787)
Cash provided by (used for) financing activities	
Additions to (reductions in) long-term debt	$ (138)
Net issues (repurchases of) shares	(5,241)
Dividends	(894)
Other	196
Cash provided by (used for) financing activities	$ (6,077)
Net increase in cash	$ 2,489

Source: Hewlett-Packard Annual Report.

pay dividends and retire outstanding securities. HP's cash holdings therefore increased by $11,353 – $2,787 – $6,077 = $2,489 million. This is reported on the last line of Table 14.3.

The statement of cash flows provides important evidence on the well-being of a firm. If a company cannot pay its dividends and maintain the productivity of its capital stock out of cash flow from operations, for example, and it must resort to borrowing to meet these demands, this is a serious warning that the firm cannot maintain payout at its current level in the long run. The statement of cash flows will reveal this developing problem when it shows that cash flow from operations is inadequate and that borrowing is being used to maintain dividend payments at unsustainable levels.

14.2 ACCOUNTING VERSUS ECONOMIC EARNINGS

We've seen that stock valuation models require a measure of economic earnings or sustainable cash flow that can be paid out to stockholders without impairing the productive capacity of the firm. In contrast, accounting earnings are affected by several conventions regarding the valuation of assets such as inventories (e.g., LIFO versus FIFO treatment) and by the way some expenditures such as capital investments are recognized over time (as depreciation expenses). We will discuss problems with some of these accounting conventions in greater detail later in the chapter. In addition to these accounting issues, as the firm makes its way through the business cycle, its earnings will rise above or fall below the trend line that might more accurately reflect sustainable economic earnings. This introduces an added complication in interpreting net income figures. One might wonder how closely accounting earnings approximate economic earnings and, correspondingly, how useful accounting data might be to investors attempting to value the firm.

accounting earnings
Earnings of a firm as reported on its income statement.

economic earnings
The real flow of cash that a firm could pay out without impairing its productive capacity.

In fact, the net income figure on the firm's income statement does convey considerable information concerning a firm's products. We see this in the fact that stock prices tend to increase when firms announce earnings greater than market analysts or investors had anticipated.

14.3 PROFITABILITY MEASURES

Profitability measures focus on the firm's earnings. To facilitate comparisons across firms, total earnings are expressed on a per-dollar-invested basis. So return on equity (ROE), which measures profitability for contributors of equity capital, is defined as (after-tax) profits divided by the book value of equity. Similarly, return on assets (ROA), which measures profitability for all contributors of capital, is defined as earnings before interest and taxes divided by total assets. Not surprisingly, ROA and ROE are linked, but as we will see shortly, the relationship between them is affected by the firm's financial policies.

Past versus Future ROE

We noted in Chapter 13 that **return on equity (ROE)** is one of the two basic factors in determining a firm's growth rate of earnings. Sometimes it is reasonable to assume that future ROE will approximate its past value, but a high ROE in the past does not necessarily imply a firm's future ROE will be high. A declining ROE, on the other hand, is evidence that the firm's new investments have offered a lower ROE than its past investments. The vital point for a security analyst is not to accept historical values as indicators of future values. Data from the recent past may provide information regarding future performance, but the analyst should always keep an eye on the future. Expectations of *future* dividends and earnings determine the intrinsic value of the company's stock.

return on equity (ROE)
The ratio of net profits to common equity.

Financial Leverage and ROE

An analyst interpreting the past behavior of a firm's ROE or forecasting its future value must pay careful attention to the firm's debt–equity mix and to the interest rate on its debt. An example will show why. Suppose Nodett is a firm that is all-equity financed and has total assets of $100 million. Assume it pays corporate taxes at the rate of 40% of taxable earnings.

Table 14.4 shows the behavior of sales, earnings before interest and taxes, and net profits under three scenarios representing phases of the business cycle. It also shows the behavior of two of the most commonly used profitability measures: operating **return on assets (ROA)**, which equals EBIT/total assets, and ROE, which equals net profits/equity.

return on assets (ROA)
Earnings before interest and taxes divided by total assets.

Somdett is an otherwise identical firm to Nodett, but $40 million of its $100 million of assets are financed with debt bearing an interest rate of 8%. It pays annual interest expenses of $3.2 million. Table 14.5 shows how Somdett's ROE differs from Nodett's.

Note that annual sales, EBIT, and therefore ROA for both firms are the same in each of the three scenarios, that is, business risk for the two companies is identical. It is their financial risk that differs. Although Nodett and Somdett have the same ROA in each scenario, Somdett's ROE exceeds that of Nodett in normal and good years and is lower in bad years.

We can summarize the exact relationship among ROE, ROA, and leverage in the following equation[1]

$$\text{ROE} = (1 - \text{Tax rate})\left[\text{ROA} + (\text{ROA} - \text{Interest rate})\frac{\text{Debt}}{\text{Equity}}\right] \qquad (14.1)$$

The relationship has the following implications. If there is no debt or if the firm's ROA equals the interest rate on its debt, its ROE will simply equal (1 – tax rate) times ROA. If

[1]The derivation of Equation 14.1 is as follows:

$$\begin{aligned}
\text{ROE} &= \frac{\text{Net profit}}{\text{Equity}} = \frac{\text{EBIT} - \text{Interest} - \text{Taxes}}{\text{Equity}} = \frac{(1 - \text{Tax rate})(\text{EBIT} - \text{Interest})}{\text{Equity}} \\
&= (1 - \text{Tax rate})\frac{(\text{ROA} \times \text{Assets} - \text{Interest rate} \times \text{Debt})}{\text{Equity}} \\
&= (1 - \text{Tax rate})\left[\text{ROA} \times \frac{(\text{Equity} + \text{Debt})}{\text{Equity}} - \text{Interest rate} \times \frac{\text{Debt}}{\text{Equity}}\right] \\
&= (1 - \text{Tax rate})\left[\text{ROA} + (\text{ROA} - \text{Interest rate})\frac{\text{Debt}}{\text{Equity}}\right]
\end{aligned}$$

TABLE 14.4
Nodett's profitability over the business cycle

Scenario	Sales ($ millions)	EBIT ($ millions)	ROA (% per year)	Net Profit ($ millions)	ROE (% per year)
Bad year	$ 80	$ 5	5%	$3	3%
Normal year	100	10	10	6	6
Good year	120	15	15	9	9

TABLE 14.5
Impact of financial leverage on ROE

		Nodett		Somdett	
Scenario	EBIT ($ millions)	Net Profit ($ millions)	ROE (%)	Net Profit* ($ millions)	ROE† (%)
Bad year	$ 5	$3	3%	$1.08	1.8%
Normal year	10	6	6	4.08	6.8
Good year	15	9	9	7.08	11.8

*Somdett's after-tax profits equal 0.6(EBIT – $3.2 million).
†Somdett's equity is only $60 million.

its ROA exceeds the interest rate, then its ROE will exceed (1 – tax rate) times ROA by an amount that will be greater the higher the debt/equity ratio.

This result makes intuitive sense: If ROA exceeds the borrowing rate, the firm earns more on its money than it pays out to creditors. The surplus earnings are available to the firm's owners, the equityholders, which raises ROE. If, on the other hand, ROA is less than the interest rate, then ROE will decline by an amount that depends on the debt/equity ratio.

EXAMPLE 14.1
Leverage and ROE

To illustrate the application of Equation 14.1, we can use the numerical example in Table 14.5. In a normal year, Nodett has an ROE of 6%, which is 0.6 (1 – tax rate) times its ROA of 10%. However, Somdett, which borrows at an interest rate of 8% and maintains a debt/equity ratio of ⅔, has an ROE of 6.8%. The calculation using Equation 14.1 is

$$\begin{aligned} \text{ROE} &= 0.6[10\% + (10\% - 8\%)\tfrac{2}{3}] \\ &= 0.6(10\% + \tfrac{1}{3}\%) = 6.8\% \end{aligned}$$

The important point is that increased debt will make a positive contribution to a firm's ROE only if the firm's ROA exceeds the interest rate on the debt.

Notice that financial leverage increases the risk of the equityholder returns. Table 14.5 shows that ROE on Somdett is worse than that of Nodett in bad years. Conversely, in good years, Somdett outperforms Nodett because the excess of ROA over ROE provides additional funds for equityholders. The presence of debt makes Somdett's ROE more sensitive to the business cycle than Nodett's. Even though the two companies have equal business risk (reflected in their identical EBIT in all three scenarios), Somdett's stockholders carry greater financial risk than Nodett's because all of the firm's business risk is absorbed by a smaller base of equity investors.

Even if financial leverage increases the expected ROE of Somdett relative to Nodett (as it seems to in Table 14.5), this does not imply that Somdett's share price will be higher. Financial leverage increases the risk of the firm's equity as surely as it raises the expected ROE, and the higher discount rate will offset the higher expected earnings.

CONCEPT check 14.1

Mordett is a company with the same assets as Nodett and Somdett but a debt/equity ratio of 1.0 and an interest rate of 9%. What would its net profit and ROE be in a bad year, a normal year, and a good year?

14.4 RATIO ANALYSIS

Decomposition of ROE

To understand the factors affecting a firm's ROE, including its trend over time and its performance relative to competitors, analysts often "decompose" ROE into the product of a series of ratios. Each component ratio is in itself meaningful, and the process serves to focus the analyst's attention on the separate factors influencing performance. This kind of decomposition of ROE is often called the DuPont system.

DuPont system
Decomposition of profitability measures into component ratios.

One useful decomposition of ROE is

$$\text{ROE} = \underbrace{\frac{\text{Net profit}}{\text{Pretax profit}}}_{(1)} \times \underbrace{\frac{\text{Pretax profit}}{\text{EBIT}}}_{(2)} \times \underbrace{\frac{\text{EBIT}}{\text{Sales}}}_{(3)} \times \underbrace{\frac{\text{Sales}}{\text{Assets}}}_{(4)} \times \underbrace{\frac{\text{Assets}}{\text{Equity}}}_{(5)}$$

Table 14.6 shows all these ratios for Nodett and Somdett under the three different economic scenarios. Let us first focus on factors 3 and 4. Notice that their product gives us the firm's ROA = EBIT/Assets.

Factor 3 is known as the firm's operating profit margin, or return on sales, which equals operating profit per dollar of sales. In an average year, Nodett's margin is 0.10, or 10%; in a bad year, it is 0.0625, or 6.25%; and in a good year, it is 0.125, or 12.5%.

profit margin or return on sales
The ratio of operating profits per dollar of sales (EBIT divided by sales).

Factor 4, the ratio of sales to total assets, is known as total asset turnover (ATO). It indicates the efficiency of the firm's use of assets in the sense that it measures the annual sales generated by each dollar of assets. In a normal year, Nodett's ATO is 1.0 per year, meaning that sales of $1 per year were generated per dollar of assets. In a bad year, this ratio declines to 0.8 per year, and in a good year, it rises to 1.2 per year.

total asset turnover (ATO)
The annual sales generated by each dollar of assets (sales/assets).

Comparing Nodett and Somdett, we see that factors 3 and 4 do not depend on a firm's financial leverage. The firms' ratios are equal to each other in all three scenarios.

TABLE 14.6
Ratio decomposition analysis for Nodett and Somdett

	ROE	(1) Net Profit / Pretax Profit	(2) Pretax Profit / EBIT	(3) EBIT / Sales (Margin)	(4) Sales / Assets (Turnover)	(5) Assets / Equity	(6) Compound Leverage Factor (2) × (5)
Bad year							
Nodett	0.030	0.6	1.000	0.0625	0.800	1.000	1.000
Somdett	0.018	0.6	0.360	0.0625	0.800	1.667	0.600
Normal year							
Nodett	0.060	0.6	1.000	0.100	1.000	1.000	1.000
Somdett	0.068	0.6	0.680	0.100	1.000	1.667	1.134
Good year							
Nodett	0.090	0.6	1.000	0.125	1.200	1.000	1.000
Somdett	0.118	0.6	0.787	0.125	1.200	1.667	1.311

Similarly, factor 1, the ratio of net income after taxes to pretax profit, is the same for both firms. We call this the tax-burden ratio. Its value reflects both the government's tax code and the policies pursued by the firm in trying to minimize its tax burden. In our example, it does not change over the business cycle, remaining a constant 0.6.

While factors 1, 3, and 4 are not affected by a firm's capital structure, factors 2 and 5 are. Factor 2 is the ratio of pretax profits to EBIT. The firm's pretax profits will be greatest when there are no interest payments to be made to debtholders. In fact, another way to express this ratio is

$$\frac{\text{Pretax profits}}{\text{EBIT}} = \frac{\text{EBIT} - \text{Interest expense}}{\text{EBIT}}$$

We will call this factor the *interest-burden (IB) ratio.* It takes on its highest possible value, 1, for Nodett, which has no financial leverage. The higher the degree of financial leverage, the lower the IB ratio. Nodett's IB ratio does not vary over the business cycle. It is fixed at 1.0, reflecting the total absence of interest payments. For Somdett, however, because interest expense is fixed in a dollar amount while EBIT varies, the IB ratio varies from a low of 0.36 in a bad year to a high of 0.787 in a good year.

interest coverage ratio or times interest earned
A financial leverage measure arrived at by dividing earnings before interest and taxes by interest expense.

A closely related statistic to the interest burden ratio is the interest coverage ratio, or times interest earned. The ratio is defined as

$$\text{Interest coverage} = \frac{\text{EBIT}}{\text{Interest expense}}$$

A high coverage ratio indicates that the likelihood of bankruptcy is low because annual earnings are significantly greater than annual interest obligations. It is widely used by both lenders and borrowers in determining the firm's debt capacity and is a major determinant of the firm's bond rating.

leverage ratio
Measure of debt to total capitalization of a firm.

Factor 5, the ratio of assets to equity, is a measure of the firm's degree of financial leverage. It is called the leverage ratio and is equal to 1 plus the debt/equity ratio.[2] In our numerical example in Table 14.6, Nodett has a leverage ratio of 1, while Somdett's is 1.667.

From our discussion of Equation 14.1, we know that financial leverage helps boost ROE only if ROA is greater than the interest rate on the firm's debt. How is this fact reflected in the ratios of Table 14.6?

The answer is that to measure the full impact of leverage in this framework, the analyst must take the product of the IB and leverage ratios (that is, factors 2 and 5, shown in Table 14.6 as column 6). For Nodett, factor 6, which we call the compound leverage factor, remains a constant 1.0 under all three scenarios. But for Somdett, we see that the compound leverage factor is greater than 1 in normal years (1.134) and in good years (1.311), indicating the positive contribution of financial leverage to ROE. It is less than 1 in bad years, reflecting the fact that when ROA falls below the interest rate, ROE falls with increased use of debt.

We can summarize all of these relationships as follows:

$$\text{ROE} = \text{Tax burden} \times \text{Interest burden} \times \text{Margin} \times \text{Turnover} \times \text{Leverage}$$

Because

$$\text{ROA} = \text{Margin} \times \text{Turnover}$$

and

$$\text{Compound leverage factor} = \text{Interest burden} \times \text{Leverage}$$

we can decompose ROE equivalently as follows:

$$\text{ROE} = \text{Tax burden} \times \text{ROA} \times \text{Compound leverage factor}$$

[2] $\frac{\text{Assets}}{\text{Equity}} = \frac{\text{Equity} + \text{Debt}}{\text{Equity}} = 1 + \frac{\text{Debt}}{\text{Equity}}$

TABLE 14.7
Differences between profit margin and asset turnover across industries

	Margin	×	ATO	=	ROA
Supermarket chain	2%		5.0		10%
Utility	20%		0.5		10%

Table 14.6 for Nodett and Somdett compares firms with the same profit margin and turnover but different degrees of financial leverage. Note, however, that comparison of profit margin and turnover usually is meaningful only in evaluating firms in the same industry. Cross-industry comparisons of these two ratios are often meaningless and can even be misleading.

EXAMPLE 14.2
Margin vs. Turnover

Consider two firms with the same ROA of 10% per year. The first is a discount supermarket chain and the second is a gas and electric utility.

As Table 14.7 shows, the supermarket chain has a "low" profit margin of 2% and achieves a 10% ROA by "turning over" its assets five times per year. The capital-intensive utility, on the other hand, has a "low" asset turnover ratio (ATO) of only 0.5 times per year and achieves its 10% ROA through its higher, 20%, profit margin. The point here is that a "low" margin or ATO ratio need not indicate a troubled firm. Each ratio must be interpreted in light of industry norms.

Even within an industry, margin and ATO sometimes can differ markedly among firms pursuing different marketing strategies. In the retailing industry, for example, Neiman-Marcus pursues a high-margin, low-turnover policy compared to Wal-Mart, which pursues a low-margin, high-turnover policy.

CONCEPT check 14.2

Do a ratio decomposition analysis for the Mordett corporation of Concept Check 1, preparing a table similar to Table 14.6.

Turnover and Other Asset Utilization Ratios

It is often helpful in understanding a firm's ratio of sales to assets to compute comparable efficiency-of-utilization, or turnover, ratios for subcategories of assets. For example, fixed-asset turnover would be

$$\frac{\text{Sales}}{\text{Fixed assets}}$$

This ratio measures sales per dollar of the firm's money tied up in fixed assets.

To illustrate how you can compute this and other ratios from a firm's financial statements, consider Growth Industries, Inc. (GI). GI's income statement and opening and closing balance sheets for the years 2006, 2007, and 2008 appear in Table 14.8.

GI's total asset turnover in 2008 was 0.303, which was below the industry average of 0.4. To understand better why GI underperformed, we compute asset utilization ratios separately for fixed assets, inventories, and accounts receivable.

GI's sales in 2008 were $144 million. Its only fixed assets were plant and equipment, which were $216 million at the beginning of the year and $259.2 million at year's end. Average fixed assets for the year were, therefore, $237.6 million [($216 million + $259.2 million)/2]. GI's fixed-asset turnover for 2008 was $144 million per year/$237.6 million = 0.606 per year. In other words, for every dollar of fixed assets, there was $0.606 in sales during the year 2006.

Comparable figures for the fixed-asset turnover ratio for 2006 and 2007 and the 2008 industry average are

2006	2007	2008	2008 Industry Average
0.606	0.606	0.606	0.700

TABLE 14.8
Growth Industries financial statements ($thousands)

	2005	2006	2007	2008
Income statements				
Sales revenue		$100,000	$120,000	$144,000
Cost of goods sold (including depreciation)		55,000	66,000	79,200
Depreciation		15,000	18,000	21,600
Selling and administrative expenses		15,000	18,000	21,600
Operating income		30,000	36,000	43,200
Interest expense		10,500	19,095	34,391
Taxable income		19,500	16,905	8,809
Income tax (40% rate)		7,800	6,762	3,524
Net income		11,700	10,143	5,285
Balance sheets (end of year)				
Cash and marketable securities	$ 50,000	$ 60,000	$ 72,000	$ 86,400
Accounts receivable	25,000	30,000	36,000	43,200
Inventories	75,000	90,000	108,000	129,600
Net plant and equipment	150,000	180,000	216,000	259,200
Total assets	$300,000	$360,000	$432,000	$518,400
Accounts payable	$ 30,000	$ 36,000	$ 43,200	$ 51,840
Short-term debt	45,000	87,300	141,957	214,432
Long-term debt (8% bonds maturing in 2020)	75,000	75,000	75,000	75,000
Total liabilities	$150,000	$198,300	$260,157	$341,272
Shareholders' equity (1 million shares outstanding)	$150,000	$161,700	$171,843	$177,128
Other data				
Market price per common share at year-end		$ 93.60	$ 61.00	$ 21.00

GI's fixed-asset turnover has been stable over time and below the industry average.

Notice that when a financial ratio includes one item from the income statement, which covers a period of time, and another from the balance sheet, which is a "snapshot" at a particular time, the practice is to take the average of the beginning and end-of-year balance sheet figures. Thus, in computing the fixed-asset turnover ratio you divide sales (from the income statement) by average fixed assets (from the balance sheet).

inventory turnover
Cost of goods sold divided by average inventory.

Another widely followed turnover ratio is the **inventory turnover ratio,** which is the ratio of cost of goods sold per dollar of inventory. It is usually expressed as cost of goods sold (instead of sales revenue) divided by average inventory. It measures the speed with which inventory is turned over.

WEB *master*

DuPont Analysis

DuPont analysis is a good way to analyze what fundamental factors drive changes in firm profitability.

1. Select five firms and retrieve their financial statements from **finance.yahoo.com** or another site that has financial information.
2. Perform a DuPont analysis of return on equity (ROE) for each of the selected firms by setting up a spreadsheet to calculate the relevant ratios. Multiply the ratios as appropriate to find ROE, then enter the ROE formula directly (ROE = Net Profit/Equity) to confirm your work.
3. Calculate the compound leverage factor for each firm.
4. For each firm, identify areas of strength and areas of weakness. State two specific things the firm can do to improve its ROE.
5. A less detailed DuPont decomposition of ROE is available at **www.credit-to-cash-advisor.com/document_120.html**. You may explore this calculator by entering inputs directly from the financial statements.

In 2006, GI's cost of goods sold (less depreciation) was $40 million, and its average inventory was $82.5 million [($75 million + $90 million)/2]. Its inventory turnover was 0.485 per year ($40 million/$82.5 million). In 2007 and 2008, inventory turnover remained the same and continued below the industry average of 0.5 per year.

Another measure of efficiency is the ratio of accounts receivable to sales. The accounts receivable ratio usually is computed as average accounts receivable/sales × 365. The result is a number called the **average collection period, or days receivables,** which equals the total credit extended to customers per dollar of daily sales. It is the number of days' worth of sales tied up in accounts receivable. You can also think of it as the average lag between the date of sale and the date payment is received.

average collection period, or days receivables
Accounts receivable per dollar of daily sales.

For GI in 2008, this number was 100.4 days:

$$\frac{(\$36 \text{ million} + \$43.2 \text{ million})/2}{\$144 \text{ million}} \times 365 = 100.4 \text{ days}$$

The industry average was 60 days.

In summary, use of these ratios lets us see that GI's poor total asset turnover relative to the industry is in part caused by lower than average fixed-asset turnover and inventory turnover, and higher than average days receivables. This suggests GI may be having problems with excess plant capacity along with poor inventory and receivables management procedures.

Liquidity Ratios

Liquidity and interest coverage ratios are of great importance in evaluating the riskiness of a firm's securities. They aid in assessing the financial strength of the firm.

Liquidity ratios include the current ratio, quick ratio, and cash ratio.

1. **Current ratio:** current assets/current liabilities. This ratio measures the ability of the firm to pay off its current liabilities by liquidating its current assets (that is, turning them into cash). It indicates the firm's ability to avoid insolvency in the short run. GI's current ratio in 2006, for example, was (60 + 30 + 90)/(36 + 87.3) = 1.46. In other years, it was

current ratio
Current assets/current liabilities.

2006	2007	2008	2008 Industry Average
1.46	1.17	0.97	2.0

This represents an unfavorable time trend and poor standing relative to the industry.

2. **Quick ratio:** (cash + marketable securities + receivables)/current liabilities. This ratio is also called the **acid test ratio.** It has the same denominator as the current ratio, but its numerator includes only cash, cash equivalents such as marketable securities, and receivables. The quick ratio is a better measure of liquidity than the current ratio for firms whose inventory is not readily convertible into cash. GI's quick ratio shows the same disturbing trends as its current ratio:

quick ratio, or acid test ratio
A measure of liquidity similar to the current ratio except for exclusion of inventories.

2006	2007	2008	2008 Industry Average
0.73	0.58	0.49	1.0

3. **Cash ratio.** A company's receivables are less liquid than its holdings of cash and marketable securities. Therefore, in addition to the quick ratio, analysts also compute a firm's cash ratio, defined as

cash ratio
Another liquidity measure. Ratio of cash and marketable securities to current liabilities.

$$\text{Cash ratio} = \frac{\text{Cash} + \text{Marketable securities}}{\text{Current liabilities}}$$

GI's cash ratios are

2006	2007	2008	2008 Industry Average
.487	.389	.324	.70

GI's liquidity ratios have fallen dramatically over this three-year period, and by 2008, they are far below the industry average. The decline in the liquidity ratios combined with the decline in coverage ratio (you can confirm that times interest earned also has fallen over this period) suggest that its credit rating has been declining as well, and no doubt, GI is considered a relatively poor credit risk in 2008.

Market Price Ratios

There are two important market price ratios: the market-to-book-value ratio and the price–earnings ratio.

market-to-book-value ratio
Market price of a share divided by book value per share.

The **market-to-book-value ratio** (P/B) equals the market price of a share of the firm's common stock divided by its *book value*, that is, shareholders' equity per share. Analysts sometimes consider the stock of a firm with a low market-to-book value to be a "safer" investment, seeing the book value as a "floor" supporting the market price.

Analysts presumably view book value as the level below which market price will not fall because the firm always has the option to liquidate, or sell, its assets for their book values. However, this view is questionable. In fact, some firms do sometimes sell for less than book value. For example, in March 2006, shares in GM sold for only about 70% of book value per share. Nevertheless, a low market-to-book-value ratio is seen by some as providing a "margin of safety," and some analysts will screen out or reject high P/B firms in their stock selection process. Recall Chapter 8, where we saw that high book-to-market (or low P/B) firms seem to provide a "value premium."

The theory of equity valuation offers some insight into the significance of the P/B ratio. A high P/B ratio is an indication that investors think a firm has opportunities of earning a rate of return on their investment in excess of the market capitalization rate, k.

EXAMPLE 14.3 *Price-to-Book Ratio and Investment Opportunities*

Return to Table 13.3 in the previous chapter, which assumes the market capitalization rate is 12% per year. Now add the assumptions that the book value per share is \$8.33 and that the coming year's expected EPS is \$1, so that in the case for which the expected ROE on future investments also is 12%, the stock will sell at \$1/.12 = \$8.33, and the P/B ratio will be 1.

Table 14.9 shows the P/B ratio for alternative assumptions about future ROE and plowback ratio. Reading down any column, you can see how the P/B ratio changes with ROE. The numbers reveal that, for a given plowback ratio, the P/B ratio is higher, the higher the expected ROE. This makes sense, because the greater the expected profitability of the firm's future investment opportunities, the greater its market value as an ongoing enterprise compared with the cost of acquiring its assets.

TABLE 14.9 Effect of ROE and plowback ratio on P/B

	Plowback Ratio (b)			
ROE	0	25%	50%	75%
10%	1.00	0.95	0.86	0.67
12	1.00	1.00	1.00	1.00
14	1.00	1.06	1.20	2.00

Note: The assumptions and formulas underlying this table are: $E_1 = \$1$; book value per share = \$8.33; $k = 12\%$ per year.

$$g = b \times \text{ROE}$$

$$P_0 = \frac{(1-b)E}{k-g}$$

$$P/B = P_0/\$8.33$$

We've noted that the price–earnings ratio that is based on the firm's financial statements and reported in newspaper stock listings is not the same as the price–earnings multiple that emerges from a discounted dividend model. The numerator is the same (the market price of the stock), but the denominator is different. The P/E ratio uses the most recent past accounting earnings, while the P/E multiple predicted by valuation models uses expected future economic earnings.

price–earnings ratio
The ratio of a stock's price to its earnings per share. Also referred to as the P/E multiple.

Many security analysts pay careful attention to the accounting P/E ratio in the belief that among low P/E stocks they are more likely to find bargains than with high P/E stocks. (Remember from Chapter 8 that low P/E stocks have in fact generally been positive-alpha investments using the CAPM as a benchmark.) The idea is that you can acquire a claim on a dollar of earnings more cheaply if the P/E ratio is low. For example, if the P/E ratio is 8, you pay \$8 per share per \$1 of *current* earnings, while if the P/E ratio is 12, you must pay \$12 for a claim on \$1 of current earnings.

Note, however, that current earnings may differ substantially from future earnings. The higher P/E stock still may be a bargain relative to the low P/E stock if its earnings and dividends are expected to grow at a faster rate. Our point is that ownership of the stock conveys the right to future earnings as well as to current earnings. An exclusive focus on the commonly reported accounting P/E ratio can be shortsighted because by its nature it ignores future growth in earnings.

An efficient markets adherent will be skeptical of the notion that a strategy of investing in low P/E stocks will result in an expected rate of return greater than that of investing in high or medium P/E stocks having the same risk. The empirical evidence on this question is mixed, but if the strategy has worked in the past, it surely should not work in the future because too many investors will be following it. This is the lesson of market efficiency.

Before leaving the P/B and P/E ratios, it is worth pointing out the relationship among these ratios and ROE.

$$\text{ROE} = \frac{\text{Earnings}}{\text{Book value}} = \frac{\text{Market price}}{\text{Book value}} \div \frac{\text{Market price}}{\text{Earnings}}$$

$$= \text{P/B ratio} \div \text{P/E ratio}$$

Rearranging terms, we find that a firm's earnings yield, the ratio of earnings to price, is equal to its ROE divided by the market-to-book-value ratio:

earnings yield
The ratio of earnings to price, E/P.

$$\frac{E}{P} = \frac{\text{ROE}}{\text{P/B}}$$

Thus, a company with a high ROE can have a relatively low earnings yield because its P/B ratio is high. This indicates that a high ROE does not in and of itself imply the stock is a good buy. The price of the stock already may be bid up to reflect an attractive ROE. If so, the P/B ratio will be above 1.0, and the earnings yield to stockholders will be below the ROE, as the equation demonstrates. The relationship shows that a strategy of investing in the stock of high ROE firms may produce a lower holding-period return than investing in the stock of firms with a low ROE.

For example, Clayman (1987) found that investing in the stocks of 29 "excellent" companies, with mean reported ROE of 19.05% during the period 1976 to 1980, produced results much inferior to investing in 39 "unexcellent" companies, those with a mean ROE of 7.09% during the period. An investor putting equal dollar amounts in the stock of the unexcellent companies would have earned a portfolio rate of return over the 1981 to 1985 period that was 11.3% higher per year than the rate of return on a comparable portfolio of excellent company stocks.

CONCEPT check 14.3

What were GI's ROE, P/E, and P/B ratios in the year 2008? How do they compare to the industry average ratios, which were:

ROE = 8.64%
P/E = 8
P/B = 0.69

How does GI's earnings yield in 2008 compare to the industry average?

Table 14.10 summarizes the ratios reviewed in this section.

TABLE 14.10
Summary of key financial ratios

Leverage ratios:	
Interest burden	$\frac{\text{EBIT} - \text{Interest expense}}{\text{EBIT}}$
Interest coverage (Times interest earned)	$\frac{\text{EBIT}}{\text{Interest expense}}$
Leverage	$\frac{\text{Assets}}{\text{Equity}} = 1 + \frac{\text{Debt}}{\text{Equity}}$
Compound leverage factor	Interest burden × Leverage
Asset utilization:	
Total asset turnover	$\frac{\text{Sales}}{\text{Average total assets}}$
Fixed asset turnover	$\frac{\text{Sales}}{\text{Average fixed assets}}$
Inventory turnover	$\frac{\text{Cost of goods sold}}{\text{Average inventories}}$
Days receivables	$\frac{\text{Average accounts receivable}}{\text{Annual sales}} \times 365$
Liquidity:	
Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$
Quick ratio	$\frac{\text{Cash} + \text{Marketable securities} + \text{Receivables}}{\text{Current liabilities}}$
Cash ratio	$\frac{\text{Cash} + \text{Marketable securities}}{\text{Current liabilities}}$
Profitability ratios:	
Return on assets	$\frac{\text{EBIT}}{\text{Average total assets}}$
Return on equity	$\frac{\text{Net income}}{\text{Average stockholders' equity}}$
Return on sales (Profit margin)	$\frac{\text{EBIT}}{\text{Sales}}$
Market price ratios:	
Market-to-book	$\frac{\text{Price per share}}{\text{Book value per share}}$
Price–earnings ratio	$\frac{\text{Price per share}}{\text{Earnings per share}}$
Earnings yield	$\frac{\text{Earnings per share}}{\text{Price per share}}$

Choosing a Benchmark

We have discussed how to calculate the principal financial ratios. To evaluate the performance of a given firm, however, you need a benchmark to which you can compare its ratios. One obvious benchmark is the ratio for the same company in earlier years. For example, Figure 14.1 shows Hewlett-Packard's return on assets, profit margin, and asset turnover ratio for the last few years.

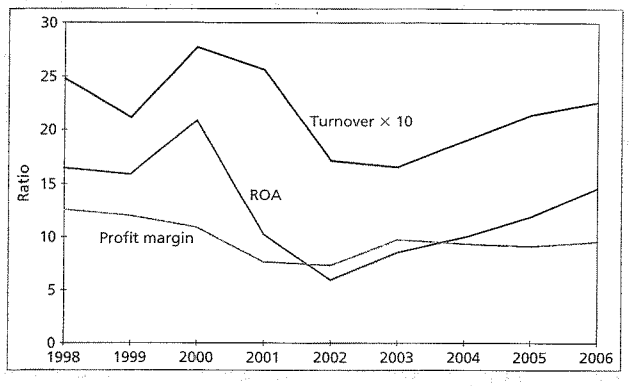


FIGURE 14.1
DuPont decomposition for Hewlett-Packard

TABLE 14.11
Financial Ratios for Major Industry Groups

	LT Debt Assets	Interest Coverage	Current Ratio	Quick Ratio	Asset Turnover	Profit Margin (%)	Return on Assets (%)	Return on Equity (%)	Payout Ratio
All manufacturing	0.18	4.06	1.29	0.92	0.97	6.57	6.35	17.18	0.43
Food products	0.25	3.71	1.22	0.71	1.33	6.43	8.54	17.93	0.41
Clothing	0.18	7.34	2.12	1.25	1.50	10.05	15.09	25.35	0.28
Printing/publishing	0.33	3.43	1.32	1.03	1.43	7.24	10.32	17.08	0.47
Chemicals	0.18	3.04	1.10	0.81	0.61	8.12	4.98	18.68	0.51
Drugs	0.14	6.05	1.19	0.94	0.50	10.27	5.09	22.50	0.45
Machinery	0.17	4.65	1.48	1.03	0.93	7.75	7.20	15.01	0.21
Electrical/electronic	0.11	5.46	1.49	1.17	0.66	6.61	4.34	12.04	0.27
Motor vehicles	0.18	−1.85	0.90	0.70	1.10	−4.10	−4.53	−11.70	−0.67

Source: U.S. Department of *Commerce, Quarterly Financial Report for Manufacturing, Mining and Trade Corporations*, third quarter 2005.

You can see there that most of the variation in HP's return on assets has been driven by the considerable variation in its asset turnover ratio. In contrast, its profit margin has been relatively stable.

It is also helpful to compare financial ratios to those of other firms in the same industry. Financial ratios for industries are published by the U.S. Department of Commerce, Dun & Bradstreet, the Risk Management Association, and others, and many ratios are available on the Web, for example, on the Yahoo! Finance site. Standard & Poor's Market Insight is a good source of ratios, and is available to users of this text at **www.mhhe.com/edumarketinsight**.

Table 14.11 presents ratios for a sample of major industry groups to give you a feel for some of the differences across industries. You should note that while some ratios such as asset turnover or total debt ratio tend to be relatively stable, others such as return on assets or equity are more sensitive to current business conditions. Notice for example the negative profitability measures for the motor vehicle industry.

14.5 ECONOMIC VALUE ADDED

One common use of financial ratios is to evaluate the performance of the firm. While it is common to use profitability to measure that performance, profitability is really not enough. A firm should be viewed as successful only if the return on its projects is better than the rate investors could expect to earn for themselves (on a risk-adjusted basis) in the capital market. Think back to Table 14.9, where we showed that plowing back funds into the firm increases share value

TABLE 14.12
Economic Value Added, 2006

	EVA ($ billion)	Capital ($ billion)	ROA (%)	Cost of capital (%)
Royal Dutch Shell	$ 3.98	$121.15	12.2%	8.9%
GlaxoSmithKline	3.26	29.41	18.2	7.2
Wal-Mart	2.13	100.78	8.9	6.7
Genentech	1.11	11.72	16.3	6.8
Motorola	−0.80	21.43	6.9	10.6
Intel	−1.35	38.59	9.8	13.3
Hewlett-Packard	−2.35	41.39	6.2	11.9
AT&T	−5.65	177.76	3.7	6.9

Source: Authors' calculations using data from Yahoo! Finance (**finance.yahoo.com**).

only if the firm earns a higher rate of return on the reinvested funds than the opportunity cost of capital, that is, the market capitalization rate. To account for this opportunity cost, we might measure the success of the firm using the difference between the return on assets, ROA, and the opportunity cost of capital. **Economic value added** (EVA) is the spread between ROA and the cost of capital multiplied by the capital invested in the firm. It therefore measures the dollar value of the firm's return in excess of its opportunity cost. Another term for EVA (the term coined by Stern Stewart, a consulting firm that has promoted the concept) is **residual income.**

economic value added, or residual income

A measure of the dollar value of a firm's return in excess of its opportunity cost.

EXAMPLE 14.4

Economic Value Added

In 2006, Wal-Mart had a weighted-average cost of capital of 6.7% (based on its cost of debt, its capital structure, its equity beta, and estimates derived from the CAPM for the cost of equity). Wal-Mart's return on assets was 8.9%, fully 2.2% greater than the opportunity cost of capital on its investments in plant, equipment, and know-how. In other words, each dollar invested by Wal-Mart earned about 2.2 cents more than the return that investors could have anticipated by investing in equivalent-risk stocks. Wal-Mart earned this superior rate of return on a capital base of $100.78 billion. Its economic value added, that is, its return in excess of opportunity cost was therefore (.089 − .067) × $100.78 = $2.13 billion.

Table 14.12 shows EVA for a small sample of firms.[3] The EVA leader in this sample was Royal Dutch Shell. Notice that its EVA was greater than GlaxoSmithKline's, despite a considerably smaller margin between ROA and the cost of capital. This is because Shell applied its margin to a much larger capital base. At the other extreme, AT&T earned less than its opportunity cost on a very large capital base, which resulted in a large negative EVA.

Notice that even the EVA "losers" in Table 14.12 had positive profits. For example, by conventional standards, Motorola was solidly profitable in 2006, with an ROA of 6.9%. But by virtue of its high business risk, its cost of capital was higher, at 10.6%. By this standard, Motorola did not cover its opportunity cost of capital, and its EVA in 2006 was negative. EVA treats the opportunity cost of capital as a real cost that, like other costs, should be deducted from revenues to arrive at a more meaningful "bottom line." A firm that is earning profits but is not covering its opportunity cost might be able to redeploy its capital to better uses. Therefore, a growing number of firms now calculate EVA and tie managers' compensation to it.

14.6 AN ILLUSTRATION OF FINANCIAL STATEMENT ANALYSIS

In her 2008 annual report to the shareholders of Growth Industries, Inc., the president wrote: "2008 was another successful year for Growth Industries. As in 2007, sales, assets, and operating income all continued to grow at a rate of 20%."

[3]Actual EVA estimates reported by Stern Stewart (a consulting firm that has done much to develop and promote the concept of EVA) differ from the values in Table 14.12 because of adjustments to the accounting data involving issues such as treatment of research and development expenses, taxes, advertising expenses, and depreciation. The estimates in Table 14.12 are designed to show the logic behind EVA but must be taken as imprecise.

TABLE 14.13
Key financial ratios of Growth Industries, Inc.

Year	ROE	(1) Net Profit / Pretax Profit	(2) Pretax Profit / EBIT	(3) EBIT / Sales (Margin)	(4) Sales / Assets (Turnover)	(5) Assets / Equity	(6) Compound Leverage Factor (2) × (5)	(7) ROA (3) × (4)	P/E	P/B
2006	7.51%	0.6	0.650	30%	0.303	2.117	1.376	9.09%	8	0.58
2007	6.08	0.6	0.470	30	0.303	2.375	1.116	9.09	6	0.35
2008	3.03	0.6	0.204	30	0.303	2.723	0.556	9.09	4	0.12
Industry average	8.64	0.6	0.800	30	0.400	1.500	1.200	12.00	8	0.69

Is she right?

We can evaluate her statement by conducting a full-scale ratio analysis of Growth Industries. Our purpose is to assess GI's performance in the recent past, to evaluate its future prospects, and to determine whether its market price reflects its intrinsic value.

Table 14.13 shows some key financial ratios we can compute from GI's financial statements. The president is certainly right about the growth in sales, assets, and operating income. Inspection of GI's key financial ratios, however, contradicts her first sentence: 2008 was not another successful year for GI—it appears to have been another miserable one.

ROE has been declining steadily from 7.51% in 2006 to 3.03% in 2008. A comparison of GI's 2008 ROE to the 2008 industry average of 8.64% makes the deteriorating time trend especially alarming. The low and falling market-to-book-value ratio and the falling price–earnings ratio indicate that investors are less and less optimistic about the firm's future profitability.

The fact that ROA has not been declining, however, tells us that the source of the declining time trend in GI's ROE must be due to financial leverage. And in fact, as GI's leverage ratio climbed from 2.117 in 2006 to 2.723 in 2008, its interest-burden ratio worsened from 0.650 to 0.204—with the net result that the compound leverage factor fell from 1.376 to 0.556.

The rapid increase in short-term debt from year to year and the concurrent increase in interest expense make it clear that, to finance its 20% growth rate in sales, GI has incurred sizable amounts of short-term debt at high interest rates. The firm is paying rates of interest greater than the ROA it is earning on the investment financed with the new borrowing. As the firm has expanded, its situation has become ever more precarious.

In 2008, for example, the average interest rate on short-term debt was 20% versus an ROA of 9.09%. (We compute the average interest rate on short-term debt by taking the total interest expense of $34,391,000, subtracting the $6 million in interest on the long-term bonds, and dividing by the beginning-of-year short-term debt of $141,957,000.)

GI's problems become clear when we examine its statement of cash flows in Table 14.14. The statement is derived from the income statement and balance sheet in Table 14.8. GI's cash flow from operations is falling steadily, from $12,700,000 in 2006 to $6,725,000 in 2008. The firm's investment in plant and equipment, by contrast, has increased greatly. Net plant and equipment (i.e., net of depreciation) rose from $150,000,000 in 2005 to $259,200,000 in 2008. This near doubling of the capital assets makes the decrease in cash flow from operations all the more troubling.

The source of the difficulty is GI's enormous amount of short-term borrowing. In a sense, the company is being run as a pyramid scheme. It borrows more and more each year to maintain its 20% growth rate in assets and income. However, the new assets are not generating enough cash flow to support the extra interest burden of the debt, as the falling cash flow from operations indicates. Eventually, when the firm loses its ability to borrow further, its growth will be at an end.

At this point, GI stock might be an attractive investment. Its market price is only 12% of its book value, and with a P/E ratio of 4, its earnings yield is 25% per year. GI is a likely candidate for a takeover by another firm that might replace GI's management and build shareholder value through a radical change in policy.

TABLE 14.14
Growth Industries statement of cash flows ($ thousands)

	2006	2007	2008
Cash flow from operating activities			
Net income	$ 11,700	$ 10,143	$ 5,285
+ Depreciation	15,000	18,000	21,600
+ Decrease (increase) in accounts receivable	(5,000)	(6,000)	(7,200)
+ Decrease (increase) in inventories	(15,000)	(18,000)	(21,600)
+ Increase in accounts payable	6,000	7,200	8,640
	$ 12,700	$ 11,343	$ 6,725
Cash flow from investing activities			
Investment in plant and equipment*	$(45,000)	$(54,000)	$(64,800)
Cash flow from financing activities			
Dividends paid†	$ 0	$ 0	$ 0
Short-term debt issued	42,300	54,657	72,475
Change in cash and marketable securities‡	$ 10,000	$ 12,000	$ 14,400

*Gross investment equals increase in net plant and equipment plus depreciation.

†We can conclude that no dividends are paid because stockholders' equity increases each year by the full amount of net income, implying a plowback ratio of 1.0.

‡Equals cash flow from operations plus cash flow from investment activities plus cash flow from financing activities. Note that this equals the yearly change in cash and marketable securities on the balance sheet.

CONCEPT check 14.4

You have the following information for IBX Corporation for the years 2006 and 2009 (all figures are in $millions):

	2009	2006
Net income	$ 253.7	$ 239.0
Pretax income	411.9	375.6
EBIT	517.6	403.1
Average assets	4,857.9	3,459.7
Sales	6,679.3	4,537.0
Shareholders' equity	2,233.3	2,347.3

What is the trend in IBX's ROE, and how can you account for it in terms of tax burden, margin, turnover, and financial leverage?

14.7 COMPARABILITY PROBLEMS

Financial statement analysis gives us a good amount of ammunition for evaluating a company's performance and future prospects. But comparing financial results of different companies is not so simple. There is more than one acceptable way to represent various items of revenue and expense according to generally accepted accounting principles (GAAP). This means two firms may have exactly the same economic income yet very different accounting incomes.

Furthermore, interpreting a single firm's performance over time is complicated when inflation distorts the dollar measuring rod. Comparability problems are especially acute in this case because the impact of inflation on reported results often depends on the particular method the firm adopts to account for inventories and depreciation. The security analyst must adjust the earnings and the financial ratio figures to a uniform standard before attempting to compare financial results across firms and over time.

Comparability problems can arise out of the flexibility of GAAP guidelines in accounting for inventories and depreciation and in adjusting for the effects of inflation. Other important potential sources of noncomparability include the capitalization of leases and other expenses, the treatment of pension costs, and allowances for reserves, but they are beyond the scope of this book.

Inventory Valuation

LIFO
The last-in first-out accounting method of valuing inventories.

FIFO
The first-in first-out accounting method of valuing inventories.

There are two commonly used ways to value inventories: **LIFO** (last-in, first-out) and **FIFO** (first-in, first-out). We can explain the difference using a numerical example.

Suppose Generic Products, Inc. (GPI), has a constant inventory of 1 million units of generic goods. The inventory turns over once per year, meaning the ratio of cost of goods sold to inventory is 1.

The LIFO system calls for valuing the million units used up during the year at the current cost of production, so that the last goods produced are considered the first ones to be sold. They are valued at today's cost. The FIFO system assumes that the units used up or sold are the ones that were added to inventory first, and goods sold should be valued at original cost.

If the price of generic goods were constant, at the level of $1, say, the book value of inventory and the cost of goods sold would be the same, $1 million under both systems. But suppose the price of generic goods rises by 10 cents per unit during the year as a result of inflation.

LIFO accounting would result in a cost of goods sold of $1.1 million, while the end-of-year balance sheet value of the 1 million units in inventory remains $1 million. The balance sheet value of inventories is given as the cost of the goods still in inventory. Under LIFO, the last goods produced are assumed to be sold at the current cost of $1.10; the goods remaining are the previously produced goods, at a cost of only $1. You can see that, although LIFO accounting accurately measures the cost of goods sold today, it understates the current value of the remaining inventory in an inflationary environment.

In contrast, under FIFO accounting, the cost of goods sold would be $1 million, and the end-of-year balance sheet value of the inventory is $1.1 million. The result is that the LIFO firm has both a lower reported profit and a lower balance sheet value of inventories than the FIFO firm.

LIFO is preferred over FIFO in computing economics earnings (that is, real sustainable cash flow), because it uses up-to-date prices to evaluate the cost of goods sold. A disadvantage is that LIFO accounting induces balance sheet distortions when it values investment in inventories at original cost. This practice results in an upward bias in ROE because the investment base on which return is earned is undervalued.

Depreciation

Another source of problems is the measurement of depreciation, which is a key factor in computing true earnings. The accounting and economic measures of depreciation can differ markedly. According to the *economic* definition, depreciation is the amount of a firm's operating cash flow that must be reinvested in the firm to sustain its real cash flow at the current level.

The *accounting* measurement is quite different. Accounting depreciation is the amount of the original acquisition cost of an asset that is allocated to each accounting period over an arbitrarily specified life of the asset. This is the figure reported in financial statements.

Assume, for example, that a firm buys machines with a useful economic life of 20 years at $100,000 apiece. In its financial statements, however, the firm can depreciate the machines over 10 years using the straight-line method, for $10,000 per year in depreciation. Thus, after 10 years, a machine will be fully depreciated on the books, even though it remains a productive asset that will not need replacement for another 10 years.

In computing accounting earnings, this firm will overestimate depreciation in the first 10 years of the machine's economic life and underestimate it in the last 10 years. This will cause reported earnings to be understated compared with economic earnings in the first 10 years and overstated in the last 10 years.

Depreciation comparability problems add one more wrinkle. A firm can use different depreciation methods for tax purposes than for other reporting purposes. Most firms use accelerated depreciation methods for tax purposes and straight-line depreciation in published financial statements. There also are differences across firms in their estimates of the depreciable life of plant, equipment, and other depreciable assets.

The major problem related to depreciation, however, is caused by inflation. Because conventional depreciation is based on historical costs rather than on the current replacement cost of assets, measured depreciation in periods of inflation is understated relative to replacement cost, and *real* economic income (sustainable cash flow) is correspondingly overstated.

For example, suppose Generic Products, Inc., has a machine with a three-year useful life that originally cost $3 million. Annual straight-line depreciation is $1 million, regardless of what happens to the replacement cost of the machine. Suppose inflation in the first year turns out to be 10%. Then the true annual depreciation expense is $1.1 million in current terms, while conventionally measured depreciation remains fixed at $1 million per year. Accounting income therefore overstates *real* economic income.

Inflation and Interest Expense

While inflation can cause distortions in the measurement of a firm's inventory and depreciation costs, it has perhaps an even greater effect on the calculation of *real* interest expense. Nominal interest rates include an inflation premium that compensates the lender for inflation-induced erosion in the real value of principal. From the perspective of both lender and borrower, therefore, part of what is conventionally measured as interest expense should be treated more properly as repayment of principal.

EXAMPLE 14.5 *Inflation and Real Income*

Suppose Generic Products has debt outstanding with a face value of $10 million at an interest rate of 10% per year. Interest expense as conventionally measured is $1 million per year. However, suppose inflation during the year is 6%, so that the real interest rate is 4%. Then $0.6 million of what appears as interest expense on the income statement is really an inflation premium, or compensation for the anticipated reduction in the real value of the $10 million principal; only $0.4 million is *real* interest expense. The $0.6 million reduction in the purchasing power of the outstanding principal may be thought of as repayment of principal, rather than as an interest expense. Real income of the firm is, therefore, understated by $0.6 million.

This mismeasurement of real interest means that inflation results in an underestimate of real income. The effects of inflation on the reported values of inventories and depreciation that we have discussed work in the opposite direction.

CONCEPT check 14.5

In a period of rapid inflation, companies ABC and XYZ have the same *reported* earnings. ABC uses LIFO inventory accounting, has relatively fewer depreciable assets, and has more debt than XYZ. XYZ uses FIFO inventory accounting. Which company has the higher *real* income and why?

On the MARKET FRONT

THE ONES THAT GET AWAY

It is corporate earnings season once again, and investors are poring over the numbers. Profits figures are meant to shed light on how a company—and its stock price—might fare in the future. But many experts worry that increasingly they don't. Past accounting scandals show that accounting numbers are malleable. And they are getting squishier as the use of estimates in company accounts increases.

Ever since accounting shifted from the simple tallying of cash in and cash out to "accrual accounting," where profits and expenses are booked when incurred, forward-looking estimates have played a critical role in measuring company profits. The biggest boost to estimation, however, has come from the gradual shift to "fair-value" accounting. Before, assets and liabilities were mostly carried at their historic, original cost; "fair value" is an attempt to show their current worth. Fair-value numbers are up-to-date and arguably more relevant than their static but verifiable precursors. But they also result in more volatile profits and a heavier reliance on estimates for the many items (bank loans, buildings) that may not have a ready market.

Baruch Lev of New York University's Stern School of Business and Siyi Li and Theodore Sougiannis from the University of Illinois at Urbana-Champaign harbor a deeper worry: that estimates, which are supposed to improve the relevance of financial information by giving managers a means to impart their forward-looking views, are not very useful at all. They found that while recent cash flows predicted future performance, adding estimates to them was of little help. Mr. Lev concludes that these results "point to the urgent need to enhance the reliability of accounting estimates—especially given the move to fair value."

On this point, even proponents of fair value agree. The Financial Accounting Standards Board (FASB) has devised a "hierarchy" of items according to how difficult they are to value. At the top are items that have an observable price in a deep, liquid market (e.g., listed corporate debt). In the middle are items where sophisticated valuation models are based on market inputs (e.g., employee stock options). At the bottom are items where valuations are based wholly on management projections (e.g., Enron's most esoteric financial instruments).

"Estimates are part of accounting. So the focus shouldn't be on the number of estimates," argues Neri Bukspan, chief accountant at Standard & Poor's, "but rather the objectivity and independence of those making the estimates and those tasked with verifying them." This puts a greater onus on auditors to weed out good estimates from hyped ones—making their independence even more critical than it seemed after Enron. The Public Accounting Oversight Board, recognizing this, also plans to expand its audit guidance on fair value.

Investors need to scrutinize the numbers harder, too. Both FASB and its international counterpart are drafting standards requiring increased disclosure of how fair values are derived and their impact on profits and balance sheets.

SOURCE *The Economist*, July 28, 2005.

Fair Value Accounting

Many major assets and liabilities do not have easily observable values. For example, we cannot simply look up the values of employee stock options, health care benefits for retired employees, buildings and other real estate, or complex derivatives contracts. While the true financial status of a firm may depend critically on these values, which can swing widely over time, common practice has been to simply value them at historic cost. Proponents of fair value accounting argue that financial statements would give a truer picture of the firm if they better reflected the current market values of all assets and liabilities.

fair value accounting
Use of current market values rather than historic cost in the firm's financial statements.

Opponents of this approach argue that fair value accounting relies too heavily on estimates. Such estimates potentially introduce considerable noise in firms' accounts and can induce great profit volatility as fluctuations in asset valuations are recognized. Even worse, subjective valuations may offer management a tempting tool to manipulate earnings or the apparent financial condition of the firm at opportune times. For example, Bergstresser, Desai, and Rauh (2006) find that firms make more aggressive assumptions about returns on defined benefit pension plans (which lowers the computed present value of pension obligations) during periods in which executives are actively exercising their stock options.

Despite these potential problems, regulators in both the U.S. and Europe are gradually moving toward greater use of fair value accounting. The nearby box reports on this trend.

Quality of Earnings and Accounting Practices

quality of earnings
The realism and sustainability of reported earnings.

Many firms make accounting choices that present their financial statements in the best possible light. The different choices that firms can make give rise to the comparability problems we have discussed. As a result, earnings statements for different companies may be more or less rosy presentations of true "economic earnings"—sustainable cash flow that can be paid to shareholders without impairing the firm's productive capacity. Analysts commonly evaluate the **quality of earnings** reported by a firm. This concept refers to the realism and conservatism of the earnings number, in other words, the extent to which we might expect the reported level of earnings to be sustained.

Examples of the accounting choices that influence quality of earnings are:

- *Allowance for bad debt.* Most firms sell goods using trade credit and must make an allowance for bad debt. An unrealistically low allowance reduces the quality of reported earnings. Look for a rising average collection period on accounts receivable as evidence of potential problems with future collections.
- *Nonrecurring items.* Some items that affect earnings should not be expected to recur regularly. These include asset sales, effects of accounting changes, effects of exchange rate movements, or unusual investment income. For example, in 2003, which was a banner year for equity returns, some firms enjoyed large investment returns on securities held. These contributed to that year's earnings, but should not be expected to repeat regularly. They would be considered a "low-quality" component of earnings. Similarly gains in corporate pension plans can generate large, but one-time, contributions to reported earnings.
- *Earnings smoothing.* In 2003, Freddie Mac was the subject of a major accounting scandal, with the disclosure that it had improperly reclassified mortgages held in its portfolio in an attempt to *reduce* its current earnings. Similarly, in the 1990s, W. R. Grace chose to offset high earnings in one of its subsidiaries by setting aside extra reserves. Why would these firms take such actions? Because later, if earnings turned down, they could "release" earnings by reversing these transactions, and thereby create the appearance of steady earnings growth. Indeed, Freddie Mac's nickname on Wall Street was "Steady Freddie." Wall Street likes strong, steady earnings growth, but these firms planned to provide such growth only cosmetically, through earnings management.
- *Stock options.* Many firms, particularly start-ups, compensate employees in large part with stock options. To the extent that these options replace cash salary that otherwise would need to be paid, the value of the options should be considered as one component of the firm's labor expense. After more than a decade of debate, the Financial Accounting Standards Board decided to require firms to recognize stock option grants as an expense starting in 2005. However, the means to value employee options is far from standard, and thus is another source of variation in earnings quality.
- *Revenue recognition.* Under GAAP accounting, a firm is allowed to recognize a sale before it is paid. This is why firms have accounts receivable. But sometimes it can be hard to know when to recognize sales. For example, suppose a computer firm signs a contract to provide products and services over a five-year period. Should the revenue be booked immediately or spread out over five years? A more extreme version of this problem is called "channel stuffing," in which firms "sell" large quantities of goods to customers, but give them the right to later either refuse delivery or return the product. The revenue from the "sale" is booked now, but the likely returns are not recognized until they occur (in a future accounting period). According to the SEC, Sunbeam, which filed for bankruptcy in 2001, generated $60 million in fraudulent profits in 1999 using this technique. If you see accounts receivable increasing far faster than sales, or becoming a larger percentage of total assets, beware of these practices. Given the wide latitude firms have to manipulate revenue, many analysts choose instead to concentrate on cash flow, which is far harder for a company to manipulate.
- *Off-balance-sheet assets and liabilities.* Suppose that one firm guarantees the outstanding debt of another firm, perhaps a firm in which it has an ownership stake. That obligation ought to be disclosed as a *contingent liability,* since it may require payments down the road. But these obligations may not be reported as part of the firm's outstanding debt. Similarly, leasing may be used to manage off-balance-sheet assets and liabilities. Airlines, for example, may show no aircraft on their balance sheets but have long-term leases that are virtually equivalent to debt-financed ownership. However, if the leases are treated as operating rather than capital leases, they may appear only as footnotes to the financial statements.

International Accounting Conventions

The examples cited above illustrate some of the problems that analysts can encounter when attempting to interpret financial data. Even greater problems arise in the interpretation of the financial statements of foreign firms. This is because these firms do not follow GAAP guidelines. Accounting practices in various countries differ to greater or lesser extents from U.S. standards. Here are some of the major issues that you should be aware of when using the financial statements of foreign firms.

Reserving practices Many countries allow firms considerably more discretion in setting aside reserves for future contingencies than is typical in the United States. Because additions to reserves result in a charge against income, reported earnings are far more subject to managerial discretion than in the United States.

Germany is a country that has allowed wide discretion in reserve practice. When Daimler-Benz AG (producer of the Mercedes Benz) decided to issue shares on the New York Stock Exchange in 1993, it had to revise its accounting statements in accordance with U.S. standards. The revisions transformed a $370 million profit for 1993 using German accounting rules into a $1 million *loss* under more stringent U.S. rules.

Depreciation As discussed above, in the United States firms typically maintain separate sets of accounts for tax and reporting purposes. For example, accelerated depreciation is used for tax purposes, while straight-line depreciation is used for reporting purposes. In contrast, most other countries do not allow dual sets of accounts, and most firms in foreign countries use accelerated depreciation to minimize taxes despite the fact that it results in lower reported earnings. This makes reported earnings of foreign firms lower than they would be if the firms were allowed to follow the U.S. practice.

Intangibles Treatment of intangibles can vary widely. Are they amortized or expensed? If amortized, over what period? Such issues can have a large impact on reported profits. A study by Speidell and Bavishi (1992) recalculated the financial statements of firms in several countries using common accounting rules. Figure 14.2, from their study, compares P/E ratios as reported and restated on a common basis. While P/E multiples have changed considerably since this study was published, these results illustrate how different accounting rules can have a big impact on these ratios.

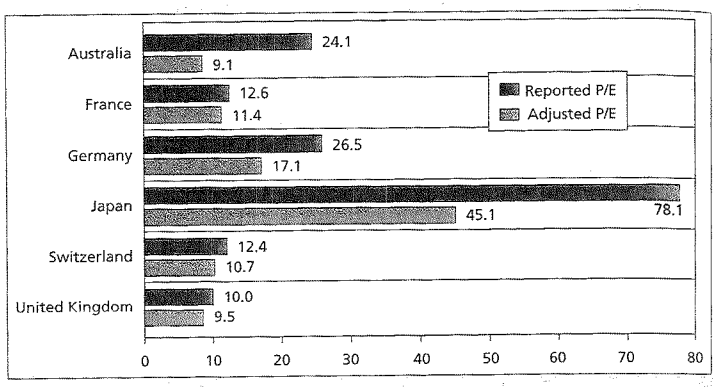
Such differences in international accounting standards have become more of a problem as the drive to globally integrate capital markets progresses. For example, many foreign firms would like to list their shares on the New York Stock Exchange in order to more easily tap the U.S. equity markets, and the NYSE would like to have those firms listed. But the Securities and Exchange Commission (SEC) will not allow such shares to be listed unless the firms prepare their financial statements in accordance with U.S. GAAP standards. This has limited the listing of non-U.S. companies dramatically.

In contrast, the European Union has moved to institute common international financial reporting standards (IFRS) across the EU, and even many non-EU countries have adopted these rules. Moreover, negotiations have been ongoing for nearly a decade to narrow differences between IFRS and U.S. GAAP rules, with the ultimate goal being a truly global set of accounting standards.

The major difference between IFRS and GAAP has to do with "principles"-versus "rules"-based standards. U.S. rules are detailed, explicit, and lengthy. European rules are

FIGURE 14.2
Adjusted versus reported price–earnings ratios

Source: Lawrence S. Speidell and Vinod Bavishi, "GAAP Arbitrage: Valuation Opportunities in International Accounting Standards," *Financial Analysts Journal*, November–December 1992, pp. 58–66. Copyright 1992, Association for Investment Management and Research. Reproduced and republished from *Financial Analysts Journal* with permission from the Association for Investment Management and Research. All Rights Reserved.



more flexible, but firms must be prepared to demonstrate that they have conformed to general principles meant to ensure that financial accounts faithfully reflect the actual status of the firm. The nearby box is a brief status report on the movement toward global accounting standards.

14.8 VALUE INVESTING: THE GRAHAM TECHNIQUE

No presentation of fundamental security analysis would be complete without a discussion of the ideas of Benjamin Graham, the greatest of the investment "gurus." Until the evolution of modern portfolio theory in the latter half of this century, Graham was the single most important thinker, writer, and teacher in the field of investment analysis. His influence on investment professionals remains very strong.

Graham's magnum opus is *Security Analysis*, written with Columbia Professor David Dodd in 1934. Its message is similar to the ideas presented in this chapter. Graham believed careful analysis of a firm's financial statements could turn up bargain stocks. Over the years, he developed many different rules for determining the most important financial ratios and the critical values for judging a stock to be undervalued. Through many editions, his book has had a profound influence on investment professionals. It has been so influential and successful, in fact, that widespread adoption of Graham's techniques has led to elimination of the very bargains they are designed to identify.

In a 1976 seminar Graham said[4]

> I am no longer an advocate of elaborate techniques of security analysis in order to find superior value opportunities. This was a rewarding activity, say, forty years ago, when our textbook "Graham and Dodd" was first published; but the situation has changed a good deal since then. In the old days any well-trained security analyst could do a good professional job of selecting under-valued issues through detailed studies; but in the light of the enormous amount of research now being carried on, I doubt whether in most cases such extensive efforts will generate sufficiently superior selections to justify their cost. To that very limited extent I'm on the side of the "efficient market" school of thought now generally accepted by the professors.

Nonetheless, in that same seminar, Graham suggested a simplified approach to identifying bargain stocks:

[4]As cited by John Train in *Money Masters* (New York: Harper & Row, Publishers, Inc., 1987).

On the MARKET FRONT

SO FAR, SO GOOD

Many things set the various countries of the European Union apart—language, culture, and laws, to name a few. But since the start of this year the list has been one item shorter. From January 1st, Europe's 7,000 listed companies adopted international financial reporting standards (IFRS), replacing the mishmash of 25 local accounting regimes with one set of rules.

Under IFRS, the focus of accounts shifts from historic costs to "fair-value accounting," and the fluctuations in the value of everything from pension promises to property portfolios will be reflected regularly in profit statements. This seems sure to make profits much more volatile than in the past.

Profits are not the only item affected. A study by Dresdner Kleinwort Wasserstein, an investment bank, found that under IFRS net debt is on average 16% higher than under local rules, with some companies hit much harder. Fiat, Italy's beleaguered carmaker, saw its debt double to about €16 billion ($19 billion).

One of the biggest complaints is that the new standards have led to insufficient consistency and comparability—contrary, you might think, to the whole point of IFRS. Now values must be found for things that often have no market price (such as employee stock options or most loans), so that estimates matter far more than before. Moreover, companies have great flexibility in deciding how to apply IFRS.

To a degree, says Guy Weyns of Morgan Stanley, this flexibility is inevitable because IFRS aims to be "principles-based" rather than highly detailed and prescriptive, like American accounting rules. He adds that companies are much easier to compare than under the old hotch-potch. For all their flaws, the new rules—which 90 countries have adopted or will adopt—are a big step toward global accounting standards. American and international standard-setters have made steady progress over many years to close the gap between America's rules and the rest.

SOURCE: *The Economist*, June 16, 2005.

> My first, more limited, technique confines itself to the purchase of common stocks at less than their working-capital value, or net current-asset value, giving no weight to the plant and other fixed assets, and deducting all liabilities in full from the current assets. We used this approach extensively in managing investment funds, and over a thirty-odd-year period we must have earned an average of some 20% per year from this source. For awhile, however, after the mid-1950s, this brand of buying opportunity became very scarce because of the pervasive bull market. But it has returned in quantity since the 1973–1974 decline. In January 1976 we counted over 100 such issues in the Standard & Poor's *Stock Guide*—about 10% of the total. I consider it a foolproof method of systematic investment—once again, not on the basis of individual results but in terms of the expectable group outcome.

There are two convenient sources of information for those interested in trying out the Graham technique. Both Standard & Poor's *Outlook* and *The Value Line Investment Survey* carry lists of stocks selling below net working capital value.

SUMMARY

- The primary focus of the security analyst should be the firm's real economic earnings rather than its reported earnings. Accounting earnings as reported in financial statements can be a biased estimate of real economic earnings, although empirical studies reveal that reported earnings convey considerable information concerning a firm's prospects.
- A firm's ROE is a key determinant of the growth rate of its earnings. ROE is affected profoundly by the firm's degree of financial leverage. An increase in a firm's debt/equity ratio will raise its ROE and hence its growth rate only if the interest rate on the debt is less than the firm's return on assets.
- It is often helpful to the analyst to decompose a firm's ROE ratio into the product of several accounting ratios and to analyze their separate behavior over time and across companies within an industry. A useful breakdown is

$$\text{ROE} = \frac{\text{Net profits}}{\text{Pretax profits}} \times \frac{\text{Preptax profits}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$